03/2021

HARVEY TOOL™

Your Specials Are Our Standards™

25,000+ Miniature and Specialty Cutting Tools Stocked and Ready to Ship

THINK HARVEY TOOL FIRST

FOR

Unique Selection

We offer a comprehensive selection of over 24,000 miniature and specialty cutting tools that are all *fully stocked*. The breadth and depth of our products help solve the industry's toughest machining challenges.

Quality Products

We are committed to designing unique geometries that optimize cutting performance for a variety of materials and applications. We introduce hundreds of new tools into the market every 6 months, offering our customers the solutions they need most.

Same-Day Shipping

Our fully stocked inventory is ready to ship the same day. We offer second day delivery at ground pricing, and any overnight orders ship until 7:00 p.m. EST. For additional shipping information and stock availability, please visit www.harveytool.com.

Harvey Performance Company combines the leading Harvey Tool, Helical Solutions, Micro 100, and Titan USA brands to provide world class tooling, unmatched service, and innovative solutions that increase productivity for our customers.

HARVEY TOOL

Think Harvey Tool First

More than 24,000 miniature and specialty end mills. Ship today, in your machine tomorrow.

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Helical

Let Helical Impress You

Material-optimized high performance carbide end mills. Run faster, push harder, machine smarter.

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MICRO 100

Make More with Micro 100

Exceptional quality turning tools designed for durability and performance in a range of difficult-to-machine materials.

www.micro100.com

TITAN USA

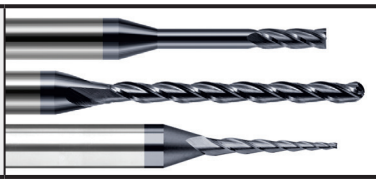
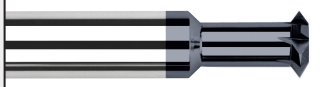
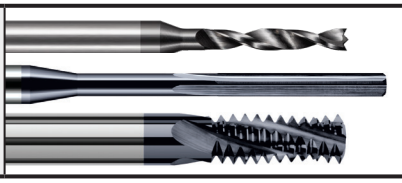
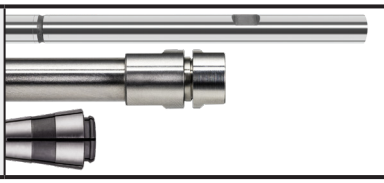
MADE IN THE U.S.A.

Trust in Titan USA

Broad assortment of premium quality, fully stocked, general purpose cutting tools of exceptional value.

www.titancuttingtools.com

WHAT WE OFFER

Miniature End Mills (page 9)		Select from over **7,600** miniature end mills down to .001" cutter diameter, available in a variety of styles and profiles.
Material-Specific End Mills (page 85)		Achieve the best results in high temp alloys, medium alloys, free machining steels, aluminum alloys, graphite, plastics, composites, wood, and more with over **5,300** high performance end mills.
Undercutting End Mills (page 232)		Over **900** options, with **3** different wrap angles: 300°, 270°, and 220°.
Drill/End Mills (page 246)		Over **550** options, with cutter diameters from 1/64" to 1".
Chamfer Cutters (page 257)		Over **1,000** options, with diameters from 1/32" to 1" and **21** different angles per side.
Engraving Cutters (page 281)		Over **900** options, available with **16** included angles and a variety of styles.
Double Angle Shank Cutters (page 302)		Over **550** options in multiple styles and reach lengths and **14** included angles.
Keyseat Cutters (page 312)		Over **2,000** options, with cutter diameters from 1/16" to 1-1/2".
Slitting Saws (page 341)		Over **100** coated and uncoated options, with thicknesses from .0100" to .2500".
Corner Rounding End Mills (page 344)		Over **850** options, with over **100** radii from .003" to 5/8".
Dovetail Cutters (page 357)		**Over 550** options, with **17** included angles.
Holemaking & Threading (page 367)		Solve a variety of holemaking challenges from spotting to threading with over **3,900** options that include miniature drills, reamers, countersinks, counterbores, and single-form, multi-form, and tri-form threadmills.
Tool Holders (page 451)		Pair our exceptional tooling with different styles and reaches of tool holders. Choices range from Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, and ER Performance Collets.

All tool images appearing in this catalog are illustrations of exemplary tools. All prices in USD.

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MATERIAL-SPECIFIC END MILLS

SPECIALTY PROFILES

SPECIALTY PROFILES (CONT.)

HOLEMAKING & THREADING

TOOL HOLDERS

INFORMATION & TECHNICAL RESOURCES

FEATURED SOLUTIONS

Mold Tool & Die Solutions

Building complex cavities requires **high performance tooling** that can mill **precise contours** while leaving **superior part finish**. Harvey Tool offers a selection of **tapered end mills** with unique geometries that are perfect for tackling the tough machining requirements of the **die and mold making** industries.

Corner Conditioning Solutions

Whether prepping a corner for functional or aesthetic reasons, Harvey Tool has a variety of unique and **hard-to-find profiles** for machining **corner requirements** and features. With multiple **angle options, reaches, and styles**, we are confident that our tools can solve any corner conditioning challenge.

FEATURED SOLUTIONS

Finishing Solutions

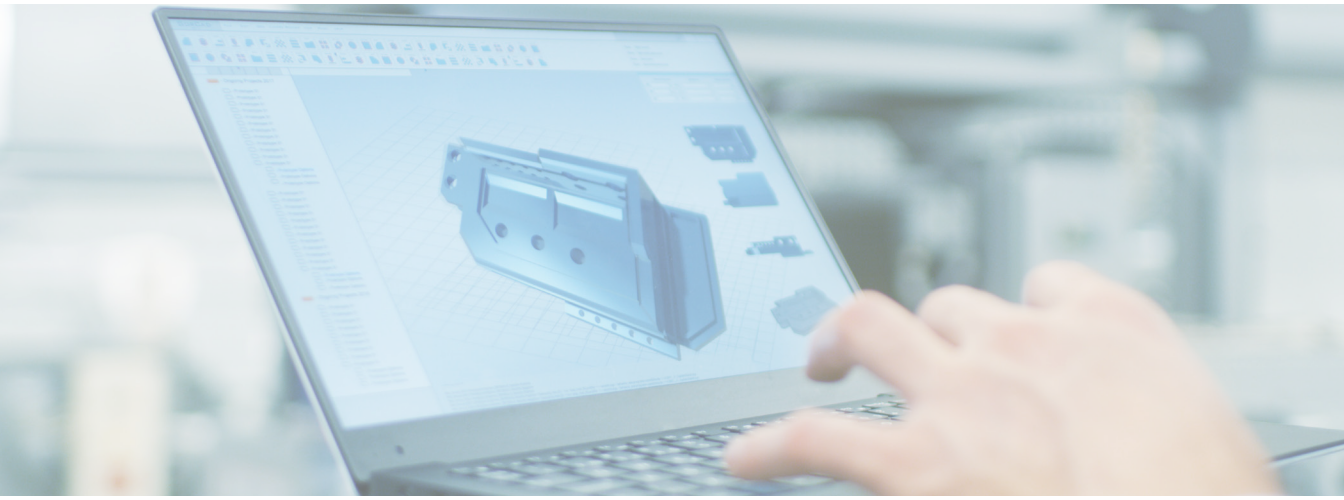
Achieving **optimal surface finish** is a critical goal for any machinist, but not all tools are designed with finish requirements in mind. Harvey Tool has a wide selection of finishing tools with **material-specific geometries** designed to ensure **tight part tolerances** and **reduce witness marks**.

Deburring Solutions

Deburring parts can be tiresome, expensive, and time-consuming, especially if done by hand. Harvey Tool's engineers have created a variety of **CNC-toleranced** deburring tools that allow you to deburr **in your CNC machine**, providing better finish, **reduced part and labor costs**, and increased capacity.

New CAM Tool Libraries

Harvey Performance Company works closely with industry-leading CAM software companies to optimize Harvey Tool and Helical Solutions product libraries for their platforms.



CAM Partners

Valuable Time Savings

Import tool libraries directly into CAM software and allow more time to be spent at the machine.

Confident Machining

Program confidently with accurate tool dimensions and CAM-specific tool data.

Growing Libraries & Partnerships

Count on up-to-date product libraries across a roster of leading CAM partners.

Download Tool Libraries Now

AUTODESK® FUSION 360™ · AUTODESK® HSM · CAMWorks · ESPRIT CAM System · GibbsCAM® · Mastercam · SolidCAM iMachining – The Revolution in CAM!

www.harveyperformance.com/tool-libraries

MINIATURE END MILLS

SQUARE

BALL

CORNER RADIUS

CORNER CHAMFER

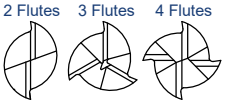
TAPERED

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard

- **Cutter diameter down to .001"**
- Center cutting
- Solid carbide
- CNC ground in the USA



Stub Flute & Standard Length

SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.001	**.001** (1.5x)	1/8	1-1/2	13901			51.40								
.001	**.003** (3x)	1/8	1-1/2	72001			51.40								
.002	**.003** (1.5x)	1/8	1-1/2	13902			44.70								
.002	**.006** (3x)	1/8	1-1/2	72002			44.70								
.003	**.004** (1.5x)	1/8	1-1/2	13903			38.60								
.003	**.009** (3x)	1/8	1-1/2	72003			38.60								
.004 (.1 mm)	**.006** (1.5x)	1/8	1-1/2	13904			33.20								
.004 (.1 mm)	**.012** (3x)	1/8	1-1/2	72004			33.20								
.005	**.007** (1.5x)	1/8	1-1/2	13905	823005	14005*	30.00	13905-C3	823005-C3	14005-C3*	34.60				
.005	**.015** (3x)	1/8	1-1/2	72005	836305	73005*	30.00	72005-C3	836305-C3	73005-C3*	34.60		73005-C4*	41.70	NEW
.006	**.009** (1.5x)	1/8	1-1/2	13906		14006*	30.70	13906-C3		14006-C3*	35.30				
.006	**.018** (3x)	1/8	1-1/2	72006	836306	73006*	30.70	72006-C3	836306-C3	73006-C3*	35.30				
.007	**.010** (1.5x)	1/8	1-1/2	13907		14007*	30.70	13907-C3		14007-C3*	35.30				
.007	**.021** (3x)	1/8	1-1/2	72007	836307	73007*	30.70	72007-C3	836307-C3	73007-C3*	35.30				
.008 (.2 mm)	**.012** (1.5x)	1/8	1-1/2	13908		14008*	30.70	13908-C3		14008-C3*	35.30				
.008 (.2 mm)	**.024** (3x)	1/8	1-1/2	72008	836308	73008*	30.70	72008-C3	836308-C3	73008-C3*	35.30				
.009	**.013** (1.5x)	1/8	1-1/2	13909		14009*	30.70	13909-C3		14009-C3*	35.30		14009-C4*	42.40	NEW
.009	**.027** (3x)	1/8	1-1/2	72009	836309	73009*	30.70	72009-C3	836309-C3	73009-C3*	35.30				
.010	**.015** (1.5x)	1/8	1-1/2	13910	823010	14010	24.20	13910-C3	823010-C3	14010-C3	28.80	13910-C4	14010-C4	35.90	NEW
.010	**.030** (3x)	1/8	1-1/2	72010	836310	73010	24.20	72010-C3	836310-C3	73010-C3	28.80	72010-C4	73010-C4	35.90	
.011	**.016** (1.5x)	1/8	1-1/2	13911		14011	24.70	13911-C3		14011-C3	29.30				
.011	**.033** (3x)	1/8	1-1/2	72011	836311	73011	24.70	72011-C3	836311-C3	73011-C3	29.30		73011-C4	36.40	
.012 (.3 mm)	**.018** (1.5x)	1/8	1-1/2	13912		14012	24.70	13912-C3		14012-C3	29.30		14012-C4	36.40	NEW
.012 (.3 mm)	**.036** (3x)	1/8	1-1/2	72012	836312	73012	24.70	72012-C3	836312-C3	73012-C3	29.30	72012-C4	73012-C4	36.40	
.013	**.019** (1.5x)	1/8	1-1/2	13913		14013	24.70	13913-C3		14013-C3	29.30				
.013	**.039** (3x)	1/8	1-1/2	72013	836313	73013	24.70	72013-C3	836313-C3	73013-C3	29.30		73013-C4	36.40	
.014	**.021** (1.5x)	1/8	1-1/2	13914		14014	24.70	13914-C3		14014-C3	29.30				
.014	**.042** (3x)	1/8	1-1/2	72014	836314	73014	24.70	72014-C3	836314-C3	73014-C3	29.30		73014-C4	36.40	
.015 (1/64)	**.022** (1.5x)	1/8	1-1/2	13915	823015	14015	21.00	13915-C3	823015-C3	14015-C3	25.60	13915-C4	14015-C4	32.70	
.015 (1/64)	**.045** (3x)	1/8	1-1/2	72015	836315	73015	21.00	72015-C3	836315-C3	73015-C3	25.60	72015-C4	73015-C4	32.70	
.016 (.4 mm)	**.024** (1.5x)	1/8	1-1/2	13916		14016	22.20	13916-C3		14016-C3	26.80				
.016 (.4 mm)	**.048** (3x)	1/8	1-1/2	72016	836316	73016	22.20	72016-C3	836316-C3	73016-C3	26.80		73016-C4	33.90	
.017	**.026** (1.5x)	1/8	1-1/2	13917		14017	22.20	13917-C3		14017-C3	26.80				
.017	**.051** (3x)	1/8	1-1/2	72017	836317	73017	22.20	72017-C3	836317-C3	73017-C3	26.80		73017-C4	33.90	
.018	**.027** (1.5x)	1/8	1-1/2	13918		14018	22.20	13918-C3		14018-C3	26.80				
.018	**.054** (3x)	1/8	1-1/2	72018	836318	73018	22.20	72018-C3	836318-C3	73018-C3	26.80		73018-C4	33.90	
.019	**.029** (1.5x)	1/8	1-1/2	13919		14019	22.20	13919-C3		14019-C3	26.80				
.019	**.057** (3x)	1/8	1-1/2	72019	836319	73019	22.20	72019-C3	836319-C3	73019-C3	26.80		73019-C4	33.90	

Coated sizes down to .005"!

*End cutting (not center cutting).

continued on next page

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	13920	823020	14020	20.10	13920-C3	823020-C3	14020-C3	24.70	13920-C4	14020-C4	31.80
.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	72020	836320	73020	20.10	72020-C3	836320-C3	73020-C3	24.70	72020-C4	73020-C4	31.80
.021	**.031** (1.5x)	1/8	1-1/2	13921		14021	21.20	13921-C3		14021-C3	25.80			
.021	**.063** (3x)	1/8	1-1/2	72021	836321	73021	21.20	72021-C3	836321-C3	73021-C3	25.80		73021-C4	32.90
.022	**.033** (1.5x)	1/8	1-1/2	13922		14022	21.20	13922-C3		14022-C3	25.80			
.022	**.066** (3x)	1/8	1-1/2	72022	836322	73022	21.20	72022-C3	836322-C3	73022-C3	25.80		73022-C4	32.90
.023	**.035** (1.5x)	1/8	1-1/2	13923		14023	21.20	13923-C3		14023-C3	25.80			
.023	**.069** (3x)	1/8	1-1/2	72023	836323	73023	21.20	72023-C3	836323-C3	73023-C3	25.80		73023-C4	32.90
.024 (.6 mm)	**.036** (1.5x)	1/8	1-1/2	13924		14024	21.20	13924-C3		14024-C3	25.80			
.024 (.6 mm)	**.072** (3x)	1/8	1-1/2	72024	836324	73024	21.20	72024-C3	836324-C3	73024-C3	25.80		73024-C4	32.90
.025	**.037** (1.5x)	1/8	1-1/2	13925	823025	14025	18.60	13925-C3	823025-C3	14025-C3	23.20	13925-C4	14025-C4	30.30
.025	**.075** (3x)	1/8	1-1/2	72025	836325	73025	18.60	72025-C3	836325-C3	73025-C3	23.20	72025-C4	73025-C4	30.30
.026	**.039** (1.5x)	1/8	1-1/2	13926		14026	19.70	13926-C3		14026-C3	24.30			
.026	**.078** (3x)	1/8	1-1/2	72026	836326	73026	19.70	72026-C3	836326-C3	73026-C3	24.30		73026-C4	31.40
.027	**.041** (1.5x)	1/8	1-1/2	13927		14027	19.70	13927-C3		14027-C3	24.30			
.027	**.081** (3x)	1/8	1-1/2	72027	836327	73027	19.70	72027-C3	836327-C3	73027-C3	24.30		73027-C4	31.40
.028 (.7 mm)	**.042** (1.5x)	1/8	1-1/2	13928		14028	19.70	13928-C3		14028-C3	24.30			
.028 (.7 mm)	**.084** (3x)	1/8	1-1/2	72028	836328	73028	19.70	72028-C3	836328-C3	73028-C3	24.30		73028-C4	31.40
.029	**.043** (1.5x)	1/8	1-1/2	13929		14029	19.70	13929-C3		14029-C3	24.30			
.029	**.087** (3x)	1/8	1-1/2	72029	836329	73029	19.70	72029-C3	836329-C3	73029-C3	24.30		73029-C4	31.40
.030	**.045** (1.5x)	1/8	1-1/2	13930	823030	14030	18.60	13930-C3	823030-C3	14030-C3	23.20		14030-C4	30.30
.030	**.090** (3x)	1/8	1-1/2	72030	836330	73030	18.60	72030-C3	836330-C3	73030-C3	23.20	72030-C4	73030-C4	30.30
.031 (1/32)	**.046** (1.5x)	1/8	1-1/2	13931	823031	14031	18.60	13931-C3	823031-C3	14031-C3	23.20	13931-C4	14031-C4	30.30
.031 (1/32)	**.093** (3x)	1/8	1-1/2	72031	836331	73031	18.60	72031-C3	836331-C3	73031-C3	23.20	72031-C4	73031-C4	30.30
.032	**.048** (1.5x)	1/8	1-1/2	13932		14032	19.70	13932-C3		14032-C3	24.30			
.032	**.096** (3x)	1/8	1-1/2	72032		73032	19.70	72032-C3		73032-C3	24.30			
.033	**.049** (1.5x)	1/8	1-1/2	13933		14033	19.70	13933-C3		14033-C3	24.30			
.033	**.099** (3x)	1/8	1-1/2	72033		73033	19.70	72033-C3		73033-C3	24.30			
.034	**.051** (1.5x)	1/8	1-1/2	13934		14034	19.70	13934-C3		14034-C3	24.30			
.034	**.102** (3x)	1/8	1-1/2	72034		73034	19.70	72034-C3		73034-C3	24.30			
.035 (.9 mm)	**.052** (1.5x)	1/8	1-1/2	13935	823035	14035	16.20	13935-C3	823035-C3	14035-C3	20.80		14035-C4	27.90
.035 (.9 mm)	**.105** (3x)	1/8	1-1/2	72035	836335	73035	16.20	72035-C3	836335-C3	73035-C3	20.80	72035-C4	73035-C4	27.90
.036	**.054** (1.5x)	1/8	1-1/2	13936		14036	16.90	13936-C3		14036-C3	21.50			
.036	**.108** (3x)	1/8	1-1/2	72036		73036	16.90	72036-C3		73036-C3	21.50			
.037	**.055** (1.5x)	1/8	1-1/2	13937		14037	16.90	13937-C3		14037-C3	21.50			
.037	**.111** (3x)	1/8	1-1/2	72037		73037	16.90	72037-C3		73037-C3	21.50			
.038	**.057** (1.5x)	1/8	1-1/2	13938		14038	16.90	13938-C3		14038-C3	21.50			
NEW .038	**.114** (3x)	1/8	1-1/2	72038		73038	16.90	72038-C3		73038-C3	21.50		73038-C4	28.60
.039 (1 mm)	**.058** (1.5x)	1/8	1-1/2	13939	823039	14039	16.70	13939-C3	823039-C3	14039-C3	21.30			
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	72039	836339	73039	16.70	72039-C3	836339-C3	73039-C3	21.30		73039-C4	28.40
.040	**.060** (1.5x)	1/8	1-1/2	13940	823040	14040	16.20	13940-C3	823040-C3	14040-C3	20.80		14040-C4	27.90
.040	**.120** (3x)	1/8	1-1/2	72040	836340	73040	16.20	72040-C3	836340-C3	73040-C3	20.80	72040-C4	73040-C4	27.90
.041	**.062** (1.5x)	1/8	1-1/2	13941		14041	16.90	13941-C3		14041-C3	21.50			
.041	**.123** (3x)	1/8	1-1/2	72041		73041	16.90	72041-C3		73041-C3	21.50			

continued on next page

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.042	**.063** (1.5x)	1/8	1-1/2	13942		14042	16.90	13942-C3		14042-C3	21.50				
.042	**.126** (3x)	1/8	1-1/2	72042		73042	16.90	72042-C3		73042-C3	21.50				
.043 (1.1 mm)	**.065** (1.5x)	1/8	1-1/2	13943		14043	16.90	13943-C3		14043-C3	21.50				
.043 (1.1 mm)	**.129** (3x)	1/8	1-1/2	72043		73043	16.90	72043-C3		73043-C3	21.50				
.044	**.066** (1.5x)	1/8	1-1/2	13944		14044	16.90	13944-C3		14044-C3	21.50				
.044	**.132** (3x)	1/8	1-1/2	72044		73044	16.90	72044-C3		73044-C3	21.50		73044-C4	28.60	NEW
.045	**.067** (1.5x)	1/8	1-1/2	13945	823045	14045	16.20	13945-C3	823045-C3	14045-C3	20.80		14045-C4	27.90	
.045	**.135** (3x)	1/8	1-1/2	72045	836345	73045	16.20	72045-C3	836345-C3	73045-C3	20.80	72045-C4	73045-C4	27.90	
.046	**.069** (1.5x)	1/8	1-1/2			14046	16.90			14046-C3	21.50				
.046	**.138** (3x)	1/8	1-1/2	72046	836346	73046	16.90	72046-C3	836346-C3	73046-C3	21.50				
.047 (3/64)	**.070** (1.5x)	1/8	1-1/2	13947	823047	14047	16.20	13947-C3	823047-C3	14047-C3	20.80		14047-C4	27.90	
.047 (3/64)	**.141** (3x)	1/8	1-1/2	72047	836347	73047	16.20	72047-C3	836347-C3	73047-C3	20.80	72047-C4	73047-C4	27.90	
.048	**.144** (3x)	1/8	1-1/2	72048		73048	16.90	72048-C3		73048-C3	21.50				
.049	**.147** (3x)	1/8	1-1/2	72049		73049	16.90	72049-C3		73049-C3	21.50				
.050	**.075** (1.5x)	1/8	1-1/2	13950	823050	14050	16.20	13950-C3	823050-C3	14050-C3	20.80		14050-C4	27.90	
.050	**.150** (3x)	1/8	1-1/2	72050	836350	73050	16.20	72050-C3	836350-C3	73050-C3	20.80	72050-C4	73050-C4	27.90	
.051 (1.3 mm)	**.153** (3x)	1/8	1-1/2	72051		73051	16.90	72051-C3		73051-C3	21.50				
.052	**.078** (1.5x)	1/8	1-1/2	13952		14052	16.90	13952-C3		14052-C3	21.50				
.052	**.156** (3x)	1/8	1-1/2	72052	836352	73052	16.90	72052-C3	836352-C3	73052-C3	21.50				NEW
.053	**.159** (3x)	1/8	1-1/2	72053		73053	16.90	72053-C3		73053-C3	21.50				
.054	**.162** (3x)	1/8	1-1/2	72054		73054	16.90	72054-C3		73054-C3	21.50				
.055 (1.4 mm)	**.082** (1.5x)	1/8	1-1/2	13955	823055	14055	16.20	13955-C3	823055-C3	14055-C3	20.80		14055-C4	27.90	
.055 (1.4 mm)	**.165** (3x)	1/8	1-1/2	72055	836355	73055	16.20	72055-C3	836355-C3	73055-C3	20.80	72055-C4	73055-C4	27.90	
.056	**.168** (3x)	1/8	1-1/2	72056		73056	16.90	72056-C3		73056-C3	21.50				
.057	**.171** (3x)	1/8	1-1/2	72057		73057	16.90	72057-C3		73057-C3	21.50				
.058	**.174** (3x)	1/8	1-1/2	72058		73058	16.90	72058-C3		73058-C3	21.50				
.059 (1.5 mm)	**.089** (1.5x)	1/8	1-1/2	13959	823059	14059	16.90	13959-C3	823059-C3	14059-C3	21.50				
.059 (1.5 mm)	**.177** (3x)	1/8	1-1/2	72059	836359	73059	16.90	72059-C3	836359-C3	73059-C3	21.50		73059-C4	28.60	NEW
.060	**.090** (1.5x)	1/8	1-1/2	13960	823060	14060	16.20	13960-C3	823060-C3	14060-C3	20.80		14060-C4	27.90	
.060	**.180** (3x)	1/8	1-1/2	72060	836360	73060	16.20	72060-C3	836360-C3	73060-C3	20.80	72060-C4	73060-C4	27.90	
.061	**.183** (3x)	1/8	1-1/2			73061	17.00			73061-C3	21.60				
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	13962	823062	14062	14.60	13962-C3	823062-C3	14062-C3	19.20	13962-C4	14062-C4	26.30	
.062 (1/16)	**.186** (3x)	1/8	1-1/2	72062	836362	73062	14.60	72062-C3	836362-C3	73062-C3	19.20	72062-C4	73062-C4	26.30	
.063 (1.6 mm)	**.189** (3x)	1/8	1-1/2			73063	17.00			73063-C3	21.60				
.064	**.192** (3x)	1/8	1-1/2			73064	17.00			73064-C3	21.60				
.065	**.097** (1.5x)	1/8	1-1/2	13965	823065	14065	14.60	13965-C3	823065-C3	14065-C3	19.20		14065-C4	26.30	NEW
.065	**.195** (3x)	1/8	1-1/2	72065	836365	73065	14.60	72065-C3	836365-C3	73065-C3	19.20	72065-C4	73065-C4	26.30	
.066	**.198** (3x)	1/8	1-1/2			73066	17.00			73066-C3	21.60				
.067 (1.7 mm)	**.201** (3x)	1/8	1-1/2			73067	17.00			73067-C3	21.60				
.068	**.204** (3x)	1/8	1-1/2			73068	17.00			73068-C3	21.60				
.069	**.207** (3x)	1/8	1-1/2			73069	17.00			73069-C3	21.60				
.070	**.105** (1.5x)	1/8	1-1/2	13970	823070	14070	14.60	13970-C3	823070-C3	14070-C3	19.20		14070-C4	26.30	NEW
.070	**.210** (3x)	1/8	1-1/2	72070	836370	73070	14.60	72070-C3	836370-C3	73070-C3	19.20	72070-C4	73070-C4	26.30	
.071 (1.8 mm)	**.213** (3x)	1/8	1-1/2			73071	17.00			73071-C3	21.60				
.072	**.216** (3x)	1/8	1-1/2			73072	17.00			73072-C3	21.60				

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NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.073	**.219** (3x)	1/8	1-1/2			73073	17.00			73073-C3	21.60			
	.074	**.222** (3x)	1/8	1-1/2			73074	17.00			73074-C3	21.60			
	.075 (1.9 mm)	**.112** (1.5x)	1/8	1-1/2	13975	823075	14075	14.60	13975-C3	823075-C3	14075-C3	19.20			
	.075 (1.9 mm)	**.225** (3x)	1/8	1-1/2	72075	836375	73075	14.60	72075-C3	836375-C3	73075-C3	19.20		73075-C4	26.30
	.076	**.228** (3x)	1/8	1-1/2			73076	17.00			73076-C3	21.60			
	.077	**.231** (3x)	1/8	1-1/2			73077	17.00			73077-C3	21.60			
	.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	13978	823078	14078	14.60	13978-C3	823078-C3	14078-C3	19.20		14078-C4	26.30
	.078 (5/64)	**.234** (3x)	1/8	1-1/2	72078	836378	73078	14.60	72078-C3	836378-C3	73078-C3	19.20	72078-C4	73078-C4	26.30
	.079	**.237** (3x)	1/8	1-1/2			73079	17.00			73079-C3	21.60			
	.080	**.120** (1.5x)	1/8	1-1/2	13980	823080	14080	14.60	13980-C3	823080-C3	14080-C3	19.20			
	.080	**.240** (3x)	1/8	1-1/2	72080	836380	73080	14.60	72080-C3	836380-C3	73080-C3	19.20	72080-C4	73080-C4	26.30
	.081	**.243** (3x)	1/8	1-1/2			73081	17.00			73081-C3	21.60			
	.082	**.246** (3x)	1/8	1-1/2			73082	17.00			73082-C3	21.60			
	.083 (2.1 mm)	**.249** (3x)	1/8	1-1/2			73083	17.00			73083-C3	21.60			
	.084	**.252** (3x)	1/8	1-1/2			73084	17.00			73084-C3	21.60			
	.085	**.127** (1.5x)	1/8	1-1/2	13985	823085	14085	14.60	13985-C3	823085-C3	14085-C3	19.20			
	.085	**.255** (3x)	1/8	1-1/2	72085	836385	73085	14.60	72085-C3	836385-C3	73085-C3	19.20		73085-C4	26.30
	.086	**.258** (3x)	1/8	1-1/2			73086	17.00			73086-C3	21.60			
	.087 (2.2 mm)	**.261** (3x)	1/8	1-1/2			73087	17.00			73087-C3	21.60			
	.088	**.264** (3x)	1/8	1-1/2			73088	17.00			73088-C3	21.60			
	.089	**.267** (3x)	1/8	1-1/2			73089	17.00			73089-C3	21.60			
NEW	.090	**.135** (1.5x)	1/8	1-1/2	13990	823090	14090	14.60	13990-C3	823090-C3	14090-C3	19.20		14090-C4	26.30
	.090	**.270** (3x)	1/8	1-1/2	72090	836390	73090	14.60	72090-C3	836390-C3	73090-C3	19.20	72090-C4	73090-C4	26.30
	.091 (2.3 mm)	**.273** (3x)	1/8	1-1/2			73091	17.00			73091-C3	21.60			
	.092	**.276** (3x)	1/8	1-1/2			73092	17.00			73092-C3	21.60			
	.093 (3/32)	**.139** (1.5x)	1/8	1-1/2	13993	823093	14093	14.60	13993-C3	823093-C3	14093-C3	19.20	13993-C4	14093-C4	26.30
	.093 (3/32)	**.279** (3x)	1/8	1-1/2	72093	836393	73093	14.60	72093-C3	836393-C3	73093-C3	19.20	72093-C4	73093-C4	26.30
	.094 (2.4 mm)	**.282** (3x)	1/8	1-1/2			73094	17.00			73094-C3	21.60			
	.095	**.142** (1.5x)	1/8	1-1/2	13995	823095	14095	14.60	13995-C3	823095-C3	14095-C3	19.20			
	.095	**.285** (3x)	1/8	1-1/2	72095	836395	73095	14.60	72095-C3	836395-C3	73095-C3	19.20		73095-C4	26.30
	.096	**.288** (3x)	1/8	1-1/2			73096	17.00			73096-C3	21.60			
	.097	**.291** (3x)	1/8	1-1/2			73097	17.00			73097-C3	21.60			
	.098 (2.5 mm)	**.294** (3x)	1/8	1-1/2			73098	17.00			73098-C3	21.60			
	.099	**.297** (3x)	1/8	1-1/2			73099	17.00			73099-C3	21.60			
NEW	.100	**.150** (1.5x)	1/8	1-1/2	13999	823100	14099	14.60	13999-C3	823100-C3	14099-C3	19.20		14099-C4	26.30
	.100	**.300** (3x)	1/8	1-1/2	72100	836400	73100	14.60	72100-C3	836400-C3	73100-C3	19.20	72100-C4	73100-C4	26.30
	.101	**.303** (3x)	1/8	1-1/2			73101	17.00			73101-C3	21.60			
	.102 (2.6 mm)	**.306** (3x)	1/8	1-1/2			73102	17.00			73102-C3	21.60			
	.103	**.309** (3x)	1/8	1-1/2			73103	17.00			73103-C3	21.60			
	.104	**.312** (3x)	1/8	1-1/2			73104	17.00			73104-C3	21.60			
	.105	**.158** (1.5x)	1/8	1-1/2	50200		50300	14.60	50200-C3		50300-C3	19.20			
	.105	**.315** (3x)	1/8	1-1/2	72105		73105	14.60	72105-C3		73105-C3	19.20		73105-C4	26.30
	.106 (2.7 mm)	**.318** (3x)	1/8	1-1/2			73106	17.00			73106-C3	21.60			
	.107	**.321** (3x)	1/8	1-1/2			73107	17.00			73107-C3	21.60			
	.108	**.324** (3x)	1/8	1-1/2			73108	17.00			73108-C3	21.60			

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NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.109 (7/64)	**.164** (1.5x)	1/8	1-1/2	50201	823102	50301	14.60	50201-C3	823102-C3	50301-C3	19.20				
.109 (7/64)	**.327** (3x)	1/8	1-1/2	72109	836402	73109	14.60	72109-C3	836402-C3	73109-C3	19.20		73109-C4	26.30	NEW
.110	**.165** (1.5x)	1/8	1-1/2	50202		50302	14.60	50202-C3		50302-C3	19.20				
.110	**.330** (3x)	1/8	1-1/2	72110		73110	14.60	72110-C3		73110-C3	19.20		73110-C4	26.30	
.111 (2.8 mm)	**.333** (3x)	1/8	1-1/2			73111	17.00			73111-C3	21.60				
.112	**.336** (3x)	1/8	1-1/2			73112	17.00			73112-C3	21.60				
.113	**.339** (3x)	1/8	1-1/2			73113	17.00			73113-C3	21.60				
.114 (2.9 mm)	**.341** (3x)	1/8	1-1/2			73114	17.00			73114-C3	21.60				
.115	**.173** (1.5x)	1/8	1-1/2	50203		50303	14.60	50203-C3		50303-C3	19.20				
.115	**.345** (3x)	1/8	1-1/2	72115		73115	14.60	72115-C3		73115-C3	19.20		73115-C4	26.30	
.116	**.348** (3x)	1/8	1-1/2			73116	17.00			73116-C3	21.60				
.117	**.351** (3x)	1/8	1-1/2			73117	17.00			73117-C3	21.60				
.118 (3 mm)	**.177** (1.5x)	1/8	1-1/2	50204	823105	50304	14.90	50204-C3	823105-C3	50304-C3	19.50				
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	72118	836405	73118	14.90	72118-C3	836405-C3	73118-C3	19.50		73118-C4	26.60	
.119	**.357** (3x)	1/8	1-1/2			73119	17.00			73119-C3	21.60				
.120	**.180** (1.5x)	1/8	1-1/2	50205		50305	14.60	50205-C3		50305-C3	19.20				
.120	**.360** (3x)	1/8	1-1/2	72120	836406	73120	14.60	72120-C3	836406-C3	73120-C3	19.20		73120-C4	26.30	NEW

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	50208	823108	50308	14.20	50208-C3	823108-C3	50308-C3	18.80	50208-C4	50308-C4	25.90	
.125 (1/8)	**.375** (3x)	1/8	1-1/2	72125	836408	73125	14.20	72125-C3	836408-C3	73125-C3	18.80	72125-C4	73125-C4	25.90	
.140 (9/64)	**.220** (1.5x)	3/16	2	50209	823109	50309	15.40	50209-C3	823109-C3	50309-C3	20.40				
.140 (9/64)	**.562** (4x)	3/16	2	72140	836409	73140	15.40	72140-C3	836409-C3	73140-C3	20.40		73140-C4	31.50	
.156 (5/32)	**.281** (1.5x)	3/16	2	50210	823110	50310	15.40	50210-C3	823110-C3	50310-C3	20.40		50310-C4	31.50	
.156 (5/32)	**.562** (3x)	3/16	2	72156	836410	73156	15.40	72156-C3	836410-C3	73156-C3	20.40	72156-C4	73156-C4	31.50	
.172 (11/64)	**.312** (1.5x)	3/16	2			50311	15.40			50311-C3	20.40				NEW
.172 (11/64)	**.625** (3x)	3/16	2	72172		73172	15.40	72172-C3		73172-C3	20.40				
.187 (3/16)	**.312** (1.5x)	3/16	2	50212	823112	50312	15.40	50212-C3	823112-C3	50312-C3	20.40	50212-C4	50312-C4	31.50	NEW
.187 (3/16)	**.625** (3x)	3/16	2	72187	836412	73187	15.40	72187-C3	836412-C3	73187-C3	20.40	72187-C4	73187-C4	31.50	
.203 (13/64)	**.625** (3x)	1/4	2-1/2	72190		73190	16.80	72190-C3		73190-C3	23.60				
.218 (7/32)	**.330** (1.5x)	1/4	2-1/2	50214	823114	50314	16.80	50214-C3	823114-C3	50314-C3	23.60				
.218 (7/32)	**.625** (3x)	1/4	2-1/2	72193	836414	73193	16.80	72193-C3	836414-C3	73193-C3	23.60				
.234 (15/64)	**.750** (3x)	1/4	2-1/2	72195		73195	16.80	72195-C3		73195-C3	23.60				
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	50216	823116	50316	16.80	50216-C3	823116-C3	50316-C3	23.60	50216-C4	50316-C4	35.10	NEW
.250 (1/4)	**.750** (3x)	1/4	2-1/2	72199	836416	73199	16.80	72199-C3	836416-C3	73199-C3	23.60	72199-C4	73199-C4	35.10	
.281 (9/32)	**.750** (3x)	5/16	2-1/2			73122	22.90			73122-C3	30.80				NEW
.312 (5/16)	**.470** (1.5x)	5/16	2-1/2	50220		50320	22.90	50220-C3		50320-C3	30.80				
.312 (5/16)	**.812** (3x)	5/16	2-1/2	15120		15220	22.90	15120-C3		15220-C3	30.80		15220-C4	45.00	
.343 (11/32)	**1.000** (3x)	3/8	2-1/2			15222	32.80			15222-C3	41.80				NEW
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2	50224		50324	30.60	50224-C3		50324-C3	39.60				
.375 (3/8)	**1.000** (3x)	3/8	2-1/2	15124	836424	15224	30.60	15124-C3	836424-C3	15224-C3	39.60		15224-C4	52.70	NEW
.437 (7/16)	**1.312** (3x)	7/16	3			15228	48.60			15228-C3	59.80				
.500 (1/2)	**1.000** (2x)	1/2	3	15132		15232	52.60	15132-C3		15232-C3	66.00		15232-C4	79.20	

NEW SIZES!

MINIATURE END MILLS

Square – Long Flute

Stocked in 9 Lengths of Cut!

Long flute and long shank design for deep cavities

Mills deep pockets · Center cutting · Solid carbide · CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.004	**.020** (5x)	3	1/8	2-1/2	31804	43.60				
.005	**.025** (5x)	3	1/8	2-1/2	31805	43.60				
.005	**.040** (8x)	3	1/8	2-1/2	33605	46.30				
.008	**.040** (5x)	3	1/8	2-1/2	31808	43.60				
.008	**.064** (8x)	3	1/8	2-1/2	33608	46.30				
.010	**.040** (4x)	3	1/8	2-1/2	888410	36.90	888410-C3	41.50		
.010	**.050** (5x)	3	1/8	2-1/2	12710	37.10	12710-C3	41.70	12710-C4	48.80
NEW .010	**.050** (5x)	4	1/8	2-1/2	834110	38.70	834110-C3	43.30		
.010	**.060** (6x)	3	1/8	2-1/2	894210	44.50	894210-C3	49.10		
.010	**.070** (7x)	3	1/8	2-1/2	897910	51.90	897910-C3	56.50		
.010	**.080** (8x)	3	1/8	2-1/2	33610	64.50	33610-C3	69.10		
.010	**.100** (10x)	3	1/8	2-1/2	951310	69.80	951310-C3	74.40		
.015 (1/64)	**.062** (4x)	3	1/8	2-1/2	888415	34.00	888415-C3	38.60		
.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	31815	34.00	31815-C3	38.60	31815-C4	45.70
.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	834115	35.60	834115-C3	40.20		
.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	894215	40.60	894215-C3	45.20		
.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	897915	47.40	897915-C3	52.00		
.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	33615	59.60	33615-C3	64.20	33615-C4	71.30
.015 (1/64)	**.125** (8x)	4	1/8	2-1/2	826815	60.90	826815-C3	65.50		
.015 (1/64)	**.156** (10x)	3	1/8	2-1/2	951315	66.60	951315-C3	71.20		
.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	34915	73.40	34915-C3	78.00		
.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	888420	29.10	888420-C3	33.70		
.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12720	29.10	12720-C3	33.70	12720-C4	40.80
.020 (.5 mm)	**.100** (5x)	4	1/8	2-1/2	834120	31.00	834120-C3	35.60		
.020 (.5 mm)	**.120** (6x)	3	1/8	2-1/2	894220	35.00	894220-C3	39.60		
.020 (.5 mm)	**.140** (7x)	3	1/8	2-1/2	897920	40.60	897920-C3	45.20		
.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	33620	57.00	33620-C3	61.60	33620-C4	68.70
.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	951320	63.90	951320-C3	68.50		
.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	34920	70.60	34920-C3	75.20		
.025	**.100** (4x)	3	1/8	2-1/2	888425	27.80	888425-C3	32.40		
.025	**.125** (5x)	3	1/8	2-1/2	12725	27.80	12725-C3	32.40	12725-C4	39.50
.025	**.125** (5x)	4	1/8	2-1/2	834125	29.40	834125-C3	34.00		
.025	**.150** (6x)	3	1/8	2-1/2	894225	33.40	894225-C3	38.00		
.025	**.175** (7x)	3	1/8	2-1/2	897925	38.90	897925-C3	43.50		
.025	**.203** (8x)	3	1/8	2-1/2	33625	55.50	33625-C3	60.10	33625-C4	67.20
.025	**.250** (10x)	3	1/8	2-1/2	951325	59.00	951325-C3	63.60		
.025	**.312** (12x)	3	1/8	2-1/2	34925	62.60	34925-C3	67.20		
.030	**.125** (4x)	3	1/8	2-1/2	888430	26.80	888430-C3	31.40		
.030	**.150** (5x)	3	1/8	2-1/2	12730	26.80	12730-C3	31.40	12730-C4	38.50
.030	**.156** (5x)	4	1/8	2-1/2	834130	28.40	834130-C3	33.00		
.030	**.187** (6x)	3	1/8	2-1/2	894230	32.00	894230-C3	36.60		

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NEW SIZES!

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.010"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.030	**.218** (7x)	3	1/8	2-1/2	897930	37.40	897930-C3	42.00			
.030	**.250** (8x)	3	1/8	2-1/2	33630	52.60	33630-C3	57.20	33630-C4	64.30	
.030	**.312** (10x)	3	1/8	2-1/2	951330	56.40	951330-C3	61.00			
.030	**.375** (12x)	3	1/8	2-1/2	34930	59.30	34930-C3	63.90			
.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	888431	26.80	888431-C3	31.40	888431-C4	38.50	NEW
.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	31831	26.80	31831-C3	31.40	31831-C4	38.50	
.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	834131	28.10	834131-C3	32.70			
.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	894231	32.00	894231-C3	36.60			
.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	897931	37.40	897931-C3	42.00			
.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	33631	52.60	33631-C3	57.20	33631-C4	64.30	
.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	826831	54.20	826831-C3	58.80			
.031 (1/32)	**.281** (9x)	3	1/8	2-1/2	837831	55.20	837831-C3	59.80			
.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	951331	55.90	951331-C3	60.50			
.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	34931	59.30	34931-C3	63.90	34931-C4	71.00	
.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	35831	79.00	35831-C3	83.60			
.035 (.9 mm)	**.140** (4x)	3	1/8	2-1/2	888435	26.80	888435-C3	31.40			
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12735	26.80	12735-C3	31.40	12735-C4	38.50	
.035 (.9 mm)	**.187** (5x)	4	1/8	2-1/2	834135	28.70	834135-C3	33.30			
.035 (.9 mm)	**.218** (6x)	3	1/8	2-1/2	894235	32.00	894235-C3	36.60			
.035 (.9 mm)	**.250** (7x)	3	1/8	2-1/2	897935	37.40	897935-C3	42.00			
.035 (.9 mm)	**.280** (8x)	3	1/8	2-1/2	33635	52.60	33635-C3	57.20	33635-C4	64.30	
.035 (.9 mm)	**.350** (10x)	3	1/8	2-1/2	951335	55.90	951335-C3	60.50			
.035 (.9 mm)	**.425** (12x)	3	1/8	2-1/2	34935	60.10	34935-C3	64.70			
.039 (1 mm)	**.156** (4x)	3	1/8	2-1/2	888439	27.20	888439-C3	31.80			
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	31839	27.20	31839-C3	31.80	31839-C4	38.90	
.039 (1 mm)	**.203** (5x)	4	1/8	2-1/2	834139	29.10	834139-C3	33.70			
.039 (1 mm)	**.240** (6x)	3	1/8	2-1/2	894239	42.80	894239-C3	47.40			
.039 (1 mm)	**.281** (7x)	3	1/8	2-1/2	897939	48.20	897939-C3	52.80			
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	33639	53.10	33639-C3	57.70			
.039 (1 mm)	**.400** (10x)	3	1/8	2-1/2	951339	56.40	951339-C3	61.00			
.039 (1 mm)	**.480** (12x)	3	1/8	2-1/2	34939	60.40	34939-C3	65.00			
.040	**.160** (4x)	3	1/8	2-1/2	888440	26.80	888440-C3	31.40			
.040	**.200** (5x)	3	1/8	2-1/2	12740	26.80	12740-C3	31.40	12740-C4	38.50	
.040	**.203** (5x)	4	1/8	2-1/2	834140	28.40	834140-C3	33.00			
.040	**.240** (6x)	3	1/8	2-1/2	894240	32.00	894240-C3	36.60			
.040	**.281** (7x)	3	1/8	2-1/2	897940	37.40	897940-C3	42.00			
.040	**.325** (8x)	3	1/8	2-1/2	33640	52.60	33640-C3	57.20	33640-C4	64.30	
.040	**.400** (10x)	3	1/8	2-1/2	951340	55.90	951340-C3	60.50			
.040	**.480** (12x)	3	1/8	2-1/2	34940	60.10	34940-C3	64.70			
.045	**.187** (4x)	3	1/8	2-1/2	888445	26.80	888445-C3	31.40			NEW
.045	**.225** (5x)	3	1/8	2-1/2	12745	26.80	12745-C3	31.40	12745-C4	38.50	
.045	**.225** (5x)	4	1/8	2-1/2	834145	28.40	834145-C3	33.00			NEW
.045	**.281** (6x)	3	1/8	2-1/2	894245	32.00	894245-C3	36.60			NEW
.045	**.325** (7x)	3	1/8	2-1/2	897945	37.40	897945-C3	42.00			NEW
.045	**.375** (8x)	3	1/8	2-1/2	33645	52.60	33645-C3	57.20			
.045	**.450** (10x)	3	1/8	2-1/2	951345	55.90	951345-C3	60.50			
.045	**.550** (12x)	3	1/8	2-1/2	34945	60.10	34945-C3	64.70			

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Square – Long Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.010"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
NEW	.047 (3/64)	**.187** (4x)	3	1/8	2-1/2	888447	26.80	888447-C3	31.40	888447-C4	38.50
	.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	31847	26.80	31847-C3	31.40	31847-C4	38.50
	.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	834147	28.10	834147-C3	32.70		
	.047 (3/64)	**.281** (6x)	3	1/8	2-1/2	894247	32.00	894247-C3	36.60		
	.047 (3/64)	**.328** (7x)	3	1/8	2-1/2	897947	37.40	897947-C3	42.00		
	.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	33647	51.70	33647-C3	56.30	33647-C4	63.40
	.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	826847	53.10	826847-C3	57.70		
	.047 (3/64)	**.480** (10x)	3	1/8	2-1/2	951347	55.90	951347-C3	60.50		
	.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	34947	59.30	34947-C3	63.90	34947-C4	71.00
	.047 (3/64)	**.710** (15x)	3	1/8	2-1/2	35847	74.30	35847-C3	78.90		
	.050	**.203** (4x)	3	1/8	2-1/2	888450	26.80	888450-C3	31.40		
	.050	**.250** (5x)	3	1/8	2-1/2	31850	26.80	31850-C3	31.40		
	.050	**.250** (5x)	4	1/8	2-1/2	834150	28.40	834150-C3	33.00		
	.050	**.300** (6x)	3	1/8	2-1/2	12750	26.80	12750-C3	31.40	12750-C4	38.50
	.050	**.350** (7x)	3	1/8	2-1/2	897950	37.40	897950-C3	42.00		
	.050	**.400** (8x)	3	1/8	2-1/2	33650	52.60	33650-C3	57.20	33650-C4	64.30
	.050	**.500** (10x)	3	1/8	2-1/2	951350	56.40	951350-C3	61.00		
	.050	**.600** (12x)	3	1/8	2-1/2	34950	59.30	34950-C3	63.90		
NEW	.055 (1.4 mm)	**.220** (4x)	3	1/8	2-1/2	888455	23.90	888455-C3	28.50		
	.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	31855	23.90	31855-C3	28.50		
	.055 (1.4 mm)	**.275** (5x)	4	1/8	2-1/2	834155	25.80	834155-C3	30.40		
NEW	.055 (1.4 mm)	**.330** (6x)	3	1/8	2-1/2	894255	26.00	894255-C3	30.60		
	.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12755	26.80	12755-C3	31.40	12755-C4	38.50
	.055 (1.4 mm)	**.560** (10x)	3	1/8	2-1/2	951355	41.70	951355-C3	46.30		
	.055 (1.4 mm)	**.660** (12x)	3	1/8	2-1/2	34955	60.10	34955-C3	64.70		
	.059 (1.5 mm)	**.295** (5x)	3	1/8	2-1/2	31859	25.00	31859-C3	29.60		
	.059 (1.5 mm)	**.472** (8x)	3	1/8	2-1/2	12759	25.00	12759-C3	29.60		
	.060	**.250** (4x)	3	1/8	2-1/2	888460	23.90	888460-C3	28.50		
	.060	**.312** (5x)	3	1/8	2-1/2	31860	23.90	31860-C3	28.50		
	.060	**.312** (5x)	4	1/8	2-1/2	834160	25.30	834160-C3	29.90		
	.060	**.375** (6x)	3	1/8	2-1/2	894260	24.90	894260-C3	29.50		
	.060	**.437** (7x)	3	1/8	2-1/2	897960	26.00	897960-C3	30.60		
	.060	**.500** (8x)	3	1/8	2-1/2	12760	27.20	12760-C3	31.80	12760-C4	38.90
	.060	**.500** (8x)	4	1/8	2-1/2	826860	29.10	826860-C3	33.70		
	.060	**.625** (10x)	3	1/8	2-1/2	951360	47.20	951360-C3	51.80		
	.060	**.720** (12x)	3	1/8	2-1/2	34960	60.10	34960-C3	64.70		
	.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	888462	23.90	888462-C3	28.50	888462-C4	35.60
	.062 (1/16)	**.250** (4x)	4	1/8	2-1/2	836962	25.80	836962-C3	30.40		
	.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	31862	23.90	31862-C3	28.50	31862-C4	35.60
NEW	.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	834162	25.80	834162-C3	30.40	834162-C4	37.50
NEW	.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	894262	24.90	894262-C3	29.50	894262-C4	36.60
NEW	.062 (1/16)	**.375** (6x)	4	1/8	2-1/2	12562	25.60	12562-C3	30.20		
	.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	897962	26.00	897962-C3	30.60		
NEW	.062 (1/16)	**.437** (7x)	4	1/8	2-1/2	810362	26.90	810362-C3	31.50		
	.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	33662	27.20	33662-C3	31.80	33662-C4	38.90
	.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	826862	28.60	826862-C3	33.20		

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NEW SIZES!

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Square – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.062 (1/16)	**.562** (9x)	3	1/8	2-1/2	837862	31.50	837862-C3	36.10			
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	951362	34.20	951362-C3	38.80			
.062 (1/16)	**.625** (10x)	4	1/8	2-1/2	802662	36.80	802662-C3	41.40			NEW
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	34962	46.40	34962-C3	51.00	34962-C4	58.10	
.062 (1/16)	**.750** (12x)	4	1/8	2-1/2	818062	48.30	818062-C3	52.90			
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	35862	65.60	35862-C3	70.20	35862-C4	77.30	
.065	**.325** (5x)	3	1/8	2-1/2	31865	23.90	31865-C3	28.50			
.065	**.500** (8x)	3	1/8	2-1/2	12765	26.80	12765-C3	31.40	12765-C4	38.50	
.065	**.650** (10x)	3	1/8	2-1/2	951365	41.70	951365-C3	46.30			
.070	**.281** (4x)	3	1/8	2-1/2	888470	25.80	888470-C3	30.40			NEW
.070	**.375** (5x)	3	1/8	2-1/2	31870	23.90	31870-C3	28.50			
.070	**.500** (7x)	3	1/8	2-1/2	12770	26.80	12770-C3	31.40	12770-C4	38.50	
.070	**.700** (10x)	3	1/8	2-1/2	951370	41.70	951370-C3	46.30			
.070	**.850** (12x)	3	1/8	2-1/2	34970	47.00	34970-C3	51.60			
.075	**.375** (5x)	3	1/8	2-1/2	31875	23.90	31875-C3	28.50			
.075	**.500** (7x)	3	1/8	2-1/2	12775	26.80	12775-C3	31.40	12775-C4	38.50	
.075	**.750** (10x)	3	1/8	2-1/2	951375	41.70	951375-C3	46.30			
.075	**.900** (12x)	3	1/8	2-1/2	34975	47.00	34975-C3	51.60			
.078 (5/64)	**.312** (4x)	3	1/8	2-1/2	888478	23.90	888478-C3	28.50	888478-C4	35.60	NEW
.078 (5/64)	**.312** (4x)	4	1/8	2-1/2	836978	25.80	836978-C3	30.40			
.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	31878	23.90	31878-C3	28.50	31878-C4	35.60	
.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	834178	25.80	834178-C3	30.40			
.078 (5/64)	**.475** (6x)	3	1/8	2-1/2	894278	24.90	894278-C3	29.50			
.078 (5/64)	**.550** (7x)	3	1/8	2-1/2	897978	26.00	897978-C3	30.60			
.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	33678	27.20	33678-C3	31.80	33678-C4	38.90	
.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	826878	29.70	826878-C3	34.30			
.078 (5/64)	**.800** (10x)	3	1/8	2-1/2	951378	33.60	951378-C3	38.20			
.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	34978	46.40	34978-C3	51.00	34978-C4	58.10	
.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	35878	65.60	35878-C3	70.20	35878-C4	77.30	
.080	**.406** (5x)	3	1/8	2-1/2	31880	23.90	31880-C3	28.50			
.080	**.750** (9x)	3	1/8	2-1/2	12780	27.30	12780-C3	31.90	12780-C4	39.00	
.080	**.960** (12x)	3	1/8	2-1/2	34980	47.00	34980-C3	51.60			
.085	**.425** (5x)	3	1/8	2-1/2	31885	23.90	31885-C3	28.50			
.085	**.750** (9x)	3	1/8	2-1/2	12785	27.30	12785-C3	31.90	12785-C4	39.00	
.090	**.450** (5x)	3	1/8	2-1/2	31890	23.90	31890-C3	28.50			
.090	**.750** (8x)	3	1/8	2-1/2	12790	27.20	12790-C3	31.80	12790-C4	38.90	
.090	**.900** (10x)	3	1/8	2-1/2	951390	41.70	951390-C3	46.30			
.090	**1.080** (12x)	3	1/8	2-1/2	34990	47.00	34990-C3	51.60			
.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	888493	23.90	888493-C3	28.50	888493-C4	35.60	
.093 (3/32)	**.375** (4x)	4	1/8	2-1/2	836993	25.80	836993-C3	30.40			
.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	31893	23.90	31893-C3	28.50	31893-C4	35.60	
.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	834193	25.80	834193-C3	30.40	834193-C4	37.50	NEW
.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	894293	24.90	894293-C3	29.50			
.093 (3/32)	**.585** (6x)	4	1/8	2-1/2	12593	25.40	12593-C3	30.00			NEW
.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	897993	26.00	897993-C3	30.60			
.093 (3/32)	**.670** (7x)	4	1/8	2-1/2	810393	27.40	810393-C3	32.00			NEW

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MINIATURE END MILLS

Square – Long Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	33693	27.20	33693-C3	31.80	33693-C4	38.90
	.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	826893	29.70	826893-C3	34.30		
	.093 (3/32)	**.850** (9x)	3	1/8	2-1/2	837893	31.80	837893-C3	36.40		
	.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	951393	33.60	951393-C3	38.20		
	.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	34993	46.40	34993-C3	51.00	34993-C4	58.10
	.093 (3/32)	**1.400** (15x)	3	1/8	3	35893	68.10	35893-C3	72.70	35893-C4	79.80
	.095	**.500** (5x)	3	1/8	2-1/2	31895	23.90	31895-C3	28.50		
	.095	**.750** (8x)	3	1/8	2-1/2	12795	26.80	12795-C3	31.40	12795-C4	38.50
	.095	**.950** (10x)	3	1/8	2-1/2	951395	41.70	951395-C3	46.30		
NEW	.100	**.400** (4x)	3	1/8	2-1/2	888500	23.90	888500-C3	28.50		
	.100	**.500** (5x)	3	1/8	2-1/2	31899	23.90	31899-C3	28.50		
	.100	**.500** (5x)	4	1/8	2-1/2	834200	25.80	834200-C3	30.40		
	.100	**.600** (6x)	3	1/8	2-1/2	894300	24.90	894300-C3	29.50		
	.100	**.750** (7.5x)	3	1/8	2-1/2	12799	26.80	12799-C3	31.40	12799-C4	38.50
	.100	**1.000** (10x)	3	1/8	2-1/2	951600	41.70	951600-C3	46.30		
	.100	**1.200** (12x)	3	1/8	2-1/2	34999	47.00	34999-C3	51.60		
	.105	**.530** (5x)	3	1/8	2-1/2	31901	24.70	31901-C3	29.30		
	.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	31902	23.90	31902-C3	28.50	31902-C4	35.60
NEW	.109 (7/64)	**.570** (5x)	4	1/8	2-1/2	834202	25.80	834202-C3	30.40		
	.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	33702	27.10	33702-C3	31.70		
	.109 (7/64)	**1.125** (10x)	3	1/8	2-1/2	951602	47.20	951602-C3	51.80		
	.110	**.570** (5x)	3	1/8	2-1/2	31903	24.70	31903-C3	29.30		
	.115	**.600** (5x)	3	1/8	2-1/2	31904	24.70	31904-C3	29.30		
	.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	31905	24.20	31905-C3	28.80	31905-C4	35.90
NEW	.118 (3 mm)	**.625** (5x)	4	1/8	2-1/2	834205	25.70	834205-C3	30.30		
	.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	33705	27.40	33705-C3	32.00		
	.118 (3 mm)	**1.187** (10x)	3	1/8	2-1/2	951605	47.50	951605-C3	52.10		
	.120	**.625** (5x)	3	1/8	2-1/2	31906	25.00	31906-C3	29.60		

	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	888508	23.50	888508-C3	28.10		
	.125 (1/8)	**.500** (4x)	4	1/8	2-1/2	837008	25.90	837008-C3	30.50		
	.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	31908	23.50	31908-C3	28.10	31908-C4	35.20
	.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	834208	25.90	834208-C3	30.50		
	.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	894308	24.30	894308-C3	28.90		
NEW	.125 (1/8)	**.750** (6x)	4	1/8	2-1/2	12508	25.90	12508-C3	30.50		
	.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	898008	24.80	898008-C3	29.40		
	.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	33708	25.30	33708-C3	29.90	33708-C4	37.00
	.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	826908	27.90	826908-C3	32.50		
	.125 (1/8)	**1.125** (9x)	3	1/8	2-1/2	837908	35.60	837908-C3	40.20		
	.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	951608	43.10	951608-C3	47.70		
	.125 (1/8)	**1.500** (12x)	3	1/8	3	35008	49.40	35008-C3	54.00	35008-C4	61.10
	.125 (1/8)	**1.500** (12x)	4	1/8	3	818108	51.30	818108-C3	55.90		
	.125 (1/8)	**1.875** (15x)	3	1/8	3	35908	68.10	35908-C3	72.70	35908-C4	79.80

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NEW SIZES!

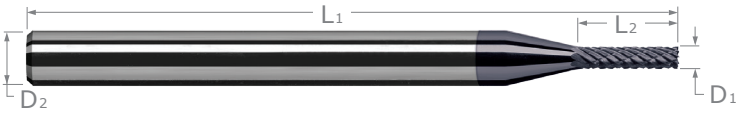
MINIATURE END MILLS

Square – Long Flute (cont.)

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.140 (9/64)	**.750** (5x)	4	3/16	3	31909	25.90	31909-C3	30.90			
.140 (9/64)	**1.125** (8x)	4	3/16	3	33709	45.70	33709-C3	50.70			
.140 (9/64)	**1.450** (10x)	4	3/16	3	951609	54.00	951609-C3	59.00			
.156 (5/32)	**.625** (4x)	4	3/16	3	888510	24.00	888510-C3	29.00			
.156 (5/32)	**.750** (5x)	4	3/16	3	834210	24.00	834210-C3	29.00			
.156 (5/32)	**.937** (6x)	3	3/16	3	894310	24.20	894310-C3	29.20			
.156 (5/32)	**1.000** (6x)	4	3/16	3	12510	26.10	12510-C3	31.10	12510-C4	42.20	
.156 (5/32)	**1.093** (7x)	4	3/16	3	898010	30.90	898010-C3	35.90			
.156 (5/32)	**1.250** (8x)	4	3/16	3	33710	45.70	33710-C3	50.70			
.156 (5/32)	**1.570** (10x)	4	3/16	3	951610	54.00	951610-C3	59.00			
.156 (5/32)	**1.875** (12x)	4	3/16	4	35010	62.90	35010-C3	69.70	35010-C4	80.10	
.187 (3/16)	**.750** (4x)	4	3/16	3	888512	24.00	888512-C3	29.00			
.187 (3/16)	**1.000** (5x)	4	3/16	3	834212	24.00	834212-C3	29.00			
.187 (3/16)	**1.156** (6x)	3	3/16	3	894312	24.20	894312-C3	29.20			
.187 (3/16)	**1.125** (6x)	4	3/16	3	12512	26.10	12512-C3	31.10	77012	42.20	
.187 (3/16)	**1.312** (7x)	4	3/16	3	898012	30.90	898012-C3	35.90			
.187 (3/16)	**1.500** (8x)	4	3/16	3	33712	45.70	33712-C3	50.70	33712-C4	61.80	
.187 (3/16)	**1.875** (10x)	4	3/16	4	951612	54.20	951612-C3	61.00			
.187 (3/16)	**2.250** (12x)	4	3/16	4	35012	62.90	35012-C3	69.70			
.218 (7/32)	**1.125** (5x)	4	1/4	4	834214	27.50	834214-C3	35.40			NEW
.218 (7/32)	**1.750** (8x)	4	1/4	4	33714	34.50	33714-C3	42.40			NEW
.250 (1/4)	**1.000** (4x)	4	1/4	4	888516	27.50	888516-C3	35.40			
.250 (1/4)	**1.250** (5x)	4	1/4	4	834216	27.50	834216-C3	35.40			
.250 (1/4)	**1.500** (6x)	3	1/4	4	894316	27.70	894316-C3	35.60			
.250 (1/4)	**1.500** (6x)	4	1/4	4	12516	29.60	12516-C3	37.50	77016	47.90	
.250 (1/4)	**1.750** (7x)	4	1/4	4	898016	34.50	898016-C3	42.40			
.250 (1/4)	**2.000** (8x)	4	1/4	4	33716	48.90	33716-C3	56.80	33716-C4	67.20	
.250 (1/4)	**2.500** (10x)	4	1/4	4	951616	58.70	951616-C3	66.60			
.250 (1/4)	**3.000** (12x)	4	1/4	6	35016	69.00	35016-C3	78.00			
.312 (5/16)	**1.625** (5x)	4	5/16	4	12520	42.50	12520-C3	52.00			
.375 (3/8)	**1.750** (5x)	4	3/8	4	12524	45.20	12524-C3	57.50			
.500 (1/2)	**2.000** (4x)	4	1/2	4	12532	63.60	12532-C3	77.00			

MINIATURE END MILLS

Square – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	6	3	1/8	2-1/2	60715	32.60	60715-C3	37.20
.031 (1/32)	**.093** (3x)	6	3	1/8	2-1/2	60731	25.00	60731-C3	29.60
.047 (3/64)	**.141** (3x)	8	4	1/8	2-1/2	60747	24.10	60747-C3	28.70
.062 (1/16)	**.186** (3x)	8	4	1/8	2-1/2	60762	24.10	60762-C3	28.70
.078 (5/64)	**.234** (3x)	10	5	1/8	2-1/2	60778	24.10	60778-C3	28.70
.093 (3/32)	**.279** (3x)	12	6	1/8	2-1/2	60793	24.10	60793-C3	28.70
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	14	7	1/8	2-1/2	60808	22.80	60808-C3	27.40
.187 (3/16)	**.562** (3x)	16	8	3/16	2-1/2	60812	40.70	60812-C3	45.70
.250 (1/4)	**.750** (3x)	18	9	1/4	2-1/2	60816	48.30	60816-C3	55.10

Tips for Maintaining Tight Tolerances

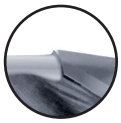
Tolerances are very important for machining operations, but do you know what they mean? Do you know how to maintain tight tolerances even in difficult operations, such as machining thin walls? Our "In the Loupe" blog post **Tips for Maintaining Tight Tolerances** is a must-read before beginning any job.

Read more on harveyperformance.com/in-the-loupe/

NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4FL	PRICE	2FL	4FL	PRICE	
.010	.030	**.050** (5x)	1/8	1-1/2	944510	956810	45.70	944510-C3	956810-C3	50.30	
.010	.030	**.080** (8x)	1/8	1-1/2	76210	76410	45.70	76210-C3	76410-C3	50.30	
.010	.030	**.125** (12x)	1/8	1-1/2	952010	992510	48.30	952010-C3	992510-C3	52.90	
.015 (1/64)	.045	**.078** (5x)	1/8	1-1/2	944515	956815	36.90	944515-C3	956815-C3	41.50	
.015 (1/64)	.045	**.128** (8x)	1/8	1-1/2	76215	76415	36.90	76215-C3	76415-C3	41.50	
.015 (1/64)	.045	**.156** (10x)	1/8	1-1/2	849615	846115	38.40		846115-C3	43.00	
.015 (1/64)	.045	**.187** (12x)	1/8	1-1/2	952015	992515	38.40	952015-C3	992515-C3	43.00	
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2	944520	956820	35.30	944520-C3	956820-C3	39.90	
.020 (.5 mm)	.060	**.120** (6x)	1/8	1-1/2		802420	35.30		802420-C3	39.90	NEW
.020 (.5 mm)	.060	**.140** (7x)	1/8	1-1/2		896820	35.30		896820-C3	39.90	NEW
.020 (.5 mm)	.060	**.170** (8x)	1/8	1-1/2	76220	76420	35.30	76220-C3	76420-C3	39.90	
.020 (.5 mm)	.060	**.200** (10x)	1/8	1-1/2	849620	846120	37.10		846120-C3	41.70	
.020 (.5 mm)	.060	**.250** (12x)	1/8	1-1/2	952020	992520	37.10	952020-C3	992520-C3	41.70	
.025	.075	**.125** (5x)	1/8	1-1/2	944525	956825	34.00	944525-C3	956825-C3	38.60	
.025	.075	**.213** (8x)	1/8	1-1/2	76225	76425	34.00	76225-C3	76425-C3	38.60	
.025	.075	**.312** (12x)	1/8	1-1/2	952025	992525	35.20	952025-C3	992525-C3	39.80	
.030	.090	**.156** (5x)	1/8	1-1/2	944530	956830	34.00	944530-C3	956830-C3	38.60	
.030	.090	**.270** (9x)	1/8	1-1/2	76230	76430	34.00	76230-C3	76430-C3	38.60	
.030	.090	**.375** (12x)	1/8	1-1/2	952030	992530	35.20	952030-C3	992530-C3	39.80	
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2	944531	956831	34.00	944531-C3	956831-C3	38.60	
.031 (1/32)	.093	**.187** (6x)	1/8	1-1/2		802431	34.00		802431-C3	38.60	NEW
.031 (1/32)	.093	**.218** (7x)	1/8	1-1/2		896831	34.00		896831-C3	38.60	NEW
.031 (1/32)	.093	**.279** (9x)	1/8	1-1/2	76231	76431	34.00	76231-C3	76431-C3	38.60	
.031 (1/32)	.093	**.375** (12x)	1/8	1-1/2	952031	992531	35.20	952031-C3	992531-C3	39.80	
.031 (1/32)	.093	**.470** (15x)	1/8	1-1/2	829131	838631	37.20	829131-C3	838631-C3	41.80	
.035 (.9 mm)	.105	**.187** (5x)	1/8	1-1/2	944535	956835	34.00	944535-C3	956835-C3	38.60	
.035 (.9 mm)	.105	**.315** (9x)	1/8	1-1/2	76235	76435	34.00	76235-C3	76435-C3	38.60	
.035 (.9 mm)	.105	**.425** (12x)	1/8	1-1/2	952035	992535	35.20	952035-C3	992535-C3	39.80	
.039 (1 mm)	.117	**.203** (5x)	1/8	1-1/2	944539	956839	34.00	944539-C3	956839-C3	38.60	
.039 (1 mm)	.117	**.325** (8x)	1/8	1-1/2	960839	972239	34.00	960839-C3	972239-C3	38.60	
.039 (1 mm)	.117	**.480** (12x)	1/8	1-1/2	952039	992539	35.20		992539-C3	39.80	NEW
.040	.120	**.203** (5x)	1/8	1-1/2	944540	956840	34.00	944540-C3	956840-C3	38.60	
.040	.120	**.360** (9x)	1/8	1-1/2	76240	76440	34.00	76240-C3	76440-C3	38.60	
.040	.120	**.480** (12x)	1/8	1-1/2	952040	992540	35.20	952040-C3	992540-C3	39.80	
.045	.135	**.225** (5x)	1/8	1-1/2	944545	956845	33.40	944545-C3	956845-C3	38.00	
.045	.135	**.405** (9x)	1/8	1-1/2	76245	76445	33.40	76245-C3	76445-C3	38.00	

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4FL	PRICE	2FL	4FL	PRICE
	.047 (3/64)	.141	**.250** (5x)	1/8	1-1/2	944547	956847	33.40	944547-C3	956847-C3	38.00
	.047 (3/64)	.141	**.328** (7x)	1/8	1-1/2	898747	896847	33.40		896847-C3	38.00
	.047 (3/64)	.141	**.423** (9x)	1/8	1-1/2	76247	76447	33.40	76247-C3	76447-C3	38.00
	.047 (3/64)	.141	**.570** (12x)	1/8	1-1/2	952047	992547	34.40	952047-C3	992547-C3	39.00
	.050	.150	**.250** (5x)	1/8	1-1/2	944550	956850	33.40	944550-C3	956850-C3	38.00
	.050	.150	**.400** (8x)	1/8	1-1/2	960850	972250	33.40	960850-C3	972250-C3	38.00
	.050	.150	**.500** (10x)	1/8	1-1/2	76250	76450	34.40	76250-C3	76450-C3	39.00
	.050	.150	**.600** (12x)	1/8	2	952050	992550	36.60	952050-C3	992550-C3	41.20
	.055 (1.4 mm)	.165	**.275** (5x)	1/8	1-1/2	944555	956855	34.20	944555-C3	956855-C3	38.80
	.055 (1.4 mm)	.165	**.500** (9x)	1/8	1-1/2	76255	76455	34.20	76255-C3	76455-C3	38.80
	.055 (1.4 mm)	.165	**.660** (12x)	1/8	2	952055	992555	36.40		992555-C3	41.00
	.060	.180	.312 (5x)	1/8	1-1/2	944560	956860	33.40	944560-C3	956860-C3	38.00
	.060	.180	**.500** (8x)	1/8	1-1/2	76260	76460	33.40	76260-C3	76460-C3	38.00
	.060	.180	**.720** (12x)	1/8	2	952060	992560	34.40	952060-C3	992560-C3	39.00
	.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2	944562	956862	33.40	944562-C3	956862-C3	38.00
NEW	.062 (1/16)	.186	**.375** (6x)	1/8	1-1/2		802462	33.40		802462-C3	38.00
NEW	.062 (1/16)	.186	**.437** (7x)	1/8	1-1/2		896862	33.40		896862-C3	38.00
	.062 (1/16)	.186	**.500** (8x)	1/8	1-1/2	76262	76462	33.40	76262-C3	76462-C3	38.00
	.062 (1/16)	.186	**.625** (10x)	1/8	2	849662	846162	34.40	849662-C3	846162-C3	39.00
	.062 (1/16)	.186	**.750** (12x)	1/8	2	952062	992562	34.40	952062-C3	992562-C3	39.00
	.062 (1/16)	.186	**.950** (15x)	1/8	2	829162	838662	36.60	829162-C3	838662-C3	41.20
	.065	.195	**.500** (8x)	1/8	1-1/2	76265	76465	33.40	76265-C3	76465-C3	38.00
	.070	.210	**.500** (7x)	1/8	1-1/2	76270	76470	33.40	76270-C3	76470-C3	38.00
	.070	.210	**.850** (12x)	1/8	2	952070	992570	34.40	952070-C3	992570-C3	39.00
	.075	.225	**.500** (7x)	1/8	1-1/2	76275	76475	33.40	76275-C3	76475-C3	38.00
	.078 (5/64)	.234	**.500** (6x)	1/8	1-1/2	76278	76478	33.40	76278-C3	76478-C3	38.00
	.078 (5/64)	.234	**.625** (8x)	1/8	2	960878	972278	33.50		972278-C3	38.10
	.078 (5/64)	.234	**.940** (12x)	1/8	2	952078	992578	34.40	952078-C3	992578-C3	39.00
	.080	.240	**.500** (6x)	1/8	1-1/2	76280	76480	33.40	76280-C3	76480-C3	38.00
	.080	.240	**.960** (12x)	1/8	2	952080	992580	34.40	952080-C3	992580-C3	39.00
	.085	.255	**.500** (6x)	1/8	1-1/2	76285	76485	33.40	76285-C3	76485-C3	38.00
	.090	.270	**.625** (7x)	1/8	1-1/2	76290	76490	33.40	76290-C3	76490-C3	38.00
	.090	.270	**1.080** (12x)	1/8	2	952090	992590	34.40	952090-C3	992590-C3	39.00
	.093 (3/32)	.279	**.500** (5x)	1/8	1-1/2	944593	956893	33.40	944593-C3	956893-C3	38.00
NEW	.093 (3/32)	.279	**.585** (6x)	1/8	1-1/2		802493	33.40		802493-C3	38.00
	.093 (3/32)	.279	**.625** (7x)	1/8	1-1/2	76293	76493	33.40	76293-C3	76493-C3	38.00
NEW	.093 (3/32)	.279	**.750** (8x)	1/8	2		960893	34.40		960893-C3	39.00
	.093 (3/32)	.279	**.950** (10x)	1/8	2	849693	846193	34.40	849693-C3	846193-C3	39.00
	.093 (3/32)	.279	**1.125** (12x)	1/8	2	952093	992593	34.40	952093-C3	992593-C3	39.00
	.093 (3/32)	.279	**1.400** (15x)	1/8	2-1/2	829193	838693	36.60	829193-C3	838693-C3	41.20
	.095	.285	**.625** (6x)	1/8	1-1/2	76295	76495	33.40	76295-C3	76495-C3	38.00
	.100	.300	**.625** (6x)	1/8	1-1/2	76300	76500	33.40	76300-C3	76500-C3	38.00
	.100	.300	**1.200** (12x)	1/8	2-1/2	952100	992600	34.40	952100-C3	992600-C3	39.00
	.109 (7/64)	.327	**.570** (5x)	1/8	1-1/2	944602	956902	33.40		956902-C3	38.00
	.109 (7/64)	.327	**.900** (8x)	1/8	2	960902	972302	33.40		972302-C3	38.00
	.118 (3 mm)	.354	**.625** (5x)	1/8	1-1/2	944605	956905	33.40	944605-C3	956905-C3	38.00
	.118 (3 mm)	.354	**.950** (8x)	1/8	2	960905	972305	33.40	960905-C3	972305-C3	38.00

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED			
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4FL	PRICE	2FL	4FL	PRICE	
.125 (1/8)	.375	**.625** (5x)	1/8	1-1/2	944608	956908	33.40	944608-C3	956908-C3	38.00	
.125 (1/8)	.375	**.750** (6x)	1/8	2		802508	33.40		802508-C3	38.00	NEW
.125 (1/8)	.375	**.875** (7x)	1/8	2-1/2		802308	36.20		802308-C3	40.80	NEW
.125 (1/8)	.375	**1.000** (8x)	1/8	2	960908	972308	33.40	960908-C3	972308-C3	38.00	
.125 (1/8)	.375	**1.250** (10x)	1/8	2-1/2	849708	846208	36.20	849708-C3	846208-C3	40.80	
.125 (1/8)	.375	**1.500** (12x)	1/8	2-1/2	952108	992608	36.20	952108-C3	992608-C3	40.80	
.125 (1/8)	.375	**1.875** (15x)	1/8	3	829208	838708	38.60	829208-C3	838708-C3	43.20	
.140 (9/64)	.422	**.750** (5x)	3/16	2	944609	956909	39.50		956909-C3	44.50	
.140 (9/64)	.422	**1.125** (8x)	3/16	2-1/2	960909	972309	39.50		972309-C3	44.50	
.156 (5/32)	.469	**.750** (5x)	3/16	2	944610	956910	39.50		956910-C3	44.50	
.156 (5/32)	.469	**1.250** (8x)	3/16	2-1/2	960910	972310	39.50		972310-C3	44.50	
.187 (3/16)	.562	**1.000** (5x)	3/16	2	944612	956912	39.50	944612-C3	956912-C3	44.50	
.187 (3/16)	.562	**1.500** (8x)	3/16	2-1/2	960912	972312	39.50	960912-C3	972312-C3	44.50	
.187 (3/16)	.562	**1.875** (10x)	3/16	3	849712	846212	41.30	849712-C3	846212-C3	46.30	
.250 (1/4)	.750	**1.250** (5x)	1/4	2-1/2	944616	956916	44.10	944616-C3	956916-C3	50.90	
.250 (1/4)	.750	**2.000** (8x)	1/4	4	960916	972316	44.10	960916-C3	972316-C3	52.00	
.250 (1/4)	.750	**3.000** (12x)	1/4	6	952116	992616	50.10		992616-C3	59.10	

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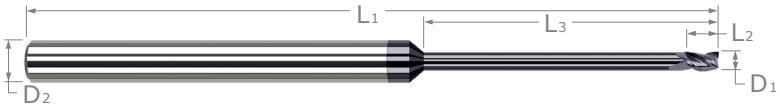
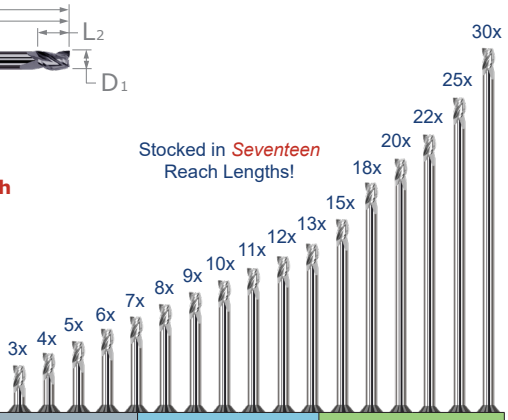
NEW SIZES!

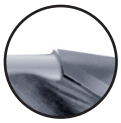
MINIATURE END MILLS

Square – Long Reach, Stub Flute





- **Long length design for deep cavities, up to 10" overall length**
- Stub flutes for maximum rigidity
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.005	.007	**.025** (5x)	3	1/8	2-1/2	33205	46.50				
.005	.007	**.040** (8x)	3	1/8	2-1/2	34605	46.50				
.008	.012	**.040** (5x)	3	1/8	2-1/2	33208	46.50				
.008	.012	**.065** (8x)	3	1/8	2-1/2	34608	46.50				
.010	.015	**.030** (3x)	3	1/8	2-1/2	47810	44.70	47810-C3	49.30		
.010	.015	**.050** (5x)	3	1/8	2-1/2	33210	44.70	33210-C3	49.30	33210-C4	56.40
.010	.015	**.080** (8x)	3	1/8	2-1/2	34610	46.50	34610-C3	51.10	34610-C4	58.20
.010	.015	**.100** (10x)	3	1/8	2-1/2	982110	48.90	982110-C3	53.50		
.010	.015	**.125** (12x)	3	1/8	2-1/2	35410	48.90	35410-C3	53.50	35410-C4	60.60
.010	.015	**.150** (15x)	3	1/8	2-1/2	48910	56.80	48910-C3	61.40		
.010	.015	**.180** (18x)	3	1/8	2-1/2	977310	63.20	977310-C3	67.80		
.011	.016	**.055** (5x)	3	1/8	2-1/2	33211	44.70	33211-C3	49.30		
.011	.016	**.088** (8x)	3	1/8	2-1/2	34611	46.50	34611-C3	51.10		
.012 (.3 mm)	.018	**.060** (5x)	3	1/8	2-1/2	33212	44.70	33212-C3	49.30		
.012 (.3 mm)	.018	**.096** (8x)	3	1/8	2-1/2	34612	46.50	34612-C3	51.10		
.013	.019	**.065** (5x)	3	1/8	2-1/2	33213	44.70	33213-C3	49.30		
.013	.019	**.104** (8x)	3	1/8	2-1/2	34613	46.50	34613-C3	51.10		
.014	.021	**.070** (5x)	3	1/8	2-1/2	33214	44.70	33214-C3	49.30		
.014	.021	**.112** (8x)	3	1/8	2-1/2	34614	46.50	34614-C3	51.10		
.015 (1/64)	.022	**.045** (3x)	3	1/8	2-1/2	47815	36.90	47815-C3	41.50	47815-C4	48.60
.015 (1/64)	.022	**.062** (4x)	3	1/8	2-1/2	945515	36.90	945515-C3	41.50		
.015 (1/64)	.022	**.078** (5x)	3	1/8	2-1/2	33215	36.90	33215-C3	41.50	33215-C4	48.60
.015 (1/64)	.022	**.093** (6x)	3	1/8	2-1/2	937015	37.10	937015-C3	41.70		
.015 (1/64)	.022	**.109** (7x)	3	1/8	2-1/2	934815	37.10	934815-C3	41.70		
.015 (1/64)	.022	**.125** (8x)	3	1/8	2-1/2	34615	37.10	34615-C3	41.70	34615-C4	48.80
.015 (1/64)	.022	**.156** (10x)	3	1/8	2-1/2	982115	38.40	982115-C3	43.00	982115-C4	50.10
.015 (1/64)	.022	**.187** (12x)	3	1/8	2-1/2	35415	38.40	35415-C3	43.00	35415-C4	50.10
.015 (1/64)	.022	**.225** (15x)	3	1/8	2-1/2	48915	43.50	48915-C3	48.10	48915-C4	55.20
.015 (1/64)	.022	**.270** (18x)	3	1/8	2-1/2	977315	51.10	977315-C3	55.70		
.015 (1/64)	.022	**.300** (20x)	3	1/8	2-1/2	58315	54.20	58315-C3	58.80		
.015 (1/64)	.022	**.375** (25x)	3	1/8	2-1/2	38015	69.30	38015-C3	73.90	***25x Diameter!***	
.016 (.4 mm)	.024	**.080** (5x)	3	1/8	2-1/2	33216	38.00	33216-C3	42.60		
.016 (.4 mm)	.024	**.128** (8x)	3	1/8	2-1/2	34616	38.20	34616-C3	42.80		
.017	.026	**.085** (5x)	3	1/8	2-1/2	33217	38.00	33217-C3	42.60		
.017	.026	**.136** (8x)	3	1/8	2-1/2	34617	38.20	34617-C3	42.80		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.018	.027	**.090** (5x)	3	1/8	2-1/2	33218	38.00	33218-C3	42.60		
.018	.027	**.144** (8x)	3	1/8	2-1/2	34618	38.20	34618-C3	42.80		
.019	.029	**.095** (5x)	3	1/8	2-1/2	33219	38.00	33219-C3	42.60		
.019	.029	**.152** (8x)	3	1/8	2-1/2	34619	38.20	34619-C3	42.80		
.020 (.5 mm)	.030	**.060** (3x)	3	1/8	2-1/2	47820	35.30	47820-C3	39.90		
.020 (.5 mm)	.030	**.080** (4x)	3	1/8	2-1/2	945520	35.30	945520-C3	39.90		
.020 (.5 mm)	.030	**.100** (5x)	3	1/8	2-1/2	33220	35.30	33220-C3	39.90	33220-C4	47.00
.020 (.5 mm)	.030	**.100** (5x)	4	1/8	2-1/2	861620	37.20	861620-C3	41.80		
.020 (.5 mm)	.030	**.120** (6x)	3	1/8	2-1/2	937020	35.30	937020-C3	39.90		
.020 (.5 mm)	.030	**.140** (7x)	3	1/8	2-1/2	934820	35.50	934820-C3	40.10		
.020 (.5 mm)	.030	**.160** (8x)	3	1/8	2-1/2	34620	35.50	34620-C3	40.10	34620-C4	47.20
.020 (.5 mm)	.030	**.180** (9x)	3	1/8	2-1/2	846820	37.10	846820-C3	41.70		
.020 (.5 mm)	.030	**.200** (10x)	3	1/8	2-1/2	982120	37.10	982120-C3	41.70	982120-C4	48.80
.020 (.5 mm)	.030	**.250** (12x)	3	1/8	2-1/2	35420	37.10	35420-C3	41.70	35420-C4	48.80
.020 (.5 mm)	.030	**.300** (15x)	3	1/8	2-1/2	48920	41.90	48920-C3	46.50	48920-C4	53.60
.020 (.5 mm)	.030	**.360** (18x)	3	1/8	2-1/2	977320	47.70	977320-C3	52.30		
.020 (.5 mm)	.030	**.400** (20x)	3	1/8	2-1/2	58320	51.80	58320-C3	56.40		
.020 (.5 mm)	.030	**.500** (25x)	3	1/8	2-1/2	38020	66.80	38020-C3	71.40	***25x Diameter!***	
.020 (.5 mm)	.030	**.600** (30x)	3	1/8	2-1/2	972020	69.70	972020-C3	74.30	***30x Diameter!***	
.021	.031	**.105** (5x)	3	1/8	2-1/2	33221	36.90	33221-C3	41.50		
.021	.031	**.168** (8x)	3	1/8	2-1/2	34621	37.10	34621-C3	41.70		
.022	.033	**.110** (5x)	3	1/8	2-1/2	33222	36.90	33222-C3	41.50		
.022	.033	**.176** (8x)	3	1/8	2-1/2	34622	37.10	34622-C3	41.70		
.023	.035	**.115** (5x)	3	1/8	2-1/2	33223	36.90	33223-C3	41.50		
.023	.035	**.187** (8x)	3	1/8	2-1/2	34623	37.10	34623-C3	41.70		
.024 (.6 mm)	.036	**.120** (5x)	3	1/8	2-1/2	33224	36.90	33224-C3	41.50		
.024 (.6 mm)	.036	**.192** (8x)	3	1/8	2-1/2	34624	37.10	34624-C3	41.70		
.025	.037	**.075** (3x)	3	1/8	2-1/2	47825	34.00	47825-C3	38.60		
.025	.037	**.100** (4x)	3	1/8	2-1/2	945525	34.00	945525-C3	38.60		
.025	.037	**.125** (5x)	3	1/8	2-1/2	33225	34.00	33225-C3	38.60	33225-C4	45.70
.025	.037	**.150** (6x)	3	1/8	2-1/2	937025	34.00	937025-C3	38.60		
.025	.037	**.175** (7x)	3	1/8	2-1/2	934825	34.00	934825-C3	38.60		
.025	.037	**.203** (8x)	3	1/8	2-1/2	34625	34.20	34625-C3	38.80	34625-C4	45.90
.025	.037	**.250** (10x)	3	1/8	2-1/2	982125	35.20	982125-C3	39.80		
.025	.037	**.312** (12x)	3	1/8	2-1/2	35425	35.20	35425-C3	39.80	35425-C4	46.90
.025	.037	**.375** (15x)	3	1/8	2-1/2	48925	41.10	48925-C3	45.70	48925-C4	52.80
.025	.037	**.450** (18x)	3	1/8	2-1/2	977325	47.10	977325-C3	51.70		
.025	.037	**.500** (20x)	3	1/8	2-1/2	58325	51.10	58325-C3	55.70		
.025	.037	**.625** (25x)	3	1/8	2-1/2	38025	66.20	38025-C3	70.80	***25x Diameter!***	
.026	.039	**.130** (5x)	3	1/8	2-1/2	33226	34.80	33226-C3	39.40		
.026	.039	**.208** (8x)	3	1/8	2-1/2	34626	35.00	34626-C3	39.60		
.027	.041	**.135** (5x)	3	1/8	2-1/2	33227	34.80	33227-C3	39.40		
.027	.041	**.216** (8x)	3	1/8	2-1/2	34627	35.00	34627-C3	39.60		
.028 (.7 mm)	.042	**.140** (5x)	3	1/8	2-1/2	33228	34.80	33228-C3	39.40		
.028 (.7 mm)	.042	**.224** (8x)	3	1/8	2-1/2	34628	35.00	34628-C3	39.60		
.029	.043	**.145** (5x)	3	1/8	2-1/2	33229	34.80	33229-C3	39.40		
.029	.043	**.232** (8x)	3	1/8	2-1/2	34629	35.00	34629-C3	39.60		

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.030	.045	**.090** (3x)	3	1/8	2-1/2	47830	34.00	47830-C3	38.60		
	.030	.045	**.125** (4x)	3	1/8	2-1/2	945530	34.00	945530-C3	38.60		
	.030	.045	**.156** (5x)	3	1/8	2-1/2	33230	34.00	33230-C3	38.60	33230-C4	45.70
NEW	.030	.045	**.156** (5x)	4	1/8	2-1/2	861630	36.00	861630-C3	40.60		
	.030	.045	**.187** (6x)	3	1/8	2-1/2	937030	34.20	937030-C3	38.80		
	.030	.045	**.218** (7x)	3	1/8	2-1/2	934830	34.20	934830-C3	38.80		
	.030	.045	**.250** (8x)	3	1/8	2-1/2	34630	34.20	34630-C3	38.80	34630-C4	45.90
	.030	.045	**.270** (9x)	3	1/8	2-1/2	846830	35.20	846830-C3	39.80		
	.030	.045	**.312** (10x)	3	1/8	2-1/2	982130	35.20	982130-C3	39.80		
	.030	.045	**.375** (12x)	3	1/8	2-1/2	35430	35.20	35430-C3	39.80	35430-C4	46.90
	.030	.045	**.450** (15x)	3	1/8	2-1/2	48930	41.10	48930-C3	45.70		
	.030	.045	**.540** (18x)	3	1/8	2-1/2	977330	47.10	977330-C3	51.70		
	.030	.045	**.600** (20x)	3	1/8	2-1/2	58330	51.10	58330-C3	55.70		
	.031 (1/32)	.046	**.093** (3x)	3	1/8	2-1/2	47831	34.00	47831-C3	38.60	47831-C4	45.70
	.031 (1/32)	.046	**.125** (4x)	3	1/8	2-1/2	945531	34.00	945531-C3	38.60		
	.031 (1/32)	.046	**.156** (5x)	3	1/8	2-1/2	33231	34.00	33231-C3	38.60	33231-C4	45.70
	.031 (1/32)	.046	**.156** (5x)	4	1/8	2-1/2	861631	36.00	861631-C3	40.60		
	.031 (1/32)	.046	**.187** (6x)	3	1/8	2-1/2	937031	34.00	937031-C3	38.60		
	.031 (1/32)	.046	**.218** (7x)	3	1/8	2-1/2	934831	34.20	934831-C3	38.80		
	.031 (1/32)	.046	**.250** (8x)	3	1/8	2-1/2	34631	34.20	34631-C3	38.80	34631-C4	45.90
	.031 (1/32)	.046	**.250** (8x)	4	1/8	2-1/2	874131	36.10	874131-C3	40.70		
	.031 (1/32)	.046	**.281** (9x)	3	1/8	2-1/2	846831	35.20	846831-C3	39.80		
	.031 (1/32)	.046	**.312** (10x)	3	1/8	2-1/2	982131	35.20	982131-C3	39.80	982131-C4	46.90
	.031 (1/32)	.046	**.375** (12x)	3	1/8	2-1/2	35431	35.20	35431-C3	39.80	35431-C4	46.90
	.031 (1/32)	.046	**.470** (15x)	3	1/8	2-1/2	48931	41.10	48931-C3	45.70	48931-C4	52.80
	.031 (1/32)	.046	**.565** (18x)	3	1/8	2-1/2	977331	51.10	977331-C3	55.70		
	.031 (1/32)	.046	**.625** (20x)	3	1/8	2-1/2	58331	51.10	58331-C3	55.70		
	.031 (1/32)	.046	**.687** (22x)	3	1/8	2-1/2	969631	56.40	969631-C3	61.00		
	.031 (1/32)	.046	**.775** (25x)	3	1/8	2-1/2	38031	66.20	38031-C3	70.80	***25x Diameter!***	
	.031 (1/32)	.046	**.937** (30x)	3	1/8	2-1/2	972031	76.90	972031-C3	81.50	***30x Diameter!***	
	.035 (.9 mm)	.052	**.105** (3x)	3	1/8	2-1/2	47835	34.00	47835-C3	38.60		
	.035 (.9 mm)	.052	**.187** (5x)	3	1/8	2-1/2	33235	34.00	33235-C3	38.60	33235-C4	45.70
	.035 (.9 mm)	.052	**.281** (8x)	3	1/8	2-1/2	34635	34.20	34635-C3	38.80	34635-C4	45.90
	.035 (.9 mm)	.052	**.350** (10x)	3	1/8	2-1/2	982135	35.20	982135-C3	39.80		
	.035 (.9 mm)	.052	**.425** (12x)	3	1/8	2-1/2	35435	35.20	35435-C3	39.80	35435-C4	46.90
	.035 (.9 mm)	.052	**.525** (15x)	3	1/8	2-1/2	48935	41.10	48935-C3	45.70		
	.035 (.9 mm)	.052	**.700** (20x)	3	1/8	2-1/2	58335	51.10	58335-C3	55.70		
	.039 (1 mm)	.059	**.117** (3x)	3	1/8	2-1/2	47839	34.00	47839-C3	38.60		
	.039 (1 mm)	.059	**.203** (5x)	3	1/8	2-1/2	33239	34.00	33239-C3	38.60	33239-C4	45.70
	.039 (1 mm)	.059	**.325** (8x)	3	1/8	2-1/2	34639	34.20	34639-C3	38.80	34639-C4	45.90
	.039 (1 mm)	.059	**.400** (10x)	3	1/8	2-1/2	982139	35.20	982139-C3	39.80		
	.039 (1 mm)	.059	**.480** (12x)	3	1/8	2-1/2	35439	35.20	35439-C3	39.80		
	.039 (1 mm)	.059	**.600** (15x)	3	1/8	2-1/2	48939	41.10	48939-C3	45.70		
	.039 (1 mm)	.059	**.700** (18x)	3	1/8	2-1/2	977339	44.00	977339-C3	48.10		
	.040	.060	**.120** (3x)	3	1/8	2-1/2	47840	34.00	47840-C3	38.60		
	.040	.060	**.160** (4x)	3	1/8	2-1/2	945540	34.00	945540-C3	38.60		
	.040	.060	**.203** (5x)	3	1/8	2-1/2	33240	34.00	33240-C3	38.60	33240-C4	45.70
NEW	.040	.060	**.203** (5x)	4	1/8	2-1/2	861640	36.00	861640-C3	40.60		
	.040	.060	**.240** (6x)	3	1/8	2-1/2	937040	34.20	937040-C3	38.80		

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Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.040	.060	**.281** (7x)	3	1/8	2-1/2	934840	34.20	934840-C3	38.80			
.040	.060	**.325** (8x)	3	1/8	2-1/2	34640	34.20	34640-C3	38.80	34640-C4	45.90	
.040	.060	**.400** (10x)	3	1/8	2-1/2	982140	35.20	982140-C3	39.80	982140-C4	46.90	NEW
.040	.060	**.480** (12x)	3	1/8	2-1/2	35440	35.20	35440-C3	39.80	35440-C4	46.90	
.040	.060	**.600** (15x)	3	1/8	2-1/2	48940	41.10	48940-C3	45.70			
.040	.060	**.720** (18x)	3	1/8	2-1/2	977340	51.10	977340-C3	55.70			
.040	.060	**.800** (20x)	3	1/8	2-1/2	58340	51.10	58340-C3	55.70			
.040	.060	**1.000** (25x)	3	1/8	2-1/2	38040	66.20	38040-C3	70.80	***25x Diameter!***		
.045	.067	**.135** (3x)	3	1/8	2-1/2	47845	33.40	47845-C3	38.00			
.045	.067	**.225** (5x)	3	1/8	2-1/2	33245	33.40	33245-C3	38.00	33245-C4	45.10	
.045	.067	**.375** (8x)	3	1/8	2-1/2	34645	33.50	34645-C3	38.10	34645-C4	45.20	
.045	.067	**.450** (10x)	3	1/8	2-1/2	982145	34.70	982145-C3	39.30			
.045	.067	**.550** (12x)	3	1/8	2-1/2	35445	34.70	35445-C3	39.30	35445-C4	46.40	
.045	.067	**.680** (15x)	3	1/8	2-1/2	48945	39.10	48945-C3	43.70			
.045	.067	**.900** (20x)	3	1/8	2-1/2	58345	48.10	58345-C3	52.70			
.047 (3/64)	.070	**.141** (3x)	3	1/8	2-1/2	47847	33.40	47847-C3	38.00			
.047 (3/64)	.070	**.187** (4x)	3	1/8	2-1/2	945547	33.40	945547-C3	38.00			
.047 (3/64)	.070	**.250** (5x)	3	1/8	2-1/2	33247	33.40	33247-C3	38.00	33247-C4	45.10	
.047 (3/64)	.070	**.250** (5x)	4	1/8	2-1/2	861647	35.50	861647-C3	40.10			
.047 (3/64)	.070	**.281** (6x)	3	1/8	2-1/2	937047	33.40	937047-C3	38.00			
.047 (3/64)	.070	**.328** (7x)	3	1/8	2-1/2	934847	33.50	934847-C3	38.10			
.047 (3/64)	.070	**.375** (8x)	3	1/8	2-1/2	34647	33.50	34647-C3	38.10	34647-C4	45.20	
.047 (3/64)	.070	**.375** (8x)	4	1/8	2-1/2	874147	35.60	874147-C3	40.20			
.047 (3/64)	.070	**.425** (9x)	3	1/8	2-1/2	846847	34.70	846847-C3	39.30			
.047 (3/64)	.070	**.480** (10x)	3	1/8	2-1/2	982147	34.70	982147-C3	39.30			
.047 (3/64)	.070	**.570** (12x)	3	1/8	2-1/2	35447	34.70	35447-C3	39.30	35447-C4	46.40	
.047 (3/64)	.070	**.710** (15x)	3	1/8	2-1/2	48947	39.10	48947-C3	43.70			
.047 (3/64)	.070	**.850** (18x)	3	1/8	2-1/2	977347	48.10	977347-C3	52.70			
.047 (3/64)	.070	**.950** (20x)	3	1/8	2-1/2	58347	48.10	58347-C3	52.70			
.047 (3/64)	.070	**1.187** (25x)	3	1/8	2-1/2	38047	58.40	38047-C3	63.00	***25x Diameter!***		
.047 (3/64)	.070	**1.406** (30x)	3	1/8	2-1/2	972047	75.40	972047-C3	80.00	***30x Diameter!***		
.050	.075	**.150** (3x)	3	1/8	2-1/2	47850	33.40	47850-C3	38.00			
.050	.075	**.203** (4x)	3	1/8	2-1/2	945550	33.40	945550-C3	38.00			
.050	.075	**.250** (5x)	3	1/8	2-1/2	33250	33.40	33250-C3	38.00	33250-C4	45.10	
.050	.075	**.250** (5x)	4	1/8	2-1/2	861650	35.60	861650-C3	40.20			NEW
.050	.075	**.300** (6x)	3	1/8	2-1/2	937050	33.50	937050-C3	38.10			
.050	.075	**.350** (7x)	3	1/8	2-1/2	934850	33.50	934850-C3	38.10			
.050	.075	**.400** (8x)	3	1/8	2-1/2	34650	33.50	34650-C3	38.10	34650-C4	45.20	
.050	.075	**.450** (9x)	3	1/8	2-1/2	846850	34.70	846850-C3	39.30			NEW
.050	.075	**.500** (10x)	3	1/8	2-1/2	982150	34.70	982150-C3	39.30			
.050	.075	**.600** (12x)	3	1/8	2-1/2	35450	34.70	35450-C3	39.30	35450-C4	46.40	
.050	.075	**.750** (15x)	3	1/8	2-1/2	48950	39.10	48950-C3	43.70			
.050	.075	**.900** (18x)	3	1/8	2-1/2	977350	48.10	977350-C3	52.70			
.055 (1.4 mm)	.082	**.165** (3x)	3	1/8	2-1/2	47855	33.40	47855-C3	38.00			
.055 (1.4 mm)	.082	**.275** (5x)	3	1/8	2-1/2	33255	33.40	33255-C3	38.00	33255-C4	45.10	
.055 (1.4 mm)	.082	**.330** (6x)	3	1/8	2-1/2	937055	33.50	937055-C3	38.10			
.055 (1.4 mm)	.082	**.385** (7x)	3	1/8	2-1/2	934855	33.50	934855-C3	38.10			
.055 (1.4 mm)	.082	**.450** (8x)	3	1/8	2-1/2	34655	33.50	34655-C3	38.10	34655-C4	45.20	

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Square – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.055 (1.4 mm)	.082	**.560** (10x)	3	1/8	2-1/2	982155	34.70	982155-C3	39.30		
	.055 (1.4 mm)	.082	**.660** (12x)	3	1/8	2-1/2	35455	34.70	35455-C3	39.30	35455-C4	46.40
	.055 (1.4 mm)	.082	**.825** (15x)	3	1/8	2-1/2	48955	39.10	48955-C3	43.70		
	.055 (1.4 mm)	.082	**1.000** (18x)	3	1/8	2-1/2	977355	48.10	977355-C3	52.70		
	.060	.090	**.180** (3x)	3	1/8	2-1/2	47860	33.40	47860-C3	38.00		
	.060	.090	**.250** (4x)	3	1/8	2-1/2	945560	33.40	945560-C3	38.00		
	.060	.090	**.312** (5x)	3	1/8	2-1/2	33260	33.40	33260-C3	38.00	33260-C4	45.10
NEW	.060	.090	**.312** (5x)	4	1/8	2-1/2	861660	35.40	861660-C3	40.00		
	.060	.090	**.375** (6x)	3	1/8	2-1/2	937060	33.50	937060-C3	38.10		
	.060	.090	**.437** (7x)	3	1/8	2-1/2	934860	33.50	934860-C3	38.10		
	.060	.090	**.500** (8x)	3	1/8	2-1/2	34660	33.50	34660-C3	38.10	34660-C4	45.20
	.060	.090	**.562** (9x)	3	1/8	2-1/2	846860	34.70	846860-C3	39.30		
	.060	.090	**.625** (10x)	3	1/8	2-1/2	982160	34.70	982160-C3	39.30		
	.060	.090	**.720** (12x)	3	1/8	2-1/2	35460	34.70	35460-C3	39.30	35460-C4	46.40
	.060	.090	**.900** (15x)	3	1/8	2-1/2	48960	39.10	48960-C3	43.70		
	.060	.090	**1.062** (18x)	3	1/8	2-1/2	977360	48.10	977360-C3	52.70		
	.060	.090	**1.200** (20x)	3	1/8	2-1/2	58360	48.10	58360-C3	52.70		
	.062 (1/16)	.093	**.186** (3x)	3	1/8	2-1/2	47862	33.40	47862-C3	38.00	47862-C4	45.10
	.062 (1/16)	.093	**.250** (4x)	3	1/8	2-1/2	945562	33.40	945562-C3	38.00	945562-C4	45.10
	.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	33262	33.40	33262-C3	38.00	33262-C4	45.10
	.062 (1/16)	.093	**.312** (5x)	4	1/8	2-1/2	861662	35.50	861662-C3	40.10		
	.062 (1/16)	.093	**.375** (6x)	3	1/8	2-1/2	937062	33.40	937062-C3	38.00	937062-C4	45.10
	.062 (1/16)	.093	**.437** (7x)	3	1/8	2-1/2	934862	33.50	934862-C3	38.10	934862-C4	45.20
	.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	34662	33.50	34662-C3	38.10	34662-C4	45.20
	.062 (1/16)	.093	**.500** (8x)	4	1/8	2-1/2	874162	35.60	874162-C3	40.20		
	.062 (1/16)	.093	**.562** (9x)	3	1/8	2-1/2	846862	34.70	846862-C3	39.30		
	.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	982162	34.70	982162-C3	39.30	982162-C4	46.40
	.062 (1/16)	.093	**.687** (11x)	3	1/8	2-1/2	850262	34.70	850262-C3	39.30		
	.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	35462	34.70	35462-C3	39.30	35462-C4	46.40
NEW	.062 (1/16)	.093	**.750** (12x)	4	1/8	2-1/2	801762	36.70	801762-C3	41.30		
	.062 (1/16)	.093	**.800** (13x)	3	1/8	2-1/2	839362	36.90	839362-C3	41.50		
	.062 (1/16)	.093	**.950** (15x)	3	1/8	2-1/2	48962	39.10	48962-C3	43.70	48962-C4	50.80
	.062 (1/16)	.093	**1.125** (18x)	3	1/8	2-1/2	977362	48.10	977362-C3	52.70		
	.062 (1/16)	.093	**1.250** (20x)	3	1/8	2-1/2	58362	48.10	58362-C3	52.70		
	.062 (1/16)	.093	**1.375** (22x)	3	1/8	3	969662	54.20	969662-C3	58.80		
	.062 (1/16)	.093	**1.550** (25x)	3	1/8	3	38062	58.40	38062-C3	63.00	***25x Diameter!***	
	.062 (1/16)	.093	**1.875** (30x)	3	1/8	3	972062	75.40	972062-C3	80.00	***30x Diameter!***	
	.065	.097	**.195** (3x)	3	1/8	2-1/2	47865	33.40	47865-C3	38.00		
	.065	.097	**.325** (5x)	3	1/8	2-1/2	33265	33.40	33265-C3	38.00		
	.065	.097	**.530** (8x)	3	1/8	2-1/2	34665	33.50	34665-C3	38.10	34665-C4	45.20
	.065	.097	**.650** (10x)	3	1/8	2-1/2	982165	34.70	982165-C3	39.30		
	.065	.097	**.800** (12x)	3	1/8	2-1/2	35465	34.70	35465-C3	39.30		
	.070	.105	**.210** (3x)	3	1/8	2-1/2	47870	33.40	47870-C3	38.00		
	.070	.105	**.375** (5x)	3	1/8	2-1/2	33270	33.40	33270-C3	38.00		
NEW	.070	.105	**.375** (5x)	4	1/8	2-1/2	861670	35.40	861670-C3	40.00		
	.070	.105	**.570** (8x)	3	1/8	2-1/2	34670	33.50	34670-C3	38.10	34670-C4	45.20
	.070	.105	**.700** (10x)	3	1/8	2-1/2	982170	34.70	982170-C3	39.30		
	.070	.105	**.850** (12x)	3	1/8	2-1/2	35470	34.70	35470-C3	39.30		
	.070	.105	**1.062** (15x)	3	1/8	2-1/2	48970	39.10	48970-C3	43.70		

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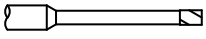

NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.075	.112	**.225** (3x)	3	1/8	2-1/2	47875	33.40	47875-C3	38.00		
.075	.112	**.375** (5x)	3	1/8	2-1/2	33275	33.40	33275-C3	38.00		
.075	.112	**.625** (8x)	3	1/8	2-1/2	34675	33.50	34675-C3	38.10	34675-C4	45.20
.075	.112	**.750** (10x)	3	1/8	2-1/2	982175	34.70	982175-C3	39.30		
.075	.112	**.900** (12x)	3	1/8	2-1/2	35475	34.70	35475-C3	39.30		
.078 (5/64)	.117	**.234** (3x)	3	1/8	2-1/2	47878	33.40	47878-C3	38.00		
.078 (5/64)	.117	**.312** (4x)	3	1/8	2-1/2	945578	33.40	945578-C3	38.00		
.078 (5/64)	.117	**.406** (5x)	3	1/8	2-1/2	33278	33.40	33278-C3	38.00	33278-C4	45.10
.078 (5/64)	.117	**.406** (5x)	4	1/8	2-1/2	861678	35.50	861678-C3	40.10		
.078 (5/64)	.117	**.475** (6x)	3	1/8	2-1/2	937078	33.40	937078-C3	38.00		
.078 (5/64)	.117	**.550** (7x)	3	1/8	2-1/2	934878	33.50	934878-C3	38.10		
.078 (5/64)	.117	**.625** (8x)	3	1/8	2-1/2	34678	33.50	34678-C3	38.10	34678-C4	45.20
.078 (5/64)	.117	**.625** (8x)	4	1/8	2-1/2	874178	35.60	874178-C3	40.20		
.078 (5/64)	.117	**.700** (9x)	3	1/8	2-1/2	846878	34.70	846878-C3	39.30		
.078 (5/64)	.117	**.800** (10x)	3	1/8	2-1/2	982178	34.70	982178-C3	39.30		
.078 (5/64)	.117	**.940** (12x)	3	1/8	2-1/2	35478	34.70	35478-C3	39.30	35478-C4	46.40
.078 (5/64)	.117	**1.187** (15x)	3	1/8	2-1/2	48978	39.10	48978-C3	43.70		
.078 (5/64)	.117	**1.400** (18x)	3	1/8	3	977378	48.10	977378-C3	52.70		
.078 (5/64)	.117	**1.562** (20x)	3	1/8	3	58378	48.10	58378-C3	52.70		
.078 (5/64)	.117	**1.950** (25x)	3	1/8	3	38078	58.40	38078-C3	63.00	***25x Diameter!***	
.078 (5/64)	.117	**2.343** (30x)	3	1/8	4	972078	75.40	972078-C3	80.40	***30x Diameter!***	
.080	.120	**.240** (3x)	3	1/8	2-1/2	47880	33.40	47880-C3	38.00		
.080	.120	**.406** (5x)	3	1/8	2-1/2	33280	33.40	33280-C3	38.00		
.080	.120	**.650** (8x)	3	1/8	2-1/2	34680	33.50	34680-C3	38.10	34680-C4	45.20
.080	.120	**.960** (12x)	3	1/8	2-1/2	35480	34.70	35480-C3	39.30		
.085	.127	**.425** (5x)	3	1/8	2-1/2	33285	33.40	33285-C3	38.00		
.085	.127	**.700** (8x)	3	1/8	2-1/2	34685	33.50	34685-C3	38.10	34685-C4	45.20
.085	.127	**1.020** (12x)	3	1/8	2-1/2	35485	34.70	35485-C3	39.30		
.090	.135	**.270** (3x)	3	1/8	2-1/2	47890	33.40	47890-C3	38.00		
.090	.135	**.450** (5x)	3	1/8	2-1/2	33290	33.40	33290-C3	38.00		
.090	.135	**.750** (8x)	3	1/8	2-1/2	34690	33.50	34690-C3	38.10	34690-C4	45.20
.090	.135	**1.080** (12x)	3	1/8	2-1/2	35490	34.70	35490-C3	39.30		
.093 (3/32)	.139	**.279** (3x)	3	1/8	2-1/2	47893	33.40	47893-C3	38.00	47893-C4	45.10
.093 (3/32)	.139	**.375** (4x)	3	1/8	2-1/2	945593	33.40	945593-C3	38.00	945593-C4	45.10
.093 (3/32)	.139	**.500** (5x)	3	1/8	2-1/2	33293	33.40	33293-C3	38.00	33293-C4	45.10
.093 (3/32)	.139	**.500** (5x)	4	1/8	2-1/2	861693	35.50	861693-C3	40.10		
.093 (3/32)	.139	**.585** (6x)	3	1/8	2-1/2	937093	33.40	937093-C3	38.00	937093-C4	45.10
.093 (3/32)	.139	**.670** (7x)	3	1/8	2-1/2	934893	33.50	934893-C3	38.10	934893-C4	45.20
.093 (3/32)	.139	**.750** (8x)	3	1/8	2-1/2	34693	33.50	34693-C3	38.10	34693-C4	45.20
.093 (3/32)	.139	**.750** (8x)	4	1/8	2-1/2	874193	35.60	874193-C3	40.20		
.093 (3/32)	.139	**.850** (9x)	3	1/8	2-1/2	846893	34.70	846893-C3	39.30		
.093 (3/32)	.139	**.950** (10x)	3	1/8	2-1/2	982193	34.70	982193-C3	39.30		
.093 (3/32)	.139	**1.030** (11x)	3	1/8	2-1/2	850293	34.70	850293-C3	39.30		
.093 (3/32)	.139	**1.125** (12x)	3	1/8	2-1/2	35493	34.70	35493-C3	39.30	35493-C4	46.40
.093 (3/32)	.139	**1.250** (13x)	3	1/8	2-1/2	839393	37.30	839393-C3	41.90		
.093 (3/32)	.139	**1.400** (15x)	3	1/8	3	48993	40.60	48993-C3	44.80	48993-C4	51.90

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	.139	**1.675** (18x)	3	1/8	3	977393	48.70	977393-C3	52.80		
.093 (3/32)	.139	**1.875** (20x)	3	1/8	4	58393	53.10	58393-C3	58.10		
.093 (3/32)	.139	**2.062** (22x)	3	1/8	4	969693	55.80	969693-C3	60.80		
.093 (3/32)	.139	**2.312** (25x)	3	1/8	4	38093	60.80	38093-C3	65.80	***25x Diameter!***	
.093 (3/32)	.139	**2.812** (30x)	3	1/8	4	972093	83.50	972093-C3	88.50	***30x Diameter!***	
.095	.142	**.500** (5x)	3	1/8	2-1/2	33295	33.40	33295-C3	38.00		
.095	.142	**.750** (8x)	3	1/8	2-1/2	34695	33.50	34695-C3	38.10	34695-C4	45.20
.095	.142	**1.150** (12x)	3	1/8	2-1/2	35495	34.70	35495-C3	39.30		
.100	.150	**.300** (3x)	3	1/8	2-1/2	978400	33.40	978400-C3	38.00		
.100	.150	**.400** (4x)	3	1/8	2-1/2	945600	33.40	945600-C3	38.00		
.100	.150	**.500** (5x)	3	1/8	2-1/2	33300	33.40	33300-C3	38.00		
.100	.150	**.600** (6x)	3	1/8	2-1/2	937100	33.40	937100-C3	38.00		
.100	.150	**.700** (7x)	3	1/8	2-1/2	934900	33.40	934900-C3	38.00		
.100	.150	**.800** (8x)	3	1/8	2-1/2	34700	33.50	34700-C3	38.10	34700-C4	45.20
.100	.150	**1.000** (10x)	3	1/8	2-1/2	982200	34.70	982200-C3	39.30		
.100	.150	**1.200** (12x)	3	1/8	2-1/2	35499	34.70	35499-C3	39.30		
.100	.150	**1.500** (15x)	3	1/8	3	49000	41.40	49000-C3	46.00		
.100	.150	**1.812** (18x)	3	1/8	4	977400	51.10	977400-C3	56.10		
.105	.158	**.530** (5x)	3	1/8	2-1/2	33301	33.40	33301-C3	38.00		
.105	.158	**.850** (8x)	3	1/8	2-1/2	34701	33.50	34701-C3	38.10		
.109 (7/64)	.163	**.570** (5x)	3	1/8	2-1/2	33302	33.40	33302-C3	38.00		
.109 (7/64)	.163	**.900** (8x)	3	1/8	2-1/2	34702	33.50	34702-C3	38.10		
.109 (7/64)	.163	**1.125** (10x)	3	1/8	2-1/2	982202	34.70	982202-C3	39.30		
.109 (7/64)	.163	**1.312** (12x)	3	1/8	3	35502	35.20	35502-C3	39.80		
.110	.165	**.570** (5x)	3	1/8	2-1/2	33303	33.40	33303-C3	38.00		
.110	.165	**.900** (8x)	3	1/8	2-1/2	34703	33.50	34703-C3	38.10		
.115	.173	**.600** (5x)	3	1/8	2-1/2	33304	33.40	33304-C3	38.00		
.115	.173	**.950** (8x)	3	1/8	2-1/2	34704	33.50	34704-C3	38.10		
.118 (3 mm)	.177	**.625** (5x)	3	1/8	2-1/2	33305	33.40	33305-C3	38.00		
.118 (3 mm)	.177	**.950** (8x)	3	1/8	2-1/2	34705	33.50	34705-C3	38.10		
.118 (3 mm)	.177	**1.187** (10x)	3	1/8	2-1/2	982205	34.70	982205-C3	39.30		
.118 (3 mm)	.177	**1.420** (12x)	3	1/8	3	35505	35.20	35505-C3	40.20		
.118 (3 mm)	.177	**1.770** (15x)	3	1/8	3	49005	42.20	49005-C3	46.80		
.118 (3 mm)	.177	**2.125** (18x)	3	1/8	4	977405	51.70	977405-C3	56.70		
.120	.180	**.625** (5x)	3	1/8	2-1/2	33306	33.40	33306-C3	38.00		
.120	.180	**1.000** (8x)	3	1/8	2-1/2	34706	33.50	34706-C3	38.10		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.187	**.375** (3x)	3	1/8	2-1/2	978408	33.40	978408-C3	38.00		
.125 (1/8)	.187	**.500** (4x)	3	1/8	2-1/2	945608	33.40	945608-C3	38.00	945608-C4	45.10
.125 (1/8)	.187	**.625** (5x)	3	1/8	2-1/2	33308	33.40	33308-C3	38.00	33308-C4	45.10
.125 (1/8)	.187	**.625** (5x)	4	1/8	2-1/2	861708	35.50	861708-C3	40.10		
.125 (1/8)	.187	**.750** (6x)	3	1/8	2-1/2	937108	33.40	937108-C3	38.00	937108-C4	45.10
.125 (1/8)	.187	**.875** (7x)	3	1/8	2-1/2	934908	33.40	934908-C3	38.00	934908-C4	45.10
.125 (1/8)	.187	**1.000** (8x)	3	1/8	2-1/2	34708	33.40	34708-C3	38.00	34708-C4	45.10
.125 (1/8)	.187	**1.000** (8x)	4	1/8	2-1/2	874208	35.50	874208-C3	40.10		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	.187	**1.125** (9x)	3	1/8	2-1/2	846908	36.10	846908-C3	40.70			
.125 (1/8)	.187	**1.250** (10x)	3	1/8	2-1/2	982208	36.10	982208-C3	40.70	982208-C4	47.80	
.125 (1/8)	.187	**1.375** (11x)	3	1/8	2-1/2	850308	36.20	850308-C3	40.80			
.125 (1/8)	.187	**1.500** (12x)	3	1/8	3	35508	36.20	35508-C3	40.80	35508-C4	47.90	
.125 (1/8)	.187	**1.625** (13x)	3	1/8	3	839408	38.80	839408-C3	43.40			
.125 (1/8)	.187	**1.875** (15x)	3	1/8	3	49008	41.40	49008-C3	46.00			
.125 (1/8)	.187	**2.250** (18x)	3	1/8	4	977408	49.70	977408-C3	54.70			
.125 (1/8)	.187	**2.500** (20x)	3	1/8	4	58408	50.60	58408-C3	55.60			
.125 (1/8)	.187	**2.750** (22x)	3	1/8	4	969708	54.20	969708-C3	59.20			
.125 (1/8)	.187	**3.125** (25x)	3	1/8	4	38108	59.60	38108-C3	64.60	***25x Diameter!***		
.125 (1/8)	.187	**3.750** (30x)	3	1/8	6	973608	70.40	973608-C3	76.50	***30x Diameter!***		
.140 (9/64)	.220	**.425** (3x)	3	3/16	3	978409	39.50	978409-C3	44.50			
.140 (9/64)	.220	**.750** (5x)	3	3/16	3	33309	39.50	33309-C3	44.50			
.140 (9/64)	.220	**1.125** (8x)	3	3/16	3	34709	39.50	34709-C3	44.50			
.140 (9/64)	.220	**1.450** (10x)	3	3/16	3	982209	42.30	982209-C3	47.30			
.140 (9/64)	.220	**1.680** (12x)	3	3/16	4	35509	45.40	35509-C3	52.20			
.156 (5/32)	.234	**.470** (3x)	3	3/16	3	978410	39.50	978410-C3	44.50			
.156 (5/32)	.234	**.625** (4x)	3	3/16	3	945610	39.50	945610-C3	44.50			
.156 (5/32)	.234	**.750** (5x)	3	3/16	3	33310	39.50	33310-C3	44.50	33310-C4	55.60	NEW
.156 (5/32)	.234	**.937** (6x)	3	3/16	3	937110	39.50	937110-C3	44.50			
.156 (5/32)	.234	**1.093** (7x)	3	3/16	3	934910	39.50	934910-C3	44.50			
.156 (5/32)	.234	**1.250** (8x)	3	3/16	3	34710	39.50	34710-C3	44.50	34710-C4	55.60	
.156 (5/32)	.234	**1.375** (9x)	3	3/16	3	846910	42.30	846910-C3	47.30			NEW
.156 (5/32)	.234	**1.570** (10x)	3	3/16	3	982210	42.30	982210-C3	47.30			
.156 (5/32)	.234	**1.875** (12x)	3	3/16	4	35510	42.50	35510-C3	49.30			
.156 (5/32)	.234	**2.375** (15x)	3	3/16	4	49010	45.40	49010-C3	52.20			
.156 (5/32)	.234	**2.812** (18x)	3	3/16	6	977410	62.60	977410-C3	71.60			
.187 (3/16)	.281	**.570** (3x)	3	3/16	3	978412	39.50	978412-C3	44.50			
.187 (3/16)	.281	**.750** (4x)	3	3/16	3	945612	39.50	945612-C3	44.50			
.187 (3/16)	.281	**1.000** (5x)	3	3/16	3	33312	39.50	33312-C3	44.50	33312-C4	55.60	
.187 (3/16)	.281	**1.156** (6x)	3	3/16	3	937112	39.50	937112-C3	44.50			
.187 (3/16)	.281	**1.312** (7x)	3	3/16	3	934912	39.50	934912-C3	44.50			
.187 (3/16)	.281	**1.500** (8x)	3	3/16	3	34712	39.50	34712-C3	44.50	34712-C4	55.60	
.187 (3/16)	.281	**1.500** (8x)	4	3/16	3	874212	41.30	874212-C3	46.30			
.187 (3/16)	.281	**1.680** (9x)	3	3/16	3	846912	42.30	846912-C3	47.30			
.187 (3/16)	.281	**1.875** (10x)	3	3/16	4	982212	42.30	982212-C3	49.10			
.187 (3/16)	.281	**2.250** (12x)	3	3/16	4	35512	42.50	35512-C3	49.30	35512-C4	59.70	
.187 (3/16)	.281	**2.812** (15x)	3	3/16	4	49012	45.40	49012-C3	52.20			
.187 (3/16)	.281	**3.375** (18x)	3	3/16	6	977412	63.70	977412-C3	72.70			
.187 (3/16)	.281	**3.750** (20x)	3	3/16	6	58412	63.70	58412-C3	72.70			
.187 (3/16)	.281	**4.125** (22x)	3	3/16	6	969712	63.90	969712-C3	72.90			
.203 (13/64)	.312	**1.015** (5x)	3	1/4	4	33313	49.70	33313-C3	57.60			
.203 (13/64)	.312	**1.625** (8x)	3	1/4	4	34713	49.70	34713-C3	57.60			
.218 (7/32)	.330	**1.125** (5x)	3	1/4	4	33314	49.40	33314-C3	57.30			
.218 (7/32)	.330	**1.750** (8x)	3	1/4	4	34714	49.40	34714-C3	57.30			
.218 (7/32)	.330	**2.187** (10x)	3	1/4	4	982214	50.80	982214-C3	58.70			

continued on next page

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

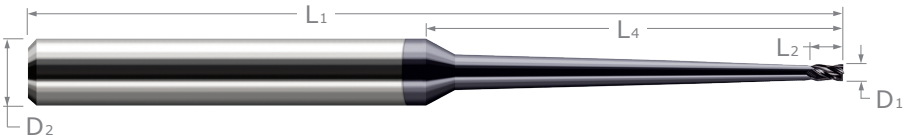
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.250 (1/4)	.375	**.750** (3x)	3	1/4	4	978416	44.10	978416-C3	52.00		
.250 (1/4)	.375	**1.000** (4x)	3	1/4	4	945616	44.10	945616-C3	52.00		
.250 (1/4)	.375	**1.250** (5x)	3	1/4	4	33316	44.10	33316-C3	52.00	33316-C4	62.40
.250 (1/4)	.375	**1.500** (6x)	3	1/4	4	937116	44.10	937116-C3	52.00		
.250 (1/4)	.375	**1.750** (7x)	3	1/4	4	934916	44.10	934916-C3	52.00		
.250 (1/4)	.375	**2.000** (8x)	3	1/4	4	34716	44.10	34716-C3	52.00	34716-C4	62.40
.250 (1/4)	.375	**2.000** (8x)	4	1/4	4	874216	46.00	874216-C3	53.90		
.250 (1/4)	.375	**2.250** (9x)	3	1/4	4	846916	49.90	846916-C3	57.80		
.250 (1/4)	.375	**2.500** (10x)	3	1/4	4	982216	49.90	982216-C3	57.80		
.250 (1/4)	.375	**3.000** (12x)	3	1/4	6	35516	53.60	35516-C3	62.60	35516-C4	80.10
.250 (1/4)	.375	**3.750** (15x)	3	1/4	6	49016	55.60	49016-C3	64.60		
.250 (1/4)	.375	**5.000** (20x)	3	1/4	8	58416	112.90	58416-C3	126.30		
.312 (5/16)	.470	**1.625** (5x)	3	5/16	4	33320	73.40	33320-C3	82.90		
.312 (5/16)	.470	**2.500** (8x)	3	5/16	4	34720	73.40	34720-C3	82.90		
.375 (3/8)	.570	**2.000** (5x)	3	3/8	4	33324	73.40	33324-C3	85.70		
.375 (3/8)	.570	**3.000** (8x)	3	3/8	6	34724	100.90	34724-C3	114.30		

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com.

MINIATURE END MILLS

Square – Tapered Reach (Clearance Cutters)



- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½ x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Maximum Reach & Maximum Rigidity!

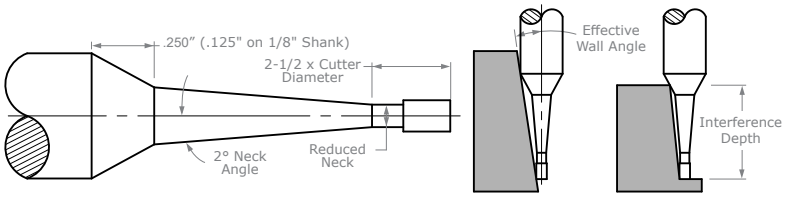
CUTTER DIA.	LOC	OVERALL REACH	EFF. WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*						UNCOATED			AlTiN NANO COATED		
D_1 +.000" −.001"	L_2 +.020" −.000"	L_4 +.020" −.000"		D_2 (h6)	L_1	0°	.5°	1°	2°	3°	4°	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.015	.023	**1/2**	6.4°	1/8	2-1/2	.060	.080	.125	.375	.395	.420		990215	69.90		990215-C6	76.70
.031	.047	**1/2**	5.4°	1/8	2-1/2	.115	.155	.235	.385	.410	.440		990231	53.90		990231-C6	60.70
.031	.047	**1**	6.3°	1/4	4	.115	.155	.235	.755	.800	.850	26631	30831	64.80	26631-C6	30831-C6	74.80
.031	.047	**1-1/2**	4.2°	1/4	4	.115	.155	.235	1.260	1.355	1.470	28331	31231	70.00	28331-C6	31231-C6	80.00
.031	.047	**2**	3.1°	1/4	4	.115	.155	.235	1.765	1.965	-	17431	913131	75.10	17431-C6	913131-C6	85.10
.047	.071	**1/2**	4.5°	1/8	2-1/2	.180	.245	.370	.395	.430	.470		990247	53.90		990247-C6	60.70
.047	.071	**1**	5.9°	1/4	4	.180	.245	.370	.765	.815	.870	26647	30847	64.80	26647-C6	30847-C6	74.80
.047	.071	**1-1/2**	3.9°	1/4	4	.180	.245	.370	1.275	1.380	-	28347	31247	70.00	28347-C6	31247-C6	80.00
.062	.093	**1/2**	3.7°	1/8	2-1/2	.220	.295	.375	.410	.460	-		990262	52.30		990262-C6	59.10
.062	.093	**1**	5.4°	1/4	4	.220	.295	.445	.775	.825	.890	26662	30862	63.00	26662-C6	30862-C6	73.00
.062	.093	**1-1/2**	3.7°	1/4	4	.220	.295	.445	1.285	1.410	-	28362	31262	68.10	28362-C6	31262-C6	78.10
.062	.093	**2**	2.6°	1/4	4	.220	.295	.445	1.805	-	-	17462	913162	73.30	17462-C6	913162-C6	83.30
.078	.118	**1**	5.0°	1/4	4	.305	.405	.610	.785	.845	.915	26678	30878	63.00	26678-C6	30878-C6	73.00
.078	.118	**1-1/2**	3.4°	1/4	4	.305	.405	.610	1.305	1.445	-	28378	31278	68.10	28378-C6	31278-C6	78.10
.093	.140	**1**	4.6°	1/4	4	.340	.455	.685	.795	.865	.945	26693	30893	63.80	26693-C6	30893-C6	73.80
.093	.140	**1-1/2**	3.1°	1/4	4	.340	.455	.685	1.320	-	-	28393	31293	67.60	28393-C6	31293-C6	77.60
.093	.140	**2**	2.2°	1/4	4	.340	.455	.685	1.890	-	-	17493	913193	71.40	17493-C6	913193-C6	81.40
.125	.188	**1**	3.7°	1/4	4	.450	.600	.760	.835	.930	-	26708	30908	63.80	26708-C6	30908-C6	73.80
.125	.188	**1-1/2**	2.5°	1/4	4	.450	.600	.905	1.395	-	-	28408	31308	67.60	28408-C6	31308-C6	77.60
.125	.188	**2**	1.7°	1/4	4	.450	.600	.905	-	-	-	17508	913208	71.40	17508-C6	913208-C6	81.40
.156	.234	**1**	2.8°	1/4	4	.525	.705	.780	.895	-	-	26710	30910	63.80	26710-C6	30910-C6	73.80
.156	.234	**1-1/2**	1.9°	1/4	4	.525	.705	1.060	-	-	-	28410	31310	67.60	28410-C6	31310-C6	77.60
.187	.281	**1-1/2**	1.3°	1/4	4	.605	.805	1.215	-	-	-	28412	31312	67.60	28412-C6	31312-C6	77.60
.250	.375	**1-1/2**	2.5°	3/8	4	.760	1.015	1.275	1.425	-	-	28416	31316	87.20	28416-C6	31316-C6	98.40

*Values are approximate and may vary due to tolerancing.

For detailed interference charts with more angles, search for keyword InterferenceChart on www.harveytool.com.

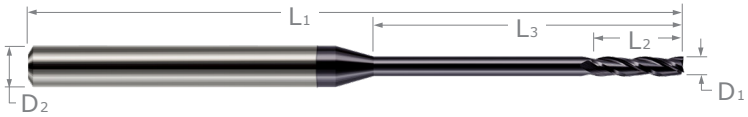
Effective Wall Angle:
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

Interference Depth:
At a given angle, the depth at which the cutter interferes with the workpiece.

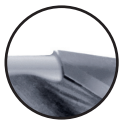


MINIATURE END MILLS

Square – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut is ≥ 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.010	.050	**.100** (10x)	1/8	2-1/2	13610	47.90	13610-C3	52.50	10010	59.60
.010	.050	**.150** (15x)	1/8	2-1/2	948210	59.90	948210-C3	64.50		
.015 (1/64)	.075	**.150** (10x)	1/8	2-1/2	13615	38.60	13615-C3	43.20	10015	50.30
.015 (1/64)	.075	**.225** (15x)	1/8	2-1/2	948215	51.40	948215-C3	56.00		
.020 (.5 mm)	.100	**.200** (10x)	1/8	2-1/2	13620	37.10	13620-C3	41.70	10020	48.80
.020 (.5 mm)	.100	**.300** (15x)	1/8	2-1/2	948220	49.70	948220-C3	54.30		
.025	.125	**.250** (10x)	1/8	2-1/2	13625	35.70	13625-C3	40.30	10025	47.40
.030	.150	**.300** (10x)	1/8	2-1/2	13630	35.70	13630-C3	40.30	10030	47.40
.030	.150	**.450** (15x)	1/8	2-1/2	948230	48.10	948230-C3	52.70		
.031 (1/32)	.155	**.250** (8x)	1/8	2-1/2	876631	34.60	876631-C3	39.20		
.031 (1/32)	.155	**.310** (10x)	1/8	2-1/2	13631	35.70	13631-C3	40.30	10031	47.40
.031 (1/32)	.155	**.375** (12x)	1/8	2-1/2	867031	45.60	867031-C3	50.20		
.031 (1/32)	.155	**.470** (15x)	1/8	2-1/2	948231	48.10	948231-C3	52.70		
.035 (.9 mm)	.175	**.350** (10x)	1/8	2-1/2	13635	35.70	13635-C3	40.30	10035	47.40
.040	.200	**.400** (10x)	1/8	2-1/2	13640	35.70	13640-C3	40.30	10040	47.40
.040	.200	**.600** (15x)	1/8	2-1/2	948240	48.10	948240-C3	52.70		
.045	.225	**.450** (10x)	1/8	2-1/2	13645	35.00	13645-C3	39.60	10045	46.70
.047 (3/64)	.250	**.500** (10x)	1/8	2-1/2	13647	35.00	13647-C3	39.60	10047	46.70
.047 (3/64)	.250	**.570** (12x)	1/8	2-1/2	867047	43.10	867047-C3	47.70		
.047 (3/64)	.250	**.710** (15x)	1/8	2-1/2	948247	45.60	948247-C3	50.20		
.050	.300	**.500** (10x)	1/8	2-1/2	956350	35.00	956350-C3	39.60		
.050	.300	**.600** (12x)	1/8	2-1/2	13650	35.00	13650-C3	39.60	10050	46.70
.050	.300	**.750** (15x)	1/8	2-1/2	948250	45.60	948250-C3	50.20		
.055 (1.4 mm)	.385	**.770** (14x)	1/8	2-1/2	13655	36.00	13655-C3	40.60	10055	47.70
.060	.312	**.625** (10x)	1/8	2-1/2	956360	35.00	956360-C3	39.60		
.060	.500	**1.000** (16x)	1/8	2-1/2	13660	36.20	13660-C3	40.80	10060	47.90
.062 (1/16)	.312	**.500** (8x)	1/8	2-1/2	876662	33.80	876662-C3	38.40		
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	956362	35.00	956362-C3	39.60		
.062 (1/16)	.312	**.750** (12x)	1/8	2-1/2	867062	33.90	867062-C3	38.50		
.062 (1/16)	.500	**1.000** (16x)	1/8	2-1/2	13662	36.20	13662-C3	40.80	10062	47.90
.065	.500	**1.000** (15x)	1/8	2-1/2	13665	36.00	13665-C3	40.60	10065	47.70
.070	.500	**1.000** (14x)	1/8	2-1/2	13670	36.00	13670-C3	40.60	10070	47.70

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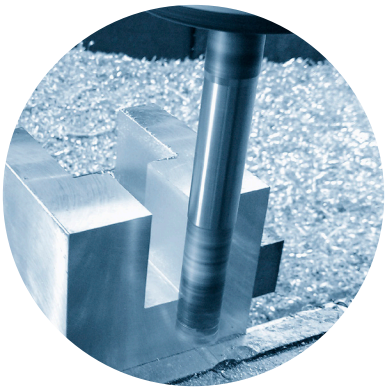
MINIATURE END MILLS

Square – Long Reach, Long Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.075	.500	**1.000** (13x)	1/8	2-1/2	13675	35.00	13675-C3	39.60	10075	46.70
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	956378	35.00	956378-C3	39.60		
.078 (5/64)	.500	**1.000** (12x)	1/8	2-1/2	13678	35.00	13678-C3	39.60	10078	46.70
.078 (5/64)	.406	**1.187** (15x)	1/8	2-1/2	948278	45.60	948278-C3	50.20		
.080	.750	**1.250** (15x)	1/8	2-1/2	13680	36.20	13680-C3	40.80	10080	47.90
.085	.750	**1.250** (14x)	1/8	2-1/2	13685	36.20	13685-C3	40.80	10085	47.90
.090	.750	**1.250** (13x)	1/8	2-1/2	13690	35.20	13690-C3	39.80	10090	46.90
.093 (3/32)	.500	**.750** (8x)	1/8	2-1/2	876693	33.80	876693-C3	38.40		
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	956393	35.00	956393-C3	39.60		
.093 (3/32)	.750	**1.250** (13x)	1/8	2-1/2	13693	35.20	13693-C3	39.80	10093	46.90
.093 (3/32)	.500	**1.400** (15x)	1/8	3	948293	45.60	948293-C3	50.20		
.095	.750	**1.250** (13x)	1/8	2-1/2	13695	35.00	13695-C3	39.60	10095	46.70
.100	.750	**1.250** (12x)	1/8	2-1/2	13700	35.00	13700-C3	39.60	10100	46.70
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.625	**1.000** (8x)	1/8	2-1/2	876708	33.80	876708-C3	38.40		
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	956408	35.00	956408-C3	39.60		
.125 (1/8)	1.000	**1.500** (12x)	1/8	2-1/2	13708	35.20	13708-C3	39.80	10108	46.90
.125 (1/8)	.625	**1.875** (15x)	1/8	3	948308	48.40	948308-C3	53.00		
.187 (3/16)	1.125	**1.625** (8x)	3/16	3	13712	41.40	13712-C3	46.00	10112	57.50
.250 (1/4)	1.500	**2.000** (8x)	1/4	4	13716	46.10	13716-C3	51.10	10116	64.40



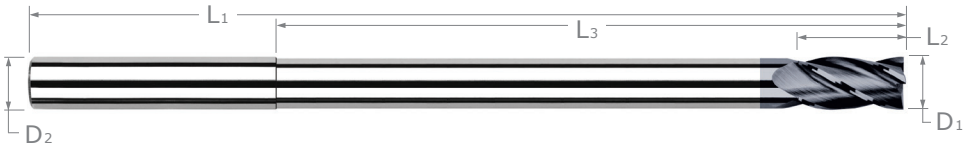
Applying HEM to Micromachining

You've heard a great deal about High Efficiency Milling (HEM), but you probably thought it was just for larger diameter tooling. In fact, this popular machining method can be used for tools smaller than .125" in diameter! Our "In the Loupe" blog post **Applying HEM to Micromachining** explains how.

Read more on harveyperformance.com/in-the-loupe/

MINIATURE END MILLS

Square – Extra Long Length

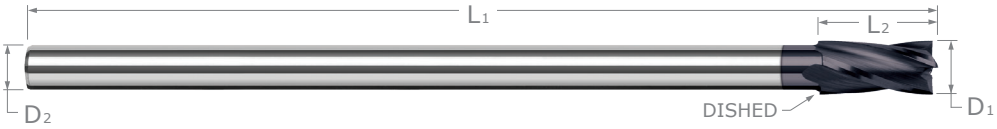


- **Up to 10" overall length**
- Longest overall length carbide end mill available in stock
- Extended Reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.030" −.000"	L_3 +.030" −.000"	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	.375	4.375 (17.5x)	1/4	6	991916	83.00	991916-C3	92.00
.250 (1/4)	.375	4.375 (17.5x)	1/4	8	960516	112.90	960516-C3	126.30
.312 (5/16)	.470	4.343 (14x)	5/16	6	991920	99.00	991920-C3	112.40
.375 (3/8)	.562	4.312 (11.5x)	3/8	6	991924	111.70	991924-C3	125.60
.375 (3/8)	.562	4.312 (11.5x)	3/8	8	960524	135.30	960524-C3	154.10
.437 (7/16)	.656	5.875 (13.5x)	7/16	8	991928	194.40	991928-C3	222.00
.500 (1/2)	.750	5.750 (11.5x)	1/2	8	991932	199.40	991932-C3	227.00
.500 (1/2)	.750	5.750 (11.5x)	1/2	10	960532	292.50	960532-C3	320.10
.625 (5/8)	.937	5.687 (9x)	5/8	8	991940	338.60	991940-C3	362.90
.750 (3/4)	1.125	5.625 (7.5x)	3/4	8	991948	416.60	991948-C3	444.90

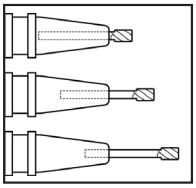
END MILLS

Square – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	3/16	2	**3 mm**	2-1/2	907808	82.30	907808-C3	86.90
1/8	3/16	4	**3 mm**	2-1/2	943208	84.70	943208-C3	89.30
5/32	15/64	2	**1/8**	2-1/2	907810	82.30	907810-C3	87.30
5/32	15/64	4	**1/8**	2-1/2	943210	84.70	943210-C3	89.70
5/32	15/64	4	**1/8**	4	920610	91.40	920610-C3	98.20
3/16	9/32	2	**1/8**	2-1/2	907812	82.30	907812-C3	87.30
3/16	9/32	4	**1/8**	2-1/2	943212	84.70	943212-C3	89.70
3/16	9/32	4	**5/32**	4	920613	91.40	920613-C3	98.20
1/4	3/8	2	**3/16**	3	907816	89.30	907816-C3	96.10
1/4	3/8	4	**3/16**	3	943216	91.80	943216-C3	98.60
1/4	3/8	4	**3/16**	4	920616	122.70	920616-C3	130.60
5/16	15/32	4	**1/4**	4	943220	112.60	943220-C3	122.10
5/16	15/32	4	**1/4**	6	920620	146.70	920620-C3	160.60
3/8	9/16	4	**5/16**	4	943224	133.00	943224-C3	145.30
3/8	9/16	4	**5/16**	6	920624	159.90	920624-C3	173.80
7/16	21/32	4	**3/8**	6	943228	179.80	943228-C3	194.80
1/2	3/4	4	**7/16**	6	943232	204.40	943232-C3	217.80
5/8	15/16	4	**1/2**	6	943240	265.50	943240-C3	285.50
3/4	1-1/8	4	**5/8**	6	943248	327.70	943248-C3	348.70

For Ball Reduced Shank, please see page 58.

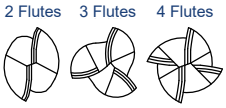
For Corner Radius Reduced Shank, please see page 77

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard

- **Cutter diameter down to .002"**
- Center cutting
- Solid carbide
- CNC ground in the USA



Stub Flute & Standard Length

BALL

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.002	**.003** (1.5x)	1/8	1-1/2	24502			63.00							
.002	**.006** (3x)	1/8	1-1/2	74002			63.00							
.003	**.004** (1.5x)	1/8	1-1/2	24503			55.80							
.003	**.009** (3x)	1/8	1-1/2	74003			55.80							
.004 (.1 mm)	**.006** (1.5x)	1/8	1-1/2	24504			50.10							
.004 (.1 mm)	**.012** (3x)	1/8	1-1/2	74004			50.10							
.005	**.007** (1.5x)	1/8	1-1/2	24505		24605	45.30	24505-C3		24605-C3	49.90			
.005	**.015** (3x)	1/8	1-1/2	74005		74305	45.30	74005-C3		74305-C3	49.90			
.006	**.009** (1.5x)	1/8	1-1/2	24506		24606	46.50			24606-C3	51.10			
.006	**.018** (3x)	1/8	1-1/2	74006		74306	46.50			74306-C3	51.10			
.007	**.010** (1.5x)	1/8	1-1/2	24507		24607	46.50			24607-C3	51.10			
.007	**.021** (3x)	1/8	1-1/2	74007		74307	46.50			74307-C3	51.10			
.008 (.2 mm)	**.012** (1.5x)	1/8	1-1/2	24508		24608	46.50	24508-C3		24608-C3	51.10			
.008 (.2 mm)	**.024** (3x)	1/8	1-1/2	74008		74308	46.50	74008-C3		74308-C3	51.10	74008-C4		58.20
.009	**.013** (1.5x)	1/8	1-1/2	24509		24609	46.50			24609-C3	51.10			
.009	**.027** (3x)	1/8	1-1/2	74009		74309	46.50			74309-C3	51.10			
.010	**.015** (1.5x)	1/8	1-1/2	24510	823410	24610	36.60	24510-C3	823410-C3	24610-C3	41.20		24610-C4	48.30
.010	**.030** (3x)	1/8	1-1/2	74010	835910	74310	36.60	74010-C3	835910-C3	74310-C3	41.20	74010-C4	74310-C4	48.30
.011	**.016** (1.5x)	1/8	1-1/2	24511		24611	37.80			24611-C3	42.40			
.011	**.033** (3x)	1/8	1-1/2	74011		74311	37.80			74311-C3	42.40			
.012 (.3 mm)	**.018** (1.5x)	1/8	1-1/2	24512		24612	37.80	24512-C3		24612-C3	42.40			
NEW .012 (.3 mm)	**.036** (3x)	1/8	1-1/2	74012		74312	37.80			74312-C3	42.40	74012-C4	49.50	
.013	**.019** (1.5x)	1/8	1-1/2	24513		24613	37.80			24613-C3	42.40			
.013	**.039** (3x)	1/8	1-1/2	74013		74313	37.80			74313-C3	42.40			
.014	**.021** (1.5x)	1/8	1-1/2	24514		24614	37.80			24614-C3	42.40			
.014	**.042** (3x)	1/8	1-1/2	74014		74314	37.80			74314-C3	42.40			
.015 (1/64)	**.022** (1.5x)	1/8	1-1/2	24515	823415	24615	28.40	24515-C3	823415-C3	24615-C3	33.00		24615-C4	40.10
.015 (1/64)	**.045** (3x)	1/8	1-1/2	74015	835915	74315	28.40	74015-C3	835915-C3	74315-C3	33.00	74015-C4	74315-C4	40.10
.016 (.4 mm)	**.024** (1.5x)	1/8	1-1/2	24516		24616	29.80			24616-C3	34.40			
.016 (.4 mm)	**.048** (3x)	1/8	1-1/2	74016		74316	29.80			74316-C3	34.40			
.017	**.026** (1.5x)	1/8	1-1/2	24517		24617	29.80			24617-C3	34.40			
.017	**.051** (3x)	1/8	1-1/2	74017		74317	29.80			74317-C3	34.40			
.018	**.027** (1.5x)	1/8	1-1/2	24518		24618	29.80			24618-C3	34.40			
.018	**.054** (3x)	1/8	1-1/2	74018		74318	29.80	74018-C3		74318-C3	34.40			
.019	**.029** (1.5x)	1/8	1-1/2	24519		24619	29.80			24619-C3	34.40			
.019	**.057** (3x)	1/8	1-1/2	74019		74319	29.80			74319-C3	34.40	74019-C4		41.50
NEW .020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	24520	823420	24620	27.40	24520-C3	823420-C3	24620-C3	32.00	24520-C4	24620-C4	39.10
.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	74020	835920	74320	27.40	74020-C3	835920-C3	74320-C3	32.00	74020-C4	74320-C4	39.10

Down to .002"!

continued on next page

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.021	**.031** (1.5x)	1/8	1-1/2	24521		24621	28.60			24621-C3	33.20			
.021	**.063** (3x)	1/8	1-1/2	74021		74321	28.60	74021-C3		74321-C3	33.20			
.022	**.033** (1.5x)	1/8	1-1/2	24522		24622	28.60			24622-C3	33.20			
.022	**.066** (3x)	1/8	1-1/2	74022		74322	28.60			74322-C3	33.20			
.023	**.035** (1.5x)	1/8	1-1/2	24523		24623	28.60			24623-C3	33.20			
.023	**.069** (3x)	1/8	1-1/2	74023		74323	28.60	74023-C3		74323-C3	33.20			
.024 (.6 mm)	**.036** (1.5x)	1/8	1-1/2	24524		24624	28.60			24624-C3	33.20			
.024 (.6 mm)	**.072** (3x)	1/8	1-1/2	74024		74324	28.60			74324-C3	33.20			
.025	**.037** (1.5x)	1/8	1-1/2	24525	823425	24625	24.70	24525-C3	823425-C3	24625-C3	29.30		24625-C4	36.40
.025	**.075** (3x)	1/8	1-1/2	74025	835925	74325	24.70	74025-C3	835925-C3	74325-C3	29.30	74025-C4	74325-C4	36.40
.026	**.039** (1.5x)	1/8	1-1/2	24526		24626	25.80			24626-C3	30.40			
.026	**.078** (3x)	1/8	1-1/2	74026		74326	25.80			74326-C3	30.40			
.027	**.041** (1.5x)	1/8	1-1/2	24527		24627	25.80			24627-C3	30.40			
.027	**.081** (3x)	1/8	1-1/2	74027		74327	25.80			74327-C3	30.40			
.028 (.7 mm)	**.042** (1.5x)	1/8	1-1/2	24528		24628	25.80			24628-C3	30.40			
.028 (.7 mm)	**.084** (3x)	1/8	1-1/2	74028		74328	25.80			74328-C3	30.40			
.029	**.043** (1.5x)	1/8	1-1/2	24529		24629	25.80			24629-C3	30.40			
.029	**.087** (3x)	1/8	1-1/2	74029		74329	25.80			74329-C3	30.40			
.030	**.045** (1.5x)	1/8	1-1/2	24530	823430	24630	22.50	24530-C3	823430-C3	24630-C3	27.10		24630-C4	34.20
.030	**.090** (3x)	1/8	1-1/2	74030	835930	74330	22.50	74030-C3	835930-C3	74330-C3	27.10	74030-C4	74330-C4	34.20
.031 (1/32)	**.046** (1.5x)	1/8	1-1/2	24531	823431	24631	22.50	24531-C3	823431-C3	24631-C3	27.10	24531-C4	24631-C4	34.20
.031 (1/32)	**.093** (3x)	1/8	1-1/2	74031	835931	74331	22.50	74031-C3	835931-C3	74331-C3	27.10	74031-C4	74331-C4	34.20
.032	**.048** (1.5x)	1/8	1-1/2	24532		24632	23.70			24632-C3	28.30			
.032	**.096** (3x)	1/8	1-1/2	74032		74332	23.70	74032-C3		74332-C3	28.30			
.033	**.049** (1.5x)	1/8	1-1/2	24533		24633	23.70			24633-C3	28.30			
.033	**.099** (3x)	1/8	1-1/2	74033		74333	23.70	74033-C3		74333-C3	28.30			
.034	**.051** (1.5x)	1/8	1-1/2	24534		24634	23.70			24634-C3	28.30			
.034	**.102** (3x)	1/8	1-1/2	74034		74334	23.70			74334-C3	28.30			
.035 (.9 mm)	**.052** (1.5x)	1/8	1-1/2	24535	823435	24635	21.40	24535-C3	823435-C3	24635-C3	26.00		24635-C4	33.10
.035 (.9 mm)	**.105** (3x)	1/8	1-1/2	74035	835935	74335	21.40	74035-C3	835935-C3	74335-C3	26.00	74035-C4	74335-C4	33.10
.036	**.054** (1.5x)	1/8	1-1/2	24536		24636	22.30			24636-C3	26.90			
.036	**.108** (3x)	1/8	1-1/2	74036		74336	22.30			74336-C3	26.90			
.037	**.055** (1.5x)	1/8	1-1/2	24537		24637	22.30			24637-C3	26.90			
.037	**.111** (3x)	1/8	1-1/2	74037		74337	22.30			74337-C3	26.90			
.038	**.057** (1.5x)	1/8	1-1/2	24538		24638	22.30			24638-C3	26.90			
.038	**.114** (3x)	1/8	1-1/2	74038		74338	22.30			74338-C3	26.90			
.039 (1 mm)	**.058** (1.5x)	1/8	1-1/2	24539	823439	24639	21.90	24539-C3	823439-C3	24639-C3	26.50			
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	74039	835939	74339	21.90	74039-C3	835939-C3	74339-C3	26.50	74039-C4		33.60
.040	**.060** (1.5x)	1/8	1-1/2	24540	823440	24640	21.40	24540-C3	823440-C3	24640-C3	26.00	24540-C4	24640-C4	33.10
.040	**.120** (3x)	1/8	1-1/2	74040	835940	74340	21.40	74040-C3	835940-C3	74340-C3	26.00	74040-C4	74340-C4	33.10
.041	**.123** (3x)	1/8	1-1/2	74041		74341	22.30			74341-C3	26.90			
.042	**.126** (3x)	1/8	1-1/2	74042		74342	22.30			74342-C3	26.90			
.043 (1.1 mm)	**.129** (3x)	1/8	1-1/2	74043		74343	22.30			74343-C3	26.90			
.044	**.132** (3x)	1/8	1-1/2	74044		74344	22.30			74344-C3	26.90			
.045	**.067** (1.5x)	1/8	1-1/2	24545	823445	24645	21.40		823445-C3	24645-C3	26.00		24645-C4	33.10
.045	**.135** (3x)	1/8	1-1/2	74045	835945	74345	21.40	74045-C3	835945-C3	74345-C3	26.00	74045-C4	74345-C4	33.10

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MINIATURE END MILLS

Ball – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.046	**.138**	(3x)	1/8	1-1/2	74046		74346	22.30			74346-C3	26.90			
NEW	.047 (3/64)	**.070**	(1.5x)	1/8	1-1/2	24547	823447	24647	21.40	24547-C3	823447-C3	24647-C3	26.00	24547-C4	24647-C4	33.10
	.047 (3/64)	**.141**	(3x)	1/8	1-1/2	74047	835947	74347	21.40	74047-C3	835947-C3	74347-C3	26.00	74047-C4	74347-C4	33.10
	.048	**.144**	(3x)	1/8	1-1/2	74048		74348	22.30			74348-C3	26.90			
	.049	**.147**	(3x)	1/8	1-1/2	74049		74349	22.30			74349-C3	26.90			
	.050	**.075**	(1.5x)	1/8	1-1/2	24550	823450	24650	21.40	24550-C3	823450-C3	24650-C3	26.00		24650-C4	33.10
	.050	**.150**	(3x)	1/8	1-1/2	74050	835950	74350	21.40	74050-C3	835950-C3	74350-C3	26.00	74050-C4	74350-C4	33.10
	.051 (1.3 mm)	**.153**	(3x)	1/8	1-1/2	74051		74351	22.30			74351-C3	26.90			
	.052	**.156**	(3x)	1/8	1-1/2	74052		74352	22.30			74352-C3	26.90			
	.053	**.159**	(3x)	1/8	1-1/2	74053		74353	22.30			74353-C3	26.90			
	.054	**.162**	(3x)	1/8	1-1/2	74054		74354	22.30			74354-C3	26.90			
	.055 (1.4 mm)	**.082**	(1.5x)	1/8	1-1/2	24555	823455	24655	21.40		823455-C3	24655-C3	26.00		24655-C4	33.10
	.055 (1.4 mm)	**.165**	(3x)	1/8	1-1/2	74055	835955	74355	21.40	74055-C3	835955-C3	74355-C3	26.00	74055-C4	74355-C4	33.10
	.056	**.168**	(3x)	1/8	1-1/2	74056		74356	22.30			74356-C3	26.90			
	.057	**.171**	(3x)	1/8	1-1/2	74057		74357	22.30			74357-C3	26.90			
	.058	**.174**	(3x)	1/8	1-1/2	74058		74358	22.30			74358-C3	26.90			
	.059 (1.5 mm)	**.089**	(1.5x)	1/8	1-1/2	24559		24659	22.30			24659-C3	26.90			
	.059 (1.5 mm)	**.177**	(3x)	1/8	1-1/2	74059		74359	22.30			74359-C3	26.90			
	.060	**.090**	(1.5x)	1/8	1-1/2	24560	823460	24660	21.40	24560-C3	823460-C3	24660-C3	26.00		24660-C4	33.10
	.060	**.180**	(3x)	1/8	1-1/2	74060	835960	74360	21.40	74060-C3	835960-C3	74360-C3	26.00	74060-C4	74360-C4	33.10
NEW	.061	**.183**	(3x)	1/8	1-1/2			74361	21.40			74361-C3	26.00			
	.062 (1/16)	**.093**	(1.5x)	1/8	1-1/2	24562	823462	24662	21.00	24562-C3	823462-C3	24662-C3	25.60	24562-C4	24662-C4	32.70
	.062 (1/16)	**.186**	(3x)	1/8	1-1/2	74062	835962	74362	21.00	74062-C3	835962-C3	74362-C3	25.60	74062-C4	74362-C4	32.70
NEW	.063	**.189**	(3x)	1/8	1-1/2			74363	21.40			74363-C3	26.00			
NEW	.064	**.192**	(3x)	1/8	1-1/2			74364	21.40			74364-C3	26.00			
	.065	**.097**	(1.5x)	1/8	1-1/2	24565		24665	21.00			24665-C3	25.60			
	.065	**.195**	(3x)	1/8	1-1/2	74065		74365	21.00			74365-C3	25.60	74065-C4	74365-C4	32.70
NEW	.066	**.198**	(3x)	1/8	1-1/2			74366	21.40			74366-C3	26.00			
NEW	.067	**.201**	(3x)	1/8	1-1/2			74367	21.40			74367-C3	26.00			
NEW	.068	**.204**	(3x)	1/8	1-1/2			74368	21.40			74368-C3	26.00			
NEW	.069	**.207**	(3x)	1/8	1-1/2			74369	21.40			74369-C3	26.00			
	.070	**.105**	(1.5x)	1/8	1-1/2	24570	823470	24670	21.00	24570-C3	823470-C3	24670-C3	25.60			
	.070	**.210**	(3x)	1/8	1-1/2	74070	835970	74370	21.00	74070-C3	835970-C3	74370-C3	25.60	74070-C4	74370-C4	32.70
	.075	**.112**	(1.5x)	1/8	1-1/2	24575		24675	21.00			24675-C3	25.60			
	.075	**.225**	(3x)	1/8	1-1/2	74075		74375	21.00	74075-C3		74375-C3	25.60	74075-C4		32.70
	.078 (5/64)	**.117**	(1.5x)	1/8	1-1/2	24578	823478	24678	21.00	24578-C3	823478-C3	24678-C3	25.60		24678-C4	32.70
	.078 (5/64)	**.234**	(3x)	1/8	1-1/2	74078	835978	74378	21.00	74078-C3	835978-C3	74378-C3	25.60	74078-C4	74378-C4	32.70
	.080	**.120**	(1.5x)	1/8	1-1/2	24580	823480	24680	21.00		823480-C3	24680-C3	25.60			
	.080	**.240**	(3x)	1/8	1-1/2	74080	835980	74380	21.00	74080-C3	835980-C3	74380-C3	25.60	74080-C4	74380-C4	32.70
	.085	**.127**	(1.5x)	1/8	1-1/2	24585		24685	21.00			24685-C3	25.60			
	.085	**.255**	(3x)	1/8	1-1/2	74085		74385	21.00			74385-C3	25.60			
	.090	**.135**	(1.5x)	1/8	1-1/2	24590	823490	24690	21.00		823490-C3	24690-C3	25.60			
	.090	**.270**	(3x)	1/8	1-1/2	74090	835990	74390	21.00	74090-C3	835990-C3	74390-C3	25.60	74090-C4	74390-C4	32.70
	.093 (3/32)	**.139**	(1.5x)	1/8	1-1/2	24593	823493	24693	21.00	24593-C3	823493-C3	24693-C3	25.60	24593-C4	24693-C4	32.70
	.093 (3/32)	**.279**	(3x)	1/8	1-1/2	74093	835993	74393	21.00	74093-C3	835993-C3	74393-C3	25.60	74093-C4	74393-C4	32.70

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NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

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CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.095	**.142** (1.5x)	1/8	1-1/2	24595		24695	21.00			24695-C3	25.60				
.095	**.285** (3x)	1/8	1-1/2	74095		74395	21.00			74395-C3	25.60				
.100	**.150** (1.5x)	1/8	1-1/2	24599	823500	24699	21.00		823500-C3	24699-C3	25.60				
.100	**.300** (3x)	1/8	1-1/2	74100	836000	74400	21.00	74100-C3	836000-C3	74400-C3	25.60	74100-C4	74400-C4	32.70	
.105	**.158** (1.5x)	1/8	1-1/2	50900		51000	21.00			51000-C3	25.60				
.105	**.315** (3x)	1/8	1-1/2	74105		74405	21.00			74405-C3	25.60				
.109 (7/64)	**.164** (1.5x)	1/8	1-1/2	50901	823502	51001	21.00	50901-C3	823502-C3	51001-C3	25.60				
.109 (7/64)	**.375** (3x)	1/8	1-1/2	74109	836002	74409	21.00	74109-C3	836002-C3	74409-C3	25.60				
.110	**.165** (1.5x)	1/8	1-1/2	50902		51002	21.00			51002-C3	25.60				
.110	**.330** (3x)	1/8	1-1/2	74110		74410	21.00			74410-C3	25.60				
.115	**.173** (1.5x)	1/8	1-1/2	50903		51003	21.00			51003-C3	25.60				
.115	**.345** (3x)	1/8	1-1/2	74115		74415	21.00			74415-C3	25.60				
.118 (3 mm)	**.177** (1.5x)	1/8	1-1/2	50904	823505	51004	21.50		823505-C3	51004-C3	26.10				
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	74118	836005	74418	21.50	74118-C3	836005-C3	74418-C3	26.10				
.120	**.180** (1.5x)	1/8	1-1/2	50905		51005	21.00			51005-C3	25.60				
.120	**.360** (3x)	1/8	1-1/2	74120		74420	21.00			74420-C3	25.60				
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	50908	823508	51008	20.10	50908-C3	823508-C3	51008-C3	24.70	50908-C4	51008-C4	31.80	
.125 (1/8)	**.375** (3x)	1/8	1-1/2	74125	836008	74425	20.10	74125-C3	836008-C3	74425-C3	24.70	74125-C4	74425-C4	31.80	
.140 (9/64)	**.220** (1.5x)	3/16	2	50909		51009	20.60			51009-C3	25.60				
.140 (9/64)	**.562** (3x)	3/16	2	74140		74440	20.60	74140-C3		74440-C3	25.60				
.156 (5/32)	**.281** (1.5x)	3/16	2	50910	823510	51010	21.40		823510-C3	51010-C3	26.40				
.156 (5/32)	**.562** (3x)	3/16	2	74156	836010	74456	21.40	74156-C3	836010-C3	74456-C3	26.40				
.172 (11/64)	**.312** (1.5x)	3/16	2			51011	23.90			51011-C3	28.90				NEW
.172 (11/64)	**.625** (3x)	3/16	2			74472	23.90			74472-C3	28.90				
.187 (3/16)	**.312** (1.5x)	3/16	2	50912	823512	51012	21.40	50912-C3	823512-C3	51012-C3	26.40		51012-C4	37.50	
.187 (3/16)	**.625** (3x)	3/16	2	74187	836012	74487	21.40	74187-C3	836012-C3	74487-C3	26.40	74187-C4	74487-C4	37.50	
.203 (13/64)	**.312** (1.5x)	1/4	2-1/2			51013	26.20			51013-C3	33.00				NEW
.203 (13/64)	**.625** (3x)	1/4	2-1/2			74490	26.20			74490-C3	33.00				
.218 (7/32)	**.330** (1.5x)	1/4	2-1/2	50914	823514	51014	23.60		823514-C3	51014-C3	30.40				
.218 (7/32)	**.625** (3x)	1/4	2-1/2	74193	836014	74493	23.60	74193-C3	836014-C3	74493-C3	30.40				
.234 (15/64)	**.750** (3x)	1/4	2-1/2			74495	26.20			74495-C3	33.00				
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	50916	823516	51016	23.60		823516-C3	51016-C3	30.40		51016-C4	41.90	
.250 (1/4)	**.750** (3x)	1/4	2-1/2	74199	836016	74499	23.60	74199-C3	836016-C3	74499-C3	30.40	74199-C4	74499-C4	41.90	
.312 (5/16)	**.470** (1.5x)	5/16	2-1/2			51020	30.60			51020-C3	38.50				
.312 (5/16)	**.812** (3x)	5/16	2-1/2			74620	30.60			74620-C3	38.50				
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2			51024	38.10			51024-C3	47.10				
.375 (3/8)	**1.000** (3x)	3/8	2-1/2			74624	38.10			74624-C3	47.10				
.500 (1/2)	**1.000** (2x)	1/2	3			74632	58.60			74632-C3	72.00				

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NEW SIZES!

MINIATURE END MILLS

Ball – Long Flute

Stocked in 8 Lengths of Cut!

- **Long flute and long shank design for deep cavities**
- Mills deep pockets
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.005	**.025** (5x)	3	1/8	2-1/2	32205	46.40				
	.008	**.040** (5x)	3	1/8	2-1/2	32208	45.30				
	.010	**.050** (5x)	3	1/8	2-1/2	12810	42.80	12810-C3	47.40	12810-C4	54.50
	.010	**.080** (8x)	3	1/8	2-1/2	34010	71.90	34010-C3	76.50		
	.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	32215	39.50	32215-C3	44.10	32215-C4	51.20
NEW	.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	841015	41.20	841015-C3	45.80		
NEW	.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	877115	45.70	877115-C3	50.30		
NEW	.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	861415	52.60	861415-C3	57.20		
	.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	34015	68.90	34015-C3	73.50	34015-C4	80.60
	.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	35115	87.20	35115-C3	91.80		
	.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	895720	34.00	895720-C3	38.60		
	.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12820	34.00	12820-C3	38.60	12820-C4	45.70
NEW	.020 (.5 mm)	**.100** (5x)	4	1/8	2-1/2	841020	37.80	841020-C3	42.40		
	.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	34020	64.00	34020-C3	68.60		
	.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	957220	76.80	957220-C3	81.40		
	.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	35120	82.10	35120-C3	86.70		
	.025	**.125** (5x)	3	1/8	2-1/2	12825	32.10	12825-C3	36.70	12825-C4	43.80
	.025	**.203** (8x)	3	1/8	2-1/2	34025	62.60	34025-C3	67.20		
	.030	**.150** (5x)	3	1/8	2-1/2	12830	31.30	12830-C3	35.90	12830-C4	43.00
NEW	.030	**.156** (5x)	4	1/8	2-1/2	841030	34.60	841030-C3	39.20		
	.030	**.250** (8x)	3	1/8	2-1/2	34030	60.80	34030-C3	65.40		
	.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	895731	31.30	895731-C3	35.90		
	.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	32231	31.30	32231-C3	35.90	32231-C4	43.00
	.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	841031	34.40	841031-C3	39.00		
	.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	877131	35.20	877131-C3	39.80		
	.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	861431	39.50	861431-C3	44.10		
	.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	34031	60.80	34031-C3	65.40	34031-C4	72.50
	.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	845531	62.40	845531-C3	67.00		
	.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	957231	65.00	957231-C3	69.60		
	.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	35131	70.00	35131-C3	74.60	35131-C4	81.70
	.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	36031	87.50	36031-C3	92.10		
	.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12835	31.30	12835-C3	35.90	12835-C4	43.00
	.035 (.9 mm)	**.281** (8x)	3	1/8	2-1/2	34035	60.80	34035-C3	65.40		
	.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	32239	31.30	32239-C3	35.90		
	.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	34039	60.80	34039-C3	65.40		

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NEW SIZES!

MINIATURE END MILLS

Ball – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.040	**.200** (5x)	3	1/8	2-1/2	12840	31.30	12840-C3	35.90	12840-C4	43.00	
.040	**.200** (5x)	4	1/8	2-1/2	841040	34.60	841040-C3	39.20			NEW
.040	**.240** (6x)	3	1/8	2-1/2	877140	35.20	877140-C3	39.80			
.040	**.281** (7x)	3	1/8	2-1/2	861440	39.50	861440-C3	44.10			
.040	**.325** (8x)	3	1/8	2-1/2	34040	60.80	34040-C3	65.40			
.040	**.480** (12x)	3	1/8	2-1/2	35140	70.00	35140-C3	74.60			
.045	**.225** (5x)	3	1/8	2-1/2	12845	31.30	12845-C3	35.90	12845-C4	43.00	
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	32247	31.30	32247-C3	35.90	32247-C4	43.00	
.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	841047	34.40	841047-C3	39.00			
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	34047	57.40	34047-C3	62.00	34047-C4	69.10	
.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	845547	60.20	845547-C3	64.80			
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	35147	70.00	35147-C3	74.60	35147-C4	81.70	
.050	**.300** (6x)	3	1/8	2-1/2	12850	31.30	12850-C3	35.90	12850-C4	43.00	
.050	**.400** (8x)	3	1/8	2-1/2	34050	60.80	34050-C3	65.40			
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	32255	27.80	32255-C3	32.40			
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12855	31.30	12855-C3	35.90	12855-C4	43.00	
.060	**.312** (5x)	3	1/8	2-1/2	32260	27.80	32260-C3	32.40			
.060	**.500** (8x)	3	1/8	2-1/2	12860	31.80	12860-C3	36.40	12860-C4	43.50	
.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	895762	27.80	895762-C3	32.40	895762-C4	39.50	NEW
.062 (1/16)	**.250** (4x)	4	1/8	2-1/2	801562	29.70	801562-C3	34.30			NEW
.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	32262	27.80	32262-C3	32.40	32262-C4	39.50	
.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	841062	30.60	841062-C3	35.20	841062-C4	42.30	NEW
.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	877162	28.90	877162-C3	33.50			
.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	861462	30.10	861462-C3	34.70			
.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	34062	31.30	34062-C3	35.90	34062-C4	43.00	
.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	845562	34.00	845562-C3	38.60			
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	957262	42.70	957262-C3	47.30			
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	35162	55.00	35162-C3	59.60	35162-C4	66.70	
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	36062	74.90	36062-C3	79.50	36062-C4	86.60	
.065	**.500** (8x)	3	1/8	2-1/2	12865	31.20	12865-C3	35.80	12865-C4	42.90	
.070	**.500** (7x)	3	1/8	2-1/2	12870	31.20	12870-C3	35.80	12870-C4	42.90	
.075	**.500** (7x)	3	1/8	2-1/2	12875	31.20	12875-C3	35.80	12875-C4	42.90	
.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	32278	27.80	32278-C3	32.40	32278-C4	39.50	
.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	841078	30.60	841078-C3	35.20			
.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	34078	31.30	34078-C3	35.90	34078-C4	43.00	
.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	845578	34.00	845578-C3	38.60			
.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	35178	55.00	35178-C3	59.60	35178-C4	66.70	
.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	36078	74.90	36078-C3	79.50	36078-C4	86.60	
.080	**.750** (9x)	3	1/8	2-1/2	12880	31.50	12880-C3	36.10	12880-C4	43.20	
.085	**.750** (9x)	3	1/8	2-1/2	12885	31.50	12885-C3	36.10	12885-C4	43.20	
.090	**.750** (8x)	3	1/8	2-1/2	12890	31.50	12890-C3	36.10	12890-C4	43.20	
.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	895793	27.80	895793-C3	32.40			
.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	32293	27.80	32293-C3	32.40	32293-C4	39.50	
.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	841093	30.60	841093-C3	35.20			
.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	877193	28.90	877193-C3	33.50			
.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	861493	30.10	861493-C3	34.70			

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MINIATURE END MILLS

Ball – Long Flute (cont.)

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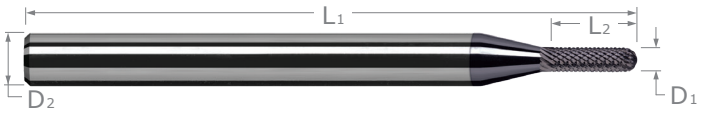
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	34093	31.30	34093-C3	35.90	34093-C4	43.00
.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	845593	34.00	845593-C3	38.60		
.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	957293	42.70	957293-C3	47.30		
.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	35193	55.00	35193-C3	59.60	35193-C4	66.70
.093 (3/32)	**1.400** (15x)	3	1/8	3	36093	76.80	36093-C3	81.40	36093-C4	88.50
.095	**.750** (8x)	3	1/8	2-1/2	12895	31.20	12895-C3	35.80	12895-C4	42.90
.100	**.500** (5x)	3	1/8	2-1/2	32299	27.90	32299-C3	32.50		
.100	**.750** (7.5x)	3	1/8	2-1/2	12899	31.50	12899-C3	36.10	12899-C4	43.20
.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	32302	27.80	32302-C3	32.40		
.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	34102	31.30	34102-C3	35.90		
.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	32305	27.80	32305-C3	32.40		
.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	34105	31.30	34105-C3	35.90		
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	895808	25.70	895808-C3	30.30		
.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	32308	25.70	32308-C3	30.30	32308-C4	37.40
.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	12608	28.30	12608-C3	32.90		
.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	877208	27.20	877208-C3	31.80		
.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	861508	28.40	861508-C3	33.00		
.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	34108	28.40	34108-C3	33.00	34108-C4	40.10
.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	845608	31.30	845608-C3	35.90		
.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	957308	42.20	957308-C3	46.80		
.125 (1/8)	**1.500** (12x)	3	1/8	3	35208	57.20	35208-C3	61.80	35208-C4	68.90
.125 (1/8)	**1.875** (15x)	3	1/8	3	36108	76.80	36108-C3	81.40	36108-C4	88.50
.140 (9/64)	**.750** (5x)	4	3/16	3	12609	30.30	12609-C3	35.30		
.140 (9/64)	**1.125** (8x)	4	3/16	3	34109	33.80	34109-C3	38.80		
.156 (5/32)	**1.000** (6x)	4	3/16	3	12610	30.30	12610-C3	35.30	12610-C4	46.40
NEW .156 (5/32)	**1.093** (7x)	4	3/16	3	856310	35.10	856310-C3	40.10		
.156 (5/32)	**1.250** (8x)	4	3/16	3	34110	33.80	34110-C3	38.80		
.187 (3/16)	**.750** (4x)	4	3/16	3	837012	27.70	837012-C3	32.70		
.187 (3/16)	**1.000** (5x)	4	3/16	3	841112	27.70	841112-C3	32.70		
.187 (3/16)	**1.125** (6x)	4	3/16	3	12612	30.30	12612-C3	35.30	77112	46.40
.187 (3/16)	**1.312** (7x)	4	3/16	3	856312	32.00	856312-C3	37.00		
.187 (3/16)	**1.500** (8x)	4	3/16	3	34112	33.80	34112-C3	38.80		
.187 (3/16)	**1.875** (10x)	4	3/16	3	957312	47.50	957312-C3	52.50		
.250 (1/4)	**1.000** (4x)	4	1/4	4	837016	32.20	837016-C3	40.10		
.250 (1/4)	**1.250** (5x)	4	1/4	4	841116	32.20	841116-C3	40.10		
.250 (1/4)	**1.500** (6x)	4	1/4	4	12616	34.00	12616-C3	41.90	77116	52.30
.250 (1/4)	**1.750** (7x)	4	1/4	4	856316	35.80	856316-C3	43.70		
.250 (1/4)	**2.000** (8x)	4	1/4	4	34116	37.70	34116-C3	45.60		
.312 (5/16)	**1.625** (5x)	4	5/16	4	12620	46.50	12620-C3	56.00		
.375 (3/8)	**1.750** (5x)	4	3/8	4	12624	58.40	12624-C3	70.70		
.500 (1/2)	**2.000** (4x)	4	1/2	4	12632	71.10	12632-C3	84.50		

MINIATURE END MILLS

Ball – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Center cutting (2 flutes to center)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.031 (1/32)	**.093** (3x)	12	10	1/8	2-1/2	892131	28.00	892131-C3	32.60
.062 (1/16)	**.186** (3x)	14	12	1/8	2-1/2	892162	27.00	892162-C3	31.60
.093 (3/32)	**.279** (3x)	14	12	1/8	2-1/2	892193	27.00	892193-C3	31.60
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	16	13	1/8	2-1/2	892208	25.60	892208-C3	30.20
.187 (3/16)	**.561** (3x)	16	13	3/16	2-1/2	892212	35.60	892212-C3	40.60
.250 (1/4)	**.750** (3x)	16	13	1/4	2-1/2	892216	45.60	892216-C3	52.40

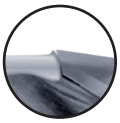
View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com.

MINIATURE END MILLS

Ball – Long Reach, Standard Flute

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.010	.030	**.050** (5x)	1/8	1-1/2	948610	982810	62.30	982810-C3	66.90
.010	.030	**.080** (8x)	1/8	1-1/2	76610	76810	62.60	76810-C3	67.20
.010	.030	**.125** (12x)	1/8	1-1/2	950210	991110	63.60	991110-C3	68.20
.015 (1/64)	.045	**.078** (5x)	1/8	1-1/2	948615	982815	48.40	982815-C3	53.00
.015 (1/64)	.045	**.128** (8x)	1/8	1-1/2	76615	76815	49.50	76815-C3	54.10
.015 (1/64)	.045	**.156** (10x)	1/8	1-1/2		851015	51.20	851015-C3	55.80
.015 (1/64)	.045	**.187** (12x)	1/8	1-1/2	950215	991115	51.20	991115-C3	55.80
.015 (1/64)	.045	**.225** (15x)	1/8	1-1/2		861215	53.90	861215-C3	58.50
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2	948620	982820	47.40	982820-C3	52.00
.020 (.5 mm)	.060	**.170** (8x)	1/8	1-1/2	76620	76820	47.60	76820-C3	52.20
.020 (.5 mm)	.060	**.200** (10x)	1/8	1-1/2		851020	49.10	851020-C3	53.70
.020 (.5 mm)	.060	**.250** (12x)	1/8	1-1/2	950220	991120	49.10	991120-C3	53.70
.020 (.5 mm)	.060	**.300** (15x)	1/8	1-1/2		861220	51.80	861220-C3	56.40
.025	.075	**.125** (5x)	1/8	1-1/2	948625	982825	43.30	982825-C3	47.90
.025	.075	**.213** (8x)	1/8	1-1/2	76625	76825	43.50	76825-C3	48.10
.025	.075	**.312** (12x)	1/8	1-1/2	950225	991125	45.10	991125-C3	49.70
.030	.090	**.156** (5x)	1/8	1-1/2	948630	982830	43.30	982830-C3	47.90
.030	.090	**.270** (9x)	1/8	1-1/2	76630	76830	43.50	76830-C3	48.10
.030	.090	**.375** (12x)	1/8	1-1/2	950230	991130	45.10	991130-C3	49.70
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2	948631	982831	42.50	982831-C3	47.10
.031 (1/32)	.093	**.250** (8x)	1/8	1-1/2		904431	43.50	904431-C3	48.10
.031 (1/32)	.093	**.279** (9x)	1/8	1-1/2	76631	76831	43.50	76831-C3	48.10
.031 (1/32)	.093	**.312** (10x)	1/8	1-1/2		851031	45.10	851031-C3	49.70
.031 (1/32)	.093	**.375** (12x)	1/8	1-1/2	950231	991131	45.10	991131-C3	49.70
.031 (1/32)	.093	**.470** (15x)	1/8	1-1/2		861231	47.70	861231-C3	52.30
.035 (.9 mm)	.105	**.187** (5x)	1/8	1-1/2	948635	982835	42.50	982835-C3	47.10
.035 (.9 mm)	.105	**.315** (9x)	1/8	1-1/2	76635	76835	43.50	76835-C3	48.10
.039 (1 mm)	.117	**.203** (5x)	1/8	1-1/2	948639	982839	42.50	982839-C3	47.10
.039 (1 mm)	.117	**.325** (8x)	1/8	1-1/2	903839	904439	43.50	904439-C3	48.10
.040	.120	**.203** (5x)	1/8	1-1/2	948640	982840	42.50	982840-C3	47.10
.040	.120	**.360** (9x)	1/8	1-1/2	76640	76840	43.50	76840-C3	48.10
.040	.120	**.480** (12x)	1/8	1-1/2	950240	991140	45.10	991140-C3	49.70
.045	.135	**.405** (9x)	1/8	1-1/2	76645	76845	42.20	76845-C3	46.80
.047 (3/64)	.141	**.250** (5x)	1/8	1-1/2	948647	982847	41.20	982847-C3	45.80
.047 (3/64)	.141	**.423** (9x)	1/8	1-1/2	76647	76847	42.20	76847-C3	46.80
.047 (3/64)	.141	**.480** (10x)	1/8	1-1/2		851047	43.50	851047-C3	48.10
.047 (3/64)	.141	**.570** (12x)	1/8	1-1/2	950247	991147	43.50	991147-C3	48.10
.047 (3/64)	.141	**.710** (15x)	1/8	2		861247	46.20	861247-C3	50.80

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MINIATURE END MILLS

Ball – Long Reach, Standard Flute (cont.)

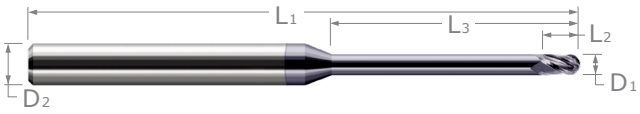
continued from previous page

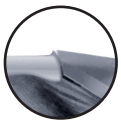
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.050	.150	**.250** (5x)	1/8	1-1/2	948650	982850	41.20	982850-C3	45.80
.050	.150	**.500** (10x)	1/8	1-1/2	76650	76850	42.20	76850-C3	46.80
.055 (1.4 mm)	.165	**.500** (9x)	1/8	1-1/2	76655	76855	42.20	76855-C3	46.80
.060	.180	**.500** (8x)	1/8	1-1/2	76660	76860	42.20	76860-C3	46.80
.060	.180	**.720** (12x)	1/8	2	950260	991160	43.50	991160-C3	48.10
.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2	948662	982862	41.20	982862-C3	45.80
.062 (1/16)	.186	**.375** (6x)	1/8	1-1/2		805762	42.20	805762-C3	46.80
.062 (1/16)	.186	**.437** (7x)	1/8	1-1/2		805562	42.20	805562-C3	46.80
.062 (1/16)	.186	**.500** (8x)	1/8	1-1/2	76662	76862	42.20	76862-C3	46.80
.062 (1/16)	.186	**.625** (10x)	1/8	2	811062	851062	43.50	851062-C3	48.10
.062 (1/16)	.186	**.750** (12x)	1/8	2	950262	991162	43.50	991162-C3	48.10
.062 (1/16)	.186	**.950** (15x)	1/8	2		861262	46.20	861262-C3	50.80
.065	.195	**.500** (8x)	1/8	1-1/2	76665	76865	42.20	76865-C3	46.80
.070	.210	**.500** (7x)	1/8	1-1/2	76670	76870	42.20	76870-C3	46.80
.075	.225	**.500** (7x)	1/8	1-1/2	76675	76875	42.20	76875-C3	46.80
.078 (5/64)	.234	**.500** (6x)	1/8	1-1/2	76678	76878	42.20	76878-C3	46.80
.078 (5/64)	.234	**.800** (10x)	1/8	2		851078	43.50	851078-C3	48.10
.078 (5/64)	.234	**.940** (12x)	1/8	2	950278	991178	43.50	991178-C3	48.10
.078 (5/64)	.234	**1.187** (15x)	1/8	2-1/2		861278	46.20	861278-C3	50.80
.080	.240	**.500** (6x)	1/8	1-1/2	76680	76880	42.20	76880-C3	46.80
.085	.255	**.500** (6x)	1/8	1-1/2	76685	76885	41.40	76885-C3	46.00
.090	.270	**.625** (7x)	1/8	1-1/2	76690	76890	42.20	76890-C3	46.80
.093 (3/32)	.279	**.500** (5x)	1/8	1-1/2	948693	982893	42.00	982893-C3	46.60
.093 (3/32)	.279	**.625** (7x)	1/8	1-1/2	76693	76893	42.20	76893-C3	46.80
.093 (3/32)	.279	**.950** (10x)	1/8	2		851093	43.50	851093-C3	48.10
.093 (3/32)	.279	**1.125** (12x)	1/8	2	950293	991193	43.50	991193-C3	48.10
.093 (3/32)	.279	**1.400** (15x)	1/8	2-1/2		861293	46.20	861293-C3	50.80
.095	.285	**.625** (6x)	1/8	1-1/2	76695	76895	42.20	76895-C3	46.80
.100	.300	**.625** (6x)	1/8	1-1/2	76700	76900	42.20	76900-C3	46.80
.109 (7/64)	.327	**.570** (5x)	1/8	1-1/2	948602	982902	42.00	982902-C3	46.60
.109 (7/64)	.327	**.900** (8x)	1/8	2	903802	904402	43.50	904402-C3	48.10
.118 (3 mm)	.354	**.625** (5x)	1/8	1-1/2	948705	982905	42.00	982905-C3	46.60
.118 (3 mm)	.354	**.950** (8x)	1/8	2	903805	904405	43.50	904405-C3	48.10
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	.375	**.625** (5x)	1/8	1-1/2	948708	982908	42.00	982908-C3	46.60
.125 (1/8)	.375	**1.000** (8x)	1/8	2	76708	76908	42.20	76908-C3	46.80
.125 (1/8)	.375	**1.250** (10x)	1/8	2-1/2		851108	44.90	851108-C3	49.50
.125 (1/8)	.375	**1.500** (12x)	1/8	2-1/2	950308	991208	44.90	991208-C3	49.50
.125 (1/8)	.375	**1.875** (15x)	1/8	3		861308	48.70	861308-C3	53.30
.187 (3/16)	.570	**1.000** (5x)	3/16	2	948712	982912	48.40	982912-C3	53.40
.187 (3/16)	.570	**1.500** (8x)	3/16	2-1/2	76712	76912	48.60	76912-C3	53.60
.250 (1/4)	.750	**1.250** (5x)	1/4	2-1/2	948716	982916	52.90	982916-C3	59.70
.250 (1/4)	.750	**2.000** (8x)	1/4	4	76716	76916	53.20	76916-C3	61.10

NEW SIZES!

MINIATURE END MILLS

Ball – Long Reach, Stub Flute





Reduced Neck Diameter to Avoid Heeling

- **Long length design for deep cavities, up to 8" overall length**
- Stub flutes for maximum rigidity
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005" −.0005"	L_2 +.010" −.000"	L_3 +.010" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.010	.015	**.030** (3x)	3	1/8	2-1/2	47910	57.30	47910-C3	61.90		
.010	.015	**.050** (5x)	3	1/8	2-1/2	33410	57.30	33410-C3	61.90	33410-C4	69.00
.010	.015	**.080** (8x)	3	1/8	2-1/2	34210	57.90	34210-C3	62.50	34210-C4	69.60
.010	.015	**.100** (10x)	3	1/8	2-1/2	966010	60.40	966010-C3	65.00		
.010	.015	**.125** (12x)	3	1/8	2-1/2	35610	60.40	35610-C3	65.00	35610-C4	72.10
.010	.015	**.150** (15x)	3	1/8	2-1/2	49210	68.00	49210-C3	72.60	49210-C4	79.70
.010	.015	**.180** (18x)	3	1/8	2-1/2	970710	77.10	970710-C3	81.70		
.011	.016	**.055** (5x)	3	1/8	2-1/2	33411	57.30	33411-C3	61.90		
.011	.016	**.088** (8x)	3	1/8	2-1/2	34211	57.90	34211-C3	62.50		
.012 (.3 mm)	.018	**.060** (5x)	3	1/8	2-1/2	33412	57.30	33412-C3	61.90		
.012 (.3 mm)	.018	**.096** (8x)	3	1/8	2-1/2	34212	57.90	34212-C3	62.50		
.013	.019	**.065** (5x)	3	1/8	2-1/2	33413	57.30	33413-C3	61.90		
.013	.019	**.104** (8x)	3	1/8	2-1/2	34213	57.90	34213-C3	62.50		
.014	.021	**.070** (5x)	3	1/8	2-1/2	33414	57.30	33414-C3	61.90		
.014	.021	**.112** (8x)	3	1/8	2-1/2	34214	57.90	34214-C3	62.50		
.015 (1/64)	.022	**.045** (3x)	3	1/8	2-1/2	47915	47.80	47915-C3	52.40		
.015 (1/64)	.022	**.062** (4x)	3	1/8	2-1/2	844415	47.80	844415-C3	52.40		
.015 (1/64)	.022	**.078** (5x)	3	1/8	2-1/2	33415	47.80	33415-C3	52.40	33415-C4	59.50
.015 (1/64)	.022	**.093** (6x)	3	1/8	2-1/2	860615	47.80	860615-C3	52.40		
.015 (1/64)	.022	**.109** (7x)	3	1/8	2-1/2	868215	47.80	868215-C3	52.40		
.015 (1/64)	.022	**.125** (8x)	3	1/8	2-1/2	34215	48.90	34215-C3	53.50	34215-C4	60.60
.015 (1/64)	.022	**.156** (10x)	3	1/8	2-1/2	966015	50.20	966015-C3	54.80	966015-C4	61.90
.015 (1/64)	.022	**.187** (12x)	3	1/8	2-1/2	35615	50.20	35615-C3	54.80	35615-C4	61.90
.015 (1/64)	.022	**.225** (15x)	3	1/8	2-1/2	49215	55.60	49215-C3	60.20	49215-C4	67.30
.015 (1/64)	.022	**.270** (18x)	3	1/8	2-1/2	970715	64.50	970715-C3	69.10		
.015 (1/64)	.022	**.300** (20x)	3	1/8	2-1/2	59415	64.50	59415-C3	69.10	59415-C4	76.20
.015 (1/64)	.022	**.375** (25x)	3	1/8	2-1/2	40115	81.70	40115-C3	86.30	***25x Diameter!***	
.016 (.4 mm)	.024	**.080** (5x)	3	1/8	2-1/2	33416	50.20	33416-C3	54.80		
.016 (.4 mm)	.024	**.128** (8x)	3	1/8	2-1/2	34216	51.20	34216-C3	55.80		
.017	.026	**.085** (5x)	3	1/8	2-1/2	33417	50.20	33417-C3	54.80		
.017	.026	**.136** (8x)	3	1/8	2-1/2	34217	51.20	34217-C3	55.80		
.018	.027	**.090** (5x)	3	1/8	2-1/2	33418	50.20	33418-C3	54.80		
.018	.027	**.144** (8x)	3	1/8	2-1/2	34218	51.20	34218-C3	55.80		
.019	.029	**.095** (5x)	3	1/8	2-1/2	33419	50.20	33419-C3	54.80		
.019	.029	**.152** (8x)	3	1/8	2-1/2	34219	51.20	34219-C3	55.80		
.020 (.5 mm)	.030	**.060** (3x)	3	1/8	2-1/2	47920	46.20	47920-C3	50.80		
.020 (.5 mm)	.030	**.080** (4x)	3	1/8	2-1/2	844420	46.20	844420-C3	50.80		
.020 (.5 mm)	.030	**.100** (5x)	3	1/8	2-1/2	33420	46.20	33420-C3	50.80	33420-C4	57.90

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.020 (.5 mm)	.030	**.100** (5x)	4	1/8	2-1/2	803120	46.20	803120-C3	50.80			NEW
.020 (.5 mm)	.030	**.120** (6x)	3	1/8	2-1/2	860620	46.20	860620-C3	50.80			
.020 (.5 mm)	.030	**.140** (7x)	3	1/8	2-1/2	868220	46.20	868220-C3	50.80			
.020 (.5 mm)	.030	**.160** (8x)	3	1/8	2-1/2	34220	47.50	34220-C3	52.10	34220-C4	59.20	
.020 (.5 mm)	.030	**.160** (8x)	4	1/8	2-1/2	801320	47.50	801320-C3	52.10			NEW
.020 (.5 mm)	.030	**.200** (10x)	3	1/8	2-1/2	966020	48.70	966020-C3	53.30	966020-C4	60.40	NEW
.020 (.5 mm)	.030	**.250** (12x)	3	1/8	2-1/2	35620	48.70	35620-C3	53.30	35620-C4	60.40	
.020 (.5 mm)	.030	**.300** (15x)	3	1/8	2-1/2	49220	53.90	49220-C3	58.50	49220-C4	65.60	
.020 (.5 mm)	.030	**.360** (18x)	3	1/8	2-1/2	970720	64.00	970720-C3	68.60			
.020 (.5 mm)	.030	**.400** (20x)	3	1/8	2-1/2	59420	64.00	59420-C3	68.60	59420-C4		
.020 (.5 mm)	.030	**.500** (25x)	3	1/8	2-1/2	40120	79.80	40120-C3	84.40	***25x Diameter!***		
.020 (.5 mm)	.030	**.600** (30x)	3	1/8	2-1/2	922720	87.80	922720-C3	96.70	***30x Diameter!***		
.021	.031	**.105** (5x)	3	1/8	2-1/2	33421	50.20	33421-C3	54.80			
.021	.031	**.168** (8x)	3	1/8	2-1/2	34221	51.20	34221-C3	55.80			
.022	.033	**.110** (5x)	3	1/8	2-1/2	33422	50.20	33422-C3	54.80			
.022	.033	**.176** (8x)	3	1/8	2-1/2	34222	51.20	34222-C3	55.80			
.023	.035	**.115** (5x)	3	1/8	2-1/2	33423	50.20	33423-C3	54.80			
.023	.035	**.187** (8x)	3	1/8	2-1/2	34223	51.20	34223-C3	55.80			
.024 (.6 mm)	.036	**.120** (5x)	3	1/8	2-1/2	33424	50.20	33424-C3	54.80			
.024 (.6 mm)	.036	**.192** (8x)	3	1/8	2-1/2	34224	51.20	34224-C3	55.80			
.025	.037	**.075** (3x)	3	1/8	2-1/2	47925	40.10	47925-C3	44.70			
.025	.037	**.125** (5x)	3	1/8	2-1/2	33425	40.10	33425-C3	44.70	33425-C4	51.80	
.025	.037	**.203** (8x)	3	1/8	2-1/2	34225	40.80	34225-C3	45.40	34225-C4	52.50	
.025	.037	**.250** (10x)	3	1/8	2-1/2	966025	42.20	966025-C3	46.80			
.025	.037	**.312** (12x)	3	1/8	2-1/2	35625	42.20	35625-C3	46.80	35625-C4	53.90	
.025	.037	**.375** (15x)	3	1/8	2-1/2	49225	48.30	49225-C3	52.90	49225-C4	60.00	
.026	.039	**.130** (5x)	3	1/8	2-1/2	33426	50.20	33426-C3	54.80			
.026	.039	**.208** (8x)	3	1/8	2-1/2	34226	51.20	34226-C3	55.80			
.027	.041	**.135** (5x)	3	1/8	2-1/2	33427	50.20	33427-C3	54.80			
.027	.041	**.216** (8x)	3	1/8	2-1/2	34227	51.20	34227-C3	55.80			
.028 (.7 mm)	.042	**.140** (5x)	3	1/8	2-1/2	33428	50.20	33428-C3	54.80			
.028 (.7 mm)	.042	**.224** (8x)	3	1/8	2-1/2	34228	51.20	34228-C3	55.80			
.029	.043	**.145** (5x)	3	1/8	2-1/2	33429	50.20	33429-C3	54.80			
.029	.043	**.232** (8x)	3	1/8	2-1/2	34229	51.20	34229-C3	55.80			
.030	.045	**.090** (3x)	3	1/8	2-1/2	47930	40.10	47930-C3	44.70			
.030	.045	**.156** (5x)	3	1/8	2-1/2	33430	40.10	33430-C3	44.70	33430-C4	51.80	
.030	.045	**.250** (8x)	3	1/8	2-1/2	34230	40.80	34230-C3	45.40	34230-C4	52.50	
.030	.045	**.312** (10x)	3	1/8	2-1/2	966030	42.20	966030-C3	46.80			
.030	.045	**.375** (12x)	3	1/8	2-1/2	35630	42.20	35630-C3	46.80	35630-C4	53.90	
.030	.045	**.450** (15x)	3	1/8	2-1/2	49230	48.30	49230-C3	52.90	49230-C4	60.00	
.030	.045	**.540** (18x)	3	1/8	2-1/2	970730	58.10	970730-C3	62.70			
.031 (1/32)	.046	**.093** (3x)	3	1/8	2-1/2	47931	40.10	47931-C3	44.70	47931-C4	51.80	
.031 (1/32)	.046	**.125** (4x)	3	1/8	2-1/2	844431	40.10	844431-C3	44.70			
.031 (1/32)	.046	**.156** (5x)	3	1/8	2-1/2	33431	40.10	33431-C3	44.70	33431-C4	51.80	
.031 (1/32)	.046	**.156** (5x)	4	1/8	2-1/2	803131	40.10	803131-C3	44.70			NEW
.031 (1/32)	.046	**.187** (6x)	3	1/8	2-1/2	860631	40.10	860631-C3	44.70			
.031 (1/32)	.046	**.218** (7x)	3	1/8	2-1/2	868231	40.10	868231-C3	44.70			NEW

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Ball – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.031 (1/32)	.046	**.250** (8x)	3	1/8	2-1/2	34231	40.80	34231-C3	45.40	34231-C4	52.50
NEW	.031 (1/32)	.046	**.250** (8x)	4	1/8	2-1/2	801331	40.80	801331-C3	45.40		
	.031 (1/32)	.046	**.312** (10x)	3	1/8	2-1/2	966031	42.20	966031-C3	46.80	966031-C4	53.90
	.031 (1/32)	.046	**.375** (12x)	3	1/8	2-1/2	35631	42.20	35631-C3	46.80	35631-C4	53.90
	.031 (1/32)	.046	**.470** (15x)	3	1/8	2-1/2	49231	48.30	49231-C3	52.90	49231-C4	60.00
	.031 (1/32)	.046	**.565** (18x)	3	1/8	2-1/2	970731	58.10	970731-C3	62.70	970731-C4	69.80
	.031 (1/32)	.046	**.625** (20x)	3	1/8	2-1/2	59431	58.10	59431-C3	62.70	59431-C4	
	.031 (1/32)	.046	**.775** (25x)	3	1/8	2-1/2	40131	69.50	40131-C3	74.10	40131-C4	81.20
	.031 (1/32)	.046	**.937** (30x)	3	1/8	2-1/2	922731	81.30	922731-C3	85.90	***30x Diameter!***	
	.035 (.9 mm)	.052	**.187** (5x)	3	1/8	2-1/2	33435	40.10	33435-C3	44.70	33435-C4	51.80
	.035 (.9 mm)	.052	**.281** (8x)	3	1/8	2-1/2	34235	40.80	34235-C3	45.40	34235-C4	52.50
	.035 (.9 mm)	.052	**.425** (12x)	3	1/8	2-1/2	35635	42.70	35635-C3	47.30	35635-C4	54.40
	.035 (.9 mm)	.052	**.525** (15x)	3	1/8	2-1/2	49235	48.30	49235-C3	52.90		
	.039 (1 mm)	.059	**.203** (5x)	3	1/8	2-1/2	33439	40.30	33439-C3	44.90		
	.039 (1 mm)	.059	**.325** (8x)	3	1/8	2-1/2	34239	40.80	34239-C3	45.40		
	.039 (1 mm)	.059	**.400** (10x)	3	1/8	2-1/2	966039	42.70	966039-C3	47.30		
	.040	.060	**.120** (3x)	3	1/8	2-1/2	47940	40.10	47940-C3	44.70		
	.040	.060	**.203** (5x)	3	1/8	2-1/2	33440	40.10	33440-C3	44.70	33440-C4	51.80
	.040	.060	**.240** (6x)	3	1/8	2-1/2	860640	40.10	860640-C3	44.70		
	.040	.060	**.281** (7x)	3	1/8	2-1/2	868240	40.10	868240-C3	44.70		
	.040	.060	**.325** (8x)	3	1/8	2-1/2	34240	40.80	34240-C3	45.40	34240-C4	52.50
	.040	.060	**.400** (10x)	3	1/8	2-1/2	966040	42.70	966040-C3	47.30	966040-C4	54.40
	.040	.060	**.480** (12x)	3	1/8	2-1/2	35640	42.70	35640-C3	47.30	35640-C4	54.40
	.040	.060	**.600** (15x)	3	1/8	2-1/2	49240	48.30	49240-C3	52.90	49240-C4	60.00
	.040	.060	**.720** (18x)	3	1/8	2-1/2	970740	58.10	970740-C3	62.70		
	.040	.060	**.800** (20x)	3	1/8	2-1/2	59440	58.10	59440-C3	62.70	59440-C4	69.80
	.040	.060	**1.000** (25x)	3	1/8	2-1/2	40140	69.50	40140-C3	74.10	***25x Diameter!***	
	.045	.067	**.225** (5x)	3	1/8	2-1/2	33445	39.10	33445-C3	43.70	33445-C4	50.80
	.045	.067	**.375** (8x)	3	1/8	2-1/2	34245	40.00	34245-C3	44.60	34245-C4	51.70
	.045	.067	**.550** (12x)	3	1/8	2-1/2	35645	41.10	35645-C3	45.70	35645-C4	52.80
	.045	.067	**.680** (15x)	3	1/8	2-1/2	49245	45.70	49245-C3	50.30		
	.047 (3/64)	.070	**.141** (3x)	3	1/8	2-1/2	47947	39.10	47947-C3	43.70		
	.047 (3/64)	.070	**.187** (4x)	3	1/8	2-1/2	844447	39.10	844447-C3	43.70		
	.047 (3/64)	.070	**.250** (5x)	3	1/8	2-1/2	33447	39.10	33447-C3	43.70	33447-C4	50.80
	.047 (3/64)	.070	**.281** (6x)	3	1/8	2-1/2	860647	39.10	860647-C3	43.70		
	.047 (3/64)	.070	**.328** (7x)	3	1/8	2-1/2	868247	39.10	868247-C3	43.70		
	.047 (3/64)	.070	**.375** (8x)	3	1/8	2-1/2	34247	40.00	34247-C3	44.60	34247-C4	51.70
	.047 (3/64)	.070	**.480** (10x)	3	1/8	2-1/2	966047	41.10	966047-C3	45.70	966047-C4	52.80
	.047 (3/64)	.070	**.570** (12x)	3	1/8	2-1/2	35647	41.10	35647-C3	45.70	35647-C4	52.80
	.047 (3/64)	.070	**.710** (15x)	3	1/8	2-1/2	49247	45.70	49247-C3	50.30	49247-C4	57.40
	.047 (3/64)	.070	**.850** (18x)	3	1/8	2-1/2	970747	54.70	970747-C3	59.30		
	.047 (3/64)	.070	**.950** (20x)	3	1/8	2-1/2	59447	54.70	59447-C3	59.30	59447-C4	66.40
	.047 (3/64)	.070	**1.187** (25x)	3	1/8	2-1/2	40147	67.00	40147-C3	71.60	***25x Diameter!***	

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Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.050	.075	**.150** (3x)	3	1/8	2-1/2	47950	39.10	47950-C3	43.70			
.050	.075	**.250** (5x)	3	1/8	2-1/2	33450	39.10	33450-C3	43.70	33450-C4	50.80	
.050	.075	**.400** (8x)	3	1/8	2-1/2	34250	40.00	34250-C3	44.60	34250-C4	51.70	
.050	.075	**.500** (10x)	3	1/8	2-1/2	966050	41.10	966050-C3	45.70			
.050	.075	**.600** (12x)	3	1/8	2-1/2	35650	41.10	35650-C3	45.70	35650-C4	52.80	
.050	.075	**.750** (15x)	3	1/8	2-1/2	49250	45.70	49250-C3	50.30			
.055 (1.4 mm)	.082	**.165** (3x)	3	1/8	2-1/2	47955	39.10	47955-C3	43.70			
.055 (1.4 mm)	.082	**.275** (5x)	3	1/8	2-1/2	33455	39.10	33455-C3	43.70	33455-C4	50.80	
.055 (1.4 mm)	.082	**.450** (8x)	3	1/8	2-1/2	34255	40.00	34255-C3	44.60	34255-C4	51.70	
.055 (1.4 mm)	.082	**.560** (10x)	3	1/8	2-1/2	966055	41.10	966055-C3	45.70			
.055 (1.4 mm)	.082	**.660** (12x)	3	1/8	2-1/2	35655	41.10	35655-C3	45.70	35655-C4	52.80	
.060	.090	**.180** (3x)	3	1/8	2-1/2	47960	39.10	47960-C3	43.70			
.060	.090	**.312** (5x)	3	1/8	2-1/2	33460	39.10	33460-C3	43.70	33460-C4	50.80	
.060	.090	**.500** (8x)	3	1/8	2-1/2	34260	40.00	34260-C3	44.60	34260-C4	51.70	
.060	.090	**.625** (10x)	3	1/8	2-1/2	966060	41.10	966060-C3	45.70			
.060	.090	**.720** (12x)	3	1/8	2-1/2	35660	41.10	35660-C3	45.70	35660-C4	52.80	
.060	.090	**.900** (15x)	3	1/8	2-1/2	49260	45.70	49260-C3	50.30			
.060	.090	**1.062** (18x)	3	1/8	2-1/2	970760	54.70	970760-C3	59.30			
.060	.090	**1.200** (20x)	3	1/8	2-1/2	59460	54.70	59460-C3	59.30			
.062 (1/16)	.093	**.186** (3x)	3	1/8	2-1/2	47962	39.10	47962-C3	43.70	47962-C4	50.80	
.062 (1/16)	.093	**.250** (4x)	3	1/8	2-1/2	844462	39.10	844462-C3	43.70			
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	33462	39.10	33462-C3	43.70	33462-C4	50.80	
.062 (1/16)	.093	**.312** (5x)	4	1/8	2-1/2	803162	39.10	803162-C3	43.70			NEW
.062 (1/16)	.093	**.375** (6x)	3	1/8	2-1/2	860662	39.10	860662-C3	43.70	860662-C4	50.80	
.062 (1/16)	.093	**.437** (7x)	3	1/8	2-1/2	868262	39.10	868262-C3	43.70			
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	34262	40.00	34262-C3	44.60	34262-C4	51.70	
.062 (1/16)	.093	**.500** (8x)	4	1/8	2-1/2	801362	40.00	801362-C3	44.60			NEW
.062 (1/16)	.093	**.558** (9x)	3	1/8	2-1/2	805362	41.10	805362-C3	45.70			
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	966062	41.10	966062-C3	45.70	966062-C4	52.80	
.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	35662	41.10	35662-C3	45.70	35662-C4	52.80	
.062 (1/16)	.093	**.950** (15x)	3	1/8	2-1/2	49262	45.70	49262-C3	50.30	49262-C4	57.40	
.062 (1/16)	.093	**1.125** (18x)	3	1/8	2-1/2	970762	54.70	970762-C3	59.30	970762-C4	66.40	
.062 (1/16)	.093	**1.250** (20x)	3	1/8	2-1/2	59462	54.70	59462-C3	59.30	59462-C4	66.40	
.062 (1/16)	.093	**1.550** (25x)	3	1/8	3	40162	67.00	40162-C3	71.60	40162-C4	78.70	
.062 (1/16)	.093	**1.875** (30x)	3	1/8	3	922762	85.20	922762-C3	89.80	***30x Diameter!***		
.065	.097	**.325** (5x)	3	1/8	2-1/2	33465	39.10	33465-C3	43.70			
.065	.097	**.530** (8x)	3	1/8	2-1/2	34265	40.00	34265-C3	44.60	34265-C4	51.70	
.070	.105	**.375** (5x)	3	1/8	2-1/2	33470	39.10	33470-C3	43.70			
.070	.105	**.570** (8x)	3	1/8	2-1/2	34270	40.00	34270-C3	44.60	34270-C4	51.70	
.075	.112	**.375** (5x)	3	1/8	2-1/2	33475	39.10	33475-C3	43.70			
.075	.112	**.625** (8x)	3	1/8	2-1/2	34275	40.00	34275-C3	44.60	34275-C4	51.70	
.078 (5/64)	.117	**.234** (3x)	3	1/8	2-1/2	47978	39.10	47978-C3	43.70			
.078 (5/64)	.117	**.312** (4x)	3	1/8	2-1/2	844478	39.10	844478-C3	43.70			
.078 (5/64)	.117	**.406** (5x)	3	1/8	2-1/2	33478	39.10	33478-C3	43.70	33478-C4	50.80	
.078 (5/64)	.117	**.475** (6x)	3	1/8	2-1/2	860678	39.10	860678-C3	43.70			
.078 (5/64)	.117	**.550** (7x)	3	1/8	2-1/2	868278	39.10	868278-C3	43.70			
.078 (5/64)	.117	**.625** (8x)	3	1/8	2-1/2	34278	40.00	34278-C3	44.60	34278-C4	51.70	

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.078 (5/64)	.117	**.800** (10x)	3	1/8	2-1/2	966078	41.10	966078-C3	45.70		
	.078 (5/64)	.117	**.940** (12x)	3	1/8	2-1/2	35678	41.10	35678-C3	45.70	35678-C4	52.80
	.078 (5/64)	.117	**1.187** (15x)	3	1/8	2-1/2	49278	45.70	49278-C3	50.30	49278-C4	57.40
	.078 (5/64)	.117	**1.400** (18x)	3	1/8	3	970778	54.70	970778-C3	59.30		
	.078 (5/64)	.117	**1.562** (20x)	3	1/8	3	59478	54.70	59478-C3	59.30		
	.078 (5/64)	.117	**1.950** (25x)	3	1/8	3	40178	67.00	40178-C3	71.60	***25x Diameter!***	
	.080	.120	**.406** (5x)	3	1/8	2-1/2	33480	39.10	33480-C3	43.70		
	.080	.120	**.650** (8x)	3	1/8	2-1/2	34280	40.00	34280-C3	44.60	34280-C4	51.70
	.085	.127	**.425** (5x)	3	1/8	2-1/2	33485	39.10	33485-C3	43.70		
	.085	.127	**.700** (8x)	3	1/8	2-1/2	34285	40.00	34285-C3	44.60	34285-C4	51.70
	.090	.135	**.450** (5x)	3	1/8	2-1/2	33490	39.10	33490-C3	43.70		
	.090	.135	**.750** (8x)	3	1/8	2-1/2	34290	40.00	34290-C3	44.60	34290-C4	51.70
	.093 (3/32)	.139	**.279** (3x)	3	1/8	2-1/2	47993	39.10	47993-C3	43.70		
	.093 (3/32)	.139	**.375** (4x)	3	1/8	2-1/2	844493	39.10	844493-C3	43.70		
	.093 (3/32)	.139	**.500** (5x)	3	1/8	2-1/2	33493	39.10	33493-C3	43.70	33493-C4	50.80
NEW	.093 (3/32)	.139	**.500** (5x)	4	1/8	2-1/2	803193	39.10	803193-C3	43.70		
	.093 (3/32)	.139	**.585** (6x)	3	1/8	2-1/2	860693	39.10	860693-C3	43.70		
	.093 (3/32)	.139	**.670** (7x)	3	1/8	2-1/2	868293	39.10	868293-C3	43.70		
	.093 (3/32)	.139	**.750** (8x)	3	1/8	2-1/2	34293	40.00	34293-C3	44.60	34293-C4	51.70
NEW	.093 (3/32)	.139	**.750** (8x)	4	1/8	2-1/2	801393	40.00	801393-C3	44.60		
	.093 (3/32)	.139	**.950** (10x)	3	1/8	2-1/2	966093	41.10	966093-C3	45.70	966093-C4	52.80
	.093 (3/32)	.139	**1.125** (12x)	3	1/8	2-1/2	35693	41.10	35693-C3	45.70	35693-C4	52.80
	.093 (3/32)	.139	**1.400** (15x)	3	1/8	3	49293	48.00	49293-C3	52.60	49293-C4	59.70
	.093 (3/32)	.139	**1.675** (18x)	3	1/8	3	970793	58.00	970793-C3	62.60		
	.093 (3/32)	.139	**1.875** (20x)	3	1/8	4	59493	60.50	59493-C3	65.50		
	.093 (3/32)	.139	**2.312** (25x)	3	1/8	4	40193	69.30	40193-C3	74.30	***25x Diameter!***	
	.093 (3/32)	.139	**2.812** (30x)	3	1/8	4	922793	92.90	922793-C3	97.90	***30x Diameter!***	
	.095	.142	**.500** (5x)	3	1/8	2-1/2	33495	39.10	33495-C3	43.70		
	.095	.142	**.750** (8x)	3	1/8	2-1/2	34295	40.00	34295-C3	44.60	34295-C4	51.70
	.100	.150	**.300** (3x)	3	1/8	2-1/2	978500	39.10	978500-C3	43.70		
	.100	.150	**.500** (5x)	3	1/8	2-1/2	33500	39.10	33500-C3	43.70		
	.100	.150	**.800** (8x)	3	1/8	2-1/2	34300	40.00	34300-C3	44.60	34300-C4	51.70
	.100	.150	**1.000** (10x)	3	1/8	2-1/2	966100	41.10	966100-C3	45.70		
	.100	.150	**1.200** (12x)	3	1/8	2-1/2	35700	41.10	35700-C3	45.70		
	.109 (7/64)	.163	**.570** (5x)	3	1/8	2-1/2	33502	39.10	33502-C3	43.70		
	.109 (7/64)	.163	**.900** (8x)	3	1/8	2-1/2	34302	40.00	34302-C3	44.60		
	.118 (3 mm)	.177	**.625** (5x)	3	1/8	2-1/2	33505	39.10	33505-C3	43.70		
	.118 (3 mm)	.177	**.950** (8x)	3	1/8	2-1/2	34305	40.00	34305-C3	44.60		
	.118 (3 mm)	.177	**1.187** (10x)	3	1/8	2-1/2	966105	41.10	966105-C3	45.70		

	D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.125 (1/8)	.187	**.375** (3x)	3	1/8	2-1/2	978508	39.10	978508-C3	43.70	978508-C4	50.80
	.125 (1/8)	.187	**.500** (4x)	3	1/8	2-1/2	844508	39.10	844508-C3	43.70		
	.125 (1/8)	.187	**.625** (5x)	3	1/8	2-1/2	33508	39.10	33508-C3	43.70	33508-C4	50.80
NEW	.125 (1/8)	.187	**.625** (5x)	4	1/8	2-1/2	803208	39.10	803208-C3	43.70		
	.125 (1/8)	.187	**.750** (6x)	3	1/8	2-1/2	860708	39.10	860708-C3	43.70	860708-C4	50.80
	.125 (1/8)	.187	**.875** (7x)	3	1/8	2-1/2	868308	39.10	868308-C3	43.70		

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NEW SIZES!

MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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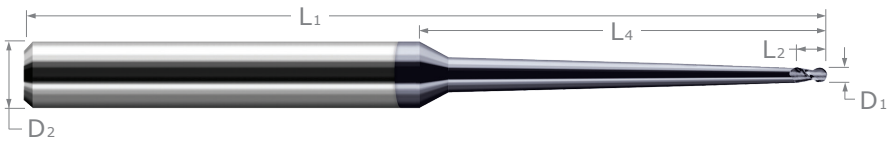
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	.187	**1.000** (8x)	3	1/8	2-1/2	34308	40.00	34308-C3	44.60	34308-C4	51.70	
.125 (1/8)	.187	**1.000** (8x)	4	1/8	2-1/2	801408	40.00	801408-C3	44.60			NEW
.125 (1/8)	.187	**1.125** (9x)	3	1/8	2-1/2	805408	42.90	805408-C3	47.50			
.125 (1/8)	.187	**1.250** (10x)	3	1/8	2-1/2	966108	42.90	966108-C3	47.50	966108-C4	54.60	
.125 (1/8)	.187	**1.500** (12x)	3	1/8	3	35708	42.90	35708-C3	47.50	35708-C4	54.60	
.125 (1/8)	.187	**1.875** (15x)	3	1/8	3	49308	48.00	49308-C3	52.60	49308-C4	59.70	
.125 (1/8)	.187	**2.250** (18x)	3	1/8	4	970808	58.00	970808-C3	63.00	970808-C4	69.70	
.125 (1/8)	.187	**2.500** (20x)	3	1/8	4	59508	58.00	59508-C3	63.00	59508-C4	75.20	
.125 (1/8)	.187	**3.125** (25x)	3	1/8	4	959108	72.30	959108-C3	77.30	***25x Diameter!***		
.125 (1/8)	.187	**3.750** (30x)	3	1/8	6	922808	86.60	922808-C3	92.70	***30x Diameter!***		
.140 (9/64)	.220	**.750** (5x)	3	3/16	3	33509	43.10	33509-C3	48.10			
.140 (9/64)	.220	**1.125** (8x)	3	3/16	3	34309	44.00	34309-C3	49.00			
.140 (9/64)	.220	**1.450** (10x)	3	3/16	3	966109	47.00	966109-C3	52.00			
.156 (5/32)	.234	**.470** (3x)	3	3/16	3	978510	43.10	978510-C3	47.30			
.156 (5/32)	.234	**.750** (5x)	3	3/16	3	33510	43.10	33510-C3	48.10			
.156 (5/32)	.234	**1.250** (8x)	3	3/16	3	34310	44.00	34310-C3	49.00	34310-C4	60.10	
.156 (5/32)	.234	**1.570** (10x)	3	3/16	3	966110	47.00	966110-C3	52.00			
.156 (5/32)	.234	**1.875** (12x)	3	3/16	4	35710	47.00	35710-C3	53.80			
.156 (5/32)	.234	**2.375** (15x)	3	3/16	4	49310	49.70	49310-C3	56.50			
.187 (3/16)	.281	**.570** (3x)	3	3/16	3	978512	43.10	978512-C3	48.10			
.187 (3/16)	.281	**1.000** (5x)	3	3/16	3	33512	43.10	33512-C3	48.10	33512-C4	59.20	
.187 (3/16)	.281	**1.500** (8x)	3	3/16	3	34312	44.00	34312-C3	49.00	34312-C4	60.10	
.187 (3/16)	.281	**1.875** (10x)	3	3/16	4	966112	47.00	966112-C3	53.80	966112-C4	64.20	
.187 (3/16)	.281	**2.250** (12x)	3	3/16	4	35712	47.00	35712-C3	53.80	35712-C4	64.20	
.187 (3/16)	.281	**2.812** (15x)	3	3/16	4	49312	49.70	49312-C3	56.50	49312-C4	66.90	
.187 (3/16)	.281	**3.375** (18x)	3	3/16	6	970812	67.80	970812-C3	76.80			
.218 (7/32)	.330	**1.125** (5x)	3	1/4	4	33514	50.00	33514-C3	57.90			
.218 (7/32)	.330	**1.750** (8x)	3	1/4	4	34314	50.60	34314-C3	58.50			
.250 (1/4)	.375	**.750** (3x)	3	1/4	4	978516	47.60	978516-C3	55.50			
.250 (1/4)	.375	**1.250** (5x)	3	1/4	4	33516	47.60	33516-C3	55.50	33516-C4	65.90	
.250 (1/4)	.375	**2.000** (8x)	3	1/4	4	34316	48.70	34316-C3	56.60	34316-C4	67.00	
.250 (1/4)	.375	**2.500** (10x)	3	1/4	4	966116	54.40	966116-C3	62.30			
.250 (1/4)	.375	**3.000** (12x)	3	1/4	6	35716	57.30	35716-C3	66.30	35716-C4	83.80	
.250 (1/4)	.375	**3.750** (15x)	3	1/4	6	49316	59.90	49316-C3	68.90			
.250 (1/4)	.375	**5.000** (20x)	3	1/4	8	59516	119.20	59516-C3	132.60			
.375 (3/8)	.570	**2.000** (5x)	3	3/8	4	33524	83.00	33524-C3	95.30			
.375 (3/8)	.570	**3.000** (8x)	3	3/8	6	34324	111.80	34324-C3	125.70			

MINIATURE END MILLS

Ball – Tapered Reach (Clearance Cutters)



- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Maximum Reach & Maximum Rigidity!

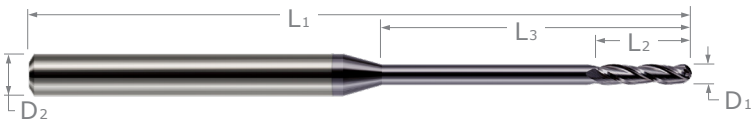
CUTTER DIA.	LOC	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*						UNCOATED		AlTiN NANO COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2°	3°	4°	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.015	.023	**1/2**	6.4°	1/8	2-1/2	.060	.080	.120	.375	.395	.420	29815	67.30	29815-C6	74.10	29815-C4	79.00
.015	.023	**1**	6.7°	1/4	4	.060	.080	.120	.765	.950	-	17715	79.00	17715-C6	89.00		
.031	.047	**1/2**	5.5°	1/8	2-1/2	.115	.150	.220	.380	.405	.435	29831	52.60	29831-C6	59.40	29831-C4	64.30
.031	.047	**1**	6.3°	1/4	4	.115	.150	.220	.755	.800	.850	17731	65.00	17731-C6	75.00	17731-C4	83.30
.031	.047	**1-1/2**	4.2°	1/4	4	.115	.150	.220	1.260	1.355	1.465	24831	70.00	24831-C6	80.00	24831-C4	88.30
.031	.047	**2**	3.2°	1/4	4	.115	.150	.220	1.765	1.960	-	18831	78.00	18831-C6	88.00	18831-C4	96.30
.047	.071	**1/2**	4.7°	1/8	2-1/2	.180	.235	.350	.395	.425	.465	29847	52.60	29847-C6	59.40	29847-C4	64.30
.047	.071	**1**	5.9°	1/4	4	.180	.235	.350	.765	.810	.865	17747	65.00	17747-C6	75.00	17747-C4	83.30
.047	.071	**1-1/2**	3.9°	1/4	4	.180	.235	.350	1.270	1.375	-	24847	70.00	24847-C6	80.00	24847-C4	88.30
.047	.071	**2**	2.9°	1/4	4	.180	.235	.350	1.780	-	-	18847	78.00	18847-C6	88.00	18847-C4	96.30
.062	.093	**1/2**	3.8°	1/8	2-1/2	.220	.285	.370	.405	.450	-	29862	51.00	29862-C6	57.80	29862-C4	62.70
.062	.093	**1**	5.5°	1/4	4	.220	.285	.415	.770	.820	.880	17762	63.00	17762-C6	73.00	17762-C4	81.30
.062	.093	**1-1/2**	3.7°	1/4	4	.220	.285	.415	1.280	1.400	-	24862	67.60	24862-C6	77.60	24862-C4	85.90
.062	.093	**2**	2.7°	1/4	4	.220	.285	.415	1.795	-	-	18862	76.00	18862-C6	86.00	18862-C4	94.30
.078	.118	**1**	5.1°	1/4	4	.305	.395	.575	.780	.840	.905	17778	63.00	17778-C6	73.00	17778-C4	81.30
.078	.118	**1-1/2**	3.4°	1/4	4	.305	.395	.575	1.295	1.435	-	24878	67.60	24878-C6	77.60	24878-C4	85.90
.078	.118	**2**	2.5°	1/4	4	.305	.395	.575	1.830	-	-	18878	76.00	18878-C6	86.00	18878-C4	94.30
.093	.140	**1**	4.7°	1/4	4	.340	.440	.640	.790	.855	.930	17793	63.80	17793-C6	73.80	17793-C4	82.10
.093	.140	**1-1/2**	3.1°	1/4	4	.340	.440	.640	1.310	1.475	-	24893	67.60	24893-C6	77.60	24893-C4	85.90
.093	.140	**2**	2.3°	1/4	4	.340	.440	.640	1.870	-	-	18893	74.00	18893-C6	84.00	18893-C4	92.30
.125	.188	**1**	3.8°	1/4	4	.450	.580	.750	.820	.910	-	17808	63.80	17808-C6	73.80	17808-C4	82.10
.125	.188	**1-1/2**	2.5°	1/4	4	.450	.580	.840	1.375	-	-	24908	67.60	24908-C6	77.60	24908-C4	85.90
.125	.188	**2**	1.8°	1/4	4	.450	.580	.840	-	-	-	18908	74.00	18908-C6	84.00	18908-C4	92.30
.125	.188	**2-1/2**	2.2°	5/16	4	.450	.580	.840	2.395	-	-	21408	77.70	21408-C6	88.90		
.156	.234	**1**	2.9°	1/4	4	.525	.680	.775	.875	-	-	17810	63.80	17810-C6	73.80	17810-C4	82.10
.156	.234	**1-1/2**	1.9°	1/4	4	.525	.680	.980	-	-	-	24910	67.60	24910-C6	77.60	24910-C4	85.90
.156	.234	**2**	1.4°	1/4	4	.540	.710	1.085	-	-	-	18910	74.00	18910-C6	84.00	18910-C4	92.30
.187	.281	**1-1/2**	1.3°	1/4	4	.605	.775	1.120	-	-	-	24912	69.30	24912-C6	79.30	24912-C4	87.60
.187	.281	**2**	2.7°	3/8	4	.605	.775	1.120	1.845	-	-	18912	99.40	18912-C6	110.60	18912-C4	121.50
.187	.281	**2-1/2**	2.2°	3/8	4	.605	.775	1.120	2.405	-	-	21412	102.60	21412-C6	113.80		
.250	.375	**1-1/2**	2.6°	3/8	4	.760	.975	1.260	1.395	-	-	24916	88.90	24916-C6	100.10	24916-C4	111.00
.250	.375	**2**	1.8°	3/8	4	.760	.975	1.405	-	-	-	18916	99.40	18916-C6	110.60	18916-C4	121.50
.250	.375	**2-1/2**	1.5°	3/8	4	.760	.975	1.405	-	-	-	21416	102.60	21416-C6	113.80		
.312	.468	**2**	2.7°	1/2	4	.915	1.170	1.685	1.860	-	-	18920	134.70	18920-C6	150.20	18920-C4	161.20
.375	.563	**2**	1.8°	1/2	4	1.075	1.370	1.770	-	-	-	18924	134.70	18924-C6	150.20	18924-C4	161.20

*Values are approximate and may vary due to tolerancing.

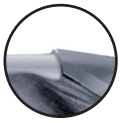
For detailed interference charts with more angles, search for keyword InterferenceChart on www.harveytool.com.

MINIATURE END MILLS

Ball – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut ≥ 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

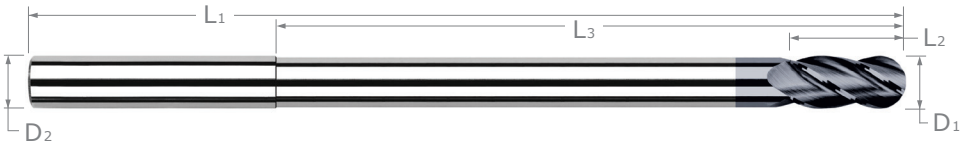


Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.010	.050	.100 (10x)	1/8	2-1/2	13810	59.90	13810-C3	64.50	10210	71.60
.015 (1/64)	.075	.150 (10x)	1/8	2-1/2	13815	51.10	13815-C3	55.70	10215	62.80
.020 (.5 mm)	.100	.200 (10x)	1/8	2-1/2	13820	49.60	13820-C3	54.20	10220	61.30
.025	.125	.250 (10x)	1/8	2-1/2	13825	42.80	13825-C3	47.40	10225	54.50
.030	.150	.300 (10x)	1/8	2-1/2	13830	42.80	13830-C3	47.40	10230	54.50
.031 (1/32)	.155	.310 (10x)	1/8	2-1/2	13831	42.80	13831-C3	47.40	10231	54.50
.035 (.9 mm)	.175	.350 (10x)	1/8	2-1/2	13835	42.80	13835-C3	47.40	10235	54.50
.040	.200	.400 (10x)	1/8	2-1/2	13840	42.80	13840-C3	47.40	10240	54.50
.045	.225	.450 (10x)	1/8	2-1/2	13845	41.90	13845-C3	46.50	10245	53.60
.047 (3/64)	.250	.500 (10x)	1/8	2-1/2	13847	41.90	13847-C3	46.50	10247	53.60
.050	.300	.600 (12x)	1/8	2-1/2	13850	41.90	13850-C3	46.50	10250	53.60
.055 (1.4 mm)	.385	.770 (14x)	1/8	2-1/2	13855	41.90	13855-C3	46.50	10255	53.60
.060	.500	1.000 (16x)	1/8	2-1/2	13860	42.70	13860-C3	47.30	10260	54.40
.062 (1/16)	.500	.625 (10x)	1/8	2-1/2	803562	41.90	803562-C3	46.50	803362	53.60
.062 (1/16)	.500	1.000 (16x)	1/8	2-1/2	13862	42.70	13862-C3	47.30	10262	54.40
.065	.500	1.000 (15x)	1/8	2-1/2	13865	41.90	13865-C3	46.50	10265	53.60
.070	.500	1.000 (14x)	1/8	2-1/2	13870	41.90	13870-C3	46.50	10270	53.60
.075	.500	1.000 (13x)	1/8	2-1/2	13875	41.90	13875-C3	46.50	10275	53.60
.078 (5/64)	.500	1.000 (12x)	1/8	2-1/2	13878	41.90	13878-C3	46.50	10278	53.60
.080	.750	1.250 (15x)	1/8	2-1/2	13880	41.90	13880-C3	46.50	10280	53.60
.085	.750	1.250 (14x)	1/8	2-1/2	13885	41.90	13885-C3	46.50	10285	53.60
.090	.750	1.250 (13x)	1/8	2-1/2	13890	41.90	13890-C3	46.50	10290	53.60
.093 (3/32)	.750	1.250 (13x)	1/8	2-1/2	13893	41.90	13893-C3	46.50	10293	53.60
.095	.750	1.250 (13x)	1/8	2-1/2	13895	41.90	13895-C3	46.50	10295	53.60
.100	.750	1.250 (12x)	1/8	2-1/2	14800	41.90	14800-C3	46.50	10300	53.60
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	1.000	1.500 (12x)	1/8	2-1/2	14808	41.90	14808-C3	46.50	10308	53.60
.187 (3/16)	1.125	1.625 (8x)	3/16	3	14812	45.30	14812-C3	50.30	10312	61.40
.250 (1/4)	1.500	2.000 (8x)	1/4	4	14816	50.70	14816-C3	55.70	10316	69.00

MINIATURE END MILLS

Ball – Extra Long Length



- **Up to 8" overall length**
- Longest overall length carbide end mill available in stock
- Extended Reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.030" −.000"	L_3 +.030" −.000"	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	.375	4.375 (17.5x)	1/4	6	14916	91.40	14916-C3	100.40
.312 (5/16)	.470	4.343 (14x)	5/16	6	14920	110.40	14920-C3	123.80
.375 (3/8)	.562	4.312 (11.5x)	3/8	6	14924	125.20	14924-C3	139.10
.500 (1/2)	.750	5.750 (11.5x)	1/2	8	14932	217.80	14932-C3	245.40
.625 (5/8)	.937	5.687 (9x)	5/8	8	14940	364.60		
.750 (3/4)	1.125	5.625 (7.5x)	3/4	8	14948	442.40		

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

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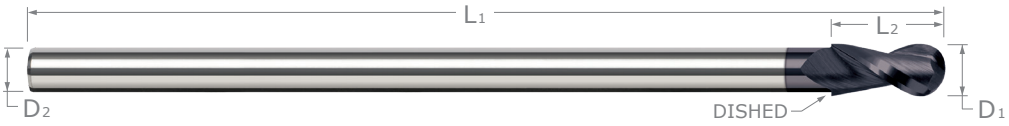
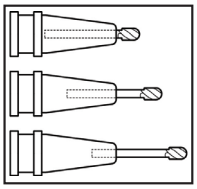
MINIATURE END MILLS

Ball – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

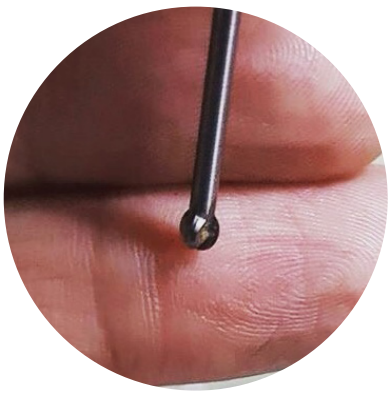
Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 +.000" −.002"	L_2 +.030" −.000"		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/8	3/16	2	**3 mm**	2-1/2	24708	91.40	24708-C3	96.00	
1/8	3/16	4	**3 mm**	2-1/2	804208	94.60	804208-C3	99.20	NEW
5/32	15/64	2	**1/8**	2-1/2	24710	91.40	24710-C3	96.40	
3/16	9/32	2	**1/8**	2-1/2	24712	91.40	24712-C3	96.40	
3/16	9/32	2	**5/32**	2-1/2	24713	94.30	24713-C3	99.30	
3/16	9/32	4	**5/32**	2-1/2	804212	97.60	804212-C3	102.60	NEW
1/4	3/8	2	**3/16**	3	24716	99.00	24716-C3	105.80	
1/4	3/8	4	**3/16**	3	804216	102.50	804216-C3	109.30	NEW
5/16	15/32	2	**1/4**	4	24720	121.60	24720-C3	131.10	
3/8	9/16	2	**5/16**	4	24724	143.60	24724-C3	155.90	
7/16	21/32	2	**3/8**	6	24728	211.50	24728-C3	226.50	
1/2	3/4	2	**7/16**	6	24732	221.00	24732-C3	234.90	
5/8	15/16	2	**1/2**	6	24740	286.50	24740-C3	306.50	
3/4	1-1/8	2	**5/8**	6	24748	354.00	24748-C3	375.00	

For Square Reduced Shank, please see page 38.

For Corner Radius Reduced Shank, please see page 77.



★★★★★

"This little guy just hit it's 1,200th detent. I was worried about making it through one! Great job Harvey Tool."

— @visionmetaldesign

Follow us on Instagram @harveytool!

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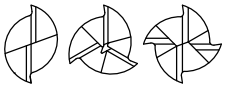
MINIATURE END MILLS

Corner Radius – Stub & Standard

- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA



Stub Flute & Standard Length

	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND	
	D_1 +.0005" −.0005"	R +.001" −.001"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
	.008	**.002**	.012 (1.5x)	1/8	1-1/2			856008	48.00		856008-C3	52.60		
	.008	**.002**	.024 (3x)	1/8	1-1/2			854208	48.00		854208-C3	52.60		
	.010	**.003**	.015 (1.5x)	1/8	1-1/2			987510	43.30		987510-C3	47.90		
	.010	**.003**	.030 (3x)	1/8	1-1/2			47210	43.30		47210-C3	47.90		
	.015 (1/64)	**.003**	.023 (1.5x)	1/8	1-1/2			987515	43.30		987515-C3	47.90		
	.015 (1/64)	**.003**	.045 (3x)	1/8	1-1/2	45415		47215	43.30		47215-C3	47.90	47215-C4	55.00
	.015 (1/64)	**.005**	.023 (1.5x)	1/8	1-1/2			993815	43.30		993815-C3	47.90		
	.015 (1/64)	**.005**	.045 (3x)	1/8	1-1/2	44715		26315	43.30		26315-C3	47.90		
	.018	**.005**	.054 (3x)	1/8	1-1/2			26318	43.30		26318-C3	47.90		
	.020 (.5 mm)	**.003**	.030 (1.5x)	1/8	1-1/2			987520	41.50		987520-C3	46.10		
	.020 (.5 mm)	**.003**	.060 (3x)	1/8	1-1/2			47220	41.50		47220-C3	46.10		
	.020 (.5 mm)	**.005**	.030 (1.5x)	1/8	1-1/2			993820	41.50		993820-C3	46.10		
NEW	.020 (.5 mm)	**.005**	.060 (3x)	1/8	1-1/2	44720	848320	26320	41.50	848320-C3	26320-C3	46.10	26320-C4	53.20
	.022	**.005**	.066 (3x)	1/8	1-1/2			26322	37.80		26322-C3	42.40		
	.024 (.6 mm)	**.005**	.072 (3x)	1/8	1-1/2			26324	37.80		26324-C3	42.40		
	.025	**.003**	.075 (3x)	1/8	1-1/2			47225	37.80		47225-C3	42.40		
	.025	**.005**	.038 (1.5x)	1/8	1-1/2			993825	37.80		993825-C3	42.40		
	.025	**.005**	.075 (3x)	1/8	1-1/2	44725		26325	37.80		26325-C3	42.40	26325-C4	49.50
	.025	**.008**	.075 (3x)	1/8	1-1/2			953025	37.80		953025-C3	42.40		
	.028 (.7mm)	**.005**	.084 (3x)	1/8	1-1/2			26328	35.00		26328-C3	39.60		
	.030	**.003**	.090 (3x)	1/8	1-1/2			47230	35.00		47230-C3	39.60		
	.030	**.005**	.045 (1.5x)	1/8	1-1/2			993830	35.00		993830-C3	39.60		
	.030	**.005**	.090 (3x)	1/8	1-1/2	44730		26330	35.00		26330-C3	39.60	26330-C4	46.70
	.030	**.008**	.090 (3x)	1/8	1-1/2			953030	35.00		953030-C3	39.60		
	.030	**.010**	.045 (1.5x)	1/8	1-1/2			994530	35.00		994530-C3	39.60		
	.030	**.010**	.090 (3x)	1/8	1-1/2	45230		27230	35.00		27230-C3	39.60	27230-C4	46.70
	.031 (1/32)	**.003**	.047 (1.5x)	1/8	1-1/2			987531	35.00		987531-C3	39.60		
	.031 (1/32)	**.003**	.093 (3x)	1/8	1-1/2			47231	35.00		47231-C3	39.60		
	.031 (1/32)	**.005**	.047 (1.5x)	1/8	1-1/2			993831	35.00		993831-C3	39.60		
	.031 (1/32)	**.005**	.093 (3x)	1/8	1-1/2	44731	848331	26331	35.00	848331-C3	26331-C3	39.60	26331-C4	46.70
	.031 (1/32)	**.008**	.047 (1.5x)	1/8	1-1/2			913731	35.00		913731-C3	39.60		
	.031 (1/32)	**.008**	.093 (3x)	1/8	1-1/2			953031	35.00		953031-C3	39.60		
	.031 (1/32)	**.010**	.047 (1.5x)	1/8	1-1/2			994531	35.00		994531-C3	39.60		
	.031 (1/32)	**.010**	.093 (3x)	1/8	1-1/2	45231	854131	27231	35.00	854131-C3	27231-C3	39.60	27231-C4	46.70
	.034	**.005**	.102 (3x)	1/8	1-1/2			26334	29.40		26334-C3	34.00		
	.035 (.9 mm)	**.005**	.053 (1.5x)	1/8	1-1/2			993835	29.40		993835-C3	34.00		
	.035 (.9 mm)	**.005**	.105 (3x)	1/8	1-1/2	44735		26335	29.40		26335-C3	34.00	26335-C4	41.10
	.035 (.9 mm)	**.010**	.053 (1.5x)	1/8	1-1/2			994535	29.40		994535-C3	34.00		
	.035 (.9 mm)	**.010**	.105 (3x)	1/8	1-1/2	45235		27235	29.40		27235-C3	34.00	27235-C4	41.10
	.037	**.005**	.111 (3x)	1/8	1-1/2			26337	29.40		26337-C3	34.00		
	.039 (1 mm)	**.003**	.117 (3x)	1/8	1-1/2			47239	22.80		47239-C3	27.40		
	.039 (1 mm)	**.005**	.059 (1.5x)	1/8	1-1/2			993839	22.80		993839-C3	27.40		

continued on next page

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
.039 (1 mm)	**.005**	.117 (3x)	1/8	1-1/2			26339	22.80		26339-C3	27.40		
.039 (1 mm)	**.008**	.117 (3x)	1/8	1-1/2			953039	22.80		953039-C3	27.40		
.039 (1 mm)	**.010**	.059 (1.5x)	1/8	1-1/2			994539	22.80		994539-C3	27.40		
.039 (1 mm)	**.010**	.117 (3x)	1/8	1-1/2			27239	22.80		27239-C3	27.40		
.040	**.003**	.120 (3x)	1/8	1-1/2			47240	22.40		47240-C3	27.00		
.040	**.005**	.060 (1.5x)	1/8	1-1/2		865140	993840	22.40	865140-C3	993840-C3	27.00		
.040	**.005**	.120 (3x)	1/8	1-1/2	44740	848340	26340	22.40	848340-C3	26340-C3	27.00	26340-C4	34.10
.040	**.008**	.120 (3x)	1/8	1-1/2			953040	22.40		953040-C3	27.00		
.040	**.010**	.060 (1.5x)	1/8	1-1/2			994540	22.40		994540-C3	27.00		
.040	**.010**	.120 (3x)	1/8	1-1/2	45240		27240	22.40		27240-C3	27.00	27240-C4	34.10
.045	**.005**	.068 (1.5x)	1/8	1-1/2			993845	22.40		993845-C3	27.00		
.045	**.005**	.135 (3x)	1/8	1-1/2	44745		26345	22.40		26345-C3	27.00	26345-C4	34.10
.045	**.010**	.068 (1.5x)	1/8	1-1/2			994545	22.40		994545-C3	27.00		
.045	**.010**	.135 (3x)	1/8	1-1/2	45245		27245	22.40		27245-C3	27.00	27245-C4	34.10
.045	**.015**	.068 (1.5x)	1/8	1-1/2			997945	22.40		997945-C3	27.00		
.045	**.015**	.135 (3x)	1/8	1-1/2	45545		28145	22.40		28145-C3	27.00	28145-C4	34.10
.046	**.005**	.138 (3x)	1/8	1-1/2			26346	22.40		26346-C3	27.00		
.047 (3/64)	**.003**	.071 (1.5x)	1/8	1-1/2			987547	22.40		987547-C3	27.00		
.047 (3/64)	**.003**	.141 (3x)	1/8	1-1/2			47247	22.40		47247-C3	27.00		
.047 (3/64)	**.005**	.071 (1.5x)	1/8	1-1/2			993847	22.40		993847-C3	27.00		
.047 (3/64)	**.005**	.141 (3x)	1/8	1-1/2	44747	848347	26347	22.40	848347-C3	26347-C3	27.00	26347-C4	34.10
.047 (3/64)	**.008**	.071 (1.5x)	1/8	1-1/2			913747	22.40		913747-C3	27.00		
.047 (3/64)	**.008**	.141 (3x)	1/8	1-1/2			953047	22.40		953047-C3	27.00		
.047 (3/64)	**.010**	.071 (1.5x)	1/8	1-1/2			994547	22.40		994547-C3	27.00		
.047 (3/64)	**.010**	.141 (3x)	1/8	1-1/2	45247		27247	22.40		27247-C3	27.00	27247-C4	34.10
.047 (3/64)	**.012**	.141 (3x)	1/8	1-1/2			966947	22.40		966947-C3	27.00		
.047 (3/64)	**.015**	.071 (1.5x)	1/8	1-1/2	830147	860847	997947	22.40	860847-C3	997947-C3	27.00		
.047 (3/64)	**.015**	.141 (3x)	1/8	1-1/2	45547	867247	28147	22.40	867247-C3	28147-C3	27.00	28147-C4	34.10
.050	**.003**	.150 (3x)	1/8	1-1/2			47250	22.40		47250-C3	27.00		
.050	**.005**	.075 (1.5x)	1/8	1-1/2			993850	22.40		993850-C3	27.00		
.050	**.005**	.150 (3x)	1/8	1-1/2	44750	848350	26350	22.40	848350-C3	26350-C3	27.00	26350-C4	34.10
.050	**.008**	.075 (1.5x)	1/8	1-1/2			913750	22.40		913750-C3	27.00		
.050	**.008**	.150 (3x)	1/8	1-1/2			953050	22.40		953050-C3	27.00		
.050	**.010**	.075 (1.5x)	1/8	1-1/2			994550	22.40		994550-C3	27.00		
.050	**.010**	.150 (3x)	1/8	1-1/2	45250		27250	22.40		27250-C3	27.00	27250-C4	34.10
.050	**.015**	.075 (1.5x)	1/8	1-1/2			997950	22.40		997950-C3	27.00		
.050	**.015**	.150 (3x)	1/8	1-1/2	45550		28150	22.40		28150-C3	27.00	28150-C4	34.10
.055 (1.4 mm)	**.003**	.165 (3x)	1/8	1-1/2			47255	22.40		47255-C3	27.00		
.055 (1.4 mm)	**.005**	.083 (1.5x)	1/8	1-1/2			993855	22.40		993855-C3	27.00		
.055 (1.4 mm)	**.005**	.165 (3x)	1/8	1-1/2	44755		26355	22.40		26355-C3	27.00	26355-C4	34.10
.055 (1.4 mm)	**.008**	.165 (3x)	1/8	1-1/2			953055	22.40		953055-C3	27.00		
.055 (1.4 mm)	**.010**	.083 (1.5x)	1/8	1-1/2			994555	22.40		994555-C3	27.00		
.055 (1.4 mm)	**.010**	.165 (3x)	1/8	1-1/2	45255		27255	22.40		27255-C3	27.00	27255-C4	34.10
.055 (1.4 mm)	**.015**	.083 (1.5x)	1/8	1-1/2			997955	22.40		997955-C3	27.00		
.055 (1.4 mm)	**.015**	.165 (3x)	1/8	1-1/2	45555		28155	22.40		28155-C3	27.00	28155-C4	34.10
.059	**.005**	.177 (3x)	1/8	1-1/2			26359	22.40		26359-C3	27.00		

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
	.060	**.003**	.180 (3x)	1/8	1-1/2			47260	22.40		47260-C3	27.00		
	.060	**.005**	.090 (1.5x)	1/8	1-1/2			993860	22.40		993860-C3	27.00		
	.060	**.005**	.180 (3x)	1/8	1-1/2	44760	848360	26360	22.40	848360-C3	26360-C3	27.00	26360-C4	34.10
	.060	**.008**	.180 (3x)	1/8	1-1/2			953060	22.40		953060-C3	27.00		
	.060	**.010**	.090 (1.5x)	1/8	1-1/2			994560	22.40		994560-C3	27.00		
	.060	**.010**	.180 (3x)	1/8	1-1/2	45260		27260	22.40		27260-C3	27.00	27260-C4	34.10
	.060	**.015**	.090 (1.5x)	1/8	1-1/2			997960	22.40		997960-C3	27.00		
	.060	**.015**	.180 (3x)	1/8	1-1/2	45560		28160	22.40		28160-C3	27.00	28160-C4	34.10
	.060	**.020**	.090 (1.5x)	1/8	1-1/2			966460	22.40		966460-C3	27.00		
	.060	**.020**	.180 (3x)	1/8	1-1/2			51660	22.40		51660-C3	27.00		
	.062 (1/16)	**.003**	.093 (1.5x)	1/8	1-1/2			987562	22.40		987562-C3	27.00		
	.062 (1/16)	**.003**	.186 (3x)	1/8	1-1/2	45462		47262	22.40		47262-C3	27.00		
	.062 (1/16)	**.005**	.093 (1.5x)	1/8	1-1/2	804562	865162	993862	22.40	865162-C3	993862-C3	27.00		
	.062 (1/16)	**.005**	.186 (3x)	1/8	1-1/2	44762	848362	26362	22.40	848362-C3	26362-C3	27.00	26362-C4	34.10
	.062 (1/16)	**.008**	.093 (1.5x)	1/8	1-1/2			913762	22.40		913762-C3	27.00		
	.062 (1/16)	**.008**	.186 (3x)	1/8	1-1/2	843962		953062	22.40		953062-C3	27.00		
	.062 (1/16)	**.010**	.093 (1.5x)	1/8	1-1/2	830362	864662	994562	22.40	864662-C3	994562-C3	27.00	994562-C4	34.10
	.062 (1/16)	**.010**	.186 (3x)	1/8	1-1/2	45262	854162	27262	22.40	854162-C3	27262-C3	27.00	27262-C4	34.10
	.062 (1/16)	**.012**	.093 (1.5x)	1/8	1-1/2			904862	22.40		904862-C3	27.00		
	.062 (1/16)	**.012**	.186 (3x)	1/8	1-1/2			966962	22.40		966962-C3	27.00		
	.062 (1/16)	**.015**	.093 (1.5x)	1/8	1-1/2	830162	860862	997962	22.40	860862-C3	997962-C3	27.00		
	.062 (1/16)	**.015**	.186 (3x)	1/8	1-1/2	45562	867262	28162	22.40	867262-C3	28162-C3	27.00	28162-C4	34.10
NEW	.062 (1/16)	**.020**	.093 (1.5x)	1/8	1-1/2	810662		966462	22.40		966462-C3	27.00		
	.062 (1/16)	**.020**	.186 (3x)	1/8	1-1/2	51362	857762	51662	22.40	857762-C3	51662-C3	27.00	51662-C4	34.10
	.065	**.005**	.098 (1.5x)	1/8	1-1/2			993865	22.40		993865-C3	27.00		
	.065	**.005**	.195 (3x)	1/8	1-1/2	44765		26365	22.40		26365-C3	27.00	26365-C4	34.10
	.065	**.010**	.098 (1.5x)	1/8	1-1/2			994565	22.40		994565-C3	27.00		
	.065	**.010**	.195 (3x)	1/8	1-1/2	45265		27265	22.40		27265-C3	27.00	27265-C4	34.10
	.065	**.015**	.195 (3x)	1/8	1-1/2	45565		28165	22.40		28165-C3	27.00	28165-C4	34.10
	.065	**.020**	.195 (3x)	1/8	1-1/2			51665	22.40		51665-C3	27.00		
	.070	**.003**	.210 (3x)	1/8	1-1/2			47270	22.40		47270-C3	27.00		
	.070	**.005**	.105 (1.5x)	1/8	1-1/2			993870	22.40		993870-C3	27.00		
	.070	**.005**	.210 (3x)	1/8	1-1/2	44770		26370	22.40		26370-C3	27.00	26370-C4	34.10
	.070	**.008**	.210 (3x)	1/8	1-1/2			953070	22.40		953070-C3	27.00		
	.070	**.010**	.105 (1.5x)	1/8	1-1/2			994570	22.40		994570-C3	27.00		
	.070	**.010**	.210 (3x)	1/8	1-1/2	45270		27270	22.40		27270-C3	27.00	27270-C4	34.10
	.070	**.015**	.210 (3x)	1/8	1-1/2	45570		28170	22.40		28170-C3	27.00	28170-C4	34.10
	.070	**.020**	.210 (3x)	1/8	1-1/2			51670	22.40		51670-C3	27.00		
	.075	**.005**	.113 (1.5x)	1/8	1-1/2			993875	22.40		993875-C3	27.00		
	.075	**.005**	.225 (3x)	1/8	1-1/2	44775		26375	22.40		26375-C3	27.00	26375-C4	34.10
	.075	**.010**	.113 (1.5x)	1/8	1-1/2			994575	22.40		994575-C3	27.00		
	.075	**.010**	.225 (3x)	1/8	1-1/2	45275		27275	22.40		27275-C3	27.00	27275-C4	34.10
	.075	**.015**	.225 (3x)	1/8	1-1/2	45575		28175	22.40		28175-C3	27.00	28175-C4	34.10
	.078 (5/64)	**.003**	.234 (3x)	1/8	1-1/2			47278	22.40		47278-C3	27.00		
	.078 (5/64)	**.005**	.117 (1.5x)	1/8	1-1/2			993878	22.40		993878-C3	27.00		
	.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	44778	848378	26378	22.40	848378-C3	26378-C3	27.00	26378-C4	34.10
	.078 (5/64)	**.008**	.117 (1.5x)	1/8	1-1/2			913778	22.40		913778-C3	27.00		
	.078 (5/64)	**.008**	.234 (3x)	1/8	1-1/2			953078	22.40		953078-C3	27.00		

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
.078 (5/64)	**.010**	.117 (1.5x)	1/8	1-1/2	830378	864678	994578	22.40	864678-C3	994578-C3	27.00		
.078 (5/64)	**.010**	.234 (3x)	1/8	1-1/2	45278	854178	27278	22.40	854178-C3	27278-C3	27.00	27278-C4	34.10
.078 (5/64)	**.012**	.234 (3x)	1/8	1-1/2			966978	22.40		966978-C3	27.00		
.078 (5/64)	**.015**	.117 (1.5x)	1/8	1-1/2		860878	997978	22.40	860878-C3	997978-C3	27.00		
.078 (5/64)	**.015**	.234 (3x)	1/8	1-1/2	45578	867278	28178	22.40	867278-C3	28178-C3	27.00	28178-C4	34.10
.078 (5/64)	**.020**	.117 (1.5x)	1/8	1-1/2	810678		966478	22.40		966478-C3	27.00		
.078 (5/64)	**.020**	.234 (3x)	1/8	1-1/2	51378		51678	22.40		51678-C3	27.00	51678-C4	34.10
.078 (5/64)	**.025**	.117 (1.5x)	1/8	1-1/2			964078	22.40		964078-C3	27.00		
.078 (5/64)	**.025**	.234 (3x)	1/8	1-1/2		842678	957178	22.40	842678-C3	957178-C3	27.00		
.080	**.003**	.240 (3x)	1/8	1-1/2			47280	22.40		47280-C3	27.00		
.080	**.005**	.120 (1.5x)	1/8	1-1/2			993880	22.40		993880-C3	27.00		
.080	**.005**	.240 (3x)	1/8	1-1/2	44780		26380	22.40		26380-C3	27.00	26380-C4	34.10
.080	**.008**	.240 (3x)	1/8	1-1/2			953080	22.40		953080-C3	27.00		
.080	**.010**	.120 (1.5x)	1/8	1-1/2			994580	22.40		994580-C3	27.00		
.080	**.010**	.240 (3x)	1/8	1-1/2	45280		27280	22.40		27280-C3	27.00	27280-C4	34.10
.080	**.015**	.240 (3x)	1/8	1-1/2	45580		28180	22.40		28180-C3	27.00	28180-C4	34.10
.080	**.020**	.240 (3x)	1/8	1-1/2			51680	22.40		51680-C3	27.00		
.085	**.005**	.128 (1.5x)	1/8	1-1/2			993885	22.40		993885-C3	27.00		
.085	**.005**	.255 (3x)	1/8	1-1/2	44785		26385	22.40		26385-C3	27.00	26385-C4	34.10
.085	**.010**	.128 (1.5x)	1/8	1-1/2			994585	22.40		994585-C3	27.00		
.085	**.010**	.255 (3x)	1/8	1-1/2	45285		27285	22.40		27285-C3	27.00	27285-C4	34.10
.085	**.015**	.255 (3x)	1/8	1-1/2	45585		28185	22.40		28185-C3	27.00	28185-C4	34.10
.090	**.003**	.270 (3x)	1/8	1-1/2			47290	22.40		47290-C3	27.00		
.090	**.005**	.135 (1.5x)	1/8	1-1/2			993890	22.40		993890-C3	27.00		
.090	**.005**	.270 (3x)	1/8	1-1/2	44790		26390	22.40		26390-C3	27.00	26390-C4	34.10
.090	**.008**	.270 (3x)	1/8	1-1/2			953090	22.40		953090-C3	27.00		
.090	**.010**	.135 (1.5x)	1/8	1-1/2			994590	22.40		994590-C3	27.00		
.090	**.010**	.270 (3x)	1/8	1-1/2	45290		27290	22.40		27290-C3	27.00	27290-C4	34.10
.090	**.015**	.135 (1.5x)	1/8	1-1/2			997990	22.40		997990-C3	27.00		
.090	**.015**	.270 (3x)	1/8	1-1/2	45590		28190	22.40		28190-C3	27.00	28190-C4	34.10
.090	**.020**	.135 (1.5x)	1/8	1-1/2			966490	22.40		966490-C3	27.00		
.090	**.020**	.270 (3x)	1/8	1-1/2			51690	22.40		51690-C3	27.00		
.090	**.030**	.135 (1.5x)	1/8	1-1/2			958890	22.40		958890-C3	27.00		
.090	**.030**	.270 (3x)	1/8	1-1/2			28690	22.40		28690-C3	27.00		
.093 (3/32)	**.003**	.140 (1.5x)	1/8	1-1/2			987593	22.40		987593-C3	27.00		
.093 (3/32)	**.003**	.279 (3x)	1/8	1-1/2	45493		47293	22.40		47293-C3	27.00		
.093 (3/32)	**.005**	.140 (1.5x)	1/8	1-1/2	804593	865193	993893	22.40	865193-C3	993893-C3	27.00		
.093 (3/32)	**.005**	.279 (3x)	1/8	1-1/2	44793	848393	26393	22.40	848393-C3	26393-C3	27.00	26393-C4	34.10
.093 (3/32)	**.008**	.140 (1.5x)	1/8	1-1/2			913793	22.40		913793-C3	27.00		
.093 (3/32)	**.008**	.279 (3x)	1/8	1-1/2	843993		953093	22.40		953093-C3	27.00		
.093 (3/32)	**.010**	.140 (1.5x)	1/8	1-1/2	830393	864693	994593	22.40	864693-C3	994593-C3	27.00	994593-C4	34.10 NEW
.093 (3/32)	**.010**	.279 (3x)	1/8	1-1/2	45293	854193	27293	22.40	854193-C3	27293-C3	27.00	27293-C4	34.10
.093 (3/32)	**.012**	.140 (1.5x)	1/8	1-1/2			904893	22.40		904893-C3	27.00		
.093 (3/32)	**.012**	.279 (3x)	1/8	1-1/2			966993	22.40		966993-C3	27.00		
.093 (3/32)	**.015**	.140 (1.5x)	1/8	1-1/2	830193	860893	997993	22.40	860893-C3	997993-C3	27.00		
.093 (3/32)	**.015**	.279 (3x)	1/8	1-1/2	45593	867293	28193	22.40	867293-C3	28193-C3	27.00	28193-C4	34.10
.093 (3/32)	**.020**	.140 (1.5x)	1/8	1-1/2	810693	858793	966493	22.40	858793-C3	966493-C3	27.00		
.093 (3/32)	**.020**	.279 (3x)	1/8	1-1/2	51393	857793	51693	22.40	857793-C3	51693-C3	27.00	51693-C4	34.10

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Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
.093 (3/32)	**.025**	.140 (1.5x)	1/8	1-1/2			964093	22.40		964093-C3	27.00		
.093 (3/32)	**.025**	.279 (3x)	1/8	1-1/2			957193	22.40		957193-C3	27.00		
.093 (3/32)	**.030**	.140 (1.5x)	1/8	1-1/2			958893	22.40		958893-C3	27.00		
.093 (3/32)	**.030**	.279 (3x)	1/8	1-1/2	73993	853493	28693	22.40	853493-C3	28693-C3	27.00	28693-C4	34.10
.095	**.005**	.143 (1.5x)	1/8	1-1/2			993895	22.40		993895-C3	27.00		
.095	**.005**	.285 (3x)	1/8	1-1/2	44795		26395	22.40		26395-C3	27.00	26395-C4	34.10
.095	**.010**	.143 (1.5x)	1/8	1-1/2			994595	22.40		994595-C3	27.00		
.095	**.010**	.285 (3x)	1/8	1-1/2	45295		27295	22.40		27295-C3	27.00	27295-C4	34.10
.095	**.015**	.285 (3x)	1/8	1-1/2	45595		28195	22.40		28195-C3	27.00	28195-C4	34.10
.095	**.020**	.285 (3x)	1/8	1-1/2			51695	22.40		51695-C3	27.00		
.095	**.030**	.285 (3x)	1/8	1-1/2			28695	22.40		28695-C3	27.00		
.100	**.005**	.150 (1.5x)	1/8	1-1/2			993899	22.40		993899-C3	27.00		
.100	**.005**	.300 (3x)	1/8	1-1/2	44799		26399	22.40		26399-C3	27.00	26399-C4	34.10
.100	**.008**	.300 (3x)	1/8	1-1/2			953099	22.40		953099-C3	27.00		
.100	**.010**	.150 (1.5x)	1/8	1-1/2			994599	22.40		994599-C3	27.00		
.100	**.010**	.300 (3x)	1/8	1-1/2	45299		27299	22.40		27299-C3	27.00	27299-C4	34.10
.100	**.015**	.150 (1.5x)	1/8	1-1/2			997999	22.40		997999-C3	27.00		
.100	**.015**	.300 (3x)	1/8	1-1/2	45599		28199	22.40		28199-C3	27.00	28199-C4	34.10
.100	**.020**	.150 (1.5x)	1/8	1-1/2			966499	22.40		966499-C3	27.00		
.100	**.020**	.300 (3x)	1/8	1-1/2			51699	22.40		51699-C3	27.00		
.100	**.030**	.150 (1.5x)	1/8	1-1/2			958899	22.40		958899-C3	27.00		
.100	**.030**	.300 (3x)	1/8	1-1/2			28699	22.40		28699-C3	27.00		
.109 (7/64)	**.003**	.327 (3x)	1/8	1-1/2			10802	22.40		10802-C3	27.00		
.109 (7/64)	**.005**	.164 (1.5x)	1/8	1-1/2			941402	22.40		941402-C3	27.00		
.109 (7/64)	**.005**	.327 (3x)	1/8	1-1/2			72902	22.40		72902-C3	27.00		
.109 (7/64)	**.008**	.327 (3x)	1/8	1-1/2			75502	22.40		75502-C3	27.00		
.109 (7/64)	**.010**	.164 (1.5x)	1/8	1-1/2			936902	22.40		936902-C3	27.00		
.109 (7/64)	**.010**	.327 (3x)	1/8	1-1/2			75802	22.40		75802-C3	27.00		
.109 (7/64)	**.015**	.164 (1.5x)	1/8	1-1/2			935002	22.40		935002-C3	27.00		
.109 (7/64)	**.015**	.327 (3x)	1/8	1-1/2			74202	22.40		74202-C3	27.00		
.109 (7/64)	**.020**	.164 (1.5x)	1/8	1-1/2			872002	22.40		872002-C3	27.00		
.109 (7/64)	**.020**	.327 (3x)	1/8	1-1/2			986302	22.40		986302-C3	27.00		
.109 (7/64)	**.030**	.164 (1.5x)	1/8	1-1/2			892402	22.40		892402-C3	27.00		
.109 (7/64)	**.030**	.327 (3x)	1/8	1-1/2			937602	22.40		937602-C3	27.00		
.118 (3 mm)	**.005**	.177 (1.5x)	1/8	1-1/2			941405	22.80		941405-C3	27.40		
.118 (3 mm)	**.005**	.354 (3x)	1/8	1-1/2			72905	22.80		72905-C3	27.40		
.118 (3 mm)	**.008**	.354 (3x)	1/8	1-1/2			916705	22.80		916705-C3	27.40		
.118 (3 mm)	**.010**	.177 (1.5x)	1/8	1-1/2			936905	22.80		936905-C3	27.40		
.118 (3 mm)	**.010**	.354 (3x)	1/8	1-1/2			75805	22.80		75805-C3	27.40		
.118 (3 mm)	**.015**	.177 (1.5x)	1/8	1-1/2			935005	22.80		935005-C3	27.40		
.118 (3 mm)	**.015**	.354 (3x)	1/8	1-1/2			74205	22.80		74205-C3	27.40		
.118 (3 mm)	**.020**	.177 (1.5x)	1/8	1-1/2			872005	22.80		872005-C3	27.40		
.118 (3 mm)	**.020**	.354 (3x)	1/8	1-1/2			986305	22.80		986305-C3	27.40		
.118 (3 mm)	**.030**	.177 (1.5x)	1/8	1-1/2			892405	22.80		892405-C3	27.40		
.118 (3 mm)	**.030**	.354 (3x)	1/8	1-1/2			937605	22.80		937605-C3	27.40		
.118 (3 mm)	**.040**	.354 (3x)	1/8	1-1/2			874005	22.80		874005-C3	27.40		

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.003**	.187 (1.5x)	1/8	1-1/2			980203	21.60		980203-C3	26.20		
.125 (1/8)	**.003**	.500 (4x)	1/8	1-1/2	46403		32403	21.60		32403-C3	26.20		
.125 (1/8)	**.005**	.187 (1.5x)	1/8	1-1/2	832905	833405	980205	22.40	833405-C3	980205-C3	27.00		
.125 (1/8)	**.005**	.500 (4x)	1/8	1-1/2	46405	870905	32405	22.40	870905-C3	32405-C3	27.00	32405-C4	34.10
.125 (1/8)	**.008**	.187 (1.5x)	1/8	1-1/2			980208	22.40		980208-C3	27.00		
.125 (1/8)	**.008**	.500 (4x)	1/8	1-1/2	46408		32408	22.40		32408-C3	27.00		
.125 (1/8)	**.010**	.187 (1.5x)	1/8	1-1/2	832910	833410	980210	21.60	833410-C3	980210-C3	26.20	980210-C4	33.30
.125 (1/8)	**.010**	.500 (4x)	1/8	1-1/2	46410	870910	32410	21.60	870910-C3	32410-C3	26.20	32410-C4	33.30
.125 (1/8)	**.012**	.187 (1.5x)	1/8	1-1/2			980212	22.40		980212-C3	27.00		
.125 (1/8)	**.012**	.500 (4x)	1/8	1-1/2			32412	22.40		32412-C3	27.00		
.125 (1/8)	**.015**	.187 (1.5x)	1/8	1-1/2		833415	980215	21.60	833415-C3	980215-C3	26.20		
.125 (1/8)	**.015**	.500 (4x)	1/8	1-1/2	46415	870915	32415	21.60	870915-C3	32415-C3	26.20	32415-C4	33.30
.125 (1/8)	**.020**	.187 (1.5x)	1/8	1-1/2	832920	833420	980220	21.60	833420-C3	980220-C3	26.20		
.125 (1/8)	**.020**	.500 (4x)	1/8	1-1/2	46420	870920	32420	21.60	870920-C3	32420-C3	26.20	32420-C4	33.30
.125 (1/8)	**.025**	.187 (1.5x)	1/8	1-1/2			980225	22.40		980225-C3	27.00		
.125 (1/8)	**.025**	.500 (4x)	1/8	1-1/2	46425		32425	22.40		32425-C3	27.00		
.125 (1/8)	**.030**	.187 (1.5x)	1/8	1-1/2	832930	833430	980230	21.60	833430-C3	980230-C3	26.20		
.125 (1/8)	**.030**	.500 (4x)	1/8	1-1/2	46430	870930	32430	21.60	870930-C3	32430-C3	26.20	32430-C4	33.30
.125 (1/8)	**.040**	.187 (1.5x)	1/8	1-1/2		833440	980240	22.40	833440-C3	980240-C3	27.00		
.125 (1/8)	**.040**	.500 (4x)	1/8	1-1/2	46440		32440	22.40		32440-C3	27.00		
.125 (1/8)	**.045**	.187 (1.5x)	1/8	1-1/2			980245	21.60		980245-C3	26.20		
.125 (1/8)	**.045**	.500 (4x)	1/8	1-1/2			32445	21.60		32445-C3	26.20		
.140 (9/64)	**.005**	.220 (1.5x)	3/16	2			857105	27.20		857105-C3	32.20		
.140 (9/64)	**.005**	.425 (3x)	3/16	2			966705	27.20		966705-C3	32.20		
.140 (9/64)	**.010**	.220 (1.5x)	3/16	2			857110	26.10		857110-C3	31.10		
.140 (9/64)	**.010**	.425 (3x)	3/16	2	810910		966710	26.10		966710-C3	31.10		
.140 (9/64)	**.015**	.220 (1.5x)	3/16	2		833315	857115	26.10	833315-C3	857115-C3	31.10		
.140 (9/64)	**.015**	.425 (3x)	3/16	2	810915	832115	966715	26.10	832115-C3	966715-C3	31.10		
.140 (9/64)	**.020**	.220 (1.5x)	3/16	2			857120	26.10		857120-C3	31.10		
.140 (9/64)	**.020**	.425 (3x)	3/16	2			966720	26.10		966720-C3	31.10		
.140 (9/64)	**.030**	.220 (1.5x)	3/16	2			857130	26.10		857130-C3	31.10		
.140 (9/64)	**.030**	.425 (3x)	3/16	2			966730	26.10		966730-C3	31.10		
.140 (9/64)	**.040**	.220 (1.5x)	3/16	2			857140	27.20		857140-C3	31.80		
.140 (9/64)	**.040**	.425 (3x)	3/16	2			966740	27.20		966740-C3	32.20		
.140 (9/64)	**.045**	.220 (1.5x)	3/16	2			857145	26.10		857145-C3	31.10		
.140 (9/64)	**.045**	.425 (3x)	3/16	2			966745	26.10		966745-C3	31.10		
.156 (5/32)	**.005**	.235 (1.5x)	3/16	2			954805	24.90		954805-C3	29.90		
.156 (5/32)	**.005**	.562 (3x)	3/16	2			75205	24.90		75205-C3	29.90		
.156 (5/32)	**.010**	.235 (1.5x)	3/16	2			954810	23.90		954810-C3	28.90		
.156 (5/32)	**.010**	.562 (3x)	3/16	2	71910		75210	23.90		75210-C3	28.90		
.156 (5/32)	**.015**	.235 (1.5x)	3/16	2			954815	23.90		954815-C3	28.90		
.156 (5/32)	**.015**	.562 (3x)	3/16	2	71915		75215	23.90		75215-C3	28.90		
.156 (5/32)	**.020**	.235 (1.5x)	3/16	2			954820	23.90		954820-C3	28.90		
.156 (5/32)	**.020**	.562 (3x)	3/16	2			75220	23.90		75220-C3	28.90	75220-C4	40.00
.156 (5/32)	**.025**	.562 (3x)	3/16	2			75225	23.90		75225-C3	28.90		
.156 (5/32)	**.030**	.235 (1.5x)	3/16	2			954830	23.90		954830-C3	28.90		
.156 (5/32)	**.030**	.562 (3x)	3/16	2	71930	832030	75230	23.90	832030-C3	75230-C3	28.90	75230-C4	40.00
.156 (5/32)	**.040**	.235 (1.5x)	3/16	2			954840	24.90		954840-C3	29.90		

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE
	.156 (5/32)	**.040**	.562 (3x)	3/16	2			75240	24.90		75240-C3	29.90		
	.156 (5/32)	**.045**	.235 (1.5x)	3/16	2			954845	23.90		954845-C3	28.90		
	.156 (5/32)	**.045**	.562 (3x)	3/16	2			75245	23.90		75245-C3	28.90		
	.172 (11/64)	**.010**	.515 (3x)	3/16	2			855310	23.90		855310-C3	28.90		
	.172 (11/64)	**.030**	.515 (3x)	3/16	2			855330	23.90		855330-C3	28.90		
	.187 (3/16)	**.005**	.285 (1.5x)	3/16	2			937905	24.90		937905-C3	29.90		
	.187 (3/16)	**.005**	.625 (3x)	3/16	2	46705		34805	24.90		34805-C3	29.90		
	.187 (3/16)	**.008**	.285 (1.5x)	3/16	2			937908	24.90		937908-C3	29.90		
	.187 (3/16)	**.008**	.625 (3x)	3/16	2		831908	34808	24.90	831908-C3	34808-C3	29.90		
	.187 (3/16)	**.010**	.285 (1.5x)	3/16	2		833210	937910	23.90	833210-C3	937910-C3	28.90		
	.187 (3/16)	**.010**	.625 (3x)	3/16	2	46710	831910	34810	23.90	831910-C3	34810-C3	28.90	34810-C4	40.00
	.187 (3/16)	**.012**	.285 (1.5x)	3/16	2			937912	24.90		937912-C3	29.90		
	.187 (3/16)	**.012**	.625 (3x)	3/16	2			34812	24.90		34812-C3	29.90		
	.187 (3/16)	**.015**	.285 (1.5x)	3/16	2			937915	23.90		937915-C3	28.90		
	.187 (3/16)	**.015**	.625 (3x)	3/16	2	46715		34815	23.90		34815-C3	28.90	34815-C4	40.00
	.187 (3/16)	**.020**	.285 (1.5x)	3/16	2			937920	23.90		937920-C3	28.90		
	.187 (3/16)	**.020**	.625 (3x)	3/16	2	46720		34820	23.90		34820-C3	28.90		
	.187 (3/16)	**.025**	.285 (1.5x)	3/16	2			937925	24.90		937925-C3	29.90		
	.187 (3/16)	**.025**	.625 (3x)	3/16	2	46725		34825	24.90		34825-C3	29.90		
	.187 (3/16)	**.030**	.285 (1.5x)	3/16	2			937930	23.90		937930-C3	28.90		
	.187 (3/16)	**.030**	.625 (3x)	3/16	2	46730		34830	23.90		34830-C3	28.90	34830-C4	40.00
	.187 (3/16)	**.040**	.285 (1.5x)	3/16	2			937940	24.90		937940-C3	29.90		
	.187 (3/16)	**.040**	.625 (3x)	3/16	2	46740		34840	24.90		34840-C3	29.90		
	.187 (3/16)	**.045**	.285 (1.5x)	3/16	2			937945	23.90		937945-C3	28.90		
	.187 (3/16)	**.045**	.625 (3x)	3/16	2	46745		34845	23.90		34845-C3	28.90	34845-C4	40.00
	.187 (3/16)	**.050**	.625 (3x)	3/16	2			34850	24.90		34850-C3	29.90		
	.187 (3/16)	**.060**	.285 (1.5x)	3/16	2	810560	833260	937960	23.90	833260-C3	937960-C3	28.90		
	.187 (3/16)	**.060**	.625 (3x)	3/16	2	46760	831960	34860	23.90	831960-C3	34860-C3	28.90	34860-C4	40.00
	.203 (13/64)	**.010**	.610 (3x)	1/4	2-1/2			865610	29.40		865610-C3	36.20		
	.203 (13/64)	**.030**	.610 (3x)	1/4	2-1/2			865630	29.40		865630-C3	36.20		
	.218 (7/32)	**.010**	.660 (3x)	1/4	2-1/2			863910	29.40		863910-C3	36.20		
	.218 (7/32)	**.030**	.660 (3x)	1/4	2-1/2			863930	29.40		863930-C3	36.20		
	.234 (15/64)	**.010**	.705 (3x)	1/4	2-1/2			863510	29.40		863510-C3	36.20		
	.234 (15/64)	**.030**	.705 (3x)	1/4	2-1/2			863530	29.40		863530-C3	36.20		
	.250 (1/4)	**.005**	.375 (1.5x)	1/4	2-1/2	810805	833005	941105	30.60	833005-C3	941105-C3	37.40		
	.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	47405	831805	36205	30.60	831805-C3	36205-C3	37.40	36205-C4	48.90
	.250 (1/4)	**.008**	.375 (1.5x)	1/4	2-1/2			941108	30.60		941108-C3	37.40		
	.250 (1/4)	**.008**	.750 (3x)	1/4	2-1/2			36208	30.60		36208-C3	37.40		
	.250 (1/4)	**.010**	.375 (1.5x)	1/4	2-1/2	810810	833010	941110	29.40	833010-C3	941110-C3	36.20		
	.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	47410	831810	36210	29.40	831810-C3	36210-C3	36.20	36210-C4	47.70
	.250 (1/4)	**.012**	.750 (3x)	1/4	2-1/2			36212	30.60		36212-C3	37.40		
	.250 (1/4)	**.015**	.375 (1.5x)	1/4	2-1/2		833015	941115	29.40	833015-C3	941115-C3	36.20		
	.250 (1/4)	**.015**	.750 (3x)	1/4	2-1/2	47415	831815	36215	29.40	831815-C3	36215-C3	36.20	36215-C4	47.70
	.250 (1/4)	**.020**	.375 (1.5x)	1/4	2-1/2			941120	29.40		941120-C3	36.20		
	.250 (1/4)	**.020**	.750 (3x)	1/4	2-1/2	47420		36220	29.40		36220-C3	36.20	36220-C4	47.70
NEW	.250 (1/4)	**.025**	.375 (1.5x)	1/4	2-1/2		833025	941125	30.60	833025-C3	941125-C3	37.40		
NEW	.250 (1/4)	**.025**	.750 (3x)	1/4	2-1/2		831825	36225	30.60	831825-C3	36225-C3	37.40		

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Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	4 FL	PRICE	
.250 (1/4)	**.030**	.375 (1.5x)	1/4	2-1/2			941130	29.40		941130-C3	36.20			
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	47430		36230	29.40		36230-C3	36.20	36230-C4	47.70	
.250 (1/4)	**.040**	.375 (1.5x)	1/4	2-1/2		833040	941140	30.60	833040-C3	941140-C3	37.40			
.250 (1/4)	**.040**	.750 (3x)	1/4	2-1/2		831840	36240	30.60	831840-C3	36240-C3	37.40			
.250 (1/4)	**.045**	.375 (1.5x)	1/4	2-1/2			941145	29.40		941145-C3	36.20			
.250 (1/4)	**.045**	.750 (3x)	1/4	2-1/2	47445		36245	29.40		36245-C3	36.20	36245-C4	47.70	
.250 (1/4)	**.050**	.375 (1.5x)	1/4	2-1/2			941150	30.60		941150-C3	37.40			
.250 (1/4)	**.050**	.750 (3x)	1/4	2-1/2			36250	30.60		36250-C3	37.40			
.250 (1/4)	**.060**	.375 (1.5x)	1/4	2-1/2			941160	29.40		941160-C3	36.20			
.250 (1/4)	**.060**	.750 (3x)	1/4	2-1/2	47460	831860	36260	29.40	831860-C3	36260-C3	36.20	36260-C4	47.70	
.250 (1/4)	**.075**	.375 (1.5x)	1/4	2-1/2			941175	30.60		941175-C3	37.40			
.250 (1/4)	**.075**	.750 (3x)	1/4	2-1/2			36275	30.60		36275-C3	37.40			
.312 (5/16)	**.005**	1.000 (3x)	5/16	2-1/2			945105	34.20		945105-C3	42.10			
.312 (5/16)	**.010**	1.000 (3x)	5/16	2-1/2			945110	32.90		945110-C3	40.80			
.312 (5/16)	**.030**	1.000 (3x)	5/16	2-1/2			945130	32.90		945130-C3	40.80			
.312 (5/16)	**.060**	1.000 (3x)	5/16	2-1/2			945160	32.90		945160-C3	40.80			
.375 (3/8)	**.005**	.570 (1.5x)	3/8	2-1/2			915205	46.50		915205-C3	55.50			
.375 (3/8)	**.005**	1.000 (3x)	3/8	2-1/2			72805	46.50		72805-C3	55.50	72805-C4	68.60	
.375 (3/8)	**.010**	.570 (1.5x)	3/8	2-1/2			915210	44.70		915210-C3	53.70			
.375 (3/8)	**.010**	1.000 (3x)	3/8	2-1/2			72810	44.70		72810-C3	53.70			
.375 (3/8)	**.015**	1.000 (3x)	3/8	2-1/2			72815	44.70		72815-C3	53.70			
.375 (3/8)	**.020**	1.000 (3x)	3/8	2-1/2			72820	44.70		72820-C3	53.70			
.375 (3/8)	**.025**	1.000 (3x)	3/8	2-1/2			72825	44.70		72825-C3	53.70			NEW
.375 (3/8)	**.030**	.570 (1.5x)	3/8	2-1/2			915230	44.70		915230-C3	53.70			
.375 (3/8)	**.030**	1.000 (3x)	3/8	2-1/2			72830	44.70		72830-C3	53.70	72830-C4	66.80	
.375 (3/8)	**.040**	.570 (1.5x)	3/8	2-1/2			915240	46.50		915240-C3	55.50			
.375 (3/8)	**.040**	1.000 (3x)	3/8	2-1/2	804340	831740	72840	46.50	831740-C3	72840-C3	55.50	72840-C4	68.60	
.375 (3/8)	**.045**	1.000 (3x)	3/8	2-1/2			72845	44.70		72845-C3	53.70			
.375 (3/8)	**.050**	1.000 (3x)	3/8	2-1/2			72850	44.70		72850-C3	53.70			
.375 (3/8)	**.060**	1.000 (3x)	3/8	2-1/2			72860	44.70		72860-C3	53.70			
.375 (3/8)	**.075**	1.000 (3x)	3/8	2-1/2			72875	44.70		72875-C3	53.70			
.500 (1/2)	**.010**	1.000 (2x)	1/2	3			74510	69.00		74510-C3	82.40			
.500 (1/2)	**.015**	1.000 (2x)	1/2	3			74515	69.00		74515-C3	82.40			
.500 (1/2)	**.020**	1.000 (2x)	1/2	3			74520	69.00		74520-C3	82.40			
.500 (1/2)	**.030**	1.000 (2x)	1/2	3			74530	69.00		74530-C3	82.40	74530-C4	95.60	
.500 (1/2)	**.040**	1.000 (2x)	1/2	3			74540	69.00		74540-C3	82.40			
.500 (1/2)	**.045**	1.000 (2x)	1/2	3			74545	69.00		74545-C3	82.40			
.500 (1/2)	**.050**	1.000 (2x)	1/2	3			74550	69.00		74550-C3	82.40			NEW
.500 (1/2)	**.060**	1.000 (2x)	1/2	3			74560	69.00		74560-C3	82.40			

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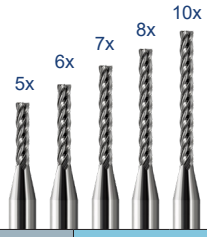
Corner Radius – Long Flute

- **Long flute and long shank design for deep cavities**
- Mills deep pockets
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Flute Lengths



	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE
	.015 (1/64)	**.003**	**.078** (5x)	4	1/8	2-1/2	981415	65.50	981415-C3	70.10
	.015 (1/64)	**.003**	**.125** (8x)	4	1/8	2-1/2	933615	75.10	933615-C3	79.70
	.020 (.5 mm)	**.005**	**.100** (5x)	4	1/8	2-1/2	959620	58.70	959620-C3	63.30
	.020 (.5 mm)	**.005**	**.160** (8x)	4	1/8	2-1/2	949820	68.20	949820-C3	72.80
	.025	**.005**	**.125** (5x)	4	1/8	2-1/2	959625	55.90	959625-C3	60.50
	.025	**.005**	**.203** (8x)	4	1/8	2-1/2	949825	65.40	949825-C3	70.00
	.031 (1/32)	**.005**	**.156** (5x)	4	1/8	2-1/2	959631	54.20	959631-C3	58.80
NEW	.031 (1/32)	**.005**	**.187** (6x)	4	1/8	2-1/2	801131	57.20	801131-C3	61.80
NEW	.031 (1/32)	**.005**	**.218** (7x)	4	1/8	2-1/2	800931	59.50	800931-C3	64.10
	.031 (1/32)	**.005**	**.250** (8x)	4	1/8	2-1/2	949831	63.60	949831-C3	68.20
	.031 (1/32)	**.008**	**.156** (5x)	4	1/8	2-1/2	884231	54.40	884231-C3	59.00
	.031 (1/32)	**.008**	**.250** (8x)	4	1/8	2-1/2	887431	63.60	887431-C3	68.20
	.031 (1/32)	**.010**	**.156** (5x)	4	1/8	2-1/2	964331	54.20	964331-C3	58.80
	.031 (1/32)	**.010**	**.250** (8x)	4	1/8	2-1/2	938031	63.60	938031-C3	68.20
	.039 (1 mm)	**.005**	**.203** (5x)	4	1/8	2-1/2	959639	51.60	959639-C3	56.20
	.039 (1 mm)	**.005**	**.325** (8x)	4	1/8	2-1/2	949839	57.50	949839-C3	62.10
	.039 (1 mm)	**.010**	**.203** (5x)	4	1/8	2-1/2	964339	51.60	964339-C3	56.20
	.039 (1 mm)	**.010**	**.325** (8x)	4	1/8	2-1/2	938039	57.50	938039-C3	62.10
	.040	**.005**	**.203** (5x)	4	1/8	2-1/2	959640	51.60	959640-C3	56.20
	.040	**.005**	**.325** (8x)	4	1/8	2-1/2	949840	57.50	949840-C3	62.10
	.047 (3/64)	**.005**	**.250** (5x)	4	1/8	2-1/2	959647	28.40	959647-C3	33.00
	.047 (3/64)	**.005**	**.375** (8x)	4	1/8	2-1/2	949847	32.20	949847-C3	36.80
	.047 (3/64)	**.010**	**.250** (5x)	4	1/8	2-1/2	964347	28.40	964347-C3	33.00
	.047 (3/64)	**.010**	**.375** (8x)	4	1/8	2-1/2	938047	32.20	938047-C3	36.80
	.047 (3/64)	**.015**	**.250** (5x)	4	1/8	2-1/2	885047	28.40	885047-C3	33.00
	.047 (3/64)	**.015**	**.375** (8x)	4	1/8	2-1/2	888247	32.20	888247-C3	36.80
	.050	**.005**	**.250** (5x)	4	1/8	2-1/2	959650	28.40	959650-C3	33.00
	.050	**.005**	**.400** (8x)	4	1/8	2-1/2	949850	32.20	949850-C3	36.80
	.060	**.005**	**.312** (5x)	4	1/8	2-1/2	959660	28.40	959660-C3	33.00
	.060	**.005**	**.500** (8x)	4	1/8	2-1/2	949860	32.20	949860-C3	36.80

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE	
.062 (1/16)	**.005**	**.312** (5x)	4	1/8	2-1/2	959662	28.40	959662-C3	33.00	
.062 (1/16)	**.005**	**.375** (6x)	4	1/8	2-1/2	801162	30.10	801162-C3	34.70	NEW
.062 (1/16)	**.005**	**.437** (7x)	4	1/8	2-1/2	800962	30.50	800962-C3	35.10	NEW
.062 (1/16)	**.005**	**.500** (8x)	4	1/8	2-1/2	949862	32.20	949862-C3	36.80	
.062 (1/16)	**.005**	**.625** (10x)	4	1/8	2-1/2	870562	37.60	870562-C3	42.20	
.062 (1/16)	**.008**	**.312** (5x)	4	1/8	2-1/2	884262	28.60	884262-C3	33.20	
.062 (1/16)	**.008**	**.500** (8x)	4	1/8	2-1/2	887462	32.20	887462-C3	36.80	
.062 (1/16)	**.010**	**.312** (5x)	4	1/8	2-1/2	964362	28.40	964362-C3	33.00	
.062 (1/16)	**.010**	**.500** (8x)	4	1/8	2-1/2	938062	32.20	938062-C3	36.80	
.062 (1/16)	**.010**	**.625** (10x)	4	1/8	2-1/2	849262	37.60	849262-C3	42.20	
.062 (1/16)	**.015**	**.312** (5x)	4	1/8	2-1/2	885062	28.40	885062-C3	33.00	
.062 (1/16)	**.015**	**.500** (8x)	4	1/8	2-1/2	888262	32.20	888262-C3	36.80	
.062 (1/16)	**.020**	**.312** (5x)	4	1/8	2-1/2	885862	28.40	885862-C3	33.00	
.062 (1/16)	**.020**	**.500** (8x)	4	1/8	2-1/2	889062	32.20	889062-C3	36.80	
.078 (5/64)	**.005**	**.406** (5x)	4	1/8	2-1/2	959678	28.40	959678-C3	33.00	
.078 (5/64)	**.005**	**.625** (8x)	4	1/8	2-1/2	949878	32.20	949878-C3	36.80	
.078 (5/64)	**.010**	**.406** (5x)	4	1/8	2-1/2	964378	28.40	964378-C3	33.00	
.078 (5/64)	**.010**	**.625** (8x)	4	1/8	2-1/2	938078	32.20	938078-C3	36.80	
.078 (5/64)	**.015**	**.406** (5x)	4	1/8	2-1/2	885078	28.40	885078-C3	33.00	
.078 (5/64)	**.015**	**.625** (8x)	4	1/8	2-1/2	888278	32.20	888278-C3	36.80	
.078 (5/64)	**.020**	**.406** (5x)	4	1/8	2-1/2	885878	28.40	885878-C3	33.00	
.078 (5/64)	**.020**	**.625** (8x)	4	1/8	2-1/2	889078	32.20	889078-C3	36.80	
.093 (3/32)	**.005**	**.500** (5x)	4	1/8	2-1/2	959693	28.40	959693-C3	33.00	
.093 (3/32)	**.005**	**.585** (6x)	4	1/8	2-1/2	801193	30.10	801193-C3	34.70	NEW
.093 (3/32)	**.005**	**.670** (7x)	4	1/8	2-1/2	800993	30.50	800993-C3	35.10	NEW
.093 (3/32)	**.005**	**.750** (8x)	4	1/8	2-1/2	949893	32.20	949893-C3	36.80	
.093 (3/32)	**.005**	**.950** (10x)	4	1/8	2-1/2	870593	37.60	870593-C3	42.20	
.093 (3/32)	**.008**	**.500** (5x)	4	1/8	2-1/2	884293	28.60	884293-C3	33.20	
.093 (3/32)	**.008**	**.750** (8x)	4	1/8	2-1/2	887493	32.20	887493-C3	36.80	
.093 (3/32)	**.010**	**.500** (5x)	4	1/8	2-1/2	964393	28.40	964393-C3	33.00	
.093 (3/32)	**.010**	**.750** (8x)	4	1/8	2-1/2	938093	32.20	938093-C3	36.80	
.093 (3/32)	**.010**	**.950** (10x)	4	1/8	2-1/2	849293	37.60	849293-C3	42.20	
.093 (3/32)	**.015**	**.500** (5x)	4	1/8	2-1/2	885093	28.40	885093-C3	33.00	
.093 (3/32)	**.015**	**.750** (8x)	4	1/8	2-1/2	888293	32.20	888293-C3	36.80	
.093 (3/32)	**.020**	**.500** (5x)	4	1/8	2-1/2	885893	28.40	885893-C3	33.00	
.093 (3/32)	**.020**	**.750** (8x)	4	1/8	2-1/2	889093	32.20	889093-C3	36.80	
.093 (3/32)	**.030**	**.500** (5x)	4	1/8	2-1/2	886693	28.40	886693-C3	33.00	
.093 (3/32)	**.030**	**.750** (8x)	4	1/8	2-1/2	889893	32.20	889893-C3	36.80	
.100	**.010**	**.500** (5x)	4	1/8	2-1/2	964400	28.40	964400-C3	33.00	
.100	**.010**	**.800** (8x)	4	1/8	2-1/2	938100	32.20	938100-C3	36.80	
.118 (3 mm)	**.005**	**.625** (5x)	4	1/8	2-1/2	912505	28.40	912505-C3	33.00	
.118 (3 mm)	**.005**	**.950** (8x)	4	1/8	2-1/2	905305	32.20	905305-C3	36.80	
.118 (3 mm)	**.010**	**.625** (5x)	4	1/8	2-1/2	912605	28.40	912605-C3	33.00	
.118 (3 mm)	**.010**	**.950** (8x)	4	1/8	2-1/2	905405	32.20	905405-C3	36.80	

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MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

continued from previous page

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE
	.125 (1/8)	**.005**	**.625** (5x)	4	1/8	2-1/2	950905	26.80	950905-C3	31.40
	.125 (1/8)	**.005**	**1.000** (8x)	4	1/8	2-1/2	981905	29.40	981905-C3	34.00
	.125 (1/8)	**.010**	**.625** (5x)	4	1/8	2-1/2	950910	26.80	950910-C3	31.40
	.125 (1/8)	**.010**	**1.000** (8x)	4	1/8	2-1/2	981910	29.40	981910-C3	34.00
	.125 (1/8)	**.015**	**.625** (5x)	4	1/8	2-1/2	950915	26.80	950915-C3	31.40
	.125 (1/8)	**.015**	**1.000** (8x)	4	1/8	2-1/2	981915	29.40	981915-C3	34.00
	.125 (1/8)	**.020**	**.625** (5x)	4	1/8	2-1/2	950920	26.80	950920-C3	31.40
	.125 (1/8)	**.020**	**1.000** (8x)	4	1/8	2-1/2	981920	29.40	981920-C3	34.00
	.125 (1/8)	**.030**	**.625** (5x)	4	1/8	2-1/2	950930	26.80	950930-C3	31.40
	.125 (1/8)	**.030**	**1.000** (8x)	4	1/8	2-1/2	981930	29.40	981930-C3	34.00
	.156 (5/32)	**.010**	**.750** (5x)	4	3/16	3	830910	33.20	830910-C3	38.20
	.156 (5/32)	**.030**	**.750** (5x)	4	3/16	3	830930	33.20	830930-C3	38.20
	.187 (3/16)	**.005**	**1.000** (5x)	4	3/16	3	932405	31.60	932405-C3	36.60
	.187 (3/16)	**.010**	**1.000** (5x)	4	3/16	3	932410	31.60	932410-C3	36.60
	.187 (3/16)	**.010**	**1.680** (8x)	4	3/16	3	830810	32.40	830810-C3	37.40
	.187 (3/16)	**.030**	**1.000** (5x)	4	3/16	3	932430	31.60	932430-C3	36.60
	.250 (1/4)	**.005**	**1.250** (5x)	4	1/4	4	917105	35.30	917105-C3	43.20
	.250 (1/4)	**.010**	**1.250** (5x)	4	1/4	4	917110	35.30	917110-C3	43.20
	.250 (1/4)	**.030**	**1.250** (5x)	4	1/4	4	917130	35.30	917130-C3	43.20
NEW	.375 (3/8)	**.005**	**2.000** (5x)	4	3/8	4	800805	47.80	800805-C3	60.10
NEW	.375 (3/8)	**.010**	**2.000** (5x)	4	3/8	4	800810	47.80	800810-C3	60.10
NEW	.375 (3/8)	**.040**	**2.000** (5x)	4	3/8	4	800840	47.80	800840-C3	60.10

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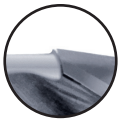
MINIATURE END MILLS

Corner Radius – Long Reach, Standard Flute

- Corner radius for improved strength
- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA



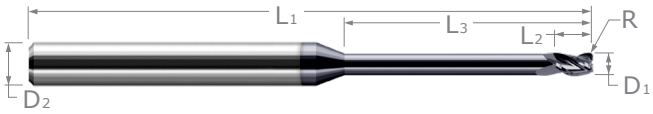
Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	
.031 (1/32)	**.005**	.093	**.156** (5x)	1/8	1-1/2	864131	875231	42.70	875231-C3	47.30	
.031 (1/32)	**.005**	.093	**.250** (8x)	1/8	1-1/2	865731	876831	43.50	876831-C3	48.10	
.031 (1/32)	**.010**	.093	**.156** (5x)	1/8	1-1/2	864931	876031	42.70	876031-C3	47.30	
.031 (1/32)	**.010**	.093	**.250** (8x)	1/8	1-1/2	866531	877631	43.50	877631-C3	48.10	
.047 (3/64)	**.005**	.141	**.250** (5x)	1/8	1-1/2	864147	875247	41.40	875247-C3	46.00	
.047 (3/64)	**.005**	.141	**.375** (8x)	1/8	1-1/2	865747	876847	42.20	876847-C3	46.80	
.047 (3/64)	**.010**	.141	**.250** (5x)	1/8	1-1/2	864947	876047	41.40	876047-C3	46.00	
.047 (3/64)	**.010**	.141	**.375** (8x)	1/8	1-1/2	866547	877647	42.20	877647-C3	46.80	
.062 (1/16)	**.005**	.186	**.312** (5x)	1/8	1-1/2	864162	875262	41.40	875262-C3	46.00	
.062 (1/16)	**.005**	.186	**.500** (8x)	1/8	1-1/2	865762	876862	42.20	876862-C3	46.80	
.062 (1/16)	**.010**	.186	**.312** (5x)	1/8	1-1/2	864962	876062	41.40	876062-C3	46.00	
.062 (1/16)	**.010**	.186	**.500** (8x)	1/8	1-1/2	866562	877662	42.20	877662-C3	46.80	
.078 (5/64)	**.005**	.234	**.406** (5x)	1/8	1-1/2	864178	875278	41.40	875278-C3	46.00	
.078 (5/64)	**.005**	.234	**.625** (8x)	1/8	2	865778	876878	42.70	876878-C3	47.30	
.078 (5/64)	**.010**	.234	**.406** (5x)	1/8	1-1/2	864978	876078	41.40	876078-C3	46.00	
.078 (5/64)	**.010**	.234	**.625** (8x)	1/8	2	866578	877678	42.70	877678-C3	47.30	
.093 (3/32)	**.005**	.279	**.500** (5x)	1/8	1-1/2	864193	875293	42.20	875293-C3	46.80	
.093 (3/32)	**.005**	.279	**.750** (8x)	1/8	2	865793	876893	42.70	876893-C3	47.30	
.093 (3/32)	**.010**	.279	**.500** (5x)	1/8	1-1/2	864993	876093	42.20	876093-C3	46.80	
.093 (3/32)	**.010**	.279	**.750** (8x)	1/8	2	866593	877693	42.70	877693-C3	47.30	
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	
.125 (1/8)	**.005**	.375	**.625** (5x)	1/8	1-1/2	864208	875308	42.20	875308-C3	46.80	
.125 (1/8)	**.005**	.375	**1.000** (8x)	1/8	2	865808	876908	42.20	876908-C3	46.80	
.125 (1/8)	**.010**	.375	**.625** (5x)	1/8	1-1/2	865008	876108	42.20	876108-C3	46.80	
.125 (1/8)	**.010**	.375	**1.000** (8x)	1/8	2	866608	877708	42.20	877708-C3	46.80	
.187 (3/16)	**.010**	.563	**1.000** (5x)	3/16	2		876112	49.30	876112-C3	54.30	NEW
.187 (3/16)	**.010**	.563	**1.500** (8x)	3/16	2-1/2		877712	49.30	877712-C3	54.30	NEW
.250 (1/4)	**.010**	.750	**1.250** (5x)	1/4	2-1/2		876116	54.30	876116-C3	61.10	NEW
.250 (1/4)	**.010**	.750	**2.000** (8x)	1/4	4		877716	55.40	877716-C3	63.30	NEW

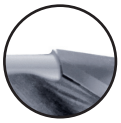
NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute

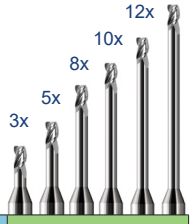


- **Long length design for deep cavities, up to 8" overall length**
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

Stocked in *Six* Reach Lengths!



	CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005" −.0005"	R +.001" −.001"	L_2 +.010" −.000"	L_3 +.010" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.010	**.003**	.015	**.050** (5x)	3	1/8	2-1/2	968210	53.00	968210-C3	57.60		
	.010	**.003**	.015	**.080** (8x)	3	1/8	2-1/2	972710	53.90	972710-C3	58.50		
	.015 (1/64)	**.003**	.022	**.078** (5x)	3	1/8	2-1/2	968215	47.40	968215-C3	52.00		
	.015 (1/64)	**.003**	.022	**.125** (8x)	3	1/8	2-1/2	972715	48.60	972715-C3	53.20		
	.015 (1/64)	**.005**	.022	**.078** (5x)	3	1/8	2-1/2	37115	47.60	37115-C3	52.20		
	.015 (1/64)	**.005**	.022	**.125** (8x)	3	1/8	2-1/2	38315	48.60	38315-C3	53.20		
	.020 (.5 mm)	**.005**	.030	**.100** (5x)	3	1/8	2-1/2	37120	45.90	37120-C3	50.50		
	.020 (.5 mm)	**.005**	.030	**.160** (8x)	3	1/8	2-1/2	38320	47.20	38320-C3	51.80		
	.020 (.5 mm)	**.005**	.030	**.200** (10x)	3	1/8	2-1/2	917820	49.40	917820-C3	54.00		
	.025	**.005**	.037	**.125** (5x)	3	1/8	2-1/2	37125	45.90	37125-C3	50.50		
	.025	**.005**	.037	**.203** (8x)	3	1/8	2-1/2	38325	47.20	38325-C3	51.80		
	.025	**.005**	.037	**.250** (10x)	3	1/8	2-1/2	917825	49.40	917825-C3	54.00		
	.030	**.005**	.045	**.156** (5x)	3	1/8	2-1/2	37130	39.50	37130-C3	44.10		
	.030	**.005**	.045	**.250** (8x)	3	1/8	2-1/2	38330	40.50	38330-C3	45.10		
	.031 (1/32)	**.003**	.046	**.156** (5x)	3	1/8	2-1/2	968231	39.50	968231-C3	44.10		
	.031 (1/32)	**.003**	.046	**.250** (8x)	3	1/8	2-1/2	972731	40.50	972731-C3	45.10		
	.031 (1/32)	**.005**	.046	**.156** (5x)	3	1/8	2-1/2	37131	39.50	37131-C3	44.10	37131-C4	51.20
NEW	.031 (1/32)	**.005**	.046	**.156** (5x)	4	1/8	2-1/2	800531	42.30	800531-C3	46.90		
	.031 (1/32)	**.005**	.046	**.250** (8x)	3	1/8	2-1/2	38331	40.50	38331-C3	45.10	38331-C4	52.20
NEW	.031 (1/32)	**.005**	.046	**.250** (8x)	4	1/8	2-1/2	800331	43.30	800331-C3	47.90		
	.031 (1/32)	**.005**	.046	**.312** (10x)	3	1/8	2-1/2	917831	42.80	917831-C3	47.40		
	.031 (1/32)	**.005**	.046	**.375** (12x)	3	1/8	2-1/2	39431	42.80	39431-C3	47.40	39431-C4	54.50
	.031 (1/32)	**.008**	.046	**.156** (5x)	3	1/8	2-1/2	912731	39.50	912731-C3	44.10		
	.031 (1/32)	**.008**	.046	**.250** (8x)	3	1/8	2-1/2	909331	40.50	909331-C3	45.10		
	.031 (1/32)	**.010**	.046	**.093** (3x)	3	1/8	2-1/2	925631	39.50	925631-C3	44.10		
	.031 (1/32)	**.010**	.046	**.156** (5x)	3	1/8	2-1/2	41531	39.50	41531-C3	44.10		
	.031 (1/32)	**.010**	.046	**.250** (8x)	3	1/8	2-1/2	41731	40.50	41731-C3	45.10		
	.031 (1/32)	**.010**	.046	**.312** (10x)	3	1/8	2-1/2	953731	42.80	953731-C3	47.40		
	.031 (1/32)	**.010**	.046	**.375** (12x)	3	1/8	2-1/2	41931	42.80	41931-C3	47.40		
	.031 (1/32)	**.010**	.046	**.470** (15x)	3	1/8	2-1/2	947831	49.20	947831-C3	53.80		
	.039 (1 mm)	**.005**	.059	**.203** (5x)	3	1/8	2-1/2	37139	39.50	37139-C3	44.10		
	.039 (1 mm)	**.005**	.059	**.325** (8x)	3	1/8	2-1/2	38339	40.50	38339-C3	45.10		
	.039 (1 mm)	**.010**	.059	**.325** (8x)	3	1/8	2-1/2	41739	40.50	41739-C3	45.10		
	.040	**.005**	.060	**.203** (5x)	3	1/8	2-1/2	37140	39.50	37140-C3	44.10		
	.040	**.005**	.060	**.325** (8x)	3	1/8	2-1/2	38340	40.50	38340-C3	45.10		
	.040	**.010**	.060	**.203** (5x)	3	1/8	2-1/2	41540	39.50	41540-C3	44.10		
	.040	**.010**	.060	**.325** (8x)	3	1/8	2-1/2	41740	40.50	41740-C3	45.10		
	.047 (3/64)	**.005**	.070	**.250** (5x)	3	1/8	2-1/2	37147	38.80	37147-C3	43.40	37147-C4	50.50
	.047 (3/64)	**.005**	.070	**.375** (8x)	3	1/8	2-1/2	38347	39.70	38347-C3	44.30	38347-C4	51.40
	.047 (3/64)	**.005**	.070	**.480** (10x)	3	1/8	2-1/2	917847	41.90	917847-C3	46.50		
	.047 (3/64)	**.005**	.070	**.570** (12x)	3	1/8	2-1/2	39447	41.90	39447-C3	46.50	39447-C4	53.60

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.047 (3/64)	**.010**	.070	**.141** (3x)	3	1/8	2-1/2	925647	38.80	925647-C3	43.40			
.047 (3/64)	**.010**	.070	**.250** (5x)	3	1/8	2-1/2	41547	38.80	41547-C3	43.40			
.047 (3/64)	**.010**	.070	**.375** (8x)	3	1/8	2-1/2	41747	39.70	41747-C3	44.30			
.047 (3/64)	**.010**	.070	**.480** (10x)	3	1/8	2-1/2	953747	41.90	953747-C3	46.50			
.047 (3/64)	**.010**	.070	**.570** (12x)	3	1/8	2-1/2	41947	41.30	41947-C3	45.90			
.047 (3/64)	**.010**	.070	**.710** (15x)	3	1/8	2-1/2	947847	47.10	947847-C3	51.70			
.047 (3/64)	**.015**	.070	**.250** (5x)	3	1/8	2-1/2	42747	38.80	42747-C3	43.40			
.047 (3/64)	**.015**	.070	**.375** (8x)	3	1/8	2-1/2	42947	39.70	42947-C3	44.30			
.050	**.005**	.075	**.250** (5x)	3	1/8	2-1/2	37150	38.80	37150-C3	43.40			
.050	**.005**	.075	**.400** (8x)	3	1/8	2-1/2	38350	39.70	38350-C3	44.30			
.050	**.010**	.075	**.250** (5x)	3	1/8	2-1/2	41550	38.80	41550-C3	43.40			
.050	**.010**	.075	**.400** (8x)	3	1/8	2-1/2	41750	39.70	41750-C3	44.30			
.060	**.005**	.090	**.312** (5x)	3	1/8	2-1/2	37160	38.80	37160-C3	43.40			
.060	**.005**	.090	**.500** (8x)	3	1/8	2-1/2	38360	39.70	38360-C3	44.30			
.060	**.010**	.090	**.312** (5x)	3	1/8	2-1/2	41560	38.80	41560-C3	43.40			
.060	**.010**	.090	**.500** (8x)	3	1/8	2-1/2	41760	39.70	41760-C3	44.30			
.060	**.015**	.090	**.500** (8x)	3	1/8	2-1/2	42960	39.70	42960-C3	44.30			
.060	**.020**	.090	**.500** (8x)	3	1/8	2-1/2	970160	39.70	970160-C3	44.30			
.062 (1/16)	**.003**	.093	**.312** (5x)	3	1/8	2-1/2	968262	38.80	968262-C3	43.40			
.062 (1/16)	**.003**	.093	**.500** (8x)	3	1/8	2-1/2	972762	39.70	972762-C3	44.30			
.062 (1/16)	**.005**	.093	**.312** (5x)	3	1/8	2-1/2	37162	38.80	37162-C3	43.40			
.062 (1/16)	**.005**	.093	**.312** (5x)	4	1/8	2-1/2	800562	41.60	800562-C3	46.20			NEW
.062 (1/16)	**.005**	.093	**.500** (8x)	3	1/8	2-1/2	38362	39.70	38362-C3	44.30			
.062 (1/16)	**.005**	.093	**.500** (8x)	4	1/8	2-1/2	800362	42.50	800362-C3	47.10			NEW
.062 (1/16)	**.005**	.093	**.625** (10x)	3	1/8	2-1/2	917862	41.90	917862-C3	46.50			
.062 (1/16)	**.005**	.093	**.750** (12x)	3	1/8	2-1/2	39462	41.90	39462-C3	46.50			
.062 (1/16)	**.008**	.093	**.312** (5x)	3	1/8	2-1/2	912762	38.80	912762-C3	43.40			
.062 (1/16)	**.008**	.093	**.500** (8x)	3	1/8	2-1/2	909362	39.70	909362-C3	44.30			
.062 (1/16)	**.010**	.093	**.187** (3x)	3	1/8	2-1/2	925662	38.80	925662-C3	43.40			
.062 (1/16)	**.010**	.093	**.312** (5x)	3	1/8	2-1/2	41562	38.80	41562-C3	43.40	41562-C4	50.50	
.062 (1/16)	**.010**	.093	**.500** (8x)	3	1/8	2-1/2	41762	39.70	41762-C3	44.30	41762-C4	51.40	
.062 (1/16)	**.010**	.093	**.625** (10x)	3	1/8	2-1/2	953762	41.90	953762-C3	46.50			
.062 (1/16)	**.010**	.093	**.750** (12x)	3	1/8	2-1/2	41962	41.90	41962-C3	46.50	41962-C4	53.60	
.062 (1/16)	**.010**	.093	**.950** (15x)	3	1/8	2-1/2	947862	47.10	947862-C3	51.70			
.062 (1/16)	**.012**	.093	**.312** (5x)	3	1/8	2-1/2	901962	38.80	901962-C3	43.40			
.062 (1/16)	**.012**	.093	**.500** (8x)	3	1/8	2-1/2	913562	39.70	913562-C3	44.30			
.062 (1/16)	**.015**	.093	**.312** (5x)	3	1/8	2-1/2	42762	38.80	42762-C3	43.40			
.062 (1/16)	**.015**	.093	**.500** (8x)	3	1/8	2-1/2	42962	39.70	42962-C3	44.30			
.062 (1/16)	**.015**	.093	**.625** (10x)	3	1/8	2-1/2	965662	41.90	965662-C3	46.50			
.062 (1/16)	**.015**	.093	**.750** (12x)	3	1/8	2-1/2	43162	41.90	43162-C3	46.50			
.062 (1/16)	**.020**	.093	**.312** (5x)	3	1/8	2-1/2	953562	38.80	953562-C3	43.40			
.062 (1/16)	**.020**	.093	**.500** (8x)	3	1/8	2-1/2	970162	39.70	970162-C3	44.30			
.062 (1/16)	**.020**	.093	**.625** (10x)	3	1/8	2-1/2	923262	41.90	923262-C3	46.50			
.062 (1/16)	**.020**	.093	**.750** (12x)	3	1/8	2-1/2	872662	41.90	872662-C3	46.50			
.070	**.005**	.105	**.375** (5x)	3	1/8	2-1/2	37170	38.80	37170-C3	43.40			
.070	**.005**	.105	**.570** (8x)	3	1/8	2-1/2	38370	39.70	38370-C3	44.30			
.070	**.010**	.105	**.375** (5x)	3	1/8	2-1/2	41570	38.80	41570-C3	43.40			
.070	**.010**	.105	**.570** (8x)	3	1/8	2-1/2	41770	39.70	41770-C3	44.30			

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.078 (5/64)	**.005**	.117	**.406** (5x)	3	1/8	2-1/2	37178	38.80	37178-C3	43.40		
	.078 (5/64)	**.005**	.117	**.625** (8x)	3	1/8	2-1/2	38378	39.70	38378-C3	44.30		
	.078 (5/64)	**.005**	.117	**.800** (10x)	3	1/8	2-1/2	917878	41.90	917878-C3	46.50		
	.078 (5/64)	**.005**	.117	**.940** (12x)	3	1/8	2-1/2	39478	41.90	39478-C3	46.50		
	.078 (5/64)	**.010**	.117	**.406** (5x)	3	1/8	2-1/2	41578	38.80	41578-C3	43.40	41578-C4	50.50
	.078 (5/64)	**.010**	.117	**.625** (8x)	3	1/8	2-1/2	41778	39.70	41778-C3	44.30	41778-C4	51.40
	.078 (5/64)	**.010**	.117	**.800** (10x)	3	1/8	2-1/2	953778	41.90	953778-C3	46.50		
	.078 (5/64)	**.010**	.117	**.940** (12x)	3	1/8	2-1/2	41978	41.90	41978-C3	46.50	41978-C4	53.60
	.078 (5/64)	**.015**	.117	**.234** (3x)	3	1/8	2-1/2	944978	38.80	944978-C3	43.40		
	.078 (5/64)	**.015**	.117	**.406** (5x)	3	1/8	2-1/2	42778	38.80	42778-C3	43.40		
	.078 (5/64)	**.015**	.117	**.625** (8x)	3	1/8	2-1/2	42978	39.70	42978-C3	44.30		
	.078 (5/64)	**.015**	.117	**.800** (10x)	3	1/8	2-1/2	965678	41.90	965678-C3	46.50		
	.078 (5/64)	**.015**	.117	**.940** (12x)	3	1/8	2-1/2	43178	41.90	43178-C3	46.50		
	.078 (5/64)	**.015**	.117	**1.187** (15x)	3	1/8	2-1/2	939378	47.10	939378-C3	51.70		
	.078 (5/64)	**.020**	.117	**.406** (5x)	3	1/8	2-1/2	953578	38.80	953578-C3	43.40		
	.078 (5/64)	**.020**	.117	**.625** (8x)	3	1/8	2-1/2	970178	39.70	970178-C3	44.30		
	.078 (5/64)	**.020**	.117	**.800** (10x)	3	1/8	2-1/2	923278	41.90	923278-C3	46.50		
	.080	**.005**	.120	**.406** (5x)	3	1/8	2-1/2	37180	38.80	37180-C3	43.40		
	.080	**.005**	.120	**.650** (8x)	3	1/8	2-1/2	38380	39.70	38380-C3	44.30		
	.080	**.010**	.120	**.406** (5x)	3	1/8	2-1/2	41580	38.80	41580-C3	43.40		
	.080	**.010**	.120	**.650** (8x)	3	1/8	2-1/2	41780	39.70	41780-C3	44.30		
	.090	**.005**	.135	**.450** (5x)	3	1/8	2-1/2	37190	38.80	37190-C3	43.40		
	.090	**.005**	.135	**.750** (8x)	3	1/8	2-1/2	38390	39.70	38390-C3	44.30		
	.090	**.010**	.135	**.450** (5x)	3	1/8	2-1/2	41590	38.80	41590-C3	43.40		
	.090	**.010**	.135	**.750** (8x)	3	1/8	2-1/2	41790	39.70	41790-C3	44.30		
	.093 (3/32)	**.003**	.139	**.500** (5x)	3	1/8	2-1/2	968293	38.80	968293-C3	43.40		
	.093 (3/32)	**.003**	.139	**.750** (8x)	3	1/8	2-1/2	972793	39.70	972793-C3	44.30		
	.093 (3/32)	**.005**	.139	**.500** (5x)	3	1/8	2-1/2	37193	38.80	37193-C3	43.40		
NEW	.093 (3/32)	**.005**	.139	**.500** (5x)	4	1/8	2-1/2	800593	41.60	800593-C3	46.20		
	.093 (3/32)	**.005**	.139	**.750** (8x)	3	1/8	2-1/2	38393	39.70	38393-C3	44.30		
NEW	.093 (3/32)	**.005**	.139	**.750** (8x)	4	1/8	2-1/2	800393	42.50	800393-C3	47.10		
	.093 (3/32)	**.005**	.139	**.950** (10x)	3	1/8	2-1/2	917893	41.90	917893-C3	46.50		
	.093 (3/32)	**.005**	.139	**1.125** (12x)	3	1/8	2-1/2	39493	41.90	39493-C3	46.50		
	.093 (3/32)	**.008**	.139	**.500** (5x)	3	1/8	2-1/2	912793	38.80	912793-C3	43.40		
	.093 (3/32)	**.008**	.139	**.750** (8x)	3	1/8	2-1/2	909393	39.50	909393-C3	44.10		
	.093 (3/32)	**.010**	.139	**.500** (5x)	3	1/8	2-1/2	41593	38.80	41593-C3	43.40		
	.093 (3/32)	**.010**	.139	**.750** (8x)	3	1/8	2-1/2	41793	39.70	41793-C3	44.30		
	.093 (3/32)	**.010**	.139	**.950** (10x)	3	1/8	2-1/2	953793	41.90	953793-C3	46.50		
	.093 (3/32)	**.010**	.139	**1.125** (12x)	3	1/8	2-1/2	41993	41.90	41993-C3	46.50		
	.093 (3/32)	**.012**	.139	**.500** (5x)	3	1/8	2-1/2	901993	38.80	901993-C3	43.40		
	.093 (3/32)	**.012**	.139	**.750** (8x)	3	1/8	2-1/2	913593	39.70	913593-C3	44.30		
	.093 (3/32)	**.015**	.139	**.279** (3x)	3	1/8	2-1/2	944993	38.80	944993-C3	43.40		
	.093 (3/32)	**.015**	.139	**.500** (5x)	3	1/8	2-1/2	42793	38.80	42793-C3	43.40	42793-C4	50.50
	.093 (3/32)	**.015**	.139	**.750** (8x)	3	1/8	2-1/2	42993	39.70	42993-C3	44.30	42993-C4	51.40
	.093 (3/32)	**.015**	.139	**.950** (10x)	3	1/8	2-1/2	965693	41.90	965693-C3	46.50		
	.093 (3/32)	**.015**	.139	**1.125** (12x)	3	1/8	2-1/2	43193	41.90	43193-C3	46.50	43193-C4	53.60
	.093 (3/32)	**.015**	.139	**1.400** (15x)	3	1/8	3	939393	47.10	939393-C3	51.70		

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	**.020**	.139	**.500** (5x)	3	1/8	2-1/2	953593	38.80	953593-C3	43.40		
.093 (3/32)	**.020**	.139	**.750** (8x)	3	1/8	2-1/2	970193	39.70	970193-C3	44.30		
.093 (3/32)	**.020**	.139	**.950** (10x)	3	1/8	2-1/2	923293	41.90	923293-C3	46.50		
.093 (3/32)	**.030**	.139	**.500** (5x)	3	1/8	2-1/2	42193	38.80	42193-C3	43.40		
.093 (3/32)	**.030**	.139	**.750** (8x)	3	1/8	2-1/2	42393	39.70	42393-C3	44.30		
.093 (3/32)	**.030**	.139	**.950** (10x)	3	1/8	2-1/2	921493	41.90	921493-C3	46.50		
.100	**.005**	.150	**.500** (5x)	3	1/8	2-1/2	37200	38.80	37200-C3	43.40		
.100	**.005**	.150	**.800** (8x)	3	1/8	2-1/2	38400	39.70	38400-C3	44.30		
.100	**.010**	.150	**.500** (5x)	3	1/8	2-1/2	41600	38.80	41600-C3	43.40		
.100	**.010**	.150	**.800** (8x)	3	1/8	2-1/2	41800	39.70	41800-C3	44.30		
.109 (7/64)	**.005**	.163	**.570** (5x)	3	1/8	2-1/2	37202	38.80	37202-C3	43.40		
.109 (7/64)	**.005**	.163	**.900** (8x)	3	1/8	2-1/2	38402	39.70	38402-C3	44.30		
.109 (7/64)	**.010**	.163	**.570** (5x)	3	1/8	2-1/2	41602	38.80	41602-C3	43.40		
.109 (7/64)	**.010**	.163	**.900** (8x)	3	1/8	2-1/2	41802	39.70	41802-C3	44.30		
.118 (3 mm)	**.005**	.177	**.950** (8x)	3	1/8	2-1/2	38405	39.70	38405-C3	44.30		
.118 (3 mm)	**.010**	.177	**.950** (8x)	3	1/8	2-1/2	41805	39.70	41805-C3	44.30		

D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	**.005**	.187	**.625** (5x)	3	1/8	2-1/2	37208	38.80	37208-C3	43.40	37208-C4	50.50	
.125 (1/8)	**.005**	.187	**1.000** (8x)	3	1/8	2-1/2	38408	39.70	38408-C3	44.30			
.125 (1/8)	**.005**	.187	**1.250** (10x)	3	1/8	2-1/2	917908	43.50	917908-C3	48.10			
.125 (1/8)	**.005**	.187	**1.500** (12x)	3	1/8	3	39508	42.70	39508-C3	47.30			
.125 (1/8)	**.008**	.187	**.625** (5x)	3	1/8	2-1/2	912808	38.80	912808-C3	43.40			
.125 (1/8)	**.008**	.187	**1.000** (8x)	3	1/8	2-1/2	909408	39.50	909408-C3	44.10			
.125 (1/8)	**.010**	.187	**.375** (3x)	3	1/8	2-1/2	925708	38.80	925708-C3	43.40			
.125 (1/8)	**.010**	.187	**.625** (5x)	3	1/8	2-1/2	41608	38.80	41608-C3	43.40	41608-C4	50.50	
.125 (1/8)	**.010**	.187	**.625** (5x)	4	1/8	2-1/2	800208	42.80	800208-C3	47.40			NEW
.125 (1/8)	**.010**	.187	**1.000** (8x)	3	1/8	2-1/2	41808	39.70	41808-C3	44.30			
.125 (1/8)	**.010**	.187	**1.000** (8x)	4	1/8	2-1/2	800008	43.70	800008-C3	48.30			NEW
.125 (1/8)	**.010**	.187	**1.250** (10x)	3	1/8	2-1/2	953808	42.50	953808-C3	47.10			
.125 (1/8)	**.010**	.187	**1.500** (12x)	3	1/8	3	42008	42.70	42008-C3	47.30			
.125 (1/8)	**.010**	.187	**1.875** (15x)	3	1/8	3	947908	48.30	947908-C3	52.90			
.125 (1/8)	**.015**	.187	**.625** (5x)	3	1/8	2-1/2	42808	38.80	42808-C3	43.40	42808-C4	50.50	
.125 (1/8)	**.015**	.187	**1.000** (8x)	3	1/8	2-1/2	43008	39.70	43008-C3	44.30	43008-C4	51.40	
.125 (1/8)	**.015**	.187	**1.250** (10x)	3	1/8	2-1/2	965708	42.50	965708-C3	47.10			
.125 (1/8)	**.015**	.187	**1.500** (12x)	3	1/8	3	43208	42.70	43208-C3	47.30	43208-C4	54.40	
.125 (1/8)	**.015**	.187	**1.875** (15x)	3	1/8	3	939408	48.10	939408-C3	52.70			
.125 (1/8)	**.020**	.187	**.625** (5x)	3	1/8	2-1/2	953608	38.80	953608-C3	43.40	953608-C4	50.50	
.125 (1/8)	**.020**	.187	**1.000** (8x)	3	1/8	2-1/2	970208	39.70	970208-C3	44.30			
.125 (1/8)	**.020**	.187	**1.250** (10x)	3	1/8	2-1/2	923308	42.50	923308-C3	47.10			
.125 (1/8)	**.025**	.187	**.625** (5x)	3	1/8	2-1/2	839908	38.80	839908-C3	43.40			
.125 (1/8)	**.025**	.187	**1.000** (8x)	3	1/8	2-1/2	840208	39.50	840208-C3	44.10			
.125 (1/8)	**.030**	.187	**.375** (3x)	3	1/8	2-1/2	827108	38.80	827108-C3	43.40			
.125 (1/8)	**.030**	.187	**.625** (5x)	3	1/8	2-1/2	42208	38.80	42208-C3	43.40	42208-C4	50.50	
.125 (1/8)	**.030**	.187	**1.000** (8x)	3	1/8	2-1/2	42408	39.70	42408-C3	44.30			
.125 (1/8)	**.030**	.187	**1.250** (10x)	3	1/8	2-1/2	921508	42.70	921508-C3	47.30			
.125 (1/8)	**.030**	.187	**1.500** (12x)	3	1/8	3	42608	42.70	42608-C3	47.30			
.125 (1/8)	**.030**	.187	**1.875** (15x)	3	1/8	3	919708	48.10	919708-C3	52.70			
.125 (1/8)	**.040**	.187	**.625** (5x)	3	1/8	2-1/2	930208	38.80	930208-C3	43.40			
.125 (1/8)	**.040**	.187	**1.000** (8x)	3	1/8	2-1/2	924308	39.50	924308-C3	44.10			

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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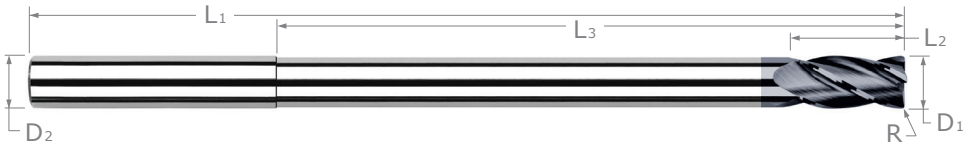
CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.140 (9/64)	**.010**	.220	**.750** (5x)	3	3/16	3	41609	38.80	41609-C3	43.80		
.140 (9/64)	**.010**	.220	**1.125** (8x)	3	3/16	3	41809	39.70	41809-C3	44.70		
.140 (9/64)	**.015**	.220	**.750** (5x)	3	3/16	3	42809	38.80	42809-C3	43.80		
.140 (9/64)	**.015**	.220	**1.125** (8x)	3	3/16	3	43009	39.70	43009-C3	44.70		
.156 (5/32)	**.010**	.234	**.750** (5x)	3	3/16	3	41610	42.70	41610-C3	47.70		
.156 (5/32)	**.010**	.234	**1.250** (8x)	3	3/16	3	41810	43.50	41810-C3	48.50		
.156 (5/32)	**.010**	.234	**1.570** (10x)	3	3/16	3	953810	46.20	953810-C3	51.20		
.156 (5/32)	**.015**	.234	**.750** (5x)	3	3/16	3	42810	42.70	42810-C3	47.70		
.156 (5/32)	**.015**	.234	**1.250** (8x)	3	3/16	3	43010	43.50	43010-C3	48.50		
.156 (5/32)	**.015**	.234	**1.570** (10x)	3	3/16	3	965710	46.20	965710-C3	51.20		
.156 (5/32)	**.020**	.234	**.750** (5x)	3	3/16	3	953610	42.70	953610-C3	47.70		
.156 (5/32)	**.020**	.234	**1.250** (8x)	3	3/16	3	970210	43.50	970210-C3	48.50		
.156 (5/32)	**.030**	.234	**.750** (5x)	3	3/16	3	42210	42.70	42210-C3	47.70		
.156 (5/32)	**.030**	.234	**1.250** (8x)	3	3/16	3	42410	43.50	42410-C3	48.50		
.187 (3/16)	**.005**	.281	**1.000** (5x)	3	3/16	3	37212	42.70	37212-C3	47.70		
.187 (3/16)	**.010**	.281	**1.000** (5x)	3	3/16	3	41612	42.70	41612-C3	47.70		
.187 (3/16)	**.010**	.281	**1.500** (8x)	3	3/16	3	41812	43.50	41812-C3	48.50		
.187 (3/16)	**.015**	.281	**1.000** (5x)	3	3/16	3	42812	42.70	42812-C3	47.70	42812-C4	58.80
.187 (3/16)	**.015**	.281	**1.500** (8x)	3	3/16	3	43012	43.50	43012-C3	48.50	43012-C4	59.60
.187 (3/16)	**.015**	.281	**1.875** (10x)	3	3/16	4	965712	46.20	965712-C3	53.00		
.187 (3/16)	**.015**	.281	**2.250** (12x)	3	3/16	4	43212	46.40	43212-C3	53.20	43212-C4	63.60
.187 (3/16)	**.020**	.281	**1.000** (5x)	3	3/16	3	953612	42.70	953612-C3	47.70		
.187 (3/16)	**.020**	.281	**1.500** (8x)	3	3/16	3	970212	43.50	970212-C3	48.50		
.187 (3/16)	**.030**	.281	**1.000** (5x)	3	3/16	3	42212	42.70	42212-C3	47.70		
.187 (3/16)	**.030**	.281	**1.500** (8x)	3	3/16	3	42412	43.50	42412-C3	48.50		
.187 (3/16)	**.030**	.281	**1.875** (10x)	3	3/16	4	921512	46.40	921512-C3	53.20		
.187 (3/16)	**.030**	.281	**2.250** (12x)	3	3/16	4	42612	46.40	42612-C3	53.20		
.187 (3/16)	**.045**	.281	**1.000** (5x)	3	3/16	3	978812	42.70	978812-C3	47.70		
.187 (3/16)	**.045**	.281	**1.500** (8x)	3	3/16	3	961812	43.50	961812-C3	48.50		
.187 (3/16)	**.060**	.281	**1.000** (5x)	3	3/16	3	949112	42.70	949112-C3	47.70		
.187 (3/16)	**.060**	.281	**1.500** (8x)	3	3/16	3	866012	43.30	866012-C3	48.30		
.250 (1/4)	**.005**	.375	**1.250** (5x)	3	1/4	4	37216	47.20	37216-C3	52.20		
.250 (1/4)	**.010**	.375	**1.250** (5x)	3	1/4	4	41616	47.20	41616-C3	55.10		
.250 (1/4)	**.015**	.375	**1.250** (5x)	3	1/4	4	42816	47.20	42816-C3	55.10		
.250 (1/4)	**.015**	.375	**2.000** (8x)	3	1/4	4	43016	48.30	43016-C3	56.20		
.250 (1/4)	**.015**	.375	**3.000** (12x)	3	1/4	6	43216	54.20	43216-C3	63.20		
.250 (1/4)	**.020**	.375	**1.250** (5x)	3	1/4	4	953616	47.20	953616-C3	55.10		
.250 (1/4)	**.020**	.375	**2.000** (8x)	3	1/4	4	970216	48.30	970216-C3	56.20		
.250 (1/4)	**.030**	.375	**1.250** (5x)	3	1/4	4	42216	47.20	42216-C3	55.10	42216-C4	65.50
.250 (1/4)	**.030**	.375	**2.000** (8x)	3	1/4	4	42416	48.30	42416-C3	56.20	42416-C4	66.60
.250 (1/4)	**.030**	.375	**3.000** (12x)	3	1/4	6	42616	54.20	42616-C3	63.20	42616-C4	80.70
.250 (1/4)	**.045**	.375	**1.250** (5x)	3	1/4	4	978816	47.20	978816-C3	55.10		
.250 (1/4)	**.060**	.375	**1.250** (5x)	3	1/4	4	949116	47.20	949116-C3	55.10		
.312 (5/16)	**.015**	.470	**1.625** (5x)	3	5/16	4	42820	75.10	42820-C3	84.60		
.312 (5/16)	**.015**	.470	**2.500** (8x)	3	5/16	4	43020	76.40	43020-C3	85.90		
.375 (3/8)	**.030**	.570	**2.000** (5x)	3	3/8	4	42224	79.50	42224-C3	91.80		
.375 (3/8)	**.030**	.570	**3.000** (8x)	3	3/8	6	42424	107.80	42424-C3	121.70		

MINIATURE END MILLS

Corner Radius – Extra Long Length



- **Up to 8" overall length**
- Longest overall length carbide end mill available in stock
- Extended Reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000"}_{-.002"}$	R $^{+.001"}_{-.001"}$	L_2 $^{+.030"}_{-.00"}$	L_3 $^{+.030"}_{-.000"}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	**.015**	.375	4.375 (17.5x)	1/4	6	24016	87.20	24016-C3	96.20
.312 (5/16)	**.015**	.470	4.343 (14x)	5/16	6	24020	102.80	24020-C3	116.20
.375 (3/8)	**.030**	.562	4.312 (11.5x)	3/8	6	24024	116.60	24024-C3	130.50
.500 (1/2)	**.030**	.750	5.750 (11.5x)	1/2	8	24032	203.00	24032-C3	230.60
.625 (5/8)	**.030**	.937	5.687 (9x)	5/8	8	24040	342.50	24040-C3	366.80
.750 (3/4)	**.030**	1.125	5.625 (7.5x)	3/4	8	24048	422.70	24048-C3	451.00

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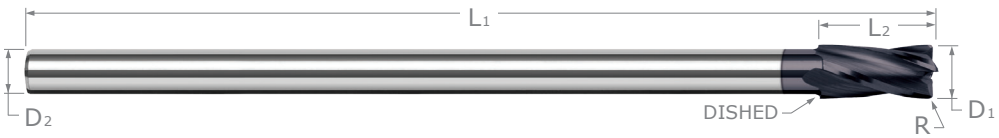
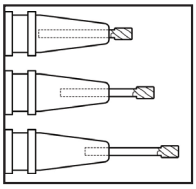
END MILLS

Corner Radius – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Center cutting
- 4 flutes
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
1/8	.015	3/16	**3 mm**	2-1/2	829008	86.40	829008-C3	91.00
5/32	.010	15/64	**1/8**	2-1/2	17610	86.40	17610-C3	91.40
5/32	.015	15/64	**1/8**	2-1/2	829010	86.40	829010-C3	91.00
3/16	.015	9/32	**1/8**	2-1/2	17612	86.40	17612-C3	91.40
3/16	.015	9/32	**5/32**	2-1/2	17613	89.00	17613-C3	94.00
3/16	.030	9/32	**1/8**	2-1/2	844912	89.00	844912-C3	93.60
1/4	.015	3/8	**3/16**	3	17616	93.60	17616-C3	100.40
1/4	.030	3/8	**3/16**	3	844916	93.60	844916-C3	98.60
5/16	.015	15/32	**1/4**	4	17620	114.00	17620-C3	123.50
5/16	.030	15/32	**1/4**	4	844920	114.00	844920-C3	123.50
3/8	.015	9/16	**5/16**	4	829024	135.60	829024-C3	147.90
3/8	.030	9/16	**5/16**	4	17624	135.60	17624-C3	147.90
7/16	.015	21/32	**3/8**	6	829028	199.20	829028-C3	213.10
7/16	.030	21/32	**3/8**	6	17628	199.20	17628-C3	214.20
1/2	.015	3/4	**7/16**	6	829032	208.40	829032-C3	216.00
1/2	.030	3/4	**7/16**	6	17632	208.40	17632-C3	222.30
5/8	.030	15/16	**1/2**	6	17640	270.70	17640-C3	290.70
3/4	.030	1-1/8	**5/8**	6	17648	334.00	17648-C3	355.00

For Square Reduced Shank, please see page 38.

For Ball Reduced Shank, please see page 58.

The Anatomy of an End Mill

With how specific part blueprints are, understanding every geometry feature of your tool is pivotal to ensuring your final product is perfect. Understand each detail of your tool and the role it plays in your machining operation in our "In the Loupe" blog post **The Anatomy of an End Mill**.

Read more on harveyperformance.com/in-the-loupe/

MINIATURE END MILLS

Corner Chamfer – Standard

4 Flutes

Standard Length 3x

- Chamfered corner creates consistent heat and wear along chamfer by distributing forces evenly
- 45° corner chamfer protects corners on the end mill and can create small chamfers and edge breaks
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER CHAMFER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_4 $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.062 (1/16)	**.005**	.187 (3x)	1/8	1-1/2	805162	22.40	805162-C3	27.00
.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	805178	22.40	805178-C3	27.00
.093 (3/32)	**.005**	.279 (3x)	1/8	1-1/2	805193	22.40	805193-C3	27.00
.093 (3/32)	**.010**	.279 (3x)	1/8	1-1/2	804993	22.40	804993-C3	27.00
D_1 $^{+.000''}_{-.002''}$	L_4 $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.005**	.375 (3x)	1/8	1-1/2	805208	22.40	805208-C3	27.00
.125 (1/8)	**.010**	.375 (3x)	1/8	1-1/2	805008	22.40	805008-C3	27.00
.125 (1/8)	**.020**	.375 (3x)	1/8	1-1/2	804808	22.40	804808-C3	27.00
.187 (3/16)	**.005**	.570 (3x)	3/16	2	805212	24.90	805212-C3	29.90
.187 (3/16)	**.010**	.570 (3x)	3/16	2	805012	24.90	805012-C3	29.90
.187 (3/16)	**.020**	.570 (3x)	3/16	2	804812	24.90	804812-C3	29.90
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	805216	30.60	805216-C3	37.40
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	805016	30.60	805016-C3	37.40
.250 (1/4)	**.020**	.750 (3x)	1/4	2-1/2	804816	30.60	804816-C3	37.40
.375 (3/8)	**.005**	1.125 (3x)	3/8	2-1/2	805224	44.70	805224-C3	53.70
.375 (3/8)	**.010**	1.125 (3x)	3/8	2-1/2	805024	44.70	805024-C3	53.70
.375 (3/8)	**.020**	1.125 (3x)	3/8	2-1/2	804824	44.70	804824-C3	53.70
.500 (1/2)	**.005**	1.500 (3x)	1/2	3	805232	69.00	805232-C3	82.40
.500 (1/2)	**.010**	1.500 (3x)	1/2	3	805032	69.00	805032-C3	82.40
.500 (1/2)	**.020**	1.500 (3x)	1/2	3	804832	69.00	804832-C3	82.40

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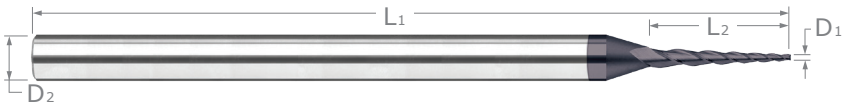
NEW SIZES!

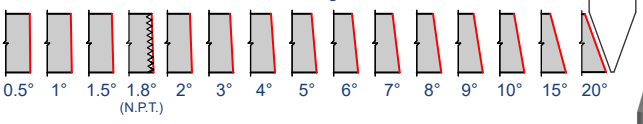
MINIATURE END MILLS

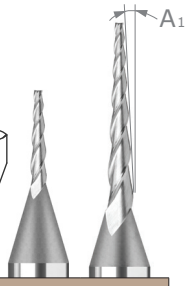
Tapered – Square



- Length of cut up to 10x end diameter
- Long length design for deep cavity machining
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in *Fifteen* Angles Per Side!





ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB_2 COATED	
A_1 +0°30′ −0°30′	D_1 +.0005″ −.0005″	L_2 +.020″ −.000″	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
0.5°	.015 (1/64)	.078 (5x)	1/8	1-1/2	997015	40.10	997015-C6	46.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20515	66.00	20515-C6	72.80		
	.030	.156 (5x)	1/8	1-1/2	997030	34.80	997030-C6	41.60		
	.030	.300 (10x)	3/16	3	20530	59.90	20530-C6	67.20		
	.045	.250 (5x)	1/8	1-1/2	997045	34.80	997045-C6	41.60		
	.045	.450 (10x)	3/16	3	20545	59.90	20545-C6	67.20		
	.060	.312 (5x)	1/8	1-1/2	997060	34.80	997060-C6	41.60		
	.060	.600 (10x)	3/16	3	20560	59.90	20560-C6	67.20		
	.075	.750 (10x)	3/16	3	20575	59.90	20575-C6	67.20		
	.090	.500 (5x)	1/8	1-1/2	997090	34.80	997090-C6	41.60		
	.090	.900 (10x)	1/4	4	20590	65.10	20590-C6	75.10		
	.125 (1/8)	.625 (5x)	3/16	2	997099	54.00	997099-C6	61.30		
	.125 (1/8)	1.250 (10x)	1/4	4	20599	65.10	20599-C6	75.10		
1.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	992715	40.10	992715-C6	46.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20615	66.00	20615-C6	72.80		
	.030	.156 (5x)	1/8	1-1/2	992730	34.80	992730-C6	41.60	992730-C8	41.60
	.030	.300 (10x)	3/16	3	20630	59.90	20630-C6	67.20	20630-C8	66.70
	.045	.250 (5x)	1/8	1-1/2	992745	34.80	992745-C6	41.60		
	.045	.450 (10x)	3/16	3	20645	59.90	20645-C6	67.20		
	.060	.312 (5x)	1/8	1-1/2	992760	34.80	992760-C6	41.60		
	.060	.600 (10x)	3/16	3	20660	59.90	20660-C6	67.20		
	.075	.750 (10x)	3/16	3	20675	59.90	20675-C6	67.20		
	.090	.500 (5x)	1/8	1-1/2	992790	34.80	992790-C6	41.60		
	.090	.900 (10x)	1/4	4	20690	65.10	20690-C6	75.10		
	.125 (1/8)	.625 (5x)	3/16	2	992799	54.00	992799-C6	61.30		
	.125 (1/8)	1.250 (10x)	1/4	4	20699	65.10	20699-C6	75.10		
1.5°	.015 (1/64)	.078 (5x)	1/8	1-1/2	991815	40.10	991815-C6	46.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20715	66.00	20715-C6	72.80		
	.030	.156 (5x)	1/8	1-1/2	991830	34.80	991830-C6	41.60		
	.030	.300 (10x)	3/16	3	20730	59.90	20730-C6	67.20		
	.045	.250 (5x)	1/8	1-1/2	991845	34.80	991845-C6	41.60		
	.045	.450 (10x)	3/16	3	20745	59.90	20745-C6	67.20		
	.060	.312 (5x)	1/8	1-1/2	991860	34.80	991860-C6	41.60		
	.060	.600 (10x)	3/16	3	20760	59.90	20760-C6	67.20		
	.075	.750 (10x)	1/4	4	20775	66.30	20775-C6	76.30		
	.090	.500 (5x)	1/8	1-1/2	991890	34.80	991890-C6	41.60		
	.090	.900 (10x)	1/4	4	20790	65.10	20790-C6	75.10		
	.125 (1/8)	1.250 (10x)	1/4	4	20799	65.10	20799-C6	75.10		

continued on next page

NEW SIZES!

MINIATURE END MILLS

Tapered – Square (cont.)

continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
1.8° (N.P.T.)	.200	.625 (3x)	1/4	2	912282	56.10	912282-C6	66.10		
	.300	.900 (3x)	3/8	2-1/2	912286	70.00	912286-C6	81.20		
	.400	1.250 (3x)	1/2	3	912292	94.10	912292-C6	108.60		
2.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	991015	40.10	991015-C6	46.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20815	66.00	20815-C6	72.80		
	.030	.156 (5x)	1/8	1-1/2	991030	34.80	991030-C6	41.60		
	.030	.300 (10x)	3/16	3	20830	59.90	20830-C6	67.20		
	.045	.250 (5x)	1/8	1-1/2	991045	34.80	991045-C6	41.60		
	.045	.450 (10x)	3/16	3	20845	59.90	20845-C6	67.20		
	.060	.312 (5x)	1/8	1-1/2	991060	34.80	991060-C6	41.60		
	.060	.600 (10x)	3/16	3	20860	59.90	20860-C6	67.20		
	.075	.750 (10x)	1/4	4	20875	66.30	20875-C6	76.30		
	.090	.500 (5x)	1/8	1-1/2	991090	34.80	991090-C6	41.60		
	.090	.900 (10x)	1/4	4	20890	65.10	20890-C6	75.10		
	.125 (1/8)	.625 (5x)	3/16	2	991099	54.00	991099-C6	61.30		
	.125 (1/8)	1.250 (10x)	1/4	4	20899	65.10	20899-C6	75.10		
3.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	990415	40.10	990415-C6	46.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20915	66.00	20915-C6	72.80		
	.030	.156 (5x)	1/8	1-1/2	990430	34.80	990430-C6	41.60	990430-C8	41.60
	.030	.300 (10x)	3/16	3	20930	59.90	20930-C6	67.20	20930-C8	66.70
	.045	.250 (5x)	1/8	1-1/2	990445	34.80	990445-C6	41.60		
	.045	.450 (10x)	3/16	3	20945	59.90	20945-C6	67.20		
	.060	.312 (5x)	1/8	1-1/2	990460	34.80	990460-C6	41.60		
	.060	.600 (10x)	3/16	3	20960	59.90	20960-C6	67.20		
	.075	.750 (10x)	1/4	4	20975	66.30	20975-C6	76.30		
	.090	.500 (5x)	3/16	2	990490	54.00	990490-C6	61.30		
	.090	.900 (10x)	1/4	4	20990	65.10	20990-C6	75.10		
	.125 (1/8)	.625 (5x)	1/4	2-1/2	990499	79.50	990499-C6	89.50		
	.125 (1/8)	1.190 (10x)	1/4	4	20999	65.10	20999-C6	75.10		
4.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	996215	66.00	996215-C6	72.80		
	.030	.300 (10x)	3/16	3	996230	59.90	996230-C6	67.20		
	.045	.450 (10x)	3/16	3	996245	59.90	996245-C6	67.20		
	.060	.600 (10x)	3/16	3	996260	59.90	996260-C6	67.20		
	.075	.750 (10x)	1/4	4	996275	66.30	996275-C6	76.30		
	.090	.900 (10x)	1/4	4	996290	66.30	996290-C6	76.30		
	.125 (1/8)	1.250 (10x)	3/8	4	996299	89.60	996299-C6	100.80		
5.0°	.010	.050 (5x)	1/8	1-1/2	989610	47.60	989610-C6	54.40		
	.010	.100 (10x)	1/8	2-1/2	27110	71.90	27110-C6	78.70		
	.015 (1/64)	.078 (5x)	1/8	1-1/2	989615	40.10	989615-C6	46.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	27115	66.00	27115-C6	72.80		
	.020	.100 (5x)	1/8	1-1/2	989620	39.30	989620-C6	46.10		
	.020	.200 (10x)	1/8	2-1/2	27120	64.80	27120-C6	71.60		
	.030	.156 (5x)	1/8	1-1/2	989630	34.80	989630-C6	41.60	989630-C8	41.60
	.030	.300 (10x)	3/16	3	27130	59.90	27130-C6	67.20	27130-C8	66.70

continued on next page

MINIATURE END MILLS

Tapered – Square (cont.)

continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
5.0°	.045	.250 (5x)	1/8	1-1/2	989645	34.80	989645-C6	41.60		
	.045	.450 (10x)	3/16	3	27145	59.90	27145-C6	67.20		
	.060	.312 (5x)	1/8	1-1/2	989660	34.80	989660-C6	41.60		
	.060	.600 (10x)	3/16	3	27160	59.90	27160-C6	67.20		
	.075	.375 (5x)	3/16	2	989675	54.00	989675-C6	61.30		
	.075	.750 (10x)	1/4	4	27175	66.30	27175-C6	76.30		
	.090	.500 (5x)	3/16	2	989690	54.00	989690-C6	61.30		
	.090	.900 (10x)	1/4	4	27190	65.10	27190-C6	75.10		
	.125 (1/8)	.625 (5x)	1/4	2-1/2	989699	79.50	989699-C6	89.50		
	.125 (1/8)	1.250 (10x)	3/8	4	27199	87.90	27199-C6	99.10		
	.187 (3/16)	1.000 (5x)	3/8	2-1/2	989681	87.90	989681-C6	99.10		
	.250 (1/4)	1.250 (5x)	1/2	3	989684	118.70	989684-C6	133.20		
6.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	993315	69.50	993315-C6	76.30		
	.030	.300 (10x)	3/16	3	993330	64.50	993330-C6	71.80		
	.045	.450 (10x)	3/16	3	993345	64.50	993345-C6	71.80		
	.060	.600 (10x)	3/16	3	993360	64.50	993360-C6	71.80		
	.090	.500 (5x)	1/4	2-1/2	904390	81.50	904390-C6	91.50		
	.125 (1/8)	.625 (5x)	5/16	2-1/2	904399	78.30	904399-C6	89.50		
7.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	922615	41.10	922615-C6	47.90		
	.015 (1/64)	.150 (10x)	1/8	2-1/2	28015	67.60	28015-C6	74.40		
	.030	.156 (5x)	1/8	1-1/2	922630	35.60	922630-C6	42.40		
	.030	.300 (10x)	3/16	3	28030	61.30	28030-C6	68.60		
	.045	.250 (5x)	1/8	1-1/2	922645	35.60	922645-C6	42.40		
	.045	.450 (10x)	3/16	3	28045	61.30	28045-C6	68.60		
	.060	.312 (5x)	3/16	2	922660	55.30	922660-C6	62.60		
	.060	.600 (10x)	1/4	4	28060	66.70	28060-C6	76.70		
	.075	.750 (10x)	3/8	4	28075	91.80	28075-C6	103.00		
	.090	.500 (5x)	1/4	2-1/2	922690	66.70	922690-C6	76.70		
	.090	.900 (10x)	3/8	4	28090	91.10	28090-C6	102.30		
	.125 (1/8)	.625 (5x)	5/16	2-1/2	922699	78.30	922699-C6	89.50		
8.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	995415	69.50	995415-C6	76.30		
	.030	.300 (10x)	3/16	3	995430	64.50	995430-C6	71.80		
	.045	.450 (10x)	3/16	3	995445	64.50	995445-C6	71.80		
	.060	.600 (10x)	1/4	4	995460	68.90	995460-C6	78.90		
	.090	.500 (5x)	1/4	2-1/2	903790	66.70	903790-C6	76.70		
	.125 (1/8)	.625 (5x)	5/16	2-1/2	903799	78.30	903799-C6	89.50		
9.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	992115	69.50	992115-C6	76.30		
	.030	.300 (10x)	3/16	3	992130	64.50	992130-C6	71.80		
	.045	.450 (10x)	3/16	3	992145	64.50	992145-C6	71.80		
	.060	.600 (10x)	1/4	4	992160	68.90	992160-C6	78.90		
	.090	.500 (5x)	1/4	2-1/2	902490	66.70	902490-C6	76.70		
	.125 (1/8)	.625 (5x)	3/8	2-1/2	902499	90.00	902499-C6	101.20		

continued on next page

NEW SIZES!

MINIATURE END MILLS

Tapered – Square (cont.)

continued from previous page

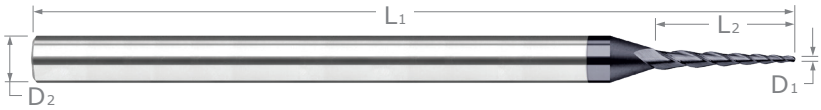
ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
10.0°	.010	.050 (5x)	1/8	1-1/2	988210	47.60	988210-C6	54.40			
	.010	.100 (10x)	1/8	2-1/2	29410	71.90	29410-C6	78.70			
	.015 (1/64)	.078 (5x)	1/8	1-1/2	988215	40.10	988215-C6	46.90			
	.015 (1/64)	.150 (10x)	1/8	2-1/2	29415	66.00	29415-C6	72.80			
	.020	.100 (5x)	1/8	1-1/2	988220	40.10	988220-C6	46.90			
	.020	.200 (10x)	1/8	2-1/2	29420	64.80	29420-C6	71.60			
	.030	.156 (5x)	1/8	1-1/2	988230	34.80	988230-C6	41.60	988230-C8	41.60	
	.030	.300 (10x)	3/16	3	29430	59.90	29430-C6	67.20	29430-C8	66.70	
	.045	.250 (5x)	3/16	2	988245	59.90	988245-C6	67.20			
	.045	.450 (10x)	1/4	4	29445	66.30	29445-C6	76.30			
	.060	.312 (5x)	3/16	2	988260	59.90	988260-C6	67.20			
	.060	.600 (10x)	3/8	4	29460	87.90	29460-C6	99.10			
	.075	.375 (5x)	1/4	2-1/2	988275	63.00	988275-C6	73.00			
	.075	.750 (10x)	3/8	4	29475	89.60	29475-C6	100.80			
	.090	.500 (5x)	5/16	2-1/2	988290	74.50	988290-C6	85.70			
	.125 (1/8)	.625 (5x)	3/8	2-1/2	988299	87.90	988299-C6	99.10			
	.187 (3/16)	.890 (5x)	1/2	3	988281	118.70	988281-C6	133.20			
	.250 (1/4)	1.065 (5x)	5/8	3-1/2	988284	127.60	988284-C6	144.30			
15.0°	.015 (1/64)	.031 (3x)	1/8	1-1/2	799415	38.30	799415-C6	45.10			NEW
	.015 (1/64)	.078 (5x)	1/8	1-1/2	919515	40.10	919515-C6	46.90			
	.015 (1/64)	.120 (8x)	1/8	1-1/2	799315	44.40	799315-C6	51.20			NEW
	.015 (1/64)	.150 (10x)	1/8	1-1/2	41115	63.00	41115-C6	69.80			
	.030	.156 (5x)	1/8	1-1/2	919530	40.10	919530-C6	46.90			
	.030	.294 (10x)	3/16	2	41130	61.60	41130-C6	68.90			
	.045	.250 (5x)	3/16	2	919545	54.00	919545-C6	61.30			
	.045	.383 (8x)	1/4	2-1/2	41145	66.00	41145-C6	76.00			
	.060	.312 (5x)	1/4	2-1/2	919560	64.80	919560-C6	74.80			
	.060	.588 (10x)	3/8	2-1/2	41160	89.60	41160-C6	100.80			
	.075	.750 (10x)	1/2	3	41175	124.60	41175-C6	139.10			
	.090	.765 (8x)	1/2	3	41190	122.20	41190-C6	136.70			
	.125 (1/8)	.700 (5x)	1/2	3	41199	122.20	41199-C6	136.70			
20°	.015	.078 (5x)	1/8	1-1/2	832815	40.10	832815-C6	46.90			
	.015	.120 (8x)	1/8	1-1/2	799215	44.40	799215-C6	51.20			NEW
	.030	.156 (5x)	3/16	2	832830	40.10	832830-C6	47.40			
	.030	.240 (8x)	1/4	2-1/2	799230	66.00	799230-C6	76.00			NEW
	.045	.250 (5x)	1/4	2-1/2	832845	54.00	832845-C6	64.00			
	.045	.360 (8x)	5/16	2-1/2	799245	70.20	799245-C6	81.40			NEW

For larger angles, please see Chamfer Cutters on page 257.

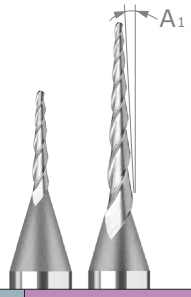
NEW SIZES!

MINIATURE END MILLS

Tapered – Ball



- Stocked in 0.5° to 15° tapers
- Long length design for deep cavity machining
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 +0°30′ −0°30′	D_1 +.0005″ −.0005″	L_2 +.020″ −.000″	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
0.5°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21515	70.40	21515-C6	77.20
	.030	**.300** (10x)	3/16	3	21530	65.80	21530-C6	73.10
	.045	**.450** (10x)	3/16	3	21545	67.00	21545-C6	74.30
	.060	**.600** (10x)	3/16	3	21560	65.80	21560-C6	73.10
	.090	**.900** (10x)	1/4	4	21590	69.40	21590-C6	79.40
	.125 (1/8)	**1.250** (10x)	1/4	4	21599	69.40	21599-C6	79.40
1.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21615	70.40	21615-C6	77.20
	.030	**.156** (5x)	1/8	1-1/2	879830	38.80	879830-C6	45.60
	.030	**.300** (10x)	3/16	3	21630	65.80	21630-C6	73.10
	.045	**.450** (10x)	3/16	3	21645	67.00	21645-C6	74.30
	.060	**.312** (5x)	1/8	1-1/2	879860	38.80	879860-C6	46.10
	.060	**.600** (10x)	3/16	3	21660	65.80	21660-C6	73.10
	.090	**.900** (10x)	1/4	4	21690	69.40	21690-C6	79.40
	.125 (1/8)	**1.250** (10x)	1/4	4	21699	69.40	21699-C6	79.40
1.5°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21715	70.40	21715-C6	77.20
	.030	**.300** (10x)	3/16	3	21730	65.80	21730-C6	73.10
	.045	**.450** (10x)	3/16	3	21745	67.00	21745-C6	74.30
	.060	**.600** (10x)	3/16	3	21760	65.80	21760-C6	73.10
	.090	**.900** (10x)	1/4	4	21790	69.40	21790-C6	79.40
	.125 (1/8)	**1.250** (10x)	1/4	4	21799	69.40	21799-C6	79.40
2.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21815	70.40	21815-C6	77.20
	.030	**.300** (10x)	3/16	3	21830	65.80	21830-C6	73.10
	.045	**.450** (10x)	3/16	3	21845	67.00	21845-C6	74.30
	.060	**.600** (10x)	3/16	3	21860	65.80	21860-C6	73.10
	.090	**.900** (10x)	1/4	4	21890	69.40	21890-C6	79.40
	.125 (1/8)	**1.250** (10x)	1/4	4	21899	69.40	21899-C6	79.40
3.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21915	70.40	21915-C6	77.20
	.030	**.156** (5x)	1/8	1-1/2	880230	38.80	880230-C6	45.60
	.030	**.300** (10x)	3/16	3	21930	65.80	21930-C6	73.10
	.045	**.450** (10x)	3/16	3	21945	67.00	21945-C6	74.30
	.060	**.312** (5x)	1/8	1-1/2	880260	38.80	880260-C6	45.60
	.060	**.600** (10x)	3/16	3	21960	65.80	21960-C6	73.10
	.090	**.900** (10x)	1/4	4	21990	69.40	21990-C6	79.40
	.125 (1/8)	**1.190** (10x)	1/4	4	21999	69.40	21999-C6	79.40

continued on next page

NEW SIZES!

MINIATURE END MILLS

Tapered – Ball (cont.)

continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN NANO COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	
4.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	840415	72.10	840415-C6	78.90	
	.030	**.300** (10x)	3/16	3	840430	67.30	840430-C6	74.60	
	.060	**.600** (10x)	3/16	3	840460	67.30	840460-C6	74.60	
	.090	**.900** (10x)	1/4	4	840490	71.10	840490-C6	81.10	
5.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	32615	70.40	32615-C6	77.20	
	.030	**.156** (5x)	1/8	1-1/2	880630	38.80	880630-C6	45.60	
	.030	**.300** (10x)	3/16	3	32630	65.80	32630-C6	73.10	
	.045	**.450** (10x)	3/16	3	32645	67.00	32645-C6	74.30	
	.060	**.312** (5x)	1/8	1-1/2	880660	38.80	880660-C6	45.60	
	.060	**.600** (10x)	3/16	3	32660	65.80	32660-C6	73.10	
	.090	**.900** (10x)	1/4	4	32690	69.40	32690-C6	79.40	
	.125 (1/8)	**1.250** (10x)	3/8	4	32699	92.40	32699-C6	103.60	
6.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	835615	72.10	835615-C6	78.90	
	.030	**.300** (10x)	3/16	3	835630	67.30	835630-C6	74.60	
	.060	**.600** (10x)	3/16	3	835660	71.10	835660-C6	78.40	
	.090	**.900** (10x)	3/8	4	835690	94.60	835690-C6	105.80	
7.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	34415	72.10	34415-C6	78.90	
	.030	**.300** (10x)	3/16	3	34430	67.30	34430-C6	74.60	
	.045	**.450** (10x)	3/16	3	34445	68.60	34445-C6	75.90	
	.060	**.600** (10x)	1/4	4	34460	71.10	34460-C6	81.10	
	.090	**.900** (10x)	3/8	4	34490	94.60	34490-C6	105.80	
8.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	853815	72.10	853815-C6	78.90	
	.030	**.300** (10x)	3/16	3	853830	67.30	853830-C6	74.60	
	.060	**.600** (10x)	1/4	4	853860	71.10	853860-C6	81.10	
	.090	**.900** (10x)	3/8	4	853890	94.60	853890-C6	105.80	
10.0°	.015 (1/64)	**.078** (5x)	1/8	1-1/2	881015	39.70	881015-C6	46.50	NEW
	.015 (1/64)	**.150** (10x)	1/8	2-1/2	35315	72.10	35315-C6	78.90	
	.030	**.156** (5x)	1/8	1-1/2	881030	39.70	881030-C6	46.50	
	.030	**.300** (10x)	3/16	3	35330	67.30	35330-C6	74.60	
	.045	**.250** (5x)	3/16	2	881045	65.20	881045-C6	72.50	NEW
	.045	**.450** (10x)	1/4	4	35345	72.10	35345-C6	82.10	
	.060	**.312** (5x)	3/16	2	881060	65.20	881060-C6	72.00	
	.060	**.600** (10x)	3/8	4	35360	94.60	35360-C6	105.80	
	.090	**.500** (5x)	5/16	2-1/2	881090	105.20	881090-C6	115.40	
	.125 (1/8)	**.625** (5x)	3/8	2-1/2	881099	129.40	881099-C6	139.90	
	.187 (3/16)	**.937** (5x)	1/2	3	881081	146.80	881081-C6	161.30	
	.250 (1/4)	**1.177** (5x)	5/8	3-1/2	881084	159.30	881084-C6	174.30	
15.0°	.015 (1/64)	**.150** (10x)	1/8	1-1/2	916115	72.50	916115-C6	79.30	
	.030	**.300** (10x)	3/16	2	916130	67.60	916130-C6	74.90	
	.045	**.402** (9x)	1/4	2-1/2	916145	72.50	916145-C6	82.50	
	.060	**.600** (10x)	3/8	2-1/2	916160	95.30	916160-C6	106.50	
20.0°	.015 (1/64)	**.078** (5x)	1/8	1-1/2	802115	39.70	802115-C6	46.50	NEW
	.030	**.156** (5x)	3/16	2-1/2	802130	64.60	802130-C6	71.90	NEW
	.045	**.250** (5x)	1/4	2-1/2	802145	72.50	802145-C6	82.50	NEW

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Recommended Materials:
readily machinable medium alloy steels, stainless steels, and tool steels

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abrasive composites, fiber-reinforced materials, layered composites

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End Mills for Wood 228

Recommended Materials:
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5 Flute, Variable Helix Design

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- Also excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
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- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
.015 (1/64)		.0150	**.023** (1.5x)	1/4	2-1/2	907415-C6	70.00
.015 (1/64)		.0150	**.045** (3x)	1/4	2-1/2	915915-C6	70.00
.020		.0200	**.030** (1.5x)	1/4	2-1/2	907420-C6	70.00
.020		.0200	**.060** (3x)	1/4	2-1/2	915920-C6	70.00
.020		.0200	**.100** (5x)	1/4	2-1/2	885220-C6	73.40
.025		.0250	**.038** (1.5x)	1/4	2-1/2	907425-C6	70.00
.025		.0250	**.075** (3x)	1/4	2-1/2	915925-C6	70.00
.030		.0300	**.045** (1.5x)	1/4	2-1/2	907430-C6	63.60
.030		.0300	**.090** (3x)	1/4	2-1/2	915930-C6	63.60
.031 (1/32)		.0310	**.025** (0.8x)	1/4	2-1/2	859431-C6	61.70
.031 (1/32)		.0310	**.047** (1.5x)	1/4	2-1/2	907431-C6	59.00
.031 (1/32)		.0310	**.093** (3x)	1/4	2-1/2	915931-C6	59.00
.031 (1/32)		.0310	**.156** (5x)	1/4	2-1/2	885231-C6	64.30
.035		.0350	**.053** (1.5x)	1/4	2-1/2	907435-C6	59.30
.035		.0350	**.105** (3x)	1/4	2-1/2	915935-C6	59.30
.039		.0390	**.117** (3x)	1/4	2-1/2	915939-C6	59.30
	1.0 mm	.0393	**3.00 mm** (3x)	6 mm	63 mm	897822-C6	64.30
.040		.0400	**.060** (1.5x)	1/4	2-1/2	907440-C6	59.00
.040		.0400	**.120** (3x)	1/4	2-1/2	915940-C6	59.00
.040		.0400	**.203** (5x)	1/4	2-1/2	885240-C6	64.30
.045		.0450	**.068** (1.5x)	1/4	2-1/2	907445-C6	59.30
.045		.0450	**.135** (3x)	1/4	2-1/2	915945-C6	59.30
.047 (3/64)		.0470	**.071** (1.5x)	1/4	2-1/2	907447-C6	59.00
.047 (3/64)		.0470	**.141** (3x)	1/4	2-1/2	915947-C6	59.00
.047 (3/64)		.0470	**.250** (5x)	1/4	2-1/2	885247-C6	64.30
.050		.0500	**.075** (1.5x)	1/4	2-1/2	907450-C6	59.00
.050		.0500	**.150** (3x)	1/4	2-1/2	915950-C6	59.00
.055		.0550	**.083** (1.5x)	1/4	2-1/2	907455-C6	59.30
.055		.0550	**.165** (3x)	1/4	2-1/2	915955-C6	59.30
.060		.0600	**.090** (1.5x)	1/4	2-1/2	907460-C6	59.00
.060		.0600	**.180** (3x)	1/4	2-1/2	915960-C6	59.00
.062 (1/16)		.0620	**.050** (0.8x)	1/4	2-1/2	859462-C6	61.70
.062 (1/16)		.0620	**.093** (1.5x)	1/4	2-1/2	907462-C6	59.00
.062 (1/16)		.0620	**.186** (3x)	1/4	2-1/2	915962-C6	59.00
.062 (1/16)		.0620	**.250** (4x)	1/4	2-1/2	824962-C6	62.20
.062 (1/16)		.0620	**.312** (5x)	1/4	2-1/2	885262-C6	64.30
.070		.0700	**.105** (1.5x)	1/4	2-1/2	907470-C6	61.70
.070		.0700	**.210** (3x)	1/4	2-1/2	915970-C6	61.70

continued on next page

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc (cont.)

continued from previous page

mm & in

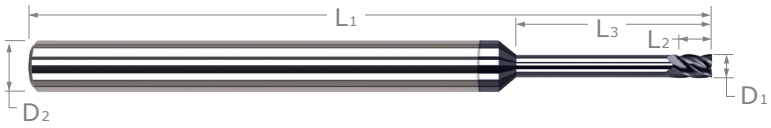
CUTTER DIAMETER D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ / +.25mm −.00mm	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED 5 FL	PRICE
.078 (5/64)		.0780	**.117** (1.5x)	1/4	2-1/2	907478-C6	61.70
.078 (5/64)		.0780	**.234** (3x)	1/4	2-1/2	915978-C6	61.70
.078 (5/64)		.0780	**.406** (5x)	1/4	2-1/2	885278-C6	67.10
	2.0 mm	.0787	**6.00 mm** (3x)	6 mm	63 mm	897845-C6	67.40
.080		.0800	**.120** (1.5x)	1/4	2-1/2	907480-C6	61.70
.080		.0800	**.240** (3x)	1/4	2-1/2	915980-C6	61.70
.090		.0900	**.135** (1.5x)	1/4	2-1/2	907490-C6	61.70
.090		.0900	**.270** (3x)	1/4	2-1/2	915990-C6	61.70
.093 (3/32)		.0930	**.074** (0.8x)	1/4	2-1/2	859493-C6	65.30
.093 (3/32)		.0930	**.140** (1.5x)	1/4	2-1/2	907493-C6	62.60
.093 (3/32)		.0930	**.279** (3x)	1/4	2-1/2	915993-C6	62.60
.093 (3/32)		.0930	**.372** (4x)	1/4	2-1/2	824993-C6	65.80
.093 (3/32)		.0930	**.500** (5x)	1/4	2-1/2	885293-C6	67.90
.100		.1000	**.150** (1.5x)	1/4	2-1/2	907500-C6	62.60
.100		.1000	**.300** (3x)	1/4	2-1/2	916000-C6	62.60
.109 (7/64)		.1090	**.164** (1.5x)	1/4	2-1/2	907502-C6	63.10
.109 (7/64)		.1090	**.327** (3x)	1/4	2-1/2	916002-C6	63.10
.118		.1180	**.177** (1.5x)	1/4	2-1/2	907505-C6	63.60
.118		.1180	**.354** (3x)	1/4	2-1/2	916005-C6	63.60
	3.0 mm	.1181	**9.00 mm** (3x)	6 mm	63 mm	897857-C6	68.70

D_1 +.000″ −.002″	D_1 +.00mm −.04mm	D_1 decimal equivalent	L_2 +.030″ −.000″ / +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
.125 (1/8)		.1250	**.100** (0.8x)	1/4	2-1/2	859508-C6	66.00
.125 (1/8)		.1250	**.187** (1.5x)	1/4	2-1/2	907508-C6	63.30
.125 (1/8)		.1250	**.375** (3x)	1/4	2-1/2	916008-C6	63.30
.125 (1/8)		.1250	**.500** (4x)	1/4	2-1/2	825008-C6	66.50
.125 (1/8)		.1250	**.625** (5x)	1/4	2-1/2	885308-C6	68.60
.140 (9/64)		.1406	**.220** (1.5x)	1/4	2-1/2	907509-C6	66.60
.140 (9/64)		.1406	**.425** (3x)	1/4	2-1/2	916009-C6	66.60
.156 (5/32)		.1562	**.235** (1.5x)	1/4	2-1/2	907510-C6	63.30
.156 (5/32)		.1562	**.468** (3x)	1/4	2-1/2	916010-C6	63.30
.156 (5/32)		.1562	**.625** (4x)	1/4	2-1/2	825010-C6	66.50
.156 (5/32)		.1562	**.750** (5x)	1/4	3	885310-C6	68.60
.187 (3/16)		.1875	**.285** (1.5x)	1/4	2-1/2	907512-C6	65.80
.187 (3/16)		.1875	**.562** (3x)	1/4	2-1/2	916012-C6	65.80
.187 (3/16)		.1875	**1.000** (5x)	1/4	3	885312-C6	72.40
	6.0 mm	.2362	**18.00 mm** (3x)	6 mm	63 mm	897866-C6	69.70
.250 (1/4)		.2500	**.375** (1.5x)	1/4	2-1/2	907516-C6	73.30
.250 (1/4)		.2500	**.750** (3x)	1/4	2-1/2	916016-C6	73.30
.250 (1/4)		.2500	**1.250** (5x)	1/4	4	885316-C6	79.70
.312 (5/16)		.3125	**.470** (1.5x)	5/16	2-1/2	907520-C6	79.90
.312 (5/16)		.3125	**1.000** (3x)	5/16	2-1/2	916020-C6	79.90
.375 (3/8)		.3750	**.570** (1.5x)	3/8	2-1/2	907524-C6	92.20
.375 (3/8)		.3750	**1.125** (3x)	3/8	2-1/2	916024-C6	92.20
.500 (1/2)		.5000	**.750** (1.5x)	1/2	3	907532-C6	111.40
.500 (1/2)		.5000	**1.500** (3x)	1/2	3	916032-C6	111.40

PLEASE SEE SPEEDS & FEEDS ON PAGE 91

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc – Long Reach, Stub Flute



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
.031	.047	**.156** (5x)	1/4	2-1/2	825331-C6	66.50
.031	.047	**.250** (8x)	1/4	2-1/2	819031-C6	71.80
.062	.093	**.312** (5x)	1/4	2-1/2	825362-C6	66.50
.062	.093	**.500** (8x)	1/4	2-1/2	819062-C6	71.80
.093	.140	**.500** (5x)	1/4	2-1/2	825393-C6	70.10
.093	.140	**.750** (8x)	1/4	2-1/2	819093-C6	75.40
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
.125	.187	**.625** (5x)	1/4	2-1/2	825408-C6	70.80
.125	.187	**1.000** (8x)	1/4	2-1/2	819108-C6	76.10
.187	.285	**1.000** (5x)	1/4	3	825412-C6	74.60
.187	.285	**1.500** (8x)	1/4	3	819112-C6	79.90

PLEASE SEE SPEEDS & FEEDS ON PAGE 92

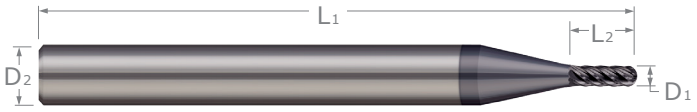
View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com.

NEW SIZES!

END MILLS FOR HARDENED STEELS

Ball – For Steels Up to 55 Rc



6 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Ball profile for maximum strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
NEW	.031 (1/32)	.047 (1.5x)	1/4	2-1/2	798131-C6	42.40
	.031 (1/32)	.093 (3x)	1/4	2-1/2	843431-C6	42.40
NEW	.047 (3/64)	.071 (1.5x)	1/4	2-1/2	798147-C6	42.40
	.047 (3/64)	.141 (3x)	1/4	2-1/2	843447-C6	42.40
NEW	.062 (1/16)	.093 (1.5x)	1/4	2-1/2	798162-C6	40.10
	.062 (1/16)	.186 (3x)	1/4	2-1/2	843462-C6	40.10
NEW	.078 (5/64)	.117 (1.5x)	1/4	2-1/2	798178-C6	40.10
	.078 (5/64)	.234 (3x)	1/4	2-1/2	843478-C6	40.10
NEW	.093 (3/32)	.140 (1.5x)	1/4	2-1/2	798193-C6	40.10
	.093 (3/32)	.279 (3x)	1/4	2-1/2	843493-C6	40.10
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
NEW	.125 (1/8)	.187 (1.5x)	1/4	2-1/2	798208-C6	36.80
	.125 (1/8)	.375 (3x)	1/4	2-1/2	843508-C6	36.80
NEW	.156 (5/32)	.468 (3x)	1/4	2-1/2	843510-C6	38.00
NEW	.187 (3/16)	.285 (1.5x)	1/4	2-1/2	798212-C6	39.20
	.187 (3/16)	.562 (3x)	1/4	2-1/2	843512-C6	39.20
NEW	.250 (1/4)	.375 (1.5x)	1/4	2-1/2	798216-C6	47.40
	.250 (1/4)	.750 (3x)	1/4	2-1/2	843516-C6	47.40
NEW	.375 (3/8)	1.125 (3x)	3/8	2-1/2	843524-C6	74.90

SPEEDS & FEEDS (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc)

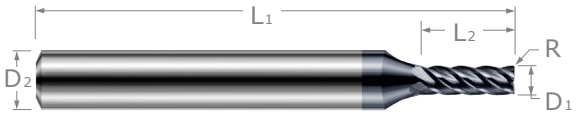
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00006	.00009	.00012	.00015	.00018	.00024	.00036	.00049	.00061	.00073	.00097	1 x Dia	.30 x Dia
			Profiling	.00004	.00007	.00011	.00015	.00018	.00022	.00029	.00044	.00059	.00073	.00088	.00118	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	.00039	.00047	.00062	1 x Dia	.15 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	.00043	.00051	.00068	.15 x Dia	.5 x Dia

NEW SIZES!

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Akso excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Corner radius for improved strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE	
.020		.0200	**.005**	.060 (3x)	1/4	2-1/2	933220-C6	59.90	NEW
.031 (1/32)		.0310	**.005**	.047 (1.5x)	1/4	2-1/2	920431-C6	59.00	
.031 (1/32)		.0310	**.005**	.093 (3x)	1/4	2-1/2	933231-C6	59.00	
.031 (1/32)		.0310	**.005**	.156 (5x)	1/4	2-1/2	851731-C6	64.30	
.031 (1/32)		.0310	**.010**	.093 (3x)	1/4	2-1/2	852131-C6	59.00	
.039		.0390	**.005**	.117 (3x)	1/4	2-1/2	933239-C6	59.30	
	1.0 mm	.0393	**.20 mm**	3.00 mm (3x)	6 mm	63 mm	894622-C6	64.30	
.040		.0400	**.005**	.060 (1.5x)	1/4	2-1/2	920440-C6	59.30	
.040		.0400	**.005**	.120 (3x)	1/4	2-1/2	933240-C6	59.30	
.047 (3/64)		.0470	**.005**	.071 (1.5x)	1/4	2-1/2	920447-C6	59.00	
.047 (3/64)		.0470	**.005**	.141 (3x)	1/4	2-1/2	933247-C6	59.00	
.047 (3/64)		.0470	**.005**	.250 (5x)	1/4	2-1/2	851747-C6	64.30	
.047 (3/64)		.0470	**.010**	.141 (3x)	1/4	2-1/2	852147-C6	59.00	
.050		.0500	**.005**	.150 (3x)	1/4	2-1/2	933250-C6	59.30	
.060		.0600	**.005**	.180 (3x)	1/4	2-1/2	933260-C6	59.30	
.062 (1/16)		.0620	**.005**	.093 (1.5x)	1/4	2-1/2	920462-C6	59.00	
.062 (1/16)		.0620	**.005**	.186 (3x)	1/4	2-1/2	933262-C6	59.00	
.062 (1/16)		.0620	**.005**	.312 (5x)	1/4	2-1/2	851762-C6	64.30	
.062 (1/16)		.0620	**.010**	.186 (3x)	1/4	2-1/2	852162-C6	59.00	
.062 (1/16)		.0620	**.020**	.186 (3x)	1/4	2-1/2	813562-C6	59.00	
.070		.0700	**.005**	.210 (3x)	1/4	2-1/2	933270-C6	62.10	
.078 (5/64)		.0780	**.005**	.117 (1.5x)	1/4	2-1/2	920478-C6	61.70	
.078 (5/64)		.0780	**.005**	.234 (3x)	1/4	2-1/2	933278-C6	61.70	
.078 (5/64)		.0780	**.005**	.406 (5x)	1/4	2-1/2	851778-C6	67.10	
.078 (5/64)		.0780	**.010**	.117 (1.5x)	1/4	2-1/2	872778-C6	61.70	
.078 (5/64)		.0780	**.010**	.234 (3x)	1/4	2-1/2	852178-C6	61.70	
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	6 mm	63 mm	894645-C6	67.40	
.080		.0800	**.005**	.240 (3x)	1/4	2-1/2	933280-C6	63.10	
.090		.0900	**.005**	.270 (3x)	1/4	2-1/2	933290-C6	63.10	
.093 (3/32)		.0930	**.005**	.140 (1.5x)	1/4	2-1/2	920493-C6	62.60	
.093 (3/32)		.0930	**.005**	.279 (3x)	1/4	2-1/2	933293-C6	62.60	
.093 (3/32)		.0930	**.005**	.500 (5x)	1/4	2-1/2	851793-C6	67.90	
.093 (3/32)		.0930	**.010**	.140 (1.5x)	1/4	2-1/2	872793-C6	62.60	
.093 (3/32)		.0930	**.010**	.279 (3x)	1/4	2-1/2	852193-C6	62.60	
.093 (3/32)		.0930	**.020**	.279 (3x)	1/4	2-1/2	813593-C6	62.60	
.093 (3/32)		.0930	**.030**	.279 (3x)	1/4	2-1/2	853293-C6	62.60	
.100		.1000	**.005**	.300 (3x)	1/4	2-1/2	933300-C6	63.10	
.109 (7/64)		.1090	**.005**	.327 (3x)	1/4	2-1/2	933302-C6	62.60	
.118		.1180	**.005**	.354 (3x)	1/4	2-1/2	933305-C6	63.60	
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	6 mm	63 mm	894657-C6	68.70	

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END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc (cont.)

mm & in continued from previous page

	CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
	.125 (1/8)		.1250	**.005**	.187 (1.5x)	1/4	2-1/2	920508-C6	63.30
	.125 (1/8)		.1250	**.005**	.375 (3x)	1/4	2-1/2	933308-C6	63.30
	.125 (1/8)		.1250	**.005**	.625 (5x)	1/4	2-1/2	851808-C6	68.60
	.125 (1/8)		.1250	**.010**	.375 (3x)	1/4	2-1/2	852208-C6	63.30
NEW	.125 (1/8)		.1250	**.015**	.187 (1.5x)	1/4	2-1/2	798008-C6	63.30
	.125 (1/8)		.1250	**.015**	.375 (3x)	1/4	2-1/2	852808-C6	63.30
	.125 (1/8)		.1250	**.020**	.375 (3x)	1/4	2-1/2	813608-C6	63.30
	.125 (1/8)		.1250	**.030**	.375 (3x)	1/4	2-1/2	853308-C6	63.30
	.156 (5/32)		.1562	**.005**	.235 (1.5x)	1/4	2-1/2	920510-C6	63.30
	.156 (5/32)		.1562	**.005**	.468 (3x)	1/4	2-1/2	933310-C6	63.30
	.156 (5/32)		.1562	**.005**	.750 (5x)	1/4	3	851810-C6	68.60
	.156 (5/32)		.1562	**.015**	.468 (3x)	1/4	2-1/2	852810-C6	63.30
	.156 (5/32)		.1562	**.030**	.468 (3x)	1/4	2-1/2	853310-C6	63.30
	.187 (3/16)		.1875	**.005**	.285 (1.5x)	1/4	2-1/2	920512-C6	65.80
	.187 (3/16)		.1875	**.005**	.562 (3x)	1/4	2-1/2	933312-C6	65.80
	.187 (3/16)		.1875	**.005**	1.000 (5x)	1/4	3	851812-C6	72.40
	.187 (3/16)		.1875	**.010**	.562 (3x)	1/4	2-1/2	852212-C6	65.80
	.187 (3/16)		.1875	**.015**	.562 (3x)	1/4	2-1/2	852812-C6	65.80
	.187 (3/16)		.1875	**.030**	.562 (3x)	1/4	2-1/2	853312-C6	65.80
NEW	.187 (3/16)		.1875	**.060**	.562 (3x)	1/4	2-1/2	800712-C6	65.80
		6.0 mm	.2362	**.20 mm**	18.00 mm (3x)	6 mm	63 mm	894666-C6	69.70
	.250 (1/4)		.2500	**.005**	.375 (1.5x)	1/4	2-1/2	920516-C6	73.30
	.250 (1/4)		.2500	**.005**	.750 (3x)	1/4	2-1/2	933316-C6	73.30
	.250 (1/4)		.2500	**.005**	1.250 (5x)	1/4	4	851816-C6	79.70
	.250 (1/4)		.2500	**.010**	.750 (3x)	1/4	2-1/2	852216-C6	73.30
	.250 (1/4)		.2500	**.015**	.750 (3x)	1/4	2-1/2	852816-C6	73.30
	.250 (1/4)		.2500	**.030**	.750 (3x)	1/4	2-1/2	853316-C6	73.30
NEW	.375 (3/8)		.3750	**.015**	1.125 (3x)	3/8	2-1/2	852824-C6	94.50
NEW	.500 (1/2)		.5000	**.015**	1.500 (3x)	1/2	3	852832-C6	114.20
NEW	.500 (1/2)		.5000	**.030**	1.500 (3x)	1/2	3	853332-C6	114.20

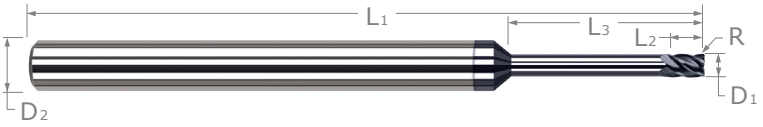
SPEEDS & FEEDS (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 90%; for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00007	.00010	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	1 x Dia	.30 x Dia
			Profiling	.00004	.00008	.00012	.00016	.00020	.00024	.00033	.00049	.00065	.00082	.00098	.00131	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00009	.00011	.00013	.00017	.00026	.00035	.00043	.00052	.00069	1 x Dia	.15 x Dia
			Profiling	.00002	.00005	.00007	.00009	.00012	.00014	.00019	.00028	.00038	.00047	.00057	.00076	.15 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc – Long Reach, Stub Flute



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
.031	**.005**	.047	**.156** (5x)	1/4	2-1/2	812731-C6	66.50
.031	**.005**	.047	**.250** (8x)	1/4	2-1/2	812531-C6	71.80
.062	**.005**	.093	**.312** (5x)	1/4	2-1/2	812762-C6	66.50
.062	**.005**	.093	**.500** (8x)	1/4	2-1/2	812562-C6	71.80
.093	**.005**	.140	**.500** (5x)	1/4	2-1/2	812793-C6	70.10
.093	**.005**	.140	**.750** (8x)	1/4	2-1/2	812593-C6	75.40
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
.125	**.005**	.187	**.625** (5x)	1/4	2-1/2	812808-C6	70.80
.125	**.005**	.187	**1.000** (8x)	1/4	2-1/2	812608-C6	76.10
.187	**.005**	.285	**1.000** (5x)	1/4	3	812812-C6	74.60
.187	**.005**	.285	**1.500** (8x)	1/4	3	812612-C6	79.90

SPEEDS & FEEDS (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc – Long Reach, Stub Flute)

Important Note: Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

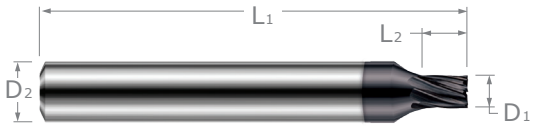
Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00006	.00009	.00012	.00015	.00018	.00024	.00036	.00048	.00060	.00072	.00096	1 x Dia	.28 x Dia
			Profiling	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	.00072	.00087	.00116	1 x Dia	.28 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00008	.00010	.00011	.00015	.00023	.00031	.00038	.00046	.00061	1 x Dia	.14 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00025	.00034	.00042	.00051	.00068	1 x Dia	.14 x Dia

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com.

END MILLS FOR HARDENED STEELS

Square – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
	.031 (1/32)	.047 (1.5x)	1/4	2-1/2	835131-C6	61.60
	.031 (1/32)	.093 (3x)	1/4	2-1/2	854831-C6	61.60
	.047 (3/64)	.141 (3x)	1/4	2-1/2	854847-C6	61.60
	.062 (1/16)	.093 (1.5x)	1/4	2-1/2	835162-C6	61.60
	.062 (1/16)	.186 (3x)	1/4	2-1/2	854862-C6	61.60
NEW	.062 (1/16)	.312 (5x)	1/4	2-1/2	797762-C6	61.60
NEW	.078 (5/64)	.117 (1.5x)	1/4	2-1/2	835178-C6	65.00
	.078 (5/64)	.234 (3x)	1/4	2-1/2	854878-C6	65.00
	.093 (3/32)	.140 (1.5x)	1/4	2-1/2	835193-C6	65.70
	.093 (3/32)	.279 (3x)	1/4	2-1/2	854893-C6	65.70
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
	.125 (1/8)	.187 (1.5x)	1/4	2-1/2	835208-C6	66.50
	.125 (1/8)	.375 (3x)	1/4	2-1/2	854808-C6	66.50
NEW	.125 (1/8)	.625 (5x)	1/4	2-1/2	797808-C6	68.30
NEW	.156 (5/32)	.235 (1.5x)	1/4	2-1/2	835210-C6	71.90
	.156 (5/32)	.468 (3x)	1/4	2-1/2	854810-C6	71.90
	.187 (3/16)	.285 (1.5x)	1/4	2-1/2	835212-C6	69.20
	.187 (3/16)	.562 (3x)	1/4	2-1/2	854812-C6	69.20
	.250 (1/4)	.375 (1.5x)	1/4	2-1/2	835216-C6	77.00
	.250 (1/4)	.750 (3x)	1/4	2-1/2	854816-C6	77.00
NEW	.375 (3/8)	.570 (1.5x)	3/8	2-1/2	835224-C6	96.00
	.375 (3/8)	1.125 (3x)	3/8	2-1/2	854824-C6	96.00
	.500 (1/2)	1.500 (3x)	1/2	3	854832-C6	116.80

PLEASE SEE SPEEDS & FEEDS ON PAGE 95

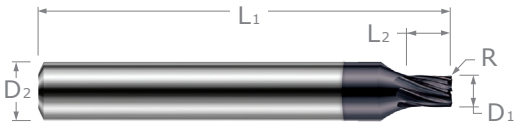
Why Flute Count Matters

7 flutes for steel? Is that really necessary? Yes! Our "In the Loupe" blog post **Why Flute Count Matters** walks readers through the importance of the tool's core diameter size and why flute count plays a pivotal role in speeds and feeds calculations.

Read more on harveyperformance.com/in-the-loupe/

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Corner radius for improved strength
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.030	**.005**	.045 (1.5x)	1/4	2-1/2	903130-C6	67.30
.030	**.005**	.090 (3x)	1/4	2-1/2	910830-C6	67.30
.031 (1/32)	**.005**	.047 (1.5x)	1/4	2-1/2	903131-C6	65.20
.031 (1/32)	**.005**	.093 (3x)	1/4	2-1/2	910831-C6	65.20
.031 (1/32)	**.005**	.156 (5x)	1/4	2-1/2	845231-C6	70.50
.040	**.005**	.120 (3x)	1/4	2-1/2	910840-C6	67.30
.047 (3/64)	**.005**	.071 (1.5x)	1/4	2-1/2	903147-C6	65.20
.047 (3/64)	**.005**	.141 (3x)	1/4	2-1/2	910847-C6	65.20
.050	**.005**	.150 (3x)	1/4	2-1/2	910850-C6	67.30
.060	**.005**	.180 (3x)	1/4	2-1/2	910860-C6	67.30
.062 (1/16)	**.005**	.093 (1.5x)	1/4	2-1/2	903162-C6	65.20
.062 (1/16)	**.005**	.186 (3x)	1/4	2-1/2	910862-C6	65.20
.062 (1/16)	**.005**	.312 (5x)	1/4	2-1/2	845262-C6	70.50
.062 (1/16)	**.010**	.186 (3x)	1/4	2-1/2	850562-C6	65.20
.070	**.005**	.210 (3x)	1/4	2-1/2	910870-C6	67.30
.078 (5/64)	**.005**	.117 (1.5x)	1/4	2-1/2	903178-C6	68.40
.078 (5/64)	**.005**	.234 (3x)	1/4	2-1/2	910878-C6	68.40
.080	**.005**	.240 (3x)	1/4	2-1/2	910880-C6	70.60
.090	**.005**	.270 (3x)	1/4	2-1/2	910890-C6	70.60
.093 (3/32)	**.005**	.140 (1.5x)	1/4	2-1/2	903193-C6	69.00
.093 (3/32)	**.005**	.279 (3x)	1/4	2-1/2	910893-C6	69.00
.093 (3/32)	**.005**	.500 (5x)	1/4	2-1/2	845293-C6	74.30
.093 (3/32)	**.010**	.279 (3x)	1/4	2-1/2	850593-C6	69.00
.100	**.005**	.300 (3x)	1/4	2-1/2	910900-C6	70.60
.109 (7/64)	**.005**	.327 (3x)	1/4	2-1/2	910902-C6	70.60
.118	**.005**	.354 (3x)	1/4	2-1/2	910905-C6	70.60

D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.125 (1/8)	**.005**	.187 (1.5x)	1/4	2-1/2	903208-C6	70.00
.125 (1/8)	**.005**	.375 (3x)	1/4	2-1/2	910908-C6	70.00
.125 (1/8)	**.005**	.625 (5x)	1/4	2-1/2	845308-C6	70.00
.125 (1/8)	**.010**	.375 (3x)	1/4	2-1/2	850608-C6	70.00
.125 (1/8)	**.015**	.187 (1.5x)	1/4	2-1/2	879108-C6	70.00
.125 (1/8)	**.015**	.375 (3x)	1/4	2-1/2	882308-C6	70.00
.125 (1/8)	**.030**	.375 (3x)	1/4	2-1/2	883508-C6	70.00

continued on next page

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.140 (9/64)	**.005**	.425 (3x)	1/4	2-1/2	910909-C6	72.20
.156 (5/32)	**.005**	.235 (1.5x)	1/4	2-1/2	903210-C6	70.00
.156 (5/32)	**.005**	.468 (3x)	1/4	2-1/2	910910-C6	70.00
.187 (3/16)	**.005**	.285 (1.5x)	1/4	2-1/2	903212-C6	72.90
.187 (3/16)	**.005**	.562 (3x)	1/4	2-1/2	910912-C6	72.90
.187 (3/16)	**.010**	.562 (3x)	1/4	2-1/2	850612-C6	72.90
.187 (3/16)	**.015**	.285 (1.5x)	1/4	2-1/2	879112-C6	72.90
.187 (3/16)	**.015**	.562 (3x)	1/4	2-1/2	882312-C6	72.90
.250 (1/4)	**.005**	.375 (1.5x)	1/4	2-1/2	903216-C6	81.10
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	910916-C6	81.10
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	850616-C6	81.10
.250 (1/4)	**.015**	.375 (1.5x)	1/4	2-1/2	879116-C6	81.10
.250 (1/4)	**.015**	.750 (3x)	1/4	2-1/2	882316-C6	81.10
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	883516-C6	81.10
.312 (5/16)	**.015**	1.000 (3x)	5/16	2-1/2	882320-C6	84.30
.312 (5/16)	**.030**	1.000 (3x)	5/16	2-1/2	883520-C6	84.30
.375 (3/8)	**.015**	.570 (1.5x)	3/8	2-1/2	879124-C6	91.20
.375 (3/8)	**.015**	1.125 (3x)	3/8	2-1/2	882324-C6	91.20
.375 (3/8)	**.030**	.570 (1.5x)	3/8	2-1/2	868024-C6	91.20
.375 (3/8)	**.030**	1.125 (3x)	3/8	2-1/2	883524-C6	91.20
.500 (1/2)	**.015**	.750 (1.5x)	1/2	3	879132-C6	101.00
.500 (1/2)	**.015**	1.500 (3x)	1/2	3	882332-C6	101.00
.500 (1/2)	**.030**	.750 (1.5x)	1/2	3	868032-C6	101.00
.500 (1/2)	**.030**	1.500 (3x)	1/2	3	883532-C6	101.00

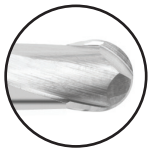
SPEEDS & FEEDS (End Mills for Hardened Steels – For Steels 45 - 68Rc)

Important Note: Values intable are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	45 - 55 Rc	60	Semi-Roughing	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00047	.00062	.00078	.00094	.00125	.15 x Dia	.25 x Dia
			Finishing	.00005	.00009	.00014	.00019	.00024	.00028	.00038	.00056	.00076	.00094	.00113	.00151	.08 x Dia	.5 x Dia
	56 - 68 Rc	50	Semi-Roughing	.00003	.00006	.00009	.00012	.00016	.00019	.00025	.00037	.00050	.00062	.00075	.00100	.12 x Dia	.20 x Dia
			Finishing	.00003	.00007	.00010	.00014	.00017	.00020	.00027	.00041	.00055	.00069	.00082	.00110	.08 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Finishers – Ball



Stub Flute and Large Rigid Core

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting (3 flutes to center)
- Reduced neck diameter to avoid heeling
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 3 FLUTE	
D_1 +.0000″ −.0006″	D_1 +.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.008		.0080	.006	**.012** (1.5x)	1/4	2-1/2	37808-C6	95.10		
.008		.0080	.006	**.025** (3x)	1/4	2-1/2	31408-C6	95.10		
.008		.0080	.006	**.040** (5x)	1/4	2-1/2	38708-C6	99.80		
.010		.0100	.008	**.015** (1.5x)	1/4	2-1/2	37810-C6	86.40		
.010		.0100	.008	**.031** (3x)	1/4	2-1/2	31410-C6	86.40		
.010		.0100	.008	**.050** (5x)	1/4	2-1/2	38710-C6	90.40		
.015 (1/64)		.0150	.012	-	1/4	2-1/2	958315-C6	73.60		
.015 (1/64)		.0150	.012	**.023** (1.5x)	1/4	2-1/2	37815-C6	69.70		
.015 (1/64)		.0150	.012	**.047** (3x)	1/4	2-1/2	31415-C6	69.70	813115-C6	74.20
.015 (1/64)		.0150	.012	**.062** (4x)	1/4	2-1/2	881515-C6	72.20		
.015 (1/64)		.0150	.012	**.078** (5x)	1/4	2-1/2	38715-C6	72.20	812915-C6	76.70
.015 (1/64)		.0150	.012	**.125** (8x)	1/4	2-1/2	32015-C6	76.40		
.015 (1/64)		.0150	.012	**.187** (12x)	1/4	2-1/2	33815-C6	93.10		
.020		.0200	.016	-	1/4	2-1/2	958320-C6	73.60		
.020		.0200	.016	**.031** (1.5x)	1/4	2-1/2	37820-C6	69.70		
.020		.0200	.016	**.062** (3x)	1/4	2-1/2	31420-C6	69.70		
.020		.0200	.016	**.080** (4x)	1/4	2-1/2	881520-C6	72.20		
.020		.0200	.016	**.100** (5x)	1/4	2-1/2	38720-C6	72.20		
.020		.0200	.016	**.160** (8x)	1/4	2-1/2	32020-C6	72.90		
.025		.0250	.020	**.038** (1.5x)	1/4	2-1/2	37825-C6	69.70		
.025		.0250	.020	**.075** (3x)	1/4	2-1/2	31425-C6	69.70		
.025		.0250	.020	**.125** (5x)	1/4	2-1/2	38725-C6	72.20		
.031 (1/32)		.0310	.025	-	1/4	2-1/2	958331-C6	63.30		
.031 (1/32)		.0310	.025	**.047** (1.5x)	1/4	2-1/2	37831-C6	59.60		
.031 (1/32)		.0310	.025	**.093** (3x)	1/4	2-1/2	31431-C6	59.60	813131-C6	64.10
.031 (1/32)		.0310	.025	**.125** (4x)	1/4	2-1/2	881531-C6	63.30		
.031 (1/32)		.0310	.025	**.156** (5x)	1/4	2-1/2	38731-C6	65.20	812931-C6	69.70
.031 (1/32)		.0310	.025	**.187** (6x)	1/4	2-1/2	858031-C6	66.50		
.031 (1/32)		.0310	.025	**.218** (7x)	1/4	2-1/2	863231-C6	67.60		
.031 (1/32)		.0310	.025	**.250** (8x)	1/4	2-1/2	32031-C6	68.70		
.031 (1/32)		.0310	.025	**.312** (10x)	1/4	2-1/2	919131-C6	79.90		
.031 (1/32)		.0310	.025	**.375** (12x)	1/4	2-1/2	33831-C6	79.90		
.031 (1/32)		.0310	.025	**.470** (15x)	1/4	2-1/2	973231-C6	91.70		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 3 FLUTE	
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.039		.0390	.031	-	1/4	2-1/2	958339-C6	63.30		
.039		.0390	.031	**.062** (1.5x)	1/4	2-1/2	37839-C6	59.60		
.039		.0390	.031	**.117** (3x)	1/4	2-1/2	31439-C6	59.60		
.039		.0390	.031	**.156** (4x)	1/4	2-1/2	881539-C6	65.20		
.039		.0390	.031	**.203** (5x)	1/4	2-1/2	38739-C6	65.20		
.039		.0390	.031	**.312** (8x)	1/4	2-1/2	32039-C6	68.70		
.039		.0390	.031	**.468** (12x)	1/4	2-1/2	33839-C6	79.90		
	1.0 mm	.0393	.80 mm	**3.00 mm** (3x)	6 mm	63 mm	882922-C6	65.20		
	1.0 mm	.0393	.80 mm	**5.00 mm** (5x)	6 mm	63 mm	881722-C6	70.60		
.040		.0400	.032	**.062** (1.5x)	1/4	2-1/2	37840-C6	59.60		
.040		.0400	.032	**.125** (3x)	1/4	2-1/2	31440-C6	59.60		
.047 (3/64)		.0470	.038	-	1/4	2-1/2	958347-C6	63.30		
.047 (3/64)		.0470	.038	**.071** (1.5x)	1/4	2-1/2	37847-C6	59.60		
.047 (3/64)		.0470	.038	**.141** (3x)	1/4	2-1/2	31447-C6	59.60	813147-C6	64.10
.047 (3/64)		.0470	.038	**.187** (4x)	1/4	2-1/2	881547-C6	65.20		
.047 (3/64)		.0470	.038	**.250** (5x)	1/4	2-1/2	38747-C6	65.20	812947-C6	69.70
.047 (3/64)		.0470	.038	**.375** (8x)	1/4	2-1/2	32047-C6	68.70		
.047 (3/64)		.0470	.038	**.470** (10x)	1/4	2-1/2	919147-C6	79.90		
.047 (3/64)		.0470	.038	**.564** (12x)	1/4	2-1/2	33847-C6	79.90		
.047 (3/64)		.0470	.038	**.710** (15x)	1/4	2-1/2	973247-C6	91.70		
.050		.0500	.040	**.078** (1.5x)	1/4	2-1/2	37850-C6	59.60		
.050		.0500	.040	**.150** (3x)	1/4	2-1/2	31450-C6	59.60		
.060		.0600	.048	**.093** (1.5x)	1/4	2-1/2	37860-C6	59.60		
.060		.0600	.048	**.180** (3x)	1/4	2-1/2	31460-C6	59.60		
.062 (1/16)		.0620	.050	-	1/4	2-1/2	958362-C6	63.30		
.062 (1/16)		.0620	.050	**.093** (1.5x)	1/4	2-1/2	37862-C6	59.60		
.062 (1/16)		.0620	.050	**.187** (3x)	1/4	2-1/2	31462-C6	59.60	813162-C6	64.10
.062 (1/16)		.0620	.050	**.250** (4x)	1/4	2-1/2	881562-C6	63.30		
.062 (1/16)		.0620	.050	**.312** (5x)	1/4	2-1/2	38762-C6	65.20	812962-C6	69.70
.062 (1/16)		.0620	.050	**.375** (6x)	1/4	2-1/2	858062-C6	66.50		
.062 (1/16)		.0620	.050	**.437** (7x)	1/4	2-1/2	863262-C6	67.60		
.062 (1/16)		.0620	.050	**.500** (8x)	1/4	2-1/2	32062-C6	68.70		
.062 (1/16)		.0620	.050	**.625** (10x)	1/4	2-1/2	919162-C6	86.90		
.062 (1/16)		.0620	.050	**.750** (12x)	1/4	4	33862-C6	86.90		
.062 (1/16)		.0620	.050	**.950** (15x)	1/4	4	973262-C6	99.10		
.078 (5/64)		.0780	.062	-	1/4	2-1/2	958378-C6	63.30		
.078 (5/64)		.0780	.062	**.117** (1.5x)	1/4	2-1/2	37878-C6	59.60		
.078 (5/64)		.0780	.062	**.234** (3x)	1/4	2-1/2	31478-C6	59.60	813178-C6	64.10
.078 (5/64)		.0780	.062	**.312** (4x)	1/4	2-1/2	881578-C6	65.20		
.078 (5/64)		.0780	.062	**.406** (5x)	1/4	2-1/2	38778-C6	65.20	812978-C6	69.70
.078 (5/64)		.0780	.062	**.625** (8x)	1/4	2-1/2	32078-C6	68.70		
.078 (5/64)		.0780	.062	**.781** (10x)	1/4	2-1/2	919178-C6	86.90		
.078 (5/64)		.0780	.062	**.937** (12x)	1/4	4	33878-C6	86.90		
.078 (5/64)		.0780	.062	**1.187** (15x)	1/4	4	973278-C6	99.10		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 3 FLUTE	
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
	2.0 mm	.0787	1.60 mm	**6.00 mm** (3x)	6 mm	63 mm	882945-C6	65.20		
	2.0 mm	.0787	1.60 mm	**10.00 mm** (5x)	6 mm	63 mm	881745-C6	70.60		
.093 (3/32)		.0930	.074	**-**	1/4	2-1/2	958393-C6	63.30		
.093 (3/32)		.0930	.074	**.140** (1.5x)	1/4	2-1/2	37893-C6	59.60		
.093 (3/32)		.0930	.074	**.281** (3x)	1/4	2-1/2	31493-C6	59.60	813193-C6	64.10
.093 (3/32)		.0930	.074	**.375** (4x)	1/4	2-1/2	881593-C6	63.30		
.093 (3/32)		.0930	.074	**.500** (5x)	1/4	2-1/2	38793-C6	65.20	812993-C6	69.70
.093 (3/32)		.0930	.074	**.585** (6x)	1/4	2-1/2	858093-C6	66.50		
.093 (3/32)		.0930	.074	**.670** (7x)	1/4	2-1/2	863293-C6	67.60		
.093 (3/32)		.0930	.074	**.750** (8x)	1/4	2-1/2	32093-C6	68.70		
.093 (3/32)		.0930	.074	**.937** (10x)	1/4	4	919193-C6	86.90		
.093 (3/32)		.0930	.074	**1.125** (12x)	1/4	4	33893-C6	86.90		
.093 (3/32)		.0930	.074	**1.400** (15x)	1/4	4	973293-C6	99.10		
.118		.1180	.094	**.177** (1.5x)	1/4	2-1/2	37905-C6	66.80		
.118		.1180	.094	**.354** (3x)	1/4	2-1/2	31505-C6	66.80		
.118		.1180	.094	**.625** (5x)	1/4	2-1/2	38805-C6	75.90		
	3.0 mm	.1181	2.40 mm	**9.00 mm** (3x)	6 mm	63 mm	882957-C6	72.20		
	3.0 mm	.1181	2.40 mm	**15.00 mm** (5x)	6 mm	63 mm	881757-C6	81.50		
.125 (1/8)		.1250	.100	**-**	1/4	2-1/2	958408-C6	70.60		
.125 (1/8)		.1250	.100	**.187** (1.5x)	1/4	2-1/2	37908-C6	66.80		
.125 (1/8)		.1250	.100	**.375** (3x)	1/4	2-1/2	31508-C6	66.80	813208-C6	71.30
.125 (1/8)		.1250	.100	**.500** (4x)	1/4	2-1/2	881608-C6	74.00		
.125 (1/8)		.1250	.100	**.625** (5x)	1/4	2-1/2	38808-C6	75.90	813008-C6	80.40
.125 (1/8)		.1250	.100	**.750** (6x)	1/4	2-1/2	858108-C6	77.40		
.125 (1/8)		.1250	.100	**.875** (7x)	1/4	2-1/2	863308-C6	78.90		
.125 (1/8)		.1250	.100	**1.000** (8x)	1/4	2-1/2	32108-C6	80.40		
.125 (1/8)		.1250	.100	**1.250** (10x)	1/4	4	919208-C6	94.00		
.125 (1/8)		.1250	.100	**1.500** (12x)	1/4	4	33908-C6	94.00		
.125 (1/8)		.1250	.100	**1.875** (15x)	1/4	4	973308-C6	106.10		

D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.156 (5/32)		.1560	.125	**.235** (1.5x)	1/4	2-1/2	37910-C6	66.80		
.156 (5/32)		.1560	.125	**.470** (3x)	1/4	2-1/2	31510-C6	66.80		
.156 (5/32)		.1560	.125	**.750** (5x)	1/4	2-1/2	38810-C6	75.90		
.187 (3/16)		.1870	.150	**-**	1/4	2-1/2	958412-C6	70.60		
.187 (3/16)		.1870	.150	**.285** (1.5x)	1/4	2-1/2	37912-C6	66.80		
.187 (3/16)		.1870	.150	**.570** (3x)	1/4	2-1/2	31512-C6	66.80	813212-C6	71.30
.187 (3/16)		.1870	.150	**1.000** (5x)	1/4	2-1/2	38812-C6	75.90	813012-C6	80.40
.187 (3/16)		.1870	.150	**1.500** (8x)	1/4	4	32112-C6	88.80		
.187 (3/16)		.1870	.150	**2.250** (12x)	1/4	4	33912-C6	106.10		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 3 FLUTE	
D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
	6.0 mm	.2362	4.80 mm	**18.00 mm** (3x)	6 mm	63 mm	882966-C6	72.20		
	6.0 mm	.2362	4.80 mm	**30.00 mm** (5x)	6 mm	63 mm	881766-C6	81.50		
.250 (1/4)		.2500	.200	-	1/4	2-1/2	958416-C6	70.60		
.250 (1/4)		.2500	.200	**.375** (1.5x)	1/4	2-1/2	37916-C6	66.80		
.250 (1/4)		.2500	.200	**.750** (3x)	1/4	2-1/2	31516-C6	75.90	813216-C6	80.40
.250 (1/4)		.2500	.200	**1.000** (4x)	1/4	2-1/2	881616-C6	75.90		
.250 (1/4)		.2500	.200	**1.250** (5x)	1/4	2-1/2	38816-C6	75.90	813016-C6	80.40
.250 (1/4)		.2500	.200	**1.500** (6x)	1/4	3	858116-C6	82.30		
.250 (1/4)		.2500	.200	**1.750** (7x)	1/4	3	863316-C6	82.30		
.250 (1/4)		.2500	.200	**2.000** (8x)	1/4	4	32116-C6	88.80		
.312 (5/16)		.3120	.250	**.470** (1.5x)	5/16	2-1/2	37920-C6	87.50		
.312 (5/16)		.3120	.250	**1.000** (3x)	5/16	2-1/2	31520-C6	92.50		
.375 (3/8)		.3750	.300	**.570** (1.5x)	3/8	2-1/2	37924-C6	94.10		
.375 (3/8)		.3750	.300	**1.125** (3x)	3/8	2-1/2	31524-C6	99.30		

GUIDELINES FOR MILLING HARDENED STEELS

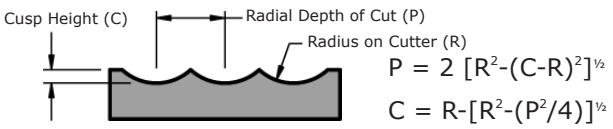
- Rigid machining enhances tool life by centering and balancing tool holders, which minimizes vibration.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

SPEEDS & FEEDS (End Mills for Hardened Steels – Ball)

Important Note: Values in table are in inches and are based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 3 Flutes, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial*	Axial
45-55 Rc	700	Finishing (.8x Reach)	.00028	.00058	.00088	.00116	.00146	.00174	.00234	.00350	.00468	.00584	.00702	.00936	.10 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00027	.00056	.00084	.00111	.00140	.00167	.00224	.00335	.00449	.00560	.00673	.00897	.10 x Dia	.04 x Dia
		Finishing (3x Reach)	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429	.00535	.00644	.00858	.10 x Dia	.04 x Dia
		Finishing (4x Reach)	.00025	.00051	.00077	.00102	.00128	.00152	.00205	.00306	.00410	.00511	.00614	.00819	.10 x Dia	.04 x Dia
		Finishing (5x Reach)	.00023	.00048	.00073	.00097	.00122	.00145	.00195	.00292	.00390	.00487	.00585	.00780	.10 x Dia	.04 x Dia
		Finishing (6x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.10 x Dia	.03 x Dia
		Finishing (7x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.10 x Dia	.03 x Dia
		Finishing (8x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.10 x Dia	.03 x Dia
		Finishing (10x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.10 x Dia	.02 x Dia
		Finishing (12x Reach)	.00016	.00034	.00051	.00068	.00085	.00102	.00137	.00204	.00273	.00341	.00410	.00546	.08 x Dia	.02 x Dia
		Finishing (15x Reach)	.00015	.00031	.00048	.00063	.00079	.00094	.00127	.00190	.00254	.00316	.00380	.00507	.08 x Dia	.01 x Dia
56-68 Rc	600	Finishing (.8x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.07 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.07 x Dia	.04 x Dia
		Finishing (3x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.07 x Dia	.04 x Dia
		Finishing (4x Reach)	.00020	.00041	.00062	.00081	.00102	.00122	.00164	.00245	.00328	.00409	.00491	.00655	.07 x Dia	.04 x Dia
		Finishing (5x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.07 x Dia	.04 x Dia
		Finishing (6x Reach)	.00018	.00037	.00056	.00074	.00093	.00111	.00150	.00224	.00300	.00374	.00449	.00599	.07 x Dia	.03 x Dia
		Finishing (7x Reach)	.00017	.00036	.00054	.00071	.00090	.00107	.00144	.00215	.00287	.00358	.00431	.00574	.07 x Dia	.03 x Dia
		Finishing (8x Reach)	.00016	.00034	.00052	.00068	.00086	.00102	.00137	.00205	.00275	.00343	.00412	.00549	.07 x Dia	.03 x Dia
		Finishing (10x Reach)	.00015	.00031	.00047	.00062	.0078	.00093	.00125	.00187	.00250	.00312	.00374	.00499	.07 x Dia	.02 x Dia
		Finishing (12x Reach)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	.00273	.00328	.00437	.06 x Dia	.02 x Dia
		Finishing (15x Reach)	.00012	.00025	.00038	.00050	.00063	.00075	.00101	.00152	.00203	.00253	.00304	.00406	.06 x Dia	.01 x Dia

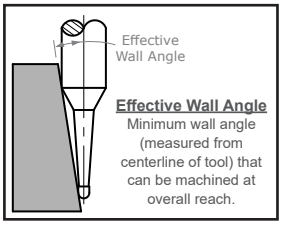
* Operator must consider proper Radial Depth of Cut since it relates directly to cusp height and part finish



END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Solid tapered neck for increased rigidity and strength
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0000″ −.0006″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
0.5°	.031 (1/32)	.025	I	**.093**	**.757**	8.4°	1/4	2-1/2	998703-C6	62.80
	.031 (1/32)	.025	I	**.156**	**.817**	7.8°	1/4	2-1/2	998706-C6	68.10
	.031 (1/32)	.025	I	**.250**	**.906**	7.0°	1/4	2-1/2	998709-C6	70.80
	.047 (3/64)	.038	I	**.156**	**.772**	7.7°	1/4	2-1/2	998712-C6	62.80
	.047 (3/64)	.038	I	**.250**	**.862**	6.9°	1/4	2-1/2	998715-C6	68.10
	.047 (3/64)	.038	I	**.375**	**.981**	6.1°	1/4	2-1/2	998718-C6	70.80
	.062 (1/16)	.050	I	**.312**	**.879**	6.4°	1/4	2-1/2	998721-C6	62.80
	.062 (1/16)	.050	I	**.500**	**1.057**	5.3°	1/4	2-1/2	998724-C6	68.10
	.062 (1/16)	.050	I	**.750**	**1.295**	4.3°	1/4	2-1/2	998727-C6	70.80
	.078 (5/64)	.062	I	**.437**	**.953**	5.4°	1/4	2-1/2	998730-C6	62.80
	.078 (5/64)	.062	I	**.625**	**1.131**	4.5°	1/4	2-1/2	998733-C6	68.10
	.078 (5/64)	.062	I	**1.000**	**1.488**	3.4°	1/4	3	998736-C6	78.30
	.093 (3/32)	.074	I	**.500**	**.971**	4.9°	1/4	2-1/2	998739-C6	62.80
	.093 (3/32)	.074	I	**.750**	**1.208**	3.9°	1/4	2-1/2	998742-C6	68.10
	.093 (3/32)	.074	I	**1.125**	**1.565**	3.0°	1/4	3	998745-C6	78.30
	.125 (1/8)	.100	I	**.625**	**1.000**	3.9°	1/4	2-1/2	998748-C6	66.60
	.125 (1/8)	.100	I	**1.000**	**1.357**	2.8°	1/4	2-1/2	998751-C6	68.60
	.125 (1/8)	.100	I	**1.500**	**1.832**	2.1°	1/4	3	998754-C6	78.70

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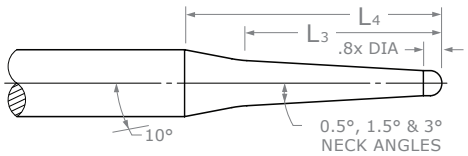
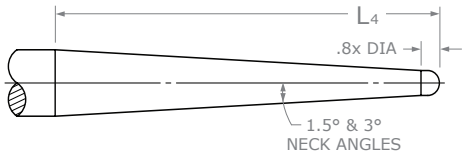
TYPE I



TYPE II



END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach (cont.)

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NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0000''}_{-.0006''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
1.5°	.031 (1/32)	.025	I	**.250**	**.875**	7.3°	1/4	2-1/2	997407-C6	68.10
	.031 (1/32)	.025	I	**.500**	**1.088**	5.9°	1/4	2-1/2	997414-C6	70.80
	.047 (3/64)	.038	I	**.375**	**.938**	6.4°	1/4	2-1/2	997421-C6	68.10
	.062 (1/16)	.050	I	**.500**	**1.004**	5.6°	1/4	2-1/2	997428-C6	68.10
	.062 (1/16)	.050	I	**1.000**	**1.429**	3.9°	1/4	3	997435-C6	78.30
	.078 (5/64)	.062	I	**.625**	**1.066**	4.8°	1/4	2-1/2	997442-C6	68.10
	.078 (5/64)	.062	I	**1.250**	**1.599**	3.2°	1/4	3	997449-C6	78.30
	.093 (3/32)	.074	I	**.750**	**1.132**	4.2°	1/4	2-1/2	997456-C6	68.10
	.093 (3/32)	.074	I	**1.500**	**1.771**	2.7°	1/4	3	997463-C6	78.30
	.125 (1/8)	.100	I	**1.000**	**1.258**	3.0°	1/4	2-1/2	997470-C6	68.60
	.125 (1/8)	.100	II	**2.487**	**2.487**	1.5°	1/4	4	997477-C6	78.70
3.0°	.031 (1/32)	.025	I	**.312**	**.714**	8.9°	1/4	2-1/2	994907-C6	70.40
	.031 (1/32)	.025	I	**.750**	**1.067**	6.0°	1/4	2-1/2	994914-C6	72.40
	.047 (3/64)	.038	I	**.875**	**1.140**	5.2°	1/4	2-1/2	994921-C6	70.40
	.047 (3/64)	.038	I	**1.250**	**1.442**	4.1°	1/4	3	994928-C6	78.30
	.062 (1/16)	.050	I	**.875**	**1.114**	5.0°	1/4	2-1/2	994935-C6	70.40
	.062 (1/16)	.050	II	**1.844**	**1.844**	3.0°	1/4	3	994942-C6	78.30
	.078 (5/64)	.062	I	**1.125**	**1.288**	4.0°	1/4	2-1/2	994949-C6	70.40
	.078 (5/64)	.062	II	**1.703**	**1.703**	3.0°	1/4	3	994956-C6	78.30
	.093 (3/32)	.074	I	**1.000**	**1.162**	4.1°	1/4	2-1/2	994963-C6	70.40
	.093 (3/32)	.074	II	**1.572**	**1.572**	3.0°	1/4	3	994970-C6	78.30
	.125 (1/8)	.100	II	**1.293**	**1.293**	2.9°	1/4	2-1/2	994977-C6	77.30
	.125 (1/8)	.100	II	**2.485**	**2.485**	3.0°	3/8	4	994984-C6	112.10

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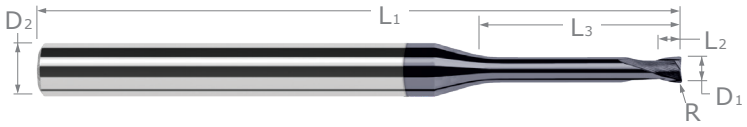
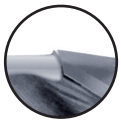
END MILLS FOR HARDENED STEELS

Finishers – Corner Radius





Reduced Neck Diameter to Avoid Heeling

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 4 FLUTE		
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE	
.010	**.002**	.008	**.015** (1.5x)	1/4	2-1/2	40210-C6	85.30			
.010	**.002**	.008	**.031** (3x)	1/4	2-1/2	30610-C6	85.30			
.015 (1/64)	**.002**	.012	**.023** (1.5x)	1/4	2-1/2	40215-C6	66.80	951415-C6	67.90	
.015 (1/64)	**.002**	.012	**.047** (3x)	1/4	2-1/2	30615-C6	66.80			
.015 (1/64)	**.002**	.012	**.078** (5x)	1/4	2-1/2	40615-C6	75.40			
.015 (1/64)	**.002**	.012	**.125** (8x)	1/4	2-1/2	31015-C6	75.90			
.015 (1/64)	**.002**	.012	**.187** (12x)	1/4	2-1/2	33015-C6	88.40			
.020	**.004**	.016	**.031** (1.5x)	1/4	2-1/2	40220-C6	66.80	951420-C6	67.90	
.020	**.004**	.016	**.062** (3x)	1/4	2-1/2	30620-C6	66.80	938720-C6	67.90	NEW
.020	**.004**	.016	**.100** (5x)	1/4	2-1/2	40620-C6	72.20	996320-C6	73.30	NEW
.025	**.004**	.020	**.038** (1.5x)	1/4	2-1/2	40225-C6	66.80			
.025	**.004**	.020	**.075** (3x)	1/4	2-1/2	30625-C6	66.80			
.025	**.004**	.020	**.125** (5x)	1/4	2-1/2	40625-C6	72.20			
.031 (1/32)	**.005**	.025	**.047** (1.5x)	1/4	2-1/2	40231-C6	59.00	951431-C6	60.10	
.031 (1/32)	**.005**	.025	**.093** (3x)	1/4	2-1/2	30631-C6	59.00	938731-C6	60.10	
.031 (1/32)	**.005**	.025	**.156** (5x)	1/4	2-1/2	40631-C6	63.90	996331-C6	65.20	
.031 (1/32)	**.005**	.025	**.250** (8x)	1/4	2-1/2	31031-C6	67.60	999031-C6	68.70	
.031 (1/32)	**.005**	.025	**.375** (12x)	1/4	2-1/2	33031-C6	75.70			
.031 (1/32)	**.005**	.025	**.470** (15x)	1/4	2-1/2	942431-C6	88.60			
.031 (1/32)	**.010**	.025	**.093** (3x)	1/4	2-1/2	982631-C6	61.10			
.031 (1/32)	**.010**	.025	**.156** (5x)	1/4	2-1/2	957431-C6	66.10			
.039 (1 mm)	**.005**	.031	**.062** (1.5x)	1/4	2-1/2	40239-C6	59.00			
.039 (1 mm)	**.005**	.031	**.117** (3x)	1/4	2-1/2	30639-C6	59.00	938739-C6	60.10	
.039 (1 mm)	**.005**	.031	**.203** (5x)	1/4	2-1/2	40639-C6	63.90	996339-C6	65.20	
.039 (1 mm)	**.005**	.031	**.312** (8x)	1/4	2-1/2	31039-C6	67.60			
.039 (1 mm)	**.005**	.031	**.468** (12x)	1/4	2-1/2	33039-C6	75.70			
.047 (3/64)	**.008**	.038	**.071** (1.5x)	1/4	2-1/2	40247-C6	59.00			
.047 (3/64)	**.008**	.038	**.141** (3x)	1/4	2-1/2	30647-C6	59.00	938747-C6	60.10	
.047 (3/64)	**.008**	.038	**.250** (5x)	1/4	2-1/2	40647-C6	63.90	996347-C6	65.20	
.047 (3/64)	**.008**	.038	**.375** (8x)	1/4	2-1/2	31047-C6	67.60	999047-C6	68.70	
.047 (3/64)	**.008**	.038	**.564** (12x)	1/4	2-1/2	33047-C6	75.70			
.047 (3/64)	**.008**	.038	**.710** (15x)	1/4	2-1/2	942447-C6	88.60			

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 4 FLUTE	
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.062 (1/16)	**.005**	.050	**.187** (3x)	1/4	2-1/2	893162-C6	59.00		
.062 (1/16)	**.010**	.050	**-**	1/4	2-1/2	870362-C6	57.60	862262-C6	58.60
.062 (1/16)	**.010**	.050	**.093** (1.5x)	1/4	2-1/2	40262-C6	59.00	951462-C6	60.10
.062 (1/16)	**.010**	.050	**.187** (3x)	1/4	2-1/2	30662-C6	59.00	938762-C6	60.10
.062 (1/16)	**.010**	.050	**.312** (5x)	1/4	2-1/2	40662-C6	63.90	996362-C6	65.20
.062 (1/16)	**.010**	.050	**.500** (8x)	1/4	2-1/2	31062-C6	67.60	999062-C6	68.70
.062 (1/16)	**.010**	.050	**.750** (12x)	1/4	4	33062-C6	85.00	924162-C6	86.20
.062 (1/16)	**.010**	.050	**.950** (15x)	1/4	4	942462-C6	97.60		
.062 (1/16)	**.020**	.050	**.187** (3x)	1/4	2-1/2	991562-C6	61.10		
.062 (1/16)	**.020**	.050	**.312** (5x)	1/4	2-1/2	953162-C6	66.10		
.078 (5/64)	**.010**	.062	**.117** (1.5x)	1/4	2-1/2	40278-C6	59.00		
.078 (5/64)	**.010**	.062	**.234** (3x)	1/4	2-1/2	30678-C6	59.00	938778-C6	60.10
.078 (5/64)	**.010**	.062	**.406** (5x)	1/4	2-1/2	40678-C6	63.90	996378-C6	65.20
.078 (5/64)	**.010**	.062	**.625** (8x)	1/4	2-1/2	31078-C6	67.60	999078-C6	68.70
.078 (5/64)	**.010**	.062	**.937** (12x)	1/4	4	33078-C6	85.00		
.093 (3/32)	**.005**	.074	**.281** (3x)	1/4	2-1/2	893193-C6	59.00		
.093 (3/32)	**.010**	.074	**.281** (3x)	1/4	2-1/2	982693-C6	59.00		
.093 (3/32)	**.015**	.074	**-**	1/4	2-1/2	850893-C6	57.60		
.093 (3/32)	**.015**	.074	**.140** (1.5x)	1/4	2-1/2	40293-C6	59.00	951493-C6	60.10
.093 (3/32)	**.015**	.074	**.281** (3x)	1/4	2-1/2	30693-C6	59.00	938793-C6	60.10
.093 (3/32)	**.015**	.074	**.500** (5x)	1/4	2-1/2	40693-C6	63.90	996393-C6	65.20
.093 (3/32)	**.015**	.074	**.750** (8x)	1/4	2-1/2	31093-C6	67.60	999093-C6	68.70
.093 (3/32)	**.015**	.074	**1.125** (12x)	1/4	4	33093-C6	85.00	924193-C6	86.20
.093 (3/32)	**.030**	.074	**.281** (3x)	1/4	2-1/2	963393-C6	61.10		
.093 (3/32)	**.030**	.074	**.500** (5x)	1/4	2-1/2	946393-C6	66.10		
.118 (3 mm)	**.015**	.094	**.177** (1.5x)	1/4	2-1/2	40305-C6	63.30		
.118 (3 mm)	**.015**	.094	**.354** (3x)	1/4	2-1/2	30705-C6	63.30		
.125 (1/8)	**.005**	.100	**.375** (3x)	1/4	2-1/2	893208-C6	63.30		
.125 (1/8)	**.010**	.100	**.375** (3x)	1/4	2-1/2	982708-C6	63.30		
.125 (1/8)	**.015**	.100	**-**	1/4	2-1/2	850908-C6	61.80		
.125 (1/8)	**.015**	.100	**.187** (1.5x)	1/4	2-1/2	40308-C6	63.30	951508-C6	64.30
.125 (1/8)	**.015**	.100	**.375** (3x)	1/4	2-1/2	30708-C6	63.30	938808-C6	64.30
.125 (1/8)	**.015**	.100	**.625** (5x)	1/4	2-1/2	40708-C6	69.40	996408-C6	75.90
.125 (1/8)	**.015**	.100	**1.000** (8x)	1/4	2-1/2	31108-C6	73.60	999108-C6	79.90
.125 (1/8)	**.015**	.100	**1.500** (12x)	1/4	4	33108-C6	91.10	924208-C6	98.10
.125 (1/8)	**.030**	.100	**.375** (3x)	1/4	2-1/2	963408-C6	65.40		
.125 (1/8)	**.030**	.100	**.625** (5x)	1/4	2-1/2	946408-C6	71.80		

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NEW SIZES!

END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 4 FLUTE	
D_1 $^{+.000''}_{-.001''}$	R $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.156 (5/32)	**.015**	.125	**.235** (1.5x)	1/4	2-1/2	40310-C6	63.30		
.156 (5/32)	**.015**	.125	**.470** (3x)	1/4	2-1/2	30710-C6	63.30		
.187 (3/16)	**.015**	.150	**.285** (1.5x)	1/4	2-1/2	40312-C6	63.30	951512-C6	64.30
.187 (3/16)	**.015**	.150	**.570** (3x)	1/4	2-1/2	30712-C6	63.30	938812-C6	64.30
.187 (3/16)	**.015**	.150	**1.000** (5x)	1/4	2-1/2	40712-C6	69.40	996412-C6	75.90
.187 (3/16)	**.015**	.150	**1.500** (8x)	1/4	4	31112-C6	82.90		
.187 (3/16)	**.015**	.150	**2.250** (12x)	1/4	4	33112-C6	97.60		
.187 (3/16)	**.060**	.150	**.570** (3x)	1/4	2-1/2	939212-C6	72.60	934412-C6	78.90
.250 (1/4)	**.015**	.200	**.375** (1.5x)	1/4	2-1/2	40316-C6	63.30	951516-C6	64.30
.250 (1/4)	**.015**	.200	**.750** (3x)	1/4	2-1/2	30716-C6	66.30	938816-C6	72.40
.250 (1/4)	**.015**	.200	**1.250** (5x)	1/4	2-1/2	40716-C6	69.40		
.250 (1/4)	**.015**	.200	**2.000** (8x)	1/4	4	31116-C6	82.90		
.250 (1/4)	**.060**	.200	**.750** (3x)	1/4	2-1/2	939216-C6	72.60	934416-C6	78.90
.312 (5/16)	**.030**	.250	**1.000** (3x)	5/16	2-1/2			938820-C6	79.90
.375 (3/8)	**.030**	.300	**1.125** (3x)	3/8	2-1/2			938824-C6	92.20
.500 (1/2)	**.030**	.400	**1.500** (3x)	1/2	3			938832-C6	114.20 NEW

GUIDELINES FOR MILLING HARDENED STEELS

- Rigid machining centers and balanced tool holders that minimize vibration and TIR will enhance tool life.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

SPEEDS & FEEDS (End Mills for Hardened Steels – Corner Radius)

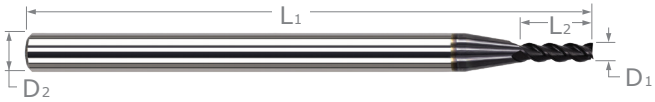
Important Note: Values in table are in inches and based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 4 flutes, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
45-55 Rc	700	Finishing (0.8x Reach)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.00292	.00351	.00468	.35 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00013	.00028	.00042	.00056	.00070	.00083	.00112	.00168	.00224	.00280	.00336	.00449	.35 x Dia	.02 x Dia
		Finishing (3x Reach)	.00013	.00027	.00040	.00053	.00067	.00080	.00107	.00160	.00215	.00268	.00322	.00429	.35 x Dia	.02 x Dia
		Finishing (5x Reach)	.00012	.00024	.00037	.00048	.00061	.00073	.00098	.00146	.00195	.00243	.00293	.00390	.35 x Dia	.02 x Dia
		Finishing (8x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.35 x Dia	.02 x Dia
		Finishing (12x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00068	.00102	.00137	.00170	.00205	.00273	.35 x Dia	.01 x Dia
		Finishing (15x Reach)	.00008	.00016	.00024	.00031	.00040	.00047	.00063	.00095	.00127	.00158	.00190	.00254	.35 x Dia	.01 x Dia
56-68 Rc	600	Finishing (0.8x Reach)	.00011	.00023	.00035	.00046	.00058	.00070	.00094	.00140	.00187	.00234	.00281	.00374	.25 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00269	.00359	.25 x Dia	.02 x Dia
		Finishing (3x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.25 x Dia	.02 x Dia
		Finishing (5x Reach)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	.00195	.00234	.00312	.25 x Dia	.02 x Dia
		Finishing (8x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00137	.00171	.00206	.00275	.25 x Dia	.02 x Dia
		Finishing (12x Reach)	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00109	.00136	.00164	.00218	.25 x Dia	.01 x Dia
		Finishing (15x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00076	.00101	.00127	.00152	.00203	.25 x Dia	.01 x Dia

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

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	CUTTER DIAMETER D_1			LENGTH OF CUT L_2	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED	
	+.0005" −.0005"	+.00mm −.02mm	decimal equivalent	+.010" −.000" +.25mm −.00mm				TOOL #	PRICE
		.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	942804-C6	55.80
	.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	973710-C6	52.60
	.010		.0100	**.030** (3x)	3	1/8	1-1/2	967010-C6	52.10
	.010		.0100	**.050** (5x)	3	1/8	2-1/2	990710-C6	60.20
	.015 (1/64)		.0150	**.012** (0.8x)	3	1/8	1-1/2	888015-C6	43.80
	.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	973715-C6	43.20
	.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	967015-C6	42.70
	.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	875415-C6	44.50
	.015 (1/64)		.0150	**.062** (4x)	3	1/8	2-1/2	886215-C6	50.40
	.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	990715-C6	52.40
		.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	942809-C6	41.20
		.5 mm	.0196	**.40 mm** (0.8x)	3	4 mm	50 mm	848011-C6	42.00
		.5 mm	.0196	**.75 mm** (1.5x)	3	4 mm	50 mm	954511-C6	41.20
		.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	942811-C6	41.20
	.020		.0200	**.016** (0.8x)	3	1/8	1-1/2	888020-C6	38.40
	.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	973720-C6	37.90
	.020		.0200	**.060** (3x)	3	1/8	1-1/2	967020-C6	37.50
	.020		.0200	**.060** (3x)	4	1/8	1-1/2	875420-C6	39.30
NEW	.020		.0200	**.080** (4x)	3	1/8	2-1/2	886220-C6	42.40
	.020		.0200	**.100** (5x)	3	1/8	2-1/2	990720-C6	44.50
		.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	942813-C6	40.00
	.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	973725-C6	36.50
	.025		.0250	**.075** (3x)	3	1/8	1-1/2	967025-C6	36.10
NEW	.025		.0250	**.075** (3x)	4	1/8	1-1/2	875425-C6	37.90
	.025		.0250	**.125** (5x)	3	1/8	2-1/2	990725-C6	43.00
NEW	.030		.0300	**.024** (0.8x)	3	1/8	1-1/2	888030-C6	35.70
	.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	973730-C6	36.50
	.030		.0300	**.090** (3x)	3	1/8	1-1/2	967030-C6	36.10
NEW	.030		.0300	**.090** (3x)	4	1/8	1-1/2	875430-C6	37.90
	.030		.0300	**.125** (4x)	3	1/8	2-1/2	886230-C6	43.00
	.030		.0300	**.156** (5x)	3	1/8	2-1/2	990730-C6	43.00
	.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	888031-C6	32.50
	.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	973731-C6	31.20
	.031 (1/32)		.0310	**.047** (1.5x)	4	1/8	1-1/2	841631-C6	32.60
	.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	967031-C6	30.80
	.031 (1/32)		.0310	**.093** (3x)	4	1/8	1-1/2	875431-C6	32.60
	.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	886231-C6	37.00
	.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	990731-C6	39.10
	.031 (1/32)		.0310	**.156** (5x)	4	1/8	2-1/2	852931-C6	40.80
		.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	942818-C6	34.70

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

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CUTTER DIAMETER D_1 +.0005" −.0005"	CUTTER DIAMETER D_1 +.00mm −.02mm	CUTTER DIAMETER D_1 decimal equivalent	LENGTH OF CUT L_2 +.010" −.000" +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	AlTiN NANO COATED PRICE	
.035		.0350	**.028** (0.8x)	3	1/8	1-1/2	888035-C6	31.40	
.035		.0350	**.053** (1.5x)	3	1/8	1-1/2	973735-C6	31.20	
.035		.0350	**.105** (3x)	3	1/8	1-1/2	967035-C6	30.80	
.035		.0350	**.105** (3x)	4	1/8	1-1/2	875435-C6	32.60	NEW
.035		.0350	**.187** (5x)	3	1/8	2-1/2	990735-C6	39.10	
	1.0 mm	.0393	**.80 mm** (0.8x)	3	4 mm	50 mm	848022-C6	35.10	
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	954522-C6	35.00	
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	942822-C6	34.70	
	1.0 mm	.0393	**3.00 mm** (3x)	4	4 mm	50 mm	821322-C6	36.50	NEW
	1.0 mm	.0393	**4.00 mm** (4x)	3	4 mm	50 mm	820722-C6	39.20	NEW
	1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	910522-C6	42.90	
.040		.0400	**.032** (0.8x)	3	1/8	1-1/2	888040-C6	31.40	
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	973740-C6	31.20	
.040		.0400	**.120** (3x)	3	1/8	1-1/2	967040-C6	30.80	
.040		.0400	**.120** (3x)	4	1/8	1-1/2	875440-C6	32.60	
.040		.0400	**.160** (4x)	3	1/8	2-1/2	886240-C6	37.20	
.040		.0400	**.203** (5x)	3	1/8	2-1/2	990740-C6	39.10	
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	973745-C6	31.20	
.045		.0450	**.135** (3x)	3	1/8	1-1/2	967045-C6	30.80	
.045		.0450	**.135** (3x)	4	1/8	1-1/2	875445-C6	32.60	NEW
.045		.0450	**.225** (5x)	3	1/8	2-1/2	990745-C6	39.10	
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	888047-C6	34.00	
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	973747-C6	31.20	
.047 (3/64)		.0470	**.071** (1.5x)	4	1/8	1-1/2	841647-C6	32.80	
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	967047-C6	30.80	
.047 (3/64)		.0470	**.141** (3x)	4	1/8	1-1/2	875447-C6	32.60	
.047 (3/64)		.0470	**.187** (4x)	3	1/8	2-1/2	886247-C6	37.00	
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	990747-C6	39.10	
.047 (3/64)		.0470	**.250** (5x)	4	1/8	2-1/2	852947-C6	40.80	
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	942827-C6	34.70	
.050		.0500	**.040** (0.8x)	3	1/8	1-1/2	888050-C6	30.40	NEW
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	973750-C6	31.20	
.050		.0500	**.150** (3x)	3	1/8	1-1/2	967050-C6	30.80	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	990750-C6	39.10	
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	973755-C6	31.20	
.055		.0550	**.165** (3x)	3	1/8	1-1/2	967055-C6	30.80	
.055		.0550	**.165** (3x)	4	1/8	1-1/2	875455-C6	32.60	NEW
.055		.0550	**.275** (5x)	3	1/8	2-1/2	990755-C6	39.10	
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	942831-C6	32.60	
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	954533-C6	32.90	
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	942833-C6	32.60	
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	910533-C6	41.10	
.060		.0600	**.048** (0.8x)	3	1/8	1-1/2	888060-C6	30.40	NEW
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	973760-C6	31.20	
.060		.0600	**.180** (3x)	3	1/8	1-1/2	967060-C6	30.80	
.060		.0600	**.312** (5x)	3	1/8	2-1/2	990760-C6	39.10	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	888062-C6	32.00
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	973762-C6	29.10
.062 (1/16)		.0620	**.093** (1.5x)	4	1/8	1-1/2	841662-C6	30.70
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	967062-C6	28.80
.062 (1/16)		.0620	**.186** (3x)	4	1/8	1-1/2	875462-C6	30.60
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	886262-C6	35.50
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	990762-C6	37.50
.062 (1/16)		.0620	**.312** (5x)	4	1/8	2-1/2	852962-C6	39.30
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	942836-C6	33.30
.065		.0650	**.195** (3x)	3	1/8	1-1/2	967065-C6	33.20
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	973770-C6	29.10
.070		.0700	**.210** (3x)	3	1/8	1-1/2	967070-C6	28.80
.070		.0700	**.375** (5x)	3	1/8	2-1/2	990770-C6	37.50
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	942840-C6	33.30
.075		.0750	**.225** (3x)	3	1/8	1-1/2	967075-C6	33.20
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	888078-C6	32.00
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	973778-C6	29.10
.078 (5/64)		.0780	**.118** (1.5x)	4	1/8	1-1/2	841678-C6	30.70
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	967078-C6	28.80
.078 (5/64)		.0780	**.234** (3x)	4	1/8	1-1/2	875478-C6	30.60
.078 (5/64)		.0780	**.312** (4x)	3	1/8	2-1/2	886278-C6	35.50
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	990778-C6	37.50
.078 (5/64)		.0780	**.406** (5x)	4	1/8	2-1/2	852978-C6	39.30
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	954545-C6	32.90
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	942845-C6	32.60
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	910545-C6	41.10
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	973780-C6	29.10
.080		.0800	**.240** (3x)	3	1/8	1-1/2	967080-C6	28.80
.080		.0800	**.406** (5x)	3	1/8	2-1/2	990780-C6	37.50
.085		.0850	**.255** (3x)	3	1/8	1-1/2	967085-C6	33.20
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	973790-C6	29.10
.090		.0900	**.270** (3x)	3	1/8	1-1/2	967090-C6	28.80
.090		.0900	**.450** (5x)	3	1/8	2-1/2	990790-C6	37.50
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	888093-C6	32.00
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	973793-C6	29.10
.093 (3/32)		.0930	**.140** (1.5x)	4	1/8	1-1/2	841693-C6	30.70
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	967093-C6	28.80
.093 (3/32)		.0930	**.279** (3x)	4	1/8	1-1/2	875493-C6	30.60
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	886293-C6	35.50
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	990793-C6	37.50
.093 (3/32)		.0930	**.500** (5x)	4	1/8	2-1/2	852993-C6	39.30
.095		.0950	**.285** (3x)	3	1/8	1-1/2	967095-C6	32.40
	2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	954551-C6	32.90
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	942851-C6	32.60
	2.5 mm	.0984	**12.00 mm** (5x)	3	4 mm	50 mm	910551-C6	41.10

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	973800-C6	29.10
.100		.1000	**.300** (3x)	3	1/8	1-1/2	967100-C6	28.80
.100		.1000	**.500** (5x)	3	1/8	2-1/2	990800-C6	37.50
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	973802-C6	29.10
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	967102-C6	28.80
.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	990802-C6	37.50
	3.0 mm	.1181	**2.40 mm** (0.8x)	3	4 mm	50 mm	848057-C6	33.10
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	954557-C6	32.90
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	942857-C6	32.60
	3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	910557-C6	41.10

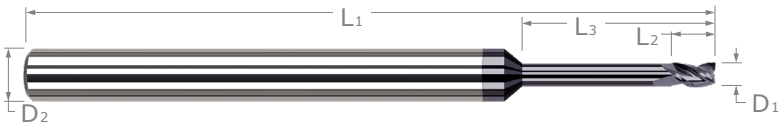
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	888108-C6	32.00	
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	973808-C6	27.80	
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	967108-C6	27.70	
.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	886308-C6	35.50	
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	990808-C6	37.50	
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	973809-C6	31.40	
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	967109-C6	31.30	
.140 (9/64)		.1406	**.750** (5x)	4	3/16	3	990809-C6	39.80	
.156 (5/32)		.1562	**.125** (0.8x)	4	3/16	2	888110-C6	30.80	
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	973810-C6	31.40	
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	967110-C6	31.30	
.156 (5/32)		.1562	**.625** (4x)	4	3/16	3	886310-C6	33.20	NEW
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	990810-C6	39.80	
	4.0 mm	.1574	**12.00 mm** (3x)	4	6 mm	63 mm	942861-C6	41.20	
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	888112-C6	34.50	
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	973812-C6	30.20	
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	967112-C6	30.10	
.187 (3/16)		.1875	**.750** (4x)	4	3/16	3	886312-C6	38.00	
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	990812-C6	39.80	
.218 (7/32)		.2187	**.660** (3x)	4	1/4	2-1/2	967114-C6	41.00	
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	942866-C6	41.20	
.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	888116-C6	42.30	
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	973816-C6	37.80	
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	967116-C6	37.60	
.250 (1/4)		.2500	**1.000** (4x)	4	1/4	4	886316-C6	45.80	
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	990816-C6	47.60	
.312 (5/16)		.3125	**1.000** (3x)	4	5/16	2-1/2	967120-C6	52.70	
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	967124-C6	61.00	
.500 (1/2)		.5000	**.750** (1.5x)	4	1/2	3	973832-C6	78.80	

PLEASE SEE SPEEDS & FEEDS ON PAGE 124

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1			L_2	L_3		D_2 (h6)	L_1	TOOL #	PRICE
	+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm	+.010″ −.000″ +.25mm −.00mm					
	.010		.0100	.015	**.050** (5x)	3	1/8	2-1/2	985310-C6	64.10
	.010		.0100	.015	**.080** (8x)	3	1/8	2-1/2	978210-C6	65.40
	.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	985315-C6	55.40
	.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	978215-C6	56.40
NEW	.020		.0200	.030	**.060** (3x)	3	1/8	1-1/2	940520-C6	51.90
	.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	985320-C6	53.00
NEW	.020		.0200	.030	**.120** (6x)	3	1/8	2-1/2	895520-C6	53.00
NEW	.020		.0200	.030	**.140** (7x)	3	1/8	2-1/2	880720-C6	54.00
	.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	978220-C6	54.00
	.020		.0200	.030	**.200** (10x)	3	1/8	2-1/2	935720-C6	58.50
	.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	985325-C6	53.00
	.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	978225-C6	54.00
	.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	985330-C6	53.00
	.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	978230-C6	54.00
	.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	940531-C6	48.00
	.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	985331-C6	49.10
	.031 (1/32)		.0310	.047	**.187** (6x)	3	1/8	2-1/2	895531-C6	49.10
	.031 (1/32)		.0310	.047	**.218** (7x)	3	1/8	2-1/2	880731-C6	50.20
	.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	978231-C6	50.20
	.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	812331-C6	52.10
	.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	935731-C6	54.60
	.031 (1/32)		.0310	.047	**.375** (12x)	3	1/8	2-1/2	901331-C6	56.30
	.031 (1/32)		.0310	.047	**.470** (15x)	3	1/8	2-1/2	851531-C6	57.40
	.035		.0350	.053	**.187** (5x)	3	1/8	2-1/2	985335-C6	48.00
		1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	905022-C6	53.50
		1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	911422-C6	53.80
	.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	985340-C6	48.00
	.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	978240-C6	49.10
	.045		.0450	.068	**.225** (5x)	3	1/8	2-1/2	985345-C6	48.00
	.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	985347-C6	48.00
NEW	.047 (3/64)		.0470	.071	**.281** (6x)	3	1/8	2-1/2	895547-C6	48.00
NEW	.047 (3/64)		.0470	.071	**.328** (7x)	3	1/8	2-1/2	880747-C6	49.10
	.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	978247-C6	49.10
	.047 (3/64)		.0470	.071	**.375** (8x)	4	1/8	2-1/2	812347-C6	51.00
	.047 (3/64)		.0470	.071	**.480** (10x)	3	1/8	2-1/2	935747-C6	53.10
	.050		.0500	.075	**.250** (5x)	3	1/8	2-1/2	985350-C6	48.00
	.055		.0550	.083	**.275** (5x)	3	1/8	2-1/2	985355-C6	48.00
	.060		.0600	.090	**.312** (5x)	3	1/8	2-1/2	985360-C6	48.00
	.060		.0600	.090	**.500** (8x)	3	1/8	2-1/2	978260-C6	49.10

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute (cont.)

mm & in

continued from previous page

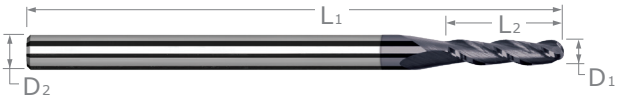
CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	940562-C6	48.00
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	985362-C6	49.10
.062 (1/16)		.0620	.093	**.375** (6x)	3	1/8	2-1/2	895562-C6	49.10
.062 (1/16)		.0620	.093	**.437** (7x)	3	1/8	2-1/2	880762-C6	50.20
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	978262-C6	50.20
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	812362-C6	52.10
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	935762-C6	54.60
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	901362-C6	56.30
.062 (1/16)		.0620	.093	**.950** (15x)	3	1/8	2-1/2	851562-C6	57.40
.070		.0700	.105	**.375** (5x)	3	1/8	2-1/2	985370-C6	51.60
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	985378-C6	48.00
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	978278-C6	49.10
.078 (5/64)		.0780	.118	**.625** (8x)	4	1/8	2-1/2	812378-C6	51.00
.078 (5/64)		.0780	.118	**.800** (10x)	3	1/8	2-1/2	935778-C6	53.10
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	905045-C6	54.30
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	911445-C6	54.90
.080		.0800	.120	**.406** (5x)	3	1/8	2-1/2	985380-C6	51.60
.090		.0900	.135	**.450** (5x)	3	1/8	2-1/2	985390-C6	51.60
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	940593-C6	48.00
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	985393-C6	49.10
.093 (3/32)		.0930	.140	**.585** (6x)	3	1/8	2-1/2	895593-C6	49.10
.093 (3/32)		.0930	.140	**.670** (7x)	3	1/8	2-1/2	880793-C6	50.20
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	978293-C6	50.20
.093 (3/32)		.0930	.140	**.750** (8x)	4	1/8	2-1/2	812393-C6	52.10
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	935793-C6	54.60
.093 (3/32)		.0930	.140	**1.125** (12x)	3	1/8	2-1/2	901393-C6	56.30
.093 (3/32)		.0930	.140	**1.400** (15x)	3	1/8	3	851593-C6	57.40
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	985400-C6	48.00
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	978300-C6	49.10
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	985402-C6	48.00
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	978302-C6	49.10
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	905057-C6	49.40
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	911457-C6	49.60

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	L_3 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)		.1250	.187	**.375** (3x)	4	1/8	1-1/2	940608-C6	48.00	
.125 (1/8)		.1250	.187	**.625** (5x)	4	1/8	2-1/2	985408-C6	49.10	
.125 (1/8)		.1250	.187	**.750** (6x)	4	1/8	2-1/2	895608-C6	49.10	
.125 (1/8)		.1250	.187	**.875** (7x)	4	1/8	2-1/2	880808-C6	50.20	
.125 (1/8)		.1250	.187	**1.000** (8x)	4	1/8	2-1/2	978308-C6	50.20	
.125 (1/8)		.1250	.187	**1.250** (10x)	4	1/8	2-1/2	935808-C6	54.60	
.140 (9/64)		.1406	.220	**.750** (5x)	4	3/16	3	985409-C6	55.60	
.156 (5/32)		.1562	.235	**.750** (5x)	4	3/16	3	985410-C6	53.00	
.156 (5/32)		.1562	.235	**1.250** (8x)	4	3/16	3	978310-C6	54.00	
.187 (3/16)		.1875	.285	**1.000** (5x)	4	3/16	3	985412-C6	53.00	
.187 (3/16)		.1875	.285	**1.500** (8x)	4	3/16	3	978312-C6	54.00	
	6.0 mm	.2362	9.00mm	**30.0mm** (5x)	4	6 mm	63 mm	905066-C6	62.10	
.250 (1/4)		.2500	.375	**1.250** (5x)	4	1/4	4	985416-C6	59.10	
.250 (1/4)		.2500	.375	**2.000** (8x)	4	1/4	4	978316-C6	60.40	
.375 (3/8)		.3750	.570	**2.000** (5x)	4	3/8	4	985424-C6	67.30	NEW

PLEASE SEE SPEEDS & FEEDS ON PAGE 116

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE
	+.0005" −.0005"	+.00mm −.02mm	decimal equivalent	+.010" −.000" +.25mm −.00mm					
		.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	975304-C6	62.40
	.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	944210-C6	59.10
	.010		.0100	**.030** (3x)	3	1/8	1-1/2	970510-C6	59.10
	.010		.0100	**.050** (5x)	3	1/8	2-1/2	930610-C6	68.40
	.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	944215-C6	50.20
	.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	970515-C6	50.20
	.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	930615-C6	59.30
		.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	975309-C6	51.60
		.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	975311-C6	46.80
	.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	944220-C6	44.90
	.020		.0200	**.060** (3x)	3	1/8	1-1/2	970520-C6	44.90
NEW	.020		.0200	**.060** (3x)	4	1/8	1-1/2	893020-C6	47.10
	.020		.0200	**.100** (5x)	3	1/8	2-1/2	930620-C6	49.40
		.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	975313-C6	45.40
	.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	944225-C6	43.50
	.025		.0250	**.075** (3x)	3	1/8	1-1/2	970525-C6	43.50
	.025		.0250	**.125** (5x)	3	1/8	2-1/2	930625-C6	48.00
	.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	944230-C6	38.40
	.030		.0300	**.090** (3x)	3	1/8	1-1/2	970530-C6	38.40
	.030		.0300	**.156** (5x)	3	1/8	2-1/2	930630-C6	42.90
	.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	848131-C6	38.90
	.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	944231-C6	38.20
	.031 (1/32)		.0310	**.047** (1.5x)	4	1/8	1-1/2	814531-C6	40.40
	.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	970531-C6	38.20
	.031 (1/32)		.0310	**.093** (3x)	4	1/8	1-1/2	893031-C6	40.40
	.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	811231-C6	46.20
	.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	930631-C6	46.20
		.8 mm	.0314	**1.20 mm** (1.5x)	3	4 mm	50 mm	968018-C6	39.90
		.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	975318-C6	39.90
	.035		.0350	**.105** (3x)	3	1/8	1-1/2	970535-C6	38.40
		1.0 mm	.0393	**.80 mm** (0.8x)	3	4 mm	50 mm	872422-C6	40.40
		1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	968022-C6	39.90
		1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	975322-C6	39.90
NEW		1.0 mm	.0393	**3.00 mm** (3x)	4	4 mm	50 mm	793822-C6	42.10
		1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	911322-C6	47.80

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	CUTTER DIAMETER D_1 +.00mm −.02mm	CUTTER DIAMETER D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	AlTiN NANO COATED PRICE
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	944240-C6	38.20
.040		.0400	**.120** (3x)	3	1/8	1-1/2	970540-C6	38.20
.040		.0400	**.203** (5x)	3	1/8	2-1/2	930640-C6	46.40
.045		.0450	**.135** (3x)	3	1/8	1-1/2	970545-C6	38.40
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	848147-C6	38.50
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	944247-C6	38.20
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	970547-C6	38.20
.047 (3/64)		.0470	**.141** (3x)	4	1/8	1-1/2	893047-C6	40.40
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	930647-C6	46.40
	1.2 mm	.0472	**1.80 mm** (1.5x)	3	4 mm	50 mm	968027-C6	39.90
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	975327-C6	39.90
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	944250-C6	38.20
.050		.0500	**.150** (3x)	3	1/8	1-1/2	970550-C6	38.20
.050		.0500	**.250** (5x)	3	1/8	2-1/2	930650-C6	46.40
.055		.0550	**.165** (3x)	3	1/8	1-1/2	970555-C6	38.40
	1.4 mm	.0551	**2.10 mm** (1.5x)	3	4 mm	50 mm	968031-C6	39.90
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	975331-C6	39.90
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	968033-C6	39.90
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	975333-C6	39.90
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	911333-C6	47.80
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	944260-C6	38.20
.060		.0600	**.180** (3x)	3	1/8	1-1/2	970560-C6	38.20
.060		.0600	**.312** (5x)	3	1/8	2-1/2	930660-C6	46.40
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	848162-C6	36.70
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	944262-C6	36.00
.062 (1/16)		.0620	**.093** (1.5x)	4	1/8	1-1/2	814562-C6	38.20
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	970562-C6	36.00
.062 (1/16)		.0620	**.186** (3x)	4	1/8	1-1/2	893062-C6	38.20
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	811262-C6	44.30
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	930662-C6	44.30
	1.6 mm	.0629	**2.40 mm** (1.5x)	3	4 mm	50 mm	968036-C6	37.50
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	975336-C6	37.50
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	944270-C6	36.50
.070		.0700	**.210** (3x)	3	1/8	1-1/2	970570-C6	36.50
.070		.0700	**.375** (5x)	3	1/8	2-1/2	930670-C6	43.40
	1.8 mm	.0708	**2.70 mm** (1.5x)	3	4 mm	50 mm	968040-C6	37.50
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	975340-C6	37.50
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	848178-C6	36.70
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	944278-C6	36.00
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	970578-C6	36.00
.078 (5/64)		.0780	**.234** (3x)	4	1/8	1-1/2	893078-C6	38.20
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	930678-C6	43.90
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	968045-C6	37.50
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	975345-C6	37.50
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	911345-C6	45.40

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	944280-C6	36.50
.080		.0800	**.240** (3x)	3	1/8	1-1/2	970580-C6	36.50
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	944290-C6	36.50
.090		.0900	**.270** (3x)	3	1/8	1-1/2	970590-C6	36.50
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	848193-C6	36.70
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	944293-C6	36.00
.093 (3/32)		.0930	**.140** (1.5x)	4	1/8	1-1/2	814593-C6	38.20
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	970593-C6	36.00
.093 (3/32)		.0930	**.279** (3x)	4	1/8	1-1/2	893093-C6	38.20
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	811293-C6	44.30
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	930693-C6	44.30
	2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	968051-C6	39.50
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	975351-C6	39.50
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	944300-C6	36.20
.100		.1000	**.300** (3x)	3	1/8	1-1/2	970600-C6	36.20
.100		.1000	**.500** (5x)	3	1/8	2-1/2	930700-C6	44.40
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	970602-C6	38.40
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	968057-C6	37.50
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	975357-C6	37.50
	3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	911357-C6	45.40

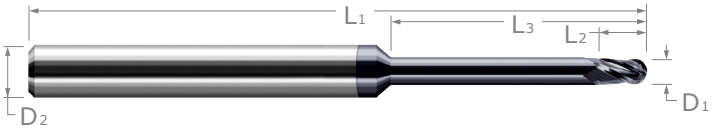
	CUTTER DIAMETER D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	LENGTH OF CUT L_2 +.030″ −.000″ +.75mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	TOOL #	PRICE
	.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	848208-C6	36.70
	.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	944308-C6	34.50
	.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	970608-C6	34.50
	.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	811308-C6	44.30
	.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	930708-C6	44.30
	.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	970609-C6	46.40
	.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	944310-C6	38.40
	.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	970610-C6	38.40
	.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	930710-C6	46.80
	.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	848212-C6	39.10
	.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	944312-C6	36.70
	.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	970612-C6	36.70
	.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	930712-C6	46.80
		6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	975372-C6	49.70
	.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	848216-C6	47.20
	.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	944316-C6	44.40
	.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	970616-C6	44.40
	.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	930716-C6	54.80
NEW	.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	970624-C6	68.20

PLEASE SEE SPEEDS & FEEDS ON PAGE 124

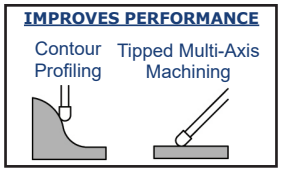
NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Suitable for steels up to 45Rc
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA



mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	4 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	63615-C6	62.70
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56115-C6	63.90
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	64815-C6	68.00
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	988709-C6	67.70
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	974009-C6	68.70
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	981309-C6	73.70
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	988711-C6	65.50
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	974011-C6	66.50
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	981311-C6	71.20
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	976511-C6	74.40
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	63620-C6	59.90
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56120-C6	61.10
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	64820-C6	65.50
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	988713-C6	63.80
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	974013-C6	65.20
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	981313-C6	69.60
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	63625-C6	58.30
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56125-C6	59.60
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	64825-C6	64.10
.031 (1/32)		.0310	.047	**.093** (3x)	4	1/8	1-1/2	929031-C6	53.40
.031 (1/32)		.0310	.047	**.156** (5x)	4	1/8	2-1/2	63631-C6	54.80
.031 (1/32)		.0310	.047	**.187** (6x)	4	1/8	2-1/2	797531-C6	54.80 NEW
.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	56131-C6	56.10
.031 (1/32)		.0310	.047	**.312** (10x)	4	1/8	2-1/2	887231-C6	57.20
.031 (1/32)		.0310	.047	**.375** (12x)	4	1/8	2-1/2	64831-C6	57.90
.031 (1/32)		.0310	.047	**.470** (15x)	4	1/8	2-1/2	953331-C6	60.70
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	988718-C6	59.60
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	974018-C6	60.90
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	981318-C6	62.40
.035		.0350	.052	**.187** (5x)	4	1/8	2-1/2	63635-C6	54.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute (cont.)

continued from previous page

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
		1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	988722-C6	59.60
		1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	974022-C6	60.90
		1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	981322-C6	62.40
		1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	976522-C6	65.50
	.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	63640-C6	54.80
	.040		.0400	.060	**.325** (8x)	4	1/8	2-1/2	56140-C6	56.10
	.045		.0450	.067	**.225** (5x)	4	1/8	2-1/2	63645-C6	54.80
	.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	63647-C6	54.80
	.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56147-C6	56.10
	.047 (3/64)		.0470	.070	**.480** (10x)	4	1/8	2-1/2	887247-C6	57.20
	.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	64847-C6	57.90
	.050		.0500	.075	**.250** (5x)	4	1/8	2-1/2	63650-C6	54.80
	.050		.0500	.075	**.400** (8x)	4	1/8	2-1/2	56150-C6	56.10
	.055		.0550	.082	**.275** (5x)	4	1/8	2-1/2	63655-C6	54.80
		1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	988733-C6	59.60
		1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	974033-C6	60.90
		1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	981333-C6	62.40
		1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	976533-C6	65.50
	.060		.0600	.090	**.312** (5x)	4	1/8	2-1/2	63660-C6	54.80
	.060		.0600	.090	**.500** (8x)	4	1/8	2-1/2	56160-C6	56.10
	.062 (1/16)		.0620	.093	**.186** (3x)	4	1/8	1-1/2	929062-C6	53.40
	.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	63662-C6	54.80
NEW	.062 (1/16)		.0620	.093	**.375** (6x)	4	1/8	2-1/2	797562-C6	54.80
	.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56162-C6	56.10
	.062 (1/16)		.0620	.093	**.625** (10x)	4	1/8	2-1/2	887262-C6	57.20
	.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	64862-C6	57.90
	.062 (1/16)		.0620	.093	**.950** (15x)	4	1/8	2-1/2	953362-C6	60.70
	.070		.0700	.105	**.375** (5x)	4	1/8	2-1/2	63670-C6	54.80
	.070		.0700	.105	**.570** (8x)	4	1/8	2-1/2	56170-C6	56.10
	.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	63678-C6	54.80
	.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56178-C6	56.10
	.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	64878-C6	57.90
		2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	988745-C6	59.40
		2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	974045-C6	60.70
		2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	981345-C6	62.40
		2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	976545-C6	65.50
	.093 (3/32)		.0930	.139	**.279** (3x)	4	1/8	1-1/2	929093-C6	53.40
	.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	63693-C6	54.80
NEW	.093 (3/32)		.0930	.139	**.585** (6x)	4	1/8	2-1/2	797593-C6	54.80
	.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56193-C6	56.10
	.093 (3/32)		.0930	.139	**.950** (10x)	4	1/8	2-1/2	887293-C6	57.20
	.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	64893-C6	57.90
	.093 (3/32)		.0930	.139	**1.400** (15x)	4	1/8	3	953393-C6	60.70

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.100		.1000	.150	**.500** (5x)	4	1/8	2-1/2	63700-C6	54.20
.100		.1000	.150	**.800** (8x)	4	1/8	2-1/2	56200-C6	55.40
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	988757-C6	56.40
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	4	4 mm	50 mm	974057-C6	57.70

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	4 FL	PRICE	
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	929108-C6	53.40	
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	63708-C6	54.40	
.125 (1/8)	.1250	.187	**.750** (6x)	4	1/8	2-1/2	797608-C6	54.40	NEW
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56208-C6	55.60	
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	3	887308-C6	57.20	
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	64908-C6	57.90	
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	63710-C6	59.00	
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56210-C6	60.10	
.156 (5/32)	.1562	.234	**1.570** (10x)	4	3/16	4	887310-C6	62.90	
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	63712-C6	59.90	
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56212-C6	61.20	
.187 (3/16)	.1875	.281	**1.875** (10x)	4	3/16	4	887312-C6	64.00	
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	63716-C6	66.30	
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56216-C6	67.60	
.250 (1/4)	.2500	.375	**2.500** (10x)	4	1/4	6	887316-C6	78.60	
.375 (3/8)	.3750	.570	**2.000** (5x)	4	3/8	4	63724-C6	82.60	NEW

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for High Temp Alloys)

Important Note: Values in table are in inches and are based on 4 flute, reached (8x Dia) end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different reaches. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%; for 6x, increase to 120%; for 7x, increase to 110%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 15x, reduce to 75%). For complete speeds and feeds charts, please see www.harveytool.com

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00004	.00008	.00012	.00016	.00021	.00025	.00033	.00049	.00066	.00086	.00104	.00139
Roughing	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00063	.00084	.00110	.00132	.00176
Finishing	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00110	.00144	.00173	.00231
Max	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00099	.00132	.00173	.00208	.00277

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .28x Dia
Finishing: .1x Dia

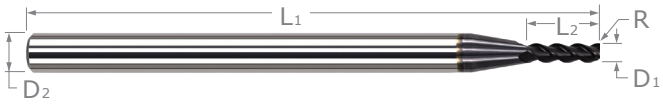
Axial Depth of Cut*:
Slotting: .28x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

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CUTTER DIAMETER D_1			CORNER RADIUS R	LENGTH OF CUT L_2	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED	
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.001″ −.001″ +.025mm −.025mm	+.010″ −.000″ +.25mm −.00mm				TOOL #	PRICE
	.2 mm	.0078	**.05 mm**	.30 mm (1.5x)	3	4 mm	50 mm	984104-C6	55.90
	.2 mm	.0078	**.05 mm**	.60 mm (3x)	3	4 mm	50 mm	979304-C6	55.90
.010		.0100	**.003**	.015 (1.5x)	3	1/8	1-1/2	52210-C6	52.60
.010		.0100	**.003**	.030 (3x)	3	1/8	1-1/2	46810-C6	53.00
	.3 mm	.0118	**.08 mm**	.45 mm (1.5x)	3	4 mm	50 mm	984106-C6	54.40
	.3 mm	.0118	**.08 mm**	.90 mm (3x)	3	4 mm	50 mm	979306-C6	54.40
.015 (1/64)		.0150	**.003**	.012 (0.8x)	3	1/8	1-1/2	954215-C6	46.20
.015 (1/64)		.0150	**.003**	.022 (1.5x)	3	1/8	1-1/2	52215-C6	43.70
.015 (1/64)		.0150	**.003**	.045 (3x)	3	1/8	1-1/2	46815-C6	43.70
.015 (1/64)		.0150	**.003**	.078 (5x)	3	1/8	2-1/2	53615-C6	52.90
.015 (1/64)		.0150	**.005**	.045 (3x)	3	1/8	1-1/2	936415-C6	49.70
	.4 mm	.0157	**.08 mm**	.60 mm (1.5x)	3	4 mm	50 mm	984109-C6	46.80
	.4 mm	.0157	**.08 mm**	1.20 mm (3x)	3	4 mm	50 mm	979309-C6	46.80
	.5 mm	.0196	**.10 mm**	.75 mm (1.5x)	3	4 mm	50 mm	984111-C6	41.90
	.5 mm	.0196	**.10 mm**	1.50 mm (3x)	3	4 mm	50 mm	979311-C6	41.90
	.5 mm	.0196	**.10 mm**	2.50 mm (5x)	3	4 mm	50 mm	965811-C6	52.60
.020		.0200	**.004**	.016 (0.8x)	3	1/8	1-1/2	954220-C6	40.80
.020		.0200	**.004**	.030 (1.5x)	3	1/8	1-1/2	52220-C6	38.40
.020		.0200	**.004**	.060 (3x)	3	1/8	1-1/2	46820-C6	38.40
.020		.0200	**.004**	.100 (5x)	3	1/8	2-1/2	53620-C6	47.00
	.6 mm	.0236	**.10 mm**	.90 mm (1.5x)	3	4 mm	50 mm	984113-C6	40.50
	.6 mm	.0236	**.10 mm**	1.80 mm (3x)	3	4 mm	50 mm	979313-C6	40.50
.025		.0250	**.004**	.020 (0.8x)	3	1/8	1-1/2	954225-C6	39.80
.025		.0250	**.004**	.038 (1.5x)	3	1/8	1-1/2	52225-C6	37.30
.025		.0250	**.004**	.075 (3x)	3	1/8	1-1/2	46825-C6	37.30
.025		.0250	**.004**	.125 (5x)	3	1/8	2-1/2	53625-C6	45.50
	.7 mm	.0275	**.10 mm**	2.10 mm (3x)	3	4 mm	50 mm	979315-C6	40.50
.030		.0300	**.005**	.045 (1.5x)	3	1/8	1-1/2	52230-C6	37.30
.030		.0300	**.005**	.090 (3x)	3	1/8	1-1/2	46830-C6	37.30

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	853631-C6	34.20	
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	923631-C6	31.50	
.031 (1/32)		.0310	**.005**	.025 (0.8x)	3	1/8	1-1/2	954231-C6	32.70	
.031 (1/32)		.0310	**.005**	.047 (1.5x)	3	1/8	1-1/2	52231-C6	31.80	
.031 (1/32)		.0310	**.005**	.047 (1.5x)	4	1/8	1-1/2	795531-C6	33.60	NEW
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	46831-C6	31.80	
.031 (1/32)		.0310	**.005**	.093 (3x)	4	1/8	1-1/2	850731-C6	33.60	
.031 (1/32)		.0310	**.005**	.125 (4x)	3	1/8	2-1/2	796731-C6	35.40	NEW
.031 (1/32)		.0310	**.005**	.156 (5x)	3	1/8	2-1/2	53631-C6	39.50	
.031 (1/32)		.0310	**.005**	.156 (5x)	4	1/8	2-1/2	796931-C6	42.20	NEW
.031 (1/32)		.0310	**.008**	.047 (1.5x)	3	1/8	1-1/2	847831-C6	34.40	
.031 (1/32)		.0310	**.008**	.093 (3x)	3	1/8	1-1/2	848431-C6	34.40	
.031 (1/32)		.0310	**.010**	.047 (1.5x)	3	1/8	1-1/2	912931-C6	34.20	
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	950731-C6	34.40	
.031 (1/32)		.0310	**.010**	.156 (5x)	3	1/8	2-1/2	869831-C6	42.20	
	.8 mm	.0314	**.10 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	984118-C6	35.20	
	.8 mm	.0314	**.10 mm**	2.40 mm (3x)	3	4 mm	50 mm	979318-C6	35.20	
.035		.0350	**.005**	.053 (1.5x)	3	1/8	1-1/2	52235-C6	31.80	
.035		.0350	**.005**	.105 (3x)	3	1/8	1-1/2	46835-C6	31.80	
.035		.0350	**.005**	.187 (5x)	3	1/8	2-1/2	53635-C6	39.50	
.035		.0350	**.010**	.105 (3x)	3	1/8	1-1/2	950735-C6	34.40	
	.9 mm	.0354	**.10 mm**	2.70 mm (3x)	3	4 mm	50 mm	979320-C6	35.20	
	1.0 mm	.0393	**.10 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	984122-C6	35.20	
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	979322-C6	35.20	
	1.0 mm	.0393	**.10 mm**	5.00 mm (5x)	3	4 mm	50 mm	965822-C6	43.10	
	1.0 mm	.0393	**.30 mm**	3.00 mm (3x)	3	4 mm	50 mm	843322-C6	35.20	
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	923640-C6	31.80	
.040		.0400	**.005**	.032 (0.8x)	3	1/8	1-1/2	954240-C6	34.20	
.040		.0400	**.005**	.060 (1.5x)	3	1/8	1-1/2	52240-C6	31.80	
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	46840-C6	31.80	
.040		.0400	**.005**	.203 (5x)	3	1/8	2-1/2	53640-C6	39.50	
.040		.0400	**.010**	.120 (3x)	3	1/8	1-1/2	950740-C6	34.40	
	1.1 mm	.0433	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	979324-C6	35.20	
.045		.0450	**.005**	.068 (1.5x)	3	1/8	1-1/2	52245-C6	31.80	
.045		.0450	**.005**	.135 (3x)	3	1/8	1-1/2	46845-C6	31.80	
.045		.0450	**.005**	.225 (5x)	3	1/8	2-1/2	53645-C6	39.50	
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	923647-C6	31.50	
.047 (3/64)		.0470	**.005**	.038 (0.8x)	3	1/8	1-1/2	954247-C6	32.70	
.047 (3/64)		.0470	**.005**	.071 (1.5x)	3	1/8	1-1/2	52247-C6	31.80	
.047 (3/64)		.0470	**.005**	.071 (1.5x)	4	1/8	1-1/2	795547-C6	33.60	NEW
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	46847-C6	31.80	
.047 (3/64)		.0470	**.005**	.141 (3x)	4	1/8	1-1/2	850747-C6	33.60	
.047 (3/64)		.0470	**.005**	.187 (4x)	3	1/8	2-1/2	796747-C6	35.40	NEW
.047 (3/64)		.0470	**.005**	.250 (5x)	3	1/8	2-1/2	53647-C6	39.50	
.047 (3/64)		.0470	**.005**	.250 (5x)	4	1/8	2-1/2	796947-C6	42.20	NEW

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.047 (3/64)		.0470	**.010**	.071 (1.5x)	3	1/8	1-1/2	912947-C6	34.20
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	950747-C6	34.40
.047 (3/64)		.0470	**.015**	.071 (1.5x)	3	1/8	1-1/2	975647-C6	31.80
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	964147-C6	34.40
	1.2 mm	.0472	**.10 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	984127-C6	35.20
	1.2 mm	.0472	**.10 mm**	3.50 mm (3x)	3	4 mm	50 mm	979327-C6	35.20
.050		.0500	**.005**	.040 (0.8x)	3	1/8	1-1/2	954250-C6	34.20
.050		.0500	**.005**	.075 (1.5x)	3	1/8	1-1/2	52250-C6	31.50
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	46850-C6	31.50
.050		.0500	**.005**	.250 (5x)	3	1/8	2-1/2	53650-C6	39.50
.050		.0500	**.010**	.075 (1.5x)	3	1/8	1-1/2	912950-C6	34.20
.050		.0500	**.010**	.150 (3x)	3	1/8	1-1/2	950750-C6	34.40
.050		.0500	**.015**	.075 (1.5x)	3	1/8	1-1/2	975650-C6	34.40
.050		.0500	**.015**	.150 (3x)	3	1/8	1-1/2	964150-C6	32.70
	1.3 mm	.0511	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	979329-C6	35.20
.055		.0550	**.005**	.083 (1.5x)	3	1/8	1-1/2	52255-C6	31.50
.055		.0550	**.005**	.165 (3x)	3	1/8	1-1/2	46855-C6	31.50
.055		.0550	**.005**	.275 (5x)	3	1/8	2-1/2	53655-C6	39.50
.055		.0550	**.010**	.083 (1.5x)	3	1/8	1-1/2	912955-C6	34.20
.055		.0550	**.010**	.165 (3x)	3	1/8	1-1/2	950755-C6	34.40
.055		.0550	**.015**	.083 (1.5x)	3	1/8	1-1/2	975655-C6	34.40
.055		.0550	**.015**	.165 (3x)	3	1/8	1-1/2	964155-C6	34.40
	1.4 mm	.0551	**.10 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	984131-C6	35.20
	1.4 mm	.0551	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	979331-C6	35.20
	1.5 mm	.0590	**.20 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	984133-C6	33.00
	1.5 mm	.0590	**.20 mm**	4.50 mm (3x)	3	4 mm	50 mm	979333-C6	33.00
	1.5 mm	.0590	**.20 mm**	7.50 mm (5x)	3	4 mm	50 mm	965833-C6	40.30
.060		.0600	**.005**	.090 (1.5x)	3	1/8	1-1/2	908860-C6	31.50
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	936460-C6	31.50
.060		.0600	**.005**	.312 (5x)	3	1/8	2-1/2	869060-C6	39.50
.060		.0600	**.010**	.048 (0.8x)	3	1/8	1-1/2	954260-C6	34.20
.060		.0600	**.010**	.090 (1.5x)	3	1/8	1-1/2	52260-C6	31.50
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	46860-C6	31.50
.060		.0600	**.010**	.312 (5x)	3	1/8	2-1/2	53660-C6	39.50
.060		.0600	**.015**	.090 (1.5x)	3	1/8	1-1/2	975660-C6	31.80
.060		.0600	**.015**	.180 (3x)	3	1/8	1-1/2	964160-C6	31.80
.060		.0600	**.020**	.090 (1.5x)	3	1/8	1-1/2	931760-C6	32.10
.060		.0600	**.020**	.180 (3x)	3	1/8	1-1/2	959260-C6	32.40
.062 (1/16)		.0620	**.003**	.093 (1.5x)	3	1/8	1-1/2	853662-C6	29.60
.062 (1/16)		.0620	**.003**	.186 (3x)	3	1/8	1-1/2	923662-C6	29.60
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	908862-C6	29.60
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	936462-C6	29.60
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	869062-C6	37.70
.062 (1/16)		.0620	**.008**	.093 (1.5x)	3	1/8	1-1/2	847862-C6	29.60
.062 (1/16)		.0620	**.008**	.186 (3x)	3	1/8	1-1/2	848462-C6	29.60

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.062 (1/16)		.0620	**.010**	.050 (0.8x)	3	1/8	1-1/2	954262-C6	29.60	
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	52262-C6	29.60	
.062 (1/16)		.0620	**.010**	.093 (1.5x)	4	1/8	1-1/2	797162-C6	33.60	NEW
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	46862-C6	29.60	
.062 (1/16)		.0620	**.010**	.186 (3x)	4	1/8	1-1/2	856462-C6	33.60	
.062 (1/16)		.0620	**.010**	.250 (4x)	3	1/8	2-1/2	796562-C6	34.80	NEW
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	53662-C6	37.90	
.062 (1/16)		.0620	**.010**	.312 (5x)	4	1/8	2-1/2	797362-C6	41.60	NEW
.062 (1/16)		.0620	**.015**	.093 (1.5x)	3	1/8	1-1/2	975662-C6	29.60	
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	964162-C6	29.60	
.062 (1/16)		.0620	**.015**	.312 (5x)	3	1/8	2-1/2	860262-C6	37.90	
.062 (1/16)		.0620	**.020**	.093 (1.5x)	3	1/8	1-1/2	931762-C6	32.50	
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	959262-C6	35.70	
.062 (1/16)		.0620	**.020**	.312 (5x)	3	1/8	2-1/2	870662-C6	37.90	
	1.6 mm	.0629	**.20 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	984136-C6	33.00	
	1.6 mm	.0629	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	979336-C6	33.00	
	1.7 mm	.0669	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	979338-C6	33.00	
.070		.0700	**.005**	.210 (3x)	3	1/8	1-1/2	936470-C6	29.60	
.070		.0700	**.010**	.105 (1.5x)	3	1/8	1-1/2	52270-C6	29.60	
.070		.0700	**.010**	.210 (3x)	3	1/8	1-1/2	46870-C6	29.60	
.070		.0700	**.010**	.375 (5x)	3	1/8	2-1/2	53670-C6	37.90	
	1.8 mm	.0708	**.20 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	984140-C6	33.00	
	1.8 mm	.0708	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	979340-C6	33.00	
	1.9 mm	.0748	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	979342-C6	33.00	
.078 (5/64)		.0780	**.003**	.234 (3x)	3	1/8	1-1/2	923678-C6	30.10	
.078 (5/64)		.0780	**.005**	.117 (1.5x)	3	1/8	1-1/2	908878-C6	29.60	
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	936478-C6	29.60	
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	869078-C6	37.70	
.078 (5/64)		.0780	**.010**	.062 (0.8x)	3	1/8	1-1/2	954278-C6	29.60	
.078 (5/64)		.0780	**.010**	.117 (1.5x)	3	1/8	1-1/2	52278-C6	29.60	
.078 (5/64)		.0780	**.010**	.117 (1.5x)	4	1/8	1-1/2	797178-C6	33.60	NEW
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	46878-C6	29.60	
.078 (5/64)		.0780	**.010**	.234 (3x)	4	1/8	1-1/2	856478-C6	33.60	
.078 (5/64)		.0780	**.010**	.312 (4x)	3	1/8	2-1/2	796578-C6	35.40	NEW
.078 (5/64)		.0780	**.010**	.406 (5x)	3	1/8	2-1/2	53678-C6	37.70	
.078 (5/64)		.0780	**.010**	.406 (5x)	4	1/8	2-1/2	797378-C6	42.10	NEW
.078 (5/64)		.0780	**.015**	.117 (1.5x)	3	1/8	1-1/2	975678-C6	32.80	
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	964178-C6	32.80	
.078 (5/64)		.0780	**.020**	.117 (1.5x)	3	1/8	1-1/2	931778-C6	35.70	
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	959278-C6	35.70	
.078 (5/64)		.0780	**.020**	.406 (5x)	3	1/8	2-1/2	870678-C6	44.20	
.078 (5/64)		.0780	**.025**	.234 (3x)	3	1/8	1-1/2	848878-C6	35.70	
	2.0 mm	.0787	**.20 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	984145-C6	33.00	
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	3	4 mm	50 mm	979345-C6	33.00	
	2.0 mm	.0787	**.20 mm**	10.00 mm (5x)	3	4 mm	50 mm	965845-C6	40.30	
	2.0 mm	.0787	**.50 mm**	6.00 mm (3x)	3	4 mm	50 mm	842545-C6	33.00	
.080		.0800	**.010**	.120 (1.5x)	3	1/8	1-1/2	52280-C6	29.60	
.080		.0800	**.010**	.240 (3x)	3	1/8	1-1/2	46880-C6	29.60	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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	CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.090		.0900	**.010**	.135 (1.5x)	3	1/8	1-1/2	52290-C6	29.60
	.090		.0900	**.010**	.270 (3x)	3	1/8	1-1/2	46890-C6	29.60
	.093 (3/32)		.0930	**.003**	.279 (3x)	3	1/8	1-1/2	923693-C6	29.10
	.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	908893-C6	29.60
	.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	936493-C6	29.60
	.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	869093-C6	37.60
	.093 (3/32)		.0930	**.008**	.140 (1.5x)	3	1/8	1-1/2	847893-C6	29.60
	.093 (3/32)		.0930	**.008**	.279 (3x)	3	1/8	1-1/2	848493-C6	29.60
	.093 (3/32)		.0930	**.010**	.074 (0.8x)	3	1/8	1-1/2	954293-C6	29.60
	.093 (3/32)		.0930	**.010**	.140 (1.5x)	3	1/8	1-1/2	52293-C6	29.60
NEW	.093 (3/32)		.0930	**.010**	.140 (1.5x)	4	1/8	1-1/2	797193-C6	33.60
	.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	46893-C6	29.60
	.093 (3/32)		.0930	**.010**	.279 (3x)	4	1/8	1-1/2	856493-C6	33.60
NEW	.093 (3/32)		.0930	**.010**	.375 (4x)	3	1/8	2-1/2	796593-C6	35.40
	.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	53693-C6	37.70
NEW	.093 (3/32)		.0930	**.010**	.500 (5x)	4	1/8	2-1/2	797393-C6	42.10
	.093 (3/32)		.0930	**.015**	.140 (1.5x)	3	1/8	1-1/2	975693-C6	29.60
	.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	964193-C6	29.60
	.093 (3/32)		.0930	**.020**	.140 (1.5x)	3	1/8	1-1/2	931793-C6	29.60
	.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	959293-C6	29.60
	.093 (3/32)		.0930	**.025**	.279 (3x)	3	1/8	1-1/2	848893-C6	35.80
	.093 (3/32)		.0930	**.030**	.140 (1.5x)	3	1/8	1-1/2	929393-C6	35.80
	.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	943893-C6	35.80
	.093 (3/32)		.0930	**.030**	.500 (5x)	3	1/8	2-1/2	871493-C6	43.70
		2.5 mm	.0984	**.20 mm**	3.70 mm (1.5x)	3	4 mm	50 mm	984151-C6	30.50
		2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	3	4 mm	50 mm	979351-C6	33.00
		2.5 mm	.0984	**.20 mm**	12.00 mm (5x)	3	4 mm	50 mm	965851-C6	40.30
	.100		.1000	**.005**	.150 (1.5x)	3	1/8	1-1/2	908800-C6	29.60
	.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	936500-C6	29.60
	.100		.1000	**.010**	.150 (1.5x)	3	1/8	1-1/2	52300-C6	29.60
	.100		.1000	**.010**	.300 (3x)	3	1/8	1-1/2	46900-C6	29.60
	.100		.1000	**.010**	.500 (5x)	3	1/8	2-1/2	53700-C6	37.90
	.100		.1000	**.015**	.150 (1.5x)	3	1/8	1-1/2	907700-C6	32.80
	.100		.1000	**.015**	.300 (3x)	3	1/8	1-1/2	964200-C6	32.80
	.100		.1000	**.020**	.150 (1.5x)	3	1/8	1-1/2	931800-C6	35.70
	.100		.1000	**.020**	.300 (3x)	3	1/8	1-1/2	959300-C6	35.70
	.100		.1000	**.030**	.150 (1.5x)	3	1/8	1-1/2	929400-C6	35.80
	.100		.1000	**.030**	.300 (3x)	3	1/8	1-1/2	943900-C6	35.80
	.109 (7/64)		.1090	**.005**	.327 (3x)	3	1/8	1-1/2	936502-C6	29.60
	.109 (7/64)		.1090	**.010**	.327 (3x)	3	1/8	1-1/2	46902-C6	29.60
	.109 (7/64)		.1090	**.015**	.327 (3x)	3	1/8	1-1/2	964202-C6	32.80
	.118		.1180	**.010**	.177 (1.5x)	3	1/8	1-1/2	52305-C6	29.60
	.118		.1180	**.010**	.354 (3x)	3	1/8	1-1/2	46905-C6	29.60
		3.0 mm	.1181	**.20 mm**	4.50 mm (1.5x)	3	4 mm	50 mm	984157-C6	33.00
		3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	3	4 mm	50 mm	979357-C6	33.00
		3.0 mm	.1181	**.20 mm**	15.00 mm (5x)	3	4 mm	50 mm	965857-C6	40.30
		3.0 mm	.1181	**1.00 mm**	9.00 mm (3x)	3	4 mm	50 mm	842157-C6	38.70

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Corner Radius (cont.)

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CUTTER DIAMETER D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm	LENGTH OF CUT L_2 +.030″ −.000″ +.75mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE	
.125 (1/8)		.1250	**.003**	.375 (3x)	4	1/8	1-1/2	923708-C6	29.40	
.125 (1/8)		.1250	**.005**	.100 (0.8x)	4	1/8	1-1/2	840608-C6	29.40	
.125 (1/8)		.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	908908-C6	29.40	
.125 (1/8)		.1250	**.005**	.375 (3x)	4	1/8	1-1/2	936508-C6	29.40	
.125 (1/8)		.1250	**.005**	.625 (5x)	4	1/8	2-1/2	869108-C6	37.90	
.125 (1/8)		.1250	**.008**	.187 (1.5x)	4	1/8	1-1/2	847908-C6	29.40	
.125 (1/8)		.1250	**.008**	.375 (3x)	4	1/8	1-1/2	848508-C6	29.40	
.125 (1/8)		.1250	**.010**	.187 (1.5x)	4	1/8	1-1/2	913008-C6	28.30	
.125 (1/8)		.1250	**.010**	.375 (3x)	4	1/8	1-1/2	950808-C6	28.30	
.125 (1/8)		.1250	**.010**	.625 (5x)	4	1/8	2-1/2	869908-C6	37.90	
.125 (1/8)		.1250	**.015**	.100 (0.8x)	4	1/8	1-1/2	954308-C6	29.60	
.125 (1/8)		.1250	**.015**	.187 (1.5x)	4	1/8	1-1/2	52308-C6	28.30	
.125 (1/8)		.1250	**.015**	.375 (3x)	4	1/8	1-1/2	46908-C6	28.30	
.125 (1/8)		.1250	**.015**	.500 (4x)	4	1/8	2-1/2	796408-C6	33.20	NEW
.125 (1/8)		.1250	**.015**	.625 (5x)	4	1/8	2-1/2	53708-C6	37.90	
.125 (1/8)		.1250	**.020**	.187 (1.5x)	4	1/8	1-1/2	931808-C6	34.20	
.125 (1/8)		.1250	**.020**	.375 (3x)	4	1/8	1-1/2	959308-C6	34.20	
.125 (1/8)		.1250	**.020**	.625 (5x)	4	1/8	2-1/2	870708-C6	43.00	
.125 (1/8)		.1250	**.025**	.375 (3x)	4	1/8	1-1/2	848908-C6	34.30	
.125 (1/8)		.1250	**.030**	.187 (1.5x)	4	1/8	1-1/2	929408-C6	34.30	
.125 (1/8)		.1250	**.030**	.375 (3x)	4	1/8	1-1/2	943908-C6	34.30	
.125 (1/8)		.1250	**.030**	.625 (5x)	4	1/8	2-1/2	871508-C6	44.00	
.125 (1/8)		.1250	**.040**	.375 (3x)	4	1/8	1-1/2	844008-C6	35.70	
.140 (9/64)		.1406	**.015**	.220 (1.5x)	4	3/16	2	52309-C6	35.00	
.140 (9/64)		.1406	**.015**	.425 (3x)	4	3/16	2	46909-C6	35.20	
.140 (9/64)		.1406	**.015**	.750 (5x)	4	3/16	3	53709-C6	43.90	
.156 (5/32)		.1562	**.005**	.235 (1.5x)	4	3/16	2	908956-C6	31.80	
.156 (5/32)		.1562	**.005**	.470 (3x)	4	3/16	2	936510-C6	31.80	
.156 (5/32)		.1562	**.010**	.235 (1.5x)	4	3/16	2	913010-C6	30.60	
.156 (5/32)		.1562	**.010**	.470 (3x)	4	3/16	2	950810-C6	30.60	
.156 (5/32)		.1562	**.015**	.125 (0.8x)	4	3/16	2	954310-C6	32.00	
.156 (5/32)		.1562	**.015**	.235 (1.5x)	4	3/16	2	52310-C6	31.80	
.156 (5/32)		.1562	**.015**	.470 (3x)	4	3/16	2	46910-C6	31.80	
.156 (5/32)		.1562	**.015**	.750 (5x)	4	3/16	3	53710-C6	41.10	
.156 (5/32)		.1562	**.025**	.470 (3x)	4	3/16	2	848910-C6	31.80	
.156 (5/32)		.1562	**.030**	.235 (1.5x)	4	3/16	2	929410-C6	30.60	
.156 (5/32)		.1562	**.030**	.470 (3x)	4	3/16	2	943910-C6	30.60	
.156 (5/32)		.1562	**.030**	.750 (5x)	4	3/16	3	871510-C6	40.20	
	4.0 mm	.1574	**.40 mm**	6.00 mm (1.5x)	4	6 mm	63 mm	984161-C6	35.40	
	4.0 mm	.1574	**.40 mm**	12.00 mm (3x)	4	6 mm	63 mm	979361-C6	35.40	

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Corner Radius (cont.)

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	CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.000″ −.002″	D_1 +.00mm −.04mm decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.187 (3/16)	.1875	**.005**	.285 (1.5x)	4	3/16	2	908910-C6	31.80
	.187 (3/16)	.1875	**.005**	.562 (3x)	4	3/16	2	936512-C6	31.80
	.187 (3/16)	.1875	**.005**	1.000 (5x)	4	3/16	3	869112-C6	40.70
	.187 (3/16)	.1875	**.008**	.562 (3x)	4	3/16	2	848512-C6	31.80
	.187 (3/16)	.1875	**.010**	.285 (1.5x)	4	3/16	2	913012-C6	30.60
	.187 (3/16)	.1875	**.010**	.562 (3x)	4	3/16	2	950812-C6	30.60
	.187 (3/16)	.1875	**.010**	1.000 (5x)	4	3/16	3	869912-C6	41.10
	.187 (3/16)	.1875	**.015**	.150 (0.8x)	4	3/16	2	954312-C6	32.00
	.187 (3/16)	.1875	**.015**	.285 (1.5x)	4	3/16	2	52312-C6	30.60
	.187 (3/16)	.1875	**.015**	.562 (3x)	4	3/16	2	46912-C6	30.60
NEW	.187 (3/16)	.1875	**.015**	.750 (4x)	4	3/16	3	796412-C6	35.50
	.187 (3/16)	.1875	**.015**	1.000 (5x)	4	3/16	3	53712-C6	41.10
	.187 (3/16)	.1875	**.020**	.285 (1.5x)	4	3/16	2	931812-C6	36.20
	.187 (3/16)	.1875	**.020**	.562 (3x)	4	3/16	2	959312-C6	36.20
	.187 (3/16)	.1875	**.020**	1.000 (5x)	4	3/16	3	870712-C6	39.30
	.187 (3/16)	.1875	**.025**	.562 (3x)	4	3/16	2	848912-C6	40.70
	.187 (3/16)	.1875	**.030**	.285 (1.5x)	4	3/16	2	929412-C6	36.50
	.187 (3/16)	.1875	**.030**	.562 (3x)	4	3/16	2	943912-C6	37.70
	.187 (3/16)	.1875	**.030**	1.000 (5x)	4	3/16	3	871512-C6	40.70
	.187 (3/16)	.1875	**.045**	.285 (1.5x)	4	3/16	2	857612-C6	37.90
	.187 (3/16)	.1875	**.045**	.562 (3x)	4	3/16	2	864512-C6	37.90
	.187 (3/16)	.1875	**.060**	.285 (1.5x)	4	3/16	2	845412-C6	36.20
	.187 (3/16)	.1875	**.060**	.562 (3x)	4	3/16	2	885612-C6	36.20
NEW	.187 (3/16)	.1875	**.060**	1.000 (5x)	4	3/16	3	804412-C6	38.30
	5.0 mm	.1968	**.40 mm**	7.50 mm (1.5x)	4	6 mm	63 mm	984164-C6	35.40
	5.0 mm	.1968	**.40 mm**	15.00 mm (3x)	4	6 mm	63 mm	979364-C6	35.40
	6.0 mm	.2362	**.40 mm**	9.00 mm (1.5x)	4	6 mm	63 mm	984166-C6	35.40
	6.0 mm	.2362	**.40 mm**	18.00 mm (3x)	4	6 mm	63 mm	979366-C6	35.40
	.250 (1/4)	.2500	**.005**	.375 (1.5x)	4	1/4	2-1/2	908916-C6	39.80
	.250 (1/4)	.2500	**.005**	.750 (3x)	4	1/4	2-1/2	936516-C6	39.80
	.250 (1/4)	.2500	**.008**	.750 (3x)	4	1/4	2-1/2	848516-C6	39.80
	.250 (1/4)	.2500	**.010**	.375 (1.5x)	4	1/4	2-1/2	913016-C6	38.30
	.250 (1/4)	.2500	**.010**	.750 (3x)	4	1/4	2-1/2	950816-C6	38.30
	.250 (1/4)	.2500	**.015**	.200 (0.8x)	4	1/4	2-1/2	954316-C6	40.30
	.250 (1/4)	.2500	**.015**	.375 (1.5x)	4	1/4	2-1/2	52316-C6	38.60
	.250 (1/4)	.2500	**.015**	.750 (3x)	4	1/4	2-1/2	46916-C6	38.60
	.250 (1/4)	.2500	**.015**	1.250 (5x)	4	1/4	4	53716-C6	50.80
	.250 (1/4)	.2500	**.020**	.200 (0.8x)	4	1/4	2-1/2	816416-C6	45.30
	.250 (1/4)	.2500	**.020**	.375 (1.5x)	4	1/4	2-1/2	931816-C6	43.90
	.250 (1/4)	.2500	**.020**	.750 (3x)	4	1/4	2-1/2	959316-C6	43.90
	.250 (1/4)	.2500	**.025**	.750 (3x)	4	1/4	2-1/2	848916-C6	43.90
	.250 (1/4)	.2500	**.030**	.375 (1.5x)	4	1/4	2-1/2	929416-C6	43.90
	.250 (1/4)	.2500	**.030**	.750 (3x)	4	1/4	2-1/2	943916-C6	43.90
	.250 (1/4)	.2500	**.030**	1.250 (5x)	4	1/4	4	871516-C6	47.90
	.250 (1/4)	.2500	**.045**	.750 (3x)	4	1/4	2-1/2	864516-C6	45.90
	.250 (1/4)	.2500	**.060**	.750 (3x)	4	1/4	2-1/2	885616-C6	43.90

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.312 (5/16)		.3125	**.015**	.470 (1.5x)	4	5/16	2-1/2	52320-C6	55.70
.312 (5/16)		.3125	**.015**	1.000 (3x)	4	5/16	2-1/2	46920-C6	55.70
.375 (3/8)		.3750	**.015**	.570 (1.5x)	4	3/8	2-1/2	52324-C6	64.20
.375 (3/8)		.3750	**.015**	1.125 (3x)	4	3/8	2-1/2	46924-C6	64.20
.375 (3/8)		.3750	**.030**	.570 (1.5x)	4	3/8	2-1/2	929424-C6	69.50
.375 (3/8)		.3750	**.030**	1.125 (3x)	4	3/8	2-1/2	943924-C6	69.50
.500 (1/2)		.5000	**.015**	.750 (1.5x)	4	1/2	3	816232-C6	82.90
.500 (1/2)		.5000	**.030**	.750 (1.5x)	4	1/2	3	52332-C6	82.90

SPEEDS & FEEDS (Variable Helix for High Temp Alloys)

Important Note:Values in table are in inches and are based on 4 flute, standard (3x Dia) length of cut end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 115%; for 1.5x, increase to 108%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00005	.00010	.00016	.00020	.00026	.00031	.00041	.00062	.00083	.00108	.00130	.00173
Roughing	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	.00138	.00165	.00221
Finishing	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	.00180	.00217	.00289
Max	.00010	.00020	.00031	.00041	.00051	.00061	.00083	.00123	.00165	.00216	.00260	.00347

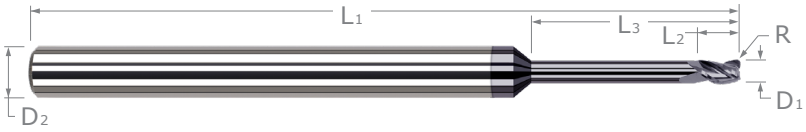
Radial Depth of Cut*:	Axial Depth of Cut*:
Slotting: 1x Dia	Slotting: .4x Dia
Roughing: .4x Dia	Roughing: .5x - .7x Dia
Finishing: .1x Dia	Finishing: .5x - 1x Dia

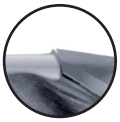
* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute





Reduced Neck Diameter to Avoid Heeling

- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

	CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D1 +.0005″ −.0005″	D1 +.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	TOOL #	PRICE
	.015 (1/64)		.0150	**.003**	.022	.045 (3x)	3	1/8	1-1/2	947615-C6	56.10
	.015 (1/64)		.0150	**.003**	.022	.078 (5x)	3	1/8	2-1/2	64415-C6	56.10
	.015 (1/64)		.0150	**.003**	.022	.125 (8x)	3	1/8	2-1/2	54815-C6	57.30
	.015 (1/64)		.0150	**.003**	.022	.187 (12x)	3	1/8	2-1/2	63015-C6	62.70
	.015 (1/64)		.0150	**.003**	.022	.225 (15x)	3	1/8	2-1/2	968915-C6	67.70
		.4 mm	.0157	**.08 mm**	.60 mm	2.0 mm (5x)	3	4 mm	50 mm	980709-C6	62.10
		.4 mm	.0157	**.08 mm**	.60 mm	3.2 mm (8x)	3	4 mm	50 mm	975009-C6	63.40
		.4 mm	.0157	**.08 mm**	.60 mm	4.8 mm (12x)	3	4 mm	50 mm	987309-C6	67.70
		.5 mm	.0196	**.10 mm**	.75 mm	2.5 mm (5x)	3	4 mm	50 mm	980711-C6	59.60
		.5 mm	.0196	**.10 mm**	.75 mm	4.0 mm (8x)	3	4 mm	50 mm	975011-C6	60.90
		.5 mm	.0196	**.10 mm**	.75 mm	6.0 mm (12x)	3	4 mm	50 mm	987311-C6	65.80
		.5 mm	.0196	**.10 mm**	.75 mm	8.0 mm (16x)	3	4 mm	50 mm	971511-C6	68.70
	.020		.0200	**.004**	.030	.060 (3x)	3	1/8	1-1/2	947620-C6	53.40
	.020		.0200	**.004**	.030	.100 (5x)	3	1/8	2-1/2	64420-C6	53.60
	.020		.0200	**.004**	.030	.160 (8x)	3	1/8	2-1/2	54820-C6	54.80
	.020		.0200	**.004**	.030	.250 (12x)	3	1/8	2-1/2	63020-C6	60.40
		.6 mm	.0236	**.10 mm**	.90 mm	3.0 mm (5x)	3	4 mm	50 mm	980713-C6	58.50
		.6 mm	.0236	**.10 mm**	.90 mm	4.8 mm (8x)	3	4 mm	50 mm	975013-C6	59.60
		.6 mm	.0236	**.10 mm**	.90 mm	7.2 mm (12x)	3	4 mm	50 mm	987313-C6	63.60
	.025		.0250	**.004**	.038	.075 (3x)	3	1/8	1-1/2	947625-C6	51.80
	.025		.0250	**.004**	.038	.125 (5x)	3	1/8	2-1/2	64425-C6	52.40
	.025		.0250	**.004**	.038	.203 (8x)	3	1/8	2-1/2	54825-C6	53.40
	.025		.0250	**.004**	.038	.312 (12x)	3	1/8	2-1/2	63025-C6	59.00
	.031 (1/32)		.0310	**.005**	.047	.093 (3x)	3	1/8	1-1/2	947631-C6	49.40
	.031 (1/32)		.0310	**.005**	.047	.156 (5x)	3	1/8	2-1/2	64431-C6	49.70
	.031 (1/32)		.0310	**.005**	.047	.156 (5x)	4	1/8	2-1/2	812131-C6	51.60
NEW	.031 (1/32)		.0310	**.005**	.047	.187 (6x)	3	1/8	2-1/2	796131-C6	51.60
	.031 (1/32)		.0310	**.005**	.047	.250 (8x)	3	1/8	2-1/2	54831-C6	50.80
	.031 (1/32)		.0310	**.005**	.047	.312 (10x)	3	1/8	2-1/2	932531-C6	52.00
	.031 (1/32)		.0310	**.005**	.047	.375 (12x)	3	1/8	2-1/2	63031-C6	53.00
	.031 (1/32)		.0310	**.005**	.047	.470 (15x)	3	1/8	2-1/2	968931-C6	57.50
	.031 (1/32)		.0310	**.010**	.047	.156 (5x)	3	1/8	2-1/2	917331-C6	49.10
	.031 (1/32)		.0310	**.010**	.047	.250 (8x)	3	1/8	2-1/2	908631-C6	50.80
		.8 mm	.0314	**.10 mm**	1.20 mm	4.0 mm (5x)	3	4 mm	50 mm	980718-C6	53.80
		.8 mm	.0314	**.10 mm**	1.20 mm	6.5 mm (8x)	3	4 mm	50 mm	975018-C6	55.20
		.8 mm	.0314	**.10 mm**	1.20 mm	9.5 mm (12x)	3	4 mm	50 mm	987318-C6	56.70

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.035		.0350	**.005**	.053	.105 (3x)	3	1/8	1-1/2	947635-C6	49.40
.035		.0350	**.005**	.053	.187 (5x)	3	1/8	2-1/2	64435-C6	49.70
.035		.0350	**.005**	.053	.281 (8x)	3	1/8	2-1/2	54835-C6	50.80
.035		.0350	**.005**	.053	.350 (10x)	3	1/8	2-1/2	932535-C6	53.00
	1.0 mm	.0393	**.10 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	980722-C6	53.80
	1.0 mm	.0393	**.10 mm**	1.50 mm	8.0 mm (8x)	3	4 mm	50 mm	975022-C6	55.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	12.0 mm (12x)	3	4 mm	50 mm	987322-C6	56.70
	1.0 mm	.0393	**.10 mm**	1.50 mm	16.0 mm (16x)	3	4 mm	50 mm	971522-C6	59.90
.040		.0400	**.005**	.060	.120 (3x)	3	1/8	1-1/2	947640-C6	49.40
.040		.0400	**.005**	.060	.203 (5x)	3	1/8	2-1/2	64440-C6	49.70
.040		.0400	**.005**	.060	.325 (8x)	3	1/8	2-1/2	54840-C6	50.80
.045		.0450	**.005**	.068	.135 (3x)	3	1/8	1-1/2	947645-C6	49.40
.045		.0450	**.005**	.068	.225 (5x)	3	1/8	2-1/2	64445-C6	49.70
.045		.0450	**.005**	.068	.375 (8x)	3	1/8	2-1/2	54845-C6	50.80
.047 (3/64)		.0470	**.005**	.070	.141 (3x)	3	1/8	1-1/2	947647-C6	49.40
.047 (3/64)		.0470	**.005**	.070	.250 (5x)	3	1/8	2-1/2	64447-C6	49.70
.047 (3/64)		.0470	**.005**	.070	.281 (6x)	3	1/8	2-1/2	796147-C6	49.70 NEW
.047 (3/64)		.0470	**.005**	.070	.375 (8x)	3	1/8	2-1/2	54847-C6	50.80
.047 (3/64)		.0470	**.005**	.070	.570 (12x)	3	1/8	2-1/2	63047-C6	53.00
.047 (3/64)		.0470	**.005**	.070	.710 (15x)	3	1/8	2-1/2	968947-C6	57.50
.047 (3/64)		.0470	**.010**	.070	.250 (5x)	3	1/8	2-1/2	917347-C6	49.70
.047 (3/64)		.0470	**.010**	.070	.375 (8x)	3	1/8	2-1/2	908647-C6	50.80
.050		.0500	**.005**	.075	.150 (3x)	3	1/8	1-1/2	947650-C6	49.40
.050		.0500	**.005**	.075	.250 (5x)	3	1/8	2-1/2	64450-C6	49.70
.050		.0500	**.005**	.075	.400 (8x)	3	1/8	2-1/2	54850-C6	50.80
.055		.0550	**.005**	.083	.275 (5x)	3	1/8	2-1/2	64455-C6	49.70
.055		.0550	**.005**	.083	.450 (8x)	3	1/8	2-1/2	54855-C6	50.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	7.5 mm (5x)	3	4 mm	50 mm	980733-C6	53.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	12.0 mm (8x)	3	4 mm	50 mm	975033-C6	55.20
	1.5 mm	.0590	**.20 mm**	2.20 mm	18.0 mm (12x)	3	4 mm	50 mm	987333-C6	56.70
	1.5 mm	.0590	**.20 mm**	2.20 mm	24.0 mm (16x)	3	4 mm	63 mm	971533-C6	59.90
.060		.0600	**.010**	.090	.312 (5x)	3	1/8	2-1/2	64460-C6	49.70
.060		.0600	**.010**	.090	.500 (8x)	3	1/8	2-1/2	54860-C6	50.80
.060		.0600	**.010**	.090	.625 (10x)	3	1/8	2-1/2	932560-C6	53.00
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	919862-C6	49.10
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	915362-C6	50.80
.062 (1/16)		.0620	**.005**	.093	.625 (10x)	3	1/8	2-1/2	884462-C6	51.40
.062 (1/16)		.0620	**.010**	.093	.186 (3x)	3	1/8	1-1/2	947662-C6	49.10
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	3	1/8	2-1/2	64462-C6	49.70
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	4	1/8	2-1/2	811862-C6	51.60
.062 (1/16)		.0620	**.010**	.093	.375 (6x)	3	1/8	2-1/2	795962-C6	51.60 NEW
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	54862-C6	50.80
.062 (1/16)		.0620	**.010**	.093	.625 (10x)	3	1/8	2-1/2	932562-C6	52.00
.062 (1/16)		.0620	**.010**	.093	.750 (12x)	3	1/8	2-1/2	63062-C6	53.00
.062 (1/16)		.0620	**.010**	.093	.950 (15x)	3	1/8	2-1/2	968962-C6	57.50
.062 (1/16)		.0620	**.015**	.093	.312 (5x)	3	1/8	2-1/2	902662-C6	49.10
.062 (1/16)		.0620	**.015**	.093	.500 (8x)	3	1/8	2-1/2	912062-C6	50.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.078 (5/64)		.0780	**.005**	.117	.406 (5x)	3	1/8	2-1/2	919878-C6	49.70
	.078 (5/64)		.0780	**.005**	.117	.625 (8x)	3	1/8	2-1/2	915378-C6	50.80
	.078 (5/64)		.0780	**.010**	.117	.234 (3x)	3	1/8	1-1/2	947678-C6	49.10
	.078 (5/64)		.0780	**.010**	.117	.406 (5x)	3	1/8	2-1/2	64478-C6	49.70
	.078 (5/64)		.0780	**.010**	.117	.406 (5x)	4	1/8	2-1/2	811878-C6	51.60
NEW	.078 (5/64)		.0780	**.010**	.117	.475 (6x)	3	1/8	2-1/2	795978-C6	49.70
	.078 (5/64)		.0780	**.010**	.117	.625 (8x)	3	1/8	2-1/2	54878-C6	50.80
	.078 (5/64)		.0780	**.010**	.117	.940 (12x)	3	1/8	2-1/2	63078-C6	53.00
	.078 (5/64)		.0780	**.010**	.117	1.187 (15x)	3	1/8	2-1/2	968978-C6	57.50
		2.0 mm	.0787	**.20 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	980745-C6	53.80
		2.0 mm	.0787	**.20 mm**	3.00 mm	16.0 mm (8x)	3	4 mm	50 mm	975045-C6	55.20
		2.0 mm	.0787	**.20 mm**	3.00 mm	24.0 mm (12x)	3	4 mm	63 mm	987345-C6	56.70
		2.0 mm	.0787	**.20 mm**	3.00 mm	32.0 mm (16x)	3	4 mm	63 mm	971545-C6	59.90
	.093 (3/32)		.0930	**.005**	.139	.500 (5x)	3	1/8	2-1/2	919893-C6	49.10
	.093 (3/32)		.0930	**.005**	.139	.750 (8x)	3	1/8	2-1/2	915393-C6	50.80
	.093 (3/32)		.0930	**.010**	.139	.279 (3x)	3	1/8	1-1/2	947693-C6	49.10
	.093 (3/32)		.0930	**.010**	.139	.500 (5x)	3	1/8	2-1/2	64493-C6	49.70
	.093 (3/32)		.0930	**.010**	.139	.500 (5x)	4	1/8	2-1/2	811893-C6	51.60
NEW	.093 (3/32)		.0930	**.010**	.139	.585 (6x)	3	1/8	2-1/2	795993-C6	49.70
	.093 (3/32)		.0930	**.010**	.139	.750 (8x)	3	1/8	2-1/2	54893-C6	50.80
	.093 (3/32)		.0930	**.010**	.139	.950 (10x)	3	1/8	2-1/2	932593-C6	52.00
	.093 (3/32)		.0930	**.010**	.139	1.125 (12x)	3	1/8	2-1/2	63093-C6	53.00
	.093 (3/32)		.0930	**.010**	.139	1.400 (15x)	3	1/8	3	968993-C6	57.50
	.093 (3/32)		.0930	**.015**	.139	.500 (5x)	3	1/8	2-1/2	902693-C6	49.10
	.093 (3/32)		.0930	**.015**	.139	.750 (8x)	3	1/8	2-1/2	912093-C6	50.80
	.093 (3/32)		.0930	**.030**	.139	.500 (5x)	3	1/8	2-1/2	910193-C6	49.10
	.093 (3/32)		.0930	**.030**	.139	.750 (8x)	3	1/8	2-1/2	906493-C6	50.80
	.100		.1000	**.010**	.150	.500 (5x)	3	1/8	2-1/2	64500-C6	49.10
	.100		.1000	**.010**	.150	.800 (8x)	3	1/8	2-1/2	54900-C6	50.40
		3.0 mm	.1181	**.20 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	980757-C6	51.10
		3.0 mm	.1181	**.20 mm**	4.50 mm	24.0 mm (8x)	3	4 mm	50 mm	975057-C6	51.20

	D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
	.125 (1/8)	.1250	**.005**	.187	.625 (5x)	4	1/8	2-1/2	919908-C6	46.20
	.125 (1/8)	.1250	**.005**	.187	1.000 (8x)	4	1/8	2-1/2	915408-C6	47.90
	.125 (1/8)	.1250	**.010**	.187	.625 (5x)	4	1/8	2-1/2	917408-C6	48.70
	.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	4	1/8	2-1/2	908708-C6	50.40
	.125 (1/8)	.1250	**.015**	.187	.375 (3x)	4	1/8	1-1/2	947708-C6	46.90
	.125 (1/8)	.1250	**.015**	.187	.625 (5x)	4	1/8	2-1/2	64508-C6	49.10
NEW	.125 (1/8)	.1250	**.015**	.187	.750 (6x)	4	1/8	2-1/2	795808-C6	49.10
	.125 (1/8)	.1250	**.015**	.187	1.000 (8x)	4	1/8	2-1/2	54908-C6	50.40
	.125 (1/8)	.1250	**.015**	.187	1.250 (10x)	4	1/8	2-1/2	932608-C6	52.00
	.125 (1/8)	.1250	**.015**	.187	1.500 (12x)	4	1/8	3	63108-C6	53.00
	.125 (1/8)	.1250	**.020**	.187	.625 (5x)	4	1/8	2-1/2	866908-C6	48.70
	.125 (1/8)	.1250	**.020**	.187	1.000 (8x)	4	1/8	2-1/2	847608-C6	50.40
	.125 (1/8)	.1250	**.030**	.187	.625 (5x)	4	1/8	2-1/2	910208-C6	48.70
	.125 (1/8)	.1250	**.030**	.187	1.000 (8x)	4	1/8	2-1/2	906508-C6	50.40

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	
.156 (5/32)	.1562	**.015**	.235	.750 (5x)	4	3/16	3	64510-C6	54.20	
.156 (5/32)	.1562	**.015**	.235	1.250 (8x)	4	3/16	3	54910-C6	55.40	
.156 (5/32)	.1562	**.015**	.235	1.875 (12x)	4	3/16	4	63110-C6	66.50	
.187 (3/16)	.1875	**.005**	.281	1.000 (5x)	4	3/16	3	919912-C6	52.20	
.187 (3/16)	.1875	**.005**	.281	1.500 (8x)	4	3/16	3	915412-C6	53.50	
.187 (3/16)	.1875	**.015**	.281	1.000 (5x)	4	3/16	3	64512-C6	54.80	
.187 (3/16)	.1875	**.015**	.281	1.156 (6x)	4	3/16	3	795812-C6	54.80	NEW
.187 (3/16)	.1875	**.015**	.281	1.500 (8x)	4	3/16	3	54912-C6	56.10	
.187 (3/16)	.1875	**.015**	.281	2.250 (12x)	4	3/16	4	63112-C6	66.50	
.187 (3/16)	.1875	**.030**	.281	1.000 (5x)	4	3/16	3	910212-C6	54.40	
.187 (3/16)	.1875	**.030**	.281	1.500 (8x)	4	3/16	3	906512-C6	55.80	
.250 (1/4)	.2500	**.015**	.375	1.250 (5x)	4	1/4	4	64516-C6	60.90	
.250 (1/4)	.2500	**.015**	.375	2.000 (8x)	4	1/4	4	54916-C6	61.90	
.250 (1/4)	.2500	**.015**	.375	3.000 (12x)	4	1/4	6	63116-C6	74.40	
.250 (1/4)	.2500	**.030**	.375	1.250 (5x)	4	1/4	4	910216-C6	60.50	
.250 (1/4)	.2500	**.030**	.375	2.000 (8x)	4	1/4	4	906516-C6	61.50	
.375 (3/8)	.3750	**.015**	.570	2.000 (5x)	4	3/8	4	64524-C6	68.40	NEW

PLEASE SEE SPEEDS & FEEDS ON PAGE 116

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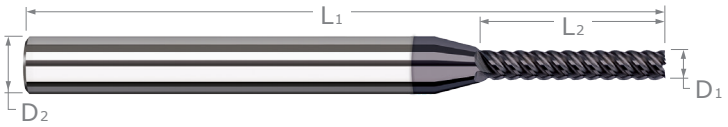
VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square



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	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
		.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	967604-C6	53.80
		.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	974504-C6	61.80
		.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	976104-C6	63.40
	.010		.0100	**.030** (3x)	4	1/8	1-1/2	57810-C6	53.60
	.010		.0100	**.050** (5x)	4	1/8	2-1/2	62610-C6	61.50
		.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	967606-C6	49.70
	.015 (1/64)		.0150	**.023** (1.5x)	4	1/8	1-1/2	946115-C6	42.70
	.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	57815-C6	42.70
NEW	.015 (1/64)		.0150	**.062** (4x)	4	1/8	2-1/2	890115-C6	53.00
	.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	62615-C6	53.00
	.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	59015-C6	54.40
	.015 (1/64)		.0150	**.156** (10x)	4	1/8	2-1/2	941815-C6	63.00
		.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	967609-C6	47.20
		.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	974509-C6	55.30
		.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	976109-C6	57.00
		.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	967611-C6	47.20
		.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	974511-C6	54.60
		.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	976111-C6	56.00
	.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	946120-C6	41.90
	.020		.0200	**.060** (3x)	4	1/8	1-1/2	57820-C6	41.90
NEW	.020		.0200	**.080** (4x)	4	1/8	2-1/2	890120-C6	52.70
	.020		.0200	**.100** (5x)	4	1/8	2-1/2	62620-C6	52.70
	.020		.0200	**.160** (8x)	4	1/8	2-1/2	59020-C6	54.20
	.020		.0200	**.200** (10x)	4	1/8	2-1/2	941820-C6	62.40
		.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	967613-C6	47.20
		.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	974513-C6	54.60
		.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	976113-C6	56.00
	.025		.0250	**.075** (3x)	4	1/8	1-1/2	57825-C6	39.30
	.025		.0250	**.125** (5x)	4	1/8	2-1/2	62625-C6	50.80
	.025		.0250	**.203** (8x)	4	1/8	2-1/2	59025-C6	52.40
	.025		.0250	**.250** (10x)	4	1/8	2-1/2	941825-C6	60.70
		.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	967615-C6	47.00
	.030		.0300	**.090** (3x)	6	1/8	1-1/2	57830-C6	39.30
	.030		.0300	**.156** (5x)	6	1/8	2-1/2	62630-C6	50.80

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE	
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm						
.031 (1/32)		.0310	**.047** (1.5x)	6	1/8	1-1/2	946131-C6	35.20	
.031 (1/32)		.0310	**.093** (3x)	6	1/8	1-1/2	57831-C6	35.20	
.031 (1/32)		.0310	**.125** (4x)	6	1/8	2-1/2	890131-C6	48.60	
.031 (1/32)		.0310	**.156** (5x)	6	1/8	2-1/2	62631-C6	48.60	
.031 (1/32)		.0310	**.187** (6x)	6	1/8	2-1/2	868531-C6	49.20	
.031 (1/32)		.0310	**.218** (7x)	6	1/8	2-1/2	881331-C6	49.20	
.031 (1/32)		.0310	**.250** (8x)	6	1/8	2-1/2	59031-C6	50.00	
.031 (1/32)		.0310	**.312** (10x)	6	1/8	2-1/2	941831-C6	58.20	
.031 (1/31)		.0310	**.375** (12x)	6	1/8	2-1/2	69131-C6	62.40	
	.8 mm	.0314	**2.40 mm** (3x)	6	4 mm	50 mm	967618-C6	42.40	
	.8 mm	.0314	**4.00 mm** (5x)	6	4 mm	50 mm	974518-C6	49.70	
	.8 mm	.0314	**6.50 mm** (8x)	6	4 mm	50 mm	976118-C6	51.20	
.035		.0350	**.105** (3x)	6	1/8	1-1/2	57835-C6	37.90	
.035		.0350	**.187** (5x)	6	1/8	2-1/2	62635-C6	39.30	
	.9 mm	.0354	**2.70 mm** (3x)	6	4 mm	50 mm	967620-C6	41.30	
	1.0 mm	.0393	**1.50 mm** (1.5x)	6	4 mm	50 mm	846722-C6	41.30	
	1.0 mm	.0393	**3.00 mm** (3x)	6	4 mm	50 mm	967622-C6	41.30	
	1.0 mm	.0393	**5.00 mm** (5x)	6	4 mm	50 mm	974522-C6	51.10	
	1.0 mm	.0393	**8.00 mm** (8x)	6	4 mm	50 mm	976122-C6	53.50	
	1.0 mm	.0393	**10.00 mm** (10x)	6	4 mm	50 mm	938322-C6	60.30	
.040		.0400	**.060** (1.5x)	6	1/8	1-1/2	946140-C6	35.20	
.040		.0400	**.120** (3x)	6	1/8	1-1/2	57840-C6	35.20	
.040		.0400	**.160** (4x)	6	1/8	2-1/2	890140-C6	48.60	NEW
.040		.0400	**.203** (5x)	6	1/8	2-1/2	62640-C6	48.60	
.040		.0400	**.325** (8x)	6	1/8	2-1/2	59040-C6	50.00	
	1.1 mm	.0433	**3.00 mm** (3x)	6	4 mm	50 mm	967624-C6	40.10	
.045		.0450	**.135** (3x)	6	1/8	1-1/2	57845-C6	37.90	
.045		.0450	**.225** (5x)	6	1/8	2-1/2	62645-C6	39.30	
.047 (3/64)		.0470	**.071** (1.5x)	6	1/8	1-1/2	946147-C6	36.00	
.047 (3/64)		.0470	**.141** (3x)	6	1/8	1-1/2	57847-C6	35.20	
.047 (3/64)		.0470	**.187** (4x)	6	1/8	2-1/2	890147-C6	48.60	
.047 (3/64)		.0470	**.250** (5x)	6	1/8	2-1/2	62647-C6	48.60	
.047 (3/64)		.0470	**.281** (6x)	6	1/8	2-1/2	868547-C6	49.20	
.047 (3/64)		.0470	**.328** (7x)	6	1/8	2-1/2	881347-C6	49.20	
.047 (3/64)		.0470	**.375** (8x)	6	1/8	2-1/2	59047-C6	50.00	
.047 (3/64)		.0470	**.480** (10x)	6	1/8	2-1/2	941847-C6	58.20	
.047 (3/64)		.0470	**.570** (12x)	6	1/8	2-1/2	69147-C6	62.40	
	1.2 mm	.0472	**3.50 mm** (3x)	6	4 mm	50 mm	967627-C6	41.30	
	1.2 mm	.0472	**6.00 mm** (5x)	6	4 mm	50 mm	974527-C6	51.10	
	1.2 mm	.0472	**9.50 mm** (8x)	6	4 mm	50 mm	976127-C6	53.50	
.050		.0500	**.075** (1.5x)	7	1/8	1-1/2	946150-C6	36.00	
.050		.0500	**.150** (3x)	7	1/8	1-1/2	57850-C6	35.20	
.050		.0500	**.250** (5x)	7	1/8	2-1/2	62650-C6	48.60	
.050		.0500	**.400** (8x)	7	1/8	2-1/2	59050-C6	50.00	

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	CUTTER DIAMETER D_1 +.00mm −.02mm	CUTTER DIAMETER D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	AlTiN NANO COATED PRICE
	1.3 mm	.0511	**4.00 mm** (3x)	7	4 mm	50 mm	967629-C6	41.30
.055		.0550	**.165** (3x)	7	1/8	1-1/2	57855-C6	37.30
.055		.0550	**.275** (5x)	7	1/8	2-1/2	62655-C6	38.30
	1.4 mm	.0551	**4.00 mm** (3x)	7	4 mm	50 mm	967631-C6	41.30
	1.4 mm	.0551	**7.00 mm** (5x)	7	4 mm	50 mm	974531-C6	51.10
	1.4 mm	.0551	**11.00 mm** (8x)	7	4 mm	50 mm	976131-C6	53.50
	1.5 mm	.0590	**2.20 mm** (1.5x)	7	4 mm	50 mm	846733-C6	39.90
	1.5 mm	.0590	**4.50 mm** (3x)	7	4 mm	50 mm	967633-C6	39.90
	1.5 mm	.0590	**7.50 mm** (5x)	7	4 mm	50 mm	974533-C6	49.70
	1.5 mm	.0590	**12.00 mm** (8x)	7	4 mm	50 mm	976133-C6	52.00
	1.5 mm	.0590	**15.00 mm** (10x)	7	4 mm	50 mm	938333-C6	61.60
.060		.0600	**.090** (1.5x)	7	1/8	1-1/2	946160-C6	34.70
.060		.0600	**.180** (3x)	7	1/8	1-1/2	57860-C6	34.70
.060		.0600	**.312** (5x)	7	1/8	2-1/2	62660-C6	44.90
.060		.0600	**.500** (8x)	7	1/8	2-1/2	59060-C6	46.40
.062 (1/16)		.0620	**.093** (1.5x)	7	1/8	1-1/2	946162-C6	34.70
.062 (1/16)		.0620	**.186** (3x)	7	1/8	1-1/2	57862-C6	34.70
.062 (1/16)		.0620	**.250** (4x)	7	1/8	2-1/2	890162-C6	45.90
.062 (1/16)		.0620	**.312** (5x)	7	1/8	2-1/2	62662-C6	45.90
.062 (1/16)		.0620	**.375** (6x)	7	1/8	2-1/2	868562-C6	46.50
.062 (1/16)		.0620	**.437** (7x)	7	1/8	2-1/2	881362-C6	46.50
.062 (1/16)		.0620	**.500** (8x)	7	1/8	2-1/2	59062-C6	47.30
.062 (1/16)		.0620	**.625** (10x)	7	1/8	2-1/2	941862-C6	59.20
.062 (1/16)		.0620	**.750** (12x)	7	1/8	2-1/2	69162-C6	66.50
.062 (1/16)		.0620	**.950** (15x)	7	1/8	2-1/2	68762-C6	83.60
	1.6 mm	.0629	**5.00 mm** (3x)	7	4 mm	50 mm	967636-C6	39.90
	1.6 mm	.0629	**8.00 mm** (5x)	7	4 mm	50 mm	974536-C6	49.70
	1.6 mm	.0629	**13.00 mm** (8x)	7	4 mm	50 mm	976136-C6	52.00
	1.7 mm	.0669	**5.00 mm** (3x)	7	4 mm	50 mm	967638-C6	39.90
.070		.0700	**.210** (3x)	7	1/8	1-1/2	57870-C6	32.80
.070		.0700	**.375** (5x)	7	1/8	2-1/2	62670-C6	45.90
.070		.0700	**.570** (8x)	7	1/8	2-1/2	59070-C6	47.30
	1.8 mm	.0708	**5.50 mm** (3x)	7	4 mm	50 mm	967640-C6	39.90
	1.8 mm	.0708	**9.00 mm** (5x)	7	4 mm	50 mm	974540-C6	49.70
	1.8 mm	.0708	**14.00 mm** (8x)	7	4 mm	50 mm	976140-C6	52.00
	1.9 mm	.0748	**5.50 mm** (3x)	7	4 mm	50 mm	967642-C6	39.90
.078 (5/64)		.0780	**.117** (1.5x)	7	1/8	1-1/2	946178-C6	32.80
.078 (5/64)		.0780	**.234** (3x)	7	1/8	1-1/2	57878-C6	32.80
.078 (5/64)		.0780	**.312** (4x)	7	1/8	2-1/2	890178-C6	45.90
.078 (5/64)		.0780	**.406** (5x)	7	1/8	2-1/2	62678-C6	45.90
.078 (5/64)		.0780	**.475** (6x)	7	1/8	2-1/2	868578-C6	46.50
.078 (5/64)		.0780	**.550** (7x)	7	1/8	2-1/2	881378-C6	46.50
.078 (5/64)		.0780	**.625** (8x)	7	1/8	2-1/2	59078-C6	47.30
.078 (5/64)		.0780	**.800** (10x)	7	1/8	2-1/2	941878-C6	59.20

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER D_1			LENGTH OF CUT L_2	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED	
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm				TOOL #	PRICE
.078 (5/64)		.0780	**.940** (12x)	7	1/8	2-1/2	69178-C6	66.50
.078 (5/64)		.0780	**1.187** (15x)	7	1/8	2-1/2	68778-C6	83.60
	2.0 mm	.0787	**3.00 mm** (1.5x)	7	4 mm	50 mm	846745-C6	39.90
	2.0 mm	.0787	**6.00 mm** (3x)	7	4 mm	50 mm	967645-C6	39.90
	2.0 mm	.0787	**10.00 mm** (5x)	7	4 mm	50 mm	974545-C6	49.40
	2.0 mm	.0787	**16.00 mm** (8x)	7	4 mm	50 mm	976145-C6	51.70
.080		.0800	**.120** (1.5x)	7	1/8	1-1/2	946180-C6	34.70
.080		.0800	**.240** (3x)	7	1/8	1-1/2	57880-C6	32.80
.080		.0800	**.406** (5x)	7	1/8	2-1/2	62680-C6	45.90
.080		.0800	**.650** (8x)	7	1/8	2-1/2	59080-C6	47.30
.090		.0900	**.270** (3x)	7	1/8	1-1/2	57890-C6	32.80
.090		.0900	**.450** (5x)	7	1/8	2-1/2	62690-C6	45.90
.090		.0900	**.750** (8x)	7	1/8	2-1/2	59090-C6	47.30
.093 (3/32)		.0930	**.074** (0.8x)	7	1/8	1-1/2	836593-C6	35.70
.093 (3/32)		.0930	**.140** (1.5x)	7	1/8	1-1/2	946193-C6	32.80
.093 (3/32)		.0930	**.279** (3x)	7	1/8	1-1/2	57893-C6	32.80
.093 (3/32)		.0930	**.375** (4x)	7	1/8	2-1/2	890193-C6	45.90
.093 (3/32)		.0930	**.500** (5x)	7	1/8	2-1/2	62693-C6	45.90
.093 (3/32)		.0930	**.585** (6x)	7	1/8	2-1/2	868593-C6	46.50
.093 (3/32)		.0930	**.670** (7x)	7	1/8	2-1/2	881393-C6	46.50
.093 (3/32)		.0930	**.750** (8x)	7	1/8	2-1/2	59093-C6	47.30
.093 (3/32)		.0930	**.950** (10x)	7	1/8	2-1/2	941893-C6	59.20
.093 (3/32)		.0930	**1.125** (12x)	7	1/8	2-1/2	69193-C6	66.50
.093 (3/32)		.0930	**1.400** (15x)	7	1/8	3	68793-C6	84.00
	2.5 mm	.0984	**7.50 mm** (3x)	7	4 mm	50 mm	967651-C6	39.90
.100		.1000	**.150** (1.5x)	7	1/8	1-1/2	960100-C6	33.00
.100		.1000	**.300** (3x)	7	1/8	1-1/2	57900-C6	32.80
.100		.1000	**.500** (5x)	7	1/8	2-1/2	62700-C6	45.90
.100		.1000	**.800** (8x)	7	1/8	2-1/2	59100-C6	47.30
.109 (7/64)		.1090	**.327** (3x)	7	1/8	1-1/2	57902-C6	32.80
.109 (7/64)		.1090	**.570** (5x)	7	1/8	2-1/2	62702-C6	45.90
.109 (7/64)		.1090	**.900** (8x)	7	1/8	2-1/2	59102-C6	48.70
	3.0 mm	.1181	**4.50 mm** (1.5x)	7	4 mm	50 mm	846757-C6	39.90
	3.0 mm	.1181	**9.00 mm** (3x)	7	4 mm	50 mm	967657-C6	39.90
	3.0 mm	.1181	**15.00 mm** (5x)	7	4 mm	50 mm	974557-C6	41.20
	3.0 mm	.1181	**24.00 mm** (8x)	7	4 mm	50 mm	976157-C6	44.70

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	LENGTH OF CUT L_2 +.030″ −.000″ +.75mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE
.125 (1/8)		.1250	**.100** (0.8x)	7	1/8	1-1/2	836608-C6	34.40
.125 (1/8)		.1250	**.187** (1.5x)	7	1/8	1-1/2	960108-C6	31.50
.125 (1/8)		.1250	**.375** (3x)	7	1/8	1-1/2	57908-C6	30.90
.125 (1/8)		.1250	**.500** (4x)	7	1/8	2-1/2	890208-C6	45.10
.125 (1/8)		.1250	**.625** (5x)	7	1/8	2-1/2	62708-C6	45.10
.125 (1/8)		.1250	**.750** (6x)	7	1/8	2-1/2	868608-C6	45.80
.125 (1/8)		.1250	**.875** (7x)	7	1/8	2-1/2	881408-C6	45.80
.125 (1/8)		.1250	**1.000** (8x)	7	1/8	2-1/2	59108-C6	46.50
.125 (1/8)		.1250	**1.250** (10x)	7	1/8	2-1/2	941908-C6	58.50
.125 (1/8)		.1250	**1.500** (12x)	7	1/8	3	69208-C6	66.00
.125 (1/8)		.1250	**1.875** (15x)	7	1/8	3	68808-C6	85.20
.140 (9/64)		.1406	**.425** (3x)	7	3/16	2	57909-C6	43.20
.140 (9/64)		.1406	**.750** (5x)	7	3/16	3	62709-C6	45.10
.140 (9/64)		.1406	**1.125** (8x)	7	3/16	3	59109-C6	47.60
.156 (5/32)		.1562	**.235** (1.5x)	7	3/16	2	960110-C6	35.70
.156 (5/32)		.1562	**.470** (3x)	7	3/16	2	57910-C6	35.20
.156 (5/32)		.1562	**.750** (5x)	7	3/16	3	62710-C6	47.50
.156 (5/32)		.1562	**1.250** (8x)	7	3/16	3	59110-C6	50.40
.187 (3/16)		.1875	**.150** (0.8x)	7	3/16	2	836612-C6	38.60
.187 (3/16)		.1875	**.285** (1.5x)	7	3/16	2	960112-C6	35.70
.187 (3/16)		.1875	**.570** (3x)	7	3/16	2	57912-C6	35.20
.187 (3/16)		.1875	**.750** (4x)	7	3/16	3	890212-C6	47.50
.187 (3/16)		.1875	**1.000** (5x)	7	3/16	3	62712-C6	47.50
.187 (3/16)		.1875	**1.156** (6x)	7	3/16	3	868612-C6	49.80
.187 (3/16)		.1875	**1.312** (7x)	7	3/16	3	881412-C6	49.80
.187 (3/16)		.1875	**1.500** (8x)	7	3/16	3	59112-C6	50.60
	6.0 mm	.2362	**18.00 mm** (3x)	7	6 mm	63 mm	967666-C6	44.90
	6.0 mm	.2362	**30.00 mm** (5x)	7	6 mm	63 mm	974566-C6	47.60
.250 (1/4)		.2500	**.200** (0.8x)	7	1/4	2-1/2	836616-C6	49.40
.250 (1/4)		.2500	**.375** (1.5x)	7	1/4	2-1/2	960116-C6	46.40
.250 (1/4)		.2500	**.750** (3x)	7	1/4	2-1/2	57916-C6	45.70
.250 (1/4)		.2500	**1.000** (4x)	7	1/4	4	890216-C6	58.20
.250 (1/4)		.2500	**1.250** (5x)	7	1/4	4	62716-C6	58.20
.250 (1/4)		.2500	**1.500** (6x)	7	1/4	4	868616-C6	60.90
.250 (1/4)		.2500	**1.750** (7x)	7	1/4	4	881416-C6	60.90
.250 (1/4)		.2500	**2.000** (8x)	7	1/4	4	59116-C6	61.60
.312 (5/16)		.3125	**.470** (1.5x)	7	5/16	2-1/2	960120-C6	62.70
.312 (5/16)		.3125	**1.000** (3x)	7	5/16	2-1/2	57920-C6	61.90
.375 (3/8)		.3750	**.570** (1.5x)	7	3/8	2-1/2	960124-C6	71.20
.375 (3/8)		.3750	**1.125** (3x)	7	3/8	2-1/2	57924-C6	70.60
.375 (3/8)		.3750	**2.000** (5x)	7	3/8	4	62724-C6	89.60
.500 (1/2)		.5000	**.750** (1.5x)	7	1/2	3	960132-C6	91.50
.500 (1/2)		.5000	**1.500** (3x)	7	1/2	3	57932-C6	91.50

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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SPEEDS & FEEDS (Finishers for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300 300 - 350	400 350	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
	350 - 400	250	Finishing (0.8x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00085	.00127	.00169	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00009	.00019	.00029	.00038	.00048	.00057	.00077	.00115	.00154	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00140	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00008	.00017	.00025	.00033	.00042	.00050	.00067	.00100	.00134	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00006	.00012	.00018	.00024	.00030	.00035	.00048	.00071	.00095	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00062	.00083	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00005	.00010	.00014	.00019	.00024	.00029	.00039	.00058	.00077	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00009	.00014	.00018	.00023	.00027	.00036	.00054	.00073	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00016	.00020	.00023	.00032	.00047	.00063	< .02x Dia	.5x - 15x Dia
	400 - 540	200	Finishing (0.8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00125	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00007	.00014	.00021	.00028	.00035	.00042	.00057	.00085	.00114	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00007	.00013	.00020	.00027	.00034	.00040	.00054	.00081	.00109	< .10x Dia	.5x - 5x Dia
			Finishing (5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00077	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00050	.00067	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00004	.00008	.00012	.00016	.00020	.00023	.00031	.00047	.00063	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00007	.00011	.00015	.00018	.00022	.00030	.00044	.00059	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00007	.00011	.00014	.00018	.00021	.00028	.00043	.00057	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00013	.00016	.00019	.00026	.00038	.00051	< .02x Dia	.5x - 15x Dia

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

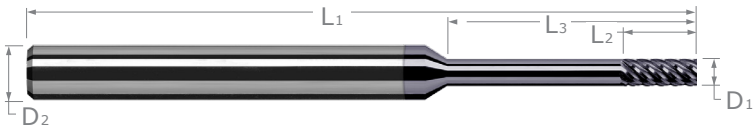
continued from previous page

SPEEDS & FEEDS (Finishers for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Titanium: All alloys	275 - 300 300 - 350	300 200	Finishing (0.8x LOC)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00070	.00094	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00078	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00009	.00014	.00018	.00023	.00028	.00037	.00055	.00074	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00007	.00010	.00013	.00016	.00020	.00026	.00039	.00053	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00034	.00046	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00003	.00005	.00008	.00011	.00013	.00016	.00021	.00032	.00043	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00005	.00008	.00010	.00013	.00015	.00020	.00030	.00040	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00005	.00007	.00010	.00012	.00014	.00019	.00029	.00039	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00009	.00011	.00013	.00017	.00026	.00035	< .02x Dia	.5x - 15x Dia
	350 - 400 400 - 425	150 100	Finishing (0.8x LOC)	.00005	.00009	.00014	.00019	.00023	.00028	.00038	.00056	.00075	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00051	.00068	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00046	.00062	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00007	.00011	.00015	.00019	.00022	.00030	.00044	.00059	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00006	.00009	.00012	.00015	.00017	.00023	.00035	.00047	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00032	.00042	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00002	.00005	.00007	.00009	.00011	.00014	.00018	.00028	.00037	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00032	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00007	.00009	.00010	.00014	.00021	.00028	< .02x Dia	.5x - 15x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300 300 - 350	150 100	Finishing (0.8x LOC)	.00002	.00005	.00007	.00010	.00012	.00015	.00020	.00029	.00039	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00007	.00009	.00011	.00013	.00018	.00027	.00036	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00033	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00015	.00020	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00005	.00006	.00007	.00009	.00014	.00018	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00007	.00011	.00015	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00011	.00015	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00002	.00002	.00003	.00004	.00005	.00007	.00010	.00013	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00003	.00004	.00004	.00006	.00009	.00011	< .01x Dia	.5x - 15x Dia
	350 - 400 400 - 425	80 60	Finishing (0.8x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00031	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00003	.00005	.00006	.00008	.00010	.00013	.00019	.00026	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00001	.00003	.00004	.00006	.00007	.00009	.00011	.00017	.00023	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00004	.00005	.00005	.00007	.00011	.00015	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00001	.00002	.00003	.00004	.00004	.00006	.00009	.00012	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00009	.00012	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00006	.00008	.00011	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00010	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00002	.00003	.00003	.00005	.00007	.00009	< .01x Dia	.5x - 15x Dia

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square – Long Reach



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities and increased rigidity
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.045	**.078** (5x)	4	1/8	2-1/2	940715-C6	56.40
.015 (1/64)		.0150	.045	**.125** (8x)	4	1/8	2-1/2	962115-C6	58.30
.015 (1/64)		.0150	.045	**.187** (12x)	4	1/8	2-1/2	951815-C6	61.50
.020		.0200	.060	**.160** (8x)	4	1/8	2-1/2	962120-C6	51.00
.025		.0250	.075	**.203** (8x)	4	1/8	2-1/2	962125-C6	51.00
.031 (1/32)		.0310	.093	**.156** (5x)	6	1/8	2-1/2	940731-C6	49.70
.031 (1/32)		.0310	.093	**.250** (8x)	6	1/8	2-1/2	962131-C6	51.00
.031 (1/32)		.0310	.093	**.312** (10x)	6	1/8	2-1/2	862831-C6	52.70
.031 (1/32)		.0310	.093	**.375** (12x)	6	1/8	2-1/2	951831-C6	54.20
	1.0 mm	.0393	3.00 mm	**8.0 mm** (8x)	6	4 mm	50 mm	924722-C6	51.50
.040		.0400	.120	**.325** (8x)	6	1/8	2-1/2	962140-C6	51.00
.047 (3/64)		.0470	.141	**.250** (5x)	6	1/8	2-1/2	940747-C6	49.70
.047 (3/64)		.0470	.141	**.375** (8x)	6	1/8	2-1/2	962147-C6	51.00
.047 (3/64)		.0470	.141	**.570** (12x)	6	1/8	2-1/2	951847-C6	54.20
.050		.0500	.150	**.400** (8x)	7	1/8	2-1/2	962150-C6	51.00
	1.5 mm	.0590	4.50 mm	**12.0 mm** (8x)	7	4 mm	50 mm	924733-C6	51.50
.060		.0600	.180	**.500** (8x)	7	1/8	2-1/2	962160-C6	51.00
.062 (1/16)		.0620	.186	**.312** (5x)	7	1/8	2-1/2	940762-C6	47.50
.062 (1/16)		.0620	.186	**.500** (8x)	7	1/8	2-1/2	962162-C6	48.90
.062 (1/16)		.0620	.186	**.625** (10x)	7	1/8	2-1/2	862862-C6	50.60
.062 (1/16)		.0620	.186	**.750** (12x)	7	1/8	2-1/2	951862-C6	52.20
.070		.0700	.210	**.570** (8x)	7	1/8	2-1/2	962170-C6	48.90
.078 (5/64)		.0780	.234	**.406** (5x)	7	1/8	2-1/2	940778-C6	47.50
.078 (5/64)		.0780	.234	**.625** (8x)	7	1/8	2-1/2	962178-C6	48.90
.078 (5/64)		.0780	.234	**.940** (12x)	7	1/8	2-1/2	951878-C6	52.20
	2.0 mm	.0787	6.00 mm	**16.0 mm** (8x)	7	4 mm	50 mm	924745-C6	49.40
.080		.0800	.240	**.650** (8x)	7	1/8	2-1/2	962180-C6	48.90
.090		.0900	.270	**.750** (8x)	7	1/8	2-1/2	962190-C6	48.90
.093 (3/32)		.0930	.279	**.500** (5x)	7	1/8	2-1/2	940793-C6	47.50
.093 (3/32)		.0930	.279	**.750** (8x)	7	1/8	2-1/2	962193-C6	48.90
.093 (3/32)		.0930	.279	**.950** (10x)	7	1/8	2-1/2	862893-C6	50.60
.093 (3/32)		.0930	.279	**1.125** (12x)	7	1/8	2-1/2	951893-C6	52.20
.100		.1000	.300	**.800** (8x)	7	1/8	2-1/2	962200-C6	48.90
.109 (7/64)		0.1094	.327	**.570** (5x)	7	1/8	2-1/2	940802-C6	47.50
.109 (7/64)		0.1094	.327	**.900** (8x)	7	1/8	2-1/2	962202-C6	48.90
	3.0 mm	.1181	9.00 mm	**24.0 mm** (8x)	7	4 mm	50 mm	924757-C6	49.40

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square – Long Reach (cont.)

continued from previous page

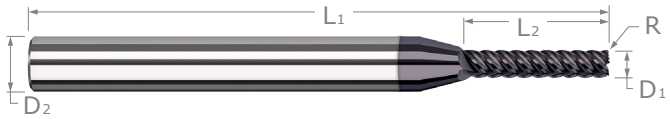
CUTTER DIAMETER		LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$		L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.375	**.625** (5x)	7	1/8	2-1/2	940808-C6	45.90
.125 (1/8)	.1250	.375	**1.000** (8x)	7	1/8	2-1/2	962208-C6	47.20
.125 (1/8)	.1250	.375	**1.250** (10x)	7	1/8	3	862908-C6	48.70
.125 (1/8)	.1250	.375	**1.500** (12x)	7	1/8	3	951908-C6	50.20
.156 (5/32)	.1562	.470	**.750** (5x)	7	3/16	3	940810-C6	45.90
.156 (5/32)	.1562	.470	**1.250** (8x)	7	3/16	3	962210-C6	47.20
.187 (3/16)	.1875	.570	**1.000** (5x)	7	3/16	3	940812-C6	48.60
.250 (1/4)	.2500	.750	**1.250** (5x)	7	1/4	4	940816-C6	58.70
.250 (1/4)	.2500	.750	**2.000** (8x)	7	1/4	4	962216-C6	60.60

SPEEDS & FEEDS (Finishers – Long Reach for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	400	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	<.07x Dia	.5x - 3x Dia
	300 - 350	350	Finishing (10x Reach)	.00007	.00015	.00023	.00030	.00038	.00046	.00061	.00092	.00123	< .06x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	<.05x Dia	.5x - 3x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	<.07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00007	.00015	.00023	.00030	.00038	.00046	.00061	.00092	.00123	< .06x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	<.05x Dia	.5x - 3x Dia
	350 - 400	250	Finishing (5x Reach)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00126	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00006	.00013	.00020	.00026	.00033	.00039	.00052	.00078	.00105	<.07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00006	.00012	.00018	.00024	.00031	.00037	.00049	.00074	.00098	< .06x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00071	.00095	<.05x Dia	.5x - 3x Dia
	400 - 540	200	Finishing (5x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00077	.00102	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00005	.00011	.00016	.00021	.00027	.00032	.00042	.00064	.00085	<.07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00005	.00010	0.00015	.00020	.00025	.00030	.00040	.00060	.00080	< .06x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00005	.00010	.00014	.00019	.00024	.00029	.00038	.00057	.00077	<.05x Dia	.5x - 3x Dia
Titanium: All alloys	275 - 300	300	Finishing (5x Reach)	.00004	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	<.07x Dia	.5x - 3x Dia
	300 - 350	200	Finishing (10x Reach)	.00003	.00007	.00010	.00013	.00017	.00020	.00027	.00041	.00054	< .06x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	<.05x Dia	.5x - 3x Dia
	350 - 400	150	Finishing (5x Reach)	.00003	.00007	.00010	.00014	.00017	.00021	.00028	.00042	.00056	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00035	.00046	<.07x Dia	.5x - 3x Dia
	400 - 425	100	Finishing (10x Reach)	.00003	.00005	.00008	.00011	.00014	.00016	.00022	.00033	.00044	< .06x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00031	.00042	<.05x Dia	.5x - 3x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	150	Finishing (5x Reach)	.00002	.00004	.00005	.00007	.00009	.00011	.00015	.00022	.00029	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00001	.00002	.00003	.00004	.00005	.00007	.00009	.00013	.00018	<.05x Dia	.5x - 3x Dia
	300 - 350	100	Finishing (10x Reach)	.00001	.00002	.00003	.00004	.00005	.00005	.00007	.00011	.00015	< .04x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	<.03x Dia	.5x - 3x Dia
	350 - 400	80	Finishing (5x Reach)	.00001	.00003	.00004	.00006	.00007	.00009	.00012	.00018	.00023	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00011	.00014	<.05x Dia	.5x - 3x Dia
	400 - 425	60	Finishing (10x Reach)	.00001	.00001	.00002	.00003	.00004	.00004	.00006	.00009	.00012	< .04x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00011	<.03x Dia	.5x - 3x Dia

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Corner Radius



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.031 (1/32)	**.005**	.093 (3x)	6	1/8	1-1/2	873031-C6	37.30
.031 (1/32)	**.005**	.156 (5x)	6	1/8	2-1/2	874631-C6	50.80
.047 (3/64)	**.005**	.141 (3x)	6	1/8	1-1/2	873047-C6	37.30
.047 (3/64)	**.005**	.250 (5x)	6	1/8	2-1/2	874647-C6	50.80
.047 (3/64)	**.010**	.141 (3x)	6	1/8	1-1/2	882647-C6	37.30
.047 (3/64)	**.010**	.250 (5x)	6	1/8	2-1/2	885447-C6	50.80
.062 (1/16)	**.005**	.186 (3x)	7	1/8	1-1/2	873062-C6	37.10
.062 (1/16)	**.005**	.312 (5x)	7	1/8	2-1/2	874662-C6	48.60
.062 (1/16)	**.010**	.186 (3x)	7	1/8	1-1/2	882662-C6	37.10
.062 (1/16)	**.010**	.312 (5x)	7	1/8	2-1/2	885462-C6	48.60
.078 (5/64)	**.005**	.234 (3x)	7	1/8	1-1/2	873078-C6	35.40
.078 (5/64)	**.005**	.406 (5x)	7	1/8	2-1/2	874678-C6	48.60
.078 (5/64)	**.010**	.234 (3x)	7	1/8	1-1/2	882678-C6	35.40
.078 (5/64)	**.010**	.406 (5x)	7	1/8	2-1/2	885478-C6	48.60
.093 (3/32)	**.005**	.279 (3x)	7	1/8	1-1/2	873093-C6	35.40
.093 (3/32)	**.005**	.500 (5x)	7	1/8	2-1/2	874693-C6	48.60
.093 (3/32)	**.010**	.279 (3x)	7	1/8	1-1/2	882693-C6	35.40
.093 (3/32)	**.010**	.500 (5x)	7	1/8	2-1/2	885493-C6	48.60

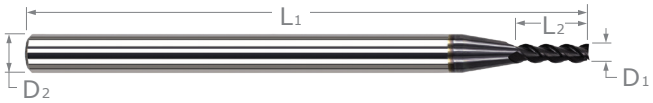
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	**.005**	.187 (1.5x)	7	1/8	1-1/2	872308-C6	32.40
.125 (1/8)	**.005**	.375 (3x)	7	1/8	1-1/2	873108-C6	32.10
.125 (1/8)	**.010**	.187 (1.5x)	7	1/8	1-1/2	880108-C6	32.40
.125 (1/8)	**.010**	.375 (3x)	7	1/8	1-1/2	882708-C6	32.10
.125 (1/8)	**.015**	.375 (3x)	7	1/8	1-1/2	813808-C6	32.10
.125 (1/8)	**.030**	.187 (1.5x)	7	1/8	1-1/2	890508-C6	32.40
.125 (1/8)	**.030**	.375 (3x)	7	1/8	1-1/2	892708-C6	32.10
.187 (3/16)	**.005**	.285 (1.5x)	7	3/16	2	872312-C6	36.50
.187 (3/16)	**.005**	.570 (3x)	7	3/16	2	873112-C6	36.00
.187 (3/16)	**.010**	.285 (1.5x)	7	3/16	2	880112-C6	36.50
.187 (3/16)	**.010**	.570 (3x)	7	3/16	2	882712-C6	36.00
.187 (3/16)	**.015**	.570 (3x)	7	3/16	2	813812-C6	36.00
.187 (3/16)	**.030**	.285 (1.5x)	7	3/16	2	890512-C6	36.50
.187 (3/16)	**.030**	.570 (3x)	7	3/16	2	892712-C6	36.00
.250 (1/4)	**.005**	.375 (1.5x)	7	1/4	2-1/2	872316-C6	47.00
.250 (1/4)	**.005**	.750 (3x)	7	1/4	2-1/2	873116-C6	46.20
.250 (1/4)	**.010**	.375 (1.5x)	7	1/4	2-1/2	880116-C6	47.00
.250 (1/4)	**.010**	.750 (3x)	7	1/4	2-1/2	882716-C6	46.20
.250 (1/4)	**.015**	.750 (3x)	7	1/4	2-1/2	813816-C6	46.20
.250 (1/4)	**.030**	.375 (1.5x)	7	1/4	2-1/2	890516-C6	47.00
.250 (1/4)	**.030**	.750 (3x)	7	1/4	2-1/2	892716-C6	46.20

PLEASE SEE SPEEDS & FEEDS ON PAGE 134

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER D_1			LENGTH OF CUT L_2	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED	
+.0005" −.0005"	+.00mm −.02mm	decimal equivalent	+.010" −.000" +.25mm −.00mm				TOOL #	PRICE
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	964910-C3	51.20
.010		.0100	**.030** (3x)	3	1/8	1-1/2	958510-C3	51.20
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	964915-C3	41.70
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	958515-C3	41.70
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	952615-C3	51.20
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	945911-C3	40.10
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	964920-C3	36.60
.020		.0200	**.060** (3x)	3	1/8	1-1/2	958520-C3	36.60
.020		.0200	**.100** (5x)	3	1/8	2-1/2	952620-C3	45.10
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	964925-C3	35.20
.025		.0250	**.075** (3x)	3	1/8	1-1/2	958525-C3	35.20
.025		.0250	**.125** (5x)	3	1/8	2-1/2	952625-C3	43.70
.030		.0300	**.090** (3x)	3	1/8	1-1/2	958530-C3	35.00
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	964931-C3	29.70
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	958531-C3	29.70
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	952631-C3	38.20
.035		.0350	**.053** (1.5x)	3	1/8	1-1/2	964935-C3	29.70
.035		.0350	**.105** (3x)	3	1/8	1-1/2	958535-C3	29.70
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	945922-C3	33.30
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	964940-C3	29.90
.040		.0400	**.120** (3x)	3	1/8	1-1/2	958540-C3	29.90
.040		.0400	**.203** (5x)	3	1/8	2-1/2	952640-C3	38.40
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	964945-C3	29.90
.045		.0450	**.135** (3x)	3	1/8	1-1/2	958545-C3	29.90
.045		.0450	**.225** (5x)	3	1/8	2-1/2	952645-C3	38.40
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	964947-C3	29.70
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	958547-C3	29.70
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	952647-C3	38.20
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	964950-C3	29.90
.050		.0500	**.150** (3x)	3	1/8	1-1/2	958550-C3	29.90
.055		.0550	**.165** (3x)	3	1/8	1-1/2	958555-C3	29.70
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	945933-C3	31.50
.060		.0600	**.180** (3x)	3	1/8	1-1/2	958560-C3	30.80
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	835762-C3	30.70
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	964962-C3	27.80
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	958562-C3	27.80
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	814862-C3	32.10
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	952662-C3	36.50
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	964970-C3	27.80
.070		.0700	**.210** (3x)	3	1/8	1-1/2	958570-C3	27.80
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	964978-C3	27.80
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	958578-C3	27.80
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	952678-C3	36.50

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square (cont.)

continued from previous page

mm & in

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED TOOL #	PRICE	
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	945945-C3	31.50	
.080		.0800	**.240** (3x)	3	1/8	1-1/2	958580-C3	27.80	
.090		.0900	**.270** (3x)	3	1/8	1-1/2	958590-C3	27.80	
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	835793-C3	30.70	
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	964993-C3	27.80	
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	958593-C3	27.80	
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	814893-C3	32.10	
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	952693-C3	36.50	
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	965000-C3	27.80	
.100		.1000	**.300** (3x)	3	1/8	1-1/2	958600-C3	27.80	
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	965002-C3	27.80	
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	958602-C3	27.80	
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	945957-C3	31.50	

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	835808-C3	29.60	
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	965008-C3	26.70	
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	958608-C3	26.70	
.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	814908-C3	33.50	
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	952708-C3	36.30	
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	965009-C3	37.90	
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	958609-C3	37.90	
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	965010-C3	28.80	
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	958610-C3	28.80	
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	952710-C3	38.80	
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	835812-C3	31.60	
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	965012-C3	28.80	
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	958612-C3	28.80	
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	952712-C3	38.80	
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	945972-C3	31.50	
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	965016-C3	36.50	
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	958616-C3	36.50	
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	952716-C3	42.20	NEW
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	958624-C3	45.60	NEW

SPEEDS & FEEDS (Variable Helix for Medium Alloy Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

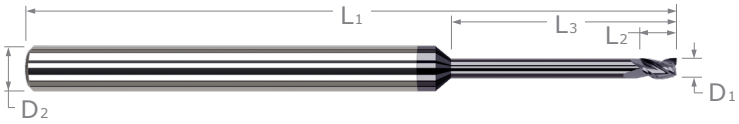
Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00008	.00017	.00026	.00035	.00043	.00052	.00066	.00099	.00133	.00174	.00209	.00278
Roughing	.00010	.00021	.00032	.00042	.00052	.00062	.00080	.00120	.00160	.00210	.00252	.00336
Finishing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00193	.00252	.00303	.00404
Max	.00016	.00032	.00049	.00064	.00081	.00097	.00124	.00185	.00248	.00324	.00390	.00520

Radial Depth of Cut*:	Axial Depth of Cut*:
Slotting: 1x Dia	Slotting: .5x Dia
Roughing: .5x Dia	Roughing: .5x - 1x Dia
Finishing: .1x Dia	Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	936115-C3	54.40
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	933815-C3	55.80
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	936120-C3	52.40
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	933820-C3	53.60
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	936125-C3	51.00
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	933825-C3	52.40
.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	936130-C3	48.00
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	933830-C3	49.10
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	945331-C3	46.50
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	936131-C3	48.00
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	933831-C3	49.10
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	931131-C3	51.50
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	886422-C3	50.80
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	887122-C3	52.20
.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	936140-C3	50.80
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	933840-C3	52.20
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	936147-C3	48.00
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	933847-C3	49.10
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	945362-C3	46.80
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	936162-C3	47.80
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	933862-C3	49.10
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	931162-C3	51.50
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	936178-C3	47.80
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	933878-C3	49.10
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	886445-C3	50.80
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	887145-C3	52.20
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	945393-C3	46.80
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	936193-C3	47.80
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	933893-C3	49.10
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	931193-C3	51.50

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute (cont.)

mm & in

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	936200-C3	50.80
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	933900-C3	52.20
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	936202-C3	50.80
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	933902-C3	52.20
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	886457-C3	52.00
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	887157-C3	53.20

D_1 +.000″ −.002″		L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	945408-C3	46.80
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	936208-C3	47.20
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	933908-C3	48.60
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	931208-C3	49.40
.156 (5/32)	.1562	.235	**.750** (5x)	4	3/16	3	936210-C3	52.40
.187 (3/16)	.1875	.285	**1.000** (5x)	4	3/16	3	936212-C3	52.40
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	936216-C3	58.50

PLEASE SEE SPEEDS & FEEDS ON PAGE 146

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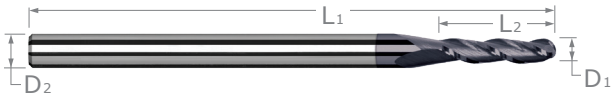
VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	974804-C3	59.30
.010		.0100	**.030** (3x)	3	1/8	1-1/2	971810-C3	57.90
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	963015-C3	48.90
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	971815-C3	48.90
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	974809-C3	51.40
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	974811-C3	44.30
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	963020-C3	44.30
.020		.0200	**.060** (3x)	3	1/8	1-1/2	971820-C3	43.90
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	974813-C3	42.90
.025		.0250	**.075** (3x)	3	1/8	1-1/2	971825-C3	42.50
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	883931-C3	39.50
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	963031-C3	36.80
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	971831-C3	36.80
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	888631-C3	46.10
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	974818-C3	37.30
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	929222-C3	37.30
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	974822-C3	37.30
.040		.0400	**.120** (3x)	3	1/8	1-1/2	971840-C3	36.80
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	883947-C3	40.30
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	963047-C3	36.80
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	971847-C3	36.80
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	974827-C3	37.30
.050		.0500	**.150** (3x)	3	1/8	1-1/2	971850-C3	36.80
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	974831-C3	37.30
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	974833-C3	35.20
.060		.0600	**.180** (3x)	3	1/8	1-1/2	971860-C3	36.80
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	883962-C3	37.30
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	963062-C3	34.80
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	971862-C3	34.80
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	888662-C3	43.90
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	974836-C3	35.20
.070		.0700	**.210** (3x)	3	1/8	1-1/2	971870-C3	34.80
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	974840-C3	35.20
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	883978-C3	39.30
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	963078-C3	34.80
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	971878-C3	34.80

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball (cont.)

mm & in

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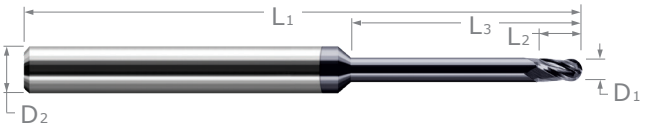
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	974845-C3	35.20
.080		.0800	**.240** (3x)	3	1/8	1-1/2	971880-C3	34.80
.090		.0900	**.270** (3x)	3	1/8	1-1/2	971890-C3	34.80
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	883993-C3	37.30
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	963093-C3	34.80
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	971893-C3	34.80
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	888693-C3	43.90
.100		.1000	**.300** (3x)	3	1/8	1-1/2	971900-C3	34.80
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	971902-C3	34.80
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	929257-C3	35.40
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	974857-C3	35.40

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.100** (0.8x)	4	1/8	1-1/2	884008-C3	37.30
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	963108-C3	33.30
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	971908-C3	33.30
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	888708-C3	43.90
.140 (9/64)	.1406	**.425** (3x)	4	3/16	2	971909-C3	46.10
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	963110-C3	37.10
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	971910-C3	37.10
.187 (3/16)	.1875	**.150** (0.8x)	4	3/16	2	884012-C3	39.80
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	963112-C3	35.50
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	971912-C3	35.50
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	963116-C3	43.40
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	971916-C3	43.40

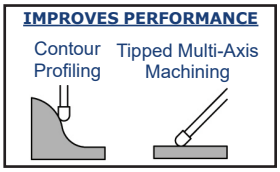
PLEASE SEE SPEEDS & FEEDS ON PAGE 140

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA



mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	64215-C3	61.50
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56615-C3	62.70
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	65415-C3	66.50
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	984709-C3	66.50
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	971009-C3	67.70
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	988309-C3	73.10
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	984711-C3	64.00
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	971011-C3	65.50
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	988311-C3	70.70
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	979511-C3	73.70
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	64220-C3	58.70
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56620-C3	59.90
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	65420-C3	64.30
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	984713-C3	62.60
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	971013-C3	63.80
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	988313-C3	68.00
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	64225-C3	57.30
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56625-C3	58.30
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	65425-C3	63.10
.031 (1/32)		.0310	.046	**.156** (5x)	4	1/8	2-1/2	64231-C3	53.60
.031 (1/32)		.0310	.046	**.250** (8x)	4	1/8	2-1/2	56631-C3	54.80
.031 (1/32)		.0310	.046	**.375** (12x)	4	1/8	2-1/2	65431-C3	56.80
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	984718-C3	58.50
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	971018-C3	59.60
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	988318-C3	61.60
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	984722-C3	58.50
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	971022-C3	59.60
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	988322-C3	61.60
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	979522-C3	64.40
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	64247-C3	53.60
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56647-C3	54.80
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	65447-C3	56.80

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	984733-C3	58.50
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	971033-C3	59.60
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	988333-C3	61.60
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	979533-C3	64.40
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	64262-C3	53.60
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56662-C3	54.80
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	65462-C3	56.80
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	64278-C3	53.60
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56678-C3	54.80
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	65478-C3	56.80
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	984745-C3	58.50
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	971045-C3	59.60
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	988345-C3	61.60
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	979545-C3	64.40
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	64293-C3	53.60
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56693-C3	54.80
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	65493-C3	56.80
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	984757-C3	55.80

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	64308-C3	53.00
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56708-C3	54.20
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	65508-C3	56.80
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	64310-C3	58.30
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56710-C3	59.60
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	64312-C3	59.00
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56712-C3	60.10
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	64316-C3	65.00
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56716-C3	66.30

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Medium Alloy Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 16x, reduce to 75%) For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

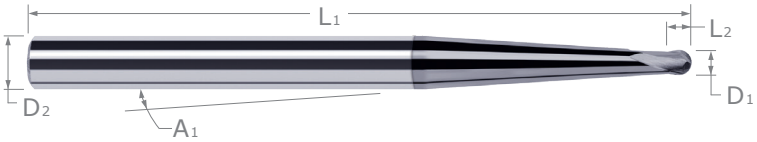
	Chip Load Per Tooth (IPT) By Cutter Diameter								
	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00007	.00014	.00021	.00028	.00035	.00041	.00053	.00079	.00106
Roughing	.00008	.00017	.00025	.00033	.00042	.00050	.00064	.00096	.00128
Finishing	.00010	.00020	.00030	.00040	.00050	.00060	.00077	.00115	.00154
Max	.00012	.00026	.00039	.00052	.00065	.00077	.00099	.00148	.00198

Radial Depth of Cut*:	Axial Depth of Cut*:
Slotting: 1x Dia	Slotting: .35x Dia
Roughing: .35x Dia	Roughing: .5x - 1x Dia
Finishing: .1x Dia	Finishing: .5x - 1x Dia

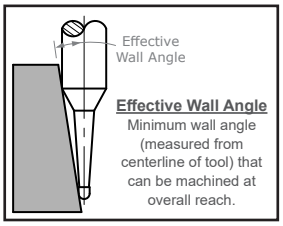
* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters)



Excellent in Readily Machinable Mold Steels, Stainless Steels, & Tool Steels



- Very short length of cut and solid tapered neck for maximum rigidity
- Ideal for contour machining of mold and die cavities
- 35° helix for increased cutting performance
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
0° (straight neck)	.062 (1/16)	.050	I	.500	**.610**	6.2°	3/16	2	882843-C6	54.80
	.062 (1/16)	.050	I	1.000	**1.110**	3.3°	3/16	2-1/2	882850-C6	59.90
	.093 (3/32)	.074	I	.750	**.833**	3.4°	3/16	2	882864-C6	54.80
	.093 (3/32)	.074	I	1.125	**1.208**	2.3°	3/16	2-1/2	882871-C6	59.90
	.125 (1/8)	.100	I	1.000	**1.058**	1.8°	3/16	2-1/2	882877-C6	59.90
	.125 (1/8)	.100	I	1.750	**1.808**	1.0°	3/16	3	882885-C6	61.70
1°	.062 (1/16)	.050	I	.500	**.595**	6.4°	3/16	2	927543-C6	54.40
	.062 (1/16)	.050	I	1.000	**1.080**	3.5°	3/16	2-1/2	927550-C6	59.40
	.093 (3/32)	.074	I	.750	**.811**	3.6°	3/16	2	927564-C6	54.40
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	927571-C6	59.40
	.125 (1/8)	.100	I	1.000	**1.027**	1.9°	3/16	2	927577-C6	56.60
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	927585-C6	61.40
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	927587-C6	72.10
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	927592-C6	77.00
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	19001-C6	61.20
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	19008-C6	61.20
	.031 (1/32)	.025	I	.250	**.375**	12.3°	3/16	2	19015-C6	60.40
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	19022-C6	60.40
	.039 (1 mm)	.031	I	.375	**.488**	9.0°	3/16	2	19025-C6	57.20
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	19029-C6	57.20
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	19036-C6	57.20
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	19043-C6	54.40
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	19050-C6	59.40
	.062 (1/16)	.050	I	1.500	**1.543**	2.4°	3/16	3	19053-C6	61.70
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	19057-C6	54.40
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	19064-C6	54.40
	.093 (3/32)	.074	I	1.500	**1.517**	1.9°	3/16	2-1/2	19066-C6	59.40
	.093 (3/32)	.074	II	1.878	**1.878**	1.5°	3/16	3	19068-C6	61.70
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	19071-C6	56.60
	.125 (1/8)	.100	II	2.487	**2.487**	1.5°	1/4	4	19078-C6	66.50
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	19085-C6	60.90
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	19092-C6	78.40

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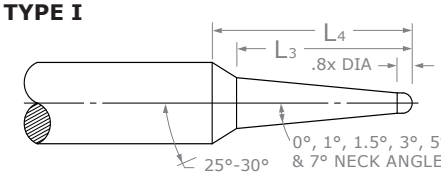
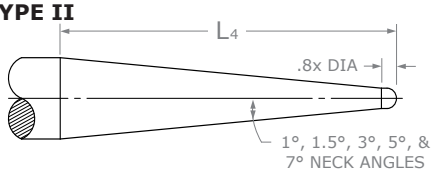
TYPE I



TYPE II



HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters) (cont.)

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NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
	.015 (1/64)	.012	I	.156	**.292**	16.8°	3/16	2-1/2	36901-C6	65.80
	.015 (1/64)	.012	I	.375	**.491**	10.1°	3/16	2-1/2	66643-C6	61.70
	.015 (1/64)	.012	I	.875	**.946**	5.3°	3/16	2-1/2	66648-C6	61.70
	.020	.016	I	.250	**.374**	13.0°	3/16	2-1/2	36904-C6	65.80
	.020	.016	I	.500	**.601**	8.1°	3/16	2-1/2	36907-C6	65.80
	.025	.020	I	.250	**.370**	12.8°	3/16	2-1/2	36910-C6	65.50
	.025	.020	I	.500	**.597**	7.9°	3/16	2-1/2	36913-C6	65.50
	.031 (1/32)	.025	I	.312	**.421**	10.9°	3/16	2-1/2	36916-C6	65.50
	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	67046-C6	54.20
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	36931-C6	54.20
	.039 (1 mm)	.031	I	.375	**.472**	9.3°	3/16	2-1/2	36917-C6	65.50
	.039 (1 mm)	.031	I	.750	**.813**	5.4°	3/16	2-1/2	36919-C6	65.50
	.039 (1 mm)	.031	II	1.448	**1.448**	3.0°	3/16	2-1/2	36921-C6	65.50
	.047 (3/64)	.038	I	.375	**.466**	9.0°	3/16	2-1/2	36922-C6	62.70
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	67348-C6	51.20
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	36947-C6	51.20
	.050	.040	I	.500	**.577**	7.1°	3/16	2-1/2	36925-C6	62.70
	.060	.048	I	.625	**.683**	5.6°	3/16	2-1/2	36928-C6	62.70
	.062 (1/16)	.050	I	.375	**.454**	8.4°	3/16	2-1/2	36934-C6	59.10
3°	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	66946-C6	51.20
	.062 (1/16)	.050	I	.875	**.909**	4.1°	3/16	2-1/2	36937-C6	59.10
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	36962-C6	51.20
	.062 (1/16)	.050	II	1.843	**1.843**	3.0°	1/4	3	37362-C6	67.60
	.078 (5/64)	.062	I	.500	**.555**	6.1°	3/16	2-1/2	36940-C6	59.10
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	36978-C6	49.80
	.093 (3/32)	.074	I	.625	**.657**	4.5°	3/16	2	36943-C6	54.40
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	36993-C6	45.40
	.093 (3/32)	.074	II	1.572	**1.572**	3.0°	1/4	3	37393-C6	65.80
	.100	.080	II	1.511	**1.511**	3.0°	1/4	3	37400-C6	68.00
	.109 (7/64)	.087	II	1.432	**1.432**	3.0°	1/4	3	37402-C6	68.00
	.118 (3 mm)	.094	II	1.354	**1.354**	2.9°	1/4	2-1/2	37405-C6	68.00
	.125 (1/8)	.100	I	.875	**.913**	4.2°	1/4	2-1/2	36946-C6	65.00
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	37408-C6	61.90
	.125 (1/8)	.100	II	2.485	**2.485**	3.0°	3/8	4	37708-C6	96.90
	.156 (5/32)	.125	II	1.020	**1.020**	2.8°	1/4	2-1/2	37410-C6	67.60
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	37412-C6	66.90
	.187 (3/16)	.150	II	1.343	**1.343**	2.9°	5/16	2-1/2	36949-C6	78.40
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	37712-C6	96.90
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	37716-C6	80.80
	.015 (1/64)	.012	I	.375	**.469**	10.6°	3/16	2	66664-C6	55.90
	.015 (1/64)	.012	II	.998	**.998**	5.0°	3/16	2	38515-C6	55.60
	.020	.016	I	.562	**.624**	7.8°	3/16	2	38907-C6	60.70
	.020	.016	II	.973	**.973**	5.0°	3/16	2	38520-C6	60.40
5°	.025	.020	I	.562	**.621**	7.6°	3/16	2	38914-C6	60.70
	.025	.020	II	.949	**.949**	5.0°	3/16	2	38525-C6	60.40
	.031 (1/32)	.025	I	.375	**.457**	10.1°	3/16	2	67065-C6	49.70
	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	38531-C6	49.70
	.039 (1 mm)	.031	I	.625	**.664**	6.6°	3/16	2	38921-C6	60.40

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HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

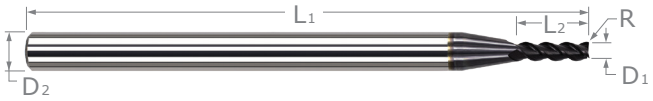
Ball – Tapered Reach (Mold Cutters) (cont.)

continued from previous page

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
5°	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	38547-C6	49.70
	.047 (3/64)	.038	II	1.198	**1.198**	5.0°	1/4	2-1/2	38947-C6	66.90
	.050	.040	II	.826	**.826**	4.9°	3/16	2	38928-C6	50.00
	.060	.048	II	.777	**.777**	4.9°	3/16	2	38935-C6	50.00
	.060	.048	II	1.134	**1.134**	5.0°	1/4	2-1/2	38960-C6	66.90
	.062 (1/16)	.050	I	.375	**.434**	8.8°	3/16	2	66963-C6	46.80
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	38562-C6	46.80
	.062 (1/16)	.050	II	1.124	**1.124**	5.0°	1/4	2-1/2	38962-C6	66.90
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	38978-C6	63.90
	.093 (3/32)	.074	II	.972	**.972**	4.9°	1/4	2-1/2	38993-C6	63.90
	.093 (3/32)	.074	II	1.686	**1.686**	5.0°	3/8	3	39293-C6	84.70
	.100	.080	II	.937	**.937**	4.9°	1/4	2-1/2	39000-C6	64.30
	.109 (7/64)	.087	II	.893	**.893**	4.8°	1/4	2-1/2	39002-C6	64.30
	.118 (3 mm)	.094	II	.849	**.849**	4.7°	1/4	2-1/2	39005-C6	64.30
	.125 (1/8)	.100	I	.500	**.548**	7.3°	1/4	2-1/2	38942-C6	61.20
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	39008-C6	60.90
	.125 (1/8)	.100	II	1.529	**1.529**	4.9°	3/8	3	39308-C6	81.80
	.156 (5/32)	.125	II	.661	**.661**	4.6°	1/4	2-1/2	39010-C6	63.90
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	39312-C6	78.40
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	4	922312-C6	87.50
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	39316-C6	78.40
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	4	922316-C6	87.50
7°	.015 (1/64)	.012	I	.187	**.299**	16.5°	3/16	2	66678-C6	55.90
	.015 (1/64)	.012	II	.714	**.714**	7.0°	3/16	2	40015-C6	55.90
	.020	.016	II	.698	**.698**	7.0°	3/16	2	40020-C6	55.90
	.031 (1/32)	.025	I	.250	**.338**	13.6°	3/16	2	67078-C6	50.00
	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	40031-C6	50.00
	.031 (1/32)	.025	II	.917	**.917**	7.0°	1/4	2-1/2	40431-C6	63.90
	.039 (1 mm)	.031	II	.636	**.636**	6.9°	3/16	2	40007-C6	50.00
	.047 (3/64)	.038	I	.375	**.425**	9.9°	3/16	2	40014-C6	50.00
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	40047-C6	50.00
	.047 (3/64)	.038	II	.864	**.864**	6.9°	1/4	2-1/2	40447-C6	63.90
	.060	.048	II	.822	**.822**	6.9°	1/4	2-1/2	40460-C6	63.90
	.062 (1/16)	.050	I	.500	**.567**	9.9°	1/4	2-1/2	66980-C6	63.90
	.062 (1/16)	.050	II	.815	**.815**	6.9°	1/4	2-1/2	40462-C6	63.90
	.062 (1/16)	.050	II	1.324	**1.324**	6.9°	3/8	2-1/2	40862-C6	81.10
	.078 (5/64)	.062	II	1.272	**1.272**	6.9°	3/8	2-1/2	40878-C6	81.10
	.093 (3/32)	.074	II	.714	**.714**	6.7°	1/4	2-1/2	40493-C6	60.90
	.093 (3/32)	.074	II	1.223	**1.223**	6.9°	3/8	2-1/2	40893-C6	81.10
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	40508-C6	58.00
	.125 (1/8)	.100	II	1.118	**1.118**	6.8°	3/8	2-1/2	40908-C6	78.40
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	40912-C6	78.40
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	4	917212-C6	87.50

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.05 mm**	.30 mm (1.5x)	3	4 mm	50 mm	985604-C3	54.40
	.2 mm	.0078	**.05 mm**	.60 mm (3x)	3	4 mm	50 mm	976804-C3	54.40
.010		.0100	**.003**	.015 (1.5x)	3	1/8	1-1/2	52610-C3	51.40
.010		.0100	**.003**	.030 (3x)	3	1/8	1-1/2	45610-C3	51.40
	.3 mm	.0118	**.08 mm**	.90 mm (3x)	3	4 mm	50 mm	976806-C3	53.40
.015 (1/64)		.0150	**.003**	.022 (1.5x)	3	1/8	1-1/2	52615-C3	42.50
.015 (1/64)		.0150	**.003**	.045 (3x)	3	1/8	1-1/2	45615-C3	42.50
.015 (1/64)		.0150	**.003**	.078 (5x)	3	1/8	2-1/2	53815-C3	51.50
	.4 mm	.0157	**.08 mm**	.60 mm (1.5x)	3	4 mm	50 mm	985609-C3	45.50
	.4 mm	.0157	**.08 mm**	1.20 mm (3x)	3	4 mm	50 mm	976809-C3	45.50
	.5 mm	.0196	**.10 mm**	.75 mm (1.5x)	3	4 mm	50 mm	985611-C3	40.70
	.5 mm	.0196	**.10 mm**	1.50 mm (3x)	3	4 mm	50 mm	976811-C3	40.70
.020		.0200	**.004**	.030 (1.5x)	3	1/8	1-1/2	52620-C3	37.30
.020		.0200	**.004**	.060 (3x)	3	1/8	1-1/2	45620-C3	37.30
.020		.0200	**.004**	.100 (5x)	3	1/8	2-1/2	53820-C3	45.70
	.6 mm	.0236	**.10 mm**	.90 mm (1.5x)	3	4 mm	50 mm	985613-C3	39.50
	.6 mm	.0236	**.10 mm**	1.80 mm (3x)	3	4 mm	50 mm	976813-C3	39.50
.025		.0250	**.004**	.038 (1.5x)	3	1/8	1-1/2	52625-C3	36.00
.025		.0250	**.004**	.075 (3x)	3	1/8	1-1/2	45625-C3	36.00
.025		.0250	**.004**	.125 (5x)	3	1/8	2-1/2	53825-C3	44.30
	.7 mm	.0275	**.10 mm**	2.10 mm (3x)	3	4 mm	50 mm	976815-C3	39.50
.031 (1/32)		.0310	**.005**	.047 (1.5x)	3	1/8	1-1/2	52631-C3	30.40
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	45631-C3	30.40
.031 (1/32)		.0310	**.005**	.156 (5x)	3	1/8	2-1/2	53831-C3	38.20
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	907231-C3	30.30
	.8 mm	.0314	**.10 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	985618-C3	34.00
	.8 mm	.0314	**.10 mm**	2.40 mm (3x)	3	4 mm	50 mm	976818-C3	34.00
.035		.0350	**.005**	.053 (1.5x)	3	1/8	1-1/2	52635-C3	30.50
.035		.0350	**.005**	.105 (3x)	3	1/8	1-1/2	45635-C3	30.50
.035		.0350	**.005**	.187 (5x)	3	1/8	2-1/2	53835-C3	38.20
	.9 mm	.0354	**.10 mm**	2.70 mm (3x)	3	4 mm	50 mm	976820-C3	34.00

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.0 mm	.0393	**.10 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	985622-C3	34.00
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	976822-C3	34.00
.040		.0400	**.005**	.060 (1.5x)	3	1/8	1-1/2	52640-C3	30.50
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	45640-C3	30.50
.040		.0400	**.005**	.203 (5x)	3	1/8	2-1/2	53840-C3	38.20
	1.1 mm	.0433	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	976824-C3	34.00
.045		.0450	**.005**	.068 (1.5x)	3	1/8	1-1/2	52645-C3	30.50
.045		.0450	**.005**	.135 (3x)	3	1/8	1-1/2	45645-C3	30.50
.045		.0450	**.005**	.225 (5x)	3	1/8	2-1/2	53845-C3	38.20
.047 (3/64)		.0470	**.005**	.071 (1.5x)	3	1/8	1-1/2	52647-C3	30.40
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	45647-C3	30.40
.047 (3/64)		.0470	**.005**	.250 (5x)	3	1/8	2-1/2	53847-C3	38.20
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	907247-C3	30.40
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	903447-C3	30.40
	1.2 mm	.0472	**.10 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	985627-C3	34.00
	1.2 mm	.0472	**.10 mm**	3.50 mm (3x)	3	4 mm	50 mm	976827-C3	34.00
.050		.0500	**.005**	.075 (1.5x)	3	1/8	1-1/2	52650-C3	30.50
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	45650-C3	30.50
.050		.0500	**.005**	.250 (5x)	3	1/8	2-1/2	53850-C3	38.20
	1.3 mm	.0511	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	976829-C3	34.00
.055		.0550	**.005**	.083 (1.5x)	3	1/8	1-1/2	52655-C3	30.50
.055		.0550	**.005**	.165 (3x)	3	1/8	1-1/2	45655-C3	30.50
.055		.0550	**.005**	.275 (5x)	3	1/8	2-1/2	53855-C3	38.20
	1.4 mm	.0551	**.10 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	985631-C3	34.00
	1.4 mm	.0551	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	976831-C3	34.00
	1.5 mm	.0590	**.20 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	985633-C3	32.00
	1.5 mm	.0590	**.20 mm**	4.50 mm (3x)	3	4 mm	50 mm	976833-C3	32.00
.060		.0600	**.010**	.090 (1.5x)	3	1/8	1-1/2	52660-C3	30.50
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	45660-C3	30.50
.060		.0600	**.010**	.312 (5x)	3	1/8	2-1/2	53860-C3	38.20
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	881862-C3	28.20
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	913862-C3	28.20
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	52662-C3	28.20
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	45662-C3	28.20
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	53862-C3	36.80
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	903462-C3	28.20
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	931362-C3	28.20
	1.6 mm	.0629	**.20 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	985636-C3	32.00
	1.6 mm	.0629	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	976836-C3	32.00
	1.7 mm	.0669	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	976838-C3	32.00
.070		.0700	**.010**	.105 (1.5x)	3	1/8	1-1/2	52670-C3	28.30
.070		.0700	**.010**	.210 (3x)	3	1/8	1-1/2	45670-C3	28.30
	1.8 mm	.0708	**.20 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	985640-C3	32.00
	1.8 mm	.0708	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	976840-C3	32.00

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.9 mm	.0748	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	976842-C3	32.00
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	913878-C3	28.30
.078 (5/64)		.0780	**.010**	.118 (1.5x)	3	1/8	1-1/2	52678-C3	28.30
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	45678-C3	28.30
.078 (5/64)		.0780	**.010**	.406 (5x)	3	1/8	2-1/2	53878-C3	36.80
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	903478-C3	28.30
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	931378-C3	28.30
	2.0 mm	.0787	**.20 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	985645-C3	32.00
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	3	4 mm	50 mm	976845-C3	32.00
.080		.0800	**.010**	.240 (3x)	3	1/8	1-1/2	45680-C3	28.30
.090		.0900	**.010**	.270 (3x)	3	1/8	1-1/2	45690-C3	28.30
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	913893-C3	28.20
.093 (3/32)		.0930	**.010**	.140 (1.5x)	3	1/8	1-1/2	52693-C3	28.20
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	45693-C3	28.20
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	53893-C3	36.80
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	903493-C3	28.20
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	931393-C3	28.20
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	927893-C3	33.10
	2.5 mm	.0984	**.20 mm**	3.70 mm (1.5x)	3	4 mm	50 mm	985651-C3	32.00
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	3	4 mm	50 mm	976851-C3	32.00
.100		.1000	**.010**	.150 (1.5x)	3	1/8	1-1/2	52700-C3	28.30
.100		.1000	**.010**	.300 (3x)	3	1/8	1-1/2	45700-C3	28.30
.100		.1000	**.010**	.500 (5x)	3	1/8	2-1/2	53900-C3	36.50
.109 (7/64)		.1090	**.010**	.164 (1.5x)	3	1/8	1-1/2	52702-C3	28.30
.109 (7/64)		.1090	**.010**	.327 (3x)	3	1/8	1-1/2	45702-C3	28.30
	3.0 mm	.1181	**.20 mm**	4.50 mm (1.5x)	3	4 mm	50 mm	985657-C3	32.00
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	3	4 mm	50 mm	976857-C3	32.00

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	913908-C3	28.30
.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	907308-C3	27.10
.125 (1/8)	.1250	**.015**	.187 (1.5x)	4	1/8	1-1/2	52708-C3	27.10
.125 (1/8)	.1250	**.015**	.375 (3x)	4	1/8	1-1/2	45708-C3	27.10
.125 (1/8)	.1250	**.015**	.625 (5x)	4	1/8	2-1/2	53908-C3	36.80
.125 (1/8)	.1250	**.020**	.375 (3x)	4	1/8	1-1/2	931408-C3	27.10
.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	927908-C3	32.10
.140 (9/64)	.1406	**.015**	.220 (1.5x)	4	3/16	2	52709-C3	34.10
.140 (9/64)	.1406	**.015**	.425 (3x)	4	3/16	2	45709-C3	34.10
.156 (5/32)	.1562	**.015**	.235 (1.5x)	4	3/16	2	52710-C3	30.70
.156 (5/32)	.1562	**.015**	.470 (3x)	4	3/16	2	45710-C3	30.70
.156 (5/32)	.1562	**.015**	.750 (5x)	4	3/16	3	53910-C3	39.80
.156 (5/32)	.1562	**.030**	.470 (3x)	4	3/16	2	927910-C3	35.60

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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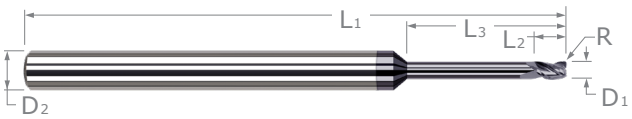
CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.187 (3/16)	.1875	**.005**	.562 (3x)	4	3/16	2	913912-C3	30.60
.187 (3/16)	.1875	**.015**	.285 (1.5x)	4	3/16	2	52712-C3	29.40
.187 (3/16)	.1875	**.015**	.562 (3x)	4	3/16	2	45712-C3	29.40
.187 (3/16)	.1875	**.015**	1.000 (5x)	4	3/16	3	53912-C3	39.80
.187 (3/16)	.1875	**.030**	.562 (3x)	4	3/16	2	927912-C3	34.30
.187 (3/16)	.1875	**.060**	.562 (3x)	4	3/16	2	816812-C3	34.30
.250 (1/4)	.2500	**.015**	.375 (1.5x)	4	1/4	2-1/2	52716-C3	37.10
.250 (1/4)	.2500	**.015**	.750 (3x)	4	1/4	2-1/2	45716-C3	37.10
.250 (1/4)	.2500	**.015**	1.250 (5x)	4	1/4	4	53916-C3	49.40
.312 (5/16)	.3125	**.015**	.470 (1.5x)	4	5/16	2-1/2	52720-C3	54.40
.312 (5/16)	.3125	**.015**	1.000 (3x)	4	5/16	2-1/2	45720-C3	54.40
.375 (3/8)	.3750	**.015**	.570 (1.5x)	4	3/8	2-1/2	52724-C3	63.20
.375 (3/8)	.3750	**.015**	1.125 (3x)	4	3/8	2-1/2	45724-C3	63.20
.500 (1/2)	.5000	**.030**	.750 (1.5x)	4	1/2	3	52732-C3	81.80

PLEASE SEE SPEEDS & FEEDS ON PAGE 140

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- Corner radius for improved strength
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.003**	.022	.078 (5x)	3	1/8	2-1/2	62415-C3	55.00
.015 (1/64)		.0150	**.003**	.022	.125 (8x)	3	1/8	2-1/2	55015-C3	56.10
.015 (1/64)		.0150	**.003**	.022	.187 (12x)	3	1/8	2-1/2	63815-C3	61.50
	.4 mm	.0157	**.08 mm**	.60 mm	2.0 mm (5x)	3	4 mm	50 mm	986709-C3	60.90
	.4 mm	.0157	**.08 mm**	.60 mm	3.2 mm (8x)	3	4 mm	50 mm	978009-C3	62.10
	.4 mm	.0157	**.08 mm**	.60 mm	4.8 mm (12x)	3	4 mm	50 mm	982309-C3	67.40
	.5 mm	.0196	**.10 mm**	.75 mm	2.5 mm (5x)	3	4 mm	50 mm	986711-C3	58.50
	.5 mm	.0196	**.10 mm**	.75 mm	4.0 mm (8x)	3	4 mm	50 mm	978011-C3	59.60
	.5 mm	.0196	**.10 mm**	.75 mm	6.0 mm (12x)	3	4 mm	50 mm	982311-C3	65.20
	.5 mm	.0196	**.10 mm**	.75 mm	8.0 mm (16x)	3	4 mm	50 mm	975511-C3	68.20
.020		.0200	**.004**	.030	.100 (5x)	3	1/8	2-1/2	62420-C3	52.40
.020		.0200	**.004**	.030	.160 (8x)	3	1/8	2-1/2	55020-C3	53.60
.020		.0200	**.004**	.030	.250 (12x)	3	1/8	2-1/2	63820-C3	59.30
	.6 mm	.0236	**.10 mm**	.90 mm	3.0 mm (5x)	3	4 mm	50 mm	986713-C3	57.20
	.6 mm	.0236	**.10 mm**	.90 mm	4.8 mm (8x)	3	4 mm	50 mm	978013-C3	58.50
	.6 mm	.0236	**.10 mm**	.90 mm	7.2 mm (12x)	3	4 mm	50 mm	982313-C3	62.40
.025		.0250	**.004**	.038	.125 (5x)	3	1/8	2-1/2	62425-C3	51.00
.025		.0250	**.004**	.038	.203 (8x)	3	1/8	2-1/2	55025-C3	52.40
.025		.0250	**.004**	.038	.312 (12x)	3	1/8	2-1/2	63825-C3	57.70
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	3	1/8	2-1/2	62431-C3	48.30
.031 (1/32)		.0310	**.005**	.047	.250 (8x)	3	1/8	2-1/2	55031-C3	49.40
.031 (1/32)		.0310	**.005**	.047	.375 (12x)	3	1/8	2-1/2	63831-C3	51.50
	.8 mm	.0314	**.10 mm**	1.20 mm	4.0 mm (5x)	3	4 mm	50 mm	986718-C3	52.80
	.8 mm	.0314	**.10 mm**	1.20 mm	6.5 mm (8x)	3	4 mm	50 mm	978018-C3	53.80
	.8 mm	.0314	**.10 mm**	1.20 mm	9.5 mm (12x)	3	4 mm	50 mm	982318-C3	55.80
.035		.0350	**.005**	.053	.187 (5x)	3	1/8	2-1/2	62435-C3	48.60
	1.0 mm	.0393	**.10 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	986722-C3	52.80
	1.0 mm	.0393	**.10 mm**	1.50 mm	8.0 mm (8x)	3	4 mm	50 mm	978022-C3	53.80
	1.0 mm	.0393	**.10 mm**	1.50 mm	12.0 mm (12x)	3	4 mm	50 mm	982322-C3	55.80
	1.0 mm	.0393	**.10 mm**	1.50 mm	16.0 mm (16x)	3	4 mm	50 mm	975522-C3	59.00
.040		.0400	**.005**	.060	.203 (5x)	3	1/8	2-1/2	62440-C3	48.60
.045		.0450	**.005**	.068	.225 (5x)	3	1/8	2-1/2	62445-C3	48.60
.047 (3/64)		.0470	**.005**	.070	.250 (5x)	3	1/8	2-1/2	62447-C3	48.60
.047 (3/64)		.0470	**.005**	.070	.375 (8x)	3	1/8	2-1/2	55047-C3	49.40
.047 (3/64)		.0470	**.005**	.070	.570 (12x)	3	1/8	2-1/2	63847-C3	51.50

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.050		.0500	**.005**	.075	.250 (5x)	3	1/8	2-1/2	62450-C3	48.00
.055		.0550	**.005**	.083	.275 (5x)	3	1/8	2-1/2	62455-C3	48.00
	1.5 mm	.0590	**.20 mm**	2.20 mm	7.5 mm (5x)	3	4 mm	50 mm	986733-C3	52.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	12.0 mm (8x)	3	4 mm	50 mm	978033-C3	53.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	18.0 mm (12x)	3	4 mm	50 mm	982333-C3	55.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	24.0 mm (16x)	3	4 mm	63 mm	975533-C3	59.00
.060		.0600	**.010**	.090	.312 (5x)	3	1/8	2-1/2	62460-C3	48.60
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	815662-C3	50.40
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	816562-C3	51.50
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	3	1/8	2-1/2	62462-C3	48.30
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	55062-C3	49.40
.062 (1/16)		.0620	**.010**	.093	.750 (12x)	3	1/8	2-1/2	63862-C3	51.50
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	3	1/8	2-1/2	62478-C3	48.30
.078 (5/64)		.0780	**.010**	.117	.625 (8x)	3	1/8	2-1/2	55078-C3	49.40
.078 (5/64)		.0780	**.010**	.117	.940 (12x)	3	1/8	2-1/2	63878-C3	51.50
	2.0 mm	.0787	**.20 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	986745-C3	52.80
	2.0 mm	.0787	**.20 mm**	3.00 mm	16.0 mm (8x)	3	4 mm	50 mm	978045-C3	53.80
	2.0 mm	.0787	**.20 mm**	3.00 mm	24.0 mm (12x)	3	4 mm	63 mm	982345-C3	55.80
	2.0 mm	.0787	**.20 mm**	3.00 mm	32.0 mm (16x)	3	4 mm	63 mm	975545-C3	59.00
.093 (3/32)		.0930	**.005**	.139	.500 (5x)	3	1/8	2-1/2	815693-C3	50.40
.093 (3/32)		.0930	**.005**	.139	.750 (8x)	3	1/8	2-1/2	816593-C3	51.50
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	3	1/8	2-1/2	62493-C3	48.30
.093 (3/32)		.0930	**.010**	.139	.750 (8x)	3	1/8	2-1/2	55093-C3	49.40
.093 (3/32)		.0930	**.010**	.139	1.125 (12x)	3	1/8	2-1/2	63893-C3	51.50
.100		.1000	**.010**	.150	.500 (5x)	3	1/8	2-1/2	62500-C3	49.40
	3.0 mm	.1181	**.20 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	986757-C3	50.00

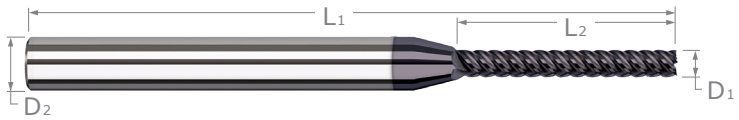
D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.010**	.187	.625 (5x)	4	1/8	2-1/2	815708-C3	48.00
.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	4	1/8	2-1/2	816608-C3	49.10
.125 (1/8)	.1250	**.015**	.187	.625 (5x)	4	1/8	2-1/2	62508-C3	48.00
.125 (1/8)	.1250	**.015**	.187	1.000 (8x)	4	1/8	2-1/2	55108-C3	49.10
.125 (1/8)	.1250	**.015**	.187	1.500 (12x)	4	1/8	3	63908-C3	51.50
.156 (5/32)	.1562	**.015**	.235	.750 (5x)	4	3/16	3	62510-C3	53.00
.156 (5/32)	.1562	**.015**	.235	1.250 (8x)	4	3/16	3	55110-C3	54.20
.156 (5/32)	.1562	**.015**	.235	1.875 (12x)	4	3/16	4	63910-C3	66.30
.156 (5/32)	.1562	**.030**	.235	1.250 (8x)	4	3/16	3	817310-C3	59.20
.187 (3/16)	.1875	**.015**	.281	1.000 (5x)	4	3/16	3	62512-C3	53.00
.187 (3/16)	.1875	**.015**	.281	1.500 (8x)	4	3/16	3	55112-C3	54.20
.187 (3/16)	.1875	**.015**	.281	2.250 (12x)	4	3/16	4	63912-C3	66.30
.187 (3/16)	.1875	**.030**	.281	1.500 (8x)	4	3/16	3	817312-C3	59.20
.250 (1/4)	.2500	**.015**	.375	1.250 (5x)	4	1/4	4	62516-C3	59.00
.250 (1/4)	.2500	**.015**	.375	2.000 (8x)	4	1/4	4	55116-C3	60.10
.250 (1/4)	.2500	**.015**	.375	3.000 (12x)	4	1/4	6	63916-C3	73.30

PLEASE SEE SPEEDS & FEEDS ON PAGE 146

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square



Down to .2 mm!

- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels
- Can be used in light duty roughing and profiling applications
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	977704-C6	51.00
	.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	980104-C6	59.00
	.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	981704-C6	60.40
	.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	977706-C6	47.20
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	24315-C6	41.40
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	53315-C6	51.40
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	62815-C6	53.00
	.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	977709-C6	44.90
	.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	980109-C6	53.00
	.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	981709-C6	54.20
	.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	977711-C6	44.30
	.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	980111-C6	51.50
	.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	981711-C6	53.40
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	935920-C6	40.70
.020		.0200	**.060** (3x)	4	1/8	1-1/2	24320-C6	40.70
.020		.0200	**.100** (5x)	4	1/8	2-1/2	53320-C6	51.00
.020		.0200	**.160** (8x)	4	1/8	2-1/2	62820-C6	52.00
	.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	977713-C6	44.30
	.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	980113-C6	51.50
	.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	981713-C6	53.40
.025		.0250	**.038** (1.5x)	4	1/8	1-1/2	935925-C6	38.20
.025		.0250	**.075** (3x)	4	1/8	1-1/2	24325-C6	38.20
.025		.0250	**.125** (5x)	4	1/8	2-1/2	53325-C6	49.40
.025		.0250	**.203** (8x)	4	1/8	2-1/2	62825-C6	50.40
	.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	977715-C6	44.30
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935931-C6	34.00
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	24331-C6	34.00
.031 (1/32)		.0310	**.125** (4x)	5	1/8	2-1/2	835331-C6	47.00
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	53331-C6	47.50
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	62831-C6	48.30
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	882431-C6	55.40
.031 (1/32)		.0310	**.375** (12x)	5	1/8	2-1/2	68531-C6	59.60
	.8 mm	.0314	**2.40 mm** (3x)	5	4 mm	50 mm	977718-C6	39.00
	.8 mm	.0314	**4.00 mm** (5x)	5	4 mm	50 mm	980118-C6	48.60
	.8 mm	.0314	**6.50 mm** (8x)	5	4 mm	50 mm	981718-C6	50.00

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

continued from previous page

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1			L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent						
		.9 mm	.0354	**2.70 mm** (3x)	5	4 mm	50 mm	977720-C6	39.00
		1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	977722-C6	39.00
		1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	980122-C6	48.60
		1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	981722-C6	50.00
	.040		.0400	**.060** (1.5x)	5	1/8	1-1/2	935940-C6	34.00
	.040		.0400	**.120** (3x)	5	1/8	1-1/2	24340-C6	34.00
	.040		.0400	**.203** (5x)	5	1/8	2-1/2	53340-C6	47.50
	.040		.0400	**.325** (8x)	5	1/8	2-1/2	62840-C6	48.30
		1.1 mm	.0433	**3.00 mm** (3x)	5	4 mm	50 mm	977724-C6	39.00
	.047 (3/64)		.0470	**.071** (1.5x)	5	1/8	1-1/2	935947-C6	34.00
	.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	24347-C6	34.00
NEW	.047 (3/64)		.0470	**.187** (4x)	5	1/8	2-1/2	835347-C6	43.60
	.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	53347-C6	47.50
	.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	62847-C6	48.30
	.047 (3/64)		.0470	**.480** (10x)	5	1/8	2-1/2	882447-C6	55.40
	.047 (3/64)		.0470	**.570** (12x)	5	1/8	2-1/2	68547-C6	59.60
		1.2 mm	.0472	**3.50 mm** (3x)	5	4 mm	50 mm	977727-C6	39.00
		1.2 mm	.0472	**6.00 mm** (5x)	5	4 mm	50 mm	980127-C6	48.60
		1.2 mm	.0472	**9.50 mm** (8x)	5	4 mm	50 mm	981727-C6	50.00
	.050		.0500	**.075** (1.5x)	5	1/8	1-1/2	935950-C6	34.00
	.050		.0500	**.150** (3x)	5	1/8	1-1/2	24350-C6	34.00
	.050		.0500	**.250** (5x)	5	1/8	2-1/2	53350-C6	47.50
	.050		.0500	**.400** (8x)	5	1/8	2-1/2	62850-C6	48.30
		1.3 mm	.0511	**4.00 mm** (3x)	5	4 mm	50 mm	977729-C6	39.00
		1.4 mm	.0551	**4.00 mm** (3x)	5	4 mm	50 mm	977731-C6	39.00
		1.4 mm	.0551	**7.00 mm** (5x)	5	4 mm	50 mm	980131-C6	48.60
		1.4 mm	.0551	**11.00 mm** (8x)	5	4 mm	50 mm	981731-C6	50.00
		1.5 mm	.0590	**4.50 mm** (3x)	5	4 mm	50 mm	977733-C6	37.70
		1.5 mm	.0590	**7.50 mm** (5x)	5	4 mm	50 mm	980133-C6	47.20
		1.5 mm	.0590	**12.00 mm** (8x)	5	4 mm	50 mm	981733-C6	48.90
	.060		.0600	**.090** (1.5x)	5	1/8	1-1/2	935960-C6	34.00
	.060		.0600	**.180** (3x)	5	1/8	1-1/2	24360-C6	34.00
	.060		.0600	**.312** (5x)	5	1/8	2-1/2	53360-C6	47.50
	.060		.0600	**.500** (8x)	5	1/8	2-1/2	62860-C6	48.30
	.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935962-C6	32.00
	.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	24362-C6	32.00
	.062 (1/16)		.0620	**.250** (4x)	5	1/8	2-1/2	835362-C6	44.20
	.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	53362-C6	44.70
	.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	62862-C6	45.40
	.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	882462-C6	56.40
	.062 (1/16)		.0620	**.750** (12x)	5	1/8	2-1/2	68562-C6	63.60
	.062 (1/16)		.0620	**.950** (15x)	5	1/8	2-1/2	68962-C6	80.10
		1.6 mm	.0629	**5.00 mm** (3x)	5	4 mm	50 mm	977736-C6	37.70
		1.6 mm	.0629	**8.00 mm** (5x)	5	4 mm	50 mm	980136-C6	47.50
		1.6 mm	.0629	**13.00 mm** (8x)	5	4 mm	50 mm	981736-C6	48.30
		1.7 mm	.0669	**5.00 mm** (3x)	5	4 mm	50 mm	977738-C6	37.70
	.070		.0700	**.210** (3x)	5	1/8	1-1/2	24370-C6	32.00
	.070		.0700	**.375** (5x)	5	1/8	2-1/2	53370-C6	44.70
	.070		.0700	**.570** (8x)	5	1/8	2-1/2	62870-C6	45.40

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

mm & in

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
	1.8 mm	.0708	**5.50 mm** (3x)	5	4 mm	50 mm	977740-C6	37.70	
	1.8 mm	.0708	**9.00 mm** (5x)	5	4 mm	50 mm	980140-C6	47.20	
	1.8 mm	.0708	**14.00 mm** (8x)	5	4 mm	50 mm	981740-C6	48.90	
	1.9 mm	.0748	**5.50 mm** (3x)	5	4 mm	50 mm	977742-C6	37.70	
.078 (5/64)		.0780	**.117** (1.5x)	5	1/8	1-1/2	935978-C6	32.00	
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	24378-C6	32.00	
.078 (5/64)		.0780	**.312** (4x)	5	1/8	2-1/2	835378-C6	40.80	NEW
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	53378-C6	44.70	
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	62878-C6	45.40	
.078 (5/64)		.0780	**.800** (10x)	5	1/8	2-1/2	882478-C6	56.40	
.078 (5/64)		.0780	**.940** (12x)	5	1/8	2-1/2	68578-C6	63.60	
.078 (5/64)		.0780	**1.187** (15x)	5	1/8	2-1/2	68978-C6	80.10	
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	977745-C6	37.70	
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	980145-C6	47.20	
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	981745-C6	48.90	
.080		.0800	**.120** (1.5x)	5	1/8	1-1/2	935980-C6	32.00	
.080		.0800	**.240** (3x)	5	1/8	1-1/2	24380-C6	32.00	
.080		.0800	**.406** (5x)	5	1/8	2-1/2	53380-C6	44.70	
.080		.0800	**.650** (8x)	5	1/8	2-1/2	62880-C6	45.40	
.090		.0900	**.270** (3x)	5	1/8	1-1/2	24390-C6	32.00	
.090		.0900	**.450** (5x)	5	1/8	2-1/2	53390-C6	44.70	
.090		.0900	**.750** (8x)	5	1/8	2-1/2	62890-C6	45.40	
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935993-C6	32.00	
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	24393-C6	32.00	
.093 (3/32)		.0930	**.375** (4x)	5	1/8	2-1/2	835393-C6	44.20	
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	53393-C6	44.70	
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	62893-C6	45.40	
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	882493-C6	56.40	
.093 (3/32)		.0930	**1.125** (12x)	5	1/8	2-1/2	68593-C6	63.60	
.093 (3/32)		.0930	**1.400** (15x)	5	1/8	3	68993-C6	80.80	
	2.5 mm	.0984	**7.50 mm** (3x)	5	4 mm	50 mm	977751-C6	37.70	
.100		.1000	**.150** (1.5x)	5	1/8	1-1/2	936000-C6	32.00	
.100		.1000	**.300** (3x)	5	1/8	1-1/2	24399-C6	32.00	
.100		.1000	**.500** (5x)	5	1/8	2-1/2	53399-C6	44.70	
.100		.1000	**.800** (8x)	5	1/8	2-1/2	53400-C6	45.40	
.109 (7/64)		.1090	**.327** (3x)	5	1/8	1-1/2	24402-C6	32.20	
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	63502-C6	44.70	
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	977757-C6	37.70	
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	980157-C6	46.80	
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	981757-C6	49.10	

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	936008-C6	29.10	
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	795408-C6	29.10	NEW
.125 (1/8)	.1250	**.500** (4x)	5	1/8	1-1/2	24408-C6	29.10	
.125 (1/8)	.1250	**.750** (6x)	5	1/8	2-1/2	63508-C6	43.70	

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

mm & in

continued from previous page

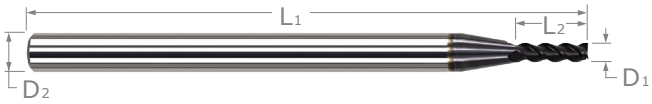
CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	53408-C6	44.70
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	882508-C6	55.00
.125 (1/8)	.1250	**1.500** (12x)	5	1/8	3	68608-C6	62.70
.125 (1/8)	.1250	**1.875** (15x)	5	1/8	3	69008-C6	79.90
.140 (9/64)	.1406	**.500** (3x)	5	3/16	2	24409-C6	42.20
.140 (9/64)	.1406	**.750** (5x)	5	3/16	3	63509-C6	43.70
.156 (5/32)	.1562	**.235** (1.5x)	5	3/16	2	936010-C6	34.70
.156 (5/32)	.1562	**.562** (3x)	5	3/16	2	24410-C6	34.70
.156 (5/32)	.1562	**.875** (5x)	5	3/16	3	63510-C6	46.50
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	53410-C6	47.30
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	936012-C6	33.20
.187 (3/16)	.1875	**.625** (3x)	5	3/16	2	24412-C6	33.20
NEW .187 (3/16)	.1875	**.750** (4x)	5	3/16	3	835412-C6	41.60
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	63512-C6	46.50
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	53412-C6	47.30
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	936016-C6	42.20
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	24416-C6	42.20
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	63516-C6	56.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	53416-C6	57.90
.375 (3/8)	.3750	**1.125** (3x)	5	3/8	2-1/2	24424-C6	67.10
.500 (1/2)	.5000	**1.500** (3x)	5	1/2	3	24432-C6	87.20

SPEEDS & FEEDS (High-Helix Finishers for Medium Alloy Steels)

Material	Hardness (HBn)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	600	Finishing (1.5x LOC)	0.00020	0.00041	0.00062	0.00082	0.00103	0.00123	0.00165	0.00247	0.00330	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00018	0.00037	0.00056	0.00074	0.00094	0.00112	0.00150	0.00224	0.00300	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00016	0.00032	0.00049	0.00065	0.00081	0.00097	0.00131	0.00195	0.00261	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00014	0.00028	0.00042	0.00056	0.00070	0.00084	0.00113	0.00168	0.00225	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00010	0.00020	0.00031	0.00041	0.00051	0.00061	0.00083	0.00123	0.00165	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00019	0.00029	0.00039	0.00049	0.00058	0.00078	0.00117	0.00156	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00019	0.00028	0.00037	0.00047	0.00056	0.00075	0.00112	0.00150	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00033	0.00042	0.00050	0.00068	0.00101	0.00135	< .02x Dia	.5x - 15x Dia
	250 - 275	550	Finishing (1.5x LOC)	0.00018	0.00038	0.00057	0.00075	0.00094	0.00113	0.00151	0.00226	0.00303	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00017	0.00034	0.00052	0.00068	0.00086	0.00102	0.00138	0.00206	0.00275	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00014	0.00030	0.00045	0.00059	0.00075	0.00089	0.00120	0.00179	0.00239	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00012	0.00026	0.00039	0.00051	0.00064	0.00077	0.00103	0.00154	0.00206	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00009	0.00019	0.00028	0.00038	0.00047	0.00056	0.00076	0.00113	0.00151	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00018	0.00027	0.00035	0.00045	0.00053	0.00072	0.00107	0.00143	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00017	0.00026	0.00034	0.00043	0.00051	0.00069	0.00103	0.00138	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00031	0.00039	0.00046	0.00062	0.00093	0.00124	< .02x Dia	.5x - 15x Dia
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502 **Tool Steels:** A, L, O, P, W series	225 - 250	500	Finishing (1.5x LOC)	0.00017	0.00034	0.00052	0.00068	0.00086	0.00102	0.00138	0.00206	0.00275	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00015	0.00031	0.00047	0.00062	0.00078	0.00093	0.00125	0.00187	0.00250	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00013	0.00027	0.00041	0.00054	0.00068	0.00081	0.00109	0.00163	0.00218	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00011	0.00023	0.00035	0.00047	0.00059	0.00070	0.00094	0.00140	0.00188	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00008	0.00017	0.00026	0.00034	0.00043	0.00051	0.00069	0.00103	0.00138	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00016	0.00024	0.00032	0.00041	0.00048	0.00065	0.00097	0.00130	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00014	0.00021	0.00028	0.00035	0.00042	0.00056	0.00084	0.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00028	0.00035	0.00042	0.00056	0.00084	0.00113	< .02x Dia	.5x - 15x Dia
	275 - 300 300 - 350	500 500	Finishing (1.5x LOC)	0.00015	0.00031	0.00047	0.00061	0.00077	0.00092	0.00124	0.00185	0.00248	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00014	0.00028	0.00042	0.00056	0.00070	0.00084	0.00113	0.00168	0.00225	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00012	0.00024	0.00037	0.00049	0.00061	0.00073	0.00098	0.00146	0.00196	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00010	0.00021	0.00032	0.00042	0.00053	0.00063	0.00084	0.00126	0.00169	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00007	0.00015	0.00023	0.00031	0.00039	0.00046	0.00062	0.00093	0.00124	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00015	0.00022	0.00029	0.00037	0.00044	0.00059	0.00088	0.00117	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00014	0.00021	0.00028	0.00035	0.00042	0.00056	0.00084	0.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00025	0.00032	0.00038	0.00051	0.00076	0.00101	< .02x Dia	.5x - 15x Dia

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

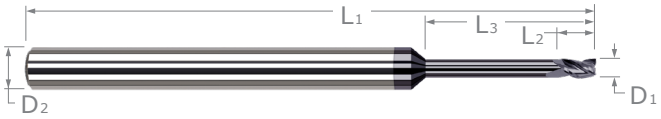
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	939815-C3	41.10
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	945715-C3	41.10
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	952411-C3	40.10
.020		.0200	**.060** (3x)	3	1/8	1-1/2	945720-C3	37.10
.025		.0250	**.075** (3x)	3	1/8	1-1/2	945725-C3	35.80
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	939831-C3	29.80
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	945731-C3	29.80
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	900531-C3	38.20
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	926022-C3	33.30
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	952422-C3	33.30
.040		.0400	**.120** (3x)	3	1/8	1-1/2	945740-C3	30.70
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	939847-C3	29.80
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	945747-C3	29.80
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	952433-C3	31.50
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	939862-C3	27.90
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	945762-C3	27.90
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	900562-C3	36.50
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	939878-C3	27.90
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	945778-C3	27.90
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	952445-C3	31.50
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	939893-C3	27.90
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	945793-C3	27.90
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	900593-C3	36.50
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	926057-C3	31.50
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	952457-C3	31.50

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	939908-C3	26.70
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	945808-C3	26.70
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	900608-C3	36.30
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	939910-C3	29.90
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	945810-C3	29.90
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	939912-C3	28.80
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	945812-C3	28.80
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	939916-C3	36.50
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	945816-C3	36.50

PLEASE SEE SPEEDS & FEEDS ON PAGE 163

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute



- Optimized for free machining varieties of carbon steels and stainless steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)	.023	**.078** (5x)	3	1/8	2-1/2	915015-C3	53.40
.015 (1/64)	.023	**.125** (8x)	3	1/8	2-1/2	920215-C3	54.40
.020	.030	**.100** (5x)	3	1/8	2-1/2	915020-C3	51.40
.020	.030	**.160** (8x)	3	1/8	2-1/2	920220-C3	52.60
.025	.038	**.125** (5x)	3	1/8	2-1/2	915025-C3	50.00
.025	.038	**.203** (8x)	3	1/8	2-1/2	920225-C3	51.20
.031 (1/32)	.047	**.093** (3x)	3	1/8	1-1/2	927331-C3	46.80
.031 (1/32)	.047	**.156** (5x)	3	1/8	2-1/2	915031-C3	47.20
.031 (1/32)	.047	**.250** (8x)	3	1/8	2-1/2	920231-C3	48.30
.031 (1/32)	.047	**.312** (10x)	3	1/8	2-1/2	909531-C3	50.00
.047 (3/64)	.071	**.250** (5x)	3	1/8	2-1/2	915047-C3	47.20
.047 (3/64)	.071	**.375** (8x)	3	1/8	2-1/2	920247-C3	48.30
.062 (1/16)	.093	**.186** (3x)	3	1/8	1-1/2	927362-C3	46.80
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	915062-C3	47.20
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	920262-C3	48.00
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	909562-C3	50.00
.078 (5/64)	.118	**.406** (5x)	3	1/8	2-1/2	915078-C3	47.20
.078 (5/64)	.118	**.625** (8x)	3	1/8	2-1/2	920278-C3	48.00
.093 (3/32)	.140	**.279** (3x)	3	1/8	1-1/2	927393-C3	46.80
.093 (3/32)	.140	**.500** (5x)	3	1/8	2-1/2	915093-C3	47.20
.093 (3/32)	.140	**.750** (8x)	3	1/8	2-1/2	920293-C3	48.00
.093 (3/32)	.140	**.950** (10x)	3	1/8	2-1/2	909593-C3	50.00

continued on next page

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.187	**.375** (3x)	4	1/8	1-1/2	927408-C3	46.80
.125 (1/8)	.187	**.625** (5x)	4	1/8	2-1/2	915108-C3	47.20
.125 (1/8)	.187	**1.000** (8x)	4	1/8	2-1/2	920308-C3	48.00
.125 (1/8)	.187	**1.250** (10x)	4	1/8	2-1/2	909608-C3	50.00
.156 (5/32)	.235	**.750** (5x)	4	3/16	3	915110-C3	51.00
.187 (3/16)	.285	**1.000** (5x)	4	3/16	3	915112-C3	51.00
.250 (1/4)	.375	**1.250** (5x)	4	1/4	4	915116-C3	57.30

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Free Machining Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx	100-125	500
	125-150	425
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X,, 420 F, 420 F Se	150-175	400
	175-200	375
	200-225	350

	Chip Load Per Tooth (IPT) By Cutter Diameter											
	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00010	.00021	.00031	.00041	.00052	.00062	.00079	.00118	.00158	.00207	.00249	.00332
Roughing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00192	.00252	.00302	.00403
Finishing	.00014	.00030	.00045	.00060	.00075	.00090	.00115	.00172	.00230	.00301	.00362	.00483
Max	.00019	.00039	.00058	.00077	.00097	.00116	.00148	.00221	.00296	.00388	.00466	.00622

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .35x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .35x Dia

Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

★★★★★

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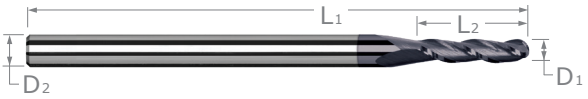
VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Ball



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	3	1/8	1-1/2	950015-C3	48.90
.031 (1/32)	**.047** (1.5x)	3	1/8	1-1/2	911531-C3	36.80
.031 (1/32)	**.093** (3x)	3	1/8	1-1/2	950031-C3	36.80
.047 (3/64)	**.141** (3x)	3	1/8	1-1/2	950047-C3	36.80
.062 (1/16)	**.093** (1.5x)	3	1/8	1-1/2	911562-C3	36.80
.062 (1/16)	**.186** (3x)	3	1/8	1-1/2	950062-C3	35.80
.078 (5/64)	**.234** (3x)	3	1/8	1-1/2	950078-C3	34.80
.093 (3/32)	**.140** (1.5x)	3	1/8	1-1/2	911593-C3	34.80
.093 (3/32)	**.279** (3x)	3	1/8	1-1/2	950093-C3	34.80
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	**.187** (1.5x)	4	1/8	1-1/2	911608-C3	33.30
.125 (1/8)	**.375** (3x)	4	1/8	1-1/2	950108-C3	33.30
.156 (5/32)	**.470** (3x)	4	3/16	2	950110-C3	37.10
.187 (3/16)	**.562** (3x)	4	3/16	2	950112-C3	35.50
.250 (1/4)	**.750** (3x)	4	1/4	2-1/2	950116-C3	43.40

SPEEDS & FEEDS (Variable Helix for Free Machining Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx	100-125	500
	125-150	425
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se	150-175	400
	175-200	375
	200-225	350

	Chip Load Per Tooth (IPT) By Cutter Diameter											
	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00013	.00026	.00040	.00053	.00067	.00079	.00099	.00148	.00198	.00259	.00311	.00415
Roughing	.00016	.00032	.00049	.00064	.00081	.00096	.00120	.00180	.00240	.00314	.00378	.00504
Finishing	.00019	.00039	.00058	.00077	.00097	.00116	.00144	.00215	.00288	.00377	.00453	.00604
Max	.00024	.00050	.00075	.00099	.00125	.00149	.00185	.00277	.00370	.00485	.00583	.00777

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .5x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .5x Dia

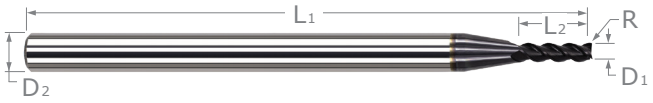
Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.25mm −.25mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.002**	.023 (1.5x)	3	1/8	1-1/2	969415-C3	42.50
.015 (1/64)		.0150	**.002**	.045 (3x)	3	1/8	1-1/2	971215-C3	42.50
.015 (1/64)		.0150	**.002**	.078 (5x)	3	1/8	2-1/2	980315-C3	51.50
.015 (1/64)		.0150	**.005**	.045 (3x)	3	1/8	1-1/2	859815-C3	42.50
.020		.0200	**.002**	.060 (3x)	3	1/8	1-1/2	971220-C3	37.40
.020		.0200	**.005**	.060 (3x)	3	1/8	1-1/2	859820-C3	37.30
.025		.0250	**.002**	.075 (3x)	3	1/8	1-1/2	971225-C3	36.00
.025		.0250	**.005**	.075 (3x)	3	1/8	1-1/2	859825-C3	36.00
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	969431-C3	30.50
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	971231-C3	30.50
.031 (1/32)		.0310	**.003**	.156 (5x)	3	1/8	2-1/2	980331-C3	38.20
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	859831-C3	30.40
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	856631-C3	32.60
	1.0 mm	.0393	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	901822-C3	33.60
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	971240-C3	30.50
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	859840-C3	30.40
.047 (3/64)		.0470	**.003**	.071 (1.5x)	3	1/8	1-1/2	969447-C3	30.50
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	971247-C3	30.50
.047 (3/64)		.0470	**.003**	.250 (5x)	3	1/8	2-1/2	980347-C3	38.20
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	859847-C3	30.40
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	856647-C3	30.40
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	857447-C3	32.60
.050		.0500	**.003**	.150 (3x)	3	1/8	1-1/2	971250-C3	30.40
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	859850-C3	30.40
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	971260-C3	30.40
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	856660-C3	30.40
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	969462-C3	28.30
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	971262-C3	28.30
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	980362-C3	36.80
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	856662-C3	28.30
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	858262-C3	30.50
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	969478-C3	28.30
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	971278-C3	28.30
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	980378-C3	36.80
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	856678-C3	28.30
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	858278-C3	30.50

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius (cont.)

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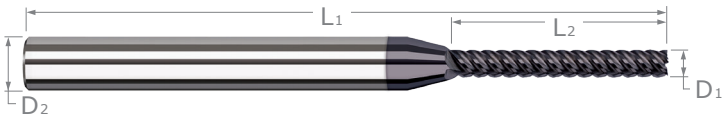
CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.25mm −.25mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	2.0 mm	.0787	**.10 mm**	6.00 mm (3x)	3	4 mm	50 mm	901845-C3	31.80
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	969493-C3	28.30
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	971293-C3	28.30
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	980393-C3	36.80
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	856693-C3	28.30
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	859093-C3	30.50
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	971300-C3	28.30
	3.0 mm	.1181	**.10 mm**	9.00 mm (3x)	3	4 mm	50 mm	901857-C3	31.80

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	969508-C3	27.10
.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	971308-C3	27.10
.125 (1/8)	.1250	**.005**	.625 (5x)	4	1/8	2-1/2	980408-C3	36.80
.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	856708-C3	28.30
.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	859108-C3	30.50
.156 (5/32)	.1562	**.010**	.235 (1.5x)	4	3/16	2	969510-C3	30.70
.156 (5/32)	.1562	**.010**	.470 (3x)	4	3/16	2	971310-C3	30.70
.156 (5/32)	.1562	**.010**	.750 (5x)	4	3/16	3	980410-C3	39.80
.187 (3/16)	.1875	**.010**	.285 (1.5x)	4	3/16	2	969512-C3	29.40
.187 (3/16)	.1875	**.010**	.562 (3x)	4	3/16	2	971312-C3	29.40
.187 (3/16)	.1875	**.010**	1.000 (5x)	4	3/16	3	980412-C3	39.80
.250 (1/4)	.2500	**.010**	.375 (1.5x)	4	1/4	2-1/2	969516-C3	37.10
.250 (1/4)	.2500	**.010**	.750 (3x)	4	1/4	2-1/2	971316-C3	37.10
.250 (1/4)	.2500	**.010**	1.250 (5x)	4	1/4	4	980416-C3	49.40
.312 (5/16)	.3125	**.010**	.470 (1.5x)	4	5/16	2-1/2	969520-C3	54.40
.312 (5/16)	.3125	**.010**	1.000 (3x)	4	5/16	2-1/2	971320-C3	54.40
.375 (3/8)	.3750	**.010**	.570 (1.5x)	4	3/8	2-1/2	969524-C3	63.20
.375 (3/8)	.3750	**.010**	1.125 (3x)	4	3/8	2-1/2	971324-C3	63.20
.500 (1/2)	.5000	**.015**	.750 (1.5x)	4	1/2	3	969532-C3	81.80

PLEASE SEE SPEEDS & FEEDS ON PAGE 163

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 47°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	967815-C3	41.40
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	972415-C3	51.40
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	983615-C3	52.00
.020		.0200	**.060** (3x)	4	1/8	1-1/2	967820-C3	40.70
.020		.0200	**.100** (5x)	4	1/8	2-1/2	972420-C3	51.00
.025		.0250	**.075** (3x)	4	1/8	1-1/2	967825-C3	38.20
.025		.0250	**.125** (5x)	4	1/8	2-1/2	972425-C3	49.40
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935131-C3	34.00
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	967831-C3	34.00
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	972431-C3	47.50
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	983631-C3	48.30
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	921922-C3	39.00
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	916422-C3	48.60
.040		.0400	**.120** (3x)	5	1/8	1-1/2	967840-C3	34.70
.040		.0400	**.203** (5x)	5	1/8	2-1/2	972440-C3	48.00
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	967847-C3	34.00
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	972447-C3	47.50
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	983647-C3	48.30
.050		.0500	**.150** (3x)	5	1/8	1-1/2	967850-C3	34.70
.050		.0500	**.250** (5x)	5	1/8	2-1/2	972450-C3	48.00
.060		.0600	**.180** (3x)	5	1/8	1-1/2	967860-C3	34.70
.060		.0600	**.312** (5x)	5	1/8	2-1/2	972460-C3	48.00
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935162-C3	32.00
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	967862-C3	32.00
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	972462-C3	44.70
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	983662-C3	45.40
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	967878-C3	32.00
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	972478-C3	44.70
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	983678-C3	45.40
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	921945-C3	37.70
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	916445-C3	47.20

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935193-C3	32.00
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	967893-C3	32.00
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	972493-C3	44.70
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	983693-C3	45.40
.100		.1000	**.300** (3x)	5	1/8	1-1/2	967900-C3	32.50
.100		.1000	**.500** (5x)	5	1/8	2-1/2	972500-C3	44.70
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	921957-C3	37.70
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	916457-C3	47.20

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	935208-C3	30.40
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	967908-C3	30.40
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	972508-C3	43.70
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	983708-C3	44.70
.156 (5/32)	.1562	**.470** (3x)	5	3/16	2	967910-C3	34.70
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	972510-C3	46.50
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	967912-C3	34.70
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	972512-C3	46.50
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	983712-C3	47.30
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	967916-C3	44.00
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	972516-C3	56.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	983716-C3	57.90

SPEEDS & FEEDS (High-Helix Finishers for Free Machining Steels)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Carbon Steels: 10xx - 1030 & all 10Lxx, 11xx - 1140 & all 11Lxx, 12xx - 1215 & all 12Lxx	100 - 125	500	Finishing (1.5x LOC)	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413	< .10x Dia	.5x - 1.5x Dia
	125 - 150	425	Finishing (3x LOC)	.00023	.00047	.00071	.00093	.00117	.00140	.00188	.00281	.00375	< .10x Dia	.5x - 3x Dia
	150 - 175	400	Finishing (5x LOC)	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00210	.00281	< .07x Dia	.5x - 5x Dia
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se, 440 F, 440 F Se	175 - 200	375												
	200 - 225	350	Finishing (8x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .05x Dia	.5x - 8x Dia

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIA. D_2 (h6)	OAL L_1	UNCOATED 3 FL	UNCOATED PRICE	TiB_2 COATED 3 FL	TiB_2 COATED PRICE	AMORPHOUS DIAMOND 3 FL	AMORPHOUS DIAMOND PRICE	
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	968710	46.40	968710-C8	53.20			
.010		.0100	**.030** (3x)	3	1/8	1-1/2	942210	46.40	942210-C8	53.00			
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	968715	37.40	968715-C8	43.80			
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	942215	37.40	942215-C8	43.80	942215-C4	49.00	
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	923015	47.30	923015-C8	53.80			
	0.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	900411	37.30	900411-C8	44.40			
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	968720	33.00	968720-C8	39.10			
.020		.0200	**.060** (3x)	3	1/8	1-1/2	942220	33.00	942220-C8	39.10	942220-C4	44.40	
.020		.0200	**.100** (5x)	3	1/8	2-1/2	923020	42.70	923020-C8	48.90			
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	968725	33.00	968725-C8	39.10			
.025		.0250	**.075** (3x)	3	1/8	1-1/2	942225	33.00	942225-C8	39.10	942225-C4	44.40	
.025		.0250	**.125** (5x)	3	1/8	2-1/2	923025	42.70	923025-C8	48.90			
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	968730	33.00	968730-C8	39.10			
.030		.0300	**.090** (3x)	3	1/8	1-1/2	942230	33.00	942230-C8	39.10	942230-C4	44.40	
.030		.0300	**156** (5x)	3	1/8	2-1/2	923030	42.70	923030-C8	48.90			
.031 (1/32)		.0310	**.025** (.8x)	3	1/8	1-1/2	873531	29.00	873531-C8	35.80			
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	968731	26.20	968731-C8	32.30	968731-C4	37.60	
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	942231	26.20	942231-C8	32.30	942231-C4	37.60	
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	857231	36.00	857231-C8	42.80			
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	923031	36.00	923031-C8	42.20	923031-C4	47.70	
.035		.0350	**.105** (3x)	3	1/8	1-1/2	942235	30.60	942235-C8	37.40			
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	900422	28.80	900422-C8	34.70	900422-C4	44.90	
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	968740	26.40	968740-C8	32.30			
.040		.0400	**.120** (3x)	3	1/8	1-1/2	942240	26.40	942240-C8	32.30	942240-C4	37.60	
.040		.0400	**.203** (5x)	3	1/8	2-1/2	923040	36.00	923040-C8	42.20	923040-C4	47.70	NEW
.045		.0450	**.135** (3x)	3	1/8	1-1/2	942245	26.40	942245-C8	33.20			
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	968747	26.20	968747-C8	32.30	968747-C4	37.60	
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	942247	26.20	942247-C8	32.30	942247-C4	37.60	
.047 (3/64)		.0470	**.187** (4x)	3	1/8	2-1/2	857247	36.00	857247-C8	42.80			
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	923047	36.00	923047-C8	42.20	923047-C4	47.70	
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	968750	26.40	968750-C8	32.30			
.050		.0500	**.150** (3x)	3	1/8	1-1/2	942250	26.40	942250-C8	32.30	942250-C4	37.60	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	923050	36.00	923050-C8	42.20			
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	968755	26.40	968755-C8	33.20			
.055		.0550	**.165** (3x)	3	1/8	1-1/2	942255	26.40	942255-C8	33.20			
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	900433	30.50	900433-C8	37.60			

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	968760	24.50	968760-C8	31.30		
.060		.0600	**.180** (3x)	3	1/8	1-1/2	942260	26.40	942260-C8	32.30	942260-C4	37.60
.060		.0600	**.312** (5x)	3	1/8	2-1/2	923060	36.00	923060-C8	42.20		
.062 (1/16)		.0620	**.050** (.8x)	3	1/8	1-1/2	873562	26.20	873562-C8	33.00		
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	968762	24.40	968762-C8	30.20	968762-C4	35.50
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	942262	24.40	942262-C8	30.20	942262-C4	35.50
NEW .062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	857262	34.00	857262-C8	40.80	857262-C4	45.70
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	923062	34.00	923062-C8	40.00	923062-C4	45.70
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	968770	24.50	968770-C8	31.30		
.070		.0700	**.210** (3x)	3	1/8	1-1/2	942270	24.50	942270-C8	30.20	942270-C4	35.50
.070		.0700	**.375** (5x)	3	1/8	2-1/2	923070	34.00	923070-C8	40.00		
.075		.0750	**.225** (3x)	3	1/8	1-1/2	942275	24.50	942275-C8	31.30		
.078 (5/64)		.0780	**.117** (1.5x)	3	1/8	1-1/2	968778	24.40	968778-C8	30.20	968778-C4	35.50
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	942278	24.40	942278-C8	30.20	942278-C4	35.50
.078 (5/64)		.0780	**.312** (4x)	3	1/8	2-1/2	857278	34.00	857278-C8	40.80		
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	923078	34.00	923078-C8	40.00	923078-C4	45.70
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	900445	26.90	900445-C8	32.70	900445-C4	43.00
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	968780	24.50	968780-C8	31.30		
.080		.0800	**.240** (3x)	3	1/8	1-1/2	942280	24.50	942280-C8	30.20	942280-C4	35.50
.080		.0800	**.406** (5x)	3	1/8	2-1/2	923080	34.00	923080-C8	40.00		
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	968790	24.50	968790-C8	31.30		
.090		.0900	**.270** (3x)	3	1/8	1-1/2	942290	24.50	942290-C8	30.20	942290-C4	35.50
.090		.0900	**.450** (5x)	3	1/8	2-1/2	923090	34.00	923090-C8	40.00		
.093 (3/32)		.0930	**.074** (.8x)	3	1/8	1-1/2	873593	26.20	873593-C8	33.00		
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	968793	24.40	968793-C8	30.20	968793-C4	35.50
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	942293	24.40	942293-C8	30.20	942293-C4	35.50
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	857293	34.00	857293-C8	40.80	857293-C4	45.70
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	923093	34.00	923093-C8	40.00	923093-C4	45.70
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	900451	28.60	900451-C8	35.70		
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	968800	24.50	968800-C8	30.20		
.100		.1000	**.300** (3x)	3	1/8	1-1/2	942300	24.50	942300-C8	30.20	942300-C4	35.50
.100		.1000	**.500** (5x)	3	1/8	2-1/2	923100	34.00	923100-C8	40.00		
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	968802	24.50	968802-C8	30.20		
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	942302	24.50	942302-C8	30.20	942302-C4	35.50
.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	923102	34.00	923102-C8	40.00		
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50mm	858457	27.20	858457-C8	34.30		
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	900457	26.90	900457-C8	32.70	900457-C4	43.00
	3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	845957	30.20	845957-C8	37.30		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.100** (.8x)	3	1/8	1-1/2	873608	27.00	873608-C8	33.80		
.125 (1/8)	.1250	**.187** (1.5x)	3	1/8	1-1/2	968808	23.40	968808-C8	30.20	968808-C4	35.10
.125 (1/8)	.1250	**.375** (3x)	3	1/8	1-1/2	942308	23.40	942308-C8	30.20	942308-C4	35.10
NEW .125 (1/8)	.1250	**.500** (4x)	3	1/8	2-1/2	857308	33.80	857308-C8	40.60	857308-C4	45.50
.125 (1/8)	.1250	**.625** (5x)	3	1/8	2-1/2	923108	33.80	923108-C8	40.00	923108-C4	45.50

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NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED		AMORPHOUS DIAMOND		
D$_1$ +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L$_2$ +.030″ −.000″ +.75mm −.00mm		D$_2$ (h6)	L$_1$	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.140 (9/64)		.1406	**.425** (3x)	3	3/16	2	942309	25.20	942309-C8	32.00			
.156 (5/32)		.1562	**.235** (1.5x)	3	3/16	2	968810	25.40	968810-C8	32.20	968810-C4	41.50	
.156 (5/32)		.1562	**.469** (3x)	3	3/16	2	942310	25.40	942310-C8	32.20	942310-C4	41.50	
.156 (5/32)		.1562	**.750** (5x)	3	3/16	3	923110	35.00	923110-C8	41.80	923110-C4	51.10	
.187 (3/16)		.1875	**.150** (.8x)	3	3/16	2	873612	28.10	873612-C8	34.90			
.187 (3/16)		.1875	**.285** (1.5x)	3	3/16	2	968812	25.20	968812-C8	32.00	968812-C4	41.30	
.187 (3/16)		.1875	**.562** (3x)	3	3/16	2	942312	25.20	942312-C8	32.00	942312-C4	41.30	
.187 (3/16)		.1875	**.750** (4x)	3	3/16	3	857312	28.30	857312-C8	35.10			NEW
.187 (3/16)		.1875	**1.000** (5x)	3	3/16	3	923112	35.00	923112-C8	41.80	923112-C4	51.10	
	6.0 mm	.2362	**18.00 mm** (3x)	3	6 mm	63 mm	900466	37.10	900466-C8	44.40			
.250 (1/4)		.2500	**.200** (.8x)	3	1/4	2-1/2	873616	35.00	873616-C8	42.30			
.250 (1/4)		.2500	**.375** (1.5x)	3	1/4	2-1/2	968816	30.40	968816-C8	38.40	968816-C4	48.70	
.250 (1/4)		.2500	**.750** (3x)	3	1/4	2-1/2	942316	30.40	942316-C8	37.70	942316-C4	48.70	
.250 (1/4)		.2500	**1.000** (4x)	3	1/4	4	857316	33.50	857316-C8	41.70			NEW
.250 (1/4)		.2500	**1.250** (5x)	3	1/4	4	923116	41.50	923116-C8	49.70	923116-C4	59.80	
.312 (5/16)		.3125	**1.000** (3x)	3	5/16	2-1/2	942320	38.10	942320-C8	53.60			
.375 (3/8)		.3750	**.570** (1.5x)	3	3/8	2-1/2	968824	41.40	968824-C8	60.20			
.375 (3/8)		.3750	**1.125** (3x)	3	3/8	2-1/2	942324	41.40	942324-C8	60.20	942324-C4	63.50	
.500 (1/2)		.5000	**.750** (1.5x)	3	1/2	3	968832	43.80	968832-C8	66.00			
.500 (1/2)		.5000	**1.500** (3x)	3	1/2	3	942332	43.80	942332-C8	65.90			NEW

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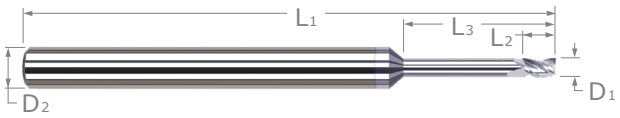
VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH		FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
	D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″	L3 +.010″ −.000″			D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.015 (1/64)		.0150	.023	**.078**	(5x)	3	1/8	2-1/2	930815	48.60	930815-C8	55.40		
	.015 (1/64)		.0150	.023	**.125**	(8x)	3	1/8	2-1/2	927115	49.80	927115-C8	56.60		
	.020		.0200	.030	**.100**	(5x)	3	1/8	2-1/2	930820	46.50	930820-C8	53.30		
	.020		.0200	.030	**.160**	(8x)	3	1/8	2-1/2	927120	47.80	927120-C8	54.60		
	.020		.0200	.030	**.200**	(10x)	3	1/8	2-1/2	919320	49.70	919320-C8	56.50		
	.025		.0250	.038	**.125**	(5x)	3	1/8	2-1/2	930825	45.40	930825-C8	52.20		
	.025		.0250	.038	**.203**	(8x)	3	1/8	2-1/2	927125	46.50	927125-C8	53.30		
	.030		.0300	.045	**.250**	(8x)	3	1/8	2-1/2	927130	46.50	927130-C8	53.30		
	.031 (1/32)		.0310	.047	**.093**	(3x)	3	1/8	1-1/2	924531	42.00	924531-C8	48.80		
	.031 (1/32)		.0310	.047	**.125**	(4x)	3	1/8	2-1/2	814331	42.50	814331-C8	49.30		
	.031 (1/32)		.0310	.047	**.156**	(5x)	3	1/8	2-1/2	930831	42.50	930831-C8	49.30	930831-C4	54.20
	.031 (1/32)		.0310	.047	**.250**	(8x)	3	1/8	2-1/2	927131	43.50	927131-C8	50.30	927131-C4	55.20
	.031 (1/32)		.0310	.047	**.312**	(10x)	3	1/8	2-1/2	919331	45.40	919331-C8	52.20		
	.031 (1/32)		.0310	.047	**.375**	(12x)	3	1/8	2-1/2	879231	47.00	879231-C8	53.80		
NEW		1.0 mm	.0393	1.5 mm	**8 mm**	(8x)	3	4 mm	50 mm	795322	47.20	795322-C8	54.30		
	.040		.0400	.060	**.325**	(8x)	3	1/8	2-1/2	927140	45.70	927140-C8	52.50		
	.047 (3/64)		.0470	.071	**.250**	(5x)	3	1/8	2-1/2	930847	42.50	930847-C8	49.30		
	.047 (3/64)		.0470	.071	**.375**	(8x)	3	1/8	2-1/2	927147	43.50	927147-C8	50.30		
	.047 (3/64)		.0470	.071	**.480**	(10x)	3	1/8	2-1/2	919347	45.70	919347-C8	52.50		
	.050		.0500	.075	**.400**	(8x)	3	1/8	2-1/2	927150	47.30	927150-C8	54.10		
NEW	.055		.0550	.083	**.450**	(8x)	3	1/8	2-1/2	927155	47.30	927155-C8	54.10		
	.060		.0600	.090	**.500**	(8x)	3	1/8	2-1/2	927160	47.30	927160-C8	54.10		
	.062 (1/16)		.0620	.093	**.186**	(3x)	3	1/8	1-1/2	924562	42.00	924562-C8	48.80		
	.062 (1/16)		.0620	.093	**.250**	(4x)	3	1/8	2-1/2	814362	42.50	814362-C8	49.30		
	.062 (1/16)		.0620	.093	**.312**	(5x)	3	1/8	2-1/2	930862	42.50	930862-C8	49.30	930862-C4	54.20
	.062 (1/16)		.0620	.093	**.375**	(6x)	3	1/8	2-1/2	814162	43.20	814162-C8	50.00		
	.062 (1/16)		.0620	.093	**.437**	(7x)	3	1/8	2-1/2	813962	43.20	813962-C8	50.00		
	.062 (1/16)		.0620	.093	**.500**	(8x)	3	1/8	2-1/2	927162	43.20	927162-C8	50.00	927162-C4	54.90
	.062 (1/16)		.0620	.093	**.625**	(10x)	3	1/8	2-1/2	919362	45.40	919362-C8	52.20		
	.062 (1/16)		.0620	.093	**.750**	(12x)	3	1/8	2-1/2	879262	47.00	879262-C8	53.80		
NEW	.070		.0700	.105	**.570**	(8x)	3	1/8	2-1/2	927170	44.20	927170-C8	51.00		
	.078 (5/64)		.0780	.118	**.406**	(5x)	3	1/8	2-1/2	930878	42.50	930878-C8	49.30		
	.078 (5/64)		.0780	.118	**.625**	(8x)	3	1/8	2-1/2	927178	43.20	927178-C8	50.00		
	.078 (5/64)		.0780	.118	**.800**	(10x)	3	1/8	2-1/2	919378	45.70	919378-C8	52.50		

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute (cont.)

mm & in

continued from previous page

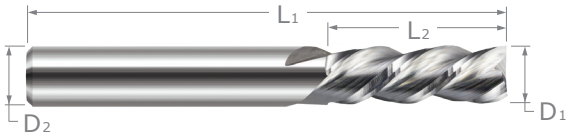
CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH		FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	L_2 +.010″ −.000″	L_3 +.010″ −.000″			D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
	2.0 mm	.0787	3 mm	**16 mm**	(8x)	3	4 mm	50 mm	795345	47.20	795345-C8	54.30			NEW
.080		.0800	.120	**.650**	(8x)	3	1/8	2-1/2	927180	44.20	927180-C8	51.00			NEW
.090		.0900	.135	**.750**	(8x)	3	1/8	2-1/2	927190	44.20	927190-C8	51.00			NEW
.093 (3/32)		.0930	.140	**.279**	(3x)	3	1/8	1-1/2	924593	42.00	924593-C8	48.80			
.093 (3/32)		.0930	.140	**.375**	(4x)	3	1/8	2-1/2	814393	42.50	814393-C8	49.30			
.093 (3/32)		.0930	.140	**.500**	(5x)	3	1/8	2-1/2	930893	42.50	930893-C8	49.30	930893-C4	54.20	
.093 (3/32)		.0930	.140	**.585**	(6x)	3	1/8	2-1/2	814193	43.20	814193-C8	50.00			
.093 (3/32)		.0930	.140	**.670**	(7x)	3	1/8	2-1/2	813993	43.20	813993-C8	50.00			
.093 (3/32)		.0930	.140	**.750**	(8x)	3	1/8	2-1/2	927193	43.20	927193-C8	50.00	927193-C4	54.90	
.093 (3/32)		.0930	.140	**.950**	(10x)	3	1/8	2-1/2	919393	45.40	919393-C8	52.20			
.093 (3/32)		.0930	.140	**1.125**	(12x)	3	1/8	2-1/2	879293	47.00	879293-C8	53.80			
.100		.1000	.150	**.800**	(8x)	3	1/8	2-1/2	927200	47.30	927200-C8	54.10			
.109 (7/64)		.1090	.164	**.900**	(8x)	3	1/8	2-1/2	927202	47.30	927202-C8	54.10			
	3.0 mm	.1181	4.50 mm	**24.0 mm**	(8x)	3	4 mm	50 mm	795357	49.20	795357-C8	56.30			NEW

D_1 +.000″ −.002″	D_1 decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		FLUTES	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.125 (1/8)	.1250	.187	**.375**	(3x)	3	1/8	1-1/2	924608	42.00	924608-C8	48.80			
.125 (1/8)	.1250	.187	**.500**	(4x)	3	1/8	2-1/2	814408	42.50	814408-C8	49.30			
.125 (1/8)	.1250	.187	**.625**	(5x)	3	1/8	2-1/2	930908	42.50	930908-C8	49.30	930908-C4	54.20	
.125 (1/8)	.1250	.187	**.750**	(6x)	3	1/8	2-1/2	814208	43.20	814208-C8	50.00			
.125 (1/8)	.1250	.187	**.875**	(7x)	3	1/8	2-1/2	814008	43.20	814008-C8	50.00			
.125 (1/8)	.1250	.187	**1.000**	(8x)	3	1/8	2-1/2	927208	43.20	927208-C8	50.00	927208-C4	54.90	
.125 (1/8)	.1250	.187	**1.250**	(10x)	3	1/8	2-1/2	919408	45.40	919408-C8	52.20			
.125 (1/8)	.1250	.187	**1.500**	(12x)	3	1/8	3	879308	47.00	879308-C8	53.80			
.140 (9/64)	.1406	.220	**1.125**	(8x)	3	3/16	3	927209	50.00	927209-C8	56.80			
.156 (5/32)	.1562	.235	**.750**	(5x)	3	3/16	3	930910	46.50	930910-C8	53.30			
.156 (5/32)	.1562	.235	**1.250**	(8x)	3	3/16	3	927210	47.80	927210-C8	54.60			
.156 (5/32)	.1562	.235	**1.570**	(10x)	3	3/16	3	919410	49.50	919410-C8	56.30			
.187 (3/16)	.1875	.285	**1.000**	(5x)	3	3/16	3	930912	46.50	930912-C8	53.30	930912-C4	62.60	NEW
.187 (3/16)	.1875	.285	**1.500**	(8x)	3	3/16	3	927212	47.80	927212-C8	54.60			
.187 (3/16)	.1875	.285	**1.875**	(10x)	3	3/16	4	919412	49.50	919412-C8	56.80			
.250 (1/4)	.2500	.375	**1.250**	(5x)	3	1/4	4	930916	49.70	930916-C8	57.90			
.250 (1/4)	.2500	.375	**2.000**	(8x)	3	1/4	4	927216	50.70	927216-C8	58.90			
.250 (1/4)	.2500	.375	**2.500**	(10x)	3	1/4	4	919416	52.40	919416-C8	60.60			
.375 (3/8)	.3750	.570	**2.000**	(5x)	3	3/8	4	930924	59.30	930924-C8	81.40			NEW
.500 (1/2)	.5000	.750	**2.500**	(5x)	3	1/2	4	930932	71.80	930932-C8	93.20			NEW

PLEASE SEE SPEEDS & FEEDS ON PAGE 184

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Downcut



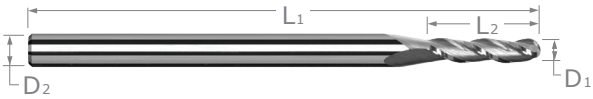
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Prevents lifting of workpiece
- h6 shank tolerance for high precision tool holders
- 3 left hand spiral, right hand cut flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)	.045 (3x)	3	1/8	1-1/2	896215	42.20	896215-C8	49.00
.031 (1/32)	.047 (1.5x)	3	1/8	1-1/2	858531	29.80	858531-C8	36.60
.031 (1/32)	.093 (3x)	3	1/8	1-1/2	896231	29.60	896231-C8	36.40
.047 (3/64)	.141 (3x)	3	1/8	1-1/2	896247	29.60	896247-C8	36.40
.062 (1/16)	.093 (1.5x)	3	1/8	1-1/2	858562	27.70	858562-C8	34.50
.062 (1/16)	.186 (3x)	3	1/8	1-1/2	896262	27.50	896262-C8	34.30
.078 (5/64)	.234 (3x)	3	1/8	1-1/2	896278	27.50	896278-C8	34.30
.093 (3/32)	.140 (1.5x)	3	1/8	1-1/2	858593	27.70	858593-C8	34.50
.093 (3/32)	.279 (3x)	3	1/8	1-1/2	896293	27.50	896293-C8	34.30
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.187 (1.5x)	3	1/8	1-1/2	858608	27.70	858608-C8	34.50
.125 (1/8)	.375 (3x)	3	1/8	1-1/2	896308	27.50	896308-C8	34.30
.187 (3/16)	.285 (1.5x)	3	3/16	2	858612	28.90	858612-C8	35.70
.187 (3/16)	.562 (3x)	3	3/16	2	896312	28.70	896312-C8	35.50
.250 (1/4)	.375 (1.5x)	3	1/4	2-1/2	858616	35.90	858616-C8	43.20
.250 (1/4)	.750 (3x)	3	1/4	2-1/2	896316	35.50	896316-C8	42.80
.375 (3/8)	.570 (1.5x)	3	3/8	2-1/2	858624	47.90	858624-C8	66.70
.375 (3/8)	1.125 (3x)	3	3/8	2-1/2	896324	47.50	896324-C8	66.30

PLEASE SEE SPEEDS & FEEDS ON PAGE 182

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	977504	54.20	977504-C8	61.30		
.010		.0100	**.030** (3x)	3	1/8	1-1/2	989710	55.30	989710-C8	62.10		
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	958115	44.70	958115-C8	51.50		
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	989715	44.70	989715-C8	51.50		
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	977509	43.90	977509-C8	51.00		
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	977511	39.30	977511-C8	46.40		
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	958120	39.10	958120-C8	45.90		
.020		.0200	**.060** (3x)	3	1/8	1-1/2	989720	39.10	989720-C8	45.90		
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	977513	37.30	977513-C8	44.40		
.025		.0250	**.075** (3x)	3	1/8	1-1/2	989725	37.70	989725-C8	44.50		
.030		.0300	**.090** (3x)	3	1/8	1-1/2	989730	33.10	989730-C8	39.90		
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	958131	32.70	958131-C8	39.50		
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	989731	32.30	989731-C8	39.10	989731-C4	44.00
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	850031	40.10	850031-C8	46.90		
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	977518	32.00	977518-C8	39.10		
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	908322	32.00	908322-C8	39.10		
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	977522	32.00	977522-C8	39.10		
.040		.0400	**.120** (3x)	3	1/8	1-1/2	989740	34.50	989740-C8	41.30		
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	958147	32.70	958147-C8	39.50		
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	989747	32.30	989747-C8	39.10		
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	850047	40.10	850047-C8	46.90		
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	977527	32.00	977527-C8	39.10		
.050		.0500	**.150** (3x)	3	1/8	1-1/2	989750	33.30	989750-C8	40.10		
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	977531	32.00	977531-C8	39.10		
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	977533	30.00	977533-C8	37.10		
.060		.0600	**.180** (3x)	3	1/8	1-1/2	989760	32.50	989760-C8	39.30		
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	958162	30.60	958162-C8	37.40		
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	989762	30.60	989762-C8	37.40	989762-C4	42.30
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	850062	38.20	850062-C8	45.00		
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	977536	30.00	977536-C8	37.10		
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	977540	30.00	977540-C8	37.10		
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	958178	30.60	958178-C8	37.40		
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	989778	30.60	989778-C8	37.40		
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	850078	38.20	850078-C8	45.00		
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	908345	30.00	908345-C8	37.10		
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	977545	30.00	977545-C8	37.10		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball (cont.)

mm & in

continued from previous page

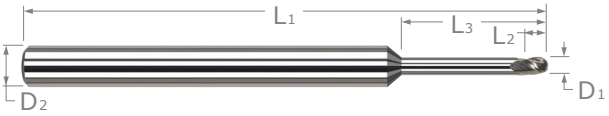
CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIA. D_2 (h6)	OAL L_1	UNCOATED 3 FL	UNCOATED PRICE	TiB_2 COATED 3 FL	TiB_2 COATED PRICE	AMORPHOUS DIAMOND 3 FL	AMORPHOUS DIAMOND PRICE
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	958193	30.60	958193-C8	37.40		
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	989793	30.60	989793-C8	37.40	989793-C4	42.30
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	850093	38.20	850093-C8	45.00		
.100		.1000	**.300** (3x)	3	1/8	1-1/2	989800	30.70	989800-C8	37.50		
.109 (7/64)		.1094	**.327** (3x)	3	1/8	1-1/2	989802	31.50	989802-C8	37.60		
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	977557	30.90	977557-C8	38.00		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	3	1/8	1-1/2	958208	29.40	958208-C8	36.20		
.125 (1/8)	.1250	**.375** (3x)	3	1/8	1-1/2	989808	29.40	989808-C8	36.20	989808-C4	41.10
.125 (1/8)	.1250	**.625** (5x)	3	1/8	2-1/2	850108	38.20	850108-C8	45.00		
.156 (5/32)	.1562	**.235** (1.5x)	3	3/16	2	958210	31.60	958210-C8	38.40		
.156 (5/32)	.1562	**.470** (3x)	3	3/16	2	989810	31.60	989810-C8	38.40		
.187 (3/16)	.1875	**.285** (1.5x)	3	3/16	2	958212	30.40	958212-C8	37.20		
.187 (3/16)	.1875	**.562** (3x)	3	3/16	2	989812	30.40	989812-C8	37.20	989812-C4	46.50
.250 (1/4)	.2500	**.375** (1.5x)	3	1/4	2-1/2	958216	36.20	958216-C8	43.50		
.250 (1/4)	.2500	**.750** (3x)	3	1/4	2-1/2	989816	36.20	989816-C8	43.50	989816-C4	54.50

PLEASE SEE SPEEDS & FEEDS ON PAGE 182

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) improves performance in off-center contour milling applications
- Reduced neck diameter to avoid heeling
- Ball end for profiling
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIA. D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	OVERALL REACH L_3 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIA D_2 (h6)	OAL L_1	UNCOATED 3 FL	UNCOATED PRICE	TiB_2 COATED 3 FL	TiB_2 COATED PRICE	AMORPHOUS DIAMOND 3 FL	AMORPHOUS DIAMOND PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	3	1/8	2-1/2	947015	48.90	947015-C8	55.70		
.015 (1/64)		.0150	.022	**.125** (8x)	3	1/8	2-1/2	54415	56.80	54415-C8	63.60		
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	947020	52.60	947020-C8	59.40		
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	54420	53.60	54420-C8	60.40		
.025		.0250	.037	**.125** (5x)	3	1/8	2-1/2	947025	51.20	947025-C8	58.00		
.025		.0250	.037	**.203** (8x)	3	1/8	2-1/2	54425	52.40	54425-C8	59.20		
.031 (1/32)		.0310	.046	**.156** (5x)	3	1/8	2-1/2	947031	48.30	947031-C8	55.10		
.031 (1/32)		.0310	.046	**.250** (8x)	3	1/8	2-1/2	54431	50.40	54431-C8	57.20	54431-C4	62.10
.031 (1/32)		.0310	.046	**.312** (10x)	3	1/8	2-1/2	925131	53.40	925131-C8	60.20		
.031 (1/32)		.0310	.046	**.375** (12x)	3	1/8	2-1/2	879431	55.80	879431-C8	62.60		
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	851322	54.20	851322-C8	61.30		
.047 (3/64)		.0470	.070	**.250** (5x)	3	1/8	2-1/2	947047	48.30	947047-C8	55.10		
.047 (3/64)		.0470	.070	**.375** (8x)	3	1/8	2-1/2	54447	48.90	54447-C8	55.70	54447-C4	60.60
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	947062	48.30	947062-C8	55.10		
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	54462	48.90	54462-C8	55.70	54462-C4	60.60
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	925162	53.40	925162-C8	60.20		
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	879462	56.30	879462-C8	63.10		
.078 (5/64)		.0780	.117	**.406** (5x)	3	1/8	2-1/2	947078	48.30	947078-C8	55.10		
.078 (5/64)		.0780	.117	**.625** (8x)	3	1/8	2-1/2	54478	48.90	54478-C8	55.70	54478-C4	60.60
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	851345	50.40	851345-C8	57.00		
.093 (3/32)		.0930	.139	**.500** (5x)	3	1/8	2-1/2	947093	48.30	947093-C8	55.10		
.093 (3/32)		.0930	.139	**.750** (8x)	3	1/8	2-1/2	54493	48.90	54493-C8	55.70	54493-C4	60.60
.093 (3/32)		.0930	.139	**.950** (10x)	3	1/8	2-1/2	925193	53.40	925193-C8	60.20		
.093 (3/32)		.0930	.139	**1.125** (12x)	3	1/8	2-1/2	879493	56.30	879493-C8	63.10		
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	851357	54.20	851357-C8	61.30		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	SHANK DIA D_2 (h6)	OAL L_1	UNCOATED 3 FL	UNCOATED PRICE	TiB_2 COATED 3 FL	TiB_2 COATED PRICE	AMORPHOUS DIAMOND 3 FL	AMORPHOUS DIAMOND PRICE
.125 (1/8)	.1250	.187	**.625** (5x)	3	1/8	2-1/2	947108	47.30	947108-C8	54.10		
.125 (1/8)	.1250	.187	**1.000** (8x)	3	1/8	2-1/2	54508	48.30	54508-C8	55.10	54508-C4	60.00
.125 (1/8)	.1250	.187	**1.250** (10x)	3	1/8	2-1/2	925208	53.40	925208-C8	60.20		
.125 (1/8)	.1250	.187	**1.500** (12x)	3	1/8	3	879508	56.30	879508-C8	63.10		
.156 (5/32)	.1562	.234	**.750** (5x)	3	3/16	3	947110	53.40	947110-C8	60.20		
.156 (5/32)	.1562	.234	**1.250** (8x)	3	3/16	3	54510	53.60	54510-C8	60.40		
.187 (3/16)	.1875	.281	**1.000** (5x)	3	3/16	3	947112	53.40	947112-C8	60.20		
.187 (3/16)	.1875	.281	**1.500** (8x)	3	3/16	3	54512	53.90	54512-C8	60.70	54512-C4	70.00
.250 (1/4)	.2500	.375	**1.250** (5x)	3	1/4	4	947116	55.40	947116-C8	63.60		
.250 (1/4)	.2500	.375	**2.000** (8x)	3	1/4	4	54516	56.40	54516-C8	64.60	54516-C4	74.70

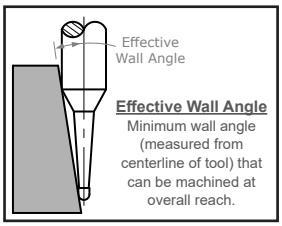
PLEASE SEE SPEEDS & FEEDS ON PAGE 184

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters)

Excellent in Aluminum & Other Non-Ferrous Materials

- Very short length of cut and solid tapered neck for maximum rigidity
- 1°, 1.5°, 3°, 5°, and 7° neck angles to address common draft angles for molds
- 45° helix, large flute valley, and sharper cutting edge for faster chip removal and better finish
- Offered with TiB_2 coating to minimize galling and enhance performance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
1°	.062 (1/16)	.050	I	.500	**.595**	6.4°	3/16	2	925049	49.10	925049-C8	55.90
	.062 (1/16)	.050	I	1.000	**1.080**	3.5°	3/16	2-1/2	925056	49.10	925056-C8	55.90
	.093 (3/32)	.074	I	.750	**.811**	3.6°	3/16	2	925070	46.50	925070-C8	53.30
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	925072	48.60	925072-C8	55.40
	.125 (1/8)	.100	I	1.000	**1.027**	1.9°	3/16	2	925091	59.40	925091-C8	66.20
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	925077	61.40	925077-C8	68.20
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	925087	61.90	925087-C8	70.10
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	925092	66.30	925092-C8	85.10
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	997807	55.00	997807-C8	61.80
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	997814	55.00	997814-C8	61.80
	.031 (1/32)	.025	I	.250	**.375**	12.3°	3/16	2	997821	50.50	997821-C8	57.30
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	997828	50.50	997828-C8	57.30
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	997835	49.80	997835-C8	56.60
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	997842	49.80	997842-C8	56.60
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	997849	49.10	997849-C8	55.90
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	997856	49.10	997856-C8	55.90
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	997863	47.50	997863-C8	54.30
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	997870	46.50	997870-C8	53.30
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	997877	59.40	997877-C8	66.20
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	997887	60.10	997887-C8	67.40
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	997892	64.30	997892-C8	79.80

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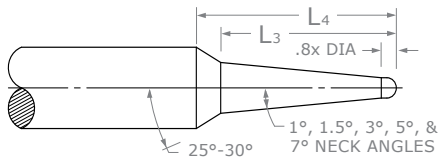
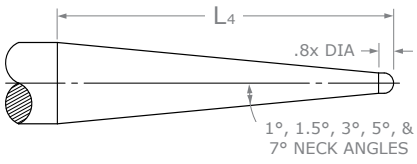


TYPE II



HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters) (cont.)

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NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
3°	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	996607	51.80	996607-C8	58.60
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	996614	51.80	996614-C8	58.60
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	996621	48.90	996621-C8	55.70
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	996628	48.90	996628-C8	55.70
	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	996635	48.90	996635-C8	55.70
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	996642	48.90	996642-C8	55.70
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	996649	47.50	996649-C8	54.30
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	996656	42.90	996656-C8	49.70
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	996663	59.40	996663-C8	66.70
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	996670	64.30	996670-C8	71.60
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	996674	66.90	996674-C8	89.00
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	996692	65.50	996692-C8	84.30
5°	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	996007	47.20	996007-C8	54.00
	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	996014	47.20	996014-C8	54.00
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	996021	44.30	996021-C8	51.10
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	996028	61.40	996028-C8	68.70
	.093 (3/32)	.074	II	.971	**.971**	4.9°	1/4	2-1/2	996035	61.40	996035-C8	68.70
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	996042	63.90	996042-C8	71.20
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	996087	65.50	996087-C8	84.30
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	996092	65.50	996092-C8	84.30
7°	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	995607	47.20	995607-C8	54.00
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	995614	47.20	995614-C8	54.00
	.062 (1/16)	.050	II	.816	**.816**	6.9°	1/4	2-1/2	995621	61.40	995621-C8	68.70
	.078 (5/64)	.062	II	.762	**.762**	6.8°	1/4	2-1/2	995628	61.40	995628-C8	68.70
	.093 (3/32)	.074	II	.713	**.713**	6.7°	1/4	2-1/2	995635	58.30	995635-C8	65.60
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	995642	55.60	995642-C8	62.90
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	995687	65.50	995687-C8	84.30

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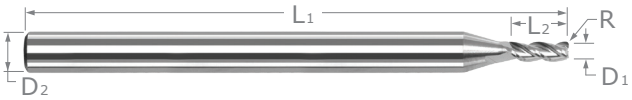
VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

TiB_2 Titanium Diboride	Best used in Non-Abrasive Aluminum Alloys and Magnesium Alloys! Extremely low affinity to aluminum. Prevents build-up on cutting edge and chip packing, extending tool life.
Amorphous Diamond	Outstanding performance in Copper, Brass, Bronze and High Silicon Aluminum! Improves wear resistance and lubricity. Thin film coating maintains sharp edge, improving performance and finish.

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.2 mm	.0078	**.03 mm**	.30 mm (1.5x)	3	4 mm	50 mm	986204	49.70	986204-C8	56.80		
	.2 mm	.0078	**.03 mm**	.60 mm (3x)	3	4 mm	50 mm	973504	49.70	973504-C8	56.80		
.010		.0100	**.002**	.030 (3x)	3	1/8	1-1/2	50010	41.10	50010-C8	47.90		
	.3 mm	.0118	**.05 mm**	.90 mm (3x)	3	4 mm	50 mm	973506	48.30	973506-C8	55.40		
.015 (1/64)		.0150	**.002**	.022 (1.5x)	3	1/8	1-1/2	61715	38.40	61715-C8	45.20		
.015 (1/64)		.0150	**.002**	.045 (3x)	3	1/8	1-1/2	50015	38.40	50015-C8	45.20	50015-C4	50.10
.015 (1/64)		.0150	**.002**	.078 (5x)	3	1/8	2-1/2	53015	45.70	53015-C8	52.50	53015-C4	57.40
	.4 mm	.0157	**.05 mm**	.60 mm (1.5x)	3	4 mm	50 mm	986209	40.50	986209-C8	47.60		
	.4 mm	.0157	**.05 mm**	1.20 mm (3x)	3	4 mm	50 mm	973509	40.50	973509-C8	47.60		
	.5 mm	.0196	**.05 mm**	.75 mm (1.5x)	3	4 mm	50 mm	986211	35.80	986211-C8	42.90		
	.5 mm	.0196	**.05 mm**	1.50 mm (3x)	3	4 mm	50 mm	973511	35.80	973511-C8	42.90		
.020		.0200	**.002**	.030 (1.5x)	3	1/8	1-1/2	61720	33.00	61720-C8	39.80		
.020		.0200	**.002**	.060 (3x)	3	1/8	1-1/2	50020	33.00	50020-C8	39.80	50020-C4	44.70
.020		.0200	**.002**	.100 (5x)	3	1/8	2-1/2	53020	40.30	53020-C8	47.10	53020-C4	52.00
	.6 mm	.0236	**.05 mm**	.90 mm (1.5x)	3	4 mm	50 mm	986213	34.40	986213-C8	41.50		
	.6 mm	.0236	**.05 mm**	1.80 mm (3x)	3	4 mm	50 mm	973513	34.40	973513-C8	41.50		
.025		.0250	**.002**	.038 (1.5x)	3	1/8	1-1/2	61725	31.80	61725-C8	38.60		
.025		.0250	**.002**	.075 (3x)	3	1/8	1-1/2	50025	31.80	50025-C8	38.60	50025-C4	43.50
.025		.0250	**.002**	.125 (5x)	3	1/8	2-1/2	53025	39.10	53025-C8	45.90	53025-C4	50.80
	.7 mm	.0275	**.08 mm**	2.10 mm (3x)	3	4 mm	50 mm	973515	34.40	973515-C8	41.50		
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	61731	26.40	61731-C8	33.20		
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	50031	26.40	50031-C8	33.20	50031-C4	38.10
.031 (1/32)		.0310	**.003**	.156 (5x)	3	1/8	2-1/2	53031	33.30	53031-C8	40.10	53031-C4	45.00
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	901531	26.00	901531-C8	32.80		
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	904631	26.00	904631-C8	32.80		
	.8 mm	.0314	**.08 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	986218	29.00	986218-C8	36.10		
	.8 mm	.0314	**.08 mm**	2.40 mm (3x)	3	4 mm	50 mm	973518	29.00	973518-C8	36.10		
.035		.0350	**.003**	.053 (1.5x)	3	1/8	1-1/2	61735	26.40	61735-C8	33.20		
.035		.0350	**.003**	.105 (3x)	3	1/8	1-1/2	50035	26.20	50035-C8	33.00		
	.9 mm	.0354	**.08 mm**	2.7 mm (3x)	3	4 mm	50 mm	973520	29.00	973520-C8	36.10		
	1.0 mm	.0393	**.08 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	986222	29.00	986222-C8	36.10		
	1.0 mm	.0393	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	973522	29.00	973522-C8	36.10		
.040		.0400	**.003**	.060 (1.5x)	3	1/8	1-1/2	61740	26.40	61740-C8	33.20		
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	50040	26.40	50040-C8	33.20		
.040		.0400	**.003**	.203 (5x)	3	1/8	2-1/2	53040	33.30	53040-C8	40.10		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT		SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND		
D1 +.0005″ −.0005″	D1 +.00mm −.02mm	D1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L2 +.010″ −.000″ +.25mm −.00mm	FLUTES	D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
	1.1 mm	.0433	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	973524	29.00	973524-C8	36.10			
.045		.0450	**.003**	.135 (3x)	3	1/8	1-1/2	50045	26.40	50045-C8	33.20			
.047 (3/64)		.0470	**.003**	.070 (1.5x)	3	1/8	1-1/2	61747	26.40	61747-C8	33.20			
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	50047	26.20	50047-C8	33.00	50047-C4	37.90	
.047 (3/64)		.0470	**.003**	.250 (5x)	3	1/8	2-1/2	53047	33.30	53047-C8	40.10	53047-C4	45.00	
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	901547	26.00	901547-C8	32.80			
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	904647	26.00	904647-C8	32.80			
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	912347	26.00	912347-C8	32.80			
	1.2 mm	.0472	**.08 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	986227	29.00	986227-C8	36.10			
	1.2 mm	.0472	**.08 mm**	3.50 mm (3x)	3	4 mm	50 mm	973527	29.00	973527-C8	36.10			
.050		.0500	**.003**	.075 (1.5x)	3	1/8	1-1/2	61750	26.20	61750-C8	33.00			
.050		.0500	**.003**	.150 (3x)	3	1/8	1-1/2	50050	26.20	50050-C8	33.00			
.050		.0500	**.003**	.250 (5x)	3	1/8	2-1/2	53050	33.30	53050-C8	40.10			
	1.3 mm	.0511	**.08 mm**	4.00 mm (3x)	3	4 mm	50 mm	973529	29.00	973529-C8	36.10			
.055		.0550	**.003**	.083 (1.5x)	3	1/8	1-1/2	61755	26.20	61755-C8	33.00			
.055		.0550	**.003**	.165 (3x)	3	1/8	1-1/2	50055	26.20	50055-C8	33.00			
.055		.0550	**.003**	.275 (5x)	3	1/8	2-1/2	53055	33.30	53055-C8	40.10			
	1.4 mm	.0551	**.08 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	986231	29.00	986231-C8	36.10			
	1.4 mm	.0551	**.08 mm**	4.00 mm (3x)	3	4 mm	50 mm	973531	29.00	973531-C8	36.10			
	1.5 mm	.0590	**.10 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	986233	26.90	986233-C8	34.00			
	1.5 mm	.0590	**.10 mm**	4.50 mm (3x)	3	4 mm	50 mm	973533	26.90	973533-C8	34.00			
.060		.0600	**.005**	.090 (1.5x)	3	1/8	1-1/2	61760	26.20	61760-C8	33.00			
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	50060	26.20	50060-C8	33.00			
.060		.0600	**.005**	.312 (5x)	3	1/8	2-1/2	53060	33.30	53060-C8	40.10			
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	904660	33.30	904660-C8	40.10			
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	61762	24.30	61762-C8	31.10	61762-C4	36.00	
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	50062	24.20	50062-C8	31.00	50062-C4	35.90	
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	53062	31.60	53062-C8	38.40	53062-C4	43.30	
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	878562	24.30	878562-C8	31.10			
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	904662	24.20	904662-C8	31.00			
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	840762	31.60	840762-C8	38.40			NEW
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	912362	24.20	912362-C8	31.00			
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	925862	24.20	925862-C8	31.00			
	1.6 mm	.0629	**.10 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	986236	26.90	986236-C8	34.00			
	1.6 mm	.0629	**.10 mm**	5.00 mm (3x)	3	4 mm	50 mm	973536	26.90	973536-C8	34.00			
	1.7 mm	.0669	**.10 mm**	5.00 mm (3x)	3	4 mm	50 mm	973538	26.90	973538-C8	34.00			
.070		.0700	**.005**	.210 (3x)	3	1/8	1-1/2	50070	24.80	50070-C8	31.60			
	1.8 mm	.0708	**.10 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	986240	26.90	986240-C8	34.00			
	1.8 mm	.0708	**.10 mm**	5.50 mm (3x)	3	4 mm	50 mm	973540	26.90	973540-C8	34.00			
	1.9 mm	.0748	**.10 mm**	5.50 mm (3x)	3	4 mm	50 mm	973542	26.90	973542-C8	34.00			
.078 (5/64)		.0780	**.005**	.117 (1.5x)	3	1/8	1-1/2	61778	24.30	61778-C8	31.10	61778-C4	36.00	
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	50078	24.20	50078-C8	31.00	50078-C4	35.90	
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	53078	31.60	53078-C8	38.40	53078-C4	43.30	
.078 (5/64)		.0780	**.010**	.117 (1.5x)	3	1/8	1-1/2	878578	24.30	878578-C8	31.10			
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	904678	24.20	904678-C8	31.00			
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	912378	24.20	912378-C8	31.00			
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	925878	24.20	925878-C8	31.00			

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	CUTTER DIAMETER D_1 +.00mm −.02mm	CUTTER DIAMETER decimal equivalent	CORNER RADIUS R +.001″ −.001″ / +.025mm −.025mm	LENGTH OF CUT L_2 +.010″ −.000″ / +.25mm −.00mm	FLUTES	SHANK DIA. D_2 (h6)	OAL L_1	UNCOATED 3 FL	UNCOATED PRICE	TiB_2 COATED 3 FL	TiB_2 COATED PRICE	AMORPHOUS DIAMOND 3 FL	AMORPHOUS DIAMOND PRICE
	2.0 mm	.0787	**.10 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	986245	26.90	986245-C8	34.00		
	2.0 mm	.0787	**.10 mm**	6.00 mm (3x)	3	4 mm	50 mm	973545	26.90	973545-C8	34.00		
.080		.0800	**.005**	.240 (3x)	3	1/8	1-1/2	50080	24.80	50080-C8	31.60		
.090		.0900	**.005**	.270 (3x)	3	1/8	1-1/2	50090	24.80	50090-C8	31.60		
.093 (3/32)		.0930	**.005**	.139 (1.5x)	3	1/8	1-1/2	61793	24.30	61793-C8	31.10	61793-C4	36.00
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	50093	24.20	50093-C8	31.00	50093-C4	35.90
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	53093	31.60	53093-C8	38.40	53093-C4	43.30
.093 (3/32)		.0930	**.010**	.139 (1.5x)	3	1/8	1-1/2	878593	24.30	878593-C8	31.10		
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	904693	24.20	904693-C8	31.00		
NEW .093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	840793	31.60	840793-C8	38.40		
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	912393	24.20	912393-C8	31.00		
.093 (3/32)		.0930	**.020**	.139 (1.5x)	3	1/8	1-1/2	889493	24.30	889493-C8	31.10		
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	925893	24.20	925893-C8	31.00		
.093 (3/32)		.0930	**.030**	.139 (1.5x)	3	1/8	1-1/2	893893	24.30	893893-C8	31.10		
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	904193	24.20	904193-C8	31.00		
	2.5 mm	.0984	**.10 mm**	7.50 mm (3x)	3	4 mm	50 mm	973551	26.90	973551-C8	34.00		
.100		.1000	**.005**	.150 (1.5x)	3	1/8	1-1/2	61800	24.30	61800-C8	31.10		
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	50100	24.30	50100-C8	31.10		
	3.0 mm	.1181	**.10 mm**	9.00 mm (3x)	3	4 mm	50 mm	973557	26.90	973557-C8	34.00		

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.005**	.187 (1.5x)	3	1/8	1-1/2	61808	24.20	61808-C8	31.00	61808-C4	35.90
.125 (1/8)	.1250	**.005**	.375 (3x)	3	1/8	1-1/2	50108	24.20	50108-C8	31.00	50108-C4	35.90
.125 (1/8)	.1250	**.005**	.625 (5x)	3	1/8	2-1/2	53108	31.60	53108-C8	38.40	53108-C4	43.30
.125 (1/8)	.1250	**.010**	.187 (1.5x)	3	1/8	1-1/2	878608	23.90	878608-C8	30.70		
.125 (1/8)	.1250	**.010**	.375 (3x)	3	1/8	1-1/2	904708	23.20	904708-C8	30.00	904708-C4	34.90
.125 (1/8)	.1250	**.010**	.625 (5x)	3	1/8	2-1/2	840808	30.80	840808-C8	37.60		
.125 (1/8)	.1250	**.015**	.187 (1.5x)	3	1/8	1-1/2	831208	23.20	831208-C8	30.00		
.125 (1/8)	.1250	**.015**	.375 (3x)	3	1/8	1-1/2	912408	23.20	912408-C8	30.00	912408-C4	34.90
.125 (1/8)	.1250	**.015**	.625 (5x)	3	1/8	2-1/2	852408	30.80	852408-C8	37.60		
.125 (1/8)	.1250	**.020**	.187 (1.5x)	3	1/8	1-1/2	889508	26.30	889508-C8	33.10		
.125 (1/8)	.1250	**.020**	.375 (3x)	3	1/8	1-1/2	925908	23.20	925908-C8	30.00	925908-C4	34.90
.125 (1/8)	.1250	**.020**	.625 (5x)	3	1/8	2-1/2	838308	30.80	838308-C8	37.60		
.125 (1/8)	.1250	**.030**	.187 (1.5x)	3	1/8	1-1/2	893908	26.30	893908-C8	33.10		
.125 (1/8)	.1250	**.030**	.375 (3x)	3	1/8	1-1/2	904208	23.20	904208-C8	30.00	904208-C4	34.90
.125 (1/8)	.1250	**.030**	.625 (5x)	3	1/8	2-1/2	829708	30.80	829708-C8	37.60		
.125 (1/8)	.1250	**.040**	.375 (3x)	3	1/8	1-1/2	892808	27.40	892808-C8	34.20		
.156 (5/32)	.1562	**.005**	.235 (1.5x)	3	3/16	2	61810	25.20	61810-C8	32.00		
.156 (5/32)	.1562	**.005**	.470 (3x)	3	3/16	2	50110	25.20	50110-C8	32.00	50110-C4	41.30
.156 (5/32)	.1562	**.005**	.750 (5x)	3	3/16	3	53110	34.80	53110-C8	41.60		
.156 (5/32)	.1562	**.020**	.470 (3x)	3	3/16	2	925910	25.20	925910-C8	32.00		
.156 (5/32)	.1562	**.030**	.470 (3x)	3	3/16	2	904210	25.20	904210-C8	32.00		
.187 (3/16)	.1875	**.005**	.285 (1.5x)	3	3/16	2	61812	25.20	61812-C8	32.00	61812-C4	41.30
.187 (3/16)	.1875	**.005**	.562 (3x)	3	3/16	2	50112	25.20	50112-C8	32.00	50112-C4	41.30
.187 (3/16)	.1875	**.005**	1.000 (5x)	3	3/16	3	53112	34.80	53112-C8	41.60	53112-C4	48.60
.187 (3/16)	.1875	**.010**	.562 (3x)	3	3/16	2	904712	36.00	904712-C8	42.80		

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NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		
D_1 +.000" −.002"	decimal equivalent	R +.001" −.001"	L_2 +.030" −.000"		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.187 (3/16)	.1875	**.015**	.562 (3x)	3	3/16	2	912412	36.00	912412-C8	42.80			
.187 (3/16)	.1875	**.020**	.285 (1.5x)	3	3/16	2	889512	36.00	889512-C8	42.80			
.187 (3/16)	.1875	**.020**	.562 (3x)	3	3/16	2	925912	36.00	925912-C8	42.80			
.187 (3/16)	.1875	**.030**	.285 (1.5x)	3	3/16	2	893912	36.00	893912-C8	42.80			
.187 (3/16)	.1875	**.030**	.562 (3x)	3	3/16	2	904212	36.00	904212-C8	42.80			
.187 (3/16)	.1875	**.060**	.562 (3x)	3	3/16	2	834812	36.00	834812-C8	42.80			
.250 (1/4)	.2500	**.005**	.750 (3x)	3	1/4	2-1/2	901616	33.20	901616-C8	40.50			
.250 (1/4)	.2500	**.010**	.375 (1.5x)	3	1/4	2-1/2	61816	30.10	61816-C8	37.40	61816-C4	48.40	
.250 (1/4)	.2500	**.010**	.750 (3x)	3	1/4	2-1/2	50116	30.10	50116-C8	37.40	50116-C4	48.40	
.250 (1/4)	.2500	**.010**	1.250 (5x)	3	1/4	4	53116	42.50	53116-C8	50.70	53116-C4	60.80	
.250 (1/4)	.2500	**.015**	.750 (3x)	3	1/4	2-1/2	912416	31.90	912416-C8	39.20			
.250 (1/4)	.2500	**.020**	.750 (3x)	3	1/4	2-1/2	925916	31.90	925916-C8	39.20			
.250 (1/4)	.2500	**.030**	.375 (1.5x)	3	1/4	2-1/2	893916	31.90	893916-C8	39.20			
.250 (1/4)	.2500	**.030**	.750 (3x)	3	1/4	2-1/2	904216	31.90	904216-C8	39.20			
.250 (1/4)	.2500	**.060**	.750 (3x)	3	1/4	2-1/2	834816	31.90	834816-C8	39.20			
.375 (3/8)	.3750	**.015**	1.125 (3x)	3	3/8	2-1/2	912424	52.50	912424-C8	71.30			NEW
.375 (3/8)	.3750	**.030**	1.125 (3x)	3	3/8	2-1/2	904224	52.50	904224-C8	71.30			NEW

SPEEDS & FEEDS (Variable Helix for Aluminum & Non-Ferrous Alloys)

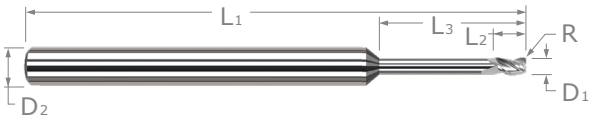
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00023	.00048	.00072	.00095	.00120	.00143	.00193	.00288	.00385
	Magnesium Alloys: All alloys	1500	Finishing	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413
	Zinc Alloys: All alloys	800	Max	.00026	.00055	.00083	.00109	.00137	.00164	.00220	.00329	.00440
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	500	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500			**Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .5x Dia Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: .5x - 1x Dia				
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550										
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00030	.00062	.00094	.00124	.00156	.00186	.00250	.00374	.00501
	Magnesium Alloys: All alloys	2000	Finishing	.00032	.00066	.00101	.00133	.00167	.00199	.00268	.00401	.00536
	Zinc Alloys: All alloys	1100	Max	.00034	.00071	.00108	.00142	.00178	.00213	.00286	.00428	.00572
					Radial Depth of Cut*: Slotting: 1x Dia Roughing: .5x Dia Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: .5x - 1x Dia				
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00025	.00053	.00080	.00105	.00132	.00158	.00212	.00317	.00424
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00027	.00056	.00085	.00113	.00142	.00169	.00227	.00339	.00454
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00029	.00060	.00091	.00120	.00151	.00180	.00242	.00362	.00484
	Wrought - 5% - 8% Si (4xxx)	2200										
	Wrought - 8% - 12% Si (4xxx)	1700										
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	1500	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800										
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150			**Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .4x Dia Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia Roughing: .3x - .8x Dia Finishing: .5x - 1x Dia				
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750										

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Small corner radius for improved strength
- 3 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)		.0150	**.002**	.023	.078 (5x)	3	1/8	2-1/2	956515	50.00	956515-C8	56.80
.015 (1/64)		.0150	**.002**	.023	.125 (8x)	3	1/8	2-1/2	961315	51.20	961315-C8	58.00
.020		.0200	**.002**	.030	.100 (5x)	3	1/8	2-1/2	956520	47.50	956520-C8	54.30
.025		.0250	**.002**	.038	.125 (5x)	3	1/8	2-1/2	956525	46.20	956525-C8	53.00
.031 (1/32)		.0310	**.003**	.047	.156 (5x)	3	1/8	2-1/2	956531	43.20	956531-C8	50.00
.031 (1/32)		.0310	**.003**	.047	.250 (8x)	3	1/8	2-1/2	961331	44.30	961331-C8	51.10
.031 (1/32)		.0310	**.003**	.047	.312 (10x)	3	1/8	2-1/2	861031	47.20	861031-C8	54.00
.031 (1/32)		.0310	**.003**	.047	.375 (12x)	3	1/8	2-1/2	949631	48.40	949631-C8	55.20
.031 (1/32)		.0310	**.010**	.047	.250 (8x)	3	1/8	2-1/2	876231	44.30	876231-C8	51.10
	1.0 mm	.0393	**.08 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	907622	47.20	907622-C8	54.30
.040		.0400	**.003**	.060	.203 (5x)	3	1/8	2-1/2	956540	43.50	956540-C8	50.30
.040		.0400	**.003**	.060	.325 (8x)	3	1/8	2-1/2	961340	44.30	961340-C8	51.10
.047 (3/64)		.0470	**.003**	.071	.250 (5x)	3	1/8	2-1/2	956547	43.20	956547-C8	50.00
.047 (3/64)		.0470	**.003**	.071	.375 (8x)	3	1/8	2-1/2	961347	44.30	961347-C8	51.10
.047 (3/64)		.0470	**.003**	.071	.570 (12x)	3	1/8	2-1/2	949647	48.40	949647-C8	55.20
.047 (3/64)		.0470	**.010**	.071	.375 (8x)	3	1/8	2-1/2	876247	44.30	876247-C8	51.10
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	956562	43.20	956562-C8	50.00
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	961362	44.30	961362-C8	51.10
.062 (1/16)		.0620	**.005**	.093	.625 (10x)	3	1/8	2-1/2	861062	47.20	861062-C8	54.00
.062 (1/16)		.0620	**.005**	.093	.750 (12x)	3	1/8	2-1/2	949662	48.40	949662-C8	55.20
.062 (1/16)		.0620	**.005**	.093	.950 (15x)	3	1/8	2-1/2	886862	48.40	886862-C8	55.20
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	876262	44.30	876262-C8	51.10
.078 (5/64)		.0780	**.005**	.118	.406 (5x)	3	1/8	2-1/2	956578	43.20	956578-C8	50.00
.078 (5/64)		.0780	**.005**	.118	.625 (8x)	3	1/8	2-1/2	961378	44.30	961378-C8	51.10
.078 (5/64)		.0780	**.005**	.118	.940 (12x)	3	1/8	2-1/2	949678	48.40	949678-C8	55.20
.078 (5/64)		.0780	**.010**	.118	.625 (8x)	3	1/8	2-1/2	876278	44.30	876278-C8	51.10
	2.0 mm	.0787	**.10 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	907645	47.20	907645-C8	54.30
.093 (3/32)		.0930	**.005**	.140	.500 (5x)	3	1/8	2-1/2	956593	43.20	956593-C8	50.00
.093 (3/32)		.0930	**.005**	.140	.750 (8x)	3	1/8	2-1/2	961393	44.30	961393-C8	51.10
.093 (3/32)		.0930	**.005**	.140	.950 (10x)	3	1/8	2-1/2	861093	47.20	861093-C8	54.00
.093 (3/32)		.0930	**.005**	.140	1.125 (12x)	3	1/8	2-1/2	949693	48.40	949693-C8	55.20
.093 (3/32)		.0930	**.005**	.140	1.400 (15x)	3	1/8	3	886893	50.90	886893-C8	57.70
.093 (3/32)		.0930	**.010**	.140	.750 (8x)	3	1/8	2-1/2	876293	44.30	876293-C8	51.10
.093 (3/32)		.0930	**.030**	.140	.750 (8x)	3	1/8	2-1/2	891893	44.30	891893-C8	51.10
	3.0 mm	.1181	**.10 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	907657	44.50	907657-C8	51.60

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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continued from previous page

CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.005**	.187	.625 (5x)	3	1/8	2-1/2	956608	42.50	956608-C8	49.30
.125 (1/8)	.1250	**.005**	.187	1.000 (8x)	3	1/8	2-1/2	961408	43.50	961408-C8	50.30
.125 (1/8)	.1250	**.005**	.187	1.250 (10x)	3	1/8	2-1/2	861108	45.90	861108-C8	52.70
.125 (1/8)	.1250	**.005**	.187	1.500 (12x)	3	1/8	3	949708	47.00	949708-C8	53.80
.125 (1/8)	.1250	**.005**	.187	1.875 (15x)	3	1/8	3	886908	49.50	886908-C8	56.30
.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	3	1/8	2-1/2	876308	43.50	876308-C8	50.30
.125 (1/8)	.1250	**.030**	.187	1.000 (8x)	3	1/8	2-1/2	891908	43.50	891908-C8	50.30
.156 (5/32)	.1562	**.005**	.235	.750 (5x)	3	3/16	3	956610	47.80	956610-C8	54.60
.156 (5/32)	.1562	**.005**	.235	1.250 (8x)	3	3/16	3	961410	49.10	961410-C8	55.90
.187 (3/16)	.1875	**.005**	.285	1.000 (5x)	3	3/16	3	956612	47.80	956612-C8	54.60
.187 (3/16)	.1875	**.005**	.285	1.500 (8x)	3	3/16	3	961412	49.10	961412-C8	55.90
.187 (3/16)	.1875	**.005**	.285	2.250 (12x)	3	3/16	4	949712	61.20	949712-C8	68.50
.250 (1/4)	.2500	**.010**	.375	1.250 (5x)	3	1/4	4	956616	50.00	956616-C8	58.20
.250 (1/4)	.2500	**.010**	.375	2.000 (8x)	3	1/4	4	961416	51.00	961416-C8	59.20
.250 (1/4)	.2500	**.010**	.375	3.000 (12x)	3	1/4	6	949716	64.30	949716-C8	76.00

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Aluminum Alloys)

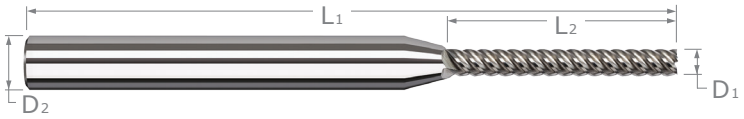
Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Magnesium Alloys: All alloys	1500	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Zinc Alloys: All alloys	800	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00013	.00026	.00040	.00052	.00066	.00079	.00106	.00158	.00211
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	Roughing	.00015	.00031	.00046	.00061	.00077	.00092	.00123	.00184	.00246
			Finishing	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Max	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00211	.00282
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500				**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia			
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550										
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00024	.00050	.00075	.00099	.00125	.00149	.00200	.00299	.00400
	Magnesium Alloys: All alloys	2000	Finishing	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Zinc Alloys: All alloys	1100	Max	.00027	.00057	.00086	.00113	.00143	.00170	.00229	.00342	.00458
						Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia		
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Wrought - 5% - 8% Si (4xxx)	2200										
	Wrought - 8% - 12% Si (4xxx)	1700										
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00014	.00029	.00044	.00058	.00072	.00086	.00116	.00174	.00232
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500	Roughing	.00016	.00034	.00051	.00067	.00085	.00101	.00136	.00203	.00271
			Finishing	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Max	.00019	.00038	.00058	.00077	.00097	.00115	.00155	.00232	.00310
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000				**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .3x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .3x Dia; Roughing: .3x - .8x Dia; Finishing: .5x - 1x Dia		
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800										
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750										

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 50°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	66715	45.10	66715-C8	51.90
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	67115	45.70	67115-C8	52.50
.020		.0200	**.100** (5x)	4	1/8	2-1/2	66720	43.90	66720-C8	50.70
.020		.0200	**.160** (8x)	4	1/8	2-1/2	67120	45.40	67120-C8	52.20
.025		.0250	**.125** (5x)	4	1/8	2-1/2	66725	42.70	66725-C8	49.50
.025		.0250	**.203** (8x)	4	1/8	2-1/2	67125	43.70	67125-C8	50.50
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	948831	29.10	948831-C8	35.90
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	66731	40.70	66731-C8	47.50
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	67131	41.90	67131-C8	48.70
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	917631	53.40	917631-C8	60.20
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	915522	41.90	915522-C8	49.00
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	907122	43.20	907122-C8	50.30
.040		.0400	**.203** (5x)	5	1/8	2-1/2	66740	40.70	66740-C8	47.50
.040		.0400	**.325** (8x)	5	1/8	2-1/2	67140	41.90	67140-C8	48.70
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	948847	29.10	948847-C8	35.90
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	66747	40.70	66747-C8	47.50
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	67147	41.90	67147-C8	48.70
.050		.0500	**.250** (5x)	5	1/8	2-1/2	66750	40.70	66750-C8	47.50
.050		.0500	**.400** (8x)	5	1/8	2-1/2	67150	41.90	67150-C8	48.70
.060		.0600	**.312** (5x)	5	1/8	2-1/2	66760	37.90	66760-C8	44.70
.060		.0600	**.500** (8x)	5	1/8	2-1/2	67160	39.00	67160-C8	45.80
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	948862	27.20	948862-C8	34.00
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	66762	37.90	66762-C8	44.70
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	67162	39.00	67162-C8	45.80
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	917662	57.30	917662-C8	64.10
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	948878	27.20	948878-C8	34.00
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	66778	37.90	66778-C8	44.70
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	67178	39.00	67178-C8	45.80
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	915545	40.50	915545-C8	47.60
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	907145	41.90	907145-C8	49.00
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	948893	27.20	948893-C8	34.00
.093 (3/32)		.0930	**.375** (4x)	5	1/8	2-1/2	829493	37.40	829493-C8	44.20
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	66793	37.90	66793-C8	44.70
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	67193	39.00	67193-C8	45.80
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	917693	57.30	917693-C8	64.10

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square (cont.)

mm & in

continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	UNCOATED TOOL #	UNCOATED PRICE	TiB_2 COATED TOOL #	TiB_2 COATED PRICE
.100		.1000	**.500** (5x)	5	1/8	2-1/2	66800	37.90	66800-C8	44.70
.100		.1000	**.800** (8x)	5	1/8	2-1/2	67200	39.00	67200-C8	45.80
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	66802	37.90	66802-C8	44.70
.109 (7/64)		.1090	**.900** (8x)	5	1/8	2-1/2	67202	39.00	67202-C8	45.80
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	915557	40.50	915557-C8	47.60
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	907157	41.90	907157-C8	49.00

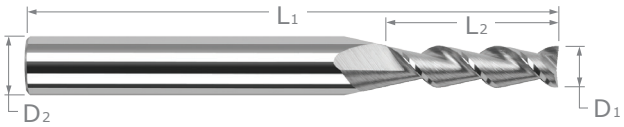
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	856908	25.20	856908-C8	32.00
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	948908	25.20	948908-C8	32.00
.125 (1/8)	.1250	**.500** (4x)	5	1/8	2-1/2	829508	36.40	829508-C8	43.20
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	66808	36.90	66808-C8	43.70
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	67208	38.20	67208-C8	45.00
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	917708	56.60	917708-C8	63.40
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	66810	39.50	66810-C8	46.30
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	67210	41.10	67210-C8	47.90
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	856912	29.70	856912-C8	36.50
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	948912	29.70	948912-C8	36.50
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	66812	39.50	66812-C8	46.30
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	67212	41.10	67212-C8	47.90
.187 (3/16)	.1875	**1.875** (10x)	5	3/16	4	917712	57.50	917712-C8	64.80
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	856916	39.10	856916-C8	46.40
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	948916	39.10	948916-C8	46.40
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	66816	48.10	66816-C8	56.30
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	67216	49.40	67216-C8	57.60

SPEEDS & FEEDS (High Helix Finishers for Aluminum & Non-Ferrous Alloys)

Cutter Series	Material	SFM		Chip Load Per Tooth (IPT) .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Depth of Cut Axial
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Finishing (3x LOC)	.00027	.00056	.00085	.00112	.00140	.00167	.00225	.00337	.00450	.12x Dia	.5x - 3x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000												
	Magnesium Alloys: All alloys	1500												
	Zinc Alloys: All alloys	800												
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Finishing (4x LOC)	.00024	.00049	.00074	.00098	.00123	.00146	.00197	.00295	.00394	.10x Dia	.5x - 4x Dia
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500												
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing (5x LOC)	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.09x Dia	.5x - 5x Dia
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500												
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	Finishing (8x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	.07x Dia	.5x - 8x Dia
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225												
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing (10x LOC)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.05x Dia	.5x - 10x Dia
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Finishing (3x LOC)	.00035	.00073	.00110	.00145	.00183	.00218	.00293	.00438	.00585	.12x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00031	.00063	.00096	.00127	.00160	.00190	.00256	.00383	.00512	.10x Dia	.5x - 4x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Finishing (5x LOC)	.00026	.00054	.00082	.00109	.00137	.00163	.00219	.00328	.00439	.09x Dia	.5x - 5x Dia
	Magnesium Alloys: All alloys	2000	Finishing (8x LOC)	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00241	.00322	.07x Dia	.5x - 8x Dia
	Zinc Alloys: All alloys	1100	Finishing (10x LOC)	.00018	.00038	.00057	.00075	.00095	.00113	.00152	.00228	.00304	.05x Dia	.5x - 10x Dia

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square



◄ *Down to .010"!*

- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

OUTSTANDING IN ALUMINUM!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.010	**.030** (3x)	1/8	1-1/2	24110	29.40			24110-C8	36.20
.015 (1/64)	**.045** (3x)	1/8	1-1/2	24115	28.60			24115-C8	35.40
.020	**.060** (3x)	1/8	1-1/2	24120	26.90			24120-C8	33.70
.025	**.075** (3x)	1/8	1-1/2	24125	25.00			24125-C8	31.80
.030	**.090** (3x)	1/8	1-1/2	24130	21.70			24130-C8	28.50
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	935531	21.70			935531-C8	28.50
.031 (1/32)	**.093** (3x)	1/8	1-1/2	24131	21.70	24131-C7	27.00	24131-C8	28.50
.031 (1/32)	**.156** (5x)	1/8	2-1/2	932031	27.90			932031-C8	34.70
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	24139	21.70			24139-C8	28.50
.040	**.120** (3x)	1/8	1-1/2	24140	21.70	24140-C7	27.00	24140-C8	28.50
.040	**.203** (5x)	1/8	2-1/2	932040	27.90			932040-C8	34.70
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	935547	21.70			935547-C8	28.50
.047 (3/64)	**.141** (3x)	1/8	1-1/2	24147	21.70	24147-C7	27.00	24147-C8	28.50
.047 (3/64)	**.250** (5x)	1/8	2-1/2	932047	27.90			932047-C8	34.70
.050	**.150** (3x)	1/8	1-1/2	24150	21.70	24150-C7	27.00	24150-C8	28.50
.050	**.250** (5x)	1/8	2-1/2	932050	27.90			932050-C8	34.70
.060	**.180** (3x)	1/8	1-1/2	24160	21.70	24160-C7	27.00	24160-C8	28.50
.060	**.312** (5x)	1/8	2-1/2	932060	28.80			932060-C8	35.60
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	935562	19.00			935562-C8	25.80
.062 (1/16)	**.186** (3x)	1/8	1-1/2	24162	19.00	24162-C7	24.30	24162-C8	25.80
.062 (1/16)	**.312** (5x)	1/8	2-1/2	932062	28.80			932062-C8	35.60
.070	**.210** (3x)	1/8	1-1/2	24170	19.00	24170-C7	24.30	24170-C8	25.80
.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	935578	19.00			935578-C8	25.80
.078 (5/64)	**.234** (3x)	1/8	1-1/2	24178	19.00	24178-C7	24.30	24178-C8	25.80
.078 (5/64)	**.406** (5x)	1/8	2-1/2	932078	28.80			932078-C8	35.60
.080	**.240** (3x)	1/8	1-1/2	24180	19.00	24180-C7	24.30	24180-C8	25.80
.090	**.270** (3x)	1/8	1-1/2	24190	19.00	24190-C7	24.30	24190-C8	25.80
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	935593	19.00			935593-C8	25.80
.093 (3/32)	**.279** (3x)	1/8	1-1/2	24193	19.00	24193-C7	24.30	24193-C8	25.80
.093 (3/32)	**.500** (5x)	1/8	2-1/2	932093	28.80			932093-C8	35.60
.100	**.300** (3x)	1/8	1-1/2	24199	19.00	24199-C7	24.30	24199-C8	25.80
.109 (7/64)	**.327** (3x)	1/8	1-1/2	24202	28.60			24202-C8	35.40
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	24205	28.40			24205-C8	35.20

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HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	935608	17.50			935608-C8	24.30
.125 (1/8)	**.500** (4x)	1/8	1-1/2	24208	17.50	24208-C7	22.80	24208-C8	24.30
.125 (1/8)	**.625** (5x)	1/8	2-1/2	932108	23.70			932108-C8	30.50
.140 (9/64)	**.500** (3x)	3/16	2	24209	23.10			24209-C8	29.90
.156 (5/32)	**.235** (1.5x)	3/16	2	935610	19.80			935610-C8	26.60
.156 (5/32)	**.562** (3x)	3/16	2	24210	19.80			24210-C8	26.60
.156 (5/32)	**.750** (5x)	3/16	3	932110	23.20			932110-C8	30.00
.187 (3/16)	**.285** (1.5x)	3/16	2	935612	19.80			935612-C8	26.60
.187 (3/16)	**.625** (3x)	3/16	2	24212	19.80	24212-C7	25.50	24212-C8	26.60
.187 (3/16)	**1.000** (5x)	3/16	3	932112	23.20			932112-C8	30.00
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	935616	24.40			935616-C8	31.70
.250 (1/4)	**.750** (3x)	1/4	2-1/2	24216	24.40	24216-C7	32.50	24216-C8	31.70
.250 (1/4)	**1.250** (5x)	1/4	4	932116	29.00			932116-C8	37.20

SPEEDS & FEEDS (45° Helix – 2 Flutes)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com

SERIES	MATERIAL	SFM
Uncoated	**Aluminum Alloys:**	
	Casting (2xx, 5xx, 7xx, 8xx)	750
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000
	Copper Alloys:	
	High Coppers - 90%+ (C1xxxx)	225
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550
	Magnesium Alloys	1500
	Zinc Alloys	800
ZrN	**Aluminum Alloys (High Silicon):**	
	Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000
	Wrought - 5% - 8% Si (4xxx)	2200
	Wrought - 8% - 12% Si (4xxx)	1700
	Copper Alloys:	
	High Coppers - 90%+ (C1xxxx)	800
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750
	Magnesium Alloys	2000
	Zinc Alloys	1100
TiB_2	**Aluminum Alloys:**	
	Casting (2xx, 5xx, 7xx, 8xx)	1000
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400
	Magnesium Alloys	2000
	Zinc Alloys	1100

CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250
Roughing	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300
Finishing	.00025	.00038	.00050	.00062	.00074	.00100	.00150	.00200

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00039	.00059	.00078	.00098	.00116	.00156	.00234	.00313
Roughing	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Finishing	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

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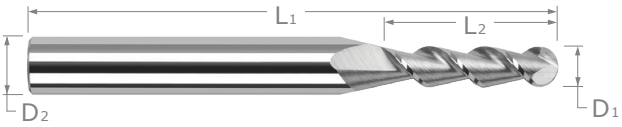
HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Ball



- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

OUTSTANDING IN ALUMINUM!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.015 (1/64)	**.045** (3x)	1/8	1-1/2	27815	32.30			27815-C8	39.10
.020	**.060** (3x)	1/8	1-1/2	27820	30.80			27820-C8	37.60
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	894831	25.00			894831-C8	31.80
.031 (1/32)	**.093** (3x)	1/8	1-1/2	27831	25.00	27831-C7	30.30	27831-C8	31.80
.031 (1/32)	**.156** (5x)	1/8	2-1/2	887631	30.90			887631-C8	37.70
.040	**.120** (3x)	1/8	1-1/2	27840	25.00	27840-C7	30.30	27840-C8	31.80
.047 (3/64)	**.141** (3x)	1/8	1-1/2	27847	25.00	27847-C7	30.30	27847-C8	31.80
.050	**.150** (3x)	1/8	1-1/2	27850	25.00	27850-C7	30.30	27850-C8	31.80
.060	**.180** (3x)	1/8	1-1/2	27860	25.00	27860-C7	30.30	27860-C8	31.80
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	894862	23.70			894862-C8	30.50
.062 (1/16)	**.186** (3x)	1/8	1-1/2	27862	23.70	27862-C7	29.00	27862-C8	30.50
.062 (1/16)	**.312** (5x)	1/8	2-1/2	887662	30.90			887662-C8	37.70
.070	**.210** (3x)	1/8	1-1/2	27870	23.70	27870-C7	29.00	27870-C8	30.50
.078 (5/64)	**.234** (3x)	1/8	1-1/2	27878	23.70	27878-C7	29.00	27878-C8	30.50
.080	**.240** (3x)	1/8	1-1/2	27880	23.70	27880-C7	29.00	27880-C8	30.50
.090	**.270** (3x)	1/8	1-1/2	27890	23.70	27890-C7	29.00	27890-C8	30.50
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	894893	23.70			894893-C8	30.50
.093 (3/32)	**.279** (3x)	1/8	1-1/2	27893	23.70	27893-C7	29.00	27893-C8	30.50
.093 (3/32)	**.500** (5x)	1/8	2-1/2	887693	30.90			887693-C8	37.70
.100	**.300** (3x)	1/8	1-1/2	27899	23.70	27899-C7	29.00	27899-C8	30.50
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	27905	32.10			27905-C8	38.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	894908	21.90			894908-C8	28.70
.125 (1/8)	**.500** (4x)	1/8	1-1/2	27908	21.90	27908-C7	27.20	27908-C8	28.70
.125 (1/8)	**.625** (5x)	1/8	2-1/2	887708	27.20			887708-C8	34.00
.156 (5/32)	**.562** (3x)	3/16	2	27910	23.70			27910-C8	30.50
.187 (3/16)	**.625** (3x)	3/16	2	27912	23.70	27912-C7	29.40	27912-C8	30.50
.250 (1/4)	**.750** (3x)	1/4	2-1/2	27916	26.80	27916-C7	34.90	27916-C8	34.30

PLEASE SEE SPEEDS & FEEDS ON PAGE 188

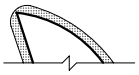
NEW COATING!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

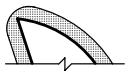
CVD Diamond – Square

◀ *Outstanding in Graphite!*

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA



CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.



CVD diamond (9 um) layer for increased tool life, especially in abrasive materials.

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE	
.015 (1/64)	**.023** (1.5x)	1/8	1-1/2			962715	83.40	
.015 (1/64)	**.045** (3x)	1/8	1-1/2	799715	70.90	995715	83.40	NEW
.015 (1/64)	**.078** (5x)	1/8	2-1/2			936615	94.30	
.020	**.060** (3x)	1/8	1-1/2	799720	70.90	995720	83.40	NEW
.020	**.100** (5x)	1/8	2-1/2			936620	94.30	
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2			962731	83.40	
.031 (1/32)	**.093** (3x)	1/8	1-1/2	799731	70.90	995731	83.40	NEW
.031 (1/32)	**.156** (5x)	1/8	2-1/2			936631	94.30	
.039 (1 mm)	**.117** (3x)	1/8	1-1/2			995739	83.40	
.040	**.120** (3x)	1/8	1-1/2			995740	83.40	
.040	**.203** (5x)	1/8	2-1/2			936640	94.30	
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2			962747	83.40	
.047 (3/64)	**.141** (3x)	1/8	1-1/2	799747	70.90	995747	83.40	NEW
.047 (3/64)	**.250** (5x)	1/8	2-1/2			936647	94.30	
.050	**.150** (3x)	1/8	1-1/2			995750	83.40	
.050	**.250** (5x)	1/8	2-1/2			936650	94.30	
.060	**.180** (3x)	1/8	1-1/2			995760	83.40	
.060	**.312** (5x)	1/8	2-1/2			936660	94.30	
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2			962762	82.60	
.062 (1/16)	**.186** (3x)	1/8	1-1/2	799762	70.20	995762	82.60	NEW
.062 (1/16)	**.250** (4x)	1/8	2-1/2			871262	93.00	
.062 (1/16)	**.312** (5x)	1/8	2-1/2			936662	93.90	
.062 (1/16)	**.500** (8x)	1/8	2-1/2			891562	96.60	
.078 (5/64)	**.118** (1.5x)	1/8	1-1/2			962778	82.60	
.078 (5/64)	**.234** (3x)	1/8	1-1/2			995778	82.60	
.078 (5/64)	**.406** (5x)	1/8	2-1/2			936678	93.90	
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2			962793	82.60	
.093 (3/32)	**.279** (3x)	1/8	1-1/2	799793	70.20	995793	82.60	NEW
.093 (3/32)	**.375** (4x)	1/8	2-1/2			871293	93.00	
.093 (3/32)	**.500** (5x)	1/8	2-1/2			936693	93.90	
.093 (3/32)	**.750** (8x)	1/8	2-1/2			891593	96.60	
.100	**.300** (3x)	1/8	1-1/2			995800	82.60	
.109 (7/64)	**.327** (3x)	1/8	1-1/2			995802	82.60	
.118 (3 mm)	**.354** (3x)	1/8	1-1/2			995805	82.60	

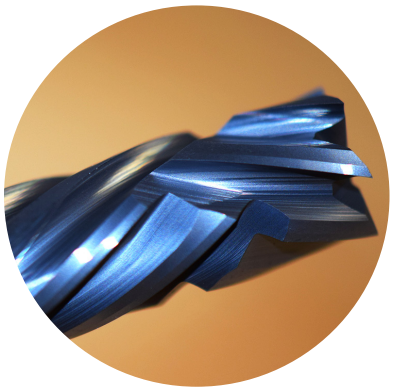
continued on next page

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
	.125 (1/8)	**.187** (1.5x)	1/8	1-1/2			962808	84.10
NEW	.125 (1/8)	**.375** (3x)	1/8	1-1/2	799808	71.50	995808	84.10
	.125 (1/8)	**.500** (4x)	1/8	2-1/2			871308	93.30
	.125 (1/8)	**.625** (5x)	1/8	2-1/2			936708	94.30
	.125 (1/8)	**1.000** (8x)	1/8	2-1/2			891608	97.00
	.140 (9/64)	**.425** (3x)	3/16	2			995809	105.70
	.156 (5/32)	**.235** (1.5x)	3/16	2			962810	105.70
	.156 (5/32)	**.470** (3x)	3/16	2			995810	105.70
	.187 (3/16)	**.285** (1.5x)	3/16	2			962812	105.70
NEW	.187 (3/16)	**.570** (3x)	3/16	2	799812	89.80	995812	105.70
	.187 (3/16)	**1.000** (5x)	3/16	3			936712	134.40
	.250 (1/4)	**.375** (1.5x)	1/4	2-1/2			962816	140.80
NEW	.250 (1/4)	**.750** (3x)	1/4	2-1/2	799816	119.70	995816	140.80
	.250 (1/4)	**1.000** (4x)	1/4	4			871316	149.10
	.250 (1/4)	**1.250** (5x)	1/4	4			936716	151.40
	.312 (5/16)	**.470** (1.5x)	5/16	2-1/2			962820	156.50
	.312 (5/16)	**1.000** (3x)	5/16	2-1/2			995820	156.50
	.375 (3/8)	**.570** (1.5x)	3/8	2-1/2			962824	169.10
	.375 (3/8)	**1.125** (3x)	3/8	2-1/2			995824	178.30
	.375 (3/8)	**2.000** (5x)	3/8	4			936724	184.50
	.500 (1/2)	**.750** (1.5x)	1/2	3			962832	272.40
	.500 (1/2)	**1.500** (3x)	1/2	3			995832	280.50
	.500 (1/2)	**2.625** (5x)	1/2	6			936732	289.80



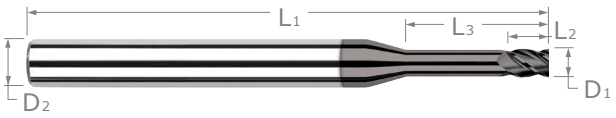
Shining a Light on Diamond End Mills

Learn the chemical makeup of our diamond coatings and how they're applied to our carbide tooling in our "In the Loupe" blog post **Shining a Light on Diamond End Mills**, a comprehensive look into the makeup and benefits of diamond end mills.

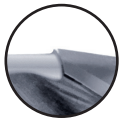
Read more on harveyperformance.com/in-the-loupe/

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Stub Flute



◀ ***Outstanding in Graphite!***



Reduced Neck Diameter to Avoid Heeling

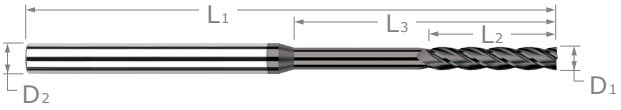
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	943015	122.60
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	960215	122.60
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	974615	125.60
.020	.030	**.100** (5x)	1/8	2-1/2	943020	122.60
.020	.030	**.160** (8x)	1/8	2-1/2	960220	122.60
.020	.030	**.250** (12x)	1/8	2-1/2	974620	125.60
.025	.038	**.125** (5x)	1/8	2-1/2	943025	122.60
.025	.038	**.203** (8x)	1/8	2-1/2	960225	122.60
.025	.038	**.312** (12x)	1/8	2-1/2	974625	125.60
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	943031	122.60
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	960231	122.60
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	974631	125.60
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	943039	122.60
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	960239	122.60
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	943047	122.60
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	960247	122.60
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	974647	125.60
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	943062	111.70
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	960262	111.70
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	974662	115.00
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	943078	111.70
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	960278	111.70
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	974678	115.00
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	943093	111.70
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	960293	111.70
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	974693	115.00
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	943105	111.70
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	960305	111.70

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	943108	114.00
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	960308	114.00
.125 (1/8)	.187	**1.500** (12x)	1/8	3	974708	117.20
.187 (3/16)	.285	**1.000** (5x)	3/16	3	943112	156.20
.187 (3/16)	.285	**1.500** (8x)	3/16	3	960312	156.20
.250 (1/4)	.375	**1.250** (5x)	1/4	4	943116	173.70
.250 (1/4)	.375	**2.000** (8x)	1/4	4	960316	173.70
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	977924	213.50
.500 (1/2)	.750	**1.500** (3x)	1/2	3	977932	320.00

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Long Flute



◀ ***Outstanding in Graphite!***

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.010″}_{-.000″}$	L_3 $^{+.010″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.078	**.156** (10x)	1/8	2-1/2	36315	140.50
.020	.100	**.200** (10x)	1/8	2-1/2	36320	140.50
.025	.125	**.250** (10x)	1/8	2-1/2	36325	140.50
.031 (1/32)	.156	**.312** (10x)	1/8	2-1/2	36331	140.50
.047 (3/64)	.250	**.480** (10x)	1/8	2-1/2	36347	140.50
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	36362	128.60
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	36378	128.60
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	36393	128.60
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	L_3 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	36408	137.30
.187 (3/16)	1.000	**1.875** (10x)	3/16	3	36412	181.10
.250 (1/4)	1.250	**2.500** (10x)	1/4	4	36416	201.20

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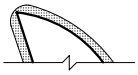
NEW COATING!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball

◀ Outstanding in Graphite!



CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.

CVD diamond (9 um) layer for increased tool life, especially in abrasive materials.

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

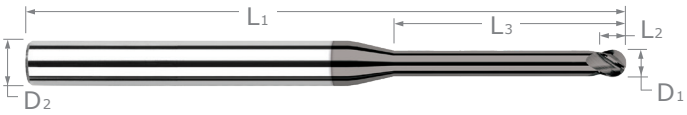
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE	
.015 (1/64)	**.023** (1.5x)	1/8	1-1/2			914415	90.80	
.015 (1/64)	**.045** (3x)	1/8	1-1/2	799515	77.20	999315	90.80	NEW
.015 (1/64)	**.078** (5x)	1/8	2-1/2			940915	101.60	
.020	**.030** (1.5x)	1/8	1-1/2			914420	90.80	
.020	**.060** (3x)	1/8	1-1/2	799520	77.20	999320	90.80	NEW
.020	**.100** (5x)	1/8	2-1/2			940920	101.60	
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2			914431	90.80	
.031 (1/32)	**.093** (3x)	1/8	1-1/2	799531	77.20	999331	90.80	NEW
.031 (1/32)	**.125** (4x)	1/8	2-1/2			818631	100.70	
.031 (1/32)	**.156** (5x)	1/8	2-1/2			940931	101.60	
.039 (1 mm)	**.117** (3x)	1/8	1-1/2			999339	90.80	
.040	**.120** (3x)	1/8	1-1/2			999340	90.80	
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2			914447	90.80	
.047 (3/64)	**.141** (3x)	1/8	1-1/2	799547	77.20	999347	90.80	NEW
.047 (3/64)	**.250** (5x)	1/8	2-1/2			940947	101.60	
.050	**.150** (3x)	1/8	1-1/2			999350	90.80	
.060	**.180** (3x)	1/8	1-1/2			999360	90.80	
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2			914462	87.90	
.062 (1/16)	**.186** (3x)	1/8	1-1/2	799562	74.70	999362	87.90	NEW
.062 (1/16)	**.250** (4x)	1/8	2-1/2			818662	98.10	
.062 (1/16)	**.312** (5x)	1/8	2-1/2			940962	99.00	
.078 (5/64)	**.118** (1.5x)	1/8	1-1/2			914478	87.90	
.078 (5/64)	**.234** (3x)	1/8	1-1/2			999378	87.90	
.078 (5/64)	**.406** (5x)	1/8	2-1/2			940978	99.00	
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2			914493	87.90	
.093 (3/32)	**.279** (3x)	1/8	1-1/2	799593	74.70	999393	87.90	NEW
.093 (3/32)	**.500** (5x)	1/8	2-1/2			940993	99.00	
.100	**.300** (3x)	1/8	1-1/2			999400	87.90	
.118 (3 mm)	**.354** (3x)	1/8	1-1/2			999405	87.90	

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2			914508	89.30	
.125 (1/8)	**.375** (3x)	1/8	1-1/2	799608	75.90	999408	89.30	NEW
.125 (1/8)	**.500** (4x)	1/8	2-1/2			818708	100.40	
.125 (1/8)	**.625** (5x)	1/8	2-1/2			941008	101.40	
.156 (5/32)	**.470** (3x)	3/16	2			999410	110.70	
.187 (3/16)	**.285** (1.5x)	3/16	2			914512	110.70	
.187 (3/16)	**.570** (3x)	3/16	2	799612	94.10	999412	110.70	NEW
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2			914516	146.40	
.250 (1/4)	**.750** (3x)	1/4	2-1/2	799616	124.40	999416	146.40	NEW
.250 (1/4)	**1.250** (5x)	1/4	4			941016	157.00	
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2			914524	180.90	
.500 (1/2)	**.750** (1.5x)	1/2	3			914532	286.70	

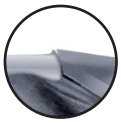
NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute



◄ Outstanding in Graphite!



Reduced Neck Diameter to Avoid Heeling

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	PRICE
	.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	61015	128.20
	.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	62015	128.20
	.015 (1/64)	.023	**.156** (10x)	1/8	2-1/2	939515	131.50
	.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	65215	131.50
	.015 (1/64)	.023	**.225** (15x)	1/8	2-1/2	76015	138.20
	.015 (1/64)	.023	**.270** (18x)	1/8	2-1/2	841815	144.70
	.020	.030	**.100** (5x)	1/8	2-1/2	61020	128.20
	.020	.030	**.160** (8x)	1/8	2-1/2	62020	128.20
	.020	.030	**.200** (10x)	1/8	2-1/2	939520	131.50
	.020	.030	**.250** (12x)	1/8	2-1/2	65220	131.50
	.020	.030	**.300** (15x)	1/8	2-1/2	76020	138.20
	.020	.030	**.360** (18x)	1/8	2-1/2	841820	144.70
	.025	.038	**.125** (5x)	1/8	2-1/2	61025	128.20
	.025	.038	**.203** (8x)	1/8	2-1/2	62025	128.20
	.025	.038	**.312** (12x)	1/8	2-1/2	65225	131.50
	.025	.038	**.375** (15x)	1/8	2-1/2	76025	138.20
	.030	.045	**.250** (8x)	1/8	2-1/2	62030	128.20
	.031 (1/32)	.047	**.093** (3x)	1/8	1-1/2	922231	115.30
	.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	61031	128.20
NEW	.031 (1/32)	.047	**.187** (6x)	1/8	2-1/2	795131	128.20
NEW	.031 (1/32)	.047	**.218** (7x)	1/8	2-1/2	794931	128.20
	.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	62031	128.20
	.031 (1/32)	.047	**.312** (10x)	1/8	2-1/2	939531	131.50
	.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	65231	131.50
	.031 (1/32)	.047	**.470** (15x)	1/8	2-1/2	76031	138.20
	.031 (1/32)	.047	**.565** (18x)	1/8	2-1/2	841831	144.70
	.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	61039	128.20
	.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	62039	128.20
	.040	.060	**.203** (5x)	1/8	2-1/2	61040	128.20
	.040	.060	**.325** (8x)	1/8	2-1/2	62040	128.20
	.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	61047	128.20
	.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	62047	128.20
	.047 (3/64)	.071	**.480** (10x)	1/8	2-1/2	939547	131.50
	.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	65247	131.50
	.047 (3/64)	.071	**.710** (15x)	1/8	2-1/2	76047	138.20
	.047 (3/64)	.071	**.850** (18x)	1/8	2-1/2	841847	144.70
	.050	.075	**.250** (5x)	1/8	2-1/2	61050	128.20
	.050	.075	**.400** (8x)	1/8	2-1/2	62050	128.20
	.060	.090	**.312** (5x)	1/8	2-1/2	61060	128.20
	.060	.090	**.500** (8x)	1/8	2-1/2	62060	128.20

continued on next page

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute (cont.)

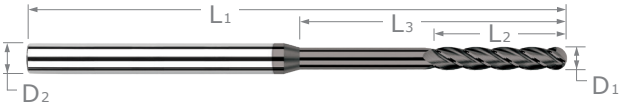
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.010″}_{-.000″}$	L_3 $^{+.010″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.062 (1/16)	.093	**.186** (3x)	1/8	1-1/2	922262	101.80
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	61062	115.00
.062 (1/16)	.093	**.375** (6x)	1/8	2-1/2	795162	115.00 NEW
.062 (1/16)	.093	**.437** (7x)	1/8	2-1/2	794962	115.00 NEW
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	62062	115.00
.062 (1/16)	.093	**.625** (10x)	1/8	2-1/2	939562	118.40
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	65262	118.40
.062 (1/16)	.093	**.950** (15x)	1/8	2-1/2	76062	124.60
.062 (1/16)	.093	**1.125** (18x)	1/8	2-1/2	841862	130.70
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	61078	115.00
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	62078	115.00
.078 (5/64)	.117	**.800** (10x)	1/8	2-1/2	939578	118.40
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	65278	118.40
.078 (5/64)	.117	**1.187** (15x)	1/8	2-1/2	76078	124.60
.078 (5/64)	.117	**1.400** (18x)	1/8	2-1/2	841878	130.70
.093 (3/32)	.140	**.279** (3x)	1/8	1-1/2	922293	101.80
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	61093	115.00
.093 (3/32)	.140	**.585** (6x)	1/8	2-1/2	795193	115.00 NEW
.093 (3/32)	.140	**.670** (7x)	1/8	2-1/2	794993	115.00 NEW
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	62093	115.00
.093 (3/32)	.140	**.950** (10x)	1/8	2-1/2	939593	118.40
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	65293	118.40
.093 (3/32)	.140	**1.400** (15x)	1/8	2-1/2	76093	124.60
.093 (3/32)	.140	**1.675** (18x)	1/8	3	841893	130.70
.100	.150	**.800** (8x)	1/8	2-1/2	62100	115.00
.109 (7/64)	.164	**.900** (8x)	1/8	2-1/2	62102	115.00
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	61105	115.00
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	62105	115.00

D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	L_3 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.187	**.375** (3x)	1/8	1-1/2	64008	112.50
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	61108	125.40
.125 (1/8)	.187	**.750** (6x)	1/8	2-1/2	795208	125.40 NEW
.125 (1/8)	.187	**.875** (7x)	1/8	2-1/2	795008	125.40 NEW
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	62108	125.40
.125 (1/8)	.187	**1.250** (10x)	1/8	2-1/2	939608	129.00
.125 (1/8)	.187	**1.500** (12x)	1/8	3	65308	129.00
.125 (1/8)	.187	**1.875** (15x)	1/8	3	944108	135.80
.125 (1/8)	.187	**2.250** (18x)	1/8	4	841908	143.90
.140 (9/64)	.220	**1.125** (8x)	3/16	3	62109	161.90
.156 (5/32)	.235	**.750** (5x)	3/16	3	61110	161.90
.156 (5/32)	.235	**1.250** (8x)	3/16	3	62110	161.90
.187 (3/16)	.285	**1.000** (5x)	3/16	3	61112	161.90
.187 (3/16)	.285	**1.500** (8x)	3/16	3	62112	161.90
.187 (3/16)	.285	**2.250** (12x)	3/16	4	65312	170.40
.250 (1/4)	.375	**1.250** (5x)	1/4	4	61116	179.80
.250 (1/4)	.375	**2.000** (8x)	1/4	4	62116	179.80
.250 (1/4)	.375	**3.000** (12x)	1/4	6	65316	187.70
.312 (5/16)	.470	**2.500** (8x)	5/16	4	62120	196.00
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	64024	225.90
.500 (1/2)	.750	**1.500** (3x)	1/2	3	64032	335.50

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Long Flute



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- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
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- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.078	**.156** (10x)	1/8	2-1/2	36515	150.20
.020	.100	**.200** (10x)	1/8	2-1/2	36520	150.20
.025	.125	**.250** (10x)	1/8	2-1/2	36525	150.20
.031 (1/32)	.156	**.312** (10x)	1/8	2-1/2	36531	150.20
.047 (3/64)	.250	**.480** (10x)	1/8	2-1/2	36547	150.20
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	36562	134.90
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	36578	134.90
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	36593	134.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	36608	143.40
.187 (3/16)	1.000	**1.875** (10x)	3/16	3	36612	189.50
.250 (1/4)	1.250	**2.500** (10x)	1/4	4	36616	210.30

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DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius

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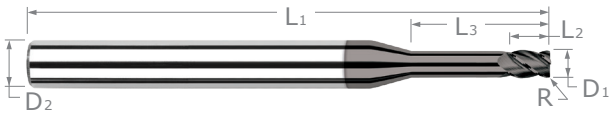
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Corner radius for improved strength
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

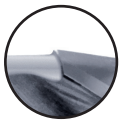
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	**.003**	**.045** (3x)	1/8	1-1/2	942015	90.80
.031 (1/32)	**.005**	**.093** (3x)	1/8	1-1/2	955431	90.80
.031 (1/32)	**.005**	**.156** (5x)	1/8	2-1/2	819331	101.60
.047 (3/64)	**.005**	**.141** (3x)	1/8	1-1/2	955447	90.80
.062 (1/16)	**.005**	**.186** (3x)	1/8	1-1/2	955462	87.90
.062 (1/16)	**.010**	**.186** (3x)	1/8	1-1/2	977162	87.90
.062 (1/16)	**.010**	**.312** (5x)	1/8	2-1/2	820462	99.00
.078 (5/64)	**.010**	**.234** (3x)	1/8	1-1/2	977178	87.90
.093 (3/32)	**.005**	**.279** (3x)	1/8	1-1/2	955493	87.90
.093 (3/32)	**.010**	**.279** (3x)	1/8	1-1/2	977193	87.90
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.005**	**.375** (3x)	1/8	1-1/2	955508	89.30
.125 (1/8)	**.010**	**.375** (3x)	1/8	1-1/2	977208	89.30
.125 (1/8)	**.015**	**.375** (3x)	1/8	1-1/2	938608	89.30
.125 (1/8)	**.015**	**.625** (5x)	1/8	2-1/2	855208	99.60
.187 (3/16)	**.030**	**.570** (3x)	3/16	2	906312	110.70
.250 (1/4)	**.030**	**.750** (3x)	1/4	2-1/2	906316	146.40
.250 (1/4)	**.030**	**1.250** (5x)	1/4	4	862116	157.00

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius – Long Reach, Stub Flute



◄ *Outstanding in Graphite!*



Reduced Neck Diameter to Avoid Heeling

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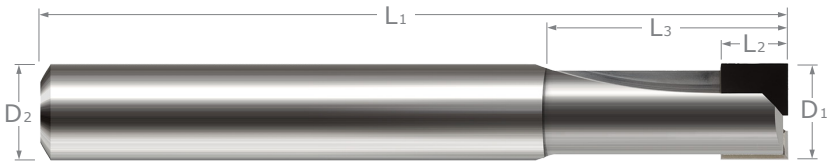
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	**.003**	.023	**.078** (5x)	1/8	2-1/2	61615	128.20
.015 (1/64)	**.003**	.023	**.125** (8x)	1/8	2-1/2	61915	128.20
.015 (1/64)	**.003**	.023	**.187** (12x)	1/8	2-1/2	62215	131.50
.020	**.005**	.030	**.100** (5x)	1/8	2-1/2	62920	128.20
.020	**.005**	.030	**.160** (8x)	1/8	2-1/2	63220	128.20
.020	**.005**	.030	**.250** (12x)	1/8	2-1/2	64120	131.50
.025	**.005**	.038	**.125** (5x)	1/8	2-1/2	62925	128.20
.025	**.005**	.038	**.203** (8x)	1/8	2-1/2	63225	128.20
.025	**.005**	.038	**.312** (12x)	1/8	2-1/2	64125	131.50
.031 (1/32)	**.005**	.047	**.156** (5x)	1/8	2-1/2	62931	128.20
.031 (1/32)	**.005**	.047	**.250** (8x)	1/8	2-1/2	63231	128.20
.031 (1/32)	**.005**	.047	**.375** (12x)	1/8	2-1/2	64131	131.50
.039 (1 mm)	**.005**	.059	**.203** (5x)	1/8	2-1/2	62939	128.20
.039 (1 mm)	**.005**	.059	**.325** (8x)	1/8	2-1/2	63239	128.20
.047 (3/64)	**.005**	.071	**.250** (5x)	1/8	2-1/2	62947	128.20
.047 (3/64)	**.005**	.071	**.375** (8x)	1/8	2-1/2	63247	128.20
.047 (3/64)	**.005**	.071	**.570** (12x)	1/8	2-1/2	64147	131.50
.062 (1/16)	**.010**	.093	**.312** (5x)	1/8	2-1/2	65062	115.00
.062 (1/16)	**.010**	.093	**.500** (8x)	1/8	2-1/2	66562	115.00
.062 (1/16)	**.010**	.093	**.750** (12x)	1/8	2-1/2	65962	118.40
.078 (5/64)	**.010**	.117	**.406** (5x)	1/8	2-1/2	65078	115.00
.078 (5/64)	**.010**	.117	**.625** (8x)	1/8	2-1/2	66578	115.00
.078 (5/64)	**.010**	.117	**.940** (12x)	1/8	2-1/2	65978	118.40
.093 (3/32)	**.010**	.140	**.500** (5x)	1/8	2-1/2	65093	115.00
.093 (3/32)	**.010**	.140	**.750** (8x)	1/8	2-1/2	66593	115.00
.093 (3/32)	**.010**	.140	**1.125** (12x)	1/8	2-1/2	65993	118.40
.118 (3 mm)	**.010**	.177	**.625** (5x)	1/8	2-1/2	916305	115.00
.118 (3 mm)	**.010**	.177	**.950** (8x)	1/8	2-1/2	914705	115.00

D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.015**	.187	**.625** (5x)	1/8	2-1/2	66208	125.40
.125 (1/8)	**.015**	.187	**1.000** (8x)	1/8	2-1/2	64708	125.40
.125 (1/8)	**.015**	.187	**1.500** (12x)	1/8	3	66408	129.00
.187 (3/16)	**.030**	.285	**1.000** (5x)	3/16	3	63312	161.90
.187 (3/16)	**.030**	.285	**1.500** (8x)	3/16	3	65612	161.90
.250 (1/4)	**.030**	.375	**1.250** (5x)	1/4	4	63316	179.80
.250 (1/4)	**.030**	.375	**2.000** (8x)	1/4	4	65616	179.80

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Square



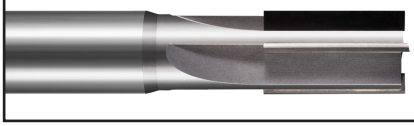
- PCD diamond brazed on solid carbide body allows for significant tool lifeimprovement over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting for 1 and 2 flutes
- End cutting (not center cutting) for 4 flutes

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
3/32	3/16	**3/8**	1	1/8	1-1/2	12106	237.80
3 mm	1/4	**1/2**	1	1/8	1-1/2	1213M	237.80
1/8	1/4	**1/2**	1	1/8	1-1/2	12108	237.80
5/32	1/4	**1/2**	1	3/16	2	12110	265.70
3/16	1/4	**5/8**	2	3/16	2	12112	265.70
1/4	1/4	**3/4**	2	1/4	2-1/2	12116	288.40
1/4	1/2	**1**	4	1/4	2-1/2	914116	464.40
5/16	1/4	**13/16**	2	5/16	2-1/2	12120	315.60
5/16	1/2	**1-1/16**	4	5/16	2-1/2	914120	513.30
3/8	1/4	**15/16**	2	3/8	2-1/2	12124	338.40
3/8	3/4	**1-7/16**	4	3/8	3	914124	586.90
1/2	1/4	**1**	2	1/2	3	12132	431.50
1/2	1	**1-3/4**	4	1/2	3	914132	692.20
5/8	3/8	**1**	2	5/8	3-1/2	12140	532.90
5/8	1	**1-3/4**	4	5/8	3-1/2	914140	811.20
3/4	3/8	**1-1/8**	2	3/4	4	12148	649.00
3/4	1-1/4	**2**	4	3/4	4	914148	948.10

* End cutting (not center cutting) for 4 flutes

Single Flute designed for smaller diameters

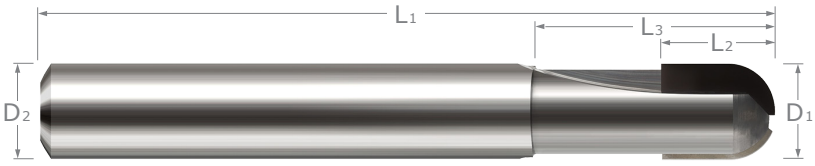
4 Flute ideal for finishing operations

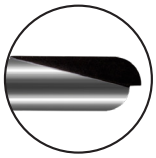


For PCD High Performance Drills, see page 403.

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Ball





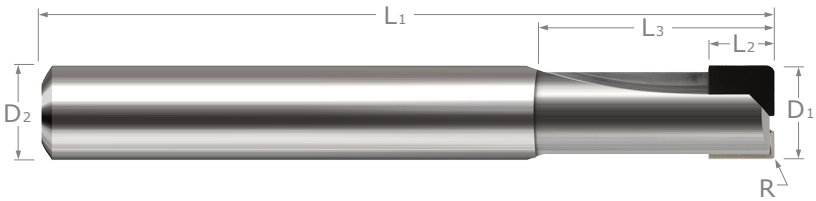
Also Stocked in Single Flute Style

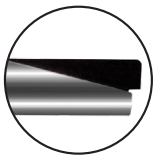
- PCD diamond brazed on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$	L_3 $^{+.050″}_{-.000″}$		D_2	L_1	TOOL #	PRICE
3/32	3/16	**3/8**	1	1/8	1-1/2	12006	288.40
1/8	1/4	**1/2**	1	1/8	1-1/2	12008	288.40
3/16	1/4	**5/8**	2	3/16	2	12012	308.80
1/4	5/16	**3/4**	2	1/4	2-1/2	12016	324.00
3/8	7/16	**15/16**	2	3/8	2-1/2	12024	400.30
1/2	1/2	**1**	2	1/2	3	12032	464.20
5/8	1/2	**1**	2	5/8	3-1/2	12040	565.20
3/4	5/8	**1-1/8**	2	3/4	4	12048	681.20

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Corner Radius





Also Stocked in Single Flute Style

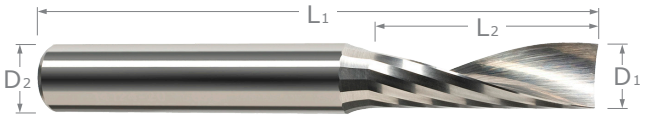
- PCD diamond brazed on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$	L_3 $^{+.050″}_{-.000″}$	R $^{+.001″}_{-.001″}$		D_2	L_1	TOOL #	PRICE
3/32	3/16	**3/8**	**.010**	1	1/8	1-1/2	12206	288.40
1/8	1/4	**1/2**	**.015**	1	1/8	1-1/2	12208	288.40
3/16	1/4	**5/8**	**.015**	2	3/16	2	12212	308.80
1/4	1/4	**3/4**	**.010**	2	1/4	2-1/2	858916	324.00
1/4	1/4	**3/4**	**.030**	2	1/4	2-1/2	12216	324.00
1/4	1/4	**3/4**	**.060**	2	1/4	2-1/2	847316	324.00
3/8	1/4	**15/16**	**.030**	2	3/8	2-1/2	12224	400.30
1/2	1/4	**1**	**.030**	2	1/2	3	12232	464.20

For PCD High Performance Drills, see page 403.

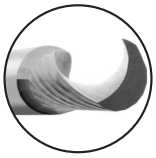
END MILLS FOR PLASTICS

Square Upcut – Single Flute



2x the Material Removal with Improved Finish Over Standard End Mills!

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Select sizes available with oversized, router-style shanks
- High flute finish resists chip welding
- Will ramp or plunge if required
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA



Single Spiral Upcut Flute

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2			51431	33.40	51431-C4	45.10
1/32	**5/32** (5x)	1/8	1-1/2			52431	41.00		
3/64	**9/64** (3x)	1/8	1-1/2			51447	29.90	51447-C4	41.60
3/64	**1/4** (5x)	1/8	1-1/2			52447	34.60		

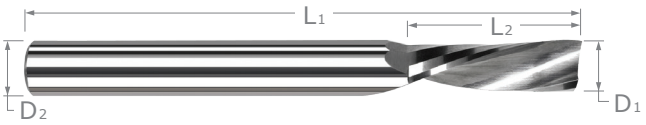
D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.030"}_{-.000"}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	51162	24.40	51462	24.40	51462-C4	36.10
1/16*	**1/4** (4x)	1/4*	2	14104-20	34.80	14204-20	34.80		
1/16	**5/16** (5x)	1/8	2	51862	28.80	52462	28.80	52462-C4	41.70
5/64	**15/64** (3x)	1/8	1-1/2	51178	24.40	51478	24.40	51478-C4	36.10
5/64*	**5/16** (4x)	1/4*	2	14105-20	34.80	14205-20	34.80		
5/64	**13/32** (5x)	1/8	2	51878	28.80	52478	28.80	52478-C4	41.70
3/32	**9/32** (3x)	1/8	1-1/2	51193	24.40	51493	24.40	51493-C4	36.10
3/32*	**3/8** (4x)	1/4*	2	14106-20	34.80	14206-20	34.80		
3/32	**1/2** (5x)	1/8	2	51893	28.80	52493	28.80	52493-C4	41.70
1/8*	**1/4** (2x)	1/4*	2	14108-10	33.10	14208-10	33.10	892026-C4	47.00
1/8	**3/8** (3x)	1/8	1-1/2	51208	24.40	51508	24.40	51508-C4	36.10
1/8*	**1/2** (4x)	1/4*	2	14108-20	33.10	14208-20	33.10	892028-C4	47.00
1/8	**5/8** (5x)	1/8	2	51908	28.80	52508	28.80	52508-C4	41.70
5/32*	**5/8** (4x)	1/4*	2	14110-20	33.10	14210-20	33.10		
5/32	**3/4** (5x)	3/16	3			52510	38.50		
3/16*	**3/8** (2x)	1/4*	2	14112-10	33.10	14212-10	33.10		
3/16	**9/16** (3x)	3/16	2	51212	31.30	51512	31.30	51512-C4	47.40
3/16*	**5/8** (3x)	1/4*	2	14112-20	33.10	14212-20	33.10		
3/16	**1** (5x)	3/16	3	51912	38.50	52512	38.50	52512-C4	54.60
1/4	**3/8** (1.5x)	1/4	2-1/2	883116	33.10	883816	33.10		
1/4	**3/4** (3x)	1/4	2-1/2	51216	33.10	51516	33.10	51516-C4	51.40
1/4	**1** (4x)	1/4	3	878316	42.80	897416	42.80		
1/4	**1-1/4** (5x)	1/4	3	51916	42.80	52516	42.80	52516-C4	61.10
3/8	**9/16** (1.5x)	3/8	2-1/2	883124	67.20	883824	67.20		
3/8	**1-1/8** (3x)	3/8	2-1/2	51224	67.20	51524	67.20	51524-C4	89.30
3/8	**2** (5x)	3/8	4	51924	74.50	52524	74.50		
1/2	**3/4** (1.5x)	1/2	3	883132	114.40	883832	114.40		
1/2	**1-1/2** (3x)	1/2	3	51232	114.40	51532	114.40	51532-C4	141.00
1/2	**2-5/8** (5x)	1/2	5	51932	189.00	52532	189.00		

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

PLEASE SEE SPEEDS & FEEDS ON PAGE 203

END MILLS FOR PLASTICS

Square Downcut – Single Flute



Prevents Fraying, Chip-Out, and Lifting

- **Prevents fraying and chip-out of top edge of work piece**
- Prevents lifting on vacuum tables
- Left hand spiral, right hand cut
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Resists chip welding
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2			929731	36.10		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2			929762	36.10		
1/16	**1/4** (4x)	1/4	2			44862	38.00		
1/16	**5/16** (5x)	1/8	2			935362	37.10		
5/64	**5/16** (4x)	1/4	2			44878	38.00		
3/32	**3/8** (4x)	1/4	2			44893	38.00	44893-C4	56.30
1/8	**3/8** (3x)	1/8	1-1/2			929808	34.60		
1/8	**1/2** (4x)	1/4	2	855908	36.30	44908	36.30	44908-C4	54.60
1/8	**5/8** (5x)	1/8	2			935408	35.70		
5/32	**5/8** (4x)	1/4	2			44910	36.30		
3/16	**9/16** (3x)	3/16	2			929812	34.60		
3/16	**5/8** (3x)	1/4	2			44912	36.30		
1/4	**3/4** (3x)	1/4	2-1/2	855916	36.30	44916	36.30	44916-C4	54.60
1/4	**1-1/4** (5x)	1/4	3			935416	66.60		
3/8	**1-1/8** (3x)	3/8	3			44924	62.30		
3/8	**2** (5x)	3/8	4			935424	106.70		
1/2	**1-1/2** (3x)	1/2	4			44932	146.50		
1/2	**2-5/8** (5x)	1/2	5			935432	225.00		

SPEEDS & FEEDS (Single Flute Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
Filled Plastics	Carbon/ Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/ Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Ball Upcut – Single Flute

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- High flute finish resists chip welding
- Will ramp or plunge if required
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	869562	28.30
1/16	**5/16** (5x)	1/8	2	842262	34.50
3/32	**9/32** (3x)	1/8	1-1/2	869593	28.30
3/32	**1/2** (5x)	1/8	2	842293	34.50
1/8	**3/8** (3x)	1/8	1-1/2	869608	28.30
1/8	**5/8** (5x)	1/8	2	842308	34.50
3/16	**9/16** (3x)	3/16	2	869612	36.40
1/4	**3/4** (3x)	1/4	2-1/2	869616	39.90
3/8	**1-1/8** (3x)	3/8	2-1/2	869624	75.50

PLEASE SEE SPEEDS & FEEDS ON PAGE 203

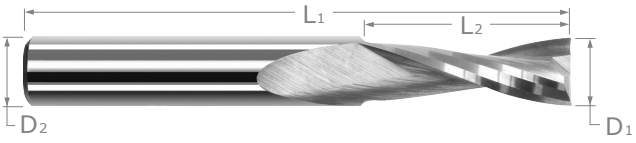
View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com.

NEW SIZES!

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER		LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	decimal equivalent	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.008	.0080	**.024** (3x)	1/8	1-1/2	48608	59.60		
.008	.0080	**.040** (5x)	1/8	1-1/2	49808	60.10		
.010	.0010	**.030** (3x)	1/8	1-1/2	48610	56.80		
.010	.0010	**.050** (5x)	1/8	1-1/2	49810	64.60		
1/64	.0156	**.023** (1.5x)	1/8	1-1/2	957615	48.60		
1/64	.0156	**3/64** (3x)	1/8	1-1/2	48615	48.60		
1/64	.0156	**5/64** (5x)	1/8	1-1/2	49815	56.40		
1/64	.0156	**1/8** (8x)	1/8	1-1/2	60215	63.40		
.020	.0200	**.030** (1.5x)	1/8	1-1/2	957620	37.10		
.020	.0200	**.060** (3x)	1/8	1-1/2	48620	37.10	48620-C4	48.80
.020	.0200	**.100** (5x)	1/8	1-1/2	49820	45.10		
.020	.0200	**.160** (8x)	1/8	1-1/2	60220	52.00		
.020	.0200	**.200** (10x)	1/8	1-1/2	938920	52.00		
.025	.0250	**.038** (1.5x)	1/8	1-1/2	957625	37.10		
.025	.0250	**.075** (3x)	1/8	1-1/2	48625	37.10		
.025	.0250	**1/8** (5x)	1/8	1-1/2	49825	44.90	49825-C4	56.60
.025	.0250	**13/64** (8x)	1/8	1-1/2	60225	52.00		
.030	.0300	**.090** (3x)	1/8	1-1/2	48630	37.10		
.030	.0300	**.156** (5x)	1/8	1-1/2	49830	45.10		
1/32	.0312	**3/64** (1.5x)	1/8	1-1/2	957631	36.80		
1/32	.0312	**3/32** (3x)	1/8	1-1/2	48631	36.80	48631-C4	48.50
1/32	.0312	**3/32** (3x)	1/4	2	878731	45.60		
1/32	.0312	**5/32** (5x)	1/8	1-1/2	49831	44.90	49831-C4	56.60
1/32	.0312	**1/4** (8x)	1/8	1-1/2	60231	51.40	60231-C4	63.10
1/32	.0312	**5/16** (10x)	1/8	1-1/2	938931	51.40		
.035	.0350	**.105** (3x)	1/8	1-1/2	48635	37.10		
.039 (1 mm)	.0394	**.118** (3x)	1/8	1-1/2	48639	37.30		
.039 (1 mm)	.0394	**13/64** (5x)	1/8	1-1/2	49839	37.30		
.040	.0400	**.060** (1.5x)	1/8	1-1/2	957640	37.10		
.040	.0400	**.120** (3x)	1/8	1-1/2	48640	37.10		
.040	.0400	**13/64** (5x)	1/8	1-1/2	49840	45.10		
.040	.0400	**.325** (8x)	1/8	2	60240	52.00		
.045	.0450	**.135** (3x)	1/8	1-1/2	48645	37.10		
3/64	.0469	**.071** (1.5x)	1/8	1-1/2	957647	31.20		
3/64	.0469	**9/64** (3x)	1/8	1-1/2	48647	31.20	48647-C4	42.90
3/64	.0469	**1/4** (5x)	1/8	1-1/2	49847	36.20	49847-C4	47.90
3/64	.0469	**3/8** (8x)	1/8	2	60247	43.50		
.050	.0500	**.150** (3x)	1/8	1-1/2	48650	31.50		
.050	.0500	**.250** (5x)	1/8	1-1/2	49850	36.50		

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NEW SIZES!

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

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continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.001″	decimal equivalent	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE	
.055	.0550	**.165** (3x)	1/8	1-1/2	48655	31.50			
.060	.0600	**.180** (3x)	1/8	1-1/2	48660	31.50			
.060	.0600	**5/16** (5x)	1/8	1-1/2	49860	36.50			

D_1 +.000″ −.002″ +.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2	L_1	2 FL	PRICE	2 FL	PRICE	
1/16	.0625	**3/32** (1.5x)	1/8	1-1/2	957662	27.40			
1/16	.0625	**3/16** (3x)	1/8	1-1/2	48662	27.40	48662-C4	39.10	
1/16	.0625	**3/16** (3x)	1/4	2	878762	36.10			
1/16	.0625	**1/4** (4x)	1/8	2	874862	32.30			
1/16	.0625	**5/16** (5x)	1/8	2	49862	32.30	49862-C4	45.20	
1/16	.0625	**1/2** (8x)	1/8	2	60262	39.90	60262-C4	53.10	
1/16	.0625	**5/8** (10x)	1/8	2	938962	39.90			
5/64	.0781	**.117** (1.5x)	1/8	1-1/2	957678	27.40			
5/64	.0781	**15/64** (3x)	1/8	1-1/2	48678	27.40	48678-C4	39.10	
5/64	.0781	**13/32** (5x)	1/8	2	49878	32.30	49878-C4	45.20	
5/64	.0781	**5/8** (8x)	1/8	2	60278	39.90			
5/64	.0781	**.800** (10x)	1/8	2	938978	39.90			
3/32	.0937	**9/64** (1.5x)	1/8	1-1/2	957693	27.40	957693-C4	39.10	
3/32	.0937	**9/32** (3x)	1/8	1-1/2	48693	27.40	48693-C4	39.10	
3/32	.0937	**9/32** (3x)	1/4	2	878793	36.10			
3/32	.0937	**3/8** (4x)	1/8	2	874893	32.30			
3/32	.0937	**1/2** (5x)	1/8	2	49893	32.30	49893-C4	45.20	
3/32	.0937	**3/4** (8x)	1/8	2	60293	39.90	60293-C4	53.10	
3/32	.0937	**.950** (10x)	1/8	2	938993	39.90			
.100	.1000	**.150** (1.5x)	1/8	1-1/2	957700	27.50			
.100	.1000	**.300** (3x)	1/8	1-1/2	48700	27.50			
.100	.1000	**1/2** (5x)	1/8	2	49900	32.80			
.100	.1000	**.800** (8x)	1/8	2-1/2	60300	40.30			
7/64	.1090	**21/64** (3x)	1/8	1-1/2	48707	27.50			
.118 (3 mm)	.1181	**.177** (1.5x)	1/8	1-1/2	957706	27.50			
.118 (3 mm)	.1181	**.354** (3x)	1/8	1-1/2	48706	27.50			
.118 (3 mm)	.1181	**.625** (5x)	1/8	2	49906	32.80			
.118 (3 mm)	.1181	**.950** (8x)	1/8	2-1/2	60306	40.30			
1/8	.1250	**.100** (0.8x)	1/8	1-1/2	793208	27.40			NEW
1/8	.1250	**3/16** (1.5x)	1/8	1-1/2	957708	27.40	957708-C4	39.10	
1/8	.1250	**3/8** (3x)	1/8	1-1/2	48708	27.40	48708-C4	39.10	
1/8	.1250	**3/8** (3x)	1/4	2	878808	36.10			
1/8	.1250	**1/2** (4x)	1/8	2	874908	32.30			
1/8	.1250	**5/8** (5x)	1/8	2	49908	32.30	49908-C4	45.20	
1/8	.1250	**1** (8x)	1/8	2-1/2	60308	39.90	60308-C4	51.60	
1/8	.1250	**1-1/4** (10x)	1/8	2-1/2	939008	39.90	939008-C4	51.60	
9/64	.1406	**27/64** (3x)	3/16	2	48709	36.20			
9/64	.1406	**3/4** (5x)	3/16	3	49909	36.10			NEW
5/32	.1562	**15/64** (1.5x)	3/16	2	957710	36.10			
5/32	.1562	**15/32** (3x)	3/16	2	48710	36.10	48710-C4	52.20	
5/32	.1562	**3/4** (5x)	3/16	3	49910	44.50	49910-C4	60.60	
5/32	.1562	**1-1/4** (8x)	3/16	3	60310	48.90			

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NEW SIZES!

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

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continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	+.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2	L_1	2 FL	PRICE	2 FL	PRICE
	3/16		.1875	**9/32** (1.5x)	3/16	2	957712	36.10	957712-C4	52.20
	3/16		.1875	**9/16** (3x)	3/16	2	48712	36.10	48712-C4	52.20
	3/16		.1875	**9/16** (3x)	1/4	2	878812	44.90		
	3/16		.1875	**3/4** (4x)	3/16	3	874912	44.50		
	3/16		.1875	**1** (5x)	3/16	3	49912	44.50	49912-C4	60.60
	3/16		.1875	**1-1/2** (8x)	3/16	3	60312	48.90		
	3/16		.1875	**1-7/8** (10x)	3/16	3	939012	48.90		
NEW	1/4		.2500	**.200** (0.8x)	1/4	2-1/2	793216	44.50		
	1/4		.2500	**3/8** (1.5x)	1/4	2-1/2	957716	44.50	957716-C4	62.80
	1/4		.2500	**3/4** (3x)	1/4	2-1/2	48716	44.50	48716-C4	62.80
	1/4		.2500	**1** (4x)	1/4	3	874916	51.00		
	1/4		.2500	**1-1/4** (5x)	1/4	3	49916	51.00	49916-C4	69.30
	1/4		.2500	**2** (8x)	1/4	4	60316	63.80	60316-C4	82.10
	1/4		.2500	**2-1/2** (10x)	1/4	4	939016	63.80		
		6.0 mm	.2362	**18 mm** (3x)	6 mm	63 mm	886566	71.10		
	5/16		.3125	**15/32** (1.5x)	5/16	2-1/2	957720	66.20		
	5/16		.3125	**1** (3x)	5/16	2-1/2	48720	66.20		
	5/16		.3125	**1-5/8** (5x)	5/16	4	49920	85.60		
		8.0 mm	.3149	**24 mm** (3x)	8 mm	63 mm	886570	95.20		
	3/8		.3750	**9/16** (1.5x)	3/8	3	957724	76.40	957724-C4	98.50
	3/8		.3750	**1-1/8** (3x)	3/8	3	48724	76.40	48724-C4	98.50
	3/8		.3750	**1-1/2** (4x)	3/8	4	874924	88.10		
	3/8		.3750	**2** (5x)	3/8	4	49924	88.10		
	3/8		.3750	**3** (8x)	3/8	6	60324	99.50		
		10.0 mm	.3937	**30 mm** (3x)	10 mm	75 mm	886573	85.30		
		12.0 mm	.4724	**36 mm** (3x)	12 mm	100 mm	886576	88.60		
	1/2		.5000	**3/4** (1.5x)	1/2	4	957732	134.50	957732-C4	161.00
	1/2		.5000	**1-1/2** (3x)	1/2	4	48732	134.50	48732-C4	161.00
NEW	1/2		.5000	**2** (4x)	1/2	4	874932	145.50		
	1/2		.5000	**2-5/8** (5x)	1/2	5	49932	160.10	49932-C4	187.00
	1/2		.5000	**4** (8x)	1/2	7	60332	184.30		
	5/8		.6250	**15/16** (1.5x)	5/8	4	957740	194.40		
	3/4		.7500	**1-1/8** (1.5x)	3/4	4	957748	253.10		
	3/4		.7500	**2-1/4** (3x)	3/4	4	48748	253.10		

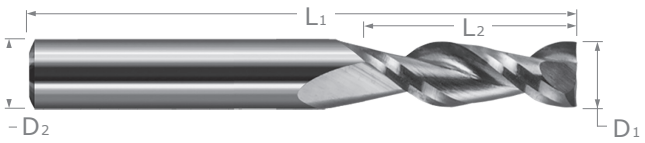
SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - Slow Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase 120%, for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 4x, reduce to 95%; for 5x, reduce to 90%; for 8x, reduce to 54%; for 10x, reduce to 40%). For complete speeds and feeds charts, please see www.harveytool.com

	Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
					.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled		800-1200	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
				Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%		600-800	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
				Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%		500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
				Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%		500-700	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
				Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%		300-400	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
				Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (High Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Higher helix (approx. 40°) for faster chip removal and better finish
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	898131	46.90

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	898162	34.50
1/16	**5/16** (5x)	1/8	2	866262	36.70
3/32	**9/32** (3x)	1/8	1-1/2	898193	34.50
1/8	**3/16** (1.5x)	1/8	1-1/2	827708	34.50
1/8	**3/8** (3x)	1/8	1-1/2	898208	34.50
1/8	**5/8** (5x)	1/8	2	866308	36.70
5/32	**15/32** (3x)	3/16	2	898210	48.90
3/16	**9/16** (3x)	3/16	2	898212	47.50
3/16	**1** (5x)	3/16	3	866312	50.80
1/4	**3/8** (1.5x)	1/4	2-1/2	827716	53.40
1/4	**3/4** (3x)	1/4	2-1/2	898216	53.40
1/4	**1-1/4** (5x)	1/4	3	866316	57.00
3/8	**1-1/8** (3x)	3/8	3	898224	80.90
3/8	**2** (5x)	3/8	4	866324	86.50
1/2	**1-1/2** (3x)	1/2	4	898232	139.50
1/2	**2-5/8** (5x)	1/2	5	866332	149.10

SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - High Helix)

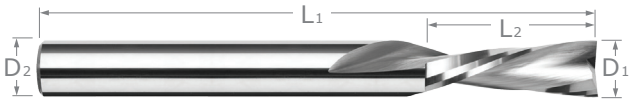
Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0012	.0018	.0024	.0030	.0036	.0048	.0072	.0097	.0102	.0123	.0164	.0205	.0246	1 x Dia	1 x Dia
			Profile	.0007	.0014	.0021	.0028	.0035	.0041	.0056	.0083	.0111	.0118	.0142	.0189	.0236	.0283	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0012	.0018	.0024	.0030	.0036	.0048	.0072	.0097	.0102	.0123	.0164	.0205	.0246	1 x Dia	1 x Dia
			Profile	.0007	.0014	.0021	.0028	.0035	.0041	.0056	.0083	.0111	.0118	.0142	.0189	.0236	.0283	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0029	.0039	.0059	.0079	.0084	.0101	.0134	.0168	.0201	1 x Dia	1 x Dia
			Profile	.0005	.0011	.0017	.0023	.0028	.0034	.0045	.0068	.0091	.0096	.0116	.0154	.0193	.0232	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0012	.0018	.0024	.0030	.0036	.0048	.0072	.0097	.0102	.0123	.0164	.0205	.0246	1 x Dia	1 x Dia
			Profile	.0007	.0014	.0021	.0028	.0035	.0041	.0056	.0083	.0111	.0118	.0142	.0189	.0236	.0283	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0029	.0039	.0059	.0079	.0084	.0101	.0134	.0168	.0201	1 x Dia	1 x Dia
			Profile	.0005	.0011	.0017	.0023	.0028	.0034	.0045	.0068	.0091	.0096	.0116	.0154	.0193	.0232	.35 x Dia	1 x Dia

NEW SIZES!

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (Slow Helix)



- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
	.010	**.030** (3x)	1/8	1-1/2	998510	58.70		
	1/64	**.023** (1.5x)	1/8	1-1/2	966215	53.60		
NEW	1/64	**3/64** (3x)	1/8	1-1/2	998515	53.60	998515-C4	65.30
	1/64	**5/64** (5x)	1/8	1-1/2	999815	61.50		
	.020	**.030** (1.5x)	1/8	1-1/2	966220	41.90		
	.020	**.060** (3x)	1/8	1-1/2	998520	41.90		
	.025	**.075** (3x)	1/8	1-1/2	998525	41.90		
	1/32	**3/64** (1.5x)	1/8	1-1/2	966231	41.90		
	1/32	**3/32** (3x)	1/8	1-1/2	998531	41.90	998531-C4	53.60
	1/32	**5/32** (5x)	1/8	1-1/2	999831	49.80		
	.040	**.120** (3x)	1/8	1-1/2	998540	41.90		
NEW	.040	**.203** (5x)	1/8	1-1/2	999840	49.80		
	3/64	**.071** (1.5x)	1/8	1-1/2	966247	36.00		
	3/64	**9/64** (3x)	1/8	1-1/2	998547	36.00		
	3/64	**1/4** (5x)	1/8	1-1/2	999847	41.40		
NEW	.050	**.150** (3x)	1/8	1-1/2	998550	41.90		
NEW	.060	**.180** (3x)	1/8	1-1/2	998560	41.90		

	D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
	1/16	**3/32** (1.5x)	1/8	1-1/2	966262	32.30		
	1/16	**3/16** (3x)	1/8	1-1/2	998562	32.30	998562-C4	44.00
	1/16	**1/4** (4x)	1/8	2	827462	43.20		
NEW	1/16	**5/16** (5x)	1/8	2	999862	43.20	999862-C4	60.40
	1/16	**1/2** (8x)	1/8	2	978962	72.10		
	5/64	**.117** (1.5x)	1/8	1-1/2	966278	32.30		
	5/64	**15/64** (3x)	1/8	1-1/2	998578	32.30		
	5/64	**13/32** (5x)	1/8	2	999878	43.20		
	5/64	**5/8** (8x)	1/8	2	978978	72.10		

continued on next page

Check Out All of Our Plastic Cutting Solutions!

NEW SIZES!

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE	
3/32	**9/64** (1.5x)	1/8	1-1/2	966293	32.30			
3/32	**9/32** (3x)	1/8	1-1/2	998593	32.30	998593-C4	44.00	
3/32	**3/8** (4x)	1/8	2	827493	43.20			
3/32	**1/2** (5x)	1/8	2	999893	43.20			
3/32	**3/4** (8x)	1/8	2	978993	72.10			
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	998606	32.30			
1/8	**3/16** (1.5x)	1/8	1-1/2	966308	32.30	966308-C4	44.00	
1/8	**3/8** (3x)	1/8	1-1/2	998608	32.30	998608-C4	44.00	
1/8	**1/2** (4x)	1/8	2	827508	43.20			
1/8	**5/8** (5x)	1/8	2	999908	43.20			
1/8	**1** (8x)	1/8	2-1/2	979008	72.10			
9/64	**.425** (3x)	3/16	2	998609	43.90			NEW
5/32	**15/64** (1.5x)	3/16	2	966310	43.90			
5/32	**15/32** (3x)	3/16	2	998610	43.90			
5/32	**3/4** (5x)	3/16	3	999910	52.00			
3/16	**9/32** (1.5x)	3/16	2	966312	43.90			
3/16	**9/16** (3x)	3/16	2	998612	43.90	998612-C4	60.00	
3/16	**1** (5x)	3/16	3	999912	52.00			
3/16	**1-1/2** (8x)	3/16	3	979012	77.30			
1/4	**3/8** (1.5x)	1/4	2-1/2	966316	52.00	966316-C4	70.30	
1/4	**3/4** (3x)	1/4	2-1/2	998616	52.00	998616-C4	70.30	
1/4	**1** (4x)	1/4	3	827516	56.80			
1/4	**1-1/4** (5x)	1/4	3	999916	56.80	999916-C4	75.10	
1/4	**2** (8x)	1/4	4	979016	83.70			
5/16	**1** (3x)	5/16	2-1/2	998620	77.80			
3/8	**9/16** (1.5x)	3/8	3	966324	88.40			
3/8	**1-1/8** (3x)	3/8	3	998624	88.40	998624-C4	110.50	
3/8	**2** (5x)	3/8	4	999924	103.70			
1/2	**3/4** (1.5x)	1/2	4	966332	159.30			
1/2	**1-1/2** (3x)	1/2	4	998632	159.30	998632-C4	185.80	
1/2	**2-5/8** (5x)	1/2	5	999932	176.50			

PLASTICS

PLEASE SEE SPEEDS & FEEDS ON PAGE 207

Plastic Cutting End Mills vs. Metal Cutting End Mills

Improved Finish - Sharper edge provides for cleaner cut and less plowing action. Chips curl faster, transferring heat to the chip, not the part.

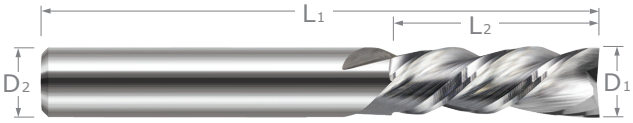
Increased Stock Removal - Large flute opening gives more chip clearance, avoids chip welding, and improves chip evacuation.

Feature	Typical Metal Working End Mills	Plastic Cutting End Mills
Flute Rake	8° – 12°	25° – 32°
Axial/End Gash Rake	2° – 4°	8° – 12°
OD Primary Relief	12° – 18°	18° – 26°
OD Secondary Relief	18° – 26°	35° – 45°
Core Diameter	56% – 60%	40% – 44%
Typical Cross Section	 2 FLUTE STANDARD	 SINGLE FLUTE  2 FLUTE  2 STRAIGHT FLUTE

Data presented is intended to be general guidelines for understanding how plastic end mill geometry compares to metal working tools. Actual values will change based on diameter, application and specific tool.

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (High Helix)



- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifing on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Higher helix (approx. 40°) for faster chip removal and better finish
- Solid carbide
- CNC ground in the USA

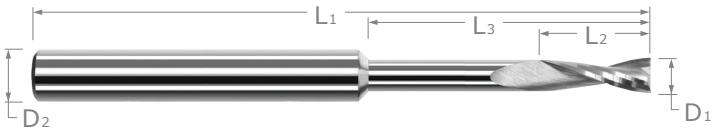
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	**5/16** (5x)	1/8	2	826362	43.20
1/8	**5/8** (5x)	1/8	2	826408	43.20
3/16	**1** (5x)	3/16	3	826412	52.00
1/4	**1-1/4** (5x)	1/4	3	826416	56.80
3/8	**2** (5x)	3/8	4	826424	103.70
1/2	**2-5/8** (5x)	1/2	5	826432	176.50

PLEASE SEE SPEEDS & FEEDS ON PAGE 208

NEW SIZES!

END MILLS FOR PLASTICS

Square Upcut – Long Reach – 2 Flute



- High rake, high relief design with large flute valley maximizes chip removal and performance
- Center cutting design improves plunging and ramping
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Solid carbide
- CNC ground in the USA

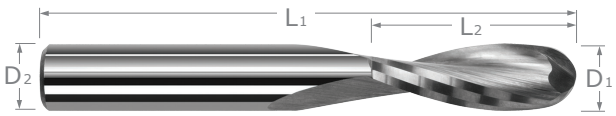
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/64	3/64	**1/8** (8x)	1/8	1-1/2	989015	62.20		
1/64	3/64	**3/16** (12x)	1/8	1-1/2	994115	65.40		
.020	.060	**.160** (8x)	1/8	1-1/2	989020	50.50		
.020	.060	**1/4** (12x)	1/8	1-1/2	994120	53.40		
1/32	3/32	**5/32** (5x)	1/8	1-1/2	961531	49.10		
1/32	3/32	**1/4** (8x)	1/8	1-1/2	989031	50.50		
1/32	3/32	**3/8** (12x)	1/8	1-1/2	994131	53.40		
1/32	3/32	**15/32** (15x)	1/8	1-1/2	979731	56.60		
.040	.120	**.325** (8x)	1/8	1-1/2	989040	50.50		
.040	.120	**.480** (12x)	1/8	1-1/2	994140	53.40		
3/64	9/64	**3/8** (8x)	1/8	1-1/2	989047	44.90		
3/64	9/64	**9/16** (12x)	1/8	1-1/2	994147	47.80		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE	
1/16	3/16	**5/16** (5x)	1/8	1-1/2	961562	40.10			
1/16	3/16	**1/2** (8x)	1/8	1-1/2	989062	41.20	989062-C4	52.90	NEW
1/16	3/16	**3/4** (12x)	1/8	2	994162	44.00			
1/16	3/16	**15/16** (15x)	1/8	2	979762	47.30			
5/64	15/64	**5/8** (8x)	1/8	2	989078	41.20			
5/64	15/64	**15/16** (12x)	1/8	2	994178	44.00			
3/32	9/32	**1/2** (5x)	1/8	1-1/2	961593	40.10			
3/32	9/32	**3/4** (8x)	1/8	2	989093	41.20			
3/32	9/32	**1-1/8** (12x)	1/8	2	994193	44.00			
3/32	9/32	**1-13/32** (15x)	1/8	2-1/2	979793	47.30			
1/8	3/8	**5/8** (5x)	1/8	1-1/2	961608	40.10			
1/8	3/8	**1** (8x)	1/8	2	989108	41.20	989108-C4	58.40	NEW
1/8	3/8	**1-1/2** (12x)	1/8	2-1/2	994208	44.00			
1/8	3/8	**1-7/8** (15x)	1/8	3	979808	47.30			
5/32	15/32	**1-1/4** (8x)	3/16	2-1/2	989110	49.70			
5/32	15/32	**1-7/8** (12x)	3/16	4	994210	57.90			
3/16	9/16	**1-1/2** (8x)	3/16	2-1/2	989112	49.70			
3/16	9/16	**2-1/4** (12x)	3/16	4	994212	57.90			
1/4	3/4	**2** (8x)	1/4	4	989116	59.00	989116-C4	77.30	NEW
1/4	3/4	**3** (12x)	1/4	6	994216	70.40			
3/8	1-1/8	**3** (8x)	3/8	6	989124	107.40			NEW
1/2	1-1/2	**4** (8x)	1/2	7	989132	195.40			NEW

PLEASE SEE SPEEDS & FEEDS ON PAGE 214

END MILLS FOR PLASTICS

Ball Upcut – 2 Flute



- Ball end for profiling complex shapes
- Ball end has increased rake and relief for improved cutting action at tip of ball
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

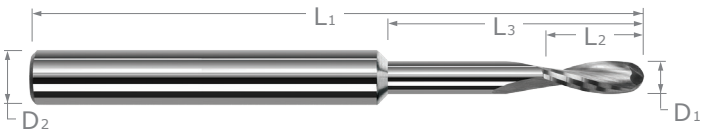
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/64	**3/64** (3x)	1/8	1-1/2	49515	54.20		
1/64	**5/64** (5x)	1/8	1-1/2	71315	63.90		
.020	**.060** (3x)	1/8	1-1/2	49520	42.50		
.020	**.100** (5x)	1/8	1-1/2	71320	52.00		
.025	**.075** (3x)	1/8	1-1/2	49525	42.50		
.025	**1/8** (5x)	1/8	1-1/2	71325	52.00		
1/32	**3/64** (1.5x)	1/8	1-1/2	962331	42.50		
1/32	**3/32** (3x)	1/8	1-1/2	49531	42.50	49531-C4	54.20
1/32	**5/32** (5x)	1/8	1-1/2	71331	51.40	71331-C4	63.10
1/32	**1/4** (8x)	1/8	1-1/2	955731	60.90		
.039 (1 mm)	**.118** (3x)	1/8	1-1/2	49539	43.00		
3/64	**9/64** (3x)	1/8	1-1/2	49547	36.00		
3/64	**1/4** (5x)	1/8	1-1/2	71347	44.70		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	962362	31.80		
1/16	**3/16** (3x)	1/8	1-1/2	49562	31.80	49562-C4	43.50
1/16	**5/16** (5x)	1/8	2	71362	38.70	71362-C4	55.90
1/16	**1/2** (8x)	1/8	2	955762	57.90		
5/64	**15/64** (3x)	1/8	1-1/2	49578	31.80		
5/64	**13/32** (5x)	1/8	2	71378	38.70		
3/32	**9/32** (3x)	1/8	1-1/2	49593	31.80	49593-C4	43.50
3/32	**1/2** (5x)	1/8	2	71393	38.70		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	49605	32.00		
1/8	**3/16** (1.5x)	1/8	1-1/2	962408	31.80		
1/8	**3/8** (3x)	1/8	1-1/2	49608	31.80	49608-C4	43.50
1/8	**5/8** (5x)	1/8	2	71408	38.70	71408-C4	55.90
1/8	**1** (8x)	1/8	2-1/2	955808	57.90		
5/32	**15/32** (3x)	3/16	2	49610	41.90		
3/16	**9/32** (1.5x)	3/16	2	962412	41.90		
3/16	**9/16** (3x)	3/16	2	49612	41.90	49612-C4	58.00
3/16	**1** (5x)	3/16	3	71412	50.80		
1/4	**3/8** (1.5x)	1/4	2-1/2	962416	53.60		
1/4	**3/4** (3x)	1/4	2-1/2	49616	53.60	49616-C4	71.90
1/4	**1-1/4** (5x)	1/4	3	71416	61.40	71416-C4	79.70
3/8	**9/16** (1.5x)	3/8	3	962424	85.80		
3/8	**1-1/8** (3x)	3/8	3	49624	85.80	49624-C4	107.90
3/8	**2** (5x)	3/8	4	71424	97.80		
1/2	**3/4** (1.5x)	1/2	4	962432	147.90		
1/2	**1-1/2** (3x)	1/2	4	49632	147.90	49632-C4	174.40
1/2	**2-5/8** (5x)	1/2	5	71432	175.50		

PLEASE SEE SPEEDS & FEEDS ON PAGE 207

END MILLS FOR PLASTICS

Ball Upcut – Long Reach – 2 Flute



- Ball end has increased rake and relief for improved cutting action at tip of ball
- Reduced neck diameter to avoid heeling
- Ball end for profiling complex shapes
- Length of cut = 3x diameter
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/32	3/32	**5/32** (5x)	1/8	1-1/2	964531	54.40
1/32	3/32	**1/4** (8x)	1/8	1-1/2	976231	56.10
3/64	9/64	**1/4** (5x)	1/8	1-1/2	964547	48.30
3/64	9/64	**3/8** (8x)	1/8	1-1/2	976247	49.50
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	3/16	**5/16** (5x)	1/8	1-1/2	964562	43.90
1/16	3/16	**1/2** (8x)	1/8	1-1/2	976262	45.50
5/64	15/64	**13/32** (5x)	1/8	1-1/2	964578	43.90
5/64	15/64	**5/8** (8x)	1/8	2	976278	45.50
3/32	9/32	**1/2** (5x)	1/8	1-1/2	964593	43.90
3/32	9/32	**3/4** (8x)	1/8	2	976293	45.50
1/8	3/8	**5/8** (5x)	1/8	1-1/2	964608	43.90
1/8	3/8	**1** (8x)	1/8	2	976308	45.50
3/16	9/16	**1** (5x)	3/16	2	964612	53.70
1/4	3/4	**1-1/4** (5x)	1/4	2-1/2	964616	65.00

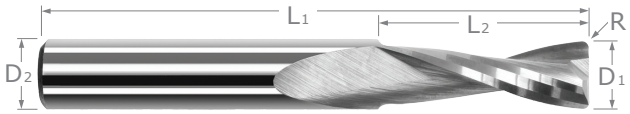
SPEEDS & FEEDS (Square & Ball – Long Reach Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 5x, increase to 130%). For longer reaches, table values of IPT and DOC must be reduced (for 12x, reduce to 80%; for 15x, reduce to 67%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Corner Radius Upcut – 2 Flute



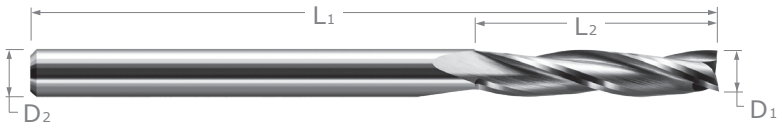
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	.005	**3/16** (3x)	1/8	1-1/2	54062	31.80
1/16	.010	**3/16** (3x)	1/8	1-1/2	55462	31.80
1/16	.010	**5/16** (5x)	1/8	2	861862	39.10
1/16	.015	**3/16** (3x)	1/8	1-1/2	69362	31.80
1/16	.015	**5/16** (5x)	1/8	2	862462	39.10
3/32	.005	**9/32** (3x)	1/8	1-1/2	54093	31.80
3/32	.010	**9/32** (3x)	1/8	1-1/2	55493	31.80
3/32	.010	**1/2** (5x)	1/8	2	861893	39.10
3/32	.015	**9/32** (3x)	1/8	1-1/2	69393	31.80
3/32	.015	**1/2** (5x)	1/8	2	862493	39.10
3/32	.020	**9/32** (3x)	1/8	1-1/2	69893	31.80
3/32	.030	**9/32** (3x)	1/8	1-1/2	70693	31.80
1/8	.005	**3/8** (3x)	1/8	1-1/2	54108	31.80
1/8	.010	**3/8** (3x)	1/8	1-1/2	55508	31.80
1/8	.010	**5/8** (5x)	1/8	2	861908	39.10
1/8	.015	**3/8** (3x)	1/8	1-1/2	56408	31.80
1/8	.015	**5/8** (5x)	1/8	2	862508	39.10
1/8	.020	**3/8** (3x)	1/8	1-1/2	69908	31.80
1/8	.030	**3/8** (3x)	1/8	1-1/2	70708	31.80
1/8	.030	**5/8** (5x)	1/8	2	863108	39.10
3/16	.005	**9/16** (3x)	3/16	2	54112	41.90
3/16	.010	**9/16** (3x)	3/16	2	55512	41.90
3/16	.015	**9/16** (3x)	3/16	2	56412	41.90
3/16	.020	**9/16** (3x)	3/16	2	69912	41.90
3/16	.030	**9/16** (3x)	3/16	2	70712	41.90
3/16	.030	**1** (5x)	3/16	3	863112	51.20
1/4	.010	**3/4** (3x)	1/4	2-1/2	55516	53.60
1/4	.015	**3/4** (3x)	1/4	2-1/2	56416	53.60
1/4	.020	**3/4** (3x)	1/4	2-1/2	69916	53.60
1/4	.030	**3/4** (3x)	1/4	2-1/2	70716	53.60
1/4	.030	**1-1/4** (5x)	1/4	4	863116	61.70
3/8	.015	**1-1/8** (3x)	3/8	3	56424	84.10
3/8	.030	**1-1/8** (3x)	3/8	3	70724	84.10
1/2	.015	**1-1/2** (3x)	1/2	4	56432	145.30
1/2	.030	**1-1/2** (3x)	1/2	4	70732	145.30

PLEASE SEE SPEEDS & FEEDS ON PAGE 207

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (Slow Helix)



Specialized Wiper Flat Geometry for Improved Finish

- 3 flute design strengthens rigidity and improves wall finish
- Specialized end geometry enhances bottom finish by reducing traditional circular marks
- Slower helix (approx. 22°) reduces lifting forces for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

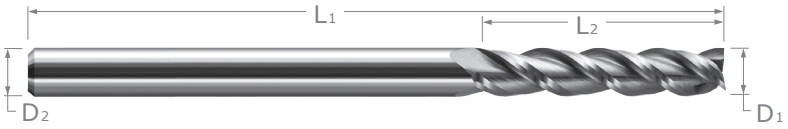
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	915631	47.50		
1/32	**5/32** (5x)	1/8	1-1/2	986431	47.50		
1/32	**1/4** (8x)	1/8	1-1/2	992331	51.00		
3/64	**1/4** (5x)	1/8	1-1/2	986447	36.50		
3/64	**3/8** (8x)	1/8	2	992347	39.40		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	915662	30.00		
1/16	**5/16** (5x)	1/8	2	986462	35.20	986462-C4	52.40
1/16	**1/2** (8x)	1/8	2	992362	38.30		
1/16	**5/8** (10x)	1/8	2	871662	48.40		
5/64	**13/32** (5x)	1/8	2	986478	35.20		
5/64	**5/8** (8x)	1/8	2	992378	38.30		
3/32	**9/32** (3x)	1/8	1-1/2	915693	30.00		
3/32	**1/2** (5x)	1/8	2	986493	35.20	986493-C4	52.40
3/32	**3/4** (8x)	1/8	2	992393	38.30		
1/8	**3/8** (3x)	1/8	1-1/2	915708	30.00		
1/8	**5/8** (5x)	1/8	2	986508	35.20	986508-C4	52.40
1/8	**1** (8x)	1/8	2	992408	38.30		
1/8	**1-1/4** (10x)	1/8	2-1/2	871708	48.40		
5/32	**15/32** (3x)	3/16	2	915710	46.50		
5/32	**3/4** (5x)	3/16	3	986510	48.60		
3/16	**9/16** (3x)	3/16	2	915712	46.50		
3/16	**1** (5x)	3/16	3	986512	48.60	986512-C4	64.70
3/16	**1-1/2** (8x)	3/16	3	992412	57.50		
1/4	**3/8** (1.5x)	1/4	2-1/2	869316	46.40		
1/4	**3/4** (3x)	1/4	2-1/2	915716	48.60		
1/4	**1-1/4** (5x)	1/4	3	986516	55.00	986516-C4	73.30
1/4	**2** (8x)	1/4	4	992416	71.60		
3/8	**9/16** (1.5x)	3/8	3	869324	78.10		
3/8	**1-1/8** (3x)	3/8	3	915724	81.10		
3/8	**2** (5x)	3/8	4	986524	87.70		
1/2	**3/4** (1.5x)	1/2	4	869332	135.70		
1/2	**1-1/2** (3x)	1/2	4	915732	140.80		
1/2	**2-5/8** (5x)	1/2	5	986532	147.40		

PLEASE SEE SPEEDS & FEEDS ON PAGE 218

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix)



Specialized Wiper Flat Geometry for Improved Finish

- 3 flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Specialized end geometry enhances bottom finish by reducing traditional circular marks
- Design is ideally suited for thin-walled applications and tightly secured workpieces
- Center cutting
- Solid carbide
- CNC ground in the USA

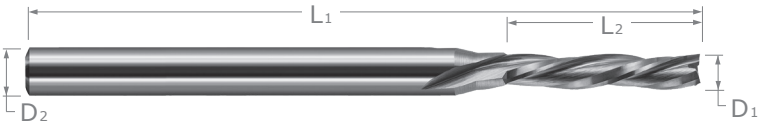
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	902131	47.00		
1/32	**5/32** (5x)	1/8	1-1/2	941231	48.90		
1/32	**1/4** (8x)	1/8	1-1/2	900731	52.50		
3/64	**1/4** (5x)	1/8	1-1/2	941247	37.60		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	902162	34.70		
1/16	**5/16** (5x)	1/8	2	941262	36.50	941262-C4	53.70
1/16	**1/2** (8x)	1/8	2	900762	39.40		
1/16	**5/8** (10x)	1/8	2	854662	41.70		
5/64	**13/32** (5x)	1/8	2	941278	36.50		
3/32	**9/32** (3x)	1/8	1-1/2	902193	34.70		
3/32	**1/2** (5x)	1/8	2	941293	36.50	941293-C4	53.70
3/32	**3/4** (8x)	1/8	2	900793	39.40		
1/8	**3/8** (3x)	1/8	1-1/2	902208	34.70		
1/8	**5/8** (5x)	1/8	2	941308	36.50	941308-C4	53.70
1/8	**1** (8x)	1/8	2	900808	39.40		
1/8	**1-1/4** (10x)	1/8	2-1/2	854708	41.70		
5/32	**15/32** (3x)	3/16	2	902210	46.80		
5/32	**3/4** (5x)	3/16	3	941310	48.60		
3/16	**9/16** (3x)	3/16	2	902212	46.80		
3/16	**1** (5x)	3/16	3	941312	48.60	941312-C4	64.70
3/16	**1-1/2** (8x)	3/16	3	900812	52.20		
1/4	**3/8** (1.5x)	1/4	2-1/2	852016	51.40		
1/4	**3/4** (3x)	1/4	2-1/2	902216	53.40		
1/4	**1-1/4** (5x)	1/4	3	941316	55.00	941316-C4	73.30
1/4	**2** (8x)	1/4	4	900816	71.60		
3/8	**9/16** (1.5x)	3/8	3	852024	79.10		
3/8	**1-1/8** (3x)	3/8	3	902224	81.10		
3/8	**2** (5x)	3/8	4	941324	87.70		
1/2	**3/4** (1.5x)	1/2	4	852032	134.60		
1/2	**1-1/2** (3x)	1/2	4	902232	139.60		
1/2	**2-5/8** (5x)	1/2	5	941332	147.40		

PLEASE SEE SPEEDS & FEEDS ON PAGE 219

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (Slow Helix)



- 3 left hand spiral, right hand cut flute design strengthens rigidity and improves wall finish
- Slower helix (approx. 22°) ideal for overhung, less secure parts
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/32	**5/32** (5x)	1/8	1-1/2	880431	47.50

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/16	**5/16** (5x)	1/8	2	880462	38.30
3/32	**1/2** (5x)	1/8	2	880493	38.30
1/8	**5/8** (5x)	1/8	2	880508	38.30
3/16	**1** (5x)	3/16	3	880512	50.40
1/4	**1-1/4** (5x)	1/4	3	880516	56.90
3/8	**1-1/8** (3x)	3/8	3	878124	83.00
1/2	**1-1/2** (3x)	1/2	4	878132	140.50

SPEEDS & FEEDS (3 Flute Plastic Finisher – Slow Helix)

Important Note: Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Un-filled	Unfilled	800-1200	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia

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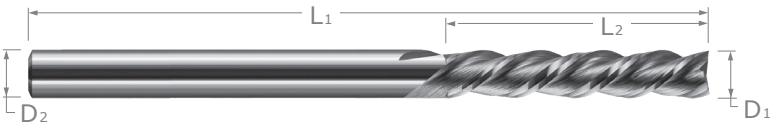
END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (High Helix)



- 3 left hand spiral, right hand cut flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Design is ideally suited for thin-walled applications
- Solid carbide
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	D_1 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/32	**5/32** (5x)	1/8	1-1/2	864331	53.10

D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/16	**5/16** (5x)	1/8	2	864362	43.00
3/32	**1/2** (5x)	1/8	2	864393	42.00
1/8	**3/8** (3x)	1/8	1-1/2	873808	33.60
1/8	**5/8** (5x)	1/8	2	864408	37.00
3/16	**9/16** (3x)	3/16	2	873812	45.30
3/16	**1** (5x)	3/16	3	864412	50.40
1/4	**3/4** (3x)	1/4	2-1/2	873816	51.50
1/4	**1-1/4** (5x)	1/4	3	864416	56.90
3/8	**1-1/8** (3x)	3/8	3	873824	83.00
1/2	**1-1/2** (3x)	1/2	4	873832	141.60

SPEEDS & FEEDS (3 Flute Plastic Finisher – High Helix)

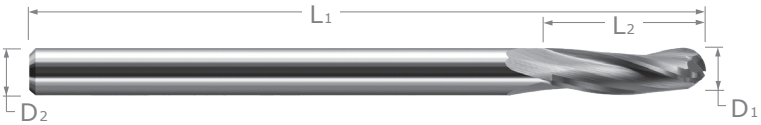
Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Un-filled	Unfilled	800-1200	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia	1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia	3 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia	1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia	3 x Dia

NEW!

END MILLS FOR PLASTICS

Finishers – Ball Upcut – 3 Flute (Slow Helix)



- Ball end has increased rake and relief for improved cutting action at the tip
- 3 Flute design strengthens rigidity and improves wall finish
- Slower helix reduces lifting forces for fiber-reinforced applications and vacuum table set ups
- Center cutting
- Ultrafine Grain Carbide to create a sharp cutting edge
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	
1/16	**3/16** (3x)	1/8	1-1/2	808762	34.40	NEW
3/32	**9/32** (3x)	1/8	1-1/2	808793	34.40	NEW
1/8	**3/8** (3x)	1/8	1-1/2	808808	34.40	NEW
3/16	**9/16** (3x)	3/16	2	808812	52.30	NEW
1/4	**3/4** (3x)	1/4	2-1/2	808816	55.50	NEW
3/8	**1-1/8** (3x)	3/8	3	808824	87.50	NEW
1/2	**1-1/2** (3x)	1/2	4	808832	149.10	NEW

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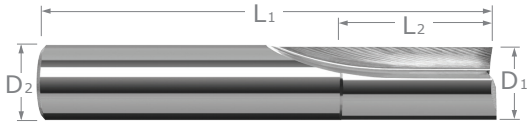
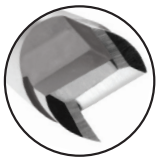
END MILLS FOR COMPOSITES

Square – 2 Straight Flutes





2 Straight Flutes
(End View)

- Designed to mill abrasive, glass-filled plastics with reinforcing fiber and other additives
- Straight flute design improves finish and minimizes fraying of fiber-reinforced and layered materials by not "pulling" fibers
- Behind center design with high positive rake for smoother cuts
- Eccentric relief for improved edge life
- Allows shallow ramping, not suited for plunge cutting
- Select sizes available with oversized, router-style shanks
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	69531	47.90	69531-C4	59.60

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	825162	32.20	825162-C4	43.90
1/16	**1/8** (2x)	1/4*	2	14604	36.50	14604-C4	54.80
1/16	**3/16** (3x)	1/8	1-1/2	69562	32.20	69562-C4	43.90
1/16	**5/16** (5x)	1/8	2	70462	37.10	70462-C4	50.10
5/64*	**5/32** (2x)	1/4*	2	14605	36.50	14605-C4	54.80
5/64	**1/4** (3x)	1/8	1-1/2	69578	32.20	69578-C4	43.90
5/64	**13/32** (5x)	1/8	2	70478	37.10	70478-C4	50.10
3/32	**9/64** (1.5x)	1/8	1-1/2	825193	32.20	825193-C4	43.90
3/32*	**3/16** (2x)	1/4*	2	14606	36.50	14606-C4	54.80
3/32	**5/16** (3x)	1/8	1-1/2	69593	32.20	69593-C4	43.90
3/32	**1/2** (5x)	1/8	2	70493	37.10	70493-C4	50.10
1/8	**3/16** (1.5x)	1/8	1-1/2	825208	32.20	825208-C4	43.90
1/8*	**1/4** (2x)	1/4*	2	14608	36.50	14608-C4	54.80
1/8	**3/8** (3x)	1/8	1-1/2	69608	32.20	69608-C4	43.90
1/8	**5/8** (5x)	1/8	2	70508	37.10	70508-C4	50.10
5/32	**1/2** (3x)	3/16	2	69610	34.20	69610-C4	50.30
3/16	**5/8** (3x)	3/16	2	69612	34.20	69612-C4	50.30
3/16*	**5/8** (3x)	1/4*	2	14612	36.50	14612-C4	54.80
3/16	**1** (5x)	3/16	3	70512	40.30	70512-C4	56.40
1/4	**3/8** (1.5x)	1/4	2-1/2	825216	33.30	825216-C4	51.60
1/4*	**3/4** (3x)	1/4	2-1/2	14616	33.30	14616-C4	51.60
1/4	**1-1/4** (5x)	1/4	3	70516	46.20	70516-C4	64.50
5/16	**7/8** (3x)	5/16	2-1/2	14620	62.10	14620-C4	84.20
3/8*	**7/8** (2x)	3/8	2-1/2	14624	62.10	14624-C4	84.20
3/8	**2** (5x)	3/8	4	70524	76.40	70524-C4	98.50
1/2*	**1** (2x)	1/2	3	14632	98.60	14632-C4	125.20
1/2	**2-1/2** (5x)	1/2	4	70532	121.70		

*Cutter diameter tolerance is +.000/-.004". Tools are ground on oversized, router-style shank.

SPEEDS & FEEDS (2 Straight Flutes)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

	Material Type	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia

END MILLS FOR COMPOSITES

Compression Cutter

Prevents Burrs & Delamination!

- Counteracting flute geometries compress material inwardly to avoid burrs, tear out, and delamination
- Produces enhanced edge finish on top and bottom of workpiece
- Offered in two diamond coatings for increased tool life in a variety of abrasive composite materials
- Stocked in 2, 4, and 6 flute configurations for rough and finish machining
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERLAP CENTER	OVERLAP LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.001″ −.001″	L_4		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	3/32	**1/32**	.006	2	1/8	1-1/2	994331	49.80	994331-C4	61.60	995031	112.50
3/64	9/64	**3/64**	.009	2	1/8	1-1/2	994347	49.80	994347-C4	61.60	995047	112.50
1/16	3/16	**1/16**	.013	2	1/8	1-1/2	994362	47.30	994362-C4	59.20	995062	109.90
5/64	1/4	**5/64**	.016	2	1/8	1-1/2	994378	47.30	994378-C4	59.20	995078	109.90
3/32	9/32	**3/32**	.019	2	1/8	1-1/2	994393	47.30	994393-C4	59.20	995093	109.90
1/8	3/8	**1/8**	.025	2	1/8	1-1/2	994408	45.90	994408-C4	57.70	995108	107.40
1/8	3/8	**1/8**	.028	4	1/8	1-1/2	993708	48.90	993708-C4	60.70	997708	112.10
3/16	9/16	**3/16**	.038	2	3/16	2	994412	51.20	994412-C4	67.50	995112	124.80
3/16	9/16	**3/16**	.041	4	3/16	2	993712	54.90	993712-C4	71.00	997712	131.60
1/4	3/4	**1/4**	.050	2	1/4	2-1/2	994416	61.20	994416-C4	79.50	995116	147.60
1/4	3/4	**1/4**	.055	4	1/4	2-1/2	993716	65.10	993716-C4	83.40	997716	154.20
5/16	1	**5/16**	.075	6	5/16	2-1/2	920120	77.90	920120-C4	100.10	918820	179.10
3/8	1-1/8	**3/8**	.090	6	3/8	2-1/2	920124	97.20	920124-C4	119.40	918824	237.10
1/2	1-1/2	**1/2**	.120	6	1/2	3	920132	173.90	920132-C4	200.70	918832	341.80

Choosing the Right Diamond

AMORPHOUS DIAMOND

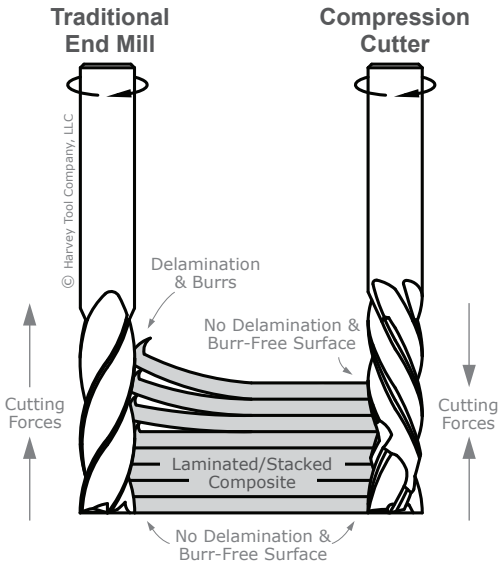
A PVD amorphous diamond coating which improves lubricity and wear resistance. Coating is thin relative to CVD diamond, preventing edge rounding. Sharp edges improve results (performance and finish) over CVD in certain abrasive materials.

Thin coating maintains sharper edge.

CVD DIAMOND

True Crystalline CVD diamond is grown directly into a carbide end mill. This dramatically improves hardness, which improves abrasion resistance and extends tool life up to 50x, allowing higher feed rates than uncoated carbide. Ideal for machining abrasive composite materials with high fiber or fill concentration (G10, FR4, etc.) Diamond layer is approximately 5 times thicker than Amorphous Diamond, improving wear resistance. Well suited for high production environments.

Thicker diamond layer for increased wear resistance.

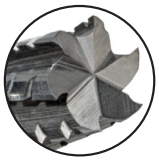


Traditional End Mills: Upward lifting force causes burrs and delamination at the top of the part.

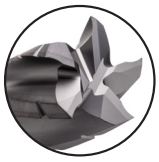
Compression Cutters: Counteracting cutting forces compress the material and stabilize the workpiece, creating a superior finish on the top and bottom of the part.

END MILLS FOR COMPOSITES

Chipbreaker Cutter



Type I
Bur-Style End



Type II
Center Cutting

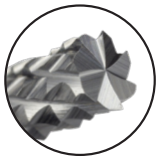
- Optimized geometry with chipbreakers efficiently shears fibers and shortens chips for improved chip removal
- Suited for roughing and profiling in composite materials with high fiber or fill concentration (G10, FR4, etc.)
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	**3/32** (3x)	4	I	1/8	1-1/2	969231	47.90	969231-C4	59.60		
3/64	**9/64** (3x)	4	I	1/8	1-1/2	969247	47.90	969247-C4	59.60		
1/16	**3/16** (3x)	3	II	1/8	1-1/2	801962	47.30			803762	109.90
1/16	**3/16** (3x)	4	I	1/8	1-1/2	969262	45.90	969262-C4	57.60		
5/64	**15/64** (3x)	4	I	1/8	1-1/2	969278	45.90	969278-C4	57.60		
3/32	**9/32** (3x)	3	II	1/8	1-1/2	801993	47.30			803793	109.90
3/32	**9/32** (3x)	4	I	1/8	1-1/2	969293	45.90	969293-C4	57.60		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	**3/8** (3x)	5	II	1/8	1-1/2	802008	45.60			803808	107.10
1/8	**3/8** (3x)	6	I	1/8	1-1/2	969308	44.30	969308-C4	56.00		
1/8	**5/8** (5x)	5	II	1/8	1-1/2	818508	48.40			803008	109.90
1/8	**5/8** (5x)	6	I	1/8	1-1/2	884908	47.00	884908-C4	58.70		
3/16	**9/16** (3x)	5	II	3/16	2	802012	50.40			803812	124.00
3/16	**9/16** (3x)	6	I	3/16	2	969312	48.90	969312-C4	65.00		
3/16	**1** (5x)	5	II	3/16	2	818512	53.10			803012	126.70
3/16	**1** (5x)	6	I	3/16	2	884912	51.60	884912-C4	67.70		
1/4	**3/4** (3x)	5	II	1/4	2-1/2	802016	60.30			803816	146.70
1/4	**3/4** (3x)	6	I	1/4	2-1/2	969316	58.50	969316-C4	76.80		
1/4	**1-1/4** (5x)	5	II	1/4	2-1/2	818516	63.20			803016	152.30
1/4	**1-1/4** (5x)	6	I	1/4	2-1/2	884916	61.40	884916-C4	79.70		
3/8	**1-1/8** (3x)	5	II	3/8	3	802024	99.00			803824	238.90
3/8	**1-1/8** (3x)	8	I	3/8	3	969324	96.10	969324-C4	118.20		
1/2	**1-1/2** (3x)	5	II	1/2	4	802032	174.50			803832	342.40
1/2	**1-1/2** (3x)	8	I	1/2	4	969332	169.40	969332-C4	195.90		

NEW!

END MILLS FOR COMPOSITES

Diamond Cut – Bur Style



Bur-Style End

- Diamond cut style and high flute count allows for effective deburring with the outer diameter in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Total flute count on the bur-style end is equal to the amount of right hand teeth
- Downcut geometry on the OD
- Solid carbide
- CNC ground in the USA

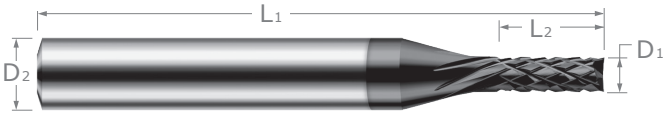
CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	798462	38.10	798462-C4	49.80	NEW
.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	798478	38.10	798478-C4	49.80	NEW
.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	798493	38.10	798493-C4	49.80	NEW

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	798508	38.10	798508-C4	49.80	NEW
.187 (3/16)	**.563** (3x)	9	11	3/16	2	798512	45.40	798512-C4	61.50	NEW
.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	798516	62.70	798516-C4	81.00	NEW

NEW SIZES!

END MILLS FOR COMPOSITES

Diamond Cut – End Mill Style



End Mill Style

- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Center cutting (two flutes to center) on end with downcut geometry on OD
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT		RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (4 µm)	
	D_1 +.000″ −.001″	L_2 +.020″ −.000″				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.062 (1/16)	**.186**	(3x)	6	8	1/8	1-1/2	920962	38.10	920962-C4	49.80		
	.078 (5/64)	**.234**	(3x)	7	9	1/8	1-1/2	920978	38.10	920978-C4	49.80		
	.093 (3/32)	**.279**	(3x)	7	9	1/8	1-1/2	920993	38.10	920993-C4	49.80		
NEW	.109 (7/64)	**.327**	(3x)	8	10	1/8	1-1/2	921002	41.20	921002-C4	52.90		

	D_1 +.000″ −.002″	L_2 +.030″ −.000″				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
NEW	.125 (1/8)	**.375**	(3x)	8	10	1/8	1-1/2	921008	38.10	921008-C4	49.80	799008	84.70
	.125 (1/8)	**.625**	(5x)	8	10	1/8	1-1/2	894508	41.20	894508-C4	52.90		
NEW	.156 (5/32)	**.469**	(3x)	9	11	3/16	2	921010	45.40	921010-C4	61.50		
NEW	.187 (3/16)	**.563**	(3x)	9	11	3/16	2	921012	45.40	921012-C4	61.50	799012	101.00
	.187 (3/16)	**1.000**	(5x)	9	11	3/16	2	894512	49.50	894512-C4	65.60		
NEW	.250 (1/4)	**.750**	(3x)	10	12	1/4	2-1/2	921016	62.70	921016-C4	81.00	799016	126.50
	.250 (1/4)	**1.250**	(5x)	10	12	1/4	2-1/2	894516	68.10	894516-C4	86.40		
	.312 (5/16)	**1.000**	(3x)	10	12	5/16	2-1/2	921020	81.30	921020-C4	103.40		
	.375 (3/8)	**1.125**	(3x)	11	13	3/8	2-1/2	921024	98.40	921024-C4	120.50		
	.500 (1/2)	**1.500**	(3x)	12	14	1/2	3	921032	166.70	921032-C4	193.30		

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

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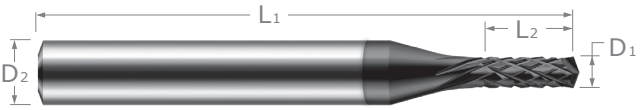
END MILLS FOR COMPOSITES

Diamond Cut – Drill Mill Style



Drill Point

- 140° point angle allows for efficient plunging through composite sheet material
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Downcut geometry on OD
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	908062	40.60	908062-C4	52.30
.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	908078	40.60	908078-C4	52.30
.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	908093	40.60	908093-C4	52.30
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	908108	40.60	908108-C4	52.30
.187 (3/16)	**.563** (3x)	9	11	3/16	2	908112	47.90	908112-C4	64.00
.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	908116	65.90	908116-C4	84.20

★★★★★

"Nothing like a fresh @harveytool when cutting carbon fiber!!!"

— @KeyBar

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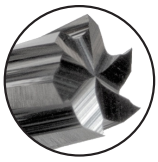
NEW SIZES!

END MILLS FOR COMPOSITES

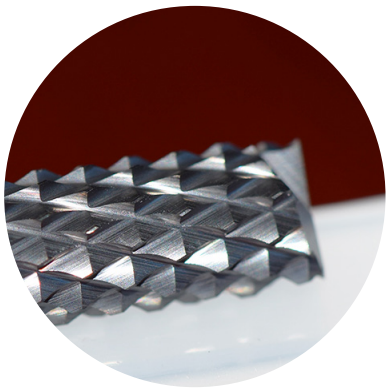
Finisher



Bur-Style End

- Optimized geometry and high flute count for finishing in composite materials with high fiber or fill concentration
- Slow helix improves finish and minimizes fraying of fiber-reinforced and layered materials by reducing vertical forces on the workpiece
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	1/32	**3/32** (3x)	4	1/8	1-1/2	944731	48.40	944731-C4	60.10		
	3/64	**9/64** (3x)	4	1/8	1-1/2	944747	48.40	944747-C4	60.10		
NEW	1/16	**3/16** (3x)	6	1/8	1-1/2	944762	46.20	944762-C4	57.90	798862	108.80
	1/16	**5/16** (5x)	6	1/8	1-1/2	889262	48.40	889262-C4	60.10		
	5/64	**15/64** (3x)	6	1/8	1-1/2	944778	46.20	944778-C4	57.90		
NEW	3/32	**9/64** (1.5x)	6	1/8	1-1/2	794793	46.20	794793-C4	57.90		
NEW	3/32	**9/32** (3x)	6	1/8	1-1/2	944793	46.20	944793-C4	57.90	798893	108.80
	3/32	**1/2** (5x)	6	1/8	1-1/2	889293	48.40	889293-C4	60.10		
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
NEW	1/8	**3/16** (1.5x)	8	1/8	1-1/2	794808	44.60	794808-C4	56.30		
NEW	1/8	**3/8** (3x)	8	1/8	1-1/2	944808	44.60	944808-C4	56.30	798908	106.10
	1/8	**5/8** (5x)	8	1/8	2	889208	46.80	889208-C4	58.70		
	3/16	**9/16** (3x)	8	3/16	2	944812	49.20	944812-C4	65.30		
	3/16	**1** (5x)	8	3/16	2-1/2	889212	51.60	889212-C4	67.70		
NEW	1/4	**3/8** (1.5x)	8	1/4	2-1/2	794816	59.00	794816-C4	77.30		
NEW	1/4	**3/4** (3x)	8	1/4	2-1/2	944816	59.00	944816-C4	77.30	798916	135.70
	1/4	**1-1/4** (5x)	8	1/4	2-1/2	889216	71.80	889216-C4	90.10		
	3/8	**1-1/8** (3x)	10	3/8	3	944824	96.90	944824-C4	119.00		
	1/2	**1-1/2** (3x)	10	1/2	4	944832	170.50	944832-C4	197.00		



Ideal Tooling for Machining Composites

Composites are a very beneficial, unique material group for their rewarding properties. But machining composites can lead to challenges if not done right. Learn why certain tools are capable of machining composites in our "In the Loupe" blog post **Ideal Tooling for Machining Composites**.

Read more on harveyperformance.com/in-the-loupe/

END MILLS FOR WOOD

Square Upcut

Outstanding in MDF and Plywood!

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- 2-flute style with deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**.186** (3x)	1/4	2	809562	36.10	809562-C4	54.40
1/16	**.312** (5x)	1/4	2-1/2	809362	39.70	809362-C4	58.00
5/64	**.234** (3x)	1/4	2	809578	36.10	809578-C4	54.40
5/64	**.406** (5x)	1/4	2-1/2	809378	39.70	809378-C4	58.00
3/32	**.279** (3x)	1/4	2	809593	36.10	809593-C4	54.40
3/32	**.500** (5x)	1/4	2-1/2	809393	39.70	809393-C4	58.00
1/8	**.375** (3x)	1/4	2	809608	36.10	809608-C4	54.40
1/8	**.625** (5x)	1/4	2-1/2	809408	39.70	809408-C4	58.00
3/16	**.563** (3x)	1/4	2	809612	36.10	809612-C4	54.40
3/16	**1.000** (5x)	1/4	3	809412	42.60	809412-C4	60.90
1/4	**.750** (3x)	1/4	2-1/2	809616	44.50	809616-C4	62.80
1/4	**1.250** (5x)	1/4	3	809416	51.00	809416-C4	69.30
3/8	**1.125** (3x)	3/8	3	809624	76.40	809624-C4	98.50
3/8	**1.875** (5x)	3/8	4	809424	88.10	809424-C4	110.20
1/2	**1.500** (3x)	1/2	4	809632	134.50	809632-C4	161.00
1/2	**2.500** (5x)	1/2	5	809432	154.60	809432-C4	181.50

PLEASE SEE SPEEDS & FEEDS ON PAGE 229

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com.

END MILLS FOR WOOD

Square Downcut

Outstanding in MDF and Plywood!

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- Prevents tear-outs and splintering on the top of the workpiece
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- Deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**.186** (3x)	1/4	2	809162	42.50	809162-C4	60.80
1/16	**.312** (5x)	1/4	2-1/2	808962	46.70	808962-C4	65.00
5/64	**.234** (3x)	1/4	2	809178	42.50	809178-C4	60.80
5/64	**.406** (5x)	1/4	2-1/2	808978	46.70	808978-C4	65.00
3/32	**.279** (3x)	1/4	2	809193	42.50	809193-C4	60.80
3/32	**.500** (5x)	1/4	2-1/2	808993	46.70	808993-C4	65.00
1/8	**.375** (3x)	1/4	2	809208	42.50	809208-C4	60.80
1/8	**.625** (5x)	1/4	2-1/2	809008	46.70	809008-C4	65.00
3/16	**.563** (3x)	1/4	2	809212	42.50	809212-C4	60.80
3/16	**1.000** (5x)	1/4	3	809012	50.10	809012-C4	68.40
1/4	**.750** (3x)	1/4	2-1/2	809216	52.00	809216-C4	70.30
1/4	**1.250** (5x)	1/4	3	809016	56.80	809016-C4	75.10
3/8	**1.125** (3x)	3/8	3	809224	88.40	809224-C4	110.50
3/8	**1.875** (5x)	3/8	4	809024	103.70	809024-C4	125.80
1/2	**1.500** (3x)	1/2	4	809232	159.30	809232-C4	185.80
1/2	**2.500** (5x)	1/2	5	809032	176.50	809032-C4	203.40

SPEEDS & FEEDS (Square – End Mills for Wood)

Important Note: Values in table are in inches and are based on (3x Dia) length of cut end mills. For longer length of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material	Janka Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter															Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	1.000	Radial	Axial
Softer Woods White Pine, Sugar Pine, Western Red Cedar, Douglas Fir, Redwood	< 1200	400 - 2000	Slot - Rough	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0088	.0118	.0125	.0150	.0200	.0250	.0300	.0400	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0005	.0011	.0017	.0022	.0028	.0033	.0045	.0067	.0090	.0097	.0116	.0155	.0194	.0233	.0310	.1 x Dia	3 x Dia
Harder Woods Red Oak, Maple, Ash, Hickory, Black Walnut, Cherry, Beech	> 1200	400 - 2000	Slot - Rough	.0006	.0013	.0020	.0026	.0033	.0039	.0053	.0079	.0106	.0112	.0135	.0180	.0225	.0270	.0360	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0005	.0010	.0015	.0020	.0025	.0030	.0041	.0061	.0081	.0087	.0105	.0140	.0174	.0209	.0279	.1 x Dia	3 x Dia
Engineered Woods Medium Density Fiberboard (MDF), Particle Board, Laminated Board	Varies	400 - 2000	Slot - Rough	.0008	.0016	.0024	.0032	.0040	.0048	.0065	.0097	.0129	.0137	.0165	.0220	.0275	.0330	.0440	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0006	.0012	.0019	.0025	.0031	.0037	.0050	.0074	.0099	.0106	.0128	.0171	.0213	.0256	.0341	.1 x Dia	3 x Dia
Phenolic Wood	Varies	400 - 1200	Slot - Rough	.0003	.0006	.0009	.0012	.0015	.0017	.0024	.0035	.0047	.0050	.0060	.0080	.0100	.0120	.0160	1 x Dia	1 x Dia
		800 - 1600	Finishing	.0002	.0004	.0007	.0009	.0011	.0013	.0018	.0027	.0036	.0039	.0047	.0062	.0078	.0093	.0124	.1 x Dia	3 x Dia

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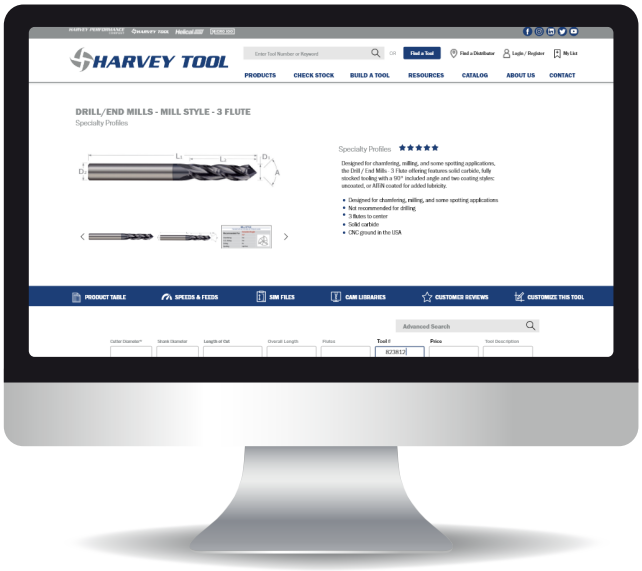

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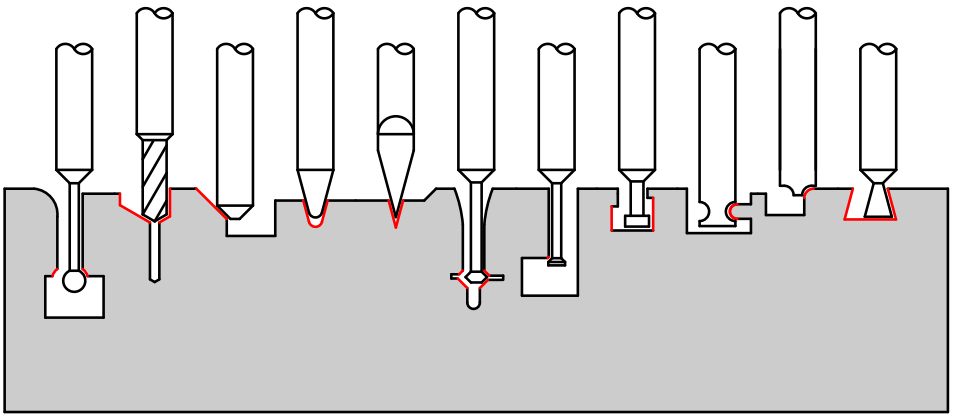
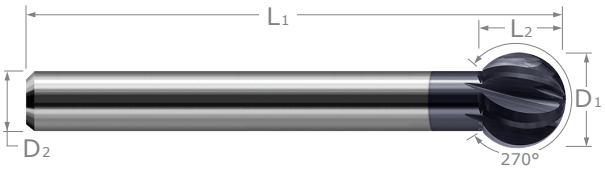


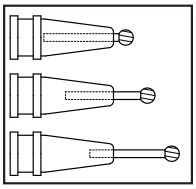
UNDERCUTTING END MILLS

270° Reduced Shank



- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

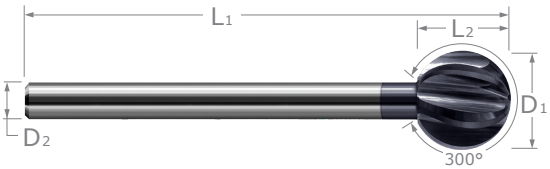
Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	PRICE	6 FL	PRICE
1/4	.217	6	4 mm	3-1/2	956116	227.40	956116-C3	235.30
5/16	.273	6	3/16	3-1/2	956120	231.80	956120-C3	239.70
3/8	.324	6	6 mm	3-1/2	956124	234.20	956124-C3	243.20
1/2	.432	6	5/16	4	956132	246.10	956132-C3	259.50
5/8	.546	6	3/8	4	956140	282.10	956140-C3	296.60
3/4	.645	6	1/2	5	956148	405.80	956148-C3	412.80
1	.873	6	5/8	5	956164	574.20	956164-C3	598.50

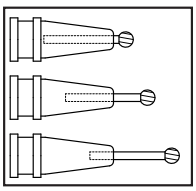
UNDERCUTTING END MILLS

300° Reduced Shank



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

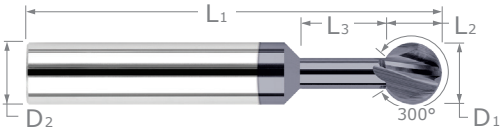
Chuck at Any Depth!



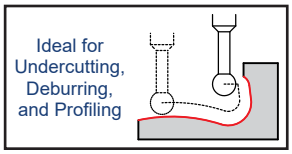
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	PRICE	6 FL	PRICE
1/4	.232	6	3 mm	3-1/2	947416	243.70	947416-C3	251.60
3/8	.355	6	4 mm	3-1/2	947424	249.60	947424-C3	258.60
1/2	.472	6	3/16	4	947432	261.40	947432-C3	274.80
5/8	.589	6	1/4	4	947440	297.30	947440-C3	311.80
3/4	.706	6	5/16	5	947448	421.10	947448-C3	436.60
1	.939	6	7/16	5	947464	588.60	947464-C3	612.90

UNDERCUTTING END MILLS

300°



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA



CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/32	.028	.010	**.031**	2	1/8	1-1/2	983931	64.70	983931-C3	69.30
1/32	.028	.010	**.062**	2	1/8	1-1/2	979131	64.70	979131-C3	69.30
.0394 (1 mm)	.036	.014	**.047**	2	1/8	1-1/2	98391M	64.70	98391M-C3	69.30
.0394 (1 mm)	.036	.014	**.078**	2	1/8	1-1/2	97911M	64.70	97911M-C3	69.30
3/64	.043	.018	**.062**	2	1/8	1-1/2	983947	64.70	983947-C3	69.30
3/64	.043	.018	**.093**	2	1/8	1-1/2	979147	64.70	979147-C3	69.30
3/64	.043	.018	**.125**	2	1/8	1-1/2	940047	64.70	940047-C3	69.30
1/16	.057	.024	**.031**	2	1/8	1-1/2	989562	45.90	989562-C3	50.50
1/16	.057	.024	**.062**	2	1/8	1-1/2	875762	45.90	875762-C3	50.50
1/16	.057	.024	**.078**	2	1/8	1-1/2	983962	45.90	983962-C3	50.50
1/16	.057	.024	**.125**	2	1/8	1-1/2	979162	45.90	979162-C3	50.50
1/16	.057	.024	**.187**	2	1/8	1-1/2	940062	45.90	940062-C3	50.50
5/64	.072	.031	**.047**	2	1/8	1-1/2	989578	45.90	989578-C3	50.50
5/64	.072	.031	**.093**	2	1/8	1-1/2	983978	45.90	983978-C3	50.50
5/64	.072	.031	**.156**	2	1/8	1-1/2	979178	45.90	979178-C3	50.50
5/64	.072	.031	**.218**	2	1/8	1-1/2	940078	45.90	940078-C3	50.50
3/32	.086	.038	**.062**	2	1/8	1-1/2	989593	45.90	989593-C3	50.50
3/32	.086	.038	**.093**	2	1/8	1-1/2	875793	45.90	875793-C3	50.50
3/32	.086	.038	**.125**	2	1/8	1-1/2	983993	45.90	983993-C3	50.50
3/32	.086	.038	**.156**	2	1/8	1-1/2	926893	45.90	926893-C3	50.50
3/32	.086	.038	**.218**	2	1/8	1-1/2	979193	45.90	979193-C3	50.50
3/32	.086	.038	**.281**	2	1/8	1-1/2	940093	45.90	940093-C3	50.50
7/64	.101	.047	**.156**	2	1/8	1-1/2	984007	46.50	984007-C3	51.10
7/64	.101	.047	**.250**	2	1/8	1-1/2	979207	46.50	979207-C3	51.10
.1181 (3 mm)	.110	.051	**.078**	2	1/8	1-1/2	98953M	45.90	98953M-C3	50.50
.1181 (3 mm)	.110	.051	**.156**	2	1/8	1-1/2	98393M	45.90	98393M-C3	50.50
.1181 (3 mm)	.110	.051	**.218**	2	1/8	1-1/2	92683M	45.90	92683M-C3	50.50
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.116	.053	**.047**	4	1/8	1-1/2	943608	34.10	943608-C3	38.70
1/8	.116	.053	**.093**	4	1/8	1-1/2	990608	37.50	990608-C3	42.10
1/8	.116	.053	**.125**	4	1/8	1-1/2	933008	40.30	933008-C3	44.90
1/8	.116	.053	**.156**	4	1/8	1-1/2	875808	43.80	875808-C3	48.40
1/8	.116	.053	**.187**	4	1/8	1-1/2	984008	43.80	984008-C3	48.40
1/8	.116	.053	**.250**	4	1/8	1-1/2	843208	48.80	843208-C3	53.40
1/8	.116	.053	**.281**	4	1/8	1-1/2	979208	48.80	979208-C3	53.40

continued on next page

NEW SIZES!

UNDERCUTTING END MILLS

300° (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/8	.116	.053	**.312**	4	1/8	1-1/2	794608	50.70	794608-C3	55.30	NEW
1/8	.116	.053	**.375**	4	1/8	1-1/2	940108	53.80	940108-C3	58.40	
1/8	.116	.053	**.500**	4	1/8	1-1/2	952308	57.70	952308-C3	62.30	
1/8	.116	.053	**.625**	4	1/8	2	911908	77.70	911908-C3	82.30	
1/8	.116	.053	**.750**	4	1/8	3	877908	80.20	877908-C3	84.80	
9/64	.130	.062	**.218**	4	3/16	2	984009	52.70	984009-C3	57.70	
9/64	.130	.062	**.312**	4	3/16	2	979209	58.90	979209-C3	63.90	
5/32	.145	.071	**.047**	4	3/16	2	943610	47.20	943610-C3	52.20	
5/32	.145	.071	**.125**	4	3/16	2	990610	47.20	990610-C3	52.20	
5/32	.145	.071	**.250**	4	3/16	2	984010	53.50	984010-C3	58.50	
5/32	.145	.071	**.375**	4	3/16	2	979210	61.90	979210-C3	66.90	
5/32	.145	.071	**.500**	4	3/16	2	940110	65.40	940110-C3	70.40	
5/32	.145	.071	**.625**	4	3/16	2	952310	66.70	952310-C3	71.70	
3/16	.174	.082	**.062**	4	3/16	2	943612	47.20	943612-C3	52.20	
3/16	.174	.082	**.125**	4	3/16	2	990612	47.20	990612-C3	52.20	
3/16	.174	.082	**.250**	4	3/16	2	984012	53.50	984012-C3	58.50	
3/16	.174	.082	**.312**	4	3/16	2	926912	57.70	926912-C3	62.70	
3/16	.174	.082	**.375**	4	3/16	2	843212	59.80	843212-C3	64.80	
3/16	.174	.082	**.437**	4	3/16	2	979212	61.90	979212-C3	66.90	
3/16	.174	.082	**.625**	4	3/16	2	940112	64.20	940112-C3	69.20	
3/16	.174	.082	**.750**	4	3/16	2	952312	67.30	952312-C3	72.30	
3/16	.174	.082	**.875**	4	3/16	2-1/2	834612	70.10	834612-C3	75.10	
3/16	.174	.082	**1.000**	4	3/16	2-1/2	911912	71.60	911912-C3	76.60	
.1969 (5 mm)	.182	.086	**.156**	4	1/4	2-1/2	99065M	65.30	99065M-C3	72.10	
.1969 (5 mm)	.182	.086	**.250**	4	1/4	2-1/2	98405M	68.40	98405M-C3	75.20	
7/32	.203	.098	**.156**	4	1/4	2-1/2	990614	65.30	990614-C3	72.10	
7/32	.203	.098	**.312**	4	1/4	2-1/2	984014	72.60	984014-C3	79.40	
.2362 (6 mm)	.220	.106	**.156**	4	1/4	2-1/2	99066M	64.50	99066M-C3	71.30	
.2362 (6 mm)	.220	.106	**.312**	4	1/4	2-1/2	98406M	72.60	98406M-C3	79.40	
.2362 (6 mm)	.220	.106	**.437**	4	1/4	2-1/2	92696M	75.10	92696M-C3	81.90	
.2362 (6 mm)	.220	.106	**.562**	4	1/4	2-1/2	97926M	79.10	97926M-C3	85.90	
1/4	.233	.112	**.093**	4	1/4	2-1/2	943616	63.30	943616-C3	70.10	
1/4	.233	.112	**.187**	4	1/4	2-1/2	990616	63.30	990616-C3	70.10	
1/4	.233	.112	**.250**	4	1/4	2-1/2	933016	66.70	933016-C3	73.50	
1/4	.233	.112	**.375**	4	1/4	2-1/2	984016	69.70	984016-C3	76.50	
1/4	.233	.112	**.500**	4	1/4	2-1/2	926916	76.90	926916-C3	83.70	
1/4	.233	.112	**.625**	4	1/4	2-1/2	979216	84.40	979216-C3	91.20	
1/4	.233	.112	**.750**	4	1/4	2-1/2	940116	89.90	940116-C3	96.70	
1/4	.233	.112	**1.000**	4	1/4	2-1/2	952316	96.40	952316-C3	103.20	
1/4	.233	.112	**1.250**	4	1/4	3	911916	104.10	911916-C3	110.90	
1/4	.233	.112	**1.500**	4	1/4	4	877916	111.70	877916-C3	119.60	
9/32	.262	.127	**.187**	4	5/16	2-1/2	990618	89.30	990618-C3	97.20	
9/32	.262	.127	**.375**	4	5/16	2-1/2	984018	104.80	984018-C3	112.70	

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	CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	5/16	.291	.143	**.250**	4	5/16	2-1/2	990620	86.40	990620-C3	94.30
	5/16	.291	.143	**.437**	4	5/16	2-1/2	984020	102.60	984020-C3	110.50
	5/16	.291	.143	**.750**	4	5/16	2-1/2	979220	115.30	979220-C3	123.20
	5/16	.291	.143	**1.000**	4	5/16	2-1/2	940120	128.30	940120-C3	136.20
	3/8	.349	.172	**.156**	4	3/8	2-1/2	943624	90.60	943624-C3	99.60
	3/8	.349	.172	**.250**	4	3/8	2-1/2	990624	92.10	990624-C3	101.10
	3/8	.349	.172	**.375**	4	3/8	2-1/2	933024	100.10	933024-C3	109.10
	3/8	.349	.172	**.500**	4	3/8	2-1/2	984024	108.20	984024-C3	117.20
	3/8	.349	.172	**.687**	4	3/8	2-1/2	926924	116.70	926924-C3	125.70
	3/8	.349	.172	**.750**	4	3/8	2-1/2	843224	120.00	843224-C3	129.00
	3/8	.349	.172	**1.000**	4	3/8	3	979224	125.60	979224-C3	134.60
	3/8	.349	.172	**1.250**	4	3/8	3	940124	131.50	940124-C3	140.50
	3/8	.349	.172	**1.500**	4	3/8	4	952324	152.60	952324-C3	164.90
	.3937 (10 mm)	.366	.181	**.312**	4	7/16	2-3/4	990625	113.60	990625-C3	124.80
	.3937 (10 mm)	.366	.181	**.562**	4	7/16	2-3/4	984025	135.20	984025-C3	146.40
	1/2	.466	.230	**.187**	4	1/2	3	943632	139.50	943632-C3	152.90
	1/2	.466	.230	**.312**	4	1/2	3	990632	140.50	990632-C3	153.90
	1/2	.466	.230	**.750**	4	1/2	3	984032	159.60	984032-C3	173.00
	1/2	.466	.230	**1.000**	4	1/2	3	926932	172.70	926932-C3	186.10
	1/2	.466	.230	**1.250**	4	1/2	4	979232	193.80	979232-C3	207.20
	1/2	.466	.230	**1.625**	4	1/2	4	940132	190.30	940132-C3	203.60
	1/2	.466	.230	**2.000**	4	1/2	4	952332	212.80	952332-C3	226.20
NEW	5/8	.583	.292	**1.625**	4	5/8	4	979240	242.60	979240-C3	257.10
	3/4	.699	.355	**2.000**	4	3/4	6	979248	306.10	979248-C3	327.10

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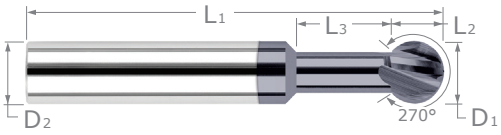
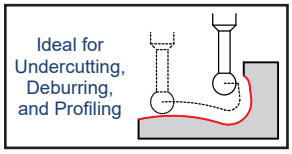
UNDERCUTTING END MILLS

270°



- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA



CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.0200	.017	.012	**.016**	2	1/8	1-1/2	974220	68.40	974220-C3	73.00	
.0200	.017	.012	**.031**	2	1/8	1-1/2	52820	68.40	52820-C3	73.00	
.0200	.017	.012	**.047**	2	1/8	1-1/2	23200	72.80	23200-C3	77.40	
.0200	.017	.012	**.062**	2	1/8	1-1/2	54620	75.10	54620-C3	79.70	
.0250	.021	.014	**.031**	2	1/8	1-1/2	974225	60.30	974225-C3	64.90	
.0250	.021	.014	**.047**	2	1/8	1-1/2	52825	60.30	52825-C3	64.90	
.0250	.021	.014	**.062**	2	1/8	1-1/2	23201	64.80	23201-C3	69.40	
.0250	.021	.014	**.078**	2	1/8	1-1/2	54625	67.10	54625-C3	71.70	
1/32	.027	.016	**.015**	2	1/8	1-1/2	931502	55.30	931502-C3	59.90	
1/32	.027	.016	**.031**	2	1/8	1-1/2	23102	55.30	23102-C3	59.90	
1/32	.027	.016	**.047**	2	1/8	1-1/2	974231	55.30	974231-C3	59.90	
1/32	.027	.016	**.062**	2	1/8	1-1/2	52831	55.30	52831-C3	59.90	
1/32	.027	.016	**.078**	2	1/8	1-1/2	39731	55.30	39731-C3	59.90	
1/32	.027	.016	**.093**	2	1/8	1-1/2	23202	56.80	23202-C3	61.40	
1/32	.027	.016	**.125**	2	1/8	1-1/2	54631	64.80	54631-C3	69.40	
1/32	.027	.016	**.187**	2	1/8	1-1/2	55202	64.80	55202-C3	69.40	
1/32	.027	.016	**.218**	2	1/8	1-1/2	867731	55.30	867731-C3	59.90	NEW
.0394 (1 mm)	.033	.024	**.047**	2	1/8	1-1/2	2311M	55.30	2311M-C3	59.90	
.0394 (1 mm)	.033	.024	**.062**	2	1/8	1-1/2	97421M	55.30	97421M-C3	59.90	
.0394 (1 mm)	.033	.024	**.078**	2	1/8	1-1/2	5281M	55.30	5281M-C3	59.90	
.0394 (1 mm)	.033	.024	**.093**	2	1/8	1-1/2	3971M	55.30	3971M-C3	59.90	
.0394 (1 mm)	.033	.024	**.125**	2	1/8	1-1/2	2321M	63.20	2321M-C3	67.80	
.0394 (1 mm)	.033	.024	**.187**	2	1/8	1-1/2	54639	64.80	54639-C3	69.40	
.0394 (1 mm)	.033	.024	**.250**	2	1/8	1-1/2	5521M	71.70	5521M-C3	76.30	
3/64	.040	.029	**.047**	2	1/8	1-1/2	23103	55.30	23103-C3	59.90	
3/64	.040	.029	**.062**	2	1/8	1-1/2	974247	55.30	974247-C3	59.90	
3/64	.040	.029	**.093**	2	1/8	1-1/2	52847	55.30	52847-C3	59.90	
3/64	.040	.029	**.125**	2	1/8	1-1/2	39703	55.30	39703-C3	59.90	
3/64	.040	.029	**.156**	2	1/8	1-1/2	23203	64.80	23203-C3	69.40	
3/64	.040	.029	**.187**	2	1/8	1-1/2	41303	64.80	41303-C3	69.40	NEW
3/64	.040	.029	**.250**	2	1/8	1-1/2	54647	64.80	54647-C3	69.40	
3/64	.040	.029	**.375**	2	1/8	1-1/2	55203	68.10	55203-C3	72.70	
3/64	.040	.029	**.437**	2	1/8	2	867747	74.90	867747-C3	79.50	
.0500	.042	.030	**.093**	2	1/8	1-1/2	52850	46.00	52850-C3	50.60	
.0500	.042	.030	**.125**	2	1/8	1-1/2	39750	46.00	39750-C3	50.60	
.0500	.042	.030	**.156**	2	1/8	1-1/2	23250	55.60	23250-C3	60.20	
1/16	.053	.037	**.031**	2	1/8	1-1/2	931504	36.80	931504-C3	41.40	
1/16	.053	.037	**.062**	2	1/8	1-1/2	23104	36.80	23104-C3	41.40	
1/16	.053	.037	**.093**	2	1/8	1-1/2	52862	36.80	52862-C3	41.40	
1/16	.053	.037	**.125**	2	1/8	1-1/2	39704	38.30	39704-C3	42.90	
1/16	.053	.037	**.156**	2	1/8	1-1/2	794362	38.30	794362-C3	42.90	NEW
1/16	.053	.037	**.187**	2	1/8	1-1/2	23204	38.30	23204-C3	42.90	

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NEW SIZES!

UNDERCUTTING END MILLS

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	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/16	.053	.037	**.250**	2	1/8	1-1/2	54662	47.40	54662-C3	52.00
	1/16	.053	.037	**.312**	2	1/8	1-1/2	909062	47.40	909062-C3	52.00
	1/16	.053	.037	**.375**	2	1/8	1-1/2	55204	47.40	55204-C3	52.00
	1/16	.053	.037	**.437**	2	1/8	2	867762	54.20	867762-C3	58.80
	5/64	.067	.045	**.031**	2	1/8	1-1/2	931505	37.50	931505-C3	42.10
	5/64	.067	.045	**.062**	2	1/8	1-1/2	23105	37.50	23105-C3	42.10
	5/64	.067	.045	**.125**	2	1/8	1-1/2	52878	37.50	52878-C3	42.10
	5/64	.067	.045	**.187**	2	1/8	1-1/2	39705	39.20	39705-C3	43.80
	5/64	.067	.045	**.250**	2	1/8	1-1/2	23205	40.20	23205-C3	44.80
NEW	5/64	.067	.045	**.312**	2	1/8	1-1/2	41305	40.20	41305-C3	44.80
	5/64	.067	.045	**.375**	2	1/8	2	54678	48.10	54678-C3	52.70
	5/64	.067	.045	**.500**	2	1/8	2	55205	48.10	55205-C3	52.70
	5/64	.067	.045	**.625**	2	1/8	2	867778	48.10	867778-C3	52.70
	3/32	.079	.054	**.031**	2	1/8	1-1/2	931506	37.50	931506-C3	42.10
	3/32	.079	.054	**.062**	2	1/8	1-1/2	23106	37.50	23106-C3	42.10
NEW	3/32	.079	.054	**.093**	2	1/8	1-1/2	789893	37.50	789893-C3	42.10
	3/32	.079	.054	**.125**	2	1/8	1-1/2	974293	37.50	974293-C3	42.10
	3/32	.079	.054	**.187**	2	1/8	1-1/2	905106	37.50	905106-C3	42.10
	3/32	.079	.054	**.250**	2	1/8	1-1/2	52893	37.50	52893-C3	42.10
	3/32	.079	.054	**.312**	2	1/8	1-1/2	39706	40.90	39706-C3	45.50
	3/32	.079	.054	**.375**	2	1/8	1-1/2	23206	40.90	23206-C3	45.50
	3/32	.079	.054	**.437**	2	1/8	2	41306	48.10	41306-C3	52.70
	3/32	.079	.054	**.500**	2	1/8	2	54693	48.10	54693-C3	52.70
	3/32	.079	.054	**.625**	2	1/8	2	55206	55.30	55206-C3	59.90
	7/64	.093	.064	**.187**	2	1/8	1-1/2	905107	36.80	905107-C3	41.40
	7/64	.093	.064	**.250**	2	1/8	1-1/2	52907	36.80	52907-C3	41.40
	7/64	.093	.064	**.375**	2	1/8	1-1/2	39707	40.20	39707-C3	44.80
	7/64	.093	.064	**.500**	2	1/8	2	23207	47.40	23207-C3	52.00
	7/64	.093	.064	**1.000**	2	1/8	3	29507	54.20	29507-C3	58.80
	.1181 (3 mm)	.100	.070	**.093**	2	1/8	1-1/2	2313M	36.80	2313M-C3	41.40
	.1181 (3 mm)	.100	.070	**.187**	2	1/8	1-1/2	90513M	36.80	90513M-C3	41.40
	.1181 (3 mm)	.100	.070	**.250**	2	1/8	1-1/2	5283M	36.80	5283M-C3	41.40
	.1181 (3 mm)	.100	.070	**.375**	2	1/8	1-1/2	3973M	40.20	3973M-C3	44.80
	.1181 (3 mm)	.100	.070	**.500**	2	1/8	2	2323M	47.40	2323M-C3	52.00

	D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/8	.107	.076	**.062**	4	1/8	1-1/2	931508	32.40	931508-C3	37.00
NEW	1/8	.107	.076	**.093**	4	1/8	1-1/2	787908	32.40	787908-C3	37.00
	1/8	.107	.076	**.125**	4	1/8	1-1/2	23108	32.40	23108-C3	37.00
	1/8	.107	.076	**.187**	4	1/8	1-1/2	974308	33.30	974308-C3	37.90
	1/8	.107	.076	**.250**	4	1/8	1-1/2	52908	34.30	52908-C3	38.90
	1/8	.107	.076	**.312**	4	1/8	1-1/2	828408	34.70	828408-C3	39.30
	1/8	.107	.076	**.375**	4	1/8	1-1/2	39708	35.00	39708-C3	39.60
	1/8	.107	.076	**.500**	4	1/8	1-1/2	23208	37.50	23208-C3	42.10
	1/8	.107	.076	**.625**	4	1/8	2	922908	40.00	922908-C3	44.60
	1/8	.107	.076	**.750**	4	1/8	2	41308	40.00	41308-C3	44.60
	1/8	.107	.076	**.875**	4	1/8	3	846608	41.80	846608-C3	46.40
	1/8	.107	.076	**1.000**	4	1/8	3	29508	43.50	29508-C3	48.10
	1/8	.107	.076	**1.250**	4	1/8	3	960608	46.50	960608-C3	51.10
	1/8	.107	.076	**1.500**	4	1/8	3	55208	49.60	55208-C3	54.20
	1/8	.107	.076	**1.750**	4	1/8	3	929608	52.10	929608-C3	56.70

continued on next page

NEW SIZES!

UNDERCUTTING END MILLS

270° (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
9/64	.119	.084	**.125**	4	3/16	2	23109	38.60	23109-C3	43.60	
9/64	.119	.084	**.250**	4	3/16	2	52909	41.90	52909-C3	46.90	
9/64	.119	.084	**.375**	4	3/16	2	39709	44.50	39709-C3	49.50	NEW
9/64	.119	.084	**.500**	4	3/16	2	23209	47.20	23209-C3	52.20	
9/64	.119	.084	**.750**	4	3/16	2	41309	50.60	41309-C3	55.60	
5/32	.133	.098	**.078**	4	3/16	2	931510	38.60	931510-C3	43.60	
5/32	.133	.098	**.125**	4	3/16	2	23110	38.60	23110-C3	43.60	
5/32	.133	.098	**.250**	4	3/16	2	52910	41.90	52910-C3	46.90	
5/32	.133	.098	**.375**	4	3/16	2	39710	44.00	39710-C3	49.00	
5/32	.133	.098	**.500**	4	3/16	2	23210	47.20	23210-C3	52.20	
5/32	.133	.098	**.750**	4	3/16	2	41310	50.60	41310-C3	55.60	
5/32	.133	.098	**1.000**	4	3/16	3	29510	54.70	29510-C3	59.70	
5/32	.133	.098	**1.500**	4	3/16	3	55210	57.00	55210-C3	62.00	
3/16	.160	.117	**.078**	4	3/16	2	931512	38.60	931512-C3	43.60	
3/16	.160	.117	**.093**	4	3/16	2	787912	38.60	787912-C3	43.60	NEW
3/16	.160	.117	**.125**	4	3/16	2	23112	38.60	23112-C3	43.60	
3/16	.160	.117	**.187**	4	3/16	2	974312	41.90	974312-C3	46.90	NEW
3/16	.160	.117	**.250**	4	3/16	2	52912	41.90	52912-C3	46.90	
3/16	.160	.117	**.375**	4	3/16	2	39712	44.00	39712-C3	49.00	
3/16	.160	.117	**.500**	4	3/16	2	23212	45.70	23212-C3	50.70	
3/16	.160	.117	**.625**	4	3/16	2	922912	48.20	922912-C3	53.20	
3/16	.160	.117	**.750**	4	3/16	2	41312	50.60	41312-C3	55.60	
3/16	.160	.117	**.875**	4	3/16	3	846612	52.70	846612-C3	57.70	
3/16	.160	.117	**1.000**	4	3/16	3	29512	54.70	29512-C3	59.70	
3/16	.160	.117	**1.250**	4	3/16	3	960612	56.90	960612-C3	61.90	
3/16	.160	.117	**1.500**	4	3/16	3	55212	59.00	55212-C3	64.00	
3/16	.160	.117	**1.750**	4	3/16	3	929612	69.70	929612-C3	74.70	
.1969 (5 mm)	.167	.119	**.250**	4	1/4	2-1/2	5295M	54.00	5295M-C3	60.80	
.1969 (5 mm)	.167	.119	**.500**	4	1/4	2-1/2	2325M	55.30	2325M-C3	62.10	
.1969 (5 mm)	.167	.119	**1.000**	4	1/4	4	2955M	62.80	2955M-C3	70.70	
7/32	.186	.138	**.250**	4	1/4	2-1/2	52914	58.00	52914-C3	64.80	
7/32	.186	.138	**.500**	4	1/4	2-1/2	23214	60.30	23214-C3	67.10	
7/32	.186	.138	**.750**	4	1/4	2-1/2	41314	63.00	41314-C3	69.80	
.2362 (6 mm)	.201	.148	**.250**	4	1/4	2-1/2	97436M	53.60	97436M-C3	60.40	
.2362 (6 mm)	.201	.148	**.375**	4	1/4	2-1/2	5296M	53.60	5296M-C3	60.40	
.2362 (6 mm)	.201	.148	**.500**	4	1/4	2-1/2	3976M	56.40	3976M-C3	63.20	
.2362 (6 mm)	.201	.148	**.750**	4	1/4	2-1/2	2326M	59.90	2326M-C3	66.70	
.2362 (6 mm)	.201	.148	**1.250**	4	1/4	4	2956M	68.10	2956M-C3	76.00	
.2362 (6 mm)	.201	.148	**2.000**	4	1/4	4	96066M	79.50	96066M-C3	87.40	
1/4	.213	.158	**.078**	4	1/4	2-1/2	931516	51.50	931516-C3	58.30	
1/4	.213	.158	**.125**	4	1/4	2-1/2	23116	51.50	23116-C3	58.30	
1/4	.213	.158	**.187**	4	1/4	2-1/2	789916	51.50	789916-C3	58.30	NEW
1/4	.213	.158	**.250**	4	1/4	2-1/2	974316	54.00	974316-C3	60.80	
1/4	.213	.158	**.312**	4	1/4	2-1/2	905116	54.00	905116-C3	60.80	NEW
1/4	.213	.158	**.375**	4	1/4	2-1/2	52916	54.70	52916-C3	61.50	
1/4	.213	.158	**.500**	4	1/4	2-1/2	39716	56.40	39716-C3	63.20	
1/4	.213	.158	**.625**	4	1/4	2-1/2	927616	56.90	927616-C3	63.70	
1/4	.213	.158	**.750**	4	1/4	2-1/2	23216	59.90	23216-C3	66.70	
1/4	.213	.158	**.875**	4	1/4	2-1/2	786916	59.90	786916-C3	66.70	NEW
1/4	.213	.158	**1.000**	4	1/4	2-1/2	922916	60.70	922916-C3	67.50	

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UNDERCUTTING END MILLS

270° (cont.)

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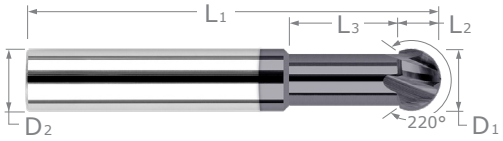
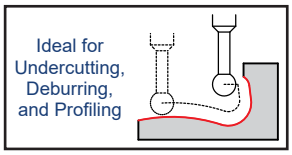
CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/4	.213	.158	**1.125**	4	1/4	2-1/2	41316	62.40	41316-C3	69.20
1/4	.213	.158	**1.250**	4	1/4	4	846616	67.00	846616-C3	74.90
1/4	.213	.158	**1.500**	4	1/4	4	29516	69.30	29516-C3	77.20
1/4	.213	.158	**2.000**	4	1/4	4	960616	73.60	960616-C3	81.50
1/4	.213	.158	**2.250**	4	1/4	4	55216	78.00	55216-C3	85.90
1/4	.213	.158	**2.500**	4	1/4	4	929616	102.70	929616-C3	110.60
9/32	.240	.180	**.375**	4	5/16	2-1/2	52918	72.80	52918-C3	80.70
9/32	.240	.180	**.750**	4	5/16	2-1/2	23218	74.90	23218-C3	82.80
5/16	.266	.201	**.187**	4	5/16	2-1/2	23120	68.90	23120-C3	76.80
5/16	.266	.201	**.375**	4	5/16	2-1/2	52920	71.70	52920-C3	79.60
5/16	.266	.201	**.500**	4	5/16	2-1/2	39720	73.40	39720-C3	81.30
5/16	.266	.201	**.750**	4	5/16	2-1/2	23220	77.30	23220-C3	85.20
5/16	.266	.201	**1.125**	4	5/16	4	41320	87.70	41320-C3	97.20
5/16	.266	.201	**1.500**	4	5/16	4	29520	93.80	29520-C3	103.30
5/16	.266	.201	**2.000**	4	5/16	4	960620	99.50	960620-C3	109.00
5/16	.266	.201	**2.250**	4	5/16	4	55220	101.10	55220-C3	110.60
5/16	.266	.201	**2.500**	4	5/16	4	929620	101.10	929620-C3	110.60
3/8	.320	.241	**.093**	4	3/8	2-1/2	931524	74.30	931524-C3	83.30
3/8	.320	.241	**.187**	4	3/8	2-1/2	23124	74.30	23124-C3	83.30
3/8	.320	.241	**.375**	4	3/8	2-1/2	52924	76.10	52924-C3	85.10
3/8	.320	.241	**.500**	4	3/8	2-1/2	39724	76.10	39724-C3	85.10
3/8	.320	.241	**.750**	4	3/8	2-1/2	23224	77.30	23224-C3	86.30
3/8	.320	.241	**1.125**	4	3/8	4	41324	95.70	41324-C3	108.00
3/8	.320	.241	**1.500**	4	3/8	4	29524	98.30	29524-C3	110.60
3/8	.320	.241	**2.000**	4	3/8	4	960624	101.80	960624-C3	114.10
3/8	.320	.241	**2.250**	4	3/8	4	55224	104.50	55224-C3	116.80
3/8	.320	.241	**2.500**	4	3/8	4	929624	108.80	929624-C3	121.10
.3937 (10 mm)	.335	.252	**.375**	4	7/16	2-3/4	52925	107.50	52925-C3	118.70
.3937 (10 mm)	.335	.252	**.750**	4	7/16	2-3/4	23225	107.90	23225-C3	119.10
7/16	.373	.285	**.500**	4	7/16	2-3/4	52928	104.30	52928-C3	115.50
7/16	.373	.285	**1.000**	4	7/16	2-3/4	23228	107.90	23228-C3	119.10
.4724 (12 mm)	.403	.308	**.500**	4	1/2	3	52931	135.80	52931-C3	149.20
.4724 (12 mm)	.403	.308	**1.000**	4	1/2	3	23231	143.50	23231-C3	156.90
1/2	.427	.323	**.187**	4	1/2	3	23132	105.70	23132-C3	119.10
1/2	.427	.323	**.500**	4	1/2	3	52932	107.70	52932-C3	121.10
1/2	.427	.323	**.750**	4	1/2	3	39732	109.50	39732-C3	122.90
1/2	.427	.323	**1.000**	4	1/2	3	23232	111.20	23232-C3	124.60
1/2	.427	.323	**1.500**	4	1/2	6	41332	187.50	41332-C3	200.90
1/2	.427	.323	**2.000**	4	1/2	6	29532	191.80	29532-C3	205.20
1/2	.427	.323	**2.500**	4	1/2	6	960632	193.80	960632-C3	207.20
1/2	.427	.323	**3.000**	4	1/2	6	55232	204.90	55232-C3	218.30
1/2	.427	.323	**3.500**	4	1/2	6	929632	215.90	929632-C3	229.30
5/8	.533	.412	**1.000**	4	5/8	3-1/2	39740	223.40	39740-C3	236.80
5/8	.533	.412	**1.500**	4	5/8	3-1/2	23240	223.40	23240-C3	236.80
3/4	.640	.500	**1.500**	4	3/4	4	23248	307.60	23248-C3	322.10

NEW SIZES!

UNDERCUTTING END MILLS

220°





Stocked in Multiple Reach Lengths

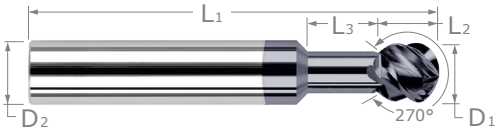
- 220° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/32	.021	.023	**.093**	2	1/8	1-1/2	22802	55.90	22802-C3	60.50	
.0394 (1 mm)	.026	.030	**.093**	2	1/8	1-1/2	785839	55.90	785839-C3	60.50	NEW
.0394 (1 mm)	.026	.030	**.125**	2	1/8	1-1/2	2281M	62.40	2281M-C3	67.00	
3/64	.031	.035	**.156**	2	1/8	1-1/2	22803	55.90	22803-C3	60.50	
1/16	.042	.047	**.062**	2	1/8	1-1/2	22704	38.00	22704-C3	42.60	
1/16	.042	.047	**.125**	2	1/8	1-1/2	785862	39.70	785862-C3	44.30	NEW
1/16	.042	.047	**.187**	2	1/8	1-1/2	22804	39.70	22804-C3	44.30	
1/16	.042	.047	**.250**	2	1/8	1-1/2	22904	39.70	22904-C3	44.30	NEW
5/64	.052	.059	**.062**	2	1/8	1-1/2	22705	38.00	22705-C3	42.60	
5/64	.052	.059	**.250**	2	1/8	1-1/2	22805	39.70	22805-C3	44.30	
3/32	.063	.070	**.062**	2	1/8	1-1/2	22706	38.00	22706-C3	42.60	
3/32	.063	.070	**.375**	2	1/8	1-1/2	22806	40.20	22806-C3	44.80	
.1181 (3 mm)	.079	.090	**.500**	2	1/8	2	2283M	40.90	2283M-C3	45.50	

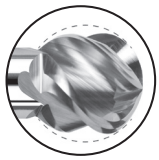
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/8	.084	.094	**.125**	4	1/8	1-1/2	22708	32.80	22708-C3	37.40	
1/8	.084	.094	**.250**	4	1/8	1-1/2	826708	34.30	826708-C3	38.90	
1/8	.084	.094	**.500**	4	1/8	1-1/2	22808	37.00	22808-C3	41.60	
1/8	.084	.094	**.750**	4	1/8	2	833808	39.90	833808-C3	44.50	NEW
1/8	.084	.094	**1.000**	4	1/8	3	22908	42.70	22908-C3	47.30	
1/8	.084	.094	**1.500**	4	1/8	3	971608	52.10	971608-C3	56.70	
5/32	.105	.125	**.500**	4	3/16	2	22810	46.30	22810-C3	51.30	
3/16	.126	.141	**.125**	4	3/16	2	22712	39.00	22712-C3	44.00	
3/16	.126	.141	**.250**	4	3/16	2	826712	41.40	826712-C3	46.40	
3/16	.126	.141	**.500**	4	3/16	2	22812	46.30	22812-C3	51.30	
3/16	.126	.141	**.750**	4	3/16	2	833812	49.90	833812-C3	54.90	NEW
3/16	.126	.141	**1.000**	4	3/16	3	22912	53.60	22912-C3	58.60	
.2362 (6 mm)	.158	.172	**.750**	4	1/4	2-1/2	2286M	58.60	2286M-C3	65.40	
1/4	.168	.188	**.125**	4	1/4	2-1/2	22716	52.30	22716-C3	59.10	
1/4	.168	.188	**.375**	4	1/4	2-1/2	826716	54.30	826716-C3	61.10	
1/4	.168	.188	**.750**	4	1/4	2-1/2	22816	58.60	22816-C3	65.40	
1/4	.168	.188	**1.000**	4	1/4	2-1/2	833816	61.80	833816-C3	68.60	
1/4	.168	.188	**1.500**	4	1/4	4	22916	68.10	22916-C3	76.00	
1/4	.168	.188	**2.250**	4	1/4	4	971616	88.90	971616-C3	96.80	
5/16	.210	.235	**.187**	4	5/16	2-1/2	22720	69.70	22720-C3	77.60	
5/16	.210	.235	**.750**	4	5/16	2-1/2	22820	76.10	22820-C3	84.00	
5/16	.210	.235	**1.500**	4	5/16	4	22920	91.90	22920-C3	101.40	
3/8	.252	.281	**.187**	4	3/8	2-1/2	22724	74.90	22724-C3	83.90	
3/8	.252	.281	**.750**	4	3/8	2-1/2	22824	79.80	22824-C3	88.80	
3/8	.252	.281	**1.500**	4	3/8	4	22924	96.50	22924-C3	108.80	
3/8	.252	.281	**2.250**	4	3/8	4	971624	133.90	971624-C3	146.20	
1/2	.336	.375	**.187**	4	1/2	3	22732	107.10	22732-C3	120.50	
1/2	.336	.375	**1.000**	4	1/2	3	22832	114.90	22832-C3	128.30	
1/2	.336	.375	**2.000**	4	1/2	6	22932	188.50	22932-C3	201.90	

UNDERCUTTING END MILLS

270° High Helix



High Helix for Improved Performance!



270° Spherical Ball

- 45° helix for faster chip removal and better finish
- 270° spherical ball
- Center cutting
- Designed for undercutting, deburring, and multi-axis machining
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	.027	.016	**.062**	2	1/8	1-1/2	951131	62.60	951131-C3	67.20		
1/32	.027	.016	**.093**	2	1/8	1-1/2	966531	62.60	966531-C3	67.20		
.0394 (1 mm)	.033	.024	**.078**	2	1/8	1-1/2	95111M	62.60	95111M-C3	67.20		
.0394 (1 mm)	.033	.024	**.125**	2	1/8	1-1/2	96651M	62.60	96651M-C3	67.20		
3/64	.040	.029	**.093**	2	1/8	1-1/2	951147	62.60	951147-C3	67.20		
3/64	.040	.029	**.156**	2	1/8	1-1/2	966547	62.60	966547-C3	67.20		
1/16	.053	.037	**.093**	2	1/8	1-1/2	951162	45.30	951162-C3	49.90	951162-C8	52.10
1/16	.053	.037	**.187**	2	1/8	1-1/2	966562	46.80	966562-C3	51.40	966562-C8	53.60
1/16	.053	.037	**.250**	2	1/8	1-1/2	970462	57.20	970462-C3	61.80	970462-C8	64.00
5/64	.067	.045	**.125**	2	1/8	1-1/2	951178	45.30	951178-C3	49.90	951178-C8	52.10
5/64	.067	.045	**.250**	2	1/8	1-1/2	966578	46.80	966578-C3	51.40	966578-C8	53.60
5/64	.067	.045	**.375**	2	1/8	2	970478	57.20	970478-C3	61.80	970478-C8	64.00
3/32	.079	.054	**.125**	2	1/8	1-1/2	837393	43.30	837393-C3	47.90	837393-C8	50.10
3/32	.079	.054	**.250**	2	1/8	1-1/2	951193	45.30	951193-C3	49.90	951193-C8	52.10
3/32	.079	.054	**.375**	2	1/8	1-1/2	966593	49.60	966593-C3	54.20	966593-C8	56.40
3/32	.079	.054	**.500**	2	1/8	2	970493	57.20	970493-C3	61.80	970493-C8	64.00
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	.107	.076	**.125**	4	1/8	1-1/2	934108	39.70	934108-C3	44.30	934108-C8	46.50
1/8	.107	.076	**.187**	4	1/8	1-1/2	808608	40.50	808608-C3	45.10	808608-C8	47.30
1/8	.107	.076	**.250**	4	1/8	1-1/2	951208	41.40	951208-C3	46.00	951208-C8	48.20
1/8	.107	.076	**.375**	4	1/8	1-1/2	863708	43.40	863708-C3	48.00	863708-C8	50.20
1/8	.107	.076	**.500**	4	1/8	1-1/2	994708	45.30	994708-C3	49.90	994708-C8	52.10
1/8	.107	.076	**1.000**	4	1/8	3	997108	51.30	997108-C3	55.90	997108-C8	58.10
1/8	.107	.076	**1.500**	4	1/8	3	928808	54.70	928808-C3	59.30	928808-C8	61.50
5/32	.133	.098	**.250**	4	3/16	2	951210	53.60	951210-C3	58.60	951210-C8	60.40
5/32	.133	.098	**.500**	4	3/16	2	994710	57.70	994710-C3	62.70	994710-C8	64.50
5/32	.133	.098	**1.000**	4	3/16	3	997110	65.90	997110-C3	70.90	997110-C8	72.70
3/16	.160	.117	**.125**	4	3/16	2	934112	49.60	934112-C3	54.60	934112-C8	56.40
3/16	.160	.117	**.250**	4	3/16	2	951212	51.00	951212-C3	56.00	951212-C8	57.80
3/16	.160	.117	**.500**	4	3/16	2	994712	55.10	994712-C3	60.10	994712-C8	61.90
3/16	.160	.117	**.750**	4	3/16	2	897712	57.70	897712-C3	62.70	897712-C8	64.50
3/16	.160	.117	**1.000**	4	3/16	3	997112	65.90	997112-C3	70.90	997112-C8	72.70
3/16	.160	.117	**1.250**	4	3/16	3	893512	69.30	893512-C3	74.30	893512-C8	76.10

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UNDERCUTTING END MILLS

270° High Helix (cont.)

continued from previous page

CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/4	.213	.158	**.125**	4	1/4	2-1/2	934116	70.90	934116-C3	77.70	934116-C8	78.20
1/4	.213	.158	**.250**	4	1/4	2-1/2	808616	72.50	808616-C3	79.30	808616-C8	79.80
1/4	.213	.158	**.375**	4	1/4	2-1/2	951216	74.20	951216-C3	81.00	951216-C8	81.50
1/4	.213	.158	**.500**	4	1/4	2-1/2	863716	76.60	863716-C3	83.40	863716-C8	83.90
1/4	.213	.158	**.750**	4	1/4	2-1/2	994716	81.30	994716-C3	88.10	994716-C8	88.60
1/4	.213	.158	**1.000**	4	1/4	2-1/2	808516	82.50	808516-C3	89.30	808516-C8	89.80
1/4	.213	.158	**1.125**	4	1/4	2-1/2	897716	83.60	897716-C3	90.40	897716-C8	90.90
1/4	.213	.158	**1.500**	4	1/4	4	997116	89.50	997116-C3	97.40	997116-C8	97.70
1/4	.213	.158	**2.250**	4	1/4	4	928816	99.00	928816-C3	106.90	928816-C8	107.20
5/16	.266	.201	**.750**	4	5/16	2-1/2	994720	94.50	994720-C3	102.40	994720-C8	110.00
5/16	.266	.201	**1.500**	4	5/16	4	997120	112.20	997120-C3	121.70	997120-C8	131.00
3/8	.320	.241	**.375**	4	3/8	2-1/2	951224	106.00	951224-C3	115.00	951224-C8	124.80
3/8	.320	.241	**.750**	4	3/8	2-1/2	994724	107.20	994724-C3	116.20	994724-C8	126.00
3/8	.320	.241	**1.125**	4	3/8	4	897724	115.10	897724-C3	127.40	897724-C8	137.20
3/8	.320	.241	**1.500**	4	3/8	4	997124	118.10	997124-C3	130.40	997124-C8	140.20
1/2	.427	.323	**.500**	4	1/2	3	951232	151.30	951232-C3	164.70	951232-C8	173.40
1/2	.427	.323	**1.000**	4	1/2	3	994732	155.10	994732-C3	168.50	994732-C8	177.20
1/2	.427	.323	**1.500**	4	1/2	6	897732	223.20	897732-C3	236.60	897732-C8	262.80
1/2	.427	.323	**2.000**	4	1/2	6	997132	229.10	997132-C3	242.50	997132-C8	268.70
1/2	.427	.323	**3.000**	4	1/2	6	928832	255.50	928832-C3	268.90	928832-C8	295.10

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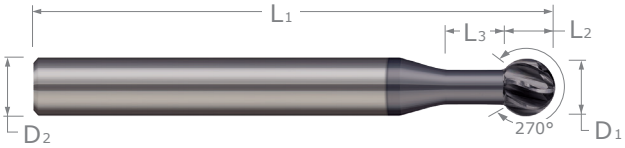
UNDERCUTTING END MILLS

270° for Hardened Steels



- Optimized for hardened steels 45-68 Rc
- Increased flute count for added strength and tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Reach Lengths

CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
1/32	.027	.016	**.062**	4	1/8	1-1/2	823231-C6	62.90
1/32	.027	.016	**.078**	4	1/8	1-1/2	819831-C6	62.90
3/64	.040	.029	**.093**	4	1/8	1-1/2	823247-C6	62.90
3/64	.040	.029	**.125**	4	1/8	1-1/2	819847-C6	62.90
1/16	.053	.037	**.062**	4	1/8	1-1/2	831562-C6	43.40
1/16	.053	.037	**.093**	4	1/8	1-1/2	823262-C6	43.40
1/16	.053	.037	**.125**	4	1/8	1-1/2	819862-C6	45.10
5/64	.067	.045	**.125**	4	1/8	1-1/2	823278-C6	44.20
5/64	.067	.045	**.187**	4	1/8	1-1/2	819878-C6	45.90
3/32	.080	.054	**.062**	4	1/8	1-1/2	831593-C6	44.20
3/32	.080	.054	**.250**	4	1/8	1-1/2	823293-C6	44.20
3/32	.080	.054	**.312**	4	1/8	1-1/2	819893-C6	47.80
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
1/8	.107	.076	**.125**	6	1/8	1-1/2	831608-C6	38.80
1/8	.107	.076	**.250**	6	1/8	1-1/2	823308-C6	40.80
1/8	.107	.076	**.375**	6	1/8	1-1/2	819908-C6	41.60
3/16	.160	.117	**.125**	6	3/16	2	831612-C6	45.80
3/16	.160	.117	**.250**	6	3/16	2	823312-C6	49.20
3/16	.160	.117	**.375**	6	3/16	2	819912-C6	51.50
1/4	.213	.158	**.125**	6	1/4	2-1/2	831616-C6	61.30
1/4	.213	.158	**.375**	6	1/4	2-1/2	823316-C6	64.60
1/4	.213	.158	**.500**	6	1/4	2-1/2	819916-C6	66.40
3/8	.320	.241	**.375**	8	3/8	2-1/2	823324-C6	89.40
3/8	.320	.241	**.500**	8	3/8	2-1/2	819924-C6	89.40
1/2	.427	.323	**.500**	8	1/2	3	823332-C6	127.10
1/2	.427	.323	**.750**	8	1/2	3	819932-C6	129.00

NEW SIZE!

UNDERCUTTING END MILLS

270° Deburring Undercut

High Number of Flutes

- 270° spherical ball is ideal for deburring complex shapes and multi-axis machining
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling-type cutters
- Double cut style flute pattern
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Reach Lengths

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		
D_1	L_2 $^{+.010''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.031 (1/32)	.026	.014	**.031**	12	10	1/8	1-1/2	899631	64.80	899631-C3	69.40	
.031 (1/32)	.026	.014	**.062**	12	10	1/8	1-1/2	980531	64.80	980531-C3	69.40	
.031 (1/32)	.026	.014	**.093**	12	10	1/8	1-1/2	926431	66.80	926431-C3	71.40	
.031 (1/32)	.026	.014	**.125**	12	10	1/8	1-1/2	883231	69.00	883231-C3	73.60	
.039 (1 mm)	.033	.019	**.047**	12	10	1/8	1-1/2	89961M	64.80	89961M-C3	69.40	
.039 (1 mm)	.033	.019	**.125**	12	10	1/8	1/1/2	92641M	69.00	92641M-C3	73.60	
.047 (3/64)	.040	.024	**.093**	12	10	1/8	1-1/2	980547	64.80	980547-C3	69.40	
.047 (3/64)	.040	.024	**.125**	12	10	1/8	1-1/2	890847	66.80	890847-C3	71.40	
.047 (3/64)	.040	.024	**.156**	12	10	1/8	1-1/2	926447	66.80	926447-C3	71.40	
.047 (3/64)	.040	.024	**.250**	12	10	1/8	1-1/2	883247	69.00	883247-C3	73.60	
.062 (1/16)	.053	.032	**.062**	15	12	1/8	1-1/2	899662	48.70	899662-C3	53.30	
.062 (1/16)	.053	.032	**.093**	15	12	1/8	1-1/2	980562	48.70	980562-C3	53.30	
.062 (1/16)	.053	.032	**.125**	15	12	1/8	1-1/2	890862	50.30	890862-C3	54.90	
.062 (1/16)	.053	.032	**.187**	15	12	1/8	1-1/2	926462	50.30	926462-C3	54.90	
.062 (1/16)	.053	.032	**.250**	15	12	1/8	1-1/2	883262	52.10	883262-C3	56.70	
.062 (1/16)	.053	.032	**.312**	15	12	1/8	1-1/2	808362	52.10	808362-C3	56.70	
.078 (5/64)	.067	.035	**.062**	15	12	1/8	1-1/2	899678	48.70	899678-C3	53.30	
.078 (5/64)	.067	.035	**.125**	15	12	1/8	1-1/2	980578	48.70	980578-C3	53.30	
.078 (5/64)	.067	.035	**.250**	15	12	1/8	1-1/2	926478	50.30	926478-C3	54.90	
.078 (5/64)	.067	.035	**.375**	15	12	1/8	2	883278	51.10	883278-C3	55.70	
.093 (3/32)	.079	.038	**.062**	15	12	1/8	1-1/2	899693	51.70	899693-C3	56.30	
.093 (3/32)	.079	.038	**.125**	15	12	1/8	1-1/2	895393	51.70	895393-C3	56.30	
.093 (3/32)	.079	.038	**.187**	15	12	1/8	1-1/2	809693	51.70	809693-C3	56.30	
.093 (3/32)	.079	.038	**.250**	15	12	1/8	1-1/2	980593	51.70	980593-C3	56.30	
.093 (3/32)	.079	.038	**.312**	15	12	1/8	1-1/2	890893	53.10	890893-C3	57.70	NEW
.093 (3/32)	.079	.038	**.375**	15	12	1/8	1-1/2	926493	53.10	926493-C3	57.70	
.093 (3/32)	.079	.038	**.500**	15	12	1/8	2	883293	58.80	883293-C3	63.40	
.118 (3 mm)	.101	.056	**.250**	15	12	1/8	1-1/2	98053M	53.90	98053M-C3	58.50	
.118 (3 mm)	.101	.056	**.500**	15	12	1/8	2	92643M	57.20	92643M-C3	61.80	

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UNDERCUTTING END MILLS

270° Deburring Undercut (cont.)

continued from previous page

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.107	.059	**.125**	16	13	1/8	1-1/2	899708	49.90	899708-C3	54.50
.125 (1/8)	.107	.059	**.187**	16	13	1/8	1-1/2	809908	50.00	809908-C3	54.60
.125 (1/8)	.107	.059	**.250**	16	13	1/8	1-1/2	980608	51.70	980608-C3	56.30
.125 (1/8)	.107	.059	**.375**	16	13	1/8	1-1/2	890908	52.50	890908-C3	57.10
.125 (1/8)	.107	.059	**.500**	16	13	1/8	2	926508	53.60	926508-C3	58.20
.125 (1/8)	.107	.059	**.750**	16	13	1/8	2	886108	56.10	886108-C3	60.70
.125 (1/8)	.107	.059	**1.000**	16	13	1/8	3	883308	59.40	883308-C3	64.00
.187 (3/16)	.160	.097	**.125**	16	13	3/16	2	899712	53.10	899712-C3	58.10
.187 (3/16)	.160	.097	**.250**	16	13	3/16	2	980612	56.10	980612-C3	61.10
.187 (3/16)	.160	.097	**.375**	16	13	3/16	2	890912	58.00	890912-C3	63.00
.187 (3/16)	.160	.097	**.500**	16	13	3/16	2	926512	61.00	926512-C3	66.00
.187 (3/16)	.160	.097	**.750**	16	13	3/16	2	886112	65.90	886112-C3	70.90
.187 (3/16)	.160	.097	**1.000**	16	13	3/16	3	883312	69.30	883312-C3	74.30
.250 (1/4)	.213	.136	**.125**	16	13	1/4	2-1/2	899716	66.40	899716-C3	73.20
.250 (1/4)	.213	.136	**.375**	16	13	1/4	2-1/2	980616	67.10	980616-C3	73.90
.250 (1/4)	.213	.136	**.500**	16	13	1/4	2-1/2	890916	68.90	890916-C3	75.70
.250 (1/4)	.213	.136	**.750**	16	13	1/4	2-1/2	926516	72.10	926516-C3	78.90
.250 (1/4)	.213	.136	**1.125**	16	13	1/4	2-1/2	886116	74.40	886116-C3	81.20

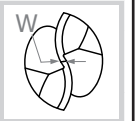
Undercutting End Mills: Well Rounded Tools That Offer Maximum Versatlity

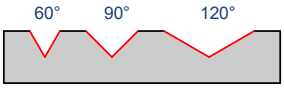
The versatility that Undercutting End Mills provide for your shop cannot be overstated. Learn how this one tool can perform several different machining operations in our "In the Loupe" blog post **Undercutting End Mills: Well-Rounded Tools That Offer Maximum Versatility**.

Read more on harveyperformance.com/in-the-loupe/

DRILL / END MILLS

Helical Tip – 2 Flute

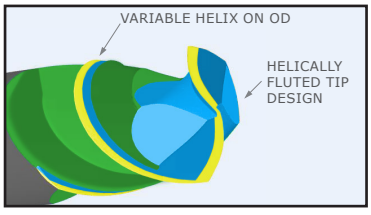
HELICAL TIP		
Recommended For		
Chamfering	Yes	
O.D. Milling	Yes	
Drilling	No	
Spotting	Light Duty	



Stocked in *Three* Included Angles!

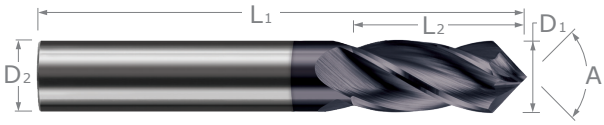
- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 2 flutes
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials.
- TiB_2 coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum.
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

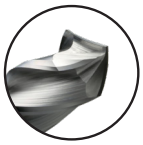
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
60°	1/32	3/32	.003	1/8	1-1/2	872502-C6	47.90	872502-C8	46.10
	1/16	3/16	.005	1/8	1-1/2	872504-C6	47.90	872504-C8	46.10
	1/8	1/2	.008	1/8	1-1/2	872508-C6	47.90	872508-C8	47.90
	3/16	5/8	.009	3/16	2	872512-C6	52.90	872512-C8	52.90
	1/4	3/4	.009	1/4	2-1/2	872516-C6	67.30	872516-C8	67.30
	3/8	7/8	.012	3/8	2-1/2	872524-C6	83.20	872524-C8	83.20
	1/2	1	.012	1/2	3	872532-C6	106.30	872532-C8	106.30
90°	1/32	3/32	.003	1/8	1-1/2	859602-C6	43.50	859602-C8	41.90
	1/16	3/16	.005	1/8	1-1/2	859604-C6	43.50	859604-C8	41.90
	5/64	1/4	.006	1/8	1-1/2	859605-C6	45.60	859605-C8	43.90
	3/32	3/8	.007	1/8	1-1/2	859606-C6	45.60	859606-C8	43.90
	1/8	1/2	.008	1/8	1-1/2	859608-C6	47.90	859608-C8	47.90
	3/16	5/8	.009	3/16	2	859612-C6	52.90	859612-C8	52.90
	1/4	3/4	.009	1/4	2-1/2	859616-C6	67.30	859616-C8	67.30
	3/8	7/8	.012	3/8	2-1/2	859624-C6	83.20	859624-C8	83.20
	1/2	1	.012	1/2	3	859632-C6	106.30	859632-C8	106.30
120°	1/8	1/2	.008	1/8	1-1/2	847708-C6	47.90	847708-C8	47.90
	3/16	5/8	.009	3/16	2	847712-C6	52.90	847712-C8	52.90
	1/4	3/4	.009	1/4	2-1/2	847716-C6	67.30	847716-C8	67.30
	3/8	7/8	.012	3/8	2-1/2	847724-C6	83.20	847724-C8	83.20
	1/2	1	.012	1/2	3	847732-C6	106.30	847732-C8	106.30



DRILL / END MILLS

Helical Tip – 4 Flute

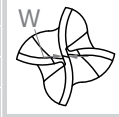




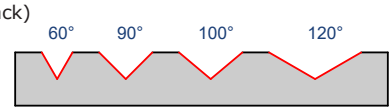
Specialized Helically Fluted Tip Design

HELICAL TIP

Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty

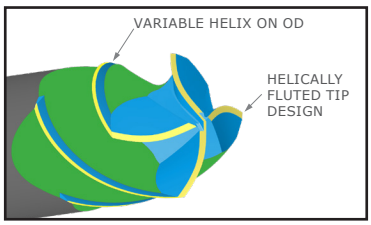


- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 4 flutes (two flutes to center, two flutes cut back)
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Stocked in *Four* Included Angles!

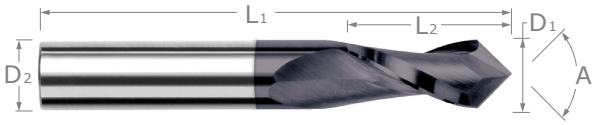
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2 (h6)	L1	4 FL	PRICE
60°	1/16	3/16	.005	1/8	1-1/2	899204-C6	50.40
	3/32	3/8	.007	1/8	1-1/2	899206-C6	50.40
	1/8	1/2	.008	1/8	1-1/2	899208-C6	50.40
	3/16	5/8	.009	3/16	2	899212-C6	55.80
	1/4	3/4	.009	1/4	2-1/2	899216-C6	70.80
	5/16	13/16	.010	5/16	2-1/2	899220-C6	78.00
	3/8	7/8	.012	3/8	2-1/2	899224-C6	87.50
	1/2	1	.012	1/2	3	899232-C6	111.90
90°	1/32	3/32	.003	1/8	1-1/2	881102-C6	46.00
	3/64	9/64	.004	1/8	1-1/2	881103-C6	46.00
	1/16	3/16	.005	1/8	1-1/2	881104-C6	46.00
	5/64	1/4	.006	1/8	1-1/2	881105-C6	48.10
	3/32	3/8	.007	1/8	1-1/2	881106-C6	48.10
	1/8	1/2	.008	1/8	1-1/2	881108-C6	50.40
	9/64	9/16	.009	3/16	2	881109-C6	55.80
	5/32	9/16	.009	3/16	2	881110-C6	55.80
	3/16	5/8	.009	3/16	2	881112-C6	55.80
	1/4	3/4	.009	1/4	2-1/2	881116-C6	70.80
	5/16	13/16	.010	5/16	2-1/2	881120-C6	78.00
	3/8	7/8	.012	3/8	2-1/2	881124-C6	87.50
	1/2	1	.012	1/2	3	881132-C6	111.90
	5/8	1-1/4	.014	5/8	3-1/2	881140-C6	148.60
	3/4	1-1/2	.015	3/4	4	881148-C6	185.80
100°	1/8	1/2	.008	1/8	1-1/2	826208-C6	50.40
	1/4	3/4	.009	1/4	2-1/2	826216-C6	70.80
	3/8	7/8	.012	3/8	2-1/2	826224-C6	87.50
	1/2	1	.012	1/2	3	826232-C6	111.90
120°	1/8	1/2	.008	1/8	1-1/2	865408-C6	50.40
	3/16	5/8	.009	3/16	2	865412-C6	55.80
	1/4	3/4	.009	1/4	2-1/2	865416-C6	70.80
	3/8	7/8	.012	3/8	2-1/2	865424-C6	87.50
	1/2	1	.012	1/2	3	865432-C6	111.90



NEW SIZES!

DRILL / END MILLS

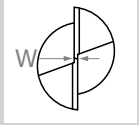
Mill Style – 2 Flute



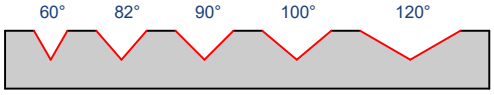
MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°	82°, 90°, 100°, 120°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty



- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 2 flutes
- Solid carbide
- CNC ground in the USA



Stocked in *Five* Included Angles!

OUTSTANDING IN ALUMINUM!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED		
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE	
60°	1/32	3/32	.0030	1/8	1-1/2	991702	29.90	991702-C3	34.50			
	1/16	3/16	.0050	1/8	1-1/2	991704	29.90	991704-C3	34.50			
	3/32	3/8	.0050	1/8	1-1/2	991706	29.90	991706-C3	34.50			
	1/8	1/2	.0050	1/8	1-1/2	991708	29.90	991708-C3	34.50	991708-C8	36.70	
	5/32	9/16	.0060	3/16	2	991710	31.00	991710-C3	36.00			
	3/16	5/8	.0060	3/16	2	991712	31.00	991712-C3	36.00	991712-C8	37.80	NEW
	1/4	3/4	.0060	1/4	2-1/2	991716	43.80	991716-C3	50.60	991716-C8	51.10	
	5/16	13/16	.0070	5/16	2-1/2	991720	46.00	991720-C3	53.90			
	3/8	7/8	.0080	3/8	2-1/2	991724	55.10	991724-C3	64.10	991724-C8	73.90	
	1/2	1	.0080	1/2	3	991732	87.30	991732-C3	100.70	991732-C8	109.40	
	5/8	1-1/4	.0090	5/8	3-1/2	991740	133.40	991740-C3	146.80			
	3/4	1-1/2	.0100	3/4	4	991748	202.20	991748-C3	216.70			
82°	1/16	3/16	.0050	1/8	1-1/2	949404	31.80	949404-C3	36.40			
	3/32	3/8	.0050	1/8	1-1/2	949406	31.80	949406-C3	36.40			
	1/8	1/2	.0050	1/8	1-1/2	949408	31.80	949408-C3	36.40	949408-C8	38.60	
	3/16	5/8	.0060	3/16	2	949412	32.60	949412-C3	37.60			
	1/4	3/4	.0060	1/4	2-1/2	949416	46.30	949416-C3	53.10	949416-C8	53.60	
	5/16	13/16	.0070	5/16	2-1/2	949420	48.30	949420-C3	56.20			
	3/8	7/8	.0080	3/8	2-1/2	949424	58.30	949424-C3	67.30			
	1/2	1	.0080	1/2	3	949432	92.10	949432-C3	105.50			
90°	1/64	3/64	.0015	1/8	1-1/2	15301-2	29.90	72201-C3	34.50			
	1/32	3/32	.0030	1/8	1-1/2	15302-2	29.90	72231-C3	34.50	72231-C8	36.70	
	3/64	9/64	.0040	1/8	1-1/2	15303-2	29.90	72247-C3	34.50			
	1/16	3/16	.0050	1/8	1-1/2	15304-2	28.80	72262-C3	33.40	72262-C8	35.60	
	5/64	1/4	.0050	1/8	1-1/2	15305-2	28.80	72278-C3	33.40	72278-C8	35.60	
	3/32	3/8	.0050	1/8	1-1/2	15306-2	28.80	72293-C3	33.40	72293-C8	35.60	
	7/64	3/8	.0050	1/8	1-1/2	15307-2	29.90	72302-C3	34.50			
	3 mm	3/8	.0050	1/8	1-1/2	1533M-2	29.90	72305-C3	34.50			

continued on next page

DRILL / END MILLS

Mill Style – 2 Flute (cont.)

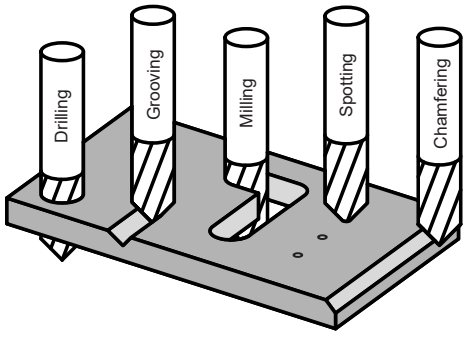
continued from previous page

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
90°	1/8	1/2	.0050	1/8	1-1/2	15308-2	28.80	72308-C3	33.40	72308-C8	35.60
	9/64	9/16	.0060	3/16	2	15309-2	31.00	72309-C3	36.00		
	5/32	9/16	.0060	3/16	2	15310-2	31.00	72310-C3	36.00		
	3/16	5/8	.0060	3/16	2	15312-2	29.80	72312-C3	34.80	72312-C8	36.60
	1/4	3/4	.0060	1/4	2-1/2	15316-2	42.20	72316-C3	49.00	72316-C8	49.50
	5/16	13/16	.0070	5/16	2-1/2	15320-2	44.20	72320-C3	52.10	72320-C8	59.70
	3/8	7/8	.0080	3/8	2-1/2	15324-2	52.90	72324-C3	61.90	72324-C8	71.70
	1/2	1	.0080	1/2	3	15332-2	83.90	72332-C3	97.30	72332-C8	106.00
	5/8	1-1/4	.0090	5/8	3-1/2	15340-2	128.20	72340-C3	141.60		
	3/4	1-1/2	.0100	3/4	4	15348-2	194.40	72348-C3	208.90		
100°	1/8	1/2	.0050	1/8	1-1/2	928508	31.80	928508-C3	36.40	928508-C8	38.60
	3/16	5/8	.0060	3/16	2	928512	32.60	928512-C3	37.60		
	1/4	3/4	.0060	1/4	2-1/2	928516	46.30	928516-C3	53.10	928516-C8	53.60
	5/16	13/16	.0070	5/16	2-1/2	928520	48.30	928520-C3	56.20		
	3/8	7/8	.0080	3/8	2-1/2	928524	58.30	928524-C3	67.30		
	1/2	1	.0080	1/2	3	928532	92.10	928532-C3	105.50		
120°	1/16	3/16	.0050	1/8	1-1/2	985504	31.80	985504-C3	36.40		
	3/32	3/8	.0050	1/8	1-1/2	985506	31.80	985506-C3	36.40		
	1/8	1/2	.0050	1/8	1-1/2	985508	31.80	985508-C3	36.40	985508-C8	38.60
	3/16	5/8	.0060	3/16	2	985512	32.70	985512-C3	37.70		
	1/4	3/4	.0060	1/4	2-1/2	985516	45.90	985516-C3	52.70	985516-C8	53.20
	5/16	13/16	.0070	5/16	2-1/2	985520	47.80	985520-C3	55.70		
NEW	3/8	7/8	.0080	3/8	2-1/2	985524	56.90	985524-C3	65.90	985524-C8	75.70
	1/2	1	.0080	1/2	3	985532	88.90	985532-C3	102.30		

Drill / End Mills

Our extensive offering of Drill / End Mills are available in multiple point angles. They allow you to...

- Perform multiple operations with a single tool
- Free up space on your tool carousel
- Improve cycle time with fewer tool changes



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DRILL / END MILLS

Mill Style – 3 Flute

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 3 flutes to center
- Solid carbide
- CNC ground in the USA

MILL STYLE

Flat relief with end mill style and 3 flutes to center.

Recommended For	Included Angle
	90°
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	D2	L1	3 FL	PRICE	3 FL	PRICE
90°	1/8	1/2	1/8	1-1/2	823808	28.80	823808-C3	35.60
	3/16	5/8	3/16	2	823812	29.80	823812-C3	34.40
	1/4	3/4	1/4	2-1/2	823816	42.20	823816-C3	47.20
	3/8	7/8	3/8	2-1/2	823824	52.90	823824-C3	61.90

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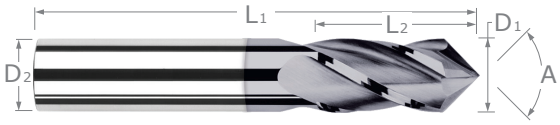
DRILL / END MILLS

Mill Style – 4 Flute

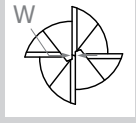


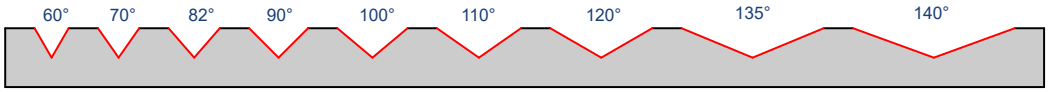
- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 4 flutes (two flutes to center, two flutes cut back)
- Solid carbide
- CNC ground in the USA

MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°, 70°	82°, 90°, 100°, 110°, 120°, 135°, 140°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty





Stocked in *Nine* Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
60°	1/32	3/32	.0030	1/8	1-1/2	15402	29.90			15402-C3	34.50
	3/64	9/64	.0040	1/8	1-1/2	15403	29.90			15403-C3	34.50
	1/16	3/16	.0050	1/8	1-1/2	15404	29.90			15404-C3	34.50
	5/64	1/4	.0050	1/8	1-1/2	15405	29.90			15405-C3	34.50
	3/32	3/8	.0050	1/8	1-1/2	15406	29.90			15406-C3	34.50
	7/64	3/8	.0050	1/8	1-1/2	15407	31.00			15407-C3	35.60
	3 mm	3/8	.0050	1/8	1-1/2	1543M	32.30			1543M-C3	36.90
	1/8	1/2	.0050	1/8	1-1/2	15408	29.90			15408-C3	34.50
	9/64	9/16	.0060	3/16	2	15409	31.00			15409-C3	36.00
	5/32	9/16	.0060	3/16	2	15410	31.00			15410-C3	36.00
	3/16	5/8	.0060	3/16	2	15412	31.00			15412-C3	36.00
	1/4	3/4	.0060	1/4	2-1/2	15416	43.80			15416-C3	50.60
	5/16	13/16	.0070	5/16	2-1/2	15420	46.00			15420-C3	53.90
	3/8	7/8	.0080	3/8	2-1/2	15424	55.10			15424-C3	64.10
	7/16	1	.0080	7/16	2-3/4	15428	85.30			15428-C3	96.50
	1/2	1	.0080	1/2	3	15432	87.30			15432-C3	100.70
	5/8	1-1/4	.0090	5/8	3-1/2	15440	133.40			15440-C3	146.80
	3/4	1-1/2	.0100	3/4	4	15448	202.20			15448-C3	216.70
	1	2	.0100	1	4	15464	304.60			15464-C3	326.70
70°	1/8	1/2	.0050	1/8	1-1/2	824608	33.40			824608-C3	38.00
	1/4	3/4	.0060	1/4	2-1/2	824616	48.20			824616-C3	55.00
	3/8	7/8	.0080	3/8	2-1/2	824624	60.20			824624-C3	69.20
	1/2	1	.0080	1/2	3	824632	94.00			824632-C3	107.40

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DRILL / END MILLS

Mill Style – 4 Flute (cont.)

continued from previous page

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		TiN COATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1		4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
82°	1/32	3/32	.0030	1/8	1-1/2		26502	33.40			26502-C3	38.00
	1/16	3/16	.0050	1/8	1-1/2		26504	33.40			26504-C3	38.00
	5/64	1/4	.0050	1/8	1-1/2		26505	33.40			26505-C3	38.00
	3/32	3/8	.0050	1/8	1-1/2		26506	33.40			26506-C3	38.00
	1/8	1/2	.0050	1/8	1-1/2		26508	33.40			26508-C3	38.00
	5/32	9/16	.0060	3/16	2		26510	34.60			26510-C3	39.60
	3/16	5/8	.0060	3/16	2		26512	34.60			26512-C3	39.60
	1/4	3/4	.0060	1/4	2-1/2		26516	48.20			26516-C3	55.00
	5/16	13/16	.0070	5/16	2-1/2		26520	50.30			26520-C3	58.20
	3/8	7/8	.0080	3/8	2-1/2		26524	60.20			26524-C3	69.20
	1/2	1	.0080	1/2	3		26532	94.00			26532-C3	107.40
	5/8	1-1/4	.0090	5/8	3-1/2		26540	142.30			26540-C3	155.70
	3/4	1-1/2	.0100	3/4	4		26548	215.20			26548-C3	229.70
90°	1/64	3/64	.0015	1/8	1-1/2		15301	29.90			15301-C3	34.50
	1/32	3/32	.0030	1/8	1-1/2		15302	29.90			15302-C3	34.50
	1 mm	1/8	.0030	1/8	1-1/2		1531M	32.30			1531M-C3	36.90
	3/64	9/64	.0040	1/8	1-1/2		15303	29.90			15303-C3	34.50
	1/16	3/16	.0050	1/8	1-1/2		15304	28.80	15304-C1	31.90	15304-C3	33.40
	1/16	5/16	.0050	1/8	2-1/2		823904	30.80			823904-C3	35.40
	5/64	1/4	.0050	1/8	1-1/2		15305	28.80	15305-C1	31.90	15305-C3	33.40
	3/32	3/8	.0050	1/8	1-1/2		15306	28.80	15306-C1	31.90	15306-C3	33.40
	7/64	3/8	.0050	1/8	1-1/2		15307	29.90			15307-C3	34.50
	3 mm	3/8	.0050	1/8	1-1/2		1533M	29.90			1533M-C3	34.50
	1/8	1/2	.0050	1/8	1-1/2		15308	28.80	15308-C1	31.90	15308-C3	33.40
	1/8	1/2	.0050	1/8	3	*LONG!*	824208	31.90			824208-C3	38.70
	1/8	5/8	.0050	1/8	2-1/2		824008	30.80			824008-C3	35.40
	9/64	9/16	.0060	3/16	2		15309	31.00			15309-C3	36.00
	5/32	9/16	.0060	3/16	2		15310	31.00			15310-C3	36.00
	11/64	5/8	.0060	3/16	2		15311	31.00			15311-C3	36.00
	3/16	5/8	.0060	3/16	2		15312	29.80	15312-C1	33.30	15312-C3	34.80
	3/16	1	.0060	3/16	3		824012	32.30			824012-C3	37.30
	13/64	3/4	.0060	1/4	2-1/2		15313	45.70			15313-C3	52.50
	7/32	3/4	.0060	1/4	2-1/2		15314	45.70			15314-C3	52.50
	6 mm	3/4	.0060	1/4	2-1/2		1536M	46.20			1536M-C3	53.00
	1/4	3/4	.0060	1/4	2-1/2		15316	42.20	15316-C1	45.90	15316-C3	49.00
	1/4	3/4	.0060	1/4	4	*LONG!*	824216	45.90			824216-C3	50.90
	1/4	1-1/4	.0060	1/4	4		824016	48.00			824016-C3	55.90
	5/16	13/16	.0070	5/16	2-1/2		15320	44.20	15320-C1	49.40	15320-C3	52.10
	3/8	7/8	.0080	3/8	2-1/2		15324	52.90	15324-C1	58.30	15324-C3	61.90
	3/8	2	.0080	3/8	4		824024	55.30			824024-C3	67.60
	7/16	1	.0080	7/16	2-3/4		15328	85.30			15328-C3	96.50
	1/2	1	.0080	1/2	3		15332	83.90	15332-C1	89.90	15332-C3	97.30
	5/8	1-1/4	.0090	5/8	3-1/2		15340	128.20	15340-C1	136.10	15340-C3	141.60
	3/4	1-1/2	.0100	3/4	4		15348	194.40	15348-C1	203.40	15348-C3	208.90
	1	2	.0100	1	4		15364	304.60			15364-C3	326.70

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DRILL / END MILLS

Mill Style – 4 Flute (cont.)

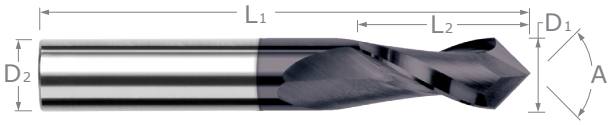
continued from previous page

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	1/32	3/32	.0030	1/8	1-1/2	27402	33.40			27402-C3	38.00
	1/16	3/16	.0050	1/8	1-1/2	27404	33.40			27404-C3	38.00
	5/64	1/4	.0050	1/8	1-1/2	27405	33.40			27405-C3	38.00
	3/32	3/8	.0050	1/8	1-1/2	27406	33.40			27406-C3	38.00
	1/8	1/2	.0050	1/8	1-1/2	27408	33.40			27408-C3	38.00
	5/32	9/16	.0060	3/16	2	27410	34.60			27410-C3	39.60
100°	3/16	5/8	.0060	3/16	2	27412	34.60			27412-C3	39.60
	1/4	3/4	.0060	1/4	2-1/2	27416	48.20			27416-C3	55.00
	5/16	13/16	.0070	5/16	2-1/2	27420	50.30			27420-C3	58.20
	3/8	7/8	.0080	3/8	2-1/2	27424	60.20			27424-C3	69.20
	1/2	1	.0080	1/2	3	27432	94.00			27432-C3	107.40
	5/8	1-1/4	.0090	5/8	3-1/2	27440	142.30			27440-C3	155.70
	3/4	1-1/2	.0100	3/4	4	27448	215.20			27448-C3	229.70
	1/8	1/2	.0050	1/8	1-1/2	824408	33.40			824408-C3	38.00
110°	1/4	3/4	.0060	1/4	2-1/2	824416	48.20			824416-C3	55.00
	3/8	7/8	.0080	3/8	2-1/2	824424	60.20			824424-C3	69.20
	1/2	1	.0080	1/2	3	824432	94.00			824432-C3	107.40
	1/32	3/32	.0030	1/8	1-1/2	988102	31.80			988102-C3	36.40
	1/16	3/16	.0050	1/8	1-1/2	988104	31.80			988104-C3	36.40
	3/32	3/8	.0050	1/8	1-1/2	988106	31.80			988106-C3	36.40
	7/64	3/8	.0050	1/8	1-1/2	988107	31.00			988107-C3	35.60
	3 mm	3/8	.0050	1/8	1-1/2	98813M	32.30			98813M-C3	36.90
	1/8	1/2	.0050	1/8	1-1/2	988108	31.80			988108-C3	36.40
	9/64	9/16	.0060	3/16	2	988109	32.70			988109-C3	37.70
120°	5/32	9/16	.0060	3/16	2	988110	32.70			988110-C3	37.70
	3/16	5/8	.0060	3/16	2	988112	32.70			988112-C3	37.70
	1/4	3/4	.0060	1/4	2-1/2	988116	45.90			988116-C3	52.70
	5/16	13/16	.0070	5/16	2-1/2	988120	47.80			988120-C3	55.70
	3/8	7/8	.0080	3/8	2-1/2	988124	56.90			988124-C3	65.90
	1/2	1	.0080	1/2	3	988132	88.90			988132-C3	102.30
	5/8	1-1/4	.0090	5/8	3-1/2	988140	134.80			988140-C3	148.20
	3/4	1-1/2	.0100	3/4	4	988148	203.70			988148-C3	218.20
	1	2	.0100	1	4	988164	306.10			988164-C3	328.20
	1/8	1/2	.0050	1/8	1-1/2	870208	33.40			870208-C3	38.00
	3/16	5/8	.0060	3/16	2	870212	34.60			870212-C3	39.60
135°	1/4	3/4	.0060	1/4	2-1/2	870216	48.20			870216-C3	55.00
	3/8	7/8	.0080	3/8	2-1/2	870224	60.20			870224-C3	69.20
	1/2	1	.0080	1/2	3	870232	94.00			870232-C3	107.40
NEW	1/8	1/2	0.005	1/8	1-1/2	817208	33.40			817208-C3	38.00
NEW 140°	1/4	3/4	0.006	1/4	2-1/2	817216	48.20			817216-C3	55.00

NEW COATING!

DRILL / END MILLS

Drill Style – 2 Flute

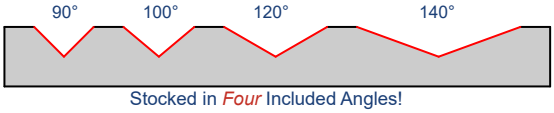


- Designed for drilling and milling applications
- 2 flutes
- Solid carbide
- CNC ground in the USA

DRILL STYLE

Cammed relief with split point with "S" style gash to thin web.

Recommended For	
Chamfering	Light Duty
O.D. Milling	Yes
Drilling	Yes
Spotting	Yes



Stocked in *Four* Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED		
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	TOOL #	PRICE	
90°	1/32	3/32	.003	1/8	1-1/2	46502	32.30	46502-C3	36.90			
	1 mm	1/8	.003	1/8	1-1/2	4651M	34.80	4651M-C3	39.40			
	3/64	9/64	.004	1/8	1-1/2	46503	32.30	46503-C3	36.90	46503-C8	39.10	NEW
	1/16	3/16	.005	1/8	1-1/2	46504	32.30	46504-C3	36.90			
	5/64	1/4	.005	1/8	1-1/2	46505	32.30	46505-C3	36.90			
	3/32	3/8	.005	1/8	1-1/2	46506	32.30	46506-C3	36.90			
	7/64	3/8	.005	1/8	1-1/2	46507	32.30	46507-C3	36.90			
	3 mm	3/8	.005	1/8	1-1/2	4653M	34.80	4653M-C3	39.40			
	1/8	1/2	.005	1/8	1-1/2	46508	32.30	46508-C3	36.90	46508-C8	39.10	NEW
	9/64	9/16	.006	3/16	2	46509	32.70	46509-C3	37.70			
	5/32	9/16	.006	3/16	2	46510	32.70	46510-C3	37.70			
	3/16	5/8	.006	3/16	2	46512	32.70	46512-C3	37.70			
	7/32	3/4	.006	1/4	2-1/2	46514	45.90	46514-C3	52.70			
	1/4	3/4	.006	1/4	2-1/2	46516	45.90	46516-C3	52.70	46516-C8	53.20	NEW
	5/16	13/16	.007	5/16	2-1/2	46520	47.80	46520-C3	55.70			
	3/8	7/8	.008	3/8	2-1/2	46524	56.90	46524-C3	65.90			
	7/16	1	.008	7/16	2-3/4	46528	87.10	46528-C3	98.30			
	1/2	1	.008	1/2	3	46532	88.90	46532-C3	102.30			
	5/8	1-1/4	.010	5/8	3-1/2	46540	134.80	46540-C3	148.20			
	3/4	1-1/2	.012	3/4	4	46548	203.70	46548-C3	218.20			
	1	2	.015	1	4	46564	301.50	46564-C3	323.60			
100°	1/8	1/2	.005	1/8	1-1/2	849108	33.40	849108-C3	38.00			
	3/16	5/8	.006	3/16	2	849112	34.60	849112-C3	39.60			
	1/4	3/4	.006	1/4	2-1/2	849116	48.20	849116-C3	55.00			
	3/8	7/8	.008	3/8	2-1/2	849124	60.20	849124-C3	69.20			

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DRILL / END MILLS

Drill Style – 2 Flute (cont.)

continued from previous page

	INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	TOOL #	PRICE
		1/32	3/32	.003	1/8	1-1/2	12902	32.30	12902-C3	36.90		
		1 mm	1/8	.003	1/8	1-1/2	1291M	34.80	1291M-C3	39.40		
		3/64	9/64	.004	1/8	1-1/2	12903	32.30	12903-C3	36.90		
		1/16	3/16	.005	1/8	1-1/2	12904	31.10	12904-C3	35.70		
		5/64	1/4	.005	1/8	1-1/2	12905	31.10	12905-C3	35.70		
		3/32	3/8	.005	1/8	1-1/2	12906	31.10	12906-C3	35.70		
		3 mm	3/8	.005	1/8	1-1/2	1293M	34.80	1293M-C3	39.40		
NEW		1/8	1/2	.005	1/8	1-1/2	12908	31.10	12908-C3	35.70	12908-C8	37.90
		9/64	9/16	.006	3/16	2	12909	32.70	12909-C3	37.70		
		5/32	9/16	.006	3/16	2	12910	32.70	12910-C3	37.70		
	120°	3/16	5/8	.006	3/16	2	12912	31.40	12912-C3	36.40		
		7/32	3/4	.006	1/4	2-1/2	12914	45.90	12914-C3	52.70		
NEW		1/4	3/4	.006	1/4	2-1/2	12916	44.10	12916-C3	50.90	12916-C8	51.40
		5/16	13/16	.007	5/16	2-1/2	12920	46.00	12920-C3	53.90		
NEW		3/8	7/8	.008	3/8	2-1/2	12924	54.70	12924-C3	63.70	12924-C8	73.50
		7/16	1	.008	7/16	2-3/4	12928	87.10	12928-C3	98.30		
		1/2	1	.008	1/2	3	12932	85.40	12932-C3	98.80		
		5/8	1-1/4	.010	5/8	3-1/2	12940	129.60	12940-C3	143.00		
		3/4	1-1/2	.012	3/4	4	12948	195.90	12948-C3	210.40		
		1	2	.015	1	4	12964	301.50	12964-C3	323.60		
		1/16	3/16	.005	1/8	1-1/2	950504	33.40	950504-C3	38.00		
		5/64	1/4	.005	1/8	1-1/2	950505	33.40	950505-C3	38.00		
		3/32	3/8	.005	1/8	1-1/2	950506	33.40	950506-C3	38.00		
		1/8	1/2	.005	1/8	1-1/2	950508	33.40	950508-C3	38.00		
		3/16	5/8	.006	3/16	2	950512	34.60	950512-C3	39.60		
	140°	1/4	3/4	.006	1/4	2-1/2	950516	48.20	950516-C3	55.00		
		5/16	13/16	.007	5/16	2-1/2	950520	50.30	950520-C3	58.20		
		3/8	7/8	.008	3/8	2-1/2	950524	60.20	950524-C3	69.20		
		1/2	1	.008	1/2	3	950532	94.00	950532-C3	107.40		
		5/8	1-1/4	.010	5/8	3-1/2	950540	142.30	950540-C3	155.70		
		3/4	1-1/2	.012	3/4	4	950548	215.20	950548-C3	229.70		

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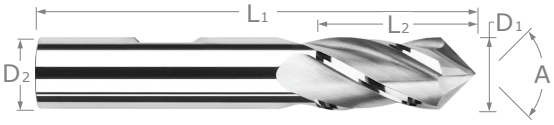
DRILL / END MILLS

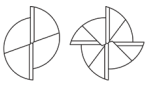
Cobalt – Mill Style – 2 & 4 Flute



- M-42 steel (8% cobalt)
- 90º included angle point
- Weldon flat
- CNC ground in the USA

MILL STYLE

END VIEW:



Flat Relief with end mill style gash to thin web

Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	Non-Ferrous Only
Spotting	Light Duty

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES*	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″		D2	L1	TOOL #	PRICE
90°	1/8	3/8	4	3/8	2-5/16	14308	60.90
	1/8	3/8	2	3/8	2-5/16	14308-2	60.90
	3/16	1/2	4	3/8	2-3/8	14312	60.90
	1/4	5/8	4	3/8	2-1/2	14316	60.90
	1/4	5/8	2	3/8	2-1/2	14316-2	60.90
	5/16	3/4	4	3/8	2-1/2	14320	60.90
	3/8	3/4	4	3/8	2-1/2	14324	60.90
	3/8	3/4	2	3/8	2-1/2	14324-2	60.90
	7/16	1	4	3/8	2-11/16	14328	71.80
	1/2	1-1/4	4	1/2	3-1/4	14332	71.80
	1/2	1-1/4	2	1/2	3-1/4	14332-2	71.80
	5/8	1-5/8	4	5/8	3-1/4	14340	105.00
	3/4	1-5/8	4	3/4	3-7/8	14348	123.40
	1	1-7/8	4	3/4	4-1/8	14364-A	179.80
	1	2	4	1	4-1/2	14364	179.80

*2 flute style is two flutes to center. 4 flute style is two flutes to center and two flutes cut back.

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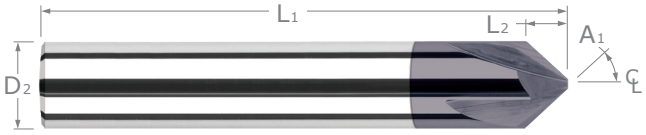
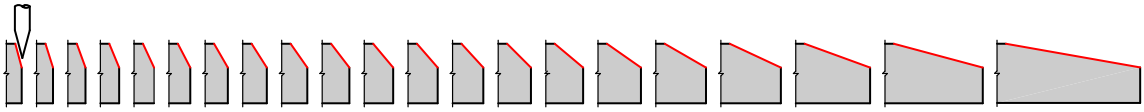
CHAMFER CUTTERS

Pointed & Flat End



Available in 2, 3, 4 & 6 Flutes!

- Choose from three types:
  - Pointed (Type I): 2 flute style for deburring and chamfering in narrow grooves, slots and small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide
- CNC ground in the USA



Stocked in *21* Angles Per Side, Ranging from 15°-80°!

ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
15°	1/8	2	.010	I	.233		1-1/2		18715	18.10	18715-C3	22.70	18715-C8	24.90
	1/8	2	.010	I	.233		3	LONG!	50615	22.30	50615-C3	26.90		
	1/8	3	.040	II	.159	.075	1-1/2		968615	18.80	968615-C3	23.40		
	1/8	4	.040	II	.159	.075	1-1/2		866115	19.80	866115-C3	24.40		
	3/16	2	.010	I	.350		2		72415	24.40	72415-C3	29.40		
	3/16	2	.010	I	.350		4	LONG!	986915	35.80	986915-C3	42.60		
	3/16	3	.040	II	.275	.075	2		978115	27.90	978115-C3	32.90		
	3/16	4	.040	II	.275	.075	2		848715	29.20	848715-C3	34.20		
	1/4	2	.010	I	.448		2-1/2		47615	35.00	47615-C3	41.80	47615-C8	42.30
	1/4	3	.060	II	.355	.112	2-1/2		18515	33.70	18515-C3	40.50		
	1/4	3	.060	II	.355	.112	4	LONG!	48515	44.40	48515-C3	48.60		
	1/4	4	.060	II	.355	.112	2-1/2		876415	36.70	876415-C3	43.50		
	5/16	3	.060	II	.471	.112	2-1/2		977015	41.20	977015-C3	49.10		
	3/8	2	.010	I	.700		2-1/2		72515	46.90	72515-C3	55.90		
NEW	3/8	3	.060	II	.588	.112	2-1/2		18415	45.20	18415-C3	54.20	18415-C8	64.00
	3/8	3	.060	II	.588	.112	4	LONG!	981215	67.00	981215-C3	79.30		
	3/8	4	.060	II	.588	.112	2-1/2		895115	49.30	895115-C3	58.30		
	1/2	2	.010	I	.933		3		960415	78.90	960415-C3	92.30		
	1/2	4	.080	II	.784	.149	3		18315	67.00	18315-C3	80.40		
	1/2	6	.080	II	.784	.149	3		839215	73.20	839215-C3	86.60		
	5/8	6	.080	II	1.017	.149	3-1/2		952815	114.90	952815-C3	128.30		
	3/4	6	.100	II	1.213	.187	4		949315	172.00	949315-C3	186.50		

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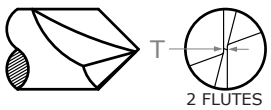
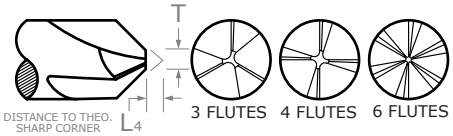
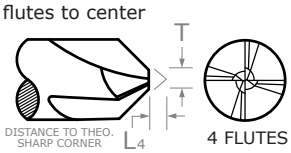
TYPE I - POINTED
Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), two flutes to center



NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
17.5°	1/8	2	.010	I	.198		1-1/2		18718	20.40	18718-C3	25.00			
	1/4	2	.010	I	.396		2-1/2		47618	37.10	47618-C3	43.90			
	1/4	3	.060	II	.301	.095	2-1/2		18518	37.10	18518-C3	43.90			
	1/2	4	.080	II	.666	.127	3		18318	74.00	18318-C3	87.40			
20°	1/8	2	.010	I	.172		1-1/2		18720	18.10	18720-C3	22.70	18720-C8	24.90	
	1/8	2	.010	I	.172		3	LONG!	50620	22.30	50620-C3	26.90			
	1/8	3	.040	II	.117	.055	1-1/2		968620	18.80	968620-C3	23.40			
	1/8	4	.040	II	.117	.055	1-1/2		866120	19.80	866120-C3	24.40			
	3/16	2	.010	I	.258		2		72420	24.40	72420-C3	29.40			
	3/16	2	.010	I	.258		4	LONG!	986920	35.80	986920-C3	42.60			
	3/16	3	.040	II	.203	.055	2		978120	27.90	978120-C3	32.90			
	3/16	4	.040	II	.203	.055	2		848720	29.20	848720-C3	34.20			
	1/4	2	.010	I	.343		2-1/2		47620	35.00	47620-C3	41.80	47620-C8	42.30	
	1/4	3	.060	II	.261	.082	2-1/2		18520	33.70	18520-C3	40.50	18520-C8	41.00	
	1/4	3	.060	II	.261	.082	4	LONG!	48520	44.40	48520-C3	48.60			
	1/4	4	.060	II	.261	.082	2-1/2		876420	38.70	876420-C3	45.50			
	1/4	4	.040	III	.288	.055	2-1/2		833120	40.60	833120-C3	47.40			NEW
	5/16	3	.060	II	.347	.082	2-1/2		977020	46.90	977020-C3	54.80			
	3/8	2	.010	I	.515		2-1/2		72520	46.90	72520-C3	55.90			
	3/8	3	.060	II	.433	.082	2-1/2		18420	45.20	18420-C3	54.20			
	3/8	3	.060	II	.433	.082	4	LONG!	981220	67.00	981220-C3	79.30			
	3/8	4	.060	II	.433	.082	2-1/2		895120	51.90	895120-C3	60.90			
	1/2	2	.010	I	.687		3		960420	78.90	960420-C3	92.30			
	1/2	4	.080	II	.577	.110	3		18320	67.00	18320-C3	80.40			
	1/2	6	.080	II	.577	.110	3		839220	73.20	839220-C3	86.60			
22.5°	1/8	2	.010	I	.151		1-1/2		18723	19.80	18723-C3	24.40	18723-C8	26.60	
	1/8	3	.040	II	.103	.048	1-1/2		968623	19.80	968623-C3	24.40			
	3/16	2	.010	I	.226		2		72423	25.90	72423-C3	30.90			
	3/16	3	.040	II	.178	.048	2		978123	25.90	978123-C3	30.90			
	1/4	2	.010	I	.302		2-1/2		47623	37.10	47623-C3	43.90			
	1/4	3	.060	II	.229	.072	2-1/2		18523	37.10	18523-C3	43.90			
	3/8	2	.010	I	.453		2-1/2		72523	49.90	72523-C3	58.90			
	3/8	3	.060	II	.380	.072	2-1/2		18423	49.90	18423-C3	58.90			
	1/2	2	.010	I	.604		3		960423	79.30	960423-C3	92.70			
	1/2	4	.080	II	.507	.097	3		18323	70.10	18323-C3	83.50			
25°	1/8	2	.010	I	.134		1-1/2		18725	19.80	18725-C3	24.40	18725-C8	26.60	
	1/8	3	.040	II	.091	.043	1-1/2		968625	19.80	968625-C3	24.40			
	3/16	2	.010	I	.201		2		72425	25.70	72425-C3	30.70			
	3/16	3	.040	II	.158	.043	2		978125	25.70	978125-C3	30.70			
	1/4	2	.010	I	.268		2-1/2		47625	37.10	47625-C3	43.90			
	1/4	3	.060	II	.204	.064	2-1/2		18525	36.90	18525-C3	43.70			
	1/4	4	.060	II	.204	.064	2-1/2		876425	38.50	876425-C3	45.30			NEW
	3/8	2	.010	I	.402		2-1/2		72525	49.50	72525-C3	58.50			
	3/8	3	.060	II	.338	.064	2-1/2		18425	49.50	18425-C3	58.50			
	1/2	2	.010	I	.536		3		960425	78.50	960425-C3	91.90			
	1/2	4	.080	II	.450	.086	3		18325	69.30	18325-C3	82.70			

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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	ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	27.5°	1/8	2	.010	I	.120		1-1/2		18728	20.40	18728-C3	25.00		
		1/4	2	.010	I	.240		2-1/2		47628	37.10	47628-C3	43.90		
		1/4	3	.060	II	.182	.058	2-1/2		18528	37.10	18528-C3	43.90		
		1/2	4	.080	II	.403	.077	3		18328	70.10	18328-C3	83.50		
NEW		3 mm	2	.120 mm	I	2.60 mm		38 mm		900230	19.80	900230-C3	24.40		
		1/8	2	.010	I	.108		1-1/2		18730	18.10	18730-C3	22.70	18730-C8	24.90
		1/8	2	.010	I	.108		3	LONG!	50630	22.30	50630-C3	26.90		
		1/8	3	.040	II	.074	.035	1-1/2		968630	18.80	968630-C3	23.40		
		1/8	4	.040	II	.074	.035	1-1/2		866130	19.80	866130-C3	24.40		
NEW		3/16	2	.010	I	.162		2		72430	24.40	72430-C3	29.40	72430-C8	31.20
		3/16	2	.010	I	.162		4	LONG!	986930	35.80	986930-C3	42.60		
		3/16	3	.040	II	.128	.035	2		978130	30.30	978130-C3	35.30		
		3/16	4	.040	II	.128	.035	2		848730	31.70	848730-C3	36.70		
		1/4	2	.010	I	.217		2-1/2		47630	35.00	47630-C3	41.80	47630-C8	42.30
		1/4	3	.060	II	.165	.052	2-1/2		18530	33.70	18530-C3	40.50	18530-C8	41.00
		1/4	3	.060	II	.165	.052	4	LONG!	48530	44.40	48530-C3	48.60		
		1/4	4	.060	II	.165	.052	2-1/2		876430	36.70	876430-C3	43.50		
		1/4	4	.040	III	.181	.035	2-1/2		833130	38.70	833130-C3	45.50		
	30°	5/16	2	.010	I	.271		2-1/2		880330	42.30	880330-C3	50.20		
		5/16	3	.060	II	.219	.052	2-1/2		977030	41.20	977030-C3	49.10		
		5/16	4	.060	II	.219	.052	2-1/2		873230	43.90	873230-C3	51.80		
		3/8	2	.010	I	.325		2-1/2		72530	46.90	72530-C3	55.90		
NEW		3/8	3	.060	II	.273	.052	2-1/2		18430	45.20	18430-C3	54.20	18430-C8	64.00
		3/8	3	.060	II	.273	.052	4	LONG!	981230	67.00	981230-C3	79.30		
		3/8	4	.060	II	.273	.052	2-1/2		895130	49.30	895130-C3	58.30		
		3/8	4	.060	III	.273	.052	2-1/2		827830	51.70	827830-C3	60.70		
		1/2	2	.010	I	.433		3		960430	74.50	960430-C3	87.90		
		1/2	3	.080	II	.364	.069	3		871830	73.40	871830-C3	86.80		
		1/2	4	.080	II	.364	.069	3		18330	63.20	18330-C3	76.60		
		1/2	4	.080	III	.364	.069	3		820230	67.30	820230-C3	80.70		
		1/2	6	.080	II	.364	.069	3		839230	69.00	839230-C3	82.40		
		5/8	6	.080	II	.472	.069	3-1/2		952830	114.90	952830-C3	128.30		
		3/4	6	.100	II	.563	.087	4		949330	172.00	949330-C3	186.50		
	32.5°	1/8	2	.010	I	.095		1-1/2		18733	20.40	18733-C3	25.00		
		1/4	3	.060	II	.149	.047	2-1/2		18533	37.10	18533-C3	43.90		
		1/2	4	.080	II	.330	.063	3		18333	70.10	18333-C3	83.50		
	35°	1/8	2	.010	I	.089		1-1/2		18735	19.30	18735-C3	23.90		
		1/8	3	.040	II	.061	.029	1-1/2		968635	19.30	968635-C3	23.90		
		3/16	2	.010	I	.134		2		72435	24.90	72435-C3	29.90		
		3/16	3	.040	II	.105	.029	2		978135	24.90	978135-C3	29.90		
		1/4	2	.010	I	.179		2-1/2		47635	45.50	47635-C3	52.30		
		1/4	3	.060	II	.136	.043	2-1/2		18535	35.80	18535-C3	42.60		
		3/8	2	.010	I	.268		2-1/2		72535	48.10	72535-C3	57.10		
		3/8	3	.060	II	.225	.043	2-1/2		18435	48.10	18435-C3	57.10		
		1/2	2	.010	I	.357		3		960435	76.30	960435-C3	89.70		
		1/2	4	.080	II	.300	.057	3		18335	67.30	18335-C3	80.70		

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NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
37.5°	1/8	2	.010	I	.081		1-1/2		18738	20.40	18738-C3	25.00			
	1/4	2	.010	I	.163		2-1/2		47638	47.20	47638-C3	54.00			
	1/4	3	.060	II	.124	.039	2-1/2		18538	37.10	18538-C3	43.90			
	1/2	4	.080	II	.274	.052	3		18338	70.10	18338-C3	83.50			
40°	1/8	2	.010	I	.074		1-1/2		18740	19.30	18740-C3	23.90			
	1/8	3	.040	II	.051	.024	1-1/2		968640	18.80	968640-C3	23.40			
	1/8	4	.040	II	.051	.024	1-1/2		866140	19.80	866140-C3	24.40			NEW
	3/16	2	.010	I	.112		2		72440	24.90	72440-C3	29.90			
	1/4	2	.010	I	.149		2-1/2		47640	45.50	47640-C3	52.30			
	1/4	3	.060	II	.113	.036	2-1/2		18540	35.80	18540-C3	42.60			
	1/4	4	.040	III	.125		2-1/2		833140	44.20	833140-C3	51.00			NEW
	1/4	4	.060	II	.113	.036	2-1/2		876440	38.80	876440-C3	45.60			NEW
	3/8	3	.060	II	.188	.036	2-1/2		18440	48.10	18440-C3	57.10			
	1/2	4	.080	II	.25	.048	3		18340	67.30	18340-C3	80.70			
41°	1/8	2	.010	I	.072		1-1/2		18741	19.10	18741-C3	23.70	18741-C8	25.90	
	1/8	3	.040	II	.049	.023	1-1/2		968641	21.00	968641-C3	25.60			
	3/16	2	.010	I	.108		2		72441	27.10	72441-C3	32.10			
	3/16	3	.040	II	.085	.023	2		978141	26.30	978141-C3	31.30			
	1/4	2	.010	I	.144		2-1/2		47641	38.40	47641-C3	45.20			
	1/4	3	.060	II	.109	.035	2-1/2		18541	35.70	18541-C3	42.50			
	3/8	2	.010	I	.216		2-1/2		72541	52.50	72541-C3	61.50			
	3/8	3	.060	II	.181	.035	2-1/2		18441	52.50	18441-C3	61.50			
	1/2	2	.010	I	.288		3		960441	79.30	960441-C3	92.70			
	1/2	4	.080	II	.242	.046	3		18341	67.00	18341-C3	80.40			
42.5°	1/8	2	.010	I	.068		1-1/2		18743	20.40	18743-C3	25.00			
	1/4	3	.060	II	.104	.033	2-1/2		18543	37.10	18543-C3	43.90			
	1/2	4	.080	II	.229	.044	3		18343	70.10	18343-C3	83.50			
45°	3 mm	2	.25 mm	I	1.50 mm		38 mm		900245	21.50	900245-C3	26.10			
	3 mm	3	1.00 mm	II	1.00 mm	.500 mm	38 mm		899545	21.50	899545-C3	26.10			
	1/8	2	.010	I	.063		1-1/2		18745	18.10	18745-C3	22.70	18745-C8	24.90	
	1/8	2	.010	I	.063		3	LONG!	50645	22.30	50645-C3	26.90	50645-C8	29.10	
	1/8	3	.040	II	.043	.020	1-1/2		968645	18.80	968645-C3	23.40	968645-C8	25.60	
	1/8	4	.040	II	.043	.020	1-1/2		866145	19.80	866145-C3	24.40			
	1/8	4	.040	III	.042	.020	1-1/2		802845	21.30	802845-C3	25.90			
	4 mm	2	.25 mm	I	2.00 mm		50 mm		878445	27.40	878445-C3	32.40			
	4 mm	3	1.00 mm	II	1.50 mm	.500 mm	50 mm		863845	27.40	863845-C3	32.40			
	3/16	2	.010	I	.094		2		72445	25.20	72445-C3	30.20	72445-C8	32.00	
	3/16	2	.010	I	.094		4	LONG!	986945	35.80	986945-C3	42.60			
	3/16	3	.040	II	.074	.020	2		978145	30.30	978145-C3	35.30	978145-C8	37.10	NEW
	3/16	3	.040	II	.074	.020	3	LONG!	790945	30.30	790945-C3	35.30			NEW
	3/16	4	.040	II	.074	.020	2		848745	31.70	848745-C3	36.70			
	3/16	4	.040	III	.073	.020	2		809745	33.20	809745-C3	38.20			
	6 mm	2	.25 mm	I	3.00 mm		63 mm		840045	38.00	840045-C3	44.80			
	6 mm	3	1.50 mm	II	2.25 mm	.750 mm	63 mm		837745	38.00	837745-C3	44.80			

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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	ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
		1/4	2	.010	I	.125		2-1/2		47645	35.00	47645-C3	41.80	47645-C8	42.30
		1/4	3	.060	II	.095	.030	2-1/2		18545	33.90	18545-C3	40.70	18545-C8	41.20
		1/4	3	.060	II	.095	.030	4	LONG!	48545	44.40	48545-C3	48.60		
		1/4	4	.060	II	.095	.030	2-1/2		876445	41.20	876445-C3	48.00		
		1/4	4	.040	III	.105	.020	2-1/2		833145	44.20	833145-C3	51.00		
NEW		1/4	4	.060	III	.095	.030	2-1/2		794145	44.20	794145-C3	51.00		
		5/16	2	.010	I	.156		2-1/2		880345	41.20	880345-C3	49.10		
		5/16	3	.060	II	.126	.030	2-1/2		977045	41.20	977045-C3	49.10		
		5/16	4	.060	II	.126	.030	2-1/2		873245	43.90	873245-C3	51.80		
		8 mm	3	1.50 mm	II	3.25 mm	.750 mm	63 mm		868845	50.30	868845-C3	58.20		
		3/8	2	.010	I	.188		2-1/2		72545	48.10	72545-C3	57.10	72545-C8	66.90
NEW		3/8	2	.010	I	.188		4	LONG!	791745	68.30	791745-C3	80.60		
		3/8	3	.060	II	.158	.030	2-1/2		18445	45.20	18445-C3	54.20	18445-C8	64.00
	45°	3/8	3	.060	II	.158	.030	4	LONG!	981245	67.00	981245-C3	79.30		
		3/8	4	.060	II	.158	.030	2-1/2		895145	51.20	895145-C3	60.20		
		3/8	4	.060	III	.158	.030	2-1/2		827845	53.90	827845-C3	62.90		
		10 mm	4	1.50 mm	II	4.25 mm	.750 mm	75 mm		871045	78.70	871045-C3	92.10		
		12 mm	4	1.50 mm	II	5.25 mm	.750 mm	75 mm		881245	78.70	881245-C3	92.10		
		1/2	2	.010	I	.250		3		960445	74.50	960445-C3	87.90	960445-C8	96.60
		1/2	3	.080	II	.210	.040	3		871845	73.40	871845-C3	86.80		
		1/2	4	.080	II	.210	.040	3		18345	63.20	18345-C3	76.60	18345-C8	85.30
		1/2	4	.080	II	.210	.040	6	LONG!	982445	112.20	982445-C3	125.60		
		1/2	4	.080	III	.210	.040	3		820245	67.30	820245-C3	80.70		
		1/2	6	.080	II	.210	.040	3		839245	69.00	839245-C3	82.40		
		5/8	6	.080	II	.273	.040	3-1/2		952845	114.90	952845-C3	128.30		
		3/4	6	.100	II	.325	.050	4		949345	172.00	949345-C3	186.50		
		1	6	.120	II	.440	.060	4		884745	305.50	884745-C3	327.60		
		1/8	2	.010	I	.052		1-1/2		18750	19.30	18750-C3	23.90	18750-C8	26.10
		1/8	3	.040	II	.036	.017	1-1/2		968650	19.30	968650-C3	23.90		
		3/16	2	.010	I	.079		2		72450	24.90	72450-C3	29.90		
		3/16	3	.040	II	.062	.017	2		978150	30.90	978150-C3	35.90		
		1/4	2	.010	I	.105		2-1/2		47650	35.80	47650-C3	42.60		
		1/4	3	.060	II	.080	.025	2-1/2		18550	35.80	18550-C3	42.60		
NEW	50°	1/4	4	.060	II	.080	.025	2-1/2		876450	38.80	876450-C3	45.60		
		3/8	2	.010	I	.157		2-1/2		72550	48.10	72550-C3	57.10		
		3/8	3	.060	II	.132	.025	2-1/2		18450	48.10	18450-C3	57.10		
NEW		3/8	4	.060	II	.132	.025	2-1/2		895150	51.10	895150-C3	60.10		
		1/2	2	.010	I	.210		3		960450	76.30	960450-C3	89.70		
		1/2	4	.080	II	.176	.034	3		18350	67.30	18350-C3	80.70		
		1/8	2	.010	I	.044		1-1/2		18755	21.00	18755-C3	25.60		
		3/16	2	.010	I	.066		2		72455	25.90	72455-C3	30.90		
		1/4	2	.010	I	.088		2-1/2		47655	49.10	47655-C3	55.90		
	55°	1/4	3	.060	II	.067	.021	2-1/2		18555	38.40	18555-C3	45.20		
		3/8	3	.060	II	.110	.021	2-1/2		18455	49.90	18455-C3	58.90		
		1/2	4	.080	II	.147	.028	3		18355	72.00	18355-C3	85.40		

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NEW SIZES!

CHAMFER CUTTERS

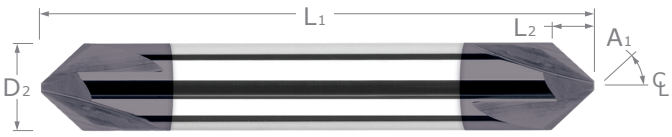
Pointed & Flat End (cont.)

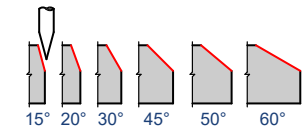
continued from previous page

ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
60°	3 mm	2	.120 mm	I	.87 mm		38 mm		900260	19.10	900260-C3	23.70			NEW
	1/8	2	.010	I	.036		1-1/2		18760	18.10	18760-C3	22.70	18760-C8	24.90	
	1/8	2	.010	I	.036		3	*LONG!*	50660	22.30	50660-C3	26.90			
	1/8	3	.040	II	.025	.012	1-1/2		968660	18.80	968660-C3	23.40			
	3/16	2	.010	I	.054		2		72460	24.40	72460-C3	29.40			
	3/16	3	.040	II	.043	.012	2		978160	30.30	978160-C3	35.30			
	1/4	2	.010	I	.072		2-1/2		47660	35.00	47660-C3	41.80			
	1/4	3	.060	II	.055	.017	2-1/2		18560	33.70	18560-C3	40.50			
	1/4	3	.060	II	.055	.017	4	*LONG!*	48560	44.40	48560-C3	48.60			
	1/4	4	.060	II	.055	.017	2-1/2		876460	36.70	876460-C3	43.50			NEW
	1/4	4	.040	III	.060	.012	2-1/2		833160	38.30	833160-C3	45.10			NEW
	5/16	3	.060	II	.073	.017	2-1/2		977060	41.20	977060-C3	49.10			
	3/8	2	.010	I	.108		2-1/2		72560	46.90	72560-C3	55.90			
	3/8	3	.060	II	.091	.017	2-1/2		18460	45.20	18460-C3	54.20			
	3/8	4	.060	II	.091	.017	2-1/2		895160	48.20	895160-C3	57.20			NEW
	1/2	2	.010	I	.144		3		960460	74.50	960460-C3	87.90			
	1/2	4	.080	II	.121	.023	3		18360	63.20	18360-C3	76.60			
	1/2	4	.080	III	.121	.023	3		820260	66.20	820260-C3	79.60			NEW
	5/8	6	.080	II	.157	.023	3-1/2		952860	114.90	952860-C3	128.30			
	3/4	6	.100	II	.188	.029	4		949360	172.00	949360-C3	186.50			
65°	1/8	2	.010	I	.029		1-1/2		18765	19.80	18765-C3	24.40			
	3/16	2	.010	I	.044		2		72465	25.90	72465-C3	30.90			
	1/4	2	.010	I	.058		2-1/2		47665	47.20	47665-C3	54.00			
	1/4	3	.060	II	.044	.014	2-1/2		18565	37.10	18565-C3	43.90			
	3/8	3	.060	II	.073	.014	2-1/2		18465	49.90	18465-C3	58.90			
	1/2	4	.080	II	.098	.019	3		18365	70.10	18365-C3	83.50			
70°	1/8	2	.010	I	.023		1-1/2		18770	19.30	18770-C3	23.90			
	3/16	2	.010	I	.034		2		72470	24.90	72470-C3	29.90			
	1/4	2	.010	I	.045		2-1/2		47670	45.50	47670-C3	52.30			
	1/4	3	.060	II	.035	.011	2-1/2		18570	35.80	18570-C3	42.60			
	3/8	3	.060	II	.057	.011	2-1/2		18470	51.90	18470-C3	60.90			NEW
	1/2	4	.080	II	.076	.015	3		18370	67.30	18370-C3	80.70			
75°	1/8	2	.010	I	.017		1-1/2		18775	21.00	18775-C3	25.60	18775-C8	27.80	
	1/8	3	.040	II	.011	.005	1-1/2		968675	21.00	968675-C3	25.60			
	3/16	2	.010	I	.025		2		72475	27.10	72475-C3	32.10			
	3/16	3	.040	II	.020	.005	2		978175	32.00	978175-C3	36.40			
	1/4	2	.010	I	.033		2-1/2		47675	38.40	47675-C3	45.20			
	1/4	3	.060	II	.025	.008	2-1/2		18575	39.10	18575-C3	45.90			
	1/4	4	.060	II	.025	.008	2-1/2		876475	42.10	876475-C3	48.90			NEW
	3/8	2	.010	I	.050		2-1/2		72575	52.50	72575-C3	61.50			
	3/8	3	.060	II	.042	.008	2-1/2		18475	52.50	18475-C3	61.50			
	1/2	2	.010	I	.067		3		960475	83.30	960475-C3	96.70			
	1/2	4	.080	II	.056	.011	3		18375	73.50	18375-C3	86.90			
80°	1/8	2	.010	I	.011		1-1/2		18780	21.00	18780-C3	25.60			
	1/4	3	.060	II	.017	.005	2-1/2		18580	28.40	18580-C3	35.20			
	1/2	4	.080	II	.037	.007	3		18380	87.90	18380-C3	101.30			

CHAMFER CUTTERS

Pointed & Flat End – Double-Ended





Stocked in *Six* Angles Per Side!

- Double-ended
- Choose from three types:
  - Pointed (Type I): 2 flute style for deburring and chamfering in narrow grooves, slots, and small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	PRICE	TOOL #	PRICE
15°	1/8	2	.010	I	.233		1-1/2	988415	35.70	988415-C3	41.40
	1/4	2	.010	I	.467		2-1/2	977615	52.30	977615-C3	61.30
	1/4	3	.060	II	.355	.112	2-1/2	891015	58.10	891015-C3	67.10
	3/8	2	.010	I	.700		3	998315	75.80	998315-C3	87.00
	3/8	3	.060	II	.588	.112	2-1/2	934015	87.50	934015-C3	100.90
	1/2	4	.080	II	.784	.149	3	18615	105.40	18615-C3	123.80
20°	1/8	2	.010	I	.172		1-1/2	988420	35.70	988420-C3	41.40
	1/4	2	.010	I	.343		2-1/2	977620	52.30	977620-C3	61.30
	1/4	3	.060	II	.261	.082	2-1/2	891020	58.10	891020-C3	67.10
	3/8	2	.010	I	.515		2-1/2	998320	75.80	998320-C3	89.20
	3/8	3	.060	II	.433	.082	2-1/2	934020	87.50	934020-C3	100.90
	1/2	4	.080	II	.577	.110	3	18620	105.40	18620-C3	123.80
30°	1/8	2	.010	I	.108		1-1/2	988430	30.30	988430-C3	36.00
	3/16	2	.010	I	.162		2	902330	30.30	902330-C3	37.10
	3/16	3	.040	II	.128	.035	2	897130	40.50	897130-C3	47.30
	1/4	2	.010	I	.217		2-1/2	977630	46.70	977630-C3	55.70
	1/4	3	.060	II	.165	.052	2-1/2	891030	56.20	891030-C3	65.20
	3/8	2	.010	I	.325		2-1/2	998330	70.20	998330-C3	83.60
	3/8	3	.060	II	.273	.052	2-1/2	934030	78.80	934030-C3	92.20
	1/2	2	.010	I	.433		3	905830	95.00	905830-C3	113.40
	1/2	4	.080	II	.364	.069	3	18630	99.10	18630-C3	117.50

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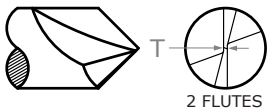
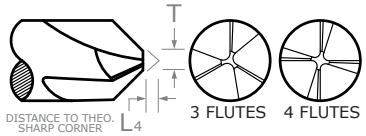
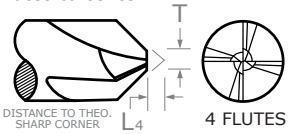
TYPE I - POINTED
Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), two flutes to center



NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End – Double-Ended (cont.)

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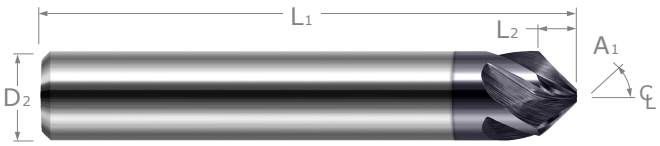
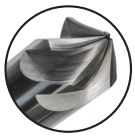
ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	PRICE	TOOL #	PRICE	
45°	1/8	2	.010	I	.063		1-1/2	988445	30.30	988445-C3	36.00	
	1/8	3	.040	II	.043	.020	1-1/2	873945	40.10	873945-C3	45.80	
	1/8	4	.040	II	.043	.020	1-1/2	808245	42.00	808245-C3	46.60	
	1/8	4	.040	III	.043	.020	1-1/2	794245	43.40	794245-C3	49.10	NEW
	3/16	2	.010	I	.094		2	902345	30.30	902345-C3	37.10	
	3/16	3	.040	II	.074	.020	2	897145	40.10	897145-C3	46.90	
	3/16	4	.040	II	.074	.020	2	808145	42.00	808145-C3	47.00	
	1/4	2	.010	I	.125		2-1/2	977645	46.70	977645-C3	55.70	
	1/4	3	.060	II	.095	.030	2-1/2	891045	56.20	891045-C3	65.20	
	1/4	4	.060	II	.095	.030	2-1/2	842445	58.50	842445-C3	67.50	
	1/4	4	.040	III	.105	.020	2-1/2	790045	59.90	790045-C3	68.90	NEW
	5/16	3	.060	II	.126	.030	2-1/2	966645	61.90	966645-C3	73.10	
	3/8	2	.010	I	.188		2-1/2	998345	70.20	998345-C3	83.60	
	3/8	3	.060	II	.158	.030	2-1/2	934045	78.80	934045-C3	92.20	
	3/8	4	.060	II	.158	.030	2-1/2	833645	81.90	833645-C3	95.30	
	1/2	2	.010	I	.250		3	905845	95.00	905845-C3	113.40	
	1/2	4	.080	II	.210	.040	3	18645	99.10	18645-C3	117.50	
	1/2	4	.080	III	.210	.040	3	788045	101.30	788045-C3	119.70	NEW
	5/8	4	.080	II	.273	.040	3-1/2	976445	143.30	976445-C3	163.30	
	3/4	4	.100	II	.325	.050	4	984645	182.10	984645-C3	205.20	
50°	1/8	2	.010	I	.052		1-1/2	988450	30.30	988450-C3	36.00	
	1/4	2	.010	I	.105		2-1/2	977650	46.70	977650-C3	55.70	
	1/4	3	.060	II	.080	.025	2-1/2	891050	56.80	891050-C3	65.80	
	3/8	2	.010	I	.157		2-1/2	998350	70.20	998350-C3	83.60	
	3/8	3	.060	II	.132	.025	2-1/2	934050	79.50	934050-C3	92.90	
	1/2	2	.010	I	.210		3	905850	95.00	905850-C3	113.40	
	1/2	4	.080	II	.173	.034	3	18650	100.00	18650-C3	118.40	
60°	1/8	2	.010	I	.036		1-1/2	988460	30.30	988460-C3	36.00	
	3/16	2	.010	I	.054		2	902360	30.30	902360-C3	37.10	
	1/4	2	.010	I	.072		2-1/2	977660	46.70	977660-C3	55.70	
	1/4	3	.060	II	.055	.017	2-1/2	891060	56.20	891060-C3	65.20	
	3/8	2	.010	I	.108		2-1/2	998360	70.20	998360-C3	83.60	
	3/8	3	.060	II	.091	.017	2-1/2	934060	78.80	934060-C3	92.20	
	1/2	2	.010	I	.144		3	905860	95.00	905860-C3	113.40	
	1/2	4	.080	II	.121	.023	3	18660	99.10	18660-C3	117.50	

NEW SIZES!

CHAMFER CUTTERS

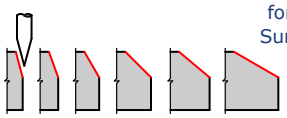
Pointed & Flat End – Helical Flutes





Free Cutting Action for Excellent Surface Finish

- **Specialized helical flute design for superior performance**
- Free cutting action provides excellent surface finish and chip evacuation
- Offered in Type I pointed and Type II flat end (non-cutting) styles
- 2, 3, 4, and 5 flute options
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Stocked in *Six* Angles Per Side!

	ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE
NEW		1/8	3	.040	II	.159	.078	1-1/2	831308	22.40	831308-C3	27.00
		1/4	3	.060	II	.355	.116	2-1/2	831316	38.10	831316-C3	44.60
		1/4	5	.060	II	.355	.116	2-1/2	832516	40.30	832516-C3	46.70
	15°	3/8	3	.070	II	.569	.134	2-1/2	831324	51.00	831324-C3	59.60
		3/8	5	.070	II	.569	.134	2-1/2	832524	53.10	832524-C3	61.60
		1/2	3	.080	II	.784	.153	3	831332	71.50	831332-C3	83.20
		1/2	5	.080	II	.784	.153	3	832532	73.70	832532-C3	85.40
NEW		1/8	3	.040	II	.117	.085	1-1/2	844608	22.40	844608-C3	27.00
		1/4	3	.060	II	.261	.085	2-1/2	844616	38.10	844616-C3	44.60
		1/4	5	.060	II	.261	.085	2-1/2	851416	40.30	851416-C3	46.70
	20°	3/8	3	.070	II	.419	.099	2-1/2	844624	51.00	844624-C3	59.60
		3/8	5	.070	II	.419	.099	2-1/2	851424	53.10	851424-C3	61.60
		1/2	3	.080	II	.577	.113	3	844632	71.50	844632-C3	83.20
		1/2	5	.080	II	.577	.113	3	851432	73.70	851432-C3	85.40
		1/8	2	.010	I	.100		1-1/2	900108	22.40	900108-C3	27.00
		1/8	3	.040	II	.074	.036	1-1/2	916508	22.40	916508-C3	27.00
		1/8	5	.040	II	.074	.036	1-1/2	899008	24.70	899008-C3	29.10
		3/16	2	.010	I	.154		2	900112	30.30	900112-C3	35.00
		3/16	3	.050	II	.119	.045	2	916512	30.30	916512-C3	35.00
		3/16	4	.010	I	.154		2	889712	32.30	889712-C3	37.10
		3/16	5	.050	II	.119	.045	2	899012	32.30	899012-C3	37.10
	30°	1/4	2	.010	I	.208		2-1/2	900116	38.10	900116-C3	44.60
		1/4	3	.060	II	.164	.054	2-1/2	916516	36.60	916516-C3	42.80
		1/4	4	.010	I	.208		2-1/2	889716	40.30	889716-C3	46.70
		1/4	5	.060	II	.164	.054	2-1/2	899016	38.80	899016-C3	44.90
		3/8	2	.010	I	.316		2-1/2	900124	51.00	900124-C3	59.60
		3/8	3	.070	II	.264	.062	2-1/2	916524	49.00	916524-C3	57.20
		3/8	4	.010	I	.316		2-1/2	889724	51.00	889724-C3	59.60
		3/8	5	.070	II	.264	.062	2-1/2	899024	49.00	899024-C3	57.20

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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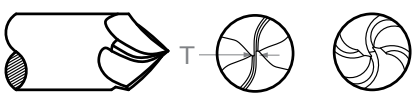
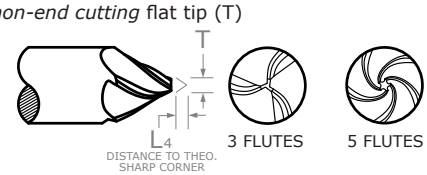
TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes (cont.)

continued from previous page

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		ALTiN COATED		
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE	
30°	1/2	2	.010	I	.424		3	900132	71.50	900132-C3	83.20	
	1/2	3	.080	II	.364	.071	3	916532	68.70	916532-C3	80.00	
	1/2	4	.010	I	.424		3	889732	71.50	889732-C3	83.20	
	1/2	5	.080	II	.364	.071	3	899032	68.70	899032-C3	80.00	
	5/8	3	.090	II	.463	.080	3	916540	70.90	916540-C3	82.20	
	5/8	5	.090	II	.463	.080	3	899040	120.40	899040-C3	132.70	
	3/4	3	.100	II	.562	.088	3	916548	170.60	916548-C3	183.90	
	3/4	4	.015	I	.637		3	889748	177.50	889748-C3	191.30	
	3/4	5	.100	II	.562	.088	3	899048	172.80	899048-C3	186.10	
45°	1/8	2	.010	I	.058		1-1/2	860508	22.40	860508-C3	25.00	
	1/8	3	.040	II	.043	.021	1-1/2	897208	22.40	897208-C3	27.00	
	1/8	4	.010	I	.058		1-1/2	859708	24.70	859708-C3	29.30	
	1/8	5	.040	II	.043	.021	1-1/2	908408	24.70	908408-C3	29.10	
	1/8	5	.040	II	.043	.021	3	789008	27.30	789008-C3	31.90	NEW
	3/16	2	.010	I	.089		2	860512	30.30	860512-C3	35.00	
	3/16	3	.050	II	.069	.026	2	897212	30.30	897212-C3	35.00	
	3/16	4	.010	I	.089		2	859712	32.30	859712-C3	37.10	
	3/16	5	.050	II	.069	.026	2	908412	32.30	908412-C3	37.10	
	1/4	2	.010	I	.120		2-1/2	860516	38.10	860516-C3	44.60	
	1/4	3	.060	II	.095	.031	2-1/2	897216	36.60	897216-C3	42.80	
	1/4	4	.010	I	.120		2-1/2	859716	40.30	859716-C3	46.70	
	1/4	5	.060	II	.095	.031	2-1/2	908416	38.80	908416-C3	44.90	
	1/4	5	.060	II	.095	.031	4	789016	45.70	789016-C3	53.60	NEW
	5/16	3	.060	II	.126	.031	2-1/2	897220	46.40	897220-C3	54.30	
	5/16	5	.060	II	.126	.031	2-1/2	908420	46.40	908420-C3	54.30	
	3/8	2	.010	I	.183		2-1/2	860524	51.00	860524-C3	59.60	
	3/8	3	.070	II	.153	.036	2-1/2	897224	49.00	897224-C3	57.20	
	3/8	4	.010	I	.183		2-1/2	859724	51.00	859724-C3	59.60	
	3/8	5	.070	II	.153	.036	2-1/2	908424	49.00	908424-C3	57.20	
	1/2	2	.010	I	.245		3	860532	71.50	860532-C3	83.20	
	1/2	3	.080	II	.210	.041	3	897232	68.70	897232-C3	80.00	
	1/2	4	.010	I	.245		3	859732	71.50	859732-C3	83.20	
	1/2	5	.080	II	.210	.041	3	908432	68.70	908432-C3	80.00	
	5/8	3	.090	II	.268	.046	3	897240	118.20	897240-C3	130.50	
	5/8	5	.090	II	.268	.046	3	908440	120.40	908440-C3	132.70	
	3/4	3	.100	II	.325	.051	3	897248	170.60	897248-C3	183.90	
	3/4	4	.015	I	.368		3	859748	177.50	859748-C3	191.30	
	3/4	5	.100	II	.325	.051	3	908448	172.80	908448-C3	186.10	
50°	1/4	3	.060	II	.080	.026	2-1/2	875016	38.10	875016-C3	44.60	
	1/4	5	.060	II	.080	.026	2-1/2	871116	40.30	871116-C3	46.70	
	3/8	3	.070	II	.128	.030	2-1/2	875024	51.00	875024-C3	59.60	
	3/8	5	.070	II	.128	.030	2-1/2	871124	53.10	871124-C3	61.60	
	1/2	3	.080	II	.176	.034	3	875032	71.50	875032-C3	83.20	
	1/2	5	.080	II	.176	.034	3	871132	73.70	871132-C3	85.40	

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes (cont.)

continued from previous page

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	1/8	2	.010	I	.033		1-1/2	872108	24.70	872108-C3	29.10
	3/16	2	.010	I	.051		2	872112	30.30	872112-C3	35.00
	3/16	4	.010	I	.051		2	888812	30.30	888812-C3	35.00
	1/4	2	.010	I	.069		2-1/2	872116	38.10	872116-C3	44.60
	1/4	3	.060	II	.057	.018	2-1/2	863416	36.60	863416-C3	42.80
	1/4	4	.010	I	.069		2-1/2	888816	40.30	888816-C3	46.70
	1/4	5	.060	II	.057	.018	2-1/2	867616	38.80	867616-C3	44.90
	3/8	2	.010	I	.105		2-1/2	872124	51.00	872124-C3	59.60
	3/8	3	.070	II	.091	.021	2-1/2	863424	49.00	863424-C3	57.20
	3/8	4	.010	I	.105		2-1/2	888824	53.10	888824-C3	61.60
	3/8	5	.070	II	.091	.021	2-1/2	867624	51.10	867624-C3	59.30
	1/2	2	.010	I	.141		3	872132	71.50	872132-C3	83.20
	1/2	3	.080	II	.126	.024	3	863432	68.70	863432-C3	80.00
	1/2	4	.010	I	.141		3	888832	71.50	888832-C3	83.20
	1/2	5	.080	II	.126	.024	3	867632	70.90	867632-C3	82.20
	5/8	3	.090	II	.157	.027	3	863440	118.20	863440-C3	130.50
	5/8	5	.090	II	.157	.027	3	867640	120.40	867640-C3	132.70
	3/4	3	.100	II	.195	.029	3	863448	170.60	863448-C3	183.90
	3/4	4	.015	I	.212		3	888848	177.50	888848-C3	191.30
	3/4	5	.100	II	.195	.029	3	867648	172.80	867648-C3	186.10

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

The Multiple Uses of a Chamfer Mill

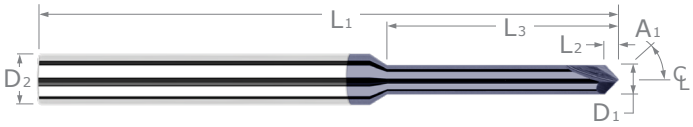
Did you know that a Chamfer Cutter, or Chamfer Mill, is one of the most versatile tools you can have in your carousel? Learn how this single tool can perform several different machining operations in our "In the Loupe" blog post **The Multiple Uses of a Chamfer Mill**.

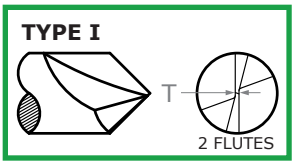
Read more on harveyperformance.com/in-the-loupe/

NEW SIZES!

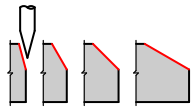
CHAMFER CUTTERS

Pointed – Long Reach





- **Reduced diameter for clearance along walls and in small features**
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- Available in multiple reaches and reduced diameters
- 2 flutes
- Solid carbide
- CNC ground in the USA



Stocked in *Four* Angles Per Side!

ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
A_1 +0°30′ −0°30′	D_1 +.000″ −.001″	L_3 +.010″ −.000″	L_2	T (MAX.)	D_2	L_1	2 FL	PRICE	2 FL	PRICE	
15°	.031 (1/32)	.156 (5x)	.058	.005	1/8	2-1/2	56815	26.60	56815-C3	31.20	NEW
	.031 (1/32)	.250 (8x)	.058	.005	1/8	2-1/2	57215	28.80	57215-C3	33.40	NEW
	.062 (1/16)	.312 (5x)	.116	.006	1/8	2-1/2	54715	26.60	54715-C3	31.20	NEW
	.062 (1/16)	.500 (8x)	.116	.006	1/8	2-1/2	55615	28.80	55615-C3	33.40	NEW
	.093 (3/32)	.500 (5x)	.174	.006	1/8	2-1/2	52115	26.60	52115-C3	31.20	NEW
	.093 (3/32)	.750 (8x)	.174	.006	1/8	2-1/2	53515	28.80	53515-C3	33.40	NEW
30°	.031 (1/32)	.093 (3x)	.027	.005	1/8	1-1/2	994830	24.90	994830-C3	29.50	
	.031 (1/32)	.156 (5x)	.027	.005	1/8	2-1/2	56830	26.60	56830-C3	31.20	
	.031 (1/32)	.250 (8x)	.027	.005	1/8	2-1/2	57230	28.80	57230-C3	33.40	
	.047 (3/64)	.250 (5x)	.041	.005	1/8	2-1/2	996830	26.30	996830-C3	30.90	
	.062 (1/16)	.187 (3x)	.054	.006	1/8	1-1/2	998930	24.90	998930-C3	29.50	
	.062 (1/16)	.312 (5x)	.054	.006	1/8	2-1/2	54730	26.60	54730-C3	31.20	
	.062 (1/16)	.500 (8x)	.054	.006	1/8	2-1/2	55630	28.80	55630-C3	33.40	
	.078 (5/64)	.406 (5x)	.068	.006	1/8	2-1/2	996930	26.30	996930-C3	30.90	
	.093 (3/32)	.279 (3x)	.081	.006	1/8	1-1/2	995330	24.90	995330-C3	29.50	
	.093 (3/32)	.500 (5x)	.081	.006	1/8	2-1/2	52130	26.60	52130-C3	31.20	
	.093 (3/32)	.750 (8x)	.081	.006	1/8	2-1/2	53530	28.80	53530-C3	33.40	
45°	.015 (1/64)	.078 (5x)	.008	.003	1/8	2-1/2	997545	29.60	997545-C3	34.20	
	.015 (1/64)	.125 (8x)	.008	.003	1/8	2-1/2	995945	33.00	995945-C3	37.60	
	.020	.060 (3x)	.010	.003	1/8	1-1/2	794045	29.00	794045-C3	33.60	NEW
	.020	.100 (5x)	.010	.003	1/8	2-1/2	940245	29.00	940245-C3	33.60	
	.020	.160 (8x)	.010	.003	1/8	2-1/2	948545	32.40	948545-C3	37.00	
	.025	.125 (5x)	.013	.003	1/8	2-1/2	821945	29.00	821945-C3	33.60	
	.031 (1/32)	.093 (3x)	.016	.005	1/8	1-1/2	994845	25.30	994845-C3	29.90	
	.031 (1/32)	.125 (4x)	.016	.005	1/8	2-1/2	862745	26.60	862745-C3	31.20	
	.031 (1/32)	.156 (5x)	.016	.005	1/8	2-1/2	56845	26.60	56845-C3	31.20	
	.031 (1/32)	.187 (6x)	.016	.005	1/8	2-1/2	870845	27.70	870845-C3	32.30	
	.031 (1/32)	.218 (7x)	.016	.005	1/8	2-1/2	855445	27.70	855445-C3	32.30	
	.031 (1/32)	.250 (8x)	.016	.005	1/8	2-1/2	57245	28.80	57245-C3	33.40	
	.031 (1/32)	.312 (10x)	.016	.005	1/8	2-1/2	838445	30.40	838445-C3	35.00	
	.031 (1/32)	.375 (12x)	.016	.005	1/8	2-1/2	998245	32.10	998245-C3	36.70	
	.031 (1/32)	.470 (15x)	.016	.005	1/8	2-1/2	918245	34.60	918245-C3	39.20	
	.040	.203 (5x)	.020	.005	1/8	2-1/2	830645	26.70	830645-C3	31.30	

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CHAMFER CUTTERS

Pointed Long Reach (cont.)

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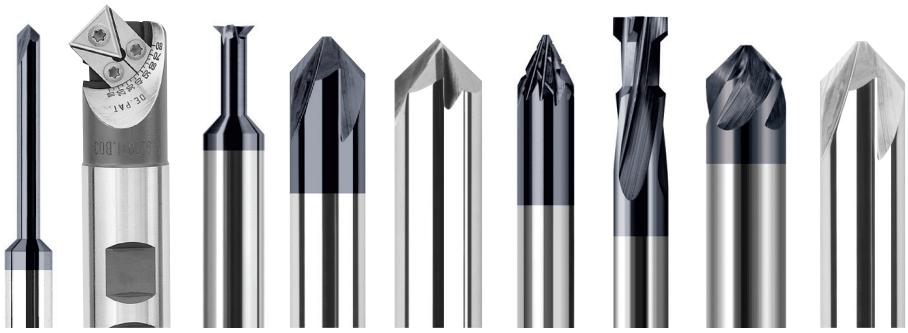
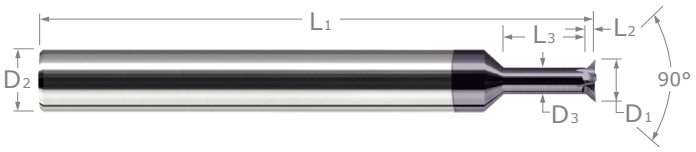
	ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_3 $^{+.010"}_{-.000"}$	L_2	T (MAX.)	D_2	L_1	2 FL	PRICE	2 FL	PRICE
	45°	.047 (3/64)	.141 (3x)	.024	.005	1/8	1-1/2	911045	24.70	911045-C3	29.30
NEW		.047 (3/64)	.187 (4x)	.024	.005	1/8	2-1/2	788745	25.70	788745-C3	30.30
		.047 (3/64)	.250 (5x)	.024	.005	1/8	2-1/2	996845	26.70	996845-C3	31.30
		.047 (3/64)	.375 (8x)	.024	.005	1/8	2-1/2	999245	28.80	999245-C3	33.40
		.047 (3/64)	.570 (12x)	.024	.005	1/8	2-1/2	919045	31.50	919045-C3	36.10
		.062 (1/16)	.187 (3x)	.031	.006	1/8	1-1/2	998945	25.30	998945-C3	29.90
		.062 (1/16)	.250 (4x)	.031	.006	1/8	2-1/2	853945	26.60	853945-C3	31.20
		.062 (1/16)	.312 (5x)	.031	.006	1/8	2-1/2	54745	26.60	54745-C3	31.20
		.062 (1/16)	.375 (6x)	.031	.006	1/8	2-1/2	846045	27.70	846045-C3	32.30
		.062 (1/16)	.437 (7x)	.031	.006	1/8	2-1/2	869745	27.70	869745-C3	32.30
		.062 (1/16)	.500 (8x)	.031	.006	1/8	2-1/2	55645	28.80	55645-C3	33.40
		.062 (1/16)	.625 (10x)	.031	.006	1/8	2-1/2	844145	30.40	844145-C3	35.00
		.062 (1/16)	.750 (12x)	.031	.006	1/8	2-1/2	997245	32.10	997245-C3	36.70
		.062 (1/16)	.950 (15x)	.031	.006	1/8	2-1/2	913345	34.60	913345-C3	39.20
		.078 (5/64)	.234 (3x)	.039	.006	1/8	1-1/2	906645	24.70	906645-C3	29.30
NEW		.078 (5/64)	.312 (4x)	.039	.006	1/8	2-1/2	787045	25.70	787045-C3	30.30
		.078 (5/64)	.406 (5x)	.039	.006	1/8	2-1/2	996945	26.70	996945-C3	31.30
		.078 (5/64)	.625 (8x)	.039	.006	1/8	2-1/2	999545	28.80	999545-C3	33.40
		.078 (5/64)	.940 (12x)	.039	.006	1/8	2-1/2	924045	31.50	924045-C3	36.10
		.093 (3/32)	.279 (3x)	.047	.006	1/8	1-1/2	995345	25.30	995345-C3	29.90
		.093 (3/32)	.375 (4x)	.047	.006	1/8	2-1/2	874345	26.60	874345-C3	31.20
		.093 (3/32)	.500 (5x)	.047	.006	1/8	2-1/2	52145	26.60	52145-C3	31.20
		.093 (3/32)	.585 (6x)	.047	.006	1/8	2-1/2	849445	27.70	849445-C3	32.30
		.093 (3/32)	.670 (7x)	.047	.006	1/8	2-1/2	843045	27.70	843045-C3	32.30
		.093 (3/32)	.750 (8x)	.047	.006	1/8	2-1/2	53545	28.80	53545-C3	33.40
		.093 (3/32)	.950 (10x)	.047	.006	1/8	2-1/2	825645	30.40	825645-C3	35.00
		.093 (3/32)	1.125 (12x)	.047	.006	1/8	2-1/2	999645	32.10	999645-C3	36.70
		.093 (3/32)	1.400 (15x)	.047	.006	1/8	2-1/2	902845	34.60	902845-C3	39.20
NEW	60°	.031 (1/32)	.156 (5x)	.009	.005	1/8	2-1/2	56860	26.60	56860-C3	31.20
NEW		.031 (1/32)	.250 (8x)	.009	.005	1/8	2-1/2	57260	28.80	57260-C3	33.40
NEW		.062 (1/16)	.312 (5x)	.018	.006	1/8	2-1/2	54760	26.60	54760-C3	31.20
NEW		.062 (1/16)	.500 (8x)	.018	.006	1/8	2-1/2	55660	28.80	55660-C3	33.40
NEW		.093 (3/32)	.500 (5x)	.027	.006	1/8	2-1/2	52160	26.60	52160-C3	31.20
NEW		.093 (3/32)	.750 (8x)	.027	.006	1/8	2-1/2	53560	28.80	53560-C3	33.40

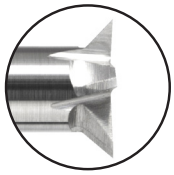


Check Out All of Our Chamfering Solutions!

CHAMFER CUTTERS

Back Chamfer Cutters





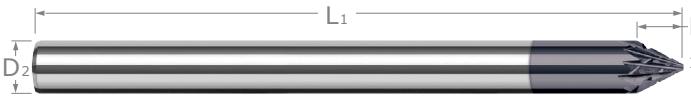
Left Hand Shear Flute & Right Hand Cut Evacuate Chips Away From Part

- Low profile design and greater radial projection ideal for generating chamfered features on the backside of small holes or slots
- Decrease costs by avoiding time-consuming changes to part set-ups
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide
- CNC ground in the USA

HEAD DIAMETER	AXIAL LOC	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000" −.001"	L_2	D_3	L_3 +.010" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.055	.010	.033	**.093** (1.5x)	4	1/8	1-1/2	943355	61.10	943355-C3	65.70
.055	.010	.033	**.156** (3x)	4	1/8	1-1/2	938155	61.10	938155-C3	65.70
.055	.010	.033	**.250** (4.5x)	4	1/8	1-1/2	910355	60.50	910355-C3	65.10
.080	.014	.047	**.070** (0.8x)	4	1/8	1-1/2	906080	59.90	906080-C3	64.50
.080	.014	.047	**.140** (1.5x)	4	1/8	1-1/2	943380	59.90	943380-C3	64.50
.080	.014	.047	**.250** (3x)	4	1/8	1-1/2	938180	59.90	938180-C3	64.50
.080	.014	.047	**.375** (4.5x)	4	1/8	1-1/2	910380	59.40	910380-C3	64.00
.115	.020	.068	**.109** (0.8x)	4	1/8	1-1/2	906015	58.60	906015-C3	63.20
.115	.020	.068	**.218** (1.5x)	4	1/8	1-1/2	943410	58.60	943410-C3	63.20
.115	.020	.068	**.375** (3x)	4	1/8	1-1/2	938210	58.60	938210-C3	63.20
.115	.020	.068	**.562** (5x)	4	1/8	2	910410	60.50	910410-C3	65.10
D_1 +.000" −.002"	L_2	D_3	L_3 +.030" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.135	.024	.081	.125 (0.8x)	5	3/16	2	906119	68.10	906119-C3	73.10
.135	.024	.081	.250 (1.5x)	5	3/16	2	943420	68.10	943420-C3	73.10
.135	.024	.081	.406 (3x)	5	3/16	2	938220	68.10	938220-C3	73.10
.135	.024	.081	.625 (5x)	5	3/16	2	910420	67.50	910420-C3	72.50
.165	.029	.101	.156 (0.8x)	5	3/16	2	906130	68.10	906130-C3	73.10
.165	.029	.101	.312 (2x)	5	3/16	2	943430	68.10	943430-C3	73.10
.165	.029	.101	.500 (3x)	5	3/16	2	938230	68.10	938230-C3	73.10
.165	.029	.101	.750 (4.5x)	5	3/16	2	910430	67.50	910430-C3	72.50
.210	.037	.130	.187 (0.8x)	5	1/4	2-1/2	906140	77.10	906140-C3	83.90
.210	.037	.130	.375 (1.5x)	5	1/4	2-1/2	943440	77.10	943440-C3	83.90
.210	.037	.130	.625 (3x)	5	1/4	2-1/2	938240	77.10	938240-C3	83.90
.210	.037	.130	1.000 (5x)	5	1/4	2-1/2	910440	76.50	910440-C3	83.30
.250	.044	.156	.250 (1x)	5	1/4	2-1/2	906116	77.10	906116-C3	83.90
.250	.044	.156	.437 (2x)	5	1/4	2-1/2	943416	77.10	943416-C3	83.90
.250	.044	.156	.750 (3x)	5	1/4	2-1/2	938216	77.10	938216-C3	83.90
.250	.044	.156	1.250 (5x)	5	1/4	3	910450	79.00	910450-C3	85.80
.312	.055	.196	.281 (0.8x)	6	5/16	2-1/2	906120	81.60	906120-C3	89.50
.312	.055	.196	.562 (2x)	6	5/16	2-1/2	943460	81.60	943460-C3	89.50
.312	.055	.196	1.500 (5x)	6	5/16	3	910460	83.60	910460-C3	91.50
.375	.066	.237	.375 (1x)	6	3/8	2-1/2	906124	88.00	906124-C3	97.00
.375	.066	.237	.750 (2x)	6	3/8	2-1/2	943470	88.00	943470-C3	97.00
.375	.066	.237	1.870 (5x)	6	3/8	4	910470	92.60	910470-C3	99.90
.500	.088	.317	.500 (1x)	6	1/2	3	906132	121.20	906132-C3	134.60
.500	.088	.317	1.000 (2x)	6	1/2	3	943480	121.20	943480-C3	134.60
.500	.088	.317	2.500 (5x)	6	1/2	4	910480	125.40	910480-C3	138.80

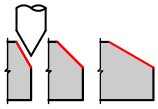
CHAMFER CUTTERS

Deburring Chamfer Cutters



End Mill Tolerances with Bur-Style Geometry!

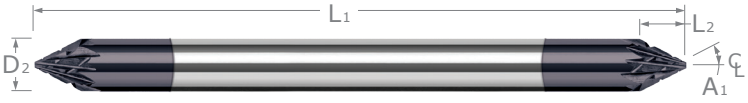
- Deburr in your CNC machine with these high precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Tight end mill tolerances allow use of standard programming and tool paths
- Cone shaped burs are effective in removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA

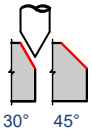


Stocked in *Three* Angles Per Side!

Single-Ended

ANGLE PER SIDE	LOC	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIA.	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	58130	24.50	58130-C3	29.10		
	.207	12	6	.012 (Max.)	1/4	2-1/2	994030	34.80	994030-C3	41.60		
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	58145	24.50	58145-C3	29.10	58145-C4	36.20
	.088	12	6	.012 (Max.)	3/16	2-1/2	891145	30.60	891145-C3	35.60	891145-C4	46.70
	.120	12	6	.012 (Max.)	1/4	2-1/2	994045	34.80	994045-C3	41.60	994045-C4	53.10
60°	.033	12	6	.012 (Max.)	1/8	2-1/2	58160	24.50	58160-C3	29.10		





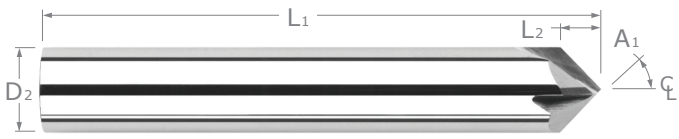
Stocked in *Two* Angles Per Side!

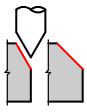
Double-Ended

ANGLE PER SIDE	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	898330	36.80	898330-C3	42.50
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	898345	36.80	898345-C3	42.50
	.088	12	6	.012 (Max.)	3/16	2-1/2	879745	44.20	879745-C3	51.00
	.120	12	6	.012 (Max.)	1/4	2-1/2	867545	52.30	867545-C3	61.30

CHAMFER CUTTERS

Cobalt – Pointed

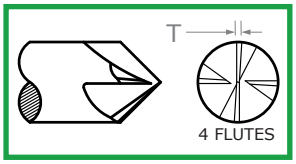




Stocked in *Two* Angles Per Side!

- 4 flutes (2 flutes to center)
- M-42 steel (8% cobalt)
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- CNC ground in the USA

ANGLE PER SIDE	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2	$T_{(MAX.)}$	D_2	L_1	4 FL	PRICE
30°	.217	.010	1/4	2	18116	38.80
	.325	.010	3/8	2-1/2	18124	46.70
	.433	.010	1/2	3	18132	60.20
45°	.125	.010	1/4	2	18016	38.80
	.188	.010	3/8	2-1/2	18024	46.70
	.250	.010	1/2	3	18032	60.20



CHAMFER CUTTERS

Adjustable Chamfer Cutters

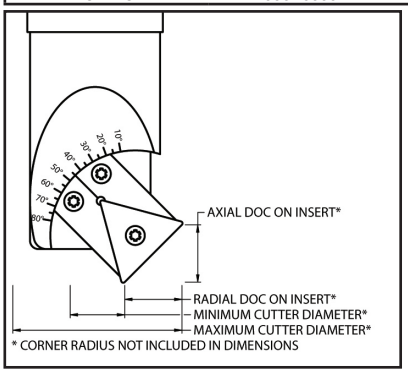
- **Mills any angle from 10° to 80°**
- Change chamfer angle with quick adjustment
- TPET-321 carbide insert (TiN coated) and wrench included
- TPET-321-AL carbide insert has polished face and upsharp relief for optimized performance in non-ferrous materials

SHANK DIAMETER	OVERALL LENGTH	TOOL #	PRICE
3/4	3-3/4	81250	344.80
1	3-3/4	81260	344.80

DESCRIPTION	TOOL #	PRICE	
TPET-321 Insert with TiN Coating	60031	130.00	(Box of 10)
TPET-321-AL Insert for Non-Ferrous Materials	60038	143.00	(Box of 10)
Clamp Plate (Replacement)	81245	20.10	(Each)
Screw (Replacement)	81247	7.50	(Each)
Seat Pocket (Replacement)	81249	73.40	(Each)

SPEEDS & FEEDS (Adjustable Chamfer Cutter)

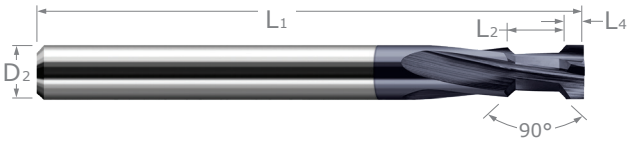
MATERIAL	SPEED (RPM)	FEED (Inches/Min)	DEPTH (Inches)
STEEL	600–2000	1″–4″	1/8″ MAX.
ALUMINUM	1000–6000 MAX.	3″–8″	1/8″ MAX.

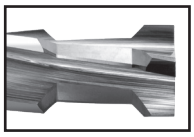


Angle Setting on Tool	Minimum Diameter*	Maximum Diameter*	Radial DOC of Insert*	Axial DOC of Insert*
10°	0.0717	1.2466	0.587	0.104
15°	0.1149	1.2672	0.576	0.154
20°	0.1617	1.2828	0.561	0.204
25°	0.2119	1.2931	0.541	0.252
30°	0.2649	1.2981	0.517	0.298
35°	0.3205	1.2977	0.489	0.342
40°	0.3781	1.2920	0.457	0.383
45°	0.4374	1.2810	0.422	0.422
50°	0.4978	1.2647	0.383	0.457
55°	0.5590	1.2433	0.342	0.489
60°	0.6205	1.2170	0.298	0.517
65°	0.6818	1.1860	0.252	0.541
70°	0.7424	1.1504	0.204	0.561
75°	0.8018	1.1106	0.154	0.576
80°	0.8597	1.0669	0.104	0.587

CHAMFER CUTTERS

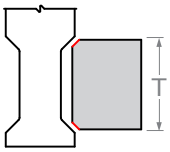
Plate Chamfer Cutters



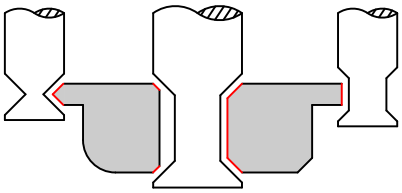


Cutting Along Entirety of Concave Form

- Tool designed to chamfer top and bottom in a single pass
- Cutting along entirety of concave form (L_2) only
- Minor diameter (D_3) relieved for light profiling and trimming edges
- 10° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA



Nominal Plate Thickness

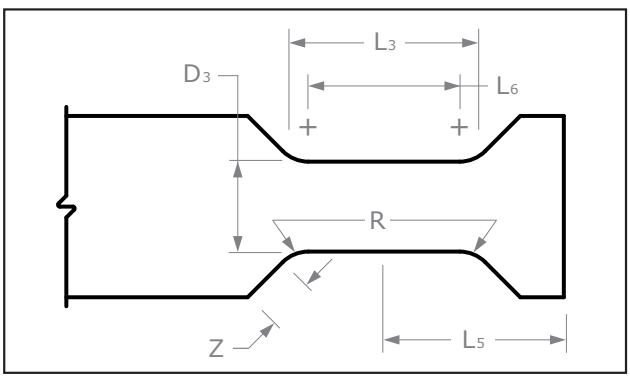


Capable of Performing Full Form Engagement, Light Profiling, & Edge Trimming

MAX OPENING WIDTH	MIN OPENING WIDTH	CHAMFER LENGTH	MINOR DIA.	MINOR DIA. LENGTH	RADIUS	END LENGTH	END TO CENTER	NOMINAL PLATE THICKNESS*	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
L_2 +.001" −.001"	L_3	Z	D_3 +.000" −.002"	L_6	R (MAX.)	L_4	L_5 +.001" −.001"	T	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.037	.010	**.019**	.096	.008	.005	.040	.059	.031	1/8	1-1/2	955202	51.70	955202-C3	56.30
.068	.037	**.022**	.091	.029	.006	.040	.074	.062	1/8	1-1/2	955204	51.70	955204-C3	56.30
.074	.012	**.044**	.184	.001	.008	.060	.097	.068	1/4	2-1/2	971104	57.20	971104-C3	64.00
.099	.037	**.044**	.184	.026	.008	.060	.110	.093	1/4	2-1/2	971106	57.20	971106-C3	64.00
.135	.104	**.019**	.091	.096	.005	.040	.108	.125	1/8	1-1/2	955208	51.70	955208-C3	56.30
.135	.073	**.044**	.184	.062	.008	.060	.128	.125	1/4	2-1/2	971108	57.20	971108-C3	64.00
.197	.135	**.044**	.184	.124	.008	.060	.159	.187	1/4	2-1/2	971112	57.20	971112-C3	64.00
.197	.105	**.065**	.278	.093	.008	.060	.159	.187	3/8	2-1/2	980812	71.60	980812-C3	80.60
.260	.198	**.044**	.184	.187	.008	.060	.190	.250	1/4	2-1/2	971116	57.20	971116-C3	64.00
.260	.137	**.087**	.372	.126	.008	.060	.190	.250	1/2	3	965916	109.00	965916-C3	122.40
.385	.293	**.065**	.278	.281	.008	.060	.253	.375	3/8	2-1/2	980824	71.60	980824-C3	80.60
.385	.262	**.087**	.372	.251	.008	.060	.253	.375	1/2	3	965924	109.00	965924-C3	122.40
.510	.387	**.087**	.372	.376	.008	.060	.315	.500	1/2	3	965932	109.00	965932-C3	122.40

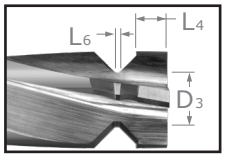
*Nominal Plate Thickness is ideal thickness of plate for chamfering top and bottom simultaneously.

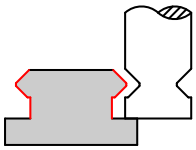
For additional tool dimensions, search for keyword PLATECHAMFER on www.harveytool.com.



PICATINNY FORM CUTTERS

Picatinny Rail Form Cutters



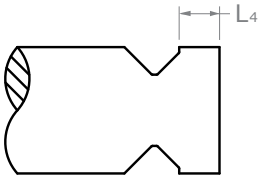


- Designed to the MIL-STD-1913 specifications
- Mill the entire Picatinny Rail in a single pass without tool changes
- Choose from two types:
  - Type I: Slight undercut at end of End Length (L4)
  - Type II: .005" radius tangent to angle and End Length (L4)
- Cutting on entirety of concave form and OD flat at end
- 4 helical flutes allow for better cutting action
- .005" max radii for all internal corners
- Solid carbide
- CNC ground in the USA

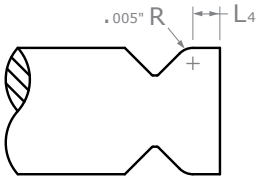
OUTSTANDING IN ALUMINUM!

CUTTER DIAMETER	LENGTH OF CUT	MINOR DIAMETER	MINOR DIA. LENGTH (TSC)	END LENGTH	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.008''}_{-.000''}$	D_3 $^{+.001''}_{-.001''}$	L_6	L_4		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.500 (1/2)	.377	.282	.021	.160	I	1/2	3	875632	139.70	875632-C8	161.80
.500 (1/2)	.377	.282	.021	.137	II	1/2	3	830032	139.70	830032-C8	161.80
.625 (5/8)	.377	.407	.021	.160	I	5/8	3-1/2	875640	160.00	875640-C8	192.20

Type I - Picatinny Rail Form 1995 Standard



Type II - Picatinny Rail Form 1999 Standard



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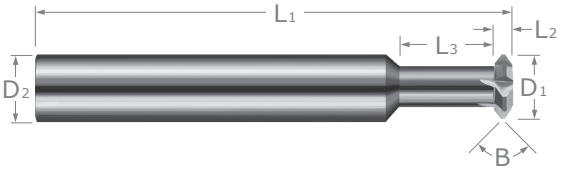
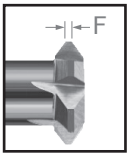
PICATINNY FORM CUTTERS

Picatinny Attachment Cutters





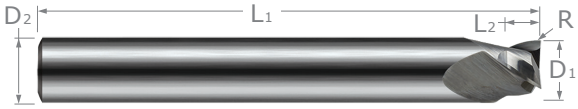
- Mill the inverse form for the Picatinny Rail used for attachments
- Cutting on entirety of angle and flat
- Short reaches for maximum strength
- 6 flutes
- Solid carbide
- CNC ground in the USA

OUTSTANDING IN ALUMINUM!

INCLUDED ANGLE	CUTTER DIAMETER	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
B $^{+0.5°}_{-0.5°}$	D_1 $^{+.000″}_{-.002″}$	F	L_2 $^{+.002″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	D_2	L_1	6 FL	PRICE	6 FL	PRICE
90°	.500 (1/2)	.021	.2075	1/4	.375	1/2	3	859232	125.40	859232-C8	147.50
	.625 (5/8)	.021	.2075	3/8	.500	5/8	3-1/2	859240	163.30	859240-C8	195.50

PICATINNY FORM CUTTERS

Picatinny Recoil Groove End Mills



Stocked in sharp corner, .005", or .010" corner radius

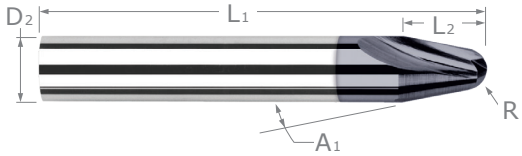
- Optimized for the grooves across the Picatinny Rail
- Diameter allows for a single pass to create the groove
- Stub flute length for improved strength
- Cutting on transition to allow for slight edge break at top of groove
- High helix and optimized geometry for improved performance
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

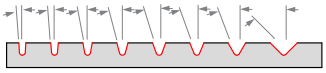
OUTSTANDING IN ALUMINUM!

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 $^{+.002″}_{-.000″}$	R $^{+.001″}_{-.001″}$	L_2 $^{+.008″}_{-.000″}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
.206	SHARP!	.118	1/4	2-1/2	864806	33.60	864806-C8	40.90
.206	.005	.118	1/4	2-1/2	874406	36.90	874406-C8	44.20
.206	.010	.118	1/4	2-1/2	862606	36.90	862606-C8	44.20
.210	SHARP!	.118	1/4	2-1/2	864810	33.60	864810-C8	40.90
.210	.005	.118	1/4	2-1/2	874410	36.90	874410-C8	44.20
.210	.010	.118	1/4	2-1/2	862610	36.90	862610-C8	44.20

NEW SIZES!

RUNNER CUTTERS





Stocked in *Eight* Angles Per Side!

- Designed to mill 3°, 5°, 10°, 15°, 20°, 22.5°, 30°, or 45° channels in molds
- 2 helical flutes (12° helix)
- AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- Center cutting
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
3°	1/64	.921	1/8	1-1/2	843600	43.00	843600-C3	47.60		
	1/32	.631	1/8	1-1/2	843602	43.00	843602-C3	47.60		
	1/16	.666	3/16	2	843604	47.40	843604-C3	52.40		
5°	1/64	.557	1/8	1-1/2	936300	43.00	936300-C3	47.60		
	1/32	.390	1/8	1-1/2	936302	43.00	936302-C3	47.60		
	3/64	.579	3/16	2	936303	47.40	936303-C3	52.40		
	1/16	.422	3/16	2	936304	47.40	936304-C3	52.40		
	3/32	.812	5/16	2-1/2	936306	60.80	936306-C3	68.70		
	1/8	.834	3/8	2-1/2	936308	68.20	936308-C3	77.20		
10°	.005	.331	1/8	1-1/2	75050	37.80	75050-C3	42.40		
	.010	.307	1/8	1-1/2	75052	37.80	75052-C3	42.40	75052-C6	44.60
	1/64	.283	1/8	1-1/2	75000	37.80	75000-C3	42.40	75000-C6	44.60
	.020	.259	1/8	1-1/2	75001	37.80	75001-C3	42.40	75001-C6	44.60
	.025	.235	1/8	1-1/2	75054	37.80	75054-C3	42.40		
	1/32	.384	3/16	2	75002	43.00	75002-C3	48.00	75002-C6	50.30
	.040	.341	3/16	2	75062	47.40	75062-C3	52.40		
	3/64	.308	3/16	2	75003	47.40	75003-C3	52.40		
	1/16	.414	1/4	2-1/2	75004	53.10	75004-C3	59.90	75004-C6	63.10
	5/64	.338	1/4	2-1/2	75005	54.40	75005-C3	61.20		
	3/32	.444	5/16	2-1/2	75006	60.80	75006-C3	68.70		
	7/64	.367	5/16	2-1/2	75007	61.00	75007-C3	68.90		
	1/8	.469	3/8	2-1/2	75008	68.20	75008-C3	77.20		
	5/32	.675	1/2	3	75010	80.20	75010-C3	93.60		
15°	.005	.219	1/8	1-1/2	75150	38.40	75150-C3	43.00		
	.010	.205	1/8	1-1/2	75152	37.80	75152-C3	42.40	75152-C6	44.60
	1/64	.190	1/8	1-1/2	75100	37.80	75100-C3	42.40	75100-C6	44.60
	.020	.176	1/8	1-1/2	75101	37.80	75101-C3	42.40	75101-C6	44.60
	.025	.162	1/8	1-1/2	75154	37.80	75154-C3	42.40		
	1/32	.261	3/16	2	75102	43.00	75102-C3	48.00	75102-C6	50.30
	.040	.235	3/16	2	75162	47.40	75162-C3	52.40		
	3/64	.215	3/16	2	75103	47.40	75103-C3	52.40		
	1/16	.289	1/4	2-1/2	75104	53.10	75104-C3	59.90	75104-C6	63.10
	5/64	.243	1/4	2-1/2	75105	54.40	75105-C3	61.20		
	3/32	.317	5/16	2-1/2	75106	60.80	75106-C3	68.70		
	7/64	.271	5/16	2-1/2	75107	61.00	75107-C3	68.90		
	1/8	.342	3/8	2-1/2	75108	68.20	75108-C3	77.20		
	5/32	.486	1/2	3	75110	80.20	75110-C3	93.60		

continued on next page

NEW SIZES!

RUNNER CUTTERS

(cont.)

continued from previous page

ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED		
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE	
20°	.005	.162	1/8	1-1/2	979950	39.50	979950-C3	44.10			
	.010	.152	1/8	1-1/2	979952	39.50	979952-C3	44.10			
	1/64	.143	1/8	1-1/2	979900	37.80	979900-C3	42.40	979900-C6	44.60	
	.020	.133	1/8	1-1/2	979901	40.60	979901-C3	45.20	979901-C6	47.40	
	.025	.124	1/8	1-1/2	979954	40.60	979954-C3	45.20			
	1/32	.198	3/16	2	979902	43.00	979902-C3	48.00	979902-C6	50.30	NEW
	3/64	.167	3/16	2	979903	47.40	979903-C3	52.40			
	1/16	.224	1/4	2-1/2	979904	53.10	979904-C3	59.90			
	5/64	.193	1/4	2-1/2	979905	54.40	979905-C3	61.20			
	3/32	.250	5/16	2-1/2	979906	60.80	979906-C3	68.70			
	1/8	.275	3/8	2-1/2	979908	68.20	979908-C3	77.20			
22.5°	1/64	.127	1/8	1-1/2	867800	37.80	867800-C3	42.40			
	1/32	.176	3/16	2	867802	43.00	867802-C3	48.00			
	1/16	.277	5/16	2-1/2	867804	60.80	867804-C3	68.30			
30°	.005	.157	3/16	2	934550	56.10	934550-C3	61.10			
	.010	.152	3/16	2	934552	56.10	934552-C3	61.10			
	1/64	.147	3/16	2	934500	54.40	934500-C3	59.40	934500-C6	61.70	NEW
	.020	.142	3/16	2	934501	54.40	934501-C3	59.40			
	1/32	.186	1/4	2-1/2	934502	54.40	934502-C3	61.20	934502-C6	64.40	
	3/64	.224	5/16	2-1/2	934503	60.80	934503-C3	68.70			
	1/16	.263	3/8	2-1/2	934504	68.20	934504-C3	77.20			
45°	1/64	.119	1/4	2-1/2	856500	55.50	856500-C3	62.30			
	1/32	.143	5/16	2-1/2	856502	61.80	856502-C3	69.70			
	3/64	.168	3/8	2-1/2	856503	69.50	856503-C3	78.50			
	1/16	.224	1/2	3	856504	83.90	856504-C3	97.30			

Multi-Functional Tools Every Shop Should Have

Is your shop trying to become more efficient? Which shop isn't? Learn how these 5 tools can go a long way toward reducing your cycle times and boosting your shop's daily output in our "In the Loupe" blog post **Multi-Functional Tools Every Shop Should Have**.

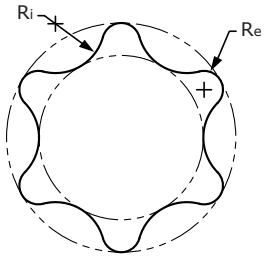
Read more on harveyperformance.com/in-the-loupe/

HEXALOBE CUTTERS

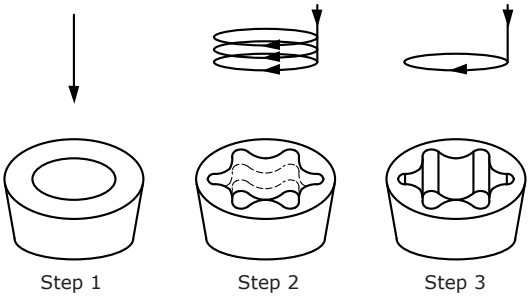
- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

	HEXALOBULAR SOCKET NUMBER	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2 (h6)	L_1	4 FL	PRICE
NEW	T8 / T10	.014	**.084** (6x)	.1575 (4 mm)	1.575 (40 mm)	793314-C6	43.30
NEW	T15 / T20	.020	**.120** (6x)	.1575 (4 mm)	1.575 (40 mm)	793320-C6	43.30
NEW	T25 / T30	.028	**.168** (6x)	.1575 (4 mm)	1.575 (40 mm)	793328-C6	43.30

Hexalobe Order of Operations



There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.



1. Pre-drill minor diameter with a drill and countersink top of the hole with appropriate angle chamfer
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
   (Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

NEW

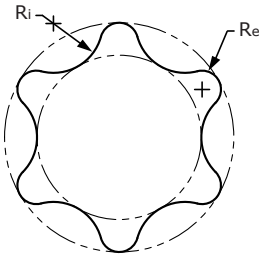
HEXALOBE CUTTERS

Long Reach

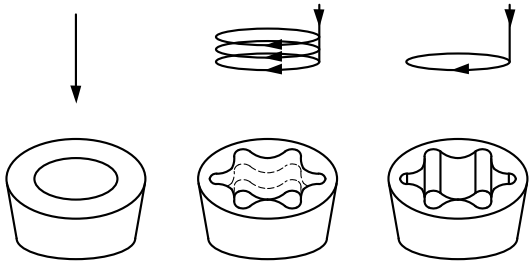
- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- Reduced neck diameter to avoid heeling
- h6 shank tolerance for high precision tool holders
- Center Cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	
T8 / T10	**.014**	.023	**.045** (3x)	.1575 (4 mm)	1.575 (40 mm)	792714-C6	45.50	NEW
T8 / T10	**.014**	.023	**.084** (6x)	.1575 (4 mm)	1.575 (40 mm)	791814-C6	48.50	NEW
T15 / T20	**.020**	.030	**.060** (3x)	.1575 (4 mm)	1.575 (40 mm)	792720-C6	45.50	NEW
T15 / T20	**.020**	.030	**.120** (6x)	.1575 (4 mm)	1.575 (40 mm)	791820-C6	48.50	NEW
T25 / T30	**.028**	.042	**.084** (3x)	.1575 (4 mm)	1.575 (40 mm)	792728-C6	45.50	NEW
T25 / T30	**.028**	.042	**.168** (6x)	.1575 (4 mm)	1.575 (40 mm)	791828-C6	48.50	NEW

Hexalobe Order of Operations



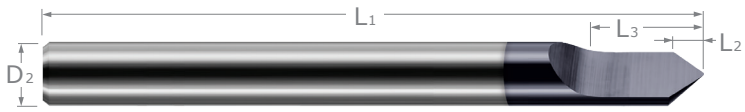
There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.

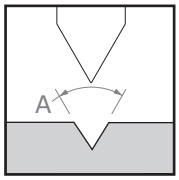


1. Pre-drill minor diameter with a drill and countersink top of the hole with appropriate angle chamfer
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
   (Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

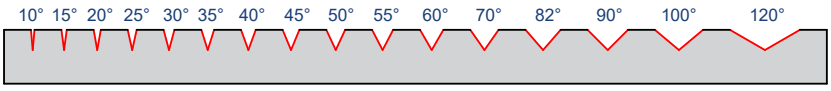
ENGRAVING CUTTERS

Pointed





- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



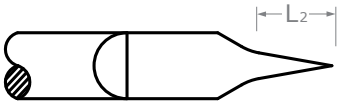
Stocked in *Sixteen* Included Angles!

mm & in

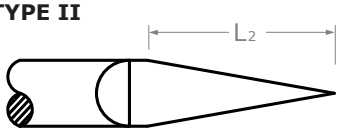
INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	1/8	.080	I	.200	1-1/2		996508	21.20	996508-C3	25.80		
10°	3/16	.080	I	1/4	2		996512	21.40	996512-C3	26.40		
	1/4	.080	I	5/16	2-1/2		996516	25.90	996516-C3	32.70		
	1/8	.080	I	.200	1-1/2		998108	21.20	998108-C3	25.80		
15°	3/16	.080	I	1/4	2		998112	21.40	998112-C3	26.40		
	1/4	.080	I	5/16	2-1/2		998116	25.90	998116-C3	32.70		
	1/8	.080	I	.200	1-1/2		999708	21.20	999708-C3	25.80	999708-C4	32.90
20°	3/16	.080	I	1/4	2		999712	21.40	999712-C3	26.40		
	1/4	.080	I	5/16	2-1/2		999716	25.90	999716-C3	32.70		
	1/8	.080	I	.200	1-1/2		983808	21.20	983808-C3	25.80		
25°	3/16	.080	I	1/4	2		983812	21.40	983812-C3	26.40		
	1/4	.080	I	5/16	2-1/2		983816	25.90	983816-C3	32.70		
	1/8	.080	I	.200	1-1/2		981508	19.00	981508-C3	23.60		
	1/8	.233	II	3/8	1-1/2		25010	14.50	25010-C3	19.10	25010-C4	26.20
30°	1/8	.233	II	3/8	4	***LONG!***	941708	23.90	941708-C3	30.10		
	3/16	.350	II	3/8	2		25020	18.80	25020-C3	23.80		
	1/4	.466	II	1/2	2-1/2		25030	23.30	25030-C3	30.10		
35°	1/8	.198	II	3/8	1-1/2		853508	17.10	853508-C3	21.70		
	1/8	.080	I	.200	1-1/2		978608	19.90	978608-C3	24.50		
	1/8	.171	II	3/8	1-1/2		25110	15.10	25110-C3	19.70	25110-C4	26.80
40°	1/8	.171	II	3/8	4	***LONG!***	937808	24.90	937808-C3	31.10		
	3/16	.257	II	3/8	2		25120	20.10	25120-C3	25.10		
	1/4	.343	II	3/8	2-1/2		25130	24.40	25130-C3	31.20		
	1/8	.151	II	3/8	1-1/2		997308	15.80	997308-C3	20.40	997308-C4	27.50
45°	3/16	.226	II	3/8	2		997312	20.30	997312-C3	25.30		
	1/4	.302	II	3/8	2-1/2		997316	25.30	997316-C3	32.10		
	1/8	.134	II	3/8	1-1/2		998408	15.90	998408-C3	20.50		
50°	3/16	.201	II	3/8	2		998412	20.70	998412-C3	25.40		
	1/4	.268	II	3/8	2-1/2		998416	25.90	998416-C3	32.70		
55°	1/8	.120	II	3/8	1-1/2		855508	17.10	855508-C3	21.70		

continued on next page

TYPE I



TYPE II

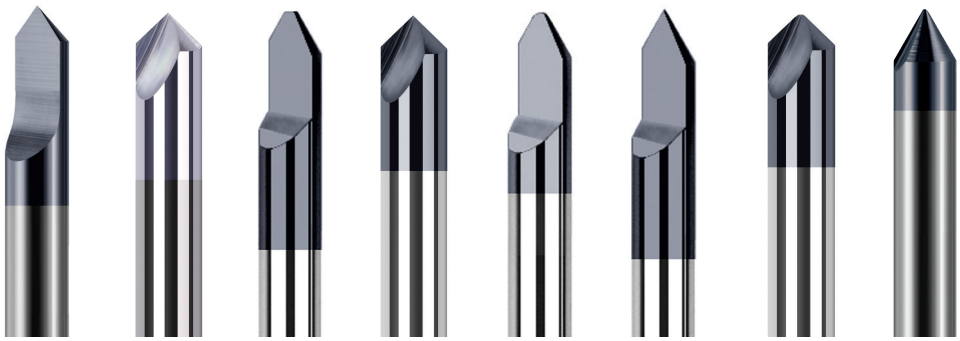


ENGRAVING CUTTERS

Pointed (cont.)

mm & in continued from previous page

INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	3 mm	2.60 mm	II	10 mm	38 mm		898657	16.60	898657-C3	21.20		
	1/8	.108	II	3/8	1-1/2		30010	14.50	30010-C3	19.10	30010-C4	26.20
	1/8	.108	II	3/8	4	*LONG!*	30410	23.90	30410-C3	30.10	30410-C4	35.60
	3/16	.162	II	3/8	2		30020	18.80	30020-C3	23.80	30020-C4	34.90
60°	3/16	.162	II	3/8	4	*LONG!*	30420	31.50	30420-C3	38.30		
	6 mm	5.20 mm	II	10 mm	63 mm		898666	26.90	898666-C3	33.70		
	1/4	.216	II	3/8	2-1/2		30030	23.30	30030-C3	30.10	30030-C4	41.60
	1/4	.216	II	3/8	6	*LONG!*	30430	45.20	30430-C3	54.20		
	3/8	.325	II	3/8	2-1/2		30040	32.80	30040-C3	41.80		
	1/8	.089	II	3/8	1-1/2		937208	15.90	937208-C3	20.50		
70°	3/16	.134	II	3/8	2		937212	20.70	937212-C3	25.40		
	1/4	.179	II	3/8	2-1/2		937216	25.90	937216-C3	32.70		
	1/8	.072	II	3/8	1-1/2		971708	15.90	971708-C3	20.50		
82°	3/16	.108	II	3/8	2		971712	20.70	971712-C3	25.40		
	1/4	.144	II	3/8	2-1/2		971716	25.90	971716-C3	32.70		
	3 mm	1.50 mm	II	10 mm	38 mm		884157	16.60	884157-C3	21.20		
	1/8	.062	II	3/8	1-1/2		30110	14.50	30110-C3	19.10	30110-C4	26.20
	1/8	.062	II	3/8	4	*LONG!*	30510	23.90	30510-C3	30.10		
	3/16	.093	II	3/8	2		30120	18.80	30120-C3	23.80	30120-C4	34.90
90°	3/16	.093	II	3/8	4	*LONG!*	30520	31.50	30520-C3	38.30		
	6 mm	3.00 mm	II	10 mm	63 mm		884166	26.90	884166-C3	33.70		
	1/4	.125	II	3/8	2-1/2		30130	23.30	30130-C3	30.10	30130-C4	41.60
	1/4	.125	II	3/8	6	*LONG!*	30530	45.20	30530-C3	54.20		
	3/8	.187	II	3/8	2-1/2		30140	32.80	30140-C3	41.80		
	1/8	.052	II	3/8	1-1/2		983508	15.90	983508-C3	20.50		
100°	3/16	.079	II	3/8	2		983512	20.70	983512-C3	25.40		
	1/4	.105	II	3/8	2-1/2		983516	25.90	983516-C3	32.70		
	1/8	.036	II	3/8	1-1/2		990508	14.50	990508-C3	19.10		
120°	3/16	.054	II	3/8	2		990512	18.80	990512-C3	23.80		
	1/4	.072	II	3/8	2-1/2		990516	23.30	990516-C3	30.10		



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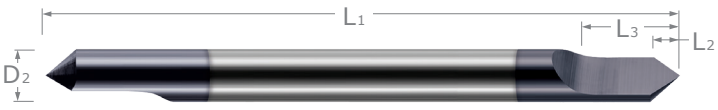
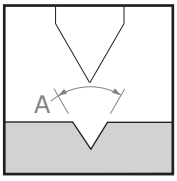
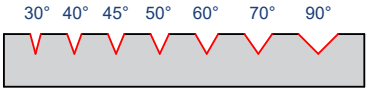
ENGRAVING CUTTERS

Pointed – Double-Ended





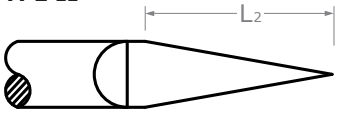
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Seven* Included Angles!

INCLUDED ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	.233	II	3/8	2	938408	25.00	938408-C3	30.70		
	3/16	.350	II	3/8	2	938410	31.00	938410-C3	37.80		
	1/4	.466	II	1/2	2-1/2	938412	36.90	938412-C3	45.90		
40°	1/8	.172	II	3/8	2	854008	27.10	854008-C3	32.80		
	3/16	.258	II	3/8	2	854010	33.20	854010-C3	40.00		
	1/4	.343	II	3/8	2-1/2	854012	39.40	854012-C3	48.40		
45°	1/8	.151	II	3/8	2	854508	27.10	854508-C3	32.80		
	3/16	.226	II	3/8	2	854510	33.20	854510-C3	40.00		
	1/4	.302	II	3/8	2-1/2	854512	39.40	854512-C3	48.40		
50°	1/8	.134	II	3/8	2	855008	27.10	855008-C3	32.80		
	3/16	.201	II	3/8	2	855010	33.20	855010-C3	40.00		
	1/4	.268	II	3/8	2-1/2	855012	39.40	855012-C3	48.40		
60°	1/8	.108	II	3/8	2	954608	25.00	954608-C3	30.70	954608-C4	45.90
	3/16	.162	II	3/8	2	954610	31.00	954610-C3	37.80		
	1/4	.216	II	3/8	2-1/2	954612	36.90	954612-C3	45.90		
70°	1/8	.089	II	3/8	2	857008	27.10	857008-C3	32.80		
	3/16	.134	II	3/8	2	857010	33.20	857010-C3	40.00		
	1/4	.179	II	3/8	2-1/2	857012	39.40	857012-C3	48.40		
90°	1/8	.062	II	3/8	2	975108	25.00	975108-C3	30.70	975108-C4	45.90
	3/16	.093	II	3/8	2	975110	31.00	975110-C3	37.80		
	1/4	.125	II	3/8	2-1/2	975112	36.90	975112-C3	45.90		

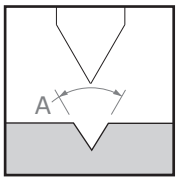
TYPE II



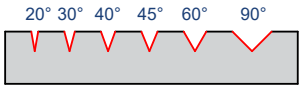
NEW SIZES!

ENGRAVING CUTTERS

Pointed – Pyramid Point



- 3 facet design increases tip strength
- Ground to a point
- Solid carbide
- CNC ground in the USA



Stocked in *Six* Included Angles!

INCLUDED ANGLE	DIAMETER	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED		
A	D_2	L_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
20°	1/8	.354	1-1/2	842810	24.70	842810-C3	29.30	
	3/16	.532	2	822010	26.90	822010-C3	31.90	NEW
	1/4	.709	2-1/2	834010	38.30	834010-C3	45.10	NEW
30°	1/8	.233	1-1/2	842815	24.70	842815-C3	29.30	
	3/16	.350	2	822015	26.90	822015-C3	31.90	
	1/4	.467	2-1/2	834015	38.30	834015-C3	45.10	
40°	1/8	.172	1-1/2	842820	24.70	842820-C3	29.30	
45°	1/8	.151	1-1/2	842823	24.70	842823-C3	29.30	
	1/4	.302	2-1/2	834023	26.90	834023-C3	33.70	
60°	1/8	.108	1-1/2	842830	24.70	842830-C3	29.30	
	3/16	.162	2	822030	26.90	822030-C3	31.90	
	1/4	.217	2-1/2	834030	38.30	834030-C3	45.10	
90°	1/8	.063	1-1/2	842845	24.70	842845-C3	29.30	
	3/16	.094	2	822045	26.90	822045-C3	31.90	
	1/4	.125	2-1/2	834045	38.30	834045-C3	45.10	

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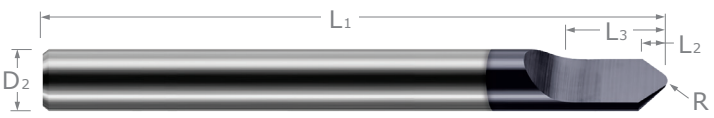
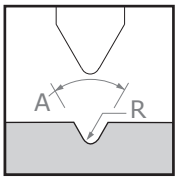
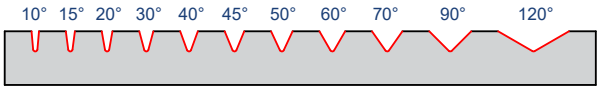
ENGRAVING CUTTERS

Tip Radius





- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Eleven* Included Angles!

INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	R	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.0050	.080	I	.200	1-1/2		940410	23.40	940410-C3	28.00		
	1/8	.0100	.080	I	.200	1-1/2		948010	23.40	948010-C3	28.00		
15°	1/8	.0050	.080	I	.200	1-1/2		952910	23.40	952910-C3	28.00		
	1/8	.0100	.080	I	.200	1-1/2		963510	23.40	963510-C3	28.00		
20°	1/8	.0050	.080	I	.200	1-1/2		989310	23.40	989310-C3	28.00		
	1/8	.0100	.080	I	.200	1-1/2		956010	23.40	956010-C3	28.00		
30°	1/8	.0025	.226	II	3/8	1-1/2		72715	21.50	72715-C3	26.10	72715-C4	33.20
	1/8	.0050	.219	II	3/8	1-1/2		47510	21.50	47510-C3	26.10	47510-C4	33.20
	1/8	.0100	.207	II	3/8	1-1/2		48810	21.50	48810-C3	26.10	48810-C4	33.20
	1/8	.0150	.190	II	3/8	1-1/2		49710	21.50	49710-C3	26.10		
	1/8	.0200	.176	II	3/8	1-1/2		58610	21.50	58610-C3	26.10		
	1/8	.0300	.147	II	3/8	1-1/2		868910	21.50	868910-C3	26.10		
	3/16	.0050	.336	II	3/8	2		47520	26.20	47520-C3	31.20		
	3/16	.0100	.321	II	3/8	2		48820	26.20	48820-C3	31.20		
	1/4	.0050	.452	II	1/2	2-1/2		47530	36.90	47530-C3	43.70		
	1/4	.0100	.438	II	1/2	2-1/2		48830	36.90	48830-C3	43.70		
40°	1/8	.0025	.167	II	3/8	1-1/2		72720	22.50	72720-C3	27.10		
	1/8	.0050	.162	II	3/8	1-1/2		57610	22.50	57610-C3	27.10		
	1/8	.0100	.152	II	3/8	1-1/2		58210	22.50	58210-C3	27.10		
	1/8	.0150	.143	II	3/8	1-1/2		59310	22.50	59310-C3	27.10		
	1/8	.0200	.133	II	3/8	1-1/2		60510	22.50	60510-C3	27.10		
45°	1/8	.0050	.143	II	3/8	1-1/2		946502	23.00	946502-C3	27.60		
	1/8	.0100	.135	II	3/8	1-1/2		957910	23.00	957910-C3	27.60		
50°	1/8	.0050	.127	II	3/8	1-1/2		845010	23.00	845010-C3	27.60		
	1/8	.0100	.120	II	3/8	1-1/2		847210	23.00	847210-C3	27.60		
60°	1/8	.0025	.106	II	3/8	1-1/2		72730	21.50	72730-C3	26.10	72730-C4	33.20
	1/8	.0050	.103	II	3/8	1-1/2		48110	21.50	48110-C3	26.10	48110-C4	33.20
	1/8	.0050	.103	II	3/8	4	LONG!	974910	38.60	974910-C3	43.60		
	1/8	.0075	.101	II	3/8	1-1/2		967310	21.50	967310-C3	26.10		
	1/8	.0100	.098	II	3/8	1-1/2		49410	21.50	49410-C3	26.10	49410-C4	33.20
	1/8	.0125	.096	II	3/8	1-1/2		817110	21.50	817110-C3	26.10		
	1/8	.0150	.093	II	3/8	1-1/2		51710	21.50	51710-C3	26.10		
	1/8	.0200	.088	II	3/8	1-1/2		58910	21.50	58910-C3	26.10		
	1/8	.0300	.078	II	3/8	1-1/2		877010	21.50	877010-C3	26.10		
	3/16	.0025	.160	II	3/8	2		964830	26.20	964830-C3	31.20		
	3/16	.0050	.157	II	3/8	2		48120	26.20	48120-C3	31.20		
	3/16	.0075	.155	II	3/8	2		967320	26.20	967320-C3	31.20		

continued on next page

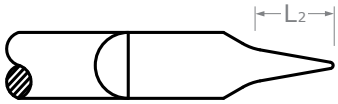
ENGRAVING CUTTERS

Tip Radius (cont.)

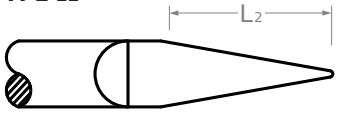
continued from previous page

INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	R	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
60°	3/16	.0100	.152	II	3/8	2		49420	26.20	49420-C3	31.20		
	3/16	.0150	.147	II	3/8	2		51720	26.20	51720-C3	31.20		
	3/16	.0200	.142	II	3/8	2		58920	26.20	58920-C3	31.20		
	1/4	.0025	.214	II	3/8	2-1/2		943730	28.80	943730-C3	35.60		
	1/4	.0050	.212	II	3/8	2-1/2		48130	28.80	48130-C3	35.60		
	1/4	.0075	.209	II	3/8	2-1/2		967330	28.80	967330-C3	35.60		
	1/4	.0100	.207	II	3/8	2-1/2		49430	28.80	49430-C3	35.60		
	1/4	.0150	.202	II	3/8	2-1/2		51730	28.80	51730-C3	35.60		
	1/4	.0200	.196	II	3/8	2-1/2		58930	28.80	58930-C3	35.60		
70°	1/8	.0050	.086	II	3/8	1-1/2		843810	23.00	843810-C3	27.60		
	1/8	.0100	.082	II	3/8	1-1/2		844710	23.00	844710-C3	27.60		
90°	1/8	.0025	.061	II	3/8	1-1/2		72745	21.50	72745-C3	26.10	72745-C4	33.20
	1/8	.0050	.060	II	3/8	1-1/2		48410	21.50	48410-C3	26.10	48410-C4	33.20
	1/8	.0050	.060	II	3/8	4	*LONG!*	986810	38.60	986810-C3	43.60		
	1/8	.0075	.059	II	3/8	1-1/2		959810	21.50	959810-C3	26.10		
	1/8	.0100	.058	II	3/8	1-1/2		49110	21.50	49110-C3	26.10	49110-C4	33.20
	1/8	.0125	.057	II	3/8	1-1/2		817010	21.50	817010-C3	26.10		
	1/8	.0150	.056	II	3/8	1-1/2		50810	21.50	50810-C3	26.10		
	1/8	.0200	.054	II	3/8	1-1/2		59910	21.50	59910-C3	26.10		
	1/8	.0300	.050	II	3/8	1-1/2		891410	21.50	891410-C3	26.10		
	3/16	.0025	.093	II	3/8	2		964845	26.20	964845-C3	31.20		
	3/16	.0050	.092	II	3/8	2		48420	26.20	48420-C3	31.20		
	3/16	.0100	.090	II	3/8	2		49120	26.20	49120-C3	31.20		
	3/16	.0150	.088	II	3/8	2		50820	26.20	50820-C3	31.20		
	3/16	.0200	.085	II	3/8	2		59920	26.20	59920-C3	31.20		
	1/4	.0025	.124	II	3/8	2-1/2		943745	28.80	943745-C3	35.60		
	1/4	.0050	.123	II	3/8	2-1/2		48430	28.80	48430-C3	35.60		
	1/4	.0100	.121	II	3/8	2-1/2		49130	28.80	49130-C3	35.60		
	1/4	.0150	.119	II	3/8	2-1/2		50830	28.80	50830-C3	35.60		
	1/4	.0200	.116	II	3/8	2-1/2		59930	28.80	59930-C3	35.60		
120°	1/8	.0050	.035	II	3/8	1-1/2		947310	21.50	947310-C3	26.10		
	1/8	.0100	.035	II	3/8	1-1/2		939110	21.50	939110-C3	26.10		

TYPE I

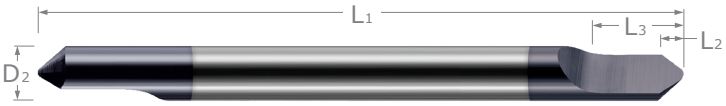


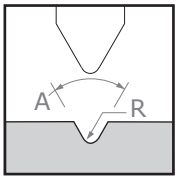
TYPE II



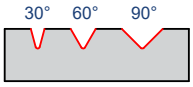
ENGRAVING CUTTERS

Tip Radius – Double-Ended





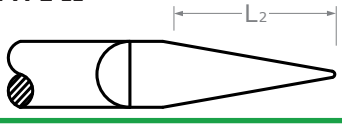
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Three* Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	R	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	.0025	.226	II	3/8	2	842008	33.10	842008-C3	38.80
	1/8	.0050	.219	II	3/8	2	834408	33.10	834408-C3	38.80
	1/8	.0100	.205	II	3/8	2	835008	33.10	835008-C3	38.80
	1/8	.0200	.176	II	3/8	2	836108	33.10	836108-C3	38.80
	1/4	.0050	.452	II	1/2	2-1/2	834416	43.50	834416-C3	52.50
	1/4	.0100	.438	II	1/2	2-1/2	835016	43.50	835016-C3	52.50
60°	1/8	.0025	.106	II	3/8	2	834708	33.10	834708-C3	38.80
	1/8	.0050	.103	II	3/8	2	828208	33.10	828208-C3	38.80
	1/8	.0100	.098	II	3/8	2	828808	33.10	828808-C3	38.80
	1/8	.0200	.088	II	3/8	2	829908	33.10	829908-C3	38.80
	1/4	.0050	.212	II	3/8	2-1/2	828216	43.50	828216-C3	52.50
	1/4	.0100	.207	II	3/8	2-1/2	828816	43.50	828816-C3	52.50
90°	1/8	.0025	.061	II	3/8	2	828908	33.10	828908-C3	38.80
	1/8	.0050	.060	II	3/8	2	818308	33.10	818308-C3	38.80
	1/8	.0100	.058	II	3/8	2	818908	33.10	818908-C3	38.80
	1/8	.0200	.054	II	3/8	2	820108	33.10	820108-C3	38.80
	1/4	.0050	.123	II	3/8	2-1/2	818316	43.50	818316-C3	52.50
	1/4	.0100	.121	II	3/8	2-1/2	818916	43.50	818916-C3	52.50

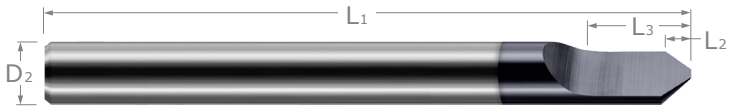
TYPE II

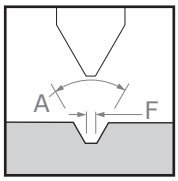


NEW SIZES!

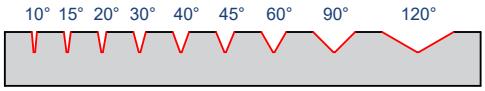
ENGRAVING CUTTERS

Tipped Off





- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Nine* Included Angles!

INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
10°	1/8	.005	.080	I	.200	1-1/2	993002	22.70	993002-C3	27.30			
	1/8	.010	.080	I	.200	1-1/2	993010	22.70	993010-C3	27.30			
	1/8	.020	.080	I	.200	1-1/2	993052	22.70	993052-C3	27.30			
15°	1/8	.005	.080	I	.200	1-1/2	990002	22.70	990002-C3	27.30			
	1/8	.010	.080	I	.200	1-1/2	990010	22.70	990010-C3	27.30			
	1/8	.020	.080	I	.200	1-1/2	990052	22.70	990052-C3	27.30			
20°	1/8	.005	.080	I	.200	1-1/2	987002	22.70	987002-C3	27.30			
	1/8	.010	.080	I	.200	1-1/2	987010	22.70	987010-C3	27.30			
	1/8	.020	.080	I	.200	1-1/2	987052	22.70	987052-C3	27.30			
30°	1/8	.005	.224	II	3/8	1-1/2	25202	16.50	25202-C3	21.10	25202-C4	28.20	NEW
	1/8	.010	.215	II	3/8	1-1/2	25210	16.50	25210-C3	21.10	25210-C4	28.20	
	1/8	.015	.205	II	3/8	1-1/2	25242	16.50	25242-C3	21.10			
	1/8	.020	.196	II	3/8	1-1/2	25252	16.50	25252-C3	21.10			
	1/8	.030	.177	II	3/8	1-1/2	25256	16.50	25256-C3	23.30			
	3/16	.010	.331	II	3/8	2	25220	21.50	25220-C3	26.50			
	3/16	.020	.313	II	3/8	2	25226	21.50	25226-C3	26.50			
	3/16	.030	.294	II	3/8	2	25224	21.50	25224-C3	26.10			
	1/4	.005	.457	II	1/2	2-1/2	25228	24.90	25228-C3	31.70			
	1/4	.010	.448	II	1/2	2-1/2	25230	24.90	25230-C3	31.70			
	1/4	.020	.429	II	1/2	2-1/2	25234	24.90	25234-C3	31.70			
	1/4	.030	.411	II	1/2	2-1/2	25236	24.90	25236-C3	33.90			
40°	1/8	.005	.165	II	3/8	1-1/2	25302	17.20	25302-C3	21.80			
	1/8	.010	.158	II	3/8	1-1/2	25310	17.20	25310-C3	21.80	25310-C4	28.90	
	1/8	.015	.151	II	3/8	1-1/2	25342	17.20	25342-C3	21.80			
	1/8	.020	.144	II	3/8	1-1/2	25352	17.20	25352-C3	21.80			
	3/16	.010	.244	II	3/8	2	25320	22.50	25320-C3	27.50			
	1/4	.005	.337	II	3/8	2-1/2	25328	26.20	25328-C3	33.00			
	1/4	.010	.330	II	3/8	2-1/2	25330	26.20	25330-C3	33.00			

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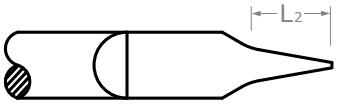
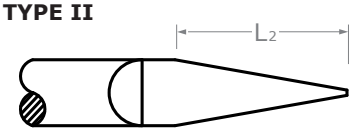
TYPE I



TYPE II



ENGRAVING CUTTERS

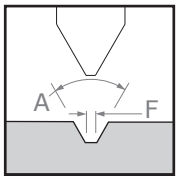
Tipped Off (cont.)

continued from previous page

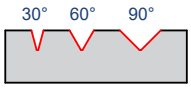
	INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	A	D_2	F	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	45°	1/8	.005	.145	II	3/8	1-1/2		955002	17.50	955002-C3	22.10		
		1/8	.010	.139	II	3/8	1-1/2		955010	17.50	955010-C3	22.10		
		3/16	.010	.214	II	3/8	2		955020	23.00	955020-C3	28.00		
		1/4	.010	.290	II	3/8	2-1/2		955030	26.70	955030-C3	33.50		
	60°	1/8	.005	.104	II	3/8	1-1/2		50710	16.50	50710-C3	21.10	50710-C4	28.20
		1/8	.005	.104	II	3/8	4	LONG!	823602	16.50	823602-C3	28.80		
		1/8	.010	.099	II	3/8	1-1/2		30210	16.50	30210-C3	21.10	30210-C4	28.20
		1/8	.015	.095	II	3/8	1-1/2		18242	16.50	18242-C3	21.10		
		1/8	.020	.091	II	3/8	1-1/2		26910	16.50	26910-C3	21.10	26910-C4	28.20
NEW		1/8	.025	.087	II	3/8	1-1/2		793055	16.50	793055-C3	21.10		
		1/8	.030	.082	II	3/8	1-1/2		27610	16.50	27610-C3	21.10	27610-C4	28.20
		3/16	.005	.158	II	3/8	2		50720	21.50	50720-C3	26.50		
		3/16	.005	.158	II	3/8	4	LONG!	823618	21.50	823618-C3	26.50		
		3/16	.010	.153	II	3/8	2		30220	21.50	30220-C3	26.50		
		3/16	.020	.145	II	3/8	2		26920	21.50	26920-C3	26.50		
		3/16	.030	.136	II	3/8	2		27620	21.50	27620-C3	26.50		
		1/4	.005	.212	II	3/8	2-1/2		50730	24.90	50730-C3	31.70		
		1/4	.005	.212	II	3/8	6	LONG!	823628	24.90	823628-C3	38.80		
		1/4	.010	.207	II	3/8	2-1/2		30230	24.90	30230-C3	31.70		
NEW		1/4	.015	.204	II	3/8	2-1/2		18232	24.90	18232-C3	31.70		
		1/4	.020	.199	II	3/8	2-1/2		26930	24.90	26930-C3	31.70		
		1/4	.030	.191	II	3/8	2-1/2		27630	24.90	27630-C3	31.70		
	90°	1/8	.005	.060	II	3/8	1-1/2		30302	16.50	30302-C3	21.10		
		1/8	.010	.057	II	3/8	1-1/2		30310	16.50	30310-C3	21.10	30310-C4	28.20
		1/8	.015	.055	II	3/8	1-1/2		30342	16.50	30342-C3	21.10		
		1/8	.020	.053	II	3/8	1-1/2		30352	16.50	30352-C3	21.10		
		1/8	.030	.048	II	3/8	1-1/2		30356	16.50	30356-C3	21.10		
		3/16	.010	.088	II	3/8	2		30320	21.50	30320-C3	26.50		
		3/16	.020	.084	II	3/8	2		30324	21.50	30324-C3	26.50		
		3/16	.030	.079	II	3/8	2		30326	21.50	30326-C3	30.50		
		1/4	.005	.123	II	3/8	2-1/2		30328	24.90	30328-C3	31.70		
		1/4	.010	.120	II	3/8	2-1/2		30330	24.90	30330-C3	31.70		
		1/4	.020	.115	II	3/8	2-1/2		30334	24.90	30334-C3	31.70		
		1/4	.030	.110	II	3/8	2-1/2		30336	24.90	30336-C3	29.50		
	120°	1/8	.005	.035	II	3/8	1-1/2		954102	16.50	954102-C3	21.10		
		1/8	.010	.033	II	3/8	1-1/2		954110	16.50	954110-C3	21.10		

ENGRAVING CUTTERS

Tipped Off – Double-Ended



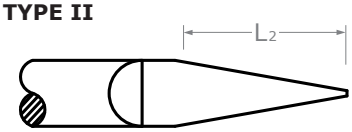
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Three* Included Angles!

INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	**.005**	.224	II	3/8	2	834308	28.00	834308-C3	33.70
	1/8	**.010**	.215	II	3/8	2	834908	28.00	834908-C3	33.70
	1/8	**.015**	.205	II	3/8	2	835508	28.00	835508-C3	33.70
	1/8	**.020**	.196	II	3/8	2	836208	28.00	836208-C3	33.70
	1/4	**.010**	.448	II	1/2	2-1/2	834916	39.70	834916-C3	48.70
60°	1/8	**.005**	.104	II	3/8	2	828108	28.00	828108-C3	33.70
	1/8	**.010**	.100	II	3/8	2	828708	28.00	828708-C3	33.70
	1/8	**.015**	.095	II	3/8	2	829308	28.00	829308-C3	33.70
	1/8	**.020**	.091	II	3/8	2	829808	28.00	829808-C3	33.70
	1/4	**.010**	.208	II	3/8	2-1/2	828716	39.70	828716-C3	48.70
90°	1/8	**.005**	.060	II	3/8	2	818208	28.00	818208-C3	33.70
	1/8	**.010**	.058	II	3/8	2	818808	28.00	818808-C3	33.70
	1/8	**.015**	.055	II	3/8	2	819408	28.00	819408-C3	33.70
	1/8	**.020**	.053	II	3/8	2	820008	28.00	820008-C3	33.70
	1/4	**.010**	.120	II	3/8	2-1/2	818816	39.70	818816-C3	48.70

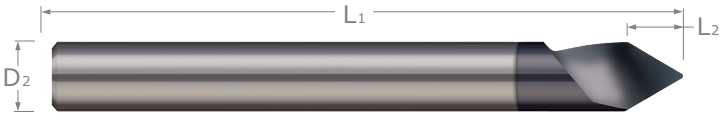
TYPE II

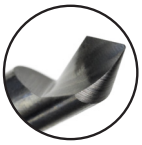


NEW COATING!

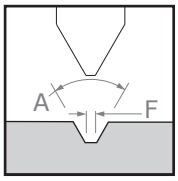
ENGRAVING CUTTERS

Tipped Off – Helical Flute

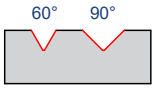




Spiral flute for soft materials



- Optimized geometry for superior engraving in softer materials such as plastics and aluminum
- Also excellent for stainless steel, Inconel, titanium, and other high temp alloys
- Free cutting action provides excellent surface finish and chip evacuation
- Tipped-off end diameter for improved cutting action
- AlTiN coating for increased performance in ferrous materials
- TiB_2 coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

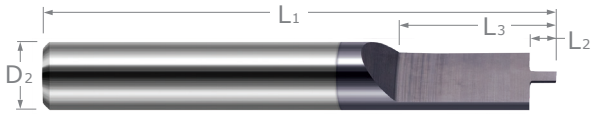


Stocked in *Two* Included Angles!

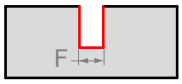
	INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	A	D_2	F	L_2	L_1	TOOL #	PRICE	TOOL #	PRICE	2 FL	PRICE
NEW	60°	1/8	.010	.100	1-1/2	824708	17.40	824708-C3	22.00	824708-C8	24.20
NEW		3/16	.010	.154	2	824712	22.60	824712-C3	27.20	824712-C8	29.40
NEW		1/4	.010	.208	2-1/2	824716	26.30	824716-C3	30.90	824716-C8	33.60
NEW	90°	1/8	.010	.058	1-1/2	814708	17.40	814708-C3	22.40	814708-C8	24.20
NEW		3/16	.010	.089	2	814712	22.60	814712-C3	27.20	814712-C8	29.40
NEW		1/4	.010	.120	2-1/2	814716	26.30	814716-C3	30.90	814716-C8	33.60

ENGRAVING CUTTERS

Parallel – Square



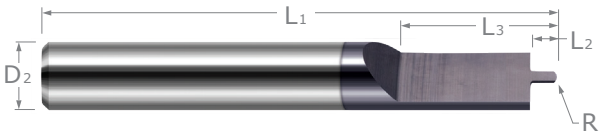
- Engraves a 90° vertical wall
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



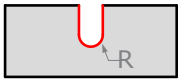
DIAMETER	FLAT ON PART	LENGTH OF CUT	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_2	F	L_2	L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	**.030**	.044	3/8	1-1/2	844230	18.00	844230-C3	22.60
1/8	**.060**	.090	3/8	1-1/2	844260	18.00	844260-C3	22.60
1/8	**.090**	.135	3/8	1-1/2	844290	18.00	844290-C3	22.60
3/16	**.060**	.090	3/8	2	827260	23.20	827260-C3	28.20
3/16	**.090**	.135	3/8	2	827290	23.20	827290-C3	28.20
3/16	**.125**	.190	1/2	2	827308	23.20	827308-C3	28.20
1/4	**.060**	.090	3/8	2-1/2	838960	27.00	838960-C3	33.80
1/4	**.090**	.135	3/8	2-1/2	838990	27.00	838990-C3	33.80
1/4	**.125**	.190	1/2	2-1/2	839008	27.00	839008-C3	33.80

ENGRAVING CUTTERS

Parallel – Ball



- Engraves a 90° vertical wall
- Radius on tip creates radius in the bottom of groove and improves strength
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



DIAMETER	RADIUS	LENGTH OF CUT	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_2	R	L_2	L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	**.0150**	.044	3/8	1-1/2	828530	20.20	828530-C3	24.80
1/8	**.0300**	.090	3/8	1-1/2	828560	20.20	828560-C3	24.80
1/8	**.0450**	.135	3/8	1-1/2	828590	20.20	828590-C3	24.80
3/16	**.0300**	.090	3/8	2	832660	25.40	832660-C3	30.40
3/16	**.0450**	.135	3/8	2	832690	25.40	832690-C3	30.40
3/16	**.0625**	.190	1/2	2	832708	25.40	832708-C3	30.40
1/4	**.0300**	.090	3/8	2-1/2	841360	29.20	841360-C3	36.00
1/4	**.0450**	.135	3/8	2-1/2	841390	29.20	841390-C3	36.00
1/4	**.0625**	.190	1/2	2-1/2	841408	29.20	841408-C3	36.00

★★★★★

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— @fro_fab

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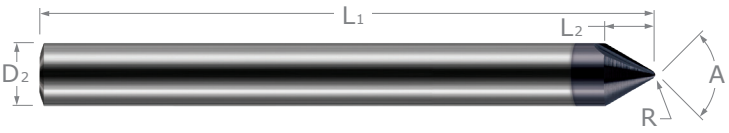
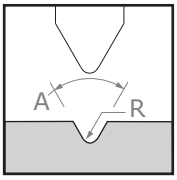
ENGRAVING CUTTERS

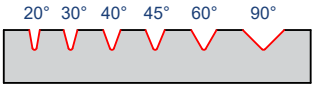
Tip Radius – 2 Flute – For Hardened Steels



2 Shallow Flute Design



- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tip radius end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA

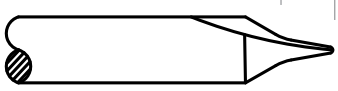


Stocked in *Six* Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A +0°30' −0°30'	D_2	R	L_2		L_1	2 FL	PRICE
20°	1/8	**.0050**	.080	I	1-1/2	873308-C6	29.30
	1/8	**.0100**	.080	I	1-1/2	857508-C6	29.30
	1/4	**.0100**	.080	I	2-1/2	857516-C6	45.20
30°	1/8	**.0050**	.218	II	1-1/2	858308-C6	28.20
	1/8	**.0075**	.211	II	1-1/2	825508-C6	28.20
	1/8	**.0100**	.204	II	1-1/2	851208-C6	28.20
	1/8	**.0150**	.190	II	1-1/2	821208-C6	28.20
	1/8	**.0200**	.175	II	1-1/2	843708-C6	28.20
	1/8	**.0250**	.161	II	1-1/2	821008-C6	28.20
	3/16	**.0050**	.335	II	2	858312-C6	34.40
	3/16	**.0100**	.331	II	2	851212-C6	34.40
	1/4	**.0050**	.452	II	2-1/2	858316-C6	43.30
	1/4	**.0100**	.437	II	2-1/2	851216-C6	43.30
	1/4	**.0200**	.409	II	2/12	843716-C6	43.30
40°	1/8	**.0050**	.162	II	1-1/2	837508-C6	29.30
	1/8	**.0100**	.152	II	1-1/2	859308-C6	29.30
	1/4	**.0100**	.324	II	2-1/2	859316-C6	45.20
45°	1/8	**.0050**	.142	II	1-1/2	825808-C6	29.30
	1/8	**.0100**	.152	II	1-1/2	825708-C6	29.30
60°	1/8	**.0050**	.103	II	1-1/2	860008-C6	28.20
	1/8	**.0075**	.100	II	1-1/2	838108-C6	28.20
	1/8	**.0100**	.098	II	1-1/2	877308-C6	28.20
	1/8	**.0150**	.093	II	1-1/2	849008-C6	28.20
	1/8	**.0200**	.088	II	1-1/2	845808-C6	28.20
	1/8	**.0250**	.083	II	1-1/2	820908-C6	28.20
	3/16	**.0050**	.157	II	2	860012-C6	34.40
	3/16	**.0100**	.152	II	2	877312-C6	34.40
	1/4	**.0050**	.211	II	2-1/2	860016-C6	43.30
	1/4	**.0075**	.209	II	2-1/2	838116-C6	43.30
	1/4	**.0100**	.206	II	2-1/2	877316-C6	43.30
	1/4	**.0150**	.201	II	2-1/2	849016-C6	43.30
	1/4	**.0200**	.196	II	2-1/2	845816-C6	43.30

continued on next page

TYPE I



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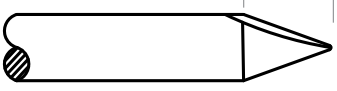

ENGRAVING CUTTERS

Tip Radius – 2 Flute – For Hardened Steels (cont.)

continued from previous page

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A $^{+0°30'}_{-0°30'}$	D_2	R	L_2		L_1	2 FL	PRICE
	1/8	**.0050**	.060	II	1-1/2	853108-C6	28.20
	1/8	**.0075**	.058	II	1-1/2	825908-C6	28.20
	1/8	**.0100**	.058	II	1-1/2	869408-C6	28.20
	1/8	**.0150**	.056	II	1-1/2	821108-C6	28.20
	1/8	**.0200**	.054	II	1-1/2	837108-C6	28.20
90°	1/8	**.0250**	.052	II	1-1/2	820808-C6	28.20
	3/16	**.0050**	.091	II	2	853112-C6	34.40
	3/16	**.0100**	.089	II	2	869412-C6	34.40
	1/4	**.0050**	.122	II	2-1/2	853116-C6	43.30
	1/4	**.0100**	.120	II	2-1/2	869416-C6	43.30
	1/4	**.0200**	.116	II	2-1/2	837116-C6	43.30

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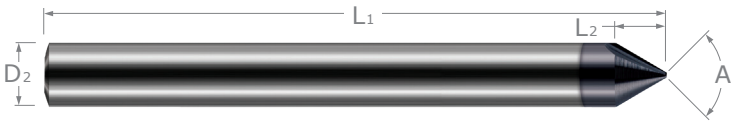
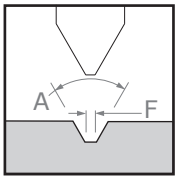
ENGRAVING CUTTERS

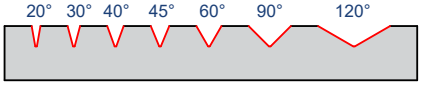
Tipped Off – 2 Flute – For Hardened Steels



2 Shallow Flute Design



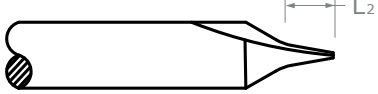
- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tipped off end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA



Stocked in *Seven* Included Angles!

INCLUDED ANGLE	DIAMETER	TIP FLAT	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A +0°30' −0°30'	D_2	F	L_2		L_1	2 FL	PRICE
20°	1/8	**.010**	.080	I	1-1/2	892508-C6	23.90
	1/4	**.010**	.080	I	2-1/2	892516-C6	38.30
30°	1/8	**.005**	.223	II	1-1/2	896708-C6	22.70
	1/8	**.010**	.214	II	1-1/2	882008-C6	22.70
	1/8	**.015**	.205	II	1-1/2	817908-C6	22.70
	1/8	**.020**	.195	II	1-1/2	879608-C6	22.70
	1/8	**.030**	.177	II	1-1/2	817608-C6	22.70
	3/16	**.010**	.331	II	2	882012-C6	27.50
	1/4	**.010**	.447	II	2-1/2	882016-C6	36.50
40°	1/8	**.005**	.164	I	1-1/2	811708-C6	23.90
	1/8	**.010**	.157	II	1-1/2	875108-C6	23.90
	1/4	**.010**	.329	II	2-1/2	875116-C6	38.30
45°	1/8	**.005**	.144	II	1-1/2	811608-C6	23.90
	1/8	**.010**	.138	II	1-1/2	811508-C6	23.90
60°	1/8	**.005**	.103	II	1-1/2	866708-C6	22.70
	1/8	**.010**	.099	II	1-1/2	889608-C6	22.70
	1/8	**.015**	.095	II	1-1/2	868108-C6	22.70
	1/8	**.020**	.090	II	1-1/2	892308-C6	22.70
	1/8	**.030**	.082	II	1-1/2	817508-C6	22.70
	3/16	**.005**	.158	II	2	866712-C6	27.50
	3/16	**.010**	.153	II	2	889612-C6	27.50
	1/4	**.010**	.207	II	2-1/2	889616-C6	36.50
	1/4	**.020**	.199	II	2-1/2	892316-C6	36.50
90°	1/8	**.005**	.060	II	1-1/2	880908-C6	22.70
	1/8	**.010**	.057	II	1-1/2	876508-C6	22.70
	1/8	**.015**	.055	II	1-1/2	817708-C6	22.70
	1/8	**.020**	.052	II	1-1/2	868408-C6	22.70
	1/8	**.030**	.047	II	1-1/2	817408-C6	22.70
	3/16	**.005**	.091	II	2	880912-C6	27.50
	3/16	**.010**	.088	II	2	876512-C6	27.50
	1/4	**.010**	.120	II	2-1/2	876516-C6	36.50
120°	1/8	**.010**	.033	II	1-1/2	865308-C6	22.70
	1/4	**.010**	.069	II	2-1/2	865316-C6	36.50

TYPE I



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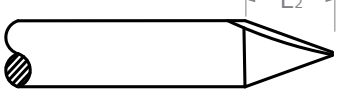
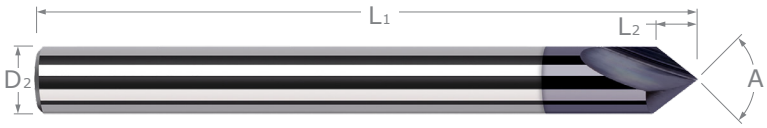
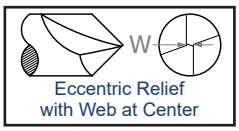


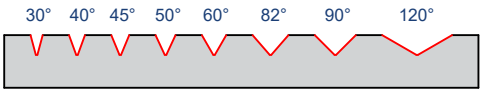
ENGRAVING CUTTERS

Marking Cutters





- **Designed for milling legible part numbers in difficult-to-machine materials**
- Burr-free, two flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half-round style engravers
- Requires less RPM than half-round engravers
- Solid carbide
- CNC ground in the USA



Stocked in *Eight* Included Angles!

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A +1° −1°	D_2	W	L_2	L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
30°	1/8	.003	.228	1-1/2		923908	18.00	923908-C3	22.60		
	1/8	.005	.224	1-1/2		47708	18.00	47708-C3	22.60	47708-C4	29.70
	1/8	.010	.215	1-1/2		996108	18.00	996108-C3	22.60		
	1/8	.015	.205	1-1/2		954008	18.00	954008-C3	22.60		
	3/16	.003	.344	2		923912	22.40	923912-C3	27.40		
	3/16	.005	.341	2		47712	22.40	47712-C3	27.40		
	3/16	.010	.331	2		996112	22.40	996112-C3	27.40		
	1/4	.003	.461	2-1/2		923916	31.40	923916-C3	38.20		
	1/4	.005	.457	2-1/2		47716	31.40	47716-C3	38.20		
	1/4	.010	.448	2-1/2		996116	31.40	996116-C3	38.20		
40°	1/8	.005	.165	1-1/2		995508	19.30	995508-C3	23.90	995508-C4	31.00
	1/8	.010	.158	1-1/2		996708	19.30	996708-C3	23.90		
	3/16	.005	.251	2		995512	24.40	995512-C3	29.40		
	3/16	.010	.244	2		996712	24.40	996712-C3	29.40		
	1/4	.005	.337	2-1/2		995516	34.10	995516-C3	40.90		
	1/4	.010	.330	2-1/2		996716	34.10	996716-C3	40.90		
45°	1/8	.005	.145	1-1/2		987408	19.00	987408-C3	23.60		
	3/16	.005	.220	2		987412	24.40	987412-C3	29.40		
	1/4	.005	.296	2-1/2		987416	34.10	987416-C3	40.90		
50°	1/8	.005	.129	1-1/2		976608	19.30	976608-C3	23.90		
	3/16	.005	.196	2		976612	24.20	976612-C3	29.20		
	1/4	.005	.263	2-1/2		976616	34.00	976616-C3	40.80		
60°	1/8	.003	.106	1-1/2		905708	18.00	905708-C3	22.60		
	1/8	.005	.104	1-1/2		29608	18.00	29608-C3	22.60	29608-C4	29.70
	1/8	.005	.104	3	***LONG!***	957808	22.00	957808-C3	26.60		
	1/8	.010	.100	1-1/2		48308	18.00	48308-C3	22.60	48308-C4	29.70
	1/8	.015	.095	1-1/2		948108	18.00	948108-C3	22.60		
	3/16	.003	.160	2		905712	22.40	905712-C3	27.40		
	3/16	.005	.158	2		29612	22.40	29612-C3	27.40	29612-C4	38.50
	3/16	.010	.154	2		48312	22.40	48312-C3	27.40		
	3/16	.015	.149	2		948112	22.40	948112-C3	27.40		

continued on next page

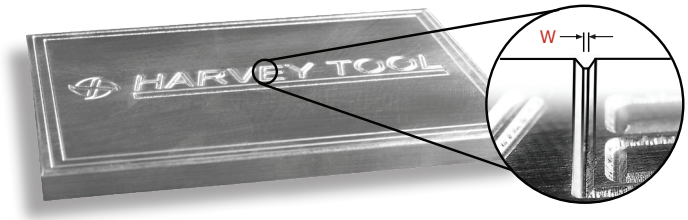
ENGRAVING CUTTERS

Marking Cutters for Ferrous Materials (cont.)

continued from previous page

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
60°	1/4	.003	.214	2-1/2		905716	31.40	905716-C3	38.20		
	1/4	.005	.212	2-1/2		29616	31.40	29616-C3	38.20	29616-C4	49.70
	1/4	.010	.208	2-1/2		48316	31.40	48316-C3	38.20		
	1/4	.015	.204	2-1/2		948116	31.40	948116-C3	38.20		
82°	1/8	.005	.069	1-1/2		974108	19.30	974108-C3	23.90		
90°	1/8	.003	.061	1-1/2		914608	18.00	914608-C3	22.60		
	1/8	.005	.060	1-1/2		23608	18.00	23608-C3	22.60	23608-C4	29.70
	1/8	.005	.060	3	*LONG!*	968108	22.00	968108-C3	26.60		
	1/8	.010	.058	1-1/2		50408	18.00	50408-C3	22.60	50408-C4	29.70
	1/8	.015	.055	1-1/2		939708	18.00	939708-C3	22.60		
	3/16	.003	.092	2		914612	22.40	914612-C3	27.40		
	3/16	.005	.091	2		23612	22.40	23612-C3	27.40	23612-C4	38.50
	3/16	.010	.089	2		50412	22.40	50412-C3	27.40		
	3/16	.015	.086	2		939712	22.40	939712-C3	27.40		
	1/4	.003	.124	2-1/2		914616	31.40	914616-C3	38.20		
	1/4	.005	.123	2-1/2		23616	31.40	23616-C3	38.20	23616-C4	49.70
	1/4	.010	.120	2-1/2		50416	31.40	50416-C3	38.20		
	1/4	.015	.118	2-1/2		939716	31.40	939716-C3	38.20		
120°	1/8	.003	.035	1-1/2		844808	18.00	844808-C3	22.60		
	1/8	.005	.035	1-1/2		23708	18.00	23708-C3	22.60	23708-C4	29.70
	1/8	.010	.033	1-1/2		998808	18.00	998808-C3	22.60		
	3/16	.005	.053	2		23712	22.40	23712-C3	27.40		
	3/16	.010	.051	2		998812	22.40	998812-C3	27.40		
	1/4	.005	.071	2-1/2		23716	31.40	23716-C3	38.20		
	1/4	.010	.069	2-1/2		998816	31.40	998816-C3	38.20		

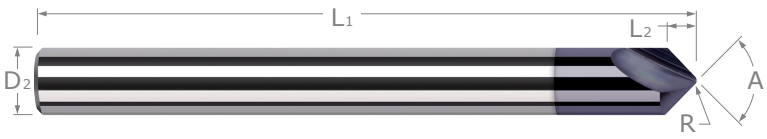
For Marking Cutters for Non-Ferrous Materials, please see page 300.

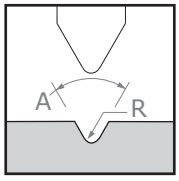


Produces Flat in Bottom of Groove

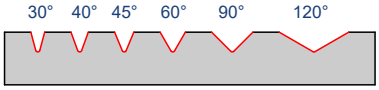
ENGRAVING CUTTERS

Marking Cutters – Tip Radius





- **Designed for milling legible part numbers in difficult-to-machine materials**
- Radiused tip design for improved strength
- 2 flute cutting design has improved strength over single point engravers
- Produces radius in bottom of groove
- Solid carbide
- CNC ground in the USA

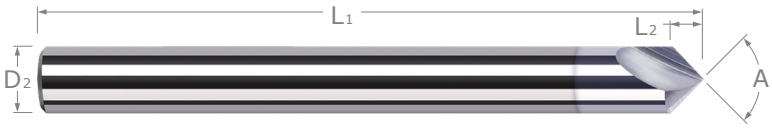


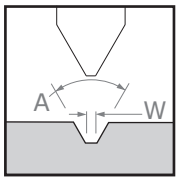
Stocked in *Six* Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	.0050	.218	1-1/2	987615	22.20	987615-C3	26.80
	1/8	.0100	.204	1-1/2	961915	22.20	961915-C3	26.80
	1/8	.0150	.190	1-1/2	981815	22.20	981815-C3	26.80
	3/16	.0050	.335	2	958715	27.10	958715-C3	32.10
	3/16	.0100	.321	2	947215	27.10	947215-C3	32.10
	1/4	.0050	.452	2-1/2	966815	36.30	966815-C3	43.10
	1/4	.0100	.437	2-1/2	954915	36.30	954915-C3	43.10
40°	1/8	.0050	.162	1-1/2	987640	24.20	987640-C3	28.80
	1/8	.0100	.152	1-1/2	961940	24.20	961940-C3	28.80
	1/8	.0150	.142	1-1/2	981820	24.20	981820-C3	28.80
45°	1/8	.0050	.143	1-1/2	987622	24.20	987622-C3	28.80
	1/8	.0100	.135	1-1/2	961922	24.20	961922-C3	28.80
60°	1/8	.0050	.103	1-1/2	987630	22.20	987630-C3	26.80
	1/8	.0075	.100	1-1/2	926330	22.20	926330-C3	26.80
	1/8	.0100	.098	1-1/2	961930	22.20	961930-C3	26.80
	1/8	.0150	.093	1-1/2	981830	22.20	981830-C3	26.80
	1/8	.0200	.088	1-1/2	918430	22.20	918430-C3	26.80
	3/16	.0050	.157	2	958730	27.10	958730-C3	32.10
	3/16	.0100	.152	2	947230	27.10	947230-C3	32.10
	3/16	.0150	.147	2	914330	27.10	914330-C3	32.10
	1/4	.0050	.211	2-1/2	966830	36.30	966830-C3	43.10
	1/4	.0100	.206	2-1/2	954930	36.30	954930-C3	43.10
	1/4	.0150	.201	2-1/2	909730	36.30	909730-C3	43.10
	1/4	.0200	.197	2-1/2	831430	36.30	831430-C3	43.10
90°	1/8	.0050	.060	1-1/2	987645	22.20	987645-C3	26.80
	1/8	.0075	.059	1-1/2	926345	22.20	926345-C3	26.80
	1/8	.0100	.058	1-1/2	961945	22.20	961945-C3	26.80
	1/8	.0150	.056	1-1/2	981845	22.20	981845-C3	26.80
	1/8	.0200	.054	1-1/2	918445	22.20	918445-C3	26.80
	3/16	.0050	.091	2	958745	27.10	958745-C3	32.10
	3/16	.0100	.089	2	947245	27.10	947245-C3	32.10
	3/16	.0150	.087	2	914345	27.10	914345-C3	32.10
	1/4	.0050	.122	2-1/2	966845	36.30	966845-C3	43.10
	1/4	.0075	.122	2-1/2	830745	36.30	830745-C3	43.10
	1/4	.0100	.120	2-1/2	954945	36.30	954945-C3	43.10
	1/4	.0150	.118	2-1/2	909745	36.30	909745-C3	43.10
	1/4	.0200	.117	2-1/2	831445	36.30	831445-C3	43.10
120°	1/8	.0050	.035	1-1/2	987660	22.20	987660-C3	26.80
	1/8	.0100	.034	1-1/2	961960	22.20	961960-C3	26.80

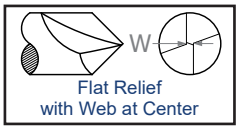
ENGRAVING CUTTERS

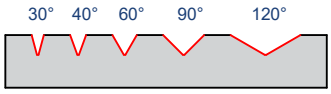
Marking Cutters for Non-Ferrous Materials





- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- 2 flute cutting design has improved strength over single point engravers
- Flat relief design for improved results in aluminum and other non-ferrous applications
- Produces flat in bottom of groove
- Solid carbide
- CNC ground in the USA



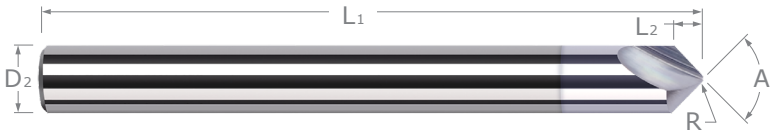


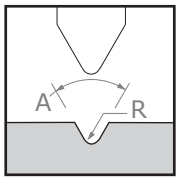
Stocked in *Five* Included Angles!

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	**.005**	.230	1-1/2	993215	18.00	993215-C8	24.80
	1/8	**.010**	.228	1-1/2	963215	18.00	963215-C8	24.80
	1/8	**.015**	.225	1-1/2	902915	18.00	902915-C8	24.80
	3/16	**.005**	.347	2	987815	22.40	987815-C8	29.20
	1/4	**.005**	.464	2-1/2	967415	31.40	967415-C8	38.70
40°	1/8	**.005**	.170	1-1/2	993220	19.30	993220-C8	26.10
	1/8	**.010**	.168	1-1/2	963220	19.30	963220-C8	26.10
	3/16	**.005**	.255	2	987820	22.70	987820-C8	29.50
	1/4	**.005**	.339	2-1/2	967420	31.50	967420-C8	38.80
60°	1/8	**.005**	.107	1-1/2	993230	18.00	993230-C8	24.80
	1/8	**.010**	.106	1-1/2	963230	18.00	963230-C8	24.80
	1/8	**.015**	.104	1-1/2	902930	18.00	902930-C8	24.80
	3/16	**.005**	.161	2	987830	22.40	987830-C8	29.20
	3/16	**.010**	.160	2	921230	22.40	921230-C8	29.20
	1/4	**.005**	.215	2-1/2	967430	31.40	967430-C8	38.70
	1/4	**.010**	.214	2-1/2	918630	31.40	918630-C8	38.70
90°	1/8	**.005**	.062	1-1/2	993245	18.00	993245-C8	24.80
	1/8	**.010**	.061	1-1/2	963245	18.00	963245-C8	24.80
	1/8	**.015**	.060	1-1/2	902945	18.00	902945-C8	24.80
	3/16	**.005**	.093	2	987845	22.40	987845-C8	29.20
	3/16	**.010**	.092	2	921245	22.40	921245-C8	29.20
	1/4	**.005**	.124	2-1/2	967445	31.40	967445-C8	38.70
	1/4	**.010**	.123	2-1/2	918645	31.40	918645-C8	38.70
120°	1/8	**.005**	.036	1-1/2	993260	18.00	993260-C8	24.80
	1/8	**.010**	.035	1-1/2	963260	18.00	963260-C8	24.80

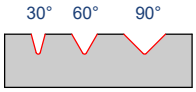
ENGRAVING CUTTERS

Marking Cutters – Tip Radius for Non-Ferrous Materials





- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- Radiused tip design for improved strength
- Flat relief design for improved results
- Solid carbide
- CNC ground in the USA



Stocked in *Three* Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	**.005**	.219	1-1/2	847115	22.20	847115-C8	29.00
	1/8	**.010**	.205	1-1/2	854415	22.20	854415-C8	29.00
60°	1/8	**.005**	.103	1-1/2	847130	22.20	847130-C8	29.00
	1/8	**.010**	.098	1-1/2	854430	22.20	854430-C8	29.00
90°	1/8	**.005**	.060	1-1/2	847145	22.20	847145-C8	29.00
	1/8	**.010**	.058	1-1/2	854445	22.20	854445-C8	29.00

Main Differences Between Engravers vs. Marking Cutters

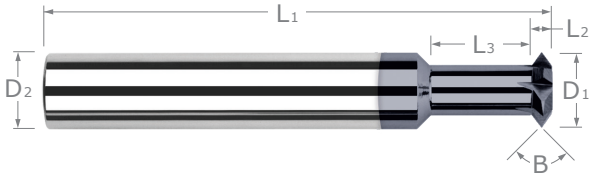
Although similar in look, Engravers and Marking Cutters serve different purposes. Do you need assistance deciding between the two? We can help! Our "In the Loupe" blog post **Main Differences Between Engravers & Marking Cutters** helps you decide which tooling option is best for you.

Read more on harveyperformance.com/in-the-loupe/

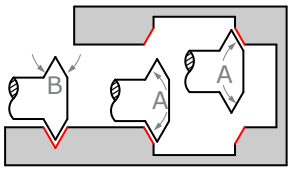
NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

Pointed



Great for Chamfering and Deburring

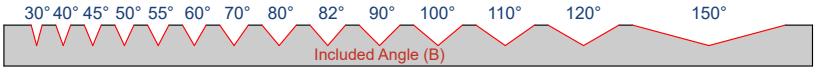


- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced neck for long reach machining
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide
- CNC ground in the USA

Included Angle Conversion

A = 180 - B	150°	140°	135°	130°	125°	120°	110°	100°	98°	90°	80°	70°	60°	30°
B = 180 - A	30°	40°	45°	50°	55°	60°	70°	80°	82°	90°	100°	110°	120°	150°

For tool selection tips, search for keyword AnglesUntangled on www.harveytool.com



Stocked in *Fourteen* Included Angles!

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D1 +.000″ −.002″	L2		L3 +.020″ −.000″		D2	L1	TOOL #	PRICE	TOOL #	PRICE
30°	1/16	.008	1/32	**.093**	2	1/8	1-1/2	66062	48.10	66062-C3	52.70
	5/64	.010	.039	**.118**	2	1/8	1-1/2	66078	48.10	66078-C3	52.70
	3/32	.012	3/64	**.141**	2	1/8	1-1/2	66093	48.10	66093-C3	52.70
	1/8	.017	1/16	**.187**	4	1/8	1-1/2	66108	47.00	66108-C3	51.60
	1/8	.017	1/16	**.500**	4	1/8	1-1/2	934308	48.10	934308-C3	52.70
	3/16	.025	3/32	**.312**	4	3/16	2	66112	48.70	66112-C3	53.70
	1/4	.033	1/8	**.312**	4	1/4	2	66116	61.90	66116-C3	68.70
	1/4	.033	1/8	**.625**	4	1/4	2	921716	72.90	921716-C3	79.70
	3/8	.033	1/4	**.500**	6	3/8	2-1/2	66105	81.40	66105-C3	90.40
	3/8	.033	1/4	**1.500**	6	3/8	3-1/2	934324	96.80	934324-C3	105.80
	1/2	.050	5/16	**.500**	6	1/2	3	66110	112.00	66110-C3	125.40
	1/2	.050	5/16	**1.500**	6	1/2	4	934332	142.90	934332-C3	156.30
40°	1/4	.045	1/8	**.312**	4	1/4	2	29720	62.20	29720-C3	69.00
	1/4	.045	1/8	**.625**	4	1/4	2	918116	72.40	918116-C3	79.20
	3/8	.045	1/4	**.500**	6	3/8	2-1/2	909924	78.70	909924-C3	87.70
	3/8	.045	1/4	**1.500**	6	3/8	3-1/2	967505	97.80	967505-C3	106.80
	1/2	.068	5/16	**.500**	6	1/2	3	909932	107.20	909932-C3	120.60
	1/2	.068	5/16	**1.500**	6	1/2	4	967510	139.40	967510-C3	152.80
45°	1/8	.026	1/16	**.187**	4	1/8	1-1/2	905608	48.10	905608-C3	52.70
	3/16	.039	3/32	**.312**	4	3/16	2	905612	48.70	905612-C3	53.70
	1/4	.052	1/8	**.312**	4	1/4	2	29723	61.90	29723-C3	68.70
	1/4	.052	1/8	**.625**	4	1/4	2	917016	72.90	917016-C3	79.70
	1/4	.052	1/8	**1.000**	4	1/4	3	984903	75.80	984903-C3	82.60
	3/8	.052	1/4	**.500**	6	3/8	2-1/2	905624	78.30	905624-C3	87.30
	3/8	.052	1/4	**1.000**	6	3/8	2-1/2	917024	89.30	917024-C3	98.30
	3/8	.052	1/4	**1.500**	6	3/8	3-1/2	984905	97.30	984905-C3	106.30
	1/2	.078	5/16	**.500**	6	1/2	3	905632	106.70	905632-C3	120.10
	1/2	.078	5/16	**1.500**	6	1/2	4	984910	138.70	984910-C3	152.10

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DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/8	.029	1/16	**.187**	4	1/8	1-1/2	985801	46.50	985801-C3	51.10
	1/8	.029	1/16	**.500**	4	1/8	1-1/2	974401	55.60	974401-C3	60.20
	3/16	.044	3/32	**.312**	4	3/16	2	985802	49.70	985802-C3	54.70
	3/16	.044	3/32	**.750**	4	3/16	2-1/2	974402	57.70	974402-C3	62.70
50°	1/4	.058	1/8	**.312**	4	1/4	2	29725	65.80	29725-C3	72.60
	1/4	.058	1/8	**1.000**	4	1/4	3	974403	76.10	974403-C3	82.90
	3/8	.058	1/4	**.500**	6	3/8	2-1/2	985805	80.90	985805-C3	89.90
	3/8	.058	1/4	**1.500**	6	3/8	3-1/2	974405	99.20	974405-C3	108.20
	1/2	.088	5/16	**.500**	6	1/2	3	985810	110.20	985810-C3	123.60
	1/2	.088	5/16	**1.500**	6	1/2	4	974410	141.40	974410-C3	154.80
55°	1/4	.065	1/8	**.312**	4	1/4	2	29728	66.10	29728-C3	72.90
	1/16	.018	1/32	**.093**	2	1/8	1-1/2	47362	46.70	47362-C3	51.30
	1/16	.018	1/32	**.156**	2	1/8	1-1/2	965562	46.70	965562-C3	51.30
	5/64	.023	.039	**.118**	2	1/8	1-1/2	47378	46.70	47378-C3	51.30
	3/32	.027	3/64	**.141**	2	1/8	1-1/2	47393	46.70	47393-C3	51.30
	3/32	.027	3/64	**.250**	2	1/8	1-1/2	965593	46.70	965593-C3	51.30
	1/8	.036	1/16	**.125**	4	1/8	1-1/2	937501	43.10	937501-C3	47.70
	1/8	.036	1/16	**.187**	4	1/8	1-1/2	16201	43.10	16201-C3	47.70
	1/8	.036	1/16	**.312**	4	1/8	1-1/2	984401	48.40	984401-C3	53.00
	1/8	.036	1/16	**.500**	4	1/8	2	27501	52.70	27501-C3	57.30
	1/8	.036	1/16	**.875**	4	1/8	2	981001	57.60	981001-C3	62.20
	5/32	.045	5/64	**.250**	4	3/16	2	16256	46.70	16256-C3	51.70
	5/32	.045	5/64	**.625**	4	3/16	2-1/2	27556	52.70	27556-C3	57.70
	3/16	.055	3/32	**.187**	4	3/16	2	937502	45.90	937502-C3	50.90
	3/16	.055	3/32	**.312**	4	3/16	2	16202	45.90	16202-C3	50.90
	3/16	.055	3/32	**.500**	4	3/16	2	984402	53.10	984402-C3	58.10
	3/16	.055	3/32	**.750**	4	3/16	2-1/2	27502	56.40	27502-C3	61.40
	3/16	.055	3/32	**1.000**	4	3/16	2-1/2	925502	59.00	925502-C3	64.00
60°	1/4	.072	1/8	**.187**	4	1/4	2	937503	61.90	937503-C3	68.70
	1/4	.072	1/8	**.312**	4	1/4	2	16203	61.90	16203-C3	68.70
	1/4	.072	1/8	**.312**	6	1/4	2	808016	66.30	808016-C3	73.10
	1/4	.072	1/8	**.625**	4	1/4	2-1/2	984403	69.40	984403-C3	76.20
	1/4	.072	1/8	**1.000**	4	1/4	3	27503	74.00	27503-C3	80.80
	1/4	.072	1/8	**1.312**	4	1/4	3	925503	74.40	925503-C3	81.20
	1/4	.072	1/8	**1.750**	4	1/4	3	981003	75.50	981003-C3	82.30
	5/16	.072	3/16	**.375**	6	5/16	2-1/2	16272	75.00	16272-C3	82.90
	5/16	.072	3/16	**.875**	6	5/16	2-1/2	984472	77.20	984472-C3	85.10
	3/8	.072	1/4	**.312**	6	3/8	2-1/2	937505	78.90	937505-C3	87.90
	3/8	.072	1/4	**.500**	6	3/8	2-1/2	16205	78.90	16205-C3	87.90
	3/8	.072	1/4	**1.000**	6	3/8	2-1/2	984405	88.90	984405-C3	97.90
	3/8	.072	1/4	**1.500**	6	3/8	3-1/2	27505	98.80	27505-C3	107.80
	3/8	.072	1/4	**2.000**	6	3/8	3-1/2	925505	103.50	925505-C3	112.50
	1/2	.109	5/16	**.500**	6	1/2	3	16210	108.00	16210-C3	121.40
	1/2	.109	5/16	**1.000**	6	1/2	3	984410	117.70	984410-C3	131.10
	1/2	.109	5/16	**1.500**	6	1/2	4	27510	137.70	27510-C3	151.10
	1/2	.109	5/16	**2.000**	6	1/2	4	925510	141.20	925510-C3	154.60
	1/2	.109	5/16	**2.625**	6	1/2	4	981010	144.90	981010-C3	158.30
	5/8	.144	3/8	**.750**	6	5/8	3-1/2	16215	194.40	16215-C3	207.80

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NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
70°	1/4	.088	1/8	**.312**	4	1/4	2	871903	66.10	871903-C3	72.90	
	3/8	.088	1/4	**1.500**	6	3/8	3-1/2	791005	104.30	791005-C3	113.30	NEW
80°	1/4	.105	1/8	**.312**	4	1/4	2	29740	66.10	29740-C3	72.90	
	3/8	.105	1/4	**1.500**	6	3/8	3-1/2	792005	104.30	792005-C3	113.30	NEW
82°	1/4	.109	1/8	**.312**	4	1/4	2	29741	66.10	29741-C3	72.90	
	3/8	.109	1/4	**1.500**	6	3/8	3-1/2	920805	104.30	920805-C3	113.30	
	1/2	.163	5/16	**1.500**	6	1/2	4	920810	145.30	920810-C3	158.70	
90°	1/32	.015	1/64	**.093**	2	1/8	1-1/2	45131	42.00	45131-C3	46.60	
	1/16	.031	1/32	**.062**	2	1/8	1-1/2	946862	42.00	946862-C3	46.60	
	1/16	.031	1/32	**.093**	2	1/8	1-1/2	19162	42.00	19162-C3	46.60	
	1/16	.031	1/32	**.125**	2	1/8	1-1/2	807662	42.00	807662-C3	46.60	
	1/16	.031	1/32	**.156**	2	1/8	1-1/2	45162	46.70	45162-C3	51.30	
	1/16	.031	1/32	**.156**	4	1/8	1-1/2	832404	49.10	832404-C3	53.70	
	1/16	.031	1/32	**.250**	2	1/8	1-1/2	71662	51.20	71662-C3	55.80	
	1/16	.031	1/32	**.312**	2	1/8	1-1/2	857862	51.20	857862-C3	55.80	NEW
	1/16	.031	1/32	**.375**	2	1/8	1-1/2	963662	51.20	963662-C3	55.80	
	5/64	.039	.039	**.078**	2	1/8	1-1/2	946878	42.00	946878-C3	46.60	
	5/64	.039	.039	**.093**	2	1/8	1-1/2	807105	42.00	807105-C3	46.60	NEW
	5/64	.039	.039	**.118**	2	1/8	1-1/2	19178	42.00	19178-C3	46.60	
	5/64	.039	.039	**.125**	2	1/8	1-1/2	807005	42.00	807005-C3	46.60	NEW
	5/64	.039	.039	**.187**	2	1/8	1-1/2	45178	46.70	45178-C3	51.30	
	5/64	.039	.039	**.187**	4	1/8	1-1/2	832405	49.10	832405-C3	53.70	
	5/64	.039	.039	**.250**	2	1/8	1-1/2	822178	49.10	822178-C3	58.10	
	5/64	.039	.039	**.312**	2	1/8	1-1/2	71678	51.20	71678-C3	55.80	
	5/64	.039	.039	**.500**	2	1/8	1-1/2	963678	51.20	963678-C3	55.80	
	3/32	.047	3/64	**.093**	2	1/8	1-1/2	946893	42.00	946893-C3	46.60	
	3/32	.047	3/64	**.141**	2	1/8	1-1/2	19193	42.00	19193-C3	46.60	
	3/32	.047	3/64	**.141**	4	1/8	1-1/2	838806	42.00	838806-C3	46.60	NEW
	3/32	.047	3/64	**.187**	2	1/8	1-1/2	807693	42.00	807693-C3	46.60	NEW
	3/32	.047	3/64	**.250**	2	1/8	1-1/2	45193	46.70	45193-C3	51.30	
	3/32	.047	3/64	**.250**	4	1/8	1-1/2	832406	49.10	832406-C3	53.70	
	3/32	.047	3/64	**.312**	2	1/8	1-1/2	807493	51.20	807493-C3	55.80	
	3/32	.047	3/64	**.375**	2	1/8	1-1/2	71693	51.20	71693-C3	55.80	
	3/32	.047	3/64	**.375**	4	1/8	1-1/2	792906	51.20	792906-C3	55.80	NEW
	3/32	.047	3/64	**.500**	2	1/8	1-1/2	857893	51.20	857893-C3	55.80	
	3/32	.047	3/64	**.625**	2	1/8	2	963693	53.10	963693-C3	57.70	
	3/32	.047	3/64	**.750**	2	1/8	2	855793	55.30	855793-C3	59.90	
	3 mm	.059	.059	**.187**	2	1/8	1-1/2	1913M	42.70	1913M-C3	47.30	
	3 mm	.059	.059	**.312**	2	1/8	1-1/2	4513M	49.10	4513M-C3	53.70	
	1/8	.062	1/16	**.125**	4	1/8	1-1/2	946901	42.00	946901-C3	46.60	
	1/8	.062	1/16	**.125**	6	1/8	1-1/2	791908	42.00	791908-C3	46.60	NEW
	1/8	.062	1/16	**.187**	4	1/8	1-1/2	19201	42.00	19201-C3	46.60	
	1/8	.062	1/16	**.187**	6	1/8	1-1/2	838808	44.00	838808-C3	48.60	
	1/8	.062	1/16	**.250**	4	1/8	1-1/2	807308	44.60	807308-C3	49.20	
	1/8	.062	1/16	**.312**	4	1/8	1-1/2	72601	47.20	72601-C3	51.80	
	1/8	.062	1/16	**.312**	6	1/8	1-1/2	847408	49.60	847408-C3	54.20	
	1/8	.062	1/16	**.375**	4	1/8	1-1/2	806908	47.20	806908-C3	51.80	
	1/8	.062	1/16	**.500**	4	1/8	2	19501	54.50	19501-C3	59.10	
	1/8	.062	1/16	**.500**	6	1/8	2	807908	56.90	807908-C3	61.50	

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DOUBLE ANGLE SHANK CUTTERS

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	INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
		1/8	.062	1/16	**.625**	4	1/8	2	71701	56.40	71701-C3	61.00
		1/8	.062	1/16	**.750**	4	1/8	2	821808	57.80	821808-C3	64.60
		1/8	.062	1/16	**.875**	4	1/8	2	26801	59.40	26801-C3	64.00
		1/8	.062	1/16	**1.125**	4	1/8	2-1/2	963701	65.20	963701-C3	69.80
		5/32	.078	5/64	**.156**	4	3/16	2	946956	42.50	946956-C3	47.50
		5/32	.078	5/64	**.250**	4	3/16	2	19256	44.70	19256-C3	49.70
NEW		5/32	.078	5/64	**.250**	6	3/16	2	838810	46.00	838810-C3	51.00
		5/32	.078	5/64	**.375**	4	3/16	2	807310	47.90	807310-C3	52.90
		5/32	.078	5/64	**.437**	4	3/16	2	72656	51.20	72656-C3	56.20
NEW		5/32	.078	5/64	**.500**	4	3/16	2	807210	51.20	807210-C3	56.20
		5/32	.078	5/64	**.625**	4	3/16	2-1/2	19556	55.10	19556-C3	60.10
		5/32	.078	5/64	**1.125**	4	3/16	2-1/2	26856	61.60	26856-C3	66.60
		3/16	.093	3/32	**.187**	4	3/16	2	946902	43.00	946902-C3	48.00
		3/16	.093	3/32	**.187**	6	3/16	2	807812	45.30	807812-C3	50.30
		3/16	.093	3/32	**.250**	4	3/16	2	807112	43.80	807112-C3	48.80
		3/16	.093	3/32	**.312**	4	3/16	2	19202	43.80	19202-C3	48.80
		3/16	.093	3/32	**.312**	6	3/16	2	838812	46.10	838812-C3	51.10
		3/16	.093	3/32	**.375**	4	3/16	2	807312	47.90	807312-C3	52.90
		3/16	.093	3/32	**.500**	4	3/16	2	72602	52.10	72602-C3	57.10
		3/16	.093	3/32	**.500**	6	3/16	2	847412	54.60	847412-C3	59.60
NEW		3/16	.093	3/32	**.625**	4	3/16	2	807212	55.30	807212-C3	60.30
		3/16	.093	3/32	**.750**	4	3/16	2-1/2	19502	55.30	19502-C3	60.30
NEW	**90°**	3/16	.093	3/32	**.750**	6	3/16	2-1/2	822612	56.60	822612-C3	61.60
		3/16	.093	3/32	**1.000**	4	3/16	2-1/2	71702	60.40	71702-C3	65.40
		3/16	.093	3/32	**1.312**	4	3/16	2-1/2	26802	61.90	26802-C3	66.90
		3/16	.093	3/32	**1.625**	4	3/16	3	963702	68.70	963702-C3	73.70
		6 mm	.118	.118	**.312**	4	1/4	2	19262	68.40	19262-C3	75.20
		6 mm	.118	.118	**.625**	4	1/4	2	72662	70.70	72662-C3	77.50
		6 mm	.118	.118	**1.000**	4	1/4	2-1/2	19562	73.00	19562-C3	79.80
		1/4	.125	1/8	**.187**	4	1/4	2	946903	52.70	946903-C3	59.50
		1/4	.125	1/8	**.250**	4	1/4	2	807116	53.70	807116-C3	60.50
		1/4	.125	1/8	**.312**	4	1/4	2	19203	53.70	19203-C3	60.50
		1/4	.125	1/8	**.312**	6	1/4	2	838816	56.40	838816-C3	63.20
		1/4	.125	1/8	**.375**	4	1/4	2-1/2	807016	59.40	807016-C3	66.20
		1/4	.125	1/8	**.500**	4	1/4	2	807316	54.30	807316-C3	61.10
		1/4	.125	1/8	**.625**	4	1/4	2-1/2	72603	59.60	72603-C3	66.40
		1/4	.125	1/8	**.625**	6	1/4	2-1/2	847416	62.60	847416-C3	69.40
		1/4	.125	1/8	**.750**	4	1/4	2-1/2	807216	59.60	807216-C3	66.40
		1/4	.125	1/8	**1.000**	4	1/4	3	19503	65.20	19503-C3	72.00
		1/4	.125	1/8	**1.000**	6	1/4	3	822616	68.20	822616-C3	72.80
		1/4	.125	1/8	**1.250**	4	1/4	3	822216	69.70	822216-C3	76.50
		1/4	.125	1/8	**1.312**	4	1/4	3	71703	69.70	71703-C3	76.50
NEW		1/4	.125	1/8	**1.500**	4	1/4	3	821816	71.80	821816-C3	78.60
		1/4	.125	1/8	**1.750**	4	1/4	3	26803	71.80	26803-C3	78.60
		1/4	.125	1/8	**2.125**	4	1/4	4	963703	77.70	963703-C3	85.60

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NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
90°	5/16	.125	3/16	**.250**	6	5/16	2-1/2	946904	72.60	946904-C3	80.50	
	5/16	.125	3/16	**.375**	6	5/16	2-1/2	19272	75.00	19272-C3	82.90	
	5/16	.125	3/16	**.625**	6	5/16	2-1/2	833572	76.00	833572-C3	83.90	
	5/16	.125	3/16	**.875**	6	5/16	2-1/2	72672	76.00	72672-C3	83.90	
	5/16	.125	3/16	**1.000**	6	5/16	3	807220	81.40	807220-C3	89.30	NEW
	5/16	.125	3/16	**1.250**	6	5/16	3	19572	81.40	19572-C3	89.30	
	5/16	.125	3/16	**1.625**	6	5/16	3	71772	84.50	71772-C3	92.40	
	5/16	.125	3/16	**2.125**	6	5/16	3	26872	87.60	26872-C3	95.50	
	3/8	.125	1/4	**.312**	6	3/8	2-1/2	946905	72.90	946905-C3	81.90	
	3/8	.125	1/4	**.375**	6	3/8	2-1/2	807124	75.30	807124-C3	84.30	
	3/8	.125	1/4	**.500**	6	3/8	2-1/2	19205	76.60	19205-C3	84.50	
	3/8	.125	1/4	**.500**	8	3/8	2-1/2	838824	80.50	838824-C3	89.50	
	3/8	.125	1/4	**.750**	6	3/8	2-1/2	807324	81.00	807324-C3	90.00	
	3/8	.125	1/4	**1.000**	6	3/8	2-1/2	72605	85.30	72605-C3	94.30	
	3/8	.125	1/4	**1.000**	8	3/8	2-1/2	847424	94.10	847424-C3	103.10	NEW
	3/8	.125	1/4	**1.500**	6	3/8	3-1/2	19505	96.40	19505-C3	105.40	
	3/8	.125	1/4	**1.500**	8	3/8	3-1/2	822624	100.20	822624-C3	104.80	
	3/8	.125	1/4	**1.750**	6	3/8	3-1/2	822224	101.10	822224-C3	109.00	
	3/8	.125	1/4	**2.000**	6	3/8	3-1/2	71705	101.10	71705-C3	110.10	
	3/8	.125	1/4	**2.312**	6	3/8	3-1/2	26805	103.80	26805-C3	112.80	
	3/8	.125	1/4	**2.625**	6	3/8	4	963705	109.90	963705-C3	122.20	
	7/16	.157	9/32	**.500**	6	7/16	2-3/4	19208	113.10	19208-C3	124.30	
	7/16	.157	9/32	**1.500**	6	7/16	3-1/2	19508	131.00	19508-C3	144.40	
	1/2	.187	5/16	**.312**	6	1/2	3	946910	99.20	946910-C3	112.60	
	1/2	.187	5/16	**.500**	6	1/2	3	19210	102.40	19210-C3	115.80	
	1/2	.187	5/16	**.500**	8	1/2	3	838832	107.50	838832-C3	120.90	
	1/2	.187	5/16	**1.000**	6	1/2	3	72610	111.70	72610-C3	125.10	
	1/2	.187	5/16	**1.000**	8	1/2	3	847432	113.50	847432-C3	126.90	NEW
	1/2	.187	5/16	**1.250**	6	1/2	3-1/2	822432	114.40	822432-C3	122.30	
	1/2	.187	5/16	**1.500**	6	1/2	4	19510	131.00	19510-C3	144.40	
	1/2	.187	5/16	**1.500**	8	1/2	4	807932	136.10	807932-C3	149.50	
	1/2	.187	5/16	**2.000**	6	1/2	4	71710	135.70	71710-C3	149.10	
	1/2	.187	5/16	**2.625**	6	1/2	4	26810	139.30	26810-C3	152.70	
	1/2	.187	5/16	**3.125**	6	1/2	6	963710	145.70	963710-C3	159.10	
	5/8	.250	3/8	**.750**	6	5/8	3-1/2	19215	194.90	19215-C3	208.30	
	5/8	.250	3/8	**1.250**	6	5/8	3-1/2	72615	200.20	72615-C3	213.60	
100°	1/8	.075	1/16	**.187**	4	1/8	1-1/2	983401	45.50	983401-C3	50.10	
	1/8	.075	1/16	**.500**	4	1/8	1-1/2	969901	54.70	969901-C3	59.30	
	3/16	.113	3/32	**.312**	4	3/16	2	983402	47.80	983402-C3	52.80	
	3/16	.113	3/32	**.750**	4	3/16	2-1/2	969902	56.90	969902-C3	61.90	
	1/4	.149	1/8	**.312**	4	1/4	2	29750	66.60	29750-C3	73.40	
	1/4	.149	1/8	**1.000**	4	1/4	3	969903	76.20	969903-C3	83.00	
	3/8	.149	1/4	**.500**	6	3/8	2-1/2	983405	78.60	983405-C3	87.60	
	3/8	.149	1/4	**1.500**	6	3/8	3-1/2	969905	99.70	969905-C3	108.70	
	1/2	.224	5/16	**.500**	6	1/2	3	983410	104.60	983410-C3	118.00	
	1/2	.224	5/16	**1.500**	6	1/2	4	969910	135.40	969910-C3	148.80	
110°	1/4	.179	1/8	**.312**	4	1/4	2	830503	69.80	830503-C3	76.60	

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NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

Pointed (cont.)

continued from previous page

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
120°	1/8	.109	1/16	**.125**	4	1/8	1-1/2	903608	43.10	903608-C3	47.70
	1/8	.109	1/16	**.187**	4	1/8	1-1/2	39108	43.10	39108-C3	47.70
	1/8	.109	1/16	**.500**	4	1/8	2	989401	51.20	989401-C3	55.80
	3/16	.163	3/32	**.187**	4	3/16	2	903612	46.30	903612-C3	51.30
	3/16	.163	3/32	**.312**	4	3/16	2	39112	47.00	39112-C3	52.00
	3/16	.163	3/32	**.750**	4	3/16	2-1/2	989402	55.10	989402-C3	60.10
	1/4	.216	1/8	**.187**	4	1/4	2	903616	61.20	903616-C3	68.00
	1/4	.216	1/8	**.312**	4	1/4	2	39116	61.90	39116-C3	68.70
	1/4	.216	1/8	**.625**	4	1/4	2-1/2	910716	59.60	910716-C3	66.40
	1/4	.216	1/8	**1.000**	4	1/4	3	989403	70.20	989403-C3	77.00
	3/8	.216	1/4	**.500**	6	3/8	2-1/2	39124	80.90	39124-C3	89.90
	3/8	.216	1/4	**1.000**	6	3/8	2-1/2	910724	89.70	910724-C3	98.70
	3/8	.216	1/4	**1.500**	6	3/8	3-1/2	989405	101.10	989405-C3	110.10
	1/2	.325	5/16	**.500**	6	1/2	3	39132	107.50	39132-C3	120.90
	1/2	.325	5/16	**1.000**	6	1/2	3	910732	116.70	910732-C3	130.10
	1/2	.325	5/16	**1.500**	6	1/2	4	989410	137.20	989410-C3	150.60
150°	1/4	.467	1/8	**.312**	4	1/4	2	826003	69.80	826003-C3	76.60

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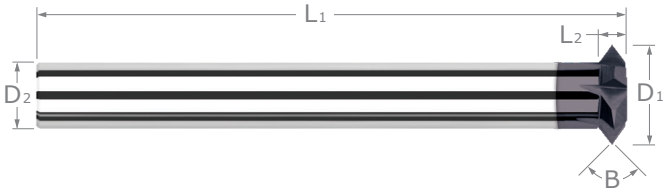
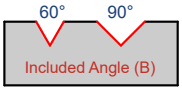
DOUBLE ANGLE SHANK CUTTERS

Pointed - Reduced Shank





Stocked in *Two* Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced straight shank allows any chucking depth
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide head brazed onto steel shank
- CNC ground in the USA

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	1/2	.144	8	1/4	3.144	866410	138.10	866410-C3	151.50
	3/4	.144	8	1/2	3.644	16220	145.90	16220-C3	160.40
	3/4	.144	8	1/2	6.144	27520	152.70	27520-C3	173.70
	1	.217	8	5/8	4.217	16230	160.50	16230-C3	182.60
90°	1/4	.125	6	1/8	2.625	875503	87.40	875503-C3	94.20
	3/8	.188	8	3/16	3.188	875505	122.60	875505-C3	137.10
	1/2	.250	8	1/4	3.250	875510	138.10	875510-C3	151.50
	3/4	.250	8	1/2	3-3/4	19220	145.40	19220-C3	159.90
	3/4	.250	8	1/2	6-1/4	19520	152.10	19520-C3	173.10
	1	.375	8	5/8	4-3/8	19230	160.80	19230-C3	182.90

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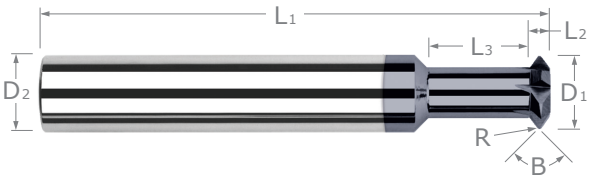
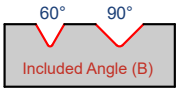
DOUBLE ANGLE SHANK CUTTERS

Tip Radius





Stocked in *Two* Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Radius on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B +1° −1°	D1 +.000″ −.002″	R +.001″ −.001″	L2		L3 +.020″ −.000″		D2	L1	TOOL #	PRICE	TOOL #	PRICE
60°	1/8	**.005**	.042	1/16	**.187**	4	1/8	1-1/2	922508	54.40	922508-C3	59.00
	3/16	**.005**	.060	3/32	**.312**	4	3/16	2	922512	57.30	922512-C3	62.30
	1/4	**.005**	.078	1/8	**.312**	4	1/4	2	922516	73.40	922516-C3	80.20
	1/4	**.010**	.084	1/8	**.312**	4	1/4	2	934716	73.40	934716-C3	80.20
	1/4	**.010**	.084	1/8	**1.000**	4	1/4	3	930516	82.30	930516-C3	89.10
	3/8	**.010**	.084	1/4	**.500**	6	3/8	2-1/2	934724	98.40	934724-C3	107.40
	3/8	**.015**	.089	1/4	**.500**	6	3/8	2-1/2	911224	98.40	911224-C3	107.40
	1/2	**.010**	.120	5/16	**.500**	6	1/2	3	934732	119.90	934732-C3	133.30
	1/2	**.015**	.126	5/16	**.500**	6	1/2	3	911232	119.90	911232-C3	133.30
90°	1/16	**.005**	.035	1/32	**.093**	2	1/8	1-1/2	45804	55.50	45804-C3	60.10
	5/64	**.005**	.043	.039	**.118**	2	1/8	1-1/2	45805	55.50	45805-C3	60.10
	3/32	**.005**	.050	3/64	**.141**	2	1/8	1-1/2	45806	55.50	45806-C3	60.10
	1/8	**.005**	.067	1/16	**.187**	4	1/8	1-1/2	45808	55.50	45808-C3	60.10
	1/8	**.005**	.067	1/16	**.500**	4	1/8	1-1/2	928708	68.40	928708-C3	73.00
	1/8	**.010**	.071	1/16	**.187**	4	1/8	1-1/2	46608	55.50	46608-C3	60.10
	5/32	**.005**	.082	5/64	**.250**	4	3/16	2	45810	58.40	45810-C3	63.40
	5/32	**.005**	.082	5/64	**.625**	4	3/16	2-1/2	928710	65.40	928710-C3	70.40
	3/16	**.005**	.099	3/32	**.312**	4	3/16	2	45812	58.40	45812-C3	63.40
	3/16	**.005**	.099	3/32	**.750**	4	3/16	2-1/2	928712	65.40	928712-C3	70.40
	3/16	**.010**	.103	3/32	**.312**	4	3/16	2	46612	58.40	46612-C3	63.40
	1/4	**.005**	.129	1/8	**.312**	4	1/4	2	45816	67.30	45816-C3	74.10
	1/4	**.005**	.129	1/8	**.625**	4	1/4	2-1/2	898416	72.10	898416-C3	78.90
	1/4	**.005**	.129	1/8	**1.000**	4	1/4	3	928716	78.50	928716-C3	85.30
	1/4	**.010**	.133	1/8	**.312**	4	1/4	2	46616	67.30	46616-C3	74.10
	1/4	**.010**	.133	1/8	**.625**	4	1/4	2-1/2	890716	72.10	890716-C3	78.90
	1/4	**.010**	.133	1/8	**1.000**	4	1/4	3	931916	78.50	931916-C3	85.30
	1/4	**.015**	.137	1/8	**.312**	4	1/4	2	988616	67.30	988616-C3	74.10
	1/4	**.020**	.142	1/8	**.312**	4	1/4	2	831016	67.30	831016-C3	74.10
	5/16	**.005**	.130	3/16	**1.250**	6	5/16	3	928720	83.20	928720-C3	91.10
	5/16	**.010**	.134	3/16	**.375**	6	5/16	2-1/2	46620	84.60	46620-C3	92.50
	5/16	**.010**	.134	3/16	**1.250**	6	5/16	3	931920	85.50	931920-C3	93.40

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DOUBLE ANGLE SHANK CUTTERS

Tip Radius (cont.)

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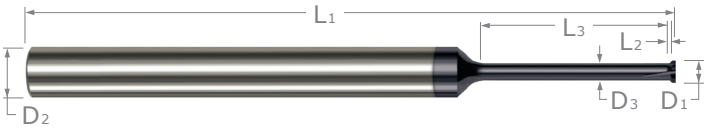
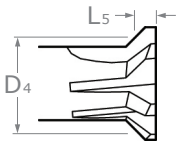
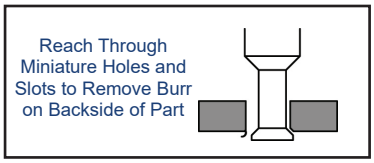
INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	R $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
90°	3/8	**.010**	.133	1/4	**.500**	6	3/8	2-1/2	46624	90.20	46624-C3	99.20
	3/8	**.010**	.133	1/4	**1.000**	6	3/8	2-1/2	890724	92.60	890724-C3	101.60
	3/8	**.010**	.133	1/4	**1.500**	6	3/8	3-1/2	931924	109.90	931924-C3	118.90
	3/8	**.015**	.137	1/4	**.500**	6	3/8	2-1/2	988624	90.20	988624-C3	99.20
	3/8	**.015**	.137	1/4	**1.000**	6	3/8	2-1/2	894124	92.60	894124-C3	101.60
	3/8	**.015**	.137	1/4	**1.500**	6	3/8	3-1/2	923524	109.90	923524-C3	118.90
	3/8	**.020**	.142	1/4	**.500**	6	3/8	2-1/2	831024	90.20	831024-C3	99.20
	1/2	**.010**	.196	5/16	**.500**	6	1/2	3	46632	115.80	46632-C3	129.20
	1/2	**.010**	.196	5/16	**1.000**	6	1/2	3	890732	119.10	890732-C3	132.50
	1/2	**.010**	.196	5/16	**1.500**	6	1/2	4	931932	143.60	931932-C3	157.00
	1/2	**.015**	.200	5/16	**.500**	6	1/2	3	988632	115.80	988632-C3	129.20
	1/2	**.015**	.200	5/16	**1.000**	6	1/2	3	894132	119.10	894132-C3	132.50
	1/2	**.015**	.200	5/16	**1.500**	6	1/2	4	923532	143.60	923532-C3	157.00

BACK DEBURRING MILLS





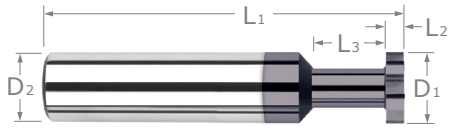
- **Ideal for deburring on backside of small holes and tight pockets**
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Design has smaller radial projection than double angle shank cutters and back chamfer cutters, which results in increased neck diameter and improved strength
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide
- CNC ground in the USA



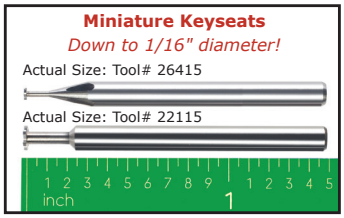
HEAD DIA.	AXIAL LOC	NECK DIA.	NECK LENGTH	CHAMFER CENTER LENGTH	CHAMFER CENTER DIAMETER	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.001''}$	L_2	D_3	L_3 $^{+.010''}_{-.000''}$	L_5 $^{+.0005''}_{-.0005''}$	D_4 (Max.)		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.028	.0029	.021	**.093**	.0215	.0261	3	1/8	2	846328	62.40	846328-C3	67.00
.028	.0029	.021	**.125**	.0215	.0261	3	1/8	2	65728	62.40	65728-C3	67.00
.028	.0029	.021	**.250**	.0215	.0261	3	1/8	2	57028	62.40	57028-C3	67.00
.040	.0048	.028	**.125**	.0324	.0362	4	1/8	2	846340	58.00	846340-C3	62.60
.040	.0048	.028	**.187**	.0324	.0362	4	1/8	2	65740	58.00	65740-C3	62.60
.040	.0048	.028	**.312**	.0324	.0362	4	1/8	2	57040	58.00	57040-C3	62.60
.055	.0045	.043	**.187**	.0423	.0515	4	1/8	2	846355	58.00	846355-C3	62.60
.055	.0045	.043	**.281**	.0423	.0515	4	1/8	2	65755	58.00	65755-C3	62.60
.055	.0045	.043	**.437**	.0423	.0515	4	1/8	2	57055	58.00	57055-C3	62.60
.080	.0077	.060	**.250**	.0638	.0733	5	1/8	2	846380	52.50	846380-C3	57.10
.080	.0077	.060	**.375**	.0638	.0733	5	1/8	2	65780	52.50	65780-C3	57.10
.080	.0077	.060	**.625**	.0638	.0733	5	1/8	2	57080	52.50	57080-C3	57.10
.115	.0111	.087	**.375**	.0655	.1049	5	1/8	2	846410	52.50	846410-C3	57.10
.115	.0111	.087	**.562**	.0655	.1049	5	1/8	2	65810	52.50	65810-C3	57.10
.115	.0111	.087	**1.000**	.0655	.1049	5	1/8	2	57110	52.50	57110-C3	57.10
D_1 $^{+.000''}_{-.002''}$	L_2	D_3	L_3 $^{+.010''}_{-.000''}$	L_5 $^{+.0005''}_{-.0005''}$	D_4 (Max.)		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.135	.0111	.107	**.437**	.0655	.1249	5	3/16	2	846420	53.30	846420-C3	58.30
.135	.0111	.107	**.625**	.0655	.1249	5	3/16	2-1/2	65820	54.00	65820-C3	59.00
.135	.0111	.107	**1.125**	.0655	.1249	5	3/16	2-1/2	57120	54.00	57120-C3	59.00
.165	.0191	.121	**.500**	.0695	.1469	6	3/16	2	846430	53.30	846430-C3	58.30
.165	.0191	.121	**.750**	.0695	.1469	6	3/16	2-1/2	65830	54.00	65830-C3	59.00
.165	.0191	.121	**1.375**	.0695	.1469	6	3/16	2-1/2	57130	54.00	57130-C3	59.00
.210	.0191	.166	**.625**	.0695	.1919	6	1/4	2-1/2	846440	56.90	846440-C3	63.70
.210	.0191	.166	**1.000**	.0695	.1919	6	1/4	3	65840	58.00	65840-C3	64.80
.210	.0191	.166	**1.750**	.0695	.1919	6	1/4	3	57140	58.00	57140-C3	64.80
.262	.0251	.206	**1.375**	.0925	.2379	8	5/16	3	65850	59.00	65850-C3	66.90
.262	.0251	.206	**2.125**	.0925	.2379	8	5/16	4	57150	67.30	57150-C3	76.80
.315	.0251	.259	**1.625**	.0925	.2909	8	3/8	3	65860	72.80	65860-C3	81.80
.315	.0251	.259	**2.500**	.0925	.2909	8	3/8	4	57160	81.20	57160-C3	93.50
.420	.0321	.350	**2.125**	.1160	.3889	10	7/16	4	65870	92.20	65870-C3	105.60
.420	.0321	.350	**3.375**	.1160	.3889	10	7/16	6	57170	106.00	57170-C3	121.00

KEYSEAT CUTTERS

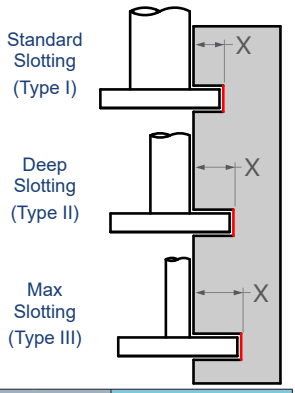
Square



- **Keyseat cutters down to 1/16″ diameter**
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Stocked in Multiple Radial Depths of Cut!



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/16	.010	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26410	47.00	26410-C3	51.60
	.015 (1/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26415	44.50	26415-C3	49.10
	.015 (1/64)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955115	52.10	955115-C3	56.70
	.020	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26420	44.50	26420-C3	49.10
	.025	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26425	44.50	26425-C3	49.10
	.030	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26430	44.50	26430-C3	49.10
	.031 (1/32)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26431	44.50	26431-C3	49.10
	.031 (1/32)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955131	52.10	955131-C3	56.70
	.039 (1 mm)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26439	44.50	26439-C3	49.10
	.047 (3/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26447	44.50	26447-C3	49.10
	.062 (1/16)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26462	44.50	26462-C3	49.10
	.062 (1/16)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955162	52.10	955162-C3	56.70
5/64	.010	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27310	46.30	27310-C3	50.90
	.015 (1/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27315	43.80	27315-C3	48.40
	.020	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27320	43.80	27320-C3	48.40
	.025	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27325	43.80	27325-C3	48.40
	.031 (1/32)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27331	43.80	27331-C3	48.40
	.031 (1/32)	1 mm	6 mm (3x)	.018	I	4	1/8	1-1/2	922031	51.30	922031-C3	55.90
	.039 (1 mm)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27339	43.80	27339-C3	48.40
	.047 (3/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27347	43.80	27347-C3	48.40
	.062 (1/16)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27362	43.80	27362-C3	48.40
3/32	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28210	45.90	28210-C3	50.50
	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28215	43.10	28215-C3	47.70
	.020	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28220	43.10	28220-C3	47.70
	.020	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967720	43.10	967720-C3	47.70
	.025	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28225	43.10	28225-C3	47.70
	.030	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28230	43.10	28230-C3	47.70
	.031 (1/32)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901131	45.50	901131-C3	50.10
	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28231	43.10	28231-C3	47.70
	.031 (1/32)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967731	50.60	967731-C3	55.20
	.039 (1 mm)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28239	43.10	28239-C3	47.70
	.040	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28240	43.10	28240-C3	47.70
	.047 (3/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28247	43.10	28247-C3	47.70
	.047 (3/64)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967747	50.60	967747-C3	55.20
	.062 (1/16)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901162	45.50	901162-C3	50.10
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28262	43.10	28262-C3	47.70
	.062 (1/16)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967762	50.60	967762-C3	55.20
	.093 (3/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28293	43.10	28293-C3	47.70

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22110	44.00	22110-C3	48.60
	.010	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43510	51.30	43510-C3	55.90
	.015 (1/64)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982515	52.10	982515-C3	56.70
	.015 (1/64)	.040	1/8 (1x)	.032	II	6	1/8	1-1/2	893315	53.20	893315-C3	57.80
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22115	41.70	22115-C3	46.30
	.015 (1/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43515	48.90	43515-C3	53.50
	.020	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982520	52.10	982520-C3	56.70
	.020	.040	1/8 (1x)	.032	II	6	1/8	1-1/2	893320	53.20	893320-C3	57.80
	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22120	41.70	22120-C3	46.30
	.020	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43520	48.90	43520-C3	53.50
	.025	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982525	52.10	982525-C3	56.70
	.025	.040	1/8 (1x)	.032	II	6	1/8	1-1/2	893325	53.20	893325-C3	57.80
	.025	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22125	41.70	22125-C3	46.30
	.025	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43525	48.90	43525-C3	53.50
	.030	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22130	41.70	22130-C3	46.30
	.030	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43530	48.90	43530-C3	53.50
	.031 (1/32)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982531	52.10	982531-C3	56.70
	.031 (1/32)	.040	1/8 (1x)	.032	II	6	1/8	1-1/2	893331	53.20	893331-C3	57.80
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22131	41.70	22131-C3	46.30
	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43531	48.90	43531-C3	53.50
	.035	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22135	41.70	22135-C3	46.30
	.035	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43535	48.90	43535-C3	53.50
	.039 (1 mm)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22139	41.70	22139-C3	46.30
	.039 (1 mm)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43539	48.90	43539-C3	53.50
	.040	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982540	52.10	982540-C3	56.70
	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22140	41.70	22140-C3	46.30
	.040	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43540	48.90	43540-C3	53.50
	.045	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22145	41.70	22145-C3	46.30
	.047 (3/64)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982547	52.10	982547-C3	56.70
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22147	41.70	22147-C3	46.30
	.047 (3/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43547	48.90	43547-C3	53.50
	.050	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22150	41.70	22150-C3	46.30
	.055	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22155	41.70	22155-C3	46.30
	.060	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22160	41.70	22160-C3	46.30
	.062 (1/16)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982562	52.10	982562-C3	56.70
	.062 (1/16)	.040	1/8 (1x)	.032	II	6	1/8	1-1/2	893362	53.20	893362-C3	57.80
	.062 (1/16)	1/16	1/8 (1x)	.022	I	6	1/8	1-1/2	806662	41.70	806662-C3	46.30
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22162	41.70	22162-C3	46.30
	.062 (1/16)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43562	48.90	43562-C3	53.50
	.078 (5/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22178	41.70	22178-C3	46.30
	.078 (5/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43578	48.90	43578-C3	53.50
	.093 (3/32)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982593	52.10	982593-C3	56.70
	.093 (3/32)	.040	1/8 (1x)	.032	II	6	1/8	1-1/2	893393	53.20	893393-C3	57.80
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22193	41.70	22193-C3	46.30
	.093 (3/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43593	48.90	43593-C3	53.50
	.100	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22182	41.70	22182-C3	46.30
	.125 (1/8)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22195	41.70	22195-C3	46.30
	.125 (1/8)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43595	48.90	43595-C3	53.50

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.010	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69410	46.00	69410-C3	51.00
	.015 (1/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69415	43.70	69415-C3	48.70
	.015 (1/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956215	50.80	956215-C3	55.80
	.020	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69420	43.70	69420-C3	48.70
	.020	5/64	1/2 (3x)	.029	I	6	3/16	2	956220	50.80	956220-C3	55.80
	.025	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69425	43.70	69425-C3	48.70
	.025	5/64	1/2 (3x)	.029	I	6	3/16	2	956225	50.80	956225-C3	55.80
	.031 (1/32)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900331	54.00	900331-C3	59.00
	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69431	43.70	69431-C3	48.70
	.031 (1/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956231	50.80	956231-C3	55.80
	.039 (1 mm)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69439	43.70	69439-C3	48.70
	.040	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69440	43.70	69440-C3	48.70
5/32	.047 (3/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69447	43.70	69447-C3	48.70
	.047 (3/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956247	50.80	956247-C3	55.80
	.050	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69450	43.70	69450-C3	48.70
	.060	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69460	43.70	69460-C3	48.70
	.062 (1/16)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900362	54.00	900362-C3	59.00
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69462	43.70	69462-C3	48.70
	.062 (1/16)	5/64	1/2 (3x)	.029	I	6	3/16	2	956262	50.80	956262-C3	55.80
	.078 (5/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69478	43.70	69478-C3	48.70
	.078 (5/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956278	50.80	956278-C3	55.80
	.093 (3/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69493	43.70	69493-C3	48.70
	.093 (3/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956293	50.80	956293-C3	55.80
	.125 (1/8)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69495	43.70	69495-C3	48.70
	.125 (1/8)	5/64	1/2 (3x)	.029	I	6	3/16	2	956295	50.80	956295-C3	55.80
	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22210	45.90	22210-C3	50.90
	.015 (1/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980015	53.30	980015-C3	58.30
	.015 (1/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22215	43.00	22215-C3	48.00
	.015 (1/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43715	54.00	43715-C3	59.00
	.018	Please see page 328 for Retaining Ring sizes.										
	.020	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980020	53.30	980020-C3	58.30
	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22220	43.00	22220-C3	48.00
	.020	3/32	9/16 (3x)	.037	I	6	3/16	2	43720	54.00	43720-C3	59.00
	.025	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980025	53.30	980025-C3	58.30
	.025	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22225	43.00	22225-C3	48.00
	.025	3/32	9/16 (3x)	.037	I	6	3/16	2	43725	54.00	43725-C3	59.00
3/16	.029	Please see page 328 for Retaining Ring sizes.										
	.030	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22230	43.00	22230-C3	48.00
	.030	3/32	9/16 (3x)	.037	I	6	3/16	2	43730	54.00	43730-C3	59.00
	.031 (1/32)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980031	53.30	980031-C3	58.30
	.031 (1/32)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928931	53.30	928931-C3	58.30
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22231	43.00	22231-C3	48.00
	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43731	54.00	43731-C3	59.00
	.035	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22235	43.00	22235-C3	48.00
	.035	3/32	9/16 (3x)	.037	I	6	3/16	2	43735	54.00	43735-C3	59.00
	.039 (1 mm)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22239	43.00	22239-C3	48.00
	.039 (1 mm)	3/32	9/16 (3x)	.037	I	6	3/16	2	43739	54.00	43739-C3	59.00

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.040	1/16	3/32 (.5x)	.052	II	6	3/16	2	980040	53.30	980040-C3	58.30
	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22240	43.00	22240-C3	48.00
	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	43740	54.00	43740-C3	59.00
	.045	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22246	43.00	22246-C3	48.00
	.045	3/32	9/16 (3x)	.037	I	6	3/16	2	43745	54.00	43745-C3	59.00
	.047 (3/64)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980047	53.30	980047-C3	58.30
	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22247	43.00	22247-C3	48.00
	.047 (3/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43747	54.00	43747-C3	59.00
	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22250	43.00	22250-C3	48.00
	.050	3/32	9/16 (3x)	.037	I	6	3/16	2	43750	54.00	43750-C3	59.00
	.055	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22255	43.00	22255-C3	48.00
	.055	3/32	9/16 (3x)	.037	I	6	3/16	2	43755	54.00	43755-C3	59.00
	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22261	43.00	22261-C3	48.00
	.060	3/32	9/16 (3x)	.037	I	6	3/16	2	43760	54.00	43760-C3	59.00
	.062 (1/16)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980062	53.30	980062-C3	58.30
3/16	.062 (1/16)	1/16	3/16 (1x)	.052	II	6	3/16	2	928962	53.30	928962-C3	58.30
	.062 (1/16)	3/32	3/16 (1x)	.037	I	6	3/16	2	806562	43.00	806562-C3	48.00
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22262	43.00	22262-C3	48.00
	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	43762	54.00	43762-C3	59.00
	.078 (5/64)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980078	53.30	980078-C3	58.30
	.078 (5/64)	1/16	3/16 (1x)	.052	II	6	3/16	2	928978	53.30	928978-C3	58.30
	.078 (5/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22278	43.00	22278-C3	48.00
	.078 (5/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43778	54.00	43778-C3	59.00
	.093 (3/32)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980093	53.30	980093-C3	58.30
	.093 (3/32)	1/16	3/16 (1x)	.052	II	6	3/16	2	928993	53.30	928993-C3	58.30
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22293	43.00	22293-C3	48.00
	.093 (3/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43793	54.00	43793-C3	59.00
	.125 (1/8)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980095	53.30	980095-C3	58.30
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22295	43.00	22295-C3	48.00
	.125 (1/8)	3/32	9/16 (3x)	.037	I	6	3/16	2	43795	54.00	43795-C3	59.00
	.156 (5/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22297	43.00	22297-C3	48.00
	.031 (1/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947531	49.60	947531-C3	56.40
	.039 (1 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947539	49.60	947539-C3	56.40
6 mm	.062 (1/16)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947562	49.60	947562-C3	56.40
	.093 (3/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947593	49.60	947593-C3	56.40
	.118 (3 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947588	49.60	947588-C3	56.40
	.125 (1/8)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947595	49.60	947595-C3	56.40
	.010	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22310	51.70	22310-C3	58.50
	.010	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43910	61.90	43910-C3	68.70
	.015 (1/64)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70815	59.00	70815-C3	65.80
	.015 (1/64)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986115	60.30	986115-C3	67.10
1/4	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22315	48.70	22315-C3	55.50
	.015 (1/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43915	59.40	43915-C3	66.20
	.020	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70820	51.50	70820-C3	58.30
	.020	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986120	52.70	986120-C3	59.50
	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22320	48.70	22320-C3	55.50
	.020	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43920	59.40	43920-C3	66.20

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.025	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70825	51.50	70825-C3	58.30
	.025	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986125	52.70	986125-C3	59.50
	.025	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22325	48.70	22325-C3	55.50
	.025	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43925	59.40	43925-C3	66.20
	.030	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70830	51.50	70830-C3	58.30
	.030	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22330	48.70	22330-C3	55.50
	.030	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43930	59.40	43930-C3	66.20
	.031 (1/32)	.050	5/64 (.3x)	.092	III	8	1/4	2-1/2	964731	84.70	964731-C3	91.50
	.031 (1/32)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70831	51.50	70831-C3	58.30
	.031 (1/32)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986131	67.30	986131-C3	74.10
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22331	48.70	22331-C3	55.50
	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43931	59.40	43931-C3	66.20
	.035	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22335	48.70	22335-C3	55.50
	.035	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43935	59.40	43935-C3	66.20
	.039 (1 mm)	Please see page 328 for Retaining Ring sizes.										
	.039 (1 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22339	48.70	22339-C3	55.50
	.040	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70840	51.50	70840-C3	58.30
	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22340	48.70	22340-C3	55.50
	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43940	59.40	43940-C3	66.20
	.045	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22346	48.70	22346-C3	55.50
	.046	Please see page 328 for Retaining Ring sizes.										
	.047 (3/64)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70847	51.50	70847-C3	58.30
	.047 (3/64)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986147	67.30	986147-C3	74.10
1/4	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22347	48.70	22347-C3	55.50
	.047 (3/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43947	59.40	43947-C3	66.20
	.050	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70850	51.50	70850-C3	58.30
	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22350	48.70	22350-C3	55.50
	.050	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43950	59.40	43950-C3	66.20
	.055	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22355	48.70	22355-C3	55.50
	.055	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43955	59.40	43955-C3	66.20
	.060	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70860	51.50	70860-C3	58.30
	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22361	48.70	22361-C3	55.50
	.060	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43961	59.40	43961-C3	66.20
	.062 (1/16)	.050	5/64 (.3x)	.092	III	8	1/4	2-1/2	964762	84.70	964762-C3	91.50
	.062 (1/16)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70862	51.50	70862-C3	58.30
	.062 (1/16)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986162	67.30	986162-C3	74.10
	.062 (1/16)	1/8	1/4 (1x)	.053	I	6	1/4	2-1/2	806462	48.70	806462-C3	55.50
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22362	48.70	22362-C3	55.50
	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43962	59.40	43962-C3	66.20
	.062 (1/16)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984262	68.70	984262-C3	75.50
	.078 (5/64)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70878	51.50	70878-C3	58.30
	.078 (5/64)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986178	67.30	986178-C3	74.10
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22378	48.70	22378-C3	55.50
	.078 (5/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43978	59.40	43978-C3	66.20
	.093 (3/32)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70893	51.50	70893-C3	58.30
	.093 (3/32)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986193	67.30	986193-C3	74.10
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22393	48.70	22393-C3	55.50
	.093 (3/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43993	59.40	43993-C3	66.20

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/4	.100	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22382	48.70	22382-C3	55.50
	.100	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43982	59.40	43982-C3	66.20
	.109 (7/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22384	48.70	22384-C3	55.50
	.118 (3 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22388	48.70	22388-C3	55.50
	.125 (1/8)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70895	51.50	70895-C3	58.30
	.125 (1/8)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986195	67.30	986195-C3	74.10
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22395	48.70	22395-C3	55.50
	.125 (1/8)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43995	59.40	43995-C3	66.20
	.125 (1/8)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984295	68.70	984295-C3	75.50
	.156 (5/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22397	48.70	22397-C3	55.50
	.156 (5/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43997	59.40	43997-C3	66.20
	.187 (3/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22398	48.70	22398-C3	55.50
	.187 (3/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43998	59.40	43998-C3	66.20
	.250 (1/4)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22399	48.70	22399-C3	55.50
5/16	.010	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22401	68.10	22401-C3	76.00
	.015 (1/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22403	64.30	22403-C3	72.20
	.020	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22405	64.30	22405-C3	72.20
	.025	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22407	64.30	22407-C3	72.20
	.030	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22409	64.30	22409-C3	72.20
	.031 (1/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973410	71.70	973410-C3	79.60
	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22410	64.30	22410-C3	72.20
	.031 (1/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69710	76.00	69710-C3	83.90
	.039 (1 mm)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22414	64.30	22414-C3	72.20
	.039 (1 mm)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69714	76.00	69714-C3	83.90
	.040	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22415	64.30	22415-C3	72.20
	.047 (3/64)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973420	71.70	973420-C3	79.60
	.047 (3/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22420	64.30	22420-C3	72.20
	.050	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22422	64.30	22422-C3	72.20
	.056	Please see page 328 for Retaining Ring sizes.										
	.060	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22428	64.30	22428-C3	72.20
	.062 (1/16)	.063	3/32 (.3x)	**.116**	III	10	5/16	2-1/2	959430	95.90	959430-C3	103.80
	.062 (1/16)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973430	71.70	973430-C3	79.60
	.062 (1/16)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907930	87.20	907930-C3	95.10
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22430	64.30	22430-C3	72.20
	.062 (1/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69730	76.00	69730-C3	83.90
	.078 (5/64)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973440	71.70	973440-C3	79.60
	.078 (5/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22440	64.30	22440-C3	72.20
	.078 (5/64)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69740	76.00	69740-C3	83.90
	.093 (3/32)	.063	3/32 (.3x)	**.116**	III	10	5/16	2-1/2	959450	95.90	959450-C3	103.80
	.093 (3/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973450	71.70	973450-C3	79.60
	.093 (3/32)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907950	87.20	907950-C3	95.10
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22450	64.30	22450-C3	72.20
	.093 (3/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69750	76.00	69750-C3	83.90
	.100	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22452	64.30	22452-C3	72.20
	.125 (1/8)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973460	71.70	973460-C3	79.60
	.125 (1/8)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907960	87.20	907960-C3	95.10
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22455	64.30	22455-C3	72.20
	.125 (1/8)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69760	76.00	69760-C3	83.90

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.156 (5/32)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973465	71.70	973465-C3	79.60
	.156 (5/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22465	64.30	22465-C3	72.20
	.156 (5/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69765	76.00	69765-C3	83.90
5/16	.187 (3/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22470	64.30	22470-C3	72.20
	.187 (3/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69770	76.00	69770-C3	83.90
	.250 (1/4)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22480	64.30	22480-C3	72.20
	.015 (1/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22503	75.10	22503-C3	84.10
	.020	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71105	76.10	71105-C3	85.10
	.020	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22505	75.10	22505-C3	84.10
	.020	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70305	84.90	70305-C3	93.90
	.025	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22507	75.10	22507-C3	84.10
	.025	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70307	84.90	70307-C3	93.90
	.030	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22509	75.10	22509-C3	84.10
	.031 (1/32)	.075	7/64 (.3x)	.142	III	10	3/8	2-1/2	991310	99.30	991310-C3	108.30
	.031 (1/32)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71110	76.10	71110-C3	85.10
	.031 (1/32)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958910	91.80	958910-C3	100.80
	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22510	72.50	22510-C3	81.50
	.031 (1/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70310	84.90	70310-C3	93.90
3/8	.035	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22512	72.50	22512-C3	81.50
	.035	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70312	84.90	70312-C3	93.90
	.039 (1 mm)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71114	76.10	71114-C3	85.10
	.039 (1 mm)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22514	72.50	22514-C3	81.50
	.039 (1 mm)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70314	84.90	70314-C3	93.90
	.040	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71115	76.10	71115-C3	85.10
	.040	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22515	72.50	22515-C3	81.50
	.040	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70315	84.90	70315-C3	93.90
	.045	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22518	72.50	22518-C3	81.50
	.047 (3/64)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71120	76.10	71120-C3	85.10
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22520	72.50	22520-C3	81.50
	.047 (3/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70320	84.90	70320-C3	93.90
	.050	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22522	72.50	22522-C3	81.50
	.055	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22525	72.50	22525-C3	81.50
	.060	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22528	72.50	22528-C3	81.50
	.060	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70328	84.90	70328-C3	93.90
	.062 (1/16)	.075	7/64 (.3x)	.142	III	10	3/8	2-1/2	991330	99.30	991330-C3	108.30
	.062 (1/16)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71130	76.10	71130-C3	85.10
	.062 (1/16)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958930	91.80	958930-C3	100.80
	.062 (1/16)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806330	72.50	806330-C3	81.50
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22530	72.50	22530-C3	81.50
	.062 (1/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70330	84.90	70330-C3	93.90
	.068	Please see page 328 for Retaining Ring sizes.										
	.078 (5/64)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71140	76.10	71140-C3	85.10
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22540	72.50	22540-C3	81.50
	.078 (5/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70340	72.50	70340-C3	81.50
	.086	Please see page 328 for Retaining Ring sizes.										

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.093 (3/32)	.075	7/64 (.3x)	.142	III	10	3/8	2-1/2	991350	99.30	991350-C3	108.30
	.093 (3/32)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71150	76.10	71150-C3	85.10
	.093 (3/32)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958950	91.80	958950-C3	100.80
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22550	72.50	22550-C3	81.50
	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70350	84.90	70350-C3	93.90
	.100	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22552	72.50	22552-C3	81.50
	.125 (1/8)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71160	76.10	71160-C3	85.10
	.125 (1/8)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958960	91.80	958960-C3	100.80
	.125 (1/8)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806360	72.50	806360-C3	81.50
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22560	72.50	22560-C3	81.50
	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70360	84.90	70360-C3	93.90
	.156 (5/32)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71165	76.10	71165-C3	85.10
	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22565	72.50	22565-C3	81.50
	.156 (5/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70365	84.90	70365-C3	93.90
	.187 (3/16)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71170	76.10	71170-C3	85.10
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22570	72.50	22570-C3	81.50
	.187 (3/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70370	84.90	70370-C3	93.90
	.250 (1/4)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71180	76.10	71180-C3	85.10
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22580	72.50	22580-C3	81.50
	.250 (1/4)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70380	84.90	70380-C3	93.90
	.312 (5/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22585	72.50	22585-C3	81.50
7/16	.031 (1/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71810	96.80	71810-C3	108.00
	.047 (3/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71820	96.80	71820-C3	108.00
	.062 (1/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71830	96.80	71830-C3	108.00
	.078 (5/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71840	96.80	71840-C3	108.00
	.093 (3/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71850	96.80	71850-C3	108.00
	.125 (1/8)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71860	96.80	71860-C3	108.00
	.125 (1/8)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892960	109.50	892960-C3	120.70
	.156 (5/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71865	96.80	71865-C3	108.00
	.187 (3/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71870	96.80	71870-C3	108.00
	.187 (3/16)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892970	109.50	892970-C3	120.70
	.250 (1/4)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71880	96.80	71880-C3	108.00
	.250 (1/4)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892980	109.50	892980-C3	120.70
1/2	.015 (1/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22603	98.50	22603-C3	111.90
	.020	5/32	1/4 (.5x)	.162	II	8	1/2	3	71205	102.30	71205-C3	115.70
	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22605	98.50	22605-C3	111.90
	.025	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22607	98.50	22607-C3	111.90
	.025	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71507	110.70	71507-C3	124.10
	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22609	98.50	22609-C3	111.90
	.031 (1/32)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71210	99.20	71210-C3	112.60
	.031 (1/32)	5/32	1/2 (1x)	.162	II	8	1/2	3	975710	100.50	975710-C3	113.90
	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22610	95.30	22610-C3	108.70
	.031 (1/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71510	107.70	71510-C3	121.10
	.035	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22612	95.30	22612-C3	108.70
	.039 (1 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22614	95.30	22614-C3	108.70
	.040	5/32	1/4 (.5x)	.162	II	8	1/2	3	71215	99.20	71215-C3	112.60
	.040	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22615	95.30	22615-C3	108.70
	.040	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71515	107.70	71515-C3	121.10

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.0005″}_{-.0005″}$		L_3 $^{+.020″}_{-.000″}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.045	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22618	95.30	22618-C3	108.70
	.045	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71518	107.70	71518-C3	121.10
	.047 (3/64)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71220	99.20	71220-C3	112.60
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22620	95.30	22620-C3	108.70
	.047 (3/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71520	107.70	71520-C3	121.10
	.050	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22622	95.30	22622-C3	108.70
	.050	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71522	107.70	71522-C3	121.10
	.055	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22625	95.30	22625-C3	108.70
	.055	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71525	107.70	71525-C3	121.10
	.060	5/32	1/4 (.5x)	.162	II	8	1/2	3	71228	99.20	71228-C3	112.60
	.060	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22628	95.30	22628-C3	108.70
	.062 (1/16)	.100	5/32 (.3x)	.192	III	12	1/2	3	985230	124.10	985230-C3	137.50
	.062 (1/16)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71230	99.20	71230-C3	112.60
	.062 (1/16)	5/32	1/2 (1x)	.162	II	8	1/2	3	975730	117.60	975730-C3	131.00
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22630	95.30	22630-C3	108.70
	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71530	107.70	71530-C3	121.10
	.070	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22635	95.30	22635-C3	108.70
	.078 (5/64)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71240	99.20	71240-C3	112.60
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22640	95.30	22640-C3	108.70
	.078 (5/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71540	107.70	71540-C3	121.10
	.080	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22642	95.30	22642-C3	108.70
	.090	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22647	95.30	22647-C3	108.70
	.093 (3/32)	.100	5/32 (.3x)	.192	III	12	1/2	3	985250	124.10	985250-C3	137.50
	.093 (3/32)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71250	99.20	71250-C3	112.60
1/2	.093 (3/32)	5/32	1/2 (1x)	.162	II	8	1/2	3	975750	117.60	975750-C3	131.00
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22650	95.30	22650-C3	108.70
	.093 (3/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71550	107.70	71550-C3	121.10
	.100	5/32	1/4 (.5x)	.162	II	8	1/2	3	71252	99.20	71252-C3	112.60
	.100	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22652	95.30	22652-C3	108.70
	.100	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71552	107.70	71552-C3	121.10
	.103	Please see page 328 for Retaining Ring sizes.										
	.109 (7/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22654	95.30	22654-C3	108.70
	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22657	95.30	22657-C3	108.70
	.118 (3 mm)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71557	107.70	71557-C3	121.10
	.120	Please see page 328 for Retaining Ring sizes.										
	.125 (1/8)	.100	5/32 (.3x)	.192	III	12	1/2	3	985260	124.10	985260-C3	137.50
	.125 (1/8)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71260	99.20	71260-C3	112.60
	.125 (1/8)	5/32	1/2 (1x)	.162	II	8	1/2	3	975760	117.60	975760-C3	131.00
	.125 (1/8)	1/4	1/2 (1x)	.115	I	8	1/2	3	806260	95.30	806260-C3	108.70
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22660	95.30	22660-C3	108.70
	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71560	107.70	71560-C3	121.10
	.125 (1/8)	1/4	2 (4x)	.115	I	8	1/2	4	933160	160.80	933160-C3	174.20
	.140 (9/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22662	95.30	22662-C3	108.70
	.156 (5/32)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71265	99.20	71265-C3	112.60
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22665	95.30	22665-C3	108.70
	.156 (5/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71565	107.70	71565-C3	121.10
	.187 (3/16)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71270	99.20	71270-C3	112.60
	.187 (3/16)	5/32	1/2 (1x)	.162	II	8	1/2	3	975770	117.60	975770-C3	131.00

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22670	95.30	22670-C3	108.70
	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71570	107.70	71570-C3	121.10
	.250 (1/4)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71280	99.20	71280-C3	112.60
	.250 (1/4)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975780	117.60	975780-C3	131.00
1/2	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22680	95.30	22680-C3	108.70
	.250 (1/4)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71580	107.70	71580-C3	121.10
	.312 (5/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22685	95.30	22685-C3	108.70
	.312 (5/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71585	107.70	71585-C3	121.10
	.375 (3/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22687	95.30	22687-C3	108.70
	.031 (1/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70910	149.30	70910-C3	162.70
	.031 (1/32)	5/16	2 (3x)	.146	I	8	5/8	3-1/2	972910	193.10	972910-C3	206.50
	.047 (3/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70920	149.30	70920-C3	162.70
	.062 (1/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70930	149.30	70930-C3	162.70
	.078 (5/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70940	149.30	70940-C3	162.70
	.093 (3/32)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950650	201.00	950650-C3	214.40
	.093 (3/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70950	149.30	70950-C3	162.70
	.093 (3/32)	5/16	2 (3x)	.146	I	8	5/8	4	972950	193.10	972950-C3	207.60
	.120	Please see page 328 for Retaining Ring sizes.										
	.125 (1/8)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950660	201.00	950660-C3	214.40
	.125 (1/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70960	149.30	70960-C3	162.70
	.125 (1/8)	5/16	2 (3x)	.146	I	8	5/8	4	972960	193.10	972960-C3	207.60
5/8	.139	Please see page 328 for Retaining Ring sizes.										
	.156 (5/32)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950665	201.00	950665-C3	214.40
	.156 (5/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70965	149.30	70965-C3	162.70
	.156 (5/32)	5/16	2 (3x)	.146	I	8	5/8	4	972965	193.10	972965-C3	207.60
	.187 (3/16)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950670	201.00	950670-C3	214.40
	.187 (3/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70970	149.30	70970-C3	162.70
	.187 (3/16)	5/16	2 (3x)	.146	I	8	5/8	4	972970	193.10	972970-C3	207.60
	.250 (1/4)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950680	201.00	950680-C3	214.40
	.250 (1/4)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70980	149.30	70980-C3	162.70
	.250 (1/4)	5/16	2 (3x)	.146	I	8	5/8	4	972980	193.10	972980-C3	207.60
	.312 (5/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70985	149.30	70985-C3	162.70
	.375 (3/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70987	149.30	70987-C3	162.70

*Radial DOC accounts for max transition radius at neck

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 325, 333, & 340.

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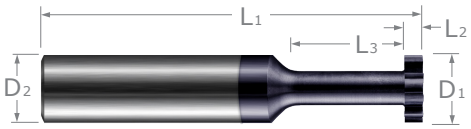
KEYSEAT CUTTERS

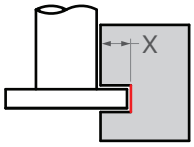
Square for Hardened Steels



- Optimized for hardened steels 45-68Rc with high flute count and specialized internal geometry
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

High Flute Count and Specialized Internal Geometry

Standard Slotting (Type I)

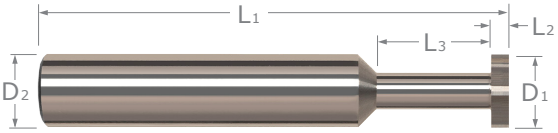


CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	AlTiN NANO COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE
1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867415-C6	52.00
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867431-C6	52.00
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867462-C6	52.00
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867493-C6	52.00
3/16	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875931-C6	54.00
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875962-C6	54.00
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875993-C6	54.00
1/4	.015 (1/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860115-C6	61.00
	.031 (1/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860131-C6	61.00
	.047 (3/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860147-C6	61.00
	.062 (1/16)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860162-C6	61.00
	.078 (5/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860178-C6	61.00
	.093 (3/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860193-C6	61.00
	.125 (1/8)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860195-C6	61.00
5/16	.062 (1/16)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855630-C6	80.70
	.093 (3/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855650-C6	80.70
	.125 (1/8)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855660-C6	80.70
3/8	.031 (1/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894710-C6	90.90
	.062 (1/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894730-C6	90.90
	.093 (3/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894750-C6	90.90
	.125 (1/8)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894760-C6	90.90
	.187 (3/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894770-C6	90.90
	.250 (1/4)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894780-C6	90.90
1/2	.031 (1/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891310-C6	123.40
	.047 (3/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891320-C6	123.40
	.062 (1/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891330-C6	123.40
	.078 (5/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891340-C6	123.40
	.093 (3/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891350-C6	123.40
	.125 (1/8)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891360-C6	123.40
	.156 (5/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891365-C6	123.40
	.187 (3/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891370-C6	123.40
	.250 (1/4)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891380-C6	123.40

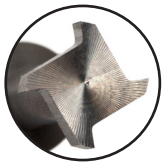
*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Square for Non-Ferrous Materials

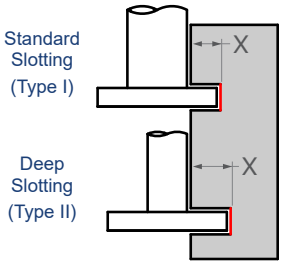


- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Large flute opening and sharper cutting edge
- Offered with TiB_2 coating to minimize galling
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Large Flute Opening & Sharper Cutting Edge

Stocked in Multiple Radial Depths of Cut!



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849815	47.00	849815-C8	53.80
3/32	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849831	47.00	849831-C8	53.80
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849862	47.00	849862-C8	53.80
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962915	47.00	962915-C8	53.80
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962931	47.00	962931-C8	53.80
1/8	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962962	47.00	962962-C8	53.80
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962993	47.00	962993-C8	53.80
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998031	48.70	998031-C8	55.50
3/16	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998047	48.70	998047-C8	55.50
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998062	48.70	998062-C8	55.50
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998095	48.70	998095-C8	55.50
	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970315	54.00	970315-C8	61.30
	.020	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970320	54.00	970320-C8	61.30
	.025	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970325	54.00	970325-C8	61.30
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970331	54.00	970331-C8	61.30
	.040	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970340	54.00	970340-C8	61.30
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970347	54.00	970347-C8	61.30
1/4	.060	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970360	54.00	970360-C8	61.30
	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	4	1/4	2-1/2	909262	56.90	909262-C8	64.20
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970362	54.00	970362-C8	61.30
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970378	54.00	970378-C8	61.30
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970393	54.00	970393-C8	61.30
	.125 (1/8)	5/64	1/8 (.5x)	**.076**	II	4	1/4	2-1/2	909295	56.90	909295-C8	64.20
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970395	54.00	970395-C8	61.30
	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984310	74.00	984310-C8	89.50
5/16	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984330	74.00	984330-C8	89.50
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984350	74.00	984350-C8	89.50
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984360	74.00	984360-C8	89.50

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square for Non-Ferrous Materials (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975210	82.80	975210-C8	101.60
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975220	82.80	975220-C8	101.60
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975230	82.80	975230-C8	101.60
3/8	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975240	82.80	975240-C8	101.60
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975250	82.80	975250-C8	101.60
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975260	82.80	975260-C8	101.60
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975270	82.80	975270-C8	101.60
	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988910	109.10	988910-C8	131.20
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988920	109.10	988920-C8	131.20
	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917530	113.20	917530-C8	135.30
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988930	109.10	988930-C8	131.20
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988940	109.10	988940-C8	131.20
1/2	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988950	109.10	988950-C8	131.20
	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917560	113.20	917560-C8	135.30
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988960	109.10	988960-C8	131.20
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988965	109.10	988965-C8	131.20
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988970	109.10	988970-C8	131.20
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988980	109.10	988980-C8	131.20
	.062 (1/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891730	156.30	891730-C8	188.50
	.078 (5/64)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891740	156.30	891740-C8	188.50
	.093 (3/32)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891750	156.30	891750-C8	188.50
5/8	.125 (1/8)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891760	156.30	891760-C8	188.50
	.187 (3/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891770	156.30	891770-C8	188.50
	.250 (1/4)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891780	156.30	891780-C8	188.50

*Radial DOC accounts for max transition radius at neck

★★★★★

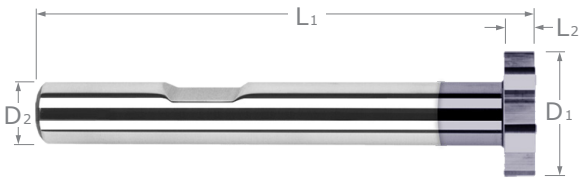
"We didn't have time to have a form tool ground for this job so we did a 3D under cut with a corner radius keyway cutter from @ harveytool. Harvey Tool makes some of the best odd size tools out there."

— @hdhmfg

Follow us on Instagram @harveytool!

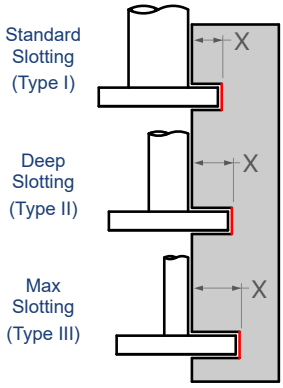
KEYSEAT CUTTERS

Square – Reduced Shank



- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Weldon flat
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!



CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.001" −.001"	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.031 (1/32)	.115	I	8	1/4*	3-1/32	849305	84.80	849305-C3	98.20
	.062 (1/16)	.115	I	8	1/4*	3-1/16	849320	84.80	849320-C3	98.20
	.093 (3/32)	.115	I	8	1/4*	3-3/32	849340	84.80	849340-C3	98.20
1/2	.125 (1/8)	.115	I	8	1/4*	3-1/8	849350	84.80	849350-C3	98.20
	.187 (3/16)	.115	I	8	1/4*	3-3/16	849360	84.80	849360-C3	98.20
	.250 (1/4)	.115	I	8	1/4*	3-1/4	849370	84.80	849370-C3	98.20
	.031 (1/32)	.240	III	10	1/4*	3-1/32	899805	111.30	899805-C3	125.80
	.031 (1/32)	.177	II	10	3/8	3-1/32	984505	105.20	984505-C3	119.70
	.031 (1/32)	.115	I	10	1/2	3-1/32	52005	102.00	52005-C3	116.50
	.040	.177	II	10	3/8	3.040	984508	105.20	984508-C3	119.70
	.040	.115	I	10	1/2	3.040	52008	102.00	52008-C3	116.50
	.047 (3/64)	.240	III	10	1/4*	3-3/64	899810	111.30	899810-C3	125.80
	.047 (3/64)	.177	II	10	3/8	3-3/64	984510	105.20	984510-C3	119.70
	.047 (3/64)	.115	I	10	1/2	3-3/64	52010	102.00	52010-C3	116.50
	.050	.115	I	10	1/2	3.050	52011	102.00	52011-C3	116.50
	.060	.115	I	10	1/2	3.060	52019	102.00	52019-C3	116.50
	.062 (1/16)	.240	III	10	1/4*	3-1/16	899820	111.30	899820-C3	125.80
	.062 (1/16)	.177	II	10	3/8	3-1/16	984520	105.20	984520-C3	119.70
	.062 (1/16)	.115	I	10	1/2	3-1/16	52020	102.00	52020-C3	116.50
3/4	.078 (5/64)	.177	II	10	3/8	3-5/64	984530	105.20	984530-C3	119.70
	.078 (5/64)	.115	I	10	1/2	3-5/64	52030	102.00	52030-C3	116.50
	.093 (3/32)	.240	III	10	1/4*	3-3/32	899840	111.30	899840-C3	125.80
	.093 (3/32)	.177	II	10	3/8	3-3/32	984540	105.20	984540-C3	119.70
	.093 (3/32)	.115	I	10	1/2	3-3/32	52040	102.00	52040-C3	116.50
	.100	.115	I	10	1/2	3.100	52045	102.00	52045-C3	116.50
	.118 (3 mm)	.115	I	10	1/2	3.118	52048	102.00	52048-C3	116.50
	.125 (1/8)	.177	II	10	3/8	3-1/8	984550	105.20	984550-C3	119.70
	.125 (1/8)	.115	I	10	1/2	3-1/8	52050	102.00	52050-C3	116.50
	.156 (5/32)	.177	II	10	3/8	3-5/32	984555	105.20	984555-C3	119.70
	.156 (5/32)	.115	I	10	1/2	3-5/32	52055	102.00	52055-C3	116.50
	.174	Please see page 328 for Retaining Ring sizes.								
	.187 (3/16)	.177	II	10	3/8	3-3/16	984560	105.20	984560-C3	119.70
	.187 (3/16)	.115	I	10	1/2	3-3/16	52060	102.00	52060-C3	116.50

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

continued on next page

KEYSEAT CUTTERS

Square – Reduced Shank (cont.)

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.236 (6 mm)	.115	I	10	1/2	3.236	52066	110.70	52066-C3	125.20
	.250 (1/4)	**.177**	II	10	3/8	3-1/4	984570	118.00	984570-C3	132.50
3/4	.250 (1/4)	.115	I	10	1/2	3-1/4	52070	115.10	52070-C3	129.60
	.312 (5/16)	.115	I	10	1/2	3-5/16	52080	135.70	52080-C3	157.80
	.375 (3/8)	.115	I	10	1/2	3-3/8	52090	141.40	52090-C3	163.50
	.062 (1/16)	.177	I	12	1/2	3-1/16	961020	109.10	961020-C3	123.60
	.093 (3/32)	.177	I	12	1/2	3-3/32	961040	109.10	961040-C3	123.60
	.125 (1/8)	**.240**	II	12	3/8	3-1/8	890650	111.80	890650-C3	126.30
	.125 (1/8)	.177	I	12	1/2	3-1/8	961050	109.10	961050-C3	123.60
7/8	.187 (3/16)	**.240**	II	12	3/8	3-3/16	890660	111.80	890660-C3	126.30
	.187 (3/16)	.177	I	12	1/2	3-3/16	961060	109.10	961060-C3	123.60
	.250 (1/4)	**.240**	II	12	3/8	3-1/4	890670	124.30	890670-C3	138.80
	.250 (1/4)	.177	I	12	1/2	3-1/4	961070	121.40	961070-C3	135.90
	.312 (5/16)	.177	I	12	1/2	3-5/16	961080	135.70	961080-C3	157.80
	.375 (3/8)	.177	I	12	1/2	3-3/8	961090	141.40	961090-C3	163.50
	.031 (1/32)	**.365**	III	12	1/4*	3-1/32	914905	129.70	914905-C3	151.80
	.031 (1/32)	**.302**	II	12	3/8	3-1/32	982005	117.60	982005-C3	139.70
	.031 (1/32)	.240	I	12	1/2	3-1/32	55905	114.70	55905-C3	136.80
	.040	.240	I	12	1/2	3.040	55908	114.70	55908-C3	136.80
	.047 (3/64)	**.365**	III	12	1/4*	3-3/64	914910	129.70	914910-C3	151.80
	.047 (3/64)	**.302**	II	12	3/8	3-3/64	982010	117.60	982010-C3	139.70
	.047 (3/64)	.240	I	12	1/2	3-3/64	55910	114.70	55910-C3	136.80
	.062 (1/16)	**.365**	III	12	1/4*	3-1/16	914920	129.70	914920-C3	151.80
	.062 (1/16)	**.302**	II	12	3/8	3-1/16	982020	117.60	982020-C3	139.70
	.062 (1/16)	.240	I	12	1/2	3-1/16	55920	114.70	55920-C3	136.80
	.078 (5/64)	**.365**	III	12	1/4*	3-5/64	914930	129.70	914930-C3	151.80
	.078 (5/64)	**.302**	II	12	3/8	3-5/64	982030	117.60	982030-C3	139.70
	.078 (5/64)	.240	I	12	1/2	3-5/64	55930	114.70	55930-C3	136.80
	.093 (3/32)	**.365**	III	12	1/4*	3-3/32	914940	129.70	914940-C3	151.80
	.093 (3/32)	**.302**	II	12	3/8	3-3/32	982040	117.60	982040-C3	139.70
1	.093 (3/32)	.240	I	12	1/2	3-3/32	55940	114.70	55940-C3	136.80
	.125 (1/8)	**.365**	III	12	1/4*	3-1/8	914950	129.70	914950-C3	151.80
	.125 (1/8)	**.302**	II	12	3/8	3-1/8	982050	117.60	982050-C3	139.70
	.125 (1/8)	.240	I	12	1/2	3-1/8	55950	114.70	55950-C3	136.80
	.156 (5/32)	**.302**	II	12	3/8	3-5/32	982055	117.60	982055-C3	139.70
	.156 (5/32)	.240	I	12	1/2	3-5/32	55955	114.70	55955-C3	136.80
	.187 (3/16)	**.302**	II	12	3/8	3-3/16	982060	117.60	982060-C3	139.70
	.187 (3/16)	.240	I	12	1/2	3-3/16	55960	114.70	55960-C3	136.80
	.209	Please see page 328 for Retaining Ring sizes.								
	.250 (1/4)	**.302**	II	12	3/8	3-1/4	982070	130.40	982070-C3	152.50
	.250 (1/4)	.240	I	12	1/2	3-1/4	55970	127.30	55970-C3	149.40
	.312 (5/16)	**.302**	II	12	3/8	3-5/16	982080	139.10	982080-C3	161.20
	.312 (5/16)	.240	I	12	1/2	3-5/16	55980	135.70	55980-C3	157.80
	.375 (3/8)	**.302**	II	12	3/8	3-3/8	982090	131.70	982090-C3	152.50
	.375 (3/8)	.240	I	12	1/2	3-3/8	55990	141.40	55990-C3	163.50
	.500 (1/2)	.240	I	12	1/2	3-1/2	55995	147.10	55995-C3	169.20

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

continued on next page

KEYSEAT CUTTERS

Square – Reduced Shank (cont.)

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.093 (3/32)	.240	I	14	3/4	3-11/32	973940	142.50	973940-C3	164.60
	.125 (1/8)	**.365**	II	14	1/2	3-1/8	879950	146.00	879950-C3	169.70
	.125 (1/8)	.240	I	14	3/4	3-3/8	973950	142.50	973950-C3	164.60
1-1/4	.250 (1/4)	**.365**	II	14	1/2	3-1/4	879970	147.40	879970-C3	169.70
	.250 (1/4)	.240	I	14	3/4	3-1/2	973970	158.50	973970-C3	173.00
	.375 (3/8)	.240	I	14	3/4	3-5/8	973990	170.90	973990-C3	198.50
	.500 (1/2)	.240	I	14	3/4	3-3/4	973995	170.90	973995-C3	198.50
	.062 (1/16)	**.490**	II	16	1/2	3-1/16	887020	155.40	887020-C3	183.00
	.062 (1/16)	.365	I	16	3/4	3-5/16	962020	151.80	962020-C3	179.40
	.093 (3/32)	.365	I	16	3/4	3-11/32	962040	151.80	962040-C3	179.40
	.125 (1/8)	**.552**	III	16	3/8	3-1/8	868750	160.00	868750-C3	187.60
	.125 (1/8)	**.490**	II	16	1/2	3-1/8	887050	155.40	887050-C3	183.00
	.125 (1/8)	.365	I	16	3/4	3-3/8	962050	151.80	962050-C3	179.40
	.187 (3/16)	**.552**	III	16	3/8	3-3/16	868760	160.00	868760-C3	187.60
1-1/2	.187 (3/16)	**.490**	II	16	1/2	3-3/16	887060	155.40	887060-C3	183.00
	.187 (3/16)	.365	I	16	3/4	3-7/16	962060	151.80	962060-C3	179.40
	.250 (1/4)	**.490**	II	16	1/2	3-1/4	887070	167.20	887070-C3	194.80
	.250 (1/4)	.365	I	16	3/4	3-1/2	962070	163.20	962070-C3	190.80
	.312 (5/16)	.365	I	16	3/4	3-9/16	962080	184.10	962080-C3	211.70
	.375 (3/8)	.365	I	16	3/4	3-5/8	962090	210.70	962090-C3	238.30
	.437 (7/16)	.365	I	16	3/4	3-11/16	962093	228.00	962093-C3	255.60
	.500 (1/2)	.365	I	16	3/4	3-3/4	962095	245.00	962095-C3	272.60

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

★★★★★

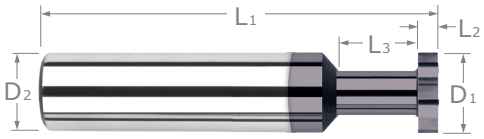
"Best Tool ever! [Back Corner Rounding End Mill] No more second ops! (making iPad/tablet display frames for kiosks)."

— @centralmachineinc

Follow us on Instagram @harveytool!

KEYSEAT CUTTERS

Retaining Ring Keyseats



Designed for Milling ◀ Retaining / Snap Ring Grooves

- Designed to mill proper slot widths for common retaining ring sizes
- Cutter diameter, neck length, radial, and axial depths of cut optimized for internal retaining ring grooves per ANSI standards
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC**	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.002″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/16	.018	1/8	1/8	.021	6	3/16	2	23504	46.00	23504-C3	51.00
	.029	1/8	1/8	.021	6	3/16	2	23508	46.00	23508-C3	51.00
1/4	.039	5/32	5/32	.037	6	1/4	2-1/2	23512	54.50	23512-C3	61.30
	.046	5/32	5/32	.037	6	1/4	2-1/2	23516	54.50	23516-C3	61.30
5/16	.056	3/16	3/16	.052	6	5/16	2-1/2	23520	65.20	23520-C3	73.10
3/8	.068	3/16	1/4	.084	8	3/8	2-1/2	23524	76.00	23524-C3	85.00
	.086	3/16	1/4	.084	8	3/8	2-1/2	23528	76.00	23528-C3	85.00
1/2	.103	1/4	5/16	.115	8	1/2	3	23532	83.70	23532-C3	97.10
	.120	1/4	3/8	.115	8	1/2	3	23536	83.70	23536-C3	97.10
5/8	.120	5/16	1/2	.146	8	5/8	3-1/2	23540	155.70	23540-C3	169.10
	.139	5/16	1/2	.146	8	5/8	3-1/2	23544	155.70	23544-C3	169.10
3/4	.174	-	-	.177	10	3/8	3.174	23548*	112.40	23548-C3*	131.90
1	.209	-	-	.240	12	1/2	3.209	23564*	134.60	23564-C3*	156.70

*Carbide head with reduced steel shank **Radial DOC accounts for max transition at neck

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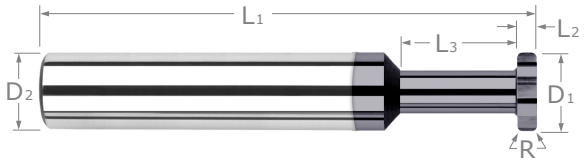
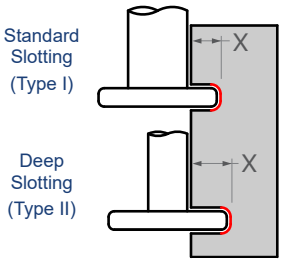
Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com

NEW SIZES!

KEYSEAT CUTTERS

Corner Radius





- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

	CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
	D_1 +.000" −.002"	L_2 +.0005" −.0005"	R +.001" −.001"		L_3 +.020" −.000"	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/16	.015 (1/64)	.005	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910615	54.50	910615-C3	59.10
NEW		.020	.005	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910620	54.50	910620-C3	59.10
		.031 (1/32)	.005	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910631	54.50	910631-C3	59.10
	3/32	.031 (1/32)	.005	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902531	53.10	902531-C3	57.70
NEW		.031 (1/32)	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909131	53.10	909131-C3	57.70
		.062 (1/16)	.005	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902562	53.10	902562-C3	57.70
		.062 (1/16)	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909162	53.10	909162-C3	57.70
	1/8	.015 (1/64)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965115	51.70	965115-C3	56.30
		.020	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965120	51.70	965120-C3	56.30
		.025	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965125	51.70	965125-C3	56.30
		.031 (1/32)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965131	51.70	965131-C3	56.30
		.031 (1/32)	.010	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	837631	60.80	837631-C3	65.40
		.040	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965140	51.70	965140-C3	56.30
		.047 (3/64)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965147	51.70	965147-C3	56.30
		.062 (1/16)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965162	51.70	965162-C3	56.30
		.062 (1/16)	.010	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	837662	60.80	837662-C3	65.40
		.062 (1/16)	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985962	51.70	985962-C3	56.30
		.078 (5/64)	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985978	51.70	985978-C3	56.30
		.093 (3/32)	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985993	51.70	985993-C3	56.30
		.093 (3/32)	.015	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	960793	51.70	960793-C3	56.30
	3/16	.015 (1/64)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954715	53.40	954715-C3	58.40
		.020	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954720	53.40	954720-C3	58.40
		.025	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954725	53.40	954725-C3	58.40
		.031 (1/32)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954731	53.40	954731-C3	58.40
		.040	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954740	53.40	954740-C3	58.40
		.047 (3/64)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954747	53.40	954747-C3	58.40
		.062 (1/16)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954762	53.40	954762-C3	58.40
		.062 (1/16)	.010	1/16	3/32 (.5x)	.052	II	6	3/16	2	837262	63.00	837262-C3	68.00
		.062 (1/16)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949962	53.40	949962-C3	58.40
		.062 (1/16)	.015	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937762	53.40	937762-C3	58.40
		.078 (5/64)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949978	53.40	949978-C3	58.40
		.093 (3/32)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949993	53.40	949993-C3	58.40
		.093 (3/32)	.015	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937793	53.40	937793-C3	58.40
		.125 (1/8)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949995	53.40	949995-C3	58.40
		.125 (1/8)	.015	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937795	53.40	937795-C3	58.40

*Radial DOC accounts for max transition radius at neck

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NEW SIZES!

KEYSEAT CUTTERS

Corner Radius (cont.)

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CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.015 (1/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981115	59.00	981115-C3	65.80
	.020	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981120	59.00	981120-C3	65.80
	.025	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981125	59.00	981125-C3	65.80
	.031 (1/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981131	59.00	981131-C3	65.80
	.031 (1/32)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	916631	69.70	916631-C3	76.50
	.031 (1/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972631	59.00	972631-C3	65.80
	.040	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981140	59.00	981140-C3	65.80
	.047 (3/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981147	59.00	981147-C3	65.80
	.047 (3/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972647	59.00	972647-C3	65.80
	.050	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981150	59.00	981150-C3	65.80
	.060	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972660	59.00	972660-C3	65.80
	.062 (1/16)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981162	57.90	981162-C3	64.70
	.062 (1/16)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911762	68.40	911762-C3	75.20
	.062 (1/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972662	57.90	972662-C3	64.70
	.062 (1/16)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900062	68.60	900062-C3	75.40
1/4	.062 (1/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968462	57.90	968462-C3	64.70
	.078 (5/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972678	59.00	972678-C3	65.80
	.093 (3/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981193	57.90	981193-C3	64.70
	.093 (3/32)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911793	68.40	911793-C3	75.20
	.093 (3/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972693	57.90	972693-C3	64.70
	.093 (3/32)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900093	68.60	900093-C3	75.40
	.093 (3/32)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968493	57.90	968493-C3	64.70
	.093 (3/32)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904593	57.90	904593-C3	64.70
	.125 (1/8)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981195	57.90	981195-C3	64.70
	.125 (1/8)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911795	68.40	911795-C3	75.20
	.125 (1/8)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972695	57.90	972695-C3	64.70
	.125 (1/8)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900095	68.60	900095-C3	75.40
	.125 (1/8)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968495	57.90	968495-C3	64.70
	.125 (1/8)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904595	57.90	904595-C3	64.70
	.187 (3/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972697	57.90	972697-C3	64.70
	.187 (3/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968497	57.90	968497-C3	64.70
	.031 (1/32)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931610	84.90	931610-C3	92.80
	.031 (1/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921110	84.90	921110-C3	92.80
	.062 (1/16)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931630	84.90	931630-C3	92.80
5/16	.062 (1/16)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921130	84.90	921130-C3	92.80
	.093 (3/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921150	84.90	921150-C3	92.80
	.093 (3/32)	**.015**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	927750	84.90	927750-C3	92.80
	.031 (1/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987210	87.30	987210-C3	96.30
	.047 (3/64)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987220	87.30	987220-C3	96.30
	.062 (1/16)	**.005**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	836830	89.60	836830-C3	98.60
	.062 (1/16)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987230	85.60	987230-C3	94.60
3/8	.062 (1/16)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916830	89.60	916830-C3	98.60
	.062 (1/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981630	85.60	981630-C3	94.60
	.062 (1/16)	**.010**	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	793730	86.80	793730-C3	95.80 NEW
	.062 (1/16)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903330	89.60	903330-C3	98.60
	.062 (1/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970030	85.60	970030-C3	94.60

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Corner Radius (cont.)

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CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.0005"}_{-.0005"}$	R $^{+.001"}_{-.001"}$		L_3 $^{+.020"}_{-.000"}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.078 (5/64)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981640	87.30	981640-C3	96.30
	.093 (3/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987250	85.60	987250-C3	94.60
	.093 (3/32)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916850	89.60	916850-C3	98.60
	.093 (3/32)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981650	85.60	981650-C3	94.60
NEW	.093 (3/32)	**.010**	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	793750	86.80	793750-C3	95.80
	.093 (3/32)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903350	89.60	903350-C3	98.60
	.093 (3/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970050	85.60	970050-C3	94.60
	.093 (3/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905950	85.60	905950-C3	94.60
	.125 (1/8)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987260	85.60	987260-C3	94.60
	.125 (1/8)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916860	89.60	916860-C3	98.60
	.125 (1/8)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981660	85.60	981660-C3	94.60
	.125 (1/8)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903360	89.60	903360-C3	98.60
	.125 (1/8)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970060	85.60	970060-C3	94.60
	.125 (1/8)	**.030**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	857960	89.60	857960-C3	98.60
	.125 (1/8)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905960	85.60	905960-C3	94.60
	.156 (5/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970065	88.90	970065-C3	97.90
	.156 (5/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905965	88.90	905965-C3	97.90
	.187 (3/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981670	87.30	981670-C3	96.30
	.187 (3/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970070	87.30	970070-C3	96.30
	.187 (3/16)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905970	87.30	905970-C3	96.30
	.250 (1/4)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970080	87.30	970080-C3	96.30
	.250 (1/4)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905980	87.30	905980-C3	96.30
1/2	.020	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976005	110.50	976005-C3	123.90
	.025	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976007	110.50	976007-C3	123.90
	.031 (1/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976010	110.50	976010-C3	123.90
	.031 (1/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987710	110.50	987710-C3	123.90
	.040	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976015	110.50	976015-C3	123.90
	.047 (3/64)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976020	110.50	976020-C3	123.90
	.047 (3/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987720	110.50	987720-C3	123.90
	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976030	108.60	976030-C3	122.00
	.062 (1/16)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901030	112.70	901030-C3	126.10
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987730	108.60	987730-C3	122.00
	.062 (1/16)	**.015**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	913430	112.70	913430-C3	126.10
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990330	108.60	990330-C3	122.00
	.062 (1/16)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933730	108.60	933730-C3	122.00
	.078 (5/64)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901040	114.80	901040-C3	128.20
	.078 (5/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987740	110.50	987740-C3	123.90
	.078 (5/64)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990340	110.50	990340-C3	123.90
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976050	108.60	976050-C3	122.00
	.093 (3/32)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901050	112.70	901050-C3	126.10
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987750	108.60	987750-C3	122.00
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990350	108.60	990350-C3	122.00
	.093 (3/32)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933750	108.60	933750-C3	122.00
	.093 (3/32)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969150	110.50	969150-C3	123.90

*Radial DOC accounts for max transition radius at neck

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NEW SIZES!

KEYSEAT CUTTERS

Corner Radius (cont.)

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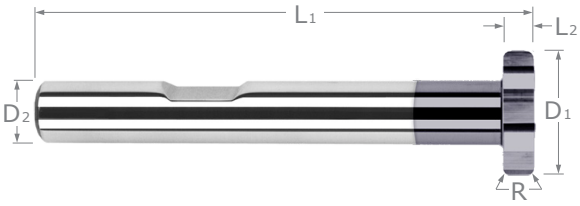
CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/2	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976060	108.60	976060-C3	122.00	
	.125 (1/8)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901060	112.70	901060-C3	126.10	
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987760	108.60	987760-C3	122.00	
	.125 (1/8)	**.010**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	793960	109.80	793960-C3	123.20	NEW
	.125 (1/8)	**.015**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	913460	112.70	913460-C3	126.10	
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990360	108.60	990360-C3	122.00	
	.125 (1/8)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933760	108.60	933760-C3	122.00	
	.125 (1/8)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926660	112.70	926660-C3	126.10	
	.125 (1/8)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969160	110.50	969160-C3	123.90	
	.125 (1/8)	**.040**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	838060	110.50	838060-C3	123.90	
	.156 (5/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987765	113.40	987765-C3	126.80	
	.156 (5/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990365	113.40	990365-C3	126.80	
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987770	110.50	987770-C3	123.90	
	.187 (3/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990370	110.50	990370-C3	123.90	
	.187 (3/16)	**.015**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	792870	111.70	792870-C3	125.10	NEW
	.187 (3/16)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933770	110.50	933770-C3	123.90	
	.187 (3/16)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926670	130.50	926670-C3	143.90	
	.187 (3/16)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969170	110.50	969170-C3	123.90	
	.187 (3/16)	**.060**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926170	112.50	926170-C3	125.90	
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987780	108.60	987780-C3	122.00	
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990380	108.60	990380-C3	122.00	
	.250 (1/4)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933780	108.60	933780-C3	122.00	
	.250 (1/4)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926680	112.70	926680-C3	126.10	
	.250 (1/4)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969180	108.60	969180-C3	122.00	
	.250 (1/4)	**.045**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	929580	108.60	929580-C3	122.00	
	.250 (1/4)	**.060**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926180	108.60	926180-C3	122.00	
5/8	.125 (1/8)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903960	162.50	903960-C3	175.90	
	.125 (1/8)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911160	162.50	911160-C3	175.90	
	.125 (1/8)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908560	162.50	908560-C3	175.90	
	.187 (3/16)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903970	162.50	903970-C3	175.90	
	.187 (3/16)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911170	162.50	911170-C3	175.90	
	.187 (3/16)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908570	162.50	908570-C3	175.90	
	.250 (1/4)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903980	162.50	903980-C3	175.90	
	.250 (1/4)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911180	162.50	911180-C3	175.90	
	.250 (1/4)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908580	162.50	908580-C3	175.90	

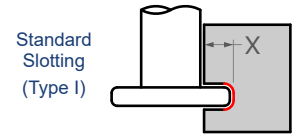
*Radial DOC accounts for max transition radius at neck

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 325, 333, & 340.

KEYSEAT CUTTERS

Corner Radius – Reduced Shank





- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Weldon flat
- CNC ground in the USA

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.031 (1/32)	**.005**	.177	I	10	3/8	3-1/32	841505	115.60	841505-C3	130.10
	.062 (1/16)	**.005**	.177	I	10	3/8	3-1/16	841520	115.60	841520-C3	130.10
	.062 (1/16)	**.010**	.177	I	10	3/8	3-1/16	923820	115.60	923820-C3	130.10
	.078 (5/64)	**.005**	.177	I	10	3/8	3-5/64	841530	115.60	841530-C3	130.10
	.078 (5/64)	**.010**	.177	I	10	3/8	3-5/64	923830	115.60	923830-C3	130.10
	.093 (3/32)	**.005**	.177	I	10	3/8	3-3/32	841540	115.60	841540-C3	130.10
	.093 (3/32)	**.010**	.177	I	10	3/8	3-3/32	923840	115.60	923840-C3	130.10
	.093 (3/32)	**.030**	.177	I	10	3/8	3-3/32	905240	115.60	905240-C3	130.10
	.125 (1/8)	**.005**	.177	I	10	3/8	3-1/8	841550	115.60	841550-C3	130.10
3/4	.125 (1/8)	**.010**	.177	I	10	3/8	3-1/8	923850	115.60	923850-C3	130.10
	.125 (1/8)	**.015**	.177	I	10	3/8	3-1/8	840950	115.60	840950-C3	130.10
	.125 (1/8)	**.030**	.177	I	10	3/8	3-1/8	905250	115.60	905250-C3	130.10
	.187 (3/16)	**.010**	.177	I	10	3/8	3-3/16	923860	122.40	923860-C3	136.90
	.187 (3/16)	**.015**	.177	I	10	3/8	3-3/16	840960	122.40	840960-C3	136.90
	.187 (3/16)	**.030**	.177	I	10	3/8	3-3/16	905260	122.40	905260-C3	136.90
	.250 (1/4)	**.010**	.177	I	10	3/8	3-1/4	923870	128.80	923870-C3	143.30
	.250 (1/4)	**.015**	.177	I	10	3/8	3-1/4	840970	128.80	840970-C3	143.30
	.250 (1/4)	**.030**	.177	I	10	3/8	3-1/4	905270	128.80	905270-C3	143.30
	.250 (1/4)	**.060**	.177	I	10	3/8	3-1/4	894070	131.90	894070-C3	146.40
	.031 (1/32)	**.005**	.240	I	12	1/2	3-1/32	840305	128.10	840305-C3	150.20
	.062 (1/16)	**.005**	.240	I	12	1/2	3-1/16	840320	128.10	840320-C3	150.20
	.062 (1/16)	**.010**	.240	I	12	1/2	3-1/16	918520	128.10	918520-C3	150.20
	.078 (5/64)	**.005**	.240	I	12	1/2	3-5/64	840330	128.10	840330-C3	150.20
	.078 (5/64)	**.010**	.240	I	12	1/2	3-5/64	918530	128.10	918530-C3	150.20
	.093 (3/32)	**.005**	.240	I	12	1/2	3-3/32	840340	128.10	840340-C3	150.20
	.093 (3/32)	**.010**	.240	I	12	1/2	3-3/32	918540	128.10	918540-C3	150.20
1	.093 (3/32)	**.030**	.240	I	12	1/2	3-3/32	910040	128.10	910040-C3	150.20
	.125 (1/8)	**.005**	.240	I	12	1/2	3-1/8	840350	128.10	840350-C3	150.20
	.125 (1/8)	**.010**	.240	I	12	1/2	3-1/8	918550	128.10	918550-C3	150.20
	.125 (1/8)	**.015**	.240	I	12	1/2	3-1/8	839750	128.10	839750-C3	150.20
	.125 (1/8)	**.030**	.240	I	12	1/2	3-1/8	910050	128.10	910050-C3	150.20
	.187 (3/16)	**.010**	.240	I	12	1/2	3-3/16	918560	135.20	918560-C3	157.30
	.187 (3/16)	**.015**	.240	I	12	1/2	3-3/16	839760	135.20	839760-C3	157.30
	.187 (3/16)	**.030**	.240	I	12	1/2	3-3/16	910060	135.20	910060-C3	157.30

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius – Reduced Shank (cont.)

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1	.250 (1/4)	**.010**	.240	I	12	1/2	3-1/4	918570	140.60	918570-C3	162.70
	.250 (1/4)	**.015**	.240	I	12	1/2	3-1/4	839770	140.60	839770-C3	162.70
	.250 (1/4)	**.030**	.240	I	12	1/2	3-1/4	910070	140.60	910070-C3	162.70
	.250 (1/4)	**.060**	.240	I	12	1/2	3-1/4	897570	140.60	897570-C3	162.70
	.375 (3/8)	**.010**	.240	I	12	1/2	3-3/8	918590	147.50	918590-C3	169.60
	.375 (3/8)	**.015**	.240	I	12	1/2	3-3/8	839790	147.50	839790-C3	169.60
	.375 (3/8)	**.030**	.240	I	12	1/2	3-3/8	910090	147.50	910090-C3	169.60
1-1/2	.125 (1/8)	**.010**	.365	I	16	3/4	3-3/8	839150	165.30	839150-C3	192.90
	.125 (1/8)	**.030**	.365	I	16	3/4	3-3/8	838550	165.30	838550-C3	192.90
	.187 (3/16)	**.010**	.365	I	16	3/4	3-7/16	839160	165.30	839160-C3	192.90
	.187 (3/16)	**.030**	.365	I	16	3/4	3-7/16	838560	165.30	838560-C3	192.90
	.250 (1/4)	**.010**	.365	I	16	3/4	3-1/2	839170	177.00	839170-C3	204.60
	.250 (1/4)	**.030**	.365	I	16	3/4	3-1/2	838570	177.00	838570-C3	204.60
	.375 (3/8)	**.010**	.365	I	16	3/4	3-5/8	839190	224.30	839190-C3	251.90
	.375 (3/8)	**.030**	.365	I	16	3/4	3-5/8	838590	224.30	838590-C3	251.90
	.500 (1/2)	**.010**	.365	I	16	3/4	3-3/4	839195	258.70	839195-C3	286.30
	.500 (1/2)	**.030**	.365	I	16	3/4	3-3/4	838595	258.70	838595-C3	286.30

*Radial DOC accounts for max transition radius at neck

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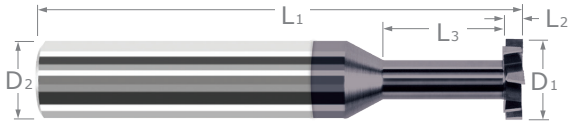
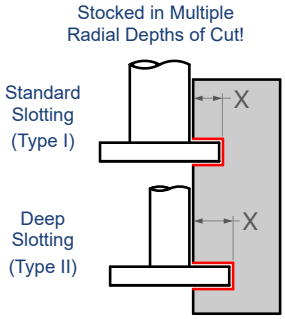
KEYSEAT CUTTERS

Staggered Tooth – Square





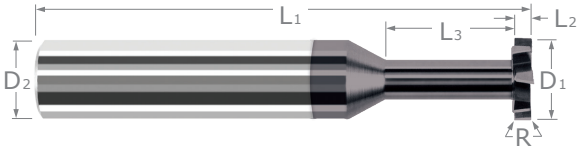
- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Relieved to allow cutting on both sides of head
- Design improves shearing action and finish while minimizing chip dragging and recutting and decreasing vibration
- Tool can be offset to increase width of groove
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.0005" −.0005"		L_3 +.020" −.000"				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969815	58.70	969815-C3	63.30
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969831	58.70	969831-C3	63.30
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969847	58.70	969847-C3	63.30
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969862	58.70	969862-C3	63.30
3/16	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907062	69.70	907062-C3	74.70
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907093	69.70	907093-C3	74.70
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907095	69.70	907095-C3	74.70
1/4	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972131	81.20	972131-C3	88.00
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972147	81.20	972147-C3	88.00
	.062 (1/16)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878962	88.30	878962-C3	94.20
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972162	81.20	972162-C3	88.00
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972193	81.20	972193-C3	88.00
	.125 (1/8)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878995	90.20	878995-C3	97.00
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972195	81.20	972195-C3	88.00
3/8	.062 (1/16)	1/8	3/16 (0.5x)	**.115**	II	8	3/8	2-1/2	867330	107.70	867330-C3	116.70
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915830	100.20	915830-C3	109.20
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915850	100.20	915850-C3	109.20
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915860	100.20	915860-C3	109.20
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915870	100.20	915870-C3	109.20
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915880	100.20	915880-C3	109.20
1/2	.062 (1/16)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895030	140.50	895030-C3	153.90
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955630	130.50	955630-C3	143.90
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955640	130.50	955640-C3	143.90
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955650	130.50	955650-C3	143.90
	.125 (1/8)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895060	140.50	895060-C3	153.90
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955660	130.50	955660-C3	143.90
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955670	130.50	955670-C3	143.90
	.250 (1/4)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895080	140.50	895080-C3	153.90
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955680	130.50	955680-C3	143.90
5/8	.125 (1/8)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904960	184.50	904960-C3	197.90
	.187 (3/16)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904970	184.50	904970-C3	197.90
	.250 (1/4)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904980	184.50	904980-C3	197.90

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

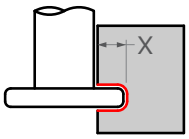
Staggered Tooth – Corner Radius

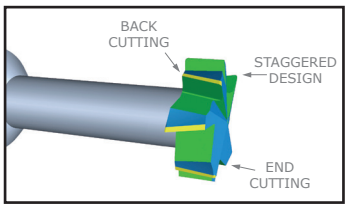


Staggered Tooth Design for Optimal Performance

- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Design improves shearing action, minimizes chip dragging and recutting, decreases vibration, and improves side wall finish
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

Standard Slotting (Type I)





CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH		RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″					D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.031 (1/32)	**.005**	1/16	3/16	(1.5x)	.022	I	6	1/8	1-1/2	43631	60.20	43631-C3	64.80
	.031 (1/32)	**.005**	1/16	3/8	(3x)	.022	I	6	1/8	1-1/2	989931	72.40	989931-C3	77.00
	.047 (3/64)	**.005**	1/16	3/16	(1.5x)	.022	I	6	1/8	1-1/2	43647	60.20	43647-C3	64.80
	.062 (1/16)	**.005**	1/16	3/16	(1.5x)	.022	I	6	1/8	1-1/2	43662	60.20	43662-C3	64.80
	.062 (1/16)	**.005**	1/16	3/8	(3x)	.022	I	6	1/8	1-1/2	989962	72.40	989962-C3	77.00
	.062 (1/16)	**.010**	1/16	3/16	(1.5x)	.022	I	6	1/8	1-1/2	44462	60.20	44462-C3	64.80
3/16	.031 (1/32)	**.005**	3/32	9/32	(1.5x)	.037	I	6	3/16	2	943531	66.70	943531-C3	71.70
	.047 (3/64)	**.005**	3/32	9/32	(1.5x)	.037	I	6	3/16	2	943547	66.70	943547-C3	71.70
	.062 (1/16)	**.005**	3/32	9/32	(1.5x)	.037	I	6	3/16	2	943562	66.70	943562-C3	71.70
	.062 (1/16)	**.010**	3/32	9/32	(1.5x)	.037	I	6	3/16	2	951762	66.70	951762-C3	71.70
1/4	.031 (1/32)	**.005**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	43831	83.20	43831-C3	90.00
	.031 (1/32)	**.010**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	44531	83.20	44531-C3	90.00
	.047 (3/64)	**.005**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	43847	83.20	43847-C3	90.00
	.047 (3/64)	**.005**	1/8	3/4	(3x)	.053	I	6	1/4	2-1/2	958047	96.20	958047-C3	103.00
	.062 (1/16)	**.005**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	43862	83.20	43862-C3	90.00
	.062 (1/16)	**.005**	1/8	3/4	(3x)	.053	I	6	1/4	2-1/2	958062	96.20	958062-C3	103.00
	.062 (1/16)	**.010**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	44562	83.20	44562-C3	90.00
	.093 (3/32)	**.005**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	43893	83.20	43893-C3	90.00
	.093 (3/32)	**.010**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	44593	83.20	44593-C3	90.00
	.125 (1/8)	**.005**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	43895	83.20	43895-C3	90.00
	.125 (1/8)	**.010**	1/8	3/8	(1.5x)	.053	I	6	1/4	2-1/2	44595	83.20	44595-C3	90.00
3/8	.031 (1/32)	**.005**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	967210	107.90	967210-C3	116.90
	.062 (1/16)	**.005**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	967230	107.90	967230-C3	116.90
	.062 (1/16)	**.010**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	970930	107.90	970930-C3	116.90
	.093 (3/32)	**.005**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	967250	107.90	967250-C3	116.90
	.093 (3/32)	**.010**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	970950	107.90	970950-C3	116.90
	.125 (1/8)	**005**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	967260	107.90	967260-C3	116.90
	.125 (1/8)	**.010**	3/16	9/16	(1.5x)	.084	I	8	3/8	2-1/2	970960	107.90	970960-C3	116.90

*Radial DOC accounts for max transition radius at neck

continued on next page

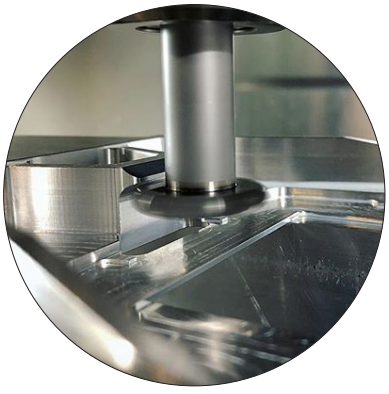
KEYSEAT CUTTERS

Staggered Tooth – Corner Radius (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44330	133.60	44330-C3	147.00
	.062 (1/16)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976730	147.90	976730-C3	161.30
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44630	133.60	44630-C3	147.00
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921330	133.60	921330-C3	147.00
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44350	133.60	44350-C3	147.00
	.093 (3/32)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976750	147.90	976750-C3	161.30
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44650	133.60	44650-C3	147.00
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921350	133.60	921350-C3	147.00
	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44360	133.60	44360-C3	147.00
	.125 (1/8)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976760	147.90	976760-C3	161.30
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44660	133.60	44660-C3	147.00
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921360	133.60	921360-C3	147.00
	.187 (3/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44370	133.60	44370-C3	147.00
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44670	133.60	44670-C3	147.00
	.250 (1/4)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44380	133.60	44380-C3	147.00
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44680	133.60	44680-C3	147.00
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921380	133.60	921380-C3	147.00
5/8	.125 (1/8)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860460	188.70	860460-C3	202.10
	.125 (1/8)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872960	188.70	872960-C3	202.10
	.187 (3/16)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860470	188.70	860470-C3	202.10
	.187 (3/16)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872970	188.70	872970-C3	202.10
	.250 (1/4)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860480	188.70	860480-C3	202.10
	.250 (1/4)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872980	188.70	872980-C3	202.10

*Radial DOC accounts for max transition radius at neck



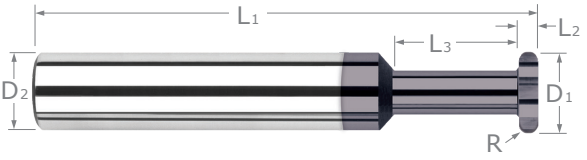
Keyseat Cutter Considerations

With more than 1,800 individual keyseat cutter in the Harvey Tool catalog, there are certainly many different options to choose from. Learn which style is best for your machining operation in our "In the Loupe" blog post **Keyseat Cutter Considerations**.

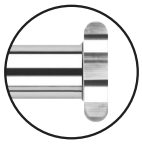
Read more on harveyperformance.com/in-the-loupe/

KEYSEAT CUTTERS

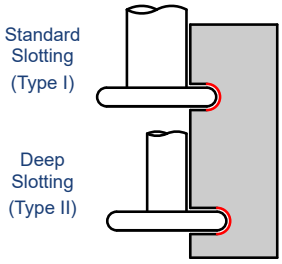
Full Radius



- Ground form relieved (can be reground without losing radius)
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Full Radius



RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D1 +.000″ −.002″	L2		L3 +.020″ −.000″	X			D2	L1	TOOL #	PRICE	TOOL #	PRICE
.0075	**3/32**	.015 (1/64)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976907	73.90	976907-C3	78.50
.0075	**1/8**	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67507	76.60	67507-C3	81.20
.0075	**1/4**	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67707	94.80	67707-C3	101.60
.0100	**3/32**	.020	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976910	71.80	976910-C3	76.40
.0100	**1/8**	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67510	74.50	67510-C3	79.10
.0100	**5/32**	.020	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965310	78.30	965310-C3	83.30
.0100	**3/16**	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68310	86.00	68310-C3	91.00
.0100	**1/4**	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67710	92.60	67710-C3	99.40
.0100	**5/16**	.020	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944410	102.40	944410-C3	110.30
.0100	**3/8**	.020	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68410	110.00	68410-C3	119.00
.0156 (1/64)	**3/32**	.031 (1/32)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976915	64.00	976915-C3	68.60
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67515	66.30	67515-C3	70.90
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	895215	70.70	895215-C3	75.30
.0156 (1/64)	**5/32**	.031 (1/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965315	78.30	965315-C3	83.30
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68315	78.50	68315-C3	83.50
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	924415	91.80	924415-C3	96.80
.0156 (1/64)	**1/4**	.031 (1/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953915	87.70	953915-C3	94.50
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43315	84.40	43315-C3	91.20
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971415	97.80	971415-C3	104.60
.0156 (1/64)	**5/16**	.031 (1/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944415	93.90	944415-C3	101.80
.0156 (1/64)	**3/8**	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68415	101.80	68415-C3	110.80
.0156 (1/64)	**1/2**	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67915	104.90	67915-C3	118.30
.0200	**1/8**	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67520	66.30	67520-C3	70.90
.0200	**5/32**	.040	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965320	78.30	965320-C3	83.30
.0200	**3/16**	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68320	78.50	68320-C3	83.50
.0200	**3/16**	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	924420	91.80	924420-C3	96.80
.0200	**1/4**	.040	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953920	87.70	953920-C3	94.50
.0200	**1/4**	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67720	85.30	67720-C3	92.10
.0200	**1/4**	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971420	97.80	971420-C3	104.60
.0200	**5/16**	.040	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944420	93.90	944420-C3	101.80
.0200	**3/8**	.040	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68420	102.70	68420-C3	111.70
.0200	**3/8**	.040	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968520	115.60	968520-C3	124.60
.0200	**1/2**	.040	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67920	105.40	67920-C3	118.80
.0250	**3/16**	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68325	78.50	68325-C3	83.50
.0250	**1/4**	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67725	85.30	67725-C3	92.10
.0250	**3/8**	.050	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68425	102.70	68425-C3	111.70
.0300	**5/32**	.060	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965330	78.30	965330-C3	83.30
.0300	**3/16**	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68330	78.50	68330-C3	83.50
.0300	**1/4**	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67730	85.30	67730-C3	92.10

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Full Radius (cont.)

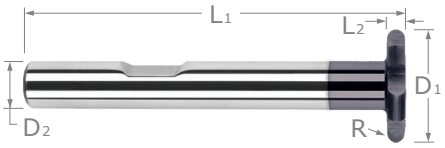
continued from previous page

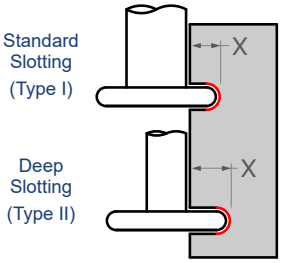
RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001" −.001"	D_1 +.000" −.002"	L_2		L_3 +.020" −.000"	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68331	78.50	68331-C3	83.50
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	924431	91.80	924431-C3	96.80
.0312 (1/32)	**1/4**	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953931	87.70	953931-C3	94.50
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43331	84.40	43331-C3	91.20
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971431	97.80	971431-C3	104.60
.0312 (1/32)	**5/16**	.062 (1/16)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944431	93.90	944431-C3	101.80
.0312 (1/32)	**3/8**	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68431	101.80	68431-C3	110.80
.0312 (1/32)	**1/2**	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898531	109.30	898531-C3	122.70
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67931	104.90	67931-C3	118.30
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942731	114.40	942731-C3	127.80
.0312 (1/32)	**5/8**	.062 (1/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43431	171.80	43431-C3	185.20
.0394 (1 mm)	**1/4**	.078 (2 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67739	85.30	67739-C3	92.10
.0394 (1 mm)	**5/16**	.078 (2 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944439	95.10	944439-C3	103.00
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43339	102.70	43339-C3	111.70
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968539	115.60	968539-C3	124.60
.0394 (1 mm)	**1/2**	.078 (2 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67939	105.40	67939-C3	118.80
.0469 (3/64)	**1/4**	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67747	84.40	67747-C3	91.20
.0469 (3/64)	**5/16**	.093 (3/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944447	93.90	944447-C3	101.80
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43347	101.80	43347-C3	110.80
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968547	115.60	968547-C3	124.60
.0469 (3/64)	**1/2**	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67947	104.90	67947-C3	118.30
.0469 (3/64)	**5/8**	.093 (3/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43447	171.80	43447-C3	185.20
.0500	**3/8**	.100	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68450	105.20	68450-C3	114.20
.0500	**1/2**	.100	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67950	119.00	67950-C3	132.40
.0590 (1.5 mm)	**5/16**	.118 (3 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944459	95.10	944459-C3	103.00
.0590 (1.5 mm)	**3/8**	.118 (3 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68459	102.70	68459-C3	111.70
.0590 (1.5 mm)	**1/2**	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67959	105.40	67959-C3	118.80
.0625 (1/16)	**5/16**	.125 (1/8)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944462	93.90	944462-C3	101.80
.0625 (1/16)	**3/8**	.125 (1/8)	1/8	3/16 (.5x)	**.115**	II	6	3/8	2-1/2	949262	105.70	949262-C3	114.70
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43362	101.80	43362-C3	110.80
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968562	115.60	968562-C3	124.60
.0625 (1/16)	**1/2**	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898562	109.30	898562-C3	122.70
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67962	104.90	67962-C3	118.30
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942762	145.90	942762-C3	159.30
.0625 (1/16)	**5/8**	.125 (1/8)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43462	171.80	43462-C3	185.20
.0781 (5/64)	**3/8**	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68478	101.80	68478-C3	110.80
.0781 (5/64)	**1/2**	.156 (5/32)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898578	109.90	898578-C3	123.30
.0781 (5/64)	**1/2**	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43378	105.40	43378-C3	118.80
.0781 (5/64)	**5/8**	.156 (5/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43478	171.80	43478-C3	185.20
.0937 (3/32)	**1/2**	.187 (3/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898593	109.90	898593-C3	123.30
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43393	105.40	43393-C3	118.80
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942793	123.10	942793-C3	136.50
.0937 (3/32)	**5/8**	.187 (3/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43493	171.80	43493-C3	185.20
.1181 (3 mm)	**5/8**	.236 (6 mm)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	4343M	171.80	4343M-C3	185.20
.1250 (1/8)	**5/8**	.250 (1/4)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43408	171.80	43408-C3	185.20
.1250 (1/8)	**5/8**	.250 (1/4)	.300	2 (3x)	.152	I	6	5/8	4	983008	193.90	983008-C3	208.40

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Full Radius – Reduced Shank



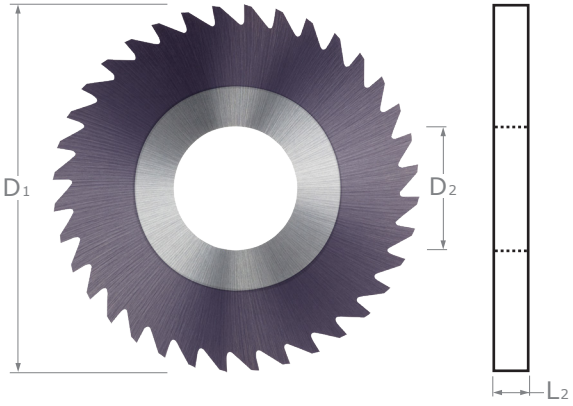


- Ground form relieved (can be reground without losing radius)
- 6 flutes
- Both sides of cutter are dished for clearance
- Solid carbide head with steel shank
- Weldon flat
- CNC ground in the USA

RADIUS	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D1 +.010″ −.000″	L2	X		D2	L1	6 FL	PRICE	6 FL	PRICE
.0156 (1/64)	3/4	.031 (1/32)	**.177**	II	3/8	3-1/32	965415	145.00	965415-C3	159.50
.0156 (1/64)	3/4	.031 (1/32)	.115	I	1/2	3-1/32	32901	131.20	32901-C3	145.70
.0156 (1/64)	1	.031 (1/32)	.240	I	1/2	3-1/32	942615	144.00	942615-C3	166.10
.0200	3/4	.040	.115	I	1/2	3.040	959720	131.20	959720-C3	145.70
.0200	1	.040	.240	I	1/2	3.040	942620	144.00	942620-C3	166.10
.0300	3/4	.060	**.177**	II	3/8	3.060	965430	145.00	965430-C3	159.50
.0312 (1/32)	3/4	.062 (1/16)	**.177**	II	3/8	3-1/16	965431	145.00	965431-C3	159.50
.0312 (1/32)	3/4	.062 (1/16)	.115	I	1/2	3-1/16	32902	131.20	32902-C3	145.70
.0312 (1/32)	1	.062 (1/16)	.240	I	1/2	3-1/16	942631	144.00	942631-C3	166.10
.0394 (1 mm)	3/4	.078 (2 mm)	.115	I	1/2	3.078	3291M	131.20	3291M-C3	145.70
.0394 (1 mm)	1	.078 (2 mm)	.240	I	1/2	3.078	94261M	144.00	94261M-C3	166.10
.0469 (3/64)	3/4	.093 (3/32)	**.177**	II	3/8	3-3/32	965447	145.00	965447-C3	159.50
.0469 (3/64)	3/4	.093 (3/32)	.115	I	1/2	3-3/32	32903	131.20	32903-C3	145.70
.0469 (3/64)	1	.093 (3/32)	.240	I	1/2	3-3/32	942647	144.00	942647-C3	166.10
.0590 (1.5 mm)	3/4	.118 (3 mm)	**.177**	II	3/8	3.118	965459	145.00	965459-C3	159.50
.0625 (1/16)	3/4	.125 (1/8)	**.177**	II	3/8	3-1/8	965462	145.00	965462-C3	159.50
.0625 (1/16)	3/4	.125 (1/8)	.115	I	1/2	3-1/8	32904	131.20	32904-C3	145.70
.0625 (1/16)	1	.125 (1/8)	**.302**	II	3/8	3-1/8	937362	145.00	937362-C3	167.10
.0625 (1/16)	1	.125 (1/8)	.240	I	1/2	3-1/8	942662	144.00	942662-C3	166.10
.0781 (5/64)	3/4	.156 (5/32)	.115	I	1/2	3-5/32	959778	131.20	959778-C3	145.70
.0781 (5/64)	1	.156 (5/32)	**.302**	II	3/8	3-5/32	937378	147.50	937378-C3	169.60
.0781 (5/64)	1	.156 (5/32)	.240	I	1/2	3-5/32	32905	153.90	32905-C3	176.00
.0787 (2 mm)	3/4	.157 (4 mm)	.177	II	3/8	3.157	96542M	145.00	96542M-C3	159.50
.0787 (2 mm)	1	.157 (4 mm)	.240	I	1/2	3.157	3292M	153.90	3292M-C3	176.00
.0937 (3/32)	3/4	.187 (3/16)	.115	I	1/2	3-3/16	959793	131.20	959793-C3	145.70
.0937 (3/32)	1	.187 (3/16)	**.302**	II	3/8	3-3/16	937393	145.00	937393-C3	167.10
.0937 (3/32)	1	.187 (3/16)	.240	I	1/2	3-3/16	32906	153.90	32906-C3	176.00
.0937 (3/32)	1-1/2	.187 (3/16)	.365	I	3/4	3-11/16	850493	164.50	850493-C3	192.10
.1181 (3 mm)	1	.236 (6 mm)	.240	I	1/2	3.236	942694	153.90	942694-C3	172.80
.1250 (1/8)	1	.250 (1/4)	**.302**	II	3/8	3-1/4	937395	145.00	937395-C3	167.10
.1250 (1/8)	1	.250 (1/4)	.240	I	1/2	3-1/4	942695	153.90	942695-C3	176.00
.1250 (1/8)	1-1/4	.250 (1/4)	**.365**	II	1/2	3-1/4	848695	170.00	848695-C3	197.60
.1250 (1/8)	1-1/4	.250 (1/4)	.240	I	3/4	3-1/2	32908	172.80	32908-C3	200.40
.1250 (1/8)	1-1/2	.250 (1/4)	.365	I	3/4	3-3/4	850495	175.20	850495-C3	202.80
.1562 (5/32)	1-1/2	.312 (5/16)	.365	I	3/4	3-13/16	32910	211.80	32910-C3	239.40
.1875 (3/16)	1-3/8	.375 (3/8)	.302	I	3/4	3-5/8	32912	211.80	32912-C3	239.40
.2500 (1/4)	1-1/2	.500 (1/2)	.365	I	3/4	4	32916	234.40	32916-C3	262.00

*Radial DOC accounts for max transition radius at neck

SLITTING SAWS



Fully stocked uncoated or AlTiN coated

- Sides of saw are dished for clearance
- Cutting on OD only
- No keyway or hub
- For use with standard saw arbors
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 +.005″ −.000″	L_2 +.00025″ −.00025″	D_2 +.0005″ +.0001″		TOOL #	PRICE	TOOL #	PRICE
1	.0100	3/8	20	SAA0100	60.50	SAA0100-C3	79.80
	.0120	3/8	20	SAA0120	60.50	SAA0120-C3	79.80
	.0156 (1/64)	3/8	20	SAA0156	60.50	SAA0156-C3	79.80
	.0180	3/8	20	SAA0180	60.50	SAA0180-C3	79.80
	.0200	3/8	20	SAA0200	60.90	SAA0200-C3	80.20
	.0250	3/8	20	SAA0250	60.90	SAA0250-C3	80.20
	.0312 (1/32)	3/8	20	SAA0312	60.90	SAA0312-C3	80.20
	.0400	3/8	20	SAA0400	60.90	SAA0400-C3	80.20
	.0468 (3/64)	3/8	20	SAA0468	54.10	SAA0468-C3	73.40
	.0625 (1/16)	3/8	20	SAA0625	54.10	SAA0625-C3	73.40
1-1/4	.0100	3/8	24	SAB0100	72.00	SAB0100-C3	101.90
	.0156 (1/64)	3/8	24	SAB0156	72.00	SAB0156-C3	101.90
	.0200	3/8	24	SAB0200	67.50	SAB0200-C3	97.40
	.0312 (1/32)	3/8	24	SAB0312	67.50	SAB0312-C3	97.40
	.0625 (1/16)	3/8	24	SAB0625	67.50	SAB0625-C3	97.40
1-1/2	.0100	1/2	36	SAC0100	77.40	SAC0100-C3	107.30
	.0120	1/2	36	SAC0120	77.40	SAC0120-C3	107.30
	.0156 (1/64)	1/2	36	SAC0156	77.40	SAC0156-C3	107.30
	.0180	1/2	36	SAC0180	77.40	SAC0180-C3	107.30
	.0200	1/2	36	SAC0200	69.70	SAC0200-C3	99.60
	.0250	1/2	36	SAC0250	69.70	SAC0250-C3	99.60
	.0312 (1/32)	1/2	36	SAC0312	69.70	SAC0312-C3	99.60
	.0400	1/2	36	SAC0400	69.70	SAC0400-C3	99.60
	.0468 (3/64)	1/2	36	SAC0468	67.90	SAC0468-C3	97.80
	.0625 (1/16)	1/2	36	SAC0625	67.90	SAC0625-C3	97.80
1-3/4	.0100	1/2	38	SAD0100	92.50	SAD0100-C3	122.40
	.0156 (1/64)	1/2	38	SAD0156	92.50	SAD0156-C3	122.40
	.0200	1/2	38	SAD0200	82.90	SAD0200-C3	112.80
	.0312 (1/32)	1/2	38	SAD0312	82.90	SAD0312-C3	112.80
	.0625 (1/16)	1/2	38	SAD0625	90.30	SAD0625-C3	120.20

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SLITTING SAWS

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CUTTER DIAMETER	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 $^{+.005''}_{-.000''}$	L_2 $^{+.00025''}_{-.00025''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	PRICE	TOOL #	PRICE
2	.0100	1/2	40	SAW0100	109.10	SAW0100-C3	139.00
	.0120	1/2	40	SAW0120	109.10	SAW0120-C3	139.00
	.0156 (1/64)	1/2	40	SAW0156	109.10	SAW0156-C3	139.00
	.0180	1/2	40	SAW0180	109.10	SAW0180-C3	139.00
	.0200	1/2	40	SAW0200	109.10	SAW0200-C3	139.00
	.0250	1/2	40	SAW0250	109.10	SAW0250-C3	139.00
	.0312 (1/32)	1/2	40	SAW0312	109.10	SAW0312-C3	139.00
	.0400	1/2	40	SAW0400	109.10	SAW0400-C3	139.00
	.0468 (3/64)	1/2	40	SAW0468	109.10	SAW0468-C3	139.00
	.0625 (1/16)	1/2	40	SAW0625	109.10	SAW0625-C3	139.00
	.0937 (3/32)	1/2	40	SAW0937	109.10	SAW0937-C3	139.00
	.1250 (1/8)	1/2	40	SAW1250	137.10	SAW1250-C3	167.00
3	.0200	1	72	SAE0200	169.30	SAE0200-C3	209.90
	.0312 (1/32)	1	72	SAE0312	169.30	SAE0312-C3	209.90
	.0625 (1/16)	1	72	SAE0625	190.60	SAE0625-C3	231.20
	.0937 (3/32)	1	72	SAE0937	243.90	SAE0937-C3	284.50
	.1250 (1/8)	1	72	SAE1250	278.00	SAE1250-C3	318.60
	.1875 (3/16)	1	72	SAE1875	347.10	SAE1875-C3	387.70
	.2500 (1/4)	1	72	SAE2500	409.90	SAE2500-C3	450.50
4	.0312 (1/32)	1	80	SAF0312	242.30	SAF0312-C3	294.60
	.0625 (1/16)	1	80	SAF0625	247.90	SAF0625-C3	300.20
	.0937 (3/32)	1	80	SAF0937	286.30	SAF0937-C3	338.60
	.1250 (1/8)	1	80	SAF1250	345.80	SAF1250-C3	398.10
	.1875 (3/16)	1	80	SAF1875	439.80	SAF1875-C3	492.10
	.2500 (1/4)	1	80	SAF2500	546.20	SAF2500-C3	598.50

For Saw Arbors, see page 454.

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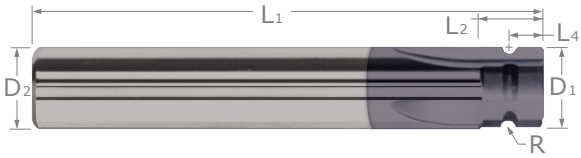
CONCAVE RADIUS END MILLS



- Ground form relieved (can be re-ground without losing radius)
- 4 flutes
- Cutting on OD and radius only (non-end cutting)
- Solid carbide
- CNC ground in the USA

RADIUS	CUTTER DIAMETER	LENGTH OF CUT	RADIUS CENTER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2 +.060″ −.000″	L_4 +.001″ −.001″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
1/64	1/4	.281	.1406	1/4	2-1/2	45915	56.60	45915-C3	63.40
1/64	1/2	.281	.1406	1/2	3	32801	108.80		
.020	1/4	.281	.1450	1/4	2-1/2	45920	55.60	45920-C3	62.40
1/32	1/4	.312	.1562	1/4	2-1/2	45931	56.60	45931-C3	63.40
1/32	1/2	.312	.1562	1/2	3	32802	108.80		
1 mm	1/4	.329	.1644	1/4	2-1/2	4591M	56.80	4591M-C3	63.60
1 mm	1/2	.329	.1644	1/2	3	3281M	113.40		
3/64	1/4	.344	.1719	1/4	2-1/2	45947	56.60	45947-C3	63.40
3/64	1/2	.344	.1719	1/2	3	32803	110.70		
1/16	3/8	.375	.1875	3/8	2-1/2	45962	70.40	45962-C3	79.40
1/16	1/2	.375	.1875	1/2	3	32804	108.80		
5/64	1/2	.407	.2034	1/2	3	32805	108.80	32805-C3	122.20
2 mm	1/2	.407	.2044	1/2	3	3282M	113.40	3282M-C3	126.80
3/32	1/2	.437	.2187	1/2	3	32806	110.70	32806-C3	124.10
7/64	5/8	.469	.2344	5/8	3-1/2	32807	141.80	32807-C3	155.20
1/8	5/8	.500	.2500	5/8	3-1/2	32808	139.30	32808-C3	152.70
5/32	3/4	.562	.2812	3/4	4	32810	234.60	32810-C3	249.10
3/16	1	.624	.3120	3/4	3-1/2	32812*	190.20	32812-C3*	204.70
1/4	1-1/4	.750	.3750	3/4	4	32816*	223.50	32816-C3*	238.00

*Solid carbide head with steel shank

★★★★★

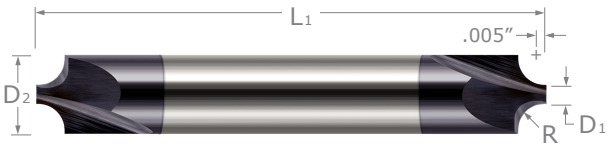
"I don't know how they do it, but thanks @harveytool for making amazing tools. The feeds and speeds from the website were spot on!"

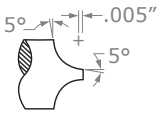
— @cameronbabineaux

Follow us on Instagram @harveytool!

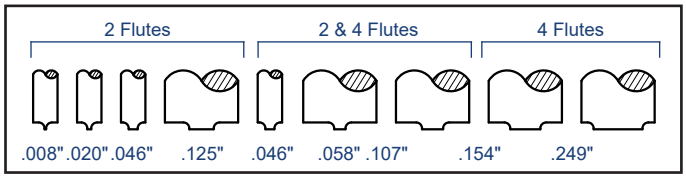
CORNER ROUNDING END MILLS

2 & 4 Flute – Flared





- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Double-ended
- Axial depth of cut ≈ radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA



RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE
.003	**.046**	2	1/8	1-1/2		17003	40.00	17003-C3	45.70
.004	**.046**	2	1/8	1-1/2		17004	40.00	17004-C3	45.70
.005	**.008**	2	1/8	1-1/2		67405	50.30	67405-C3	56.00
.005	**.020**	2	1/8	1-1/2		45305	43.30	45305-C3	49.00
.005	**.046**	2	1/8	1-1/2		17005	40.00	17005-C3	45.70
.005	**.046**	2	3/16	4	***LONG!***	31605	69.70	31605-C3	77.60
.005	**.046**	4	1/8	1-1/2		806105	54.40	806105-C3	59.00
.005	**.058**	4	1/8	1-1/2		67605	54.40	67605-C3	60.10
.005	**.107**	4	1/8	1-1/2		68005	54.40	68005-C3	60.10
.005	**.249**	4	3/8	2-1/2		21005	63.50	21005-C3	76.90
.006	**.020**	2	1/8	1-1/2		45306	43.30	45306-C3	49.00
.006	**.046**	2	1/8	1-1/2		17006	40.00	17006-C3	45.70
.006	**.058**	4	1/8	1-1/2		67606	54.40	67606-C3	60.10
.006	**.107**	4	1/8	1-1/2		68006	54.40	68006-C3	60.10
.007	**.020**	2	1/8	1-1/2		45307	43.30	45307-C3	49.00
.007	**.046**	2	1/8	1-1/2		17007	40.00	17007-C3	45.70
.007	**.058**	4	1/8	1-1/2		67607	54.40	67607-C3	60.10
.007	**.107**	4	1/8	1-1/2		68007	54.40	68007-C3	60.10
.008	**.008**	2	1/8	1-1/2		67408	50.30	67408-C3	56.00
.008	**.020**	2	1/8	1-1/2		45308	43.30	45308-C3	49.00
.008	**.046**	2	1/8	1-1/2		17008	40.00	17008-C3	45.70
.008	**.046**	2	3/16	4	***LONG!***	31608	69.70	31608-C3	77.60
.008	**.058**	4	1/8	1-1/2		67608	54.40	67608-C3	60.10
.008	**.249**	4	3/8	2-1/2		21008	63.50	21008-C3	76.90
.009	**.020**	2	1/8	1-1/2		45309	43.30	45309-C3	49.00
.009	**.046**	2	1/8	1-1/2		17009	40.00	17009-C3	45.70
.010	**.008**	2	1/8	1-1/2		67410	50.30	67410-C3	56.00
.010	**.020**	2	1/8	1-1/2		45310	43.30	45310-C3	49.00
.010	**.046**	2	1/8	1-1/2		17010	40.00	17010-C3	45.70

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.010	**.046**	2	3/16	4	***LONG!***	31610	69.70	31610-C3	77.60
.010	**.046**	4	1/8	1-1/2		806110	54.50	806110-C3	59.10
.010	**.058**	4	1/8	1-1/2		67610	54.40	67610-C3	60.10
.010	**.107**	4	3/16	2		68010	59.00	68010-C3	65.80
.010	**.125**	2	3/16	2		941510	59.00	941510-C3	65.80
.010	**.249**	4	3/8	2-1/2		21010	63.50	21010-C3	76.90
.011	**.020**	2	1/8	1-1/2		45311	43.30	45311-C3	49.00
.011	**.046**	2	1/8	1-1/2		17011	40.00	17011-C3	45.70
.012	**.020**	2	1/8	1-1/2		45312	43.30	45312-C3	49.00
.012	**.046**	2	1/8	1-1/2		17012	40.00	17012-C3	45.70
.012	**.107**	4	3/16	2		68012	59.00	68012-C3	65.80
.013	**.020**	2	1/8	1-1/2		45313	43.30	45313-C3	49.00
.013	**.046**	2	1/8	1-1/2		17013	40.00	17013-C3	45.70
.014	**.020**	2	1/8	1-1/2		45314	43.30	45314-C3	49.00
.014	**.046**	2	1/8	1-1/2		17014	40.00	17014-C3	45.70
.015 (1/64)	**.008**	2	1/8	1-1/2		67415	50.30	67415-C3	56.00
.015 (1/64)	**.020**	2	1/8	1-1/2		45315	43.30	45315-C3	49.00
.015 (1/64)	**.046**	2	1/8	1-1/2		17015	40.00	17015-C3	45.70
.015 (1/64)	**.046**	2	3/16	4	***LONG!***	31615	69.70	31615-C3	77.60
.015 (1/64)	**.046**	4	1/8	1-1/2		806115	54.40	806115-C3	59.00
.015 (1/64)	**.058**	4	1/8	1-1/2		67615	54.40	67615-C3	60.10
.015 (1/64)	**.107**	4	3/16	2		68015	59.00	68015-C3	65.80
.015 (1/64)	**.125**	2	3/16	2		941515	59.00	941515-C3	65.80
.015 (1/64)	**.249**	4	3/8	2-1/2		21015	63.50	21015-C3	76.90
.018	**.020**	2	1/8	1-1/2		45318	43.30	45318-C3	49.00
.018	**.046**	2	1/8	1-1/2		17018	40.00	17018-C3	45.70
.018	**.107**	4	3/16	2		68018	59.00	68018-C3	65.80
.020	**.008**	2	1/8	1-1/2		67420	50.30	67420-C3	56.00
.020	**.020**	2	1/8	1-1/2		45320	43.30	45320-C3	49.00
.020	**.046**	2	1/8	1-1/2		17020	40.00	17020-C3	45.70
.020	**.046**	2	3/16	4	***LONG!***	31620	69.70	31620-C3	77.60
.020	**.046**	4	1/8	1-1/2		806120	54.40	806120-C3	59.00
.020	**.058**	4	1/8	1-1/2		67620	54.40	67620-C3	60.10
.020	**.107**	4	3/16	2		68020	59.00	68020-C3	64.70
.020	**.125**	2	3/16	2		941520	59.00	941520-C3	65.80
.020	**.249**	4	3/8	2-1/2		21020	63.50	21020-C3	76.90
.022	**.020**	2	1/8	1-1/2		45322	43.30	45322-C3	49.00
.022	**.046**	2	1/8	1-1/2		17022	40.00	17022-C3	45.70
.022	**.107**	4	3/16	2		68022	59.00	68022-C3	65.80

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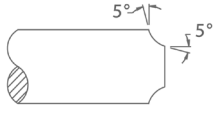
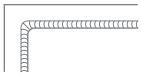


5° Flares at Shoulder and Pilot to Avoid Steps in Workpiece

Large Pilots for Profiling, Increasing Strength and Requiring Less Speed

Small Pilots for Narrow Slots and Holes



Small Pilots Allow Milling of Tight Inside Corners

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.025	**.008**	2	1/8	1-1/2		67425	50.30	67425-C3	56.00
.025	**.020**	2	1/8	1-1/2		45325	43.30	45325-C3	49.00
.025	**.046**	2	1/8	1-1/2		17025	40.00	17025-C3	45.70
.025	**.046**	2	3/16	4	***LONG!***	31625	69.70	31625-C3	77.60
.025	**.058**	4	1/8	1-1/2		67625	54.40	67625-C3	60.10
.025	**.107**	4	3/16	2		68025	59.00	68025-C3	64.70
.025	**.125**	2	3/16	2		941525	59.00	941525-C3	65.80
.025	**.249**	4	3/8	2-1/2		21025	63.50	21025-C3	76.90
.027	**.046**	2	1/8	1-1/2		17027	40.00	17027-C3	45.70
.027	**.107**	4	3/16	2		68027	59.00	68027-C3	65.80
.030	**.008**	2	1/8	1-1/2		67430	50.30	67430-C3	56.00
.030	**.020**	2	1/8	1-1/2		45330	43.30	45330-C3	49.00
.030	**.046**	2	1/8	1-1/2		17030	40.00	17030-C3	45.70
.030	**.046**	2	3/16	4	***LONG!***	31630	69.70	31630-C3	77.60
.030	**.046**	4	1/8	1-1/2		806130	54.40	806130-C3	59.00
.030	**.058**	4	1/8	1-1/2		67630	54.40	67630-C3	60.10
.030	**.107**	4	3/16	2		68030	59.00	68030-C3	64.70
.030	**.125**	2	3/16	2		941530	59.00	941530-C3	65.80
.030	**.249**	4	3/8	2-1/2		21030	69.90	21030-C3	83.30
.031 (1/32)	**.008**	2	1/8	1-1/2		67431	50.30	67431-C3	56.00
.031 (1/32)	**.020**	2	1/8	1-1/2		45331	43.30	45331-C3	49.00
.031 (1/32)	**.046**	2	1/8	1-1/2		17031	40.00	17031-C3	45.70
.031 (1/32)	**.046**	2	3/16	4	***LONG!***	31631	69.70	31631-C3	77.60
.031 (1/32)	**.058**	4	1/8	1-1/2		67631	54.40	67631-C3	60.10
.031 (1/32)	**.107**	4	3/16	2		68031	59.00	68031-C3	65.80
.031 (1/32)	**.125**	2	3/16	2		941531	65.90	941531-C3	72.70
.031 (1/32)	**.154**	4	1/4	2		946631	77.30	946631-C3	86.50
.031 (1/32)	**.249**	4	3/8	2-1/2		21031	69.90	21031-C3	83.30
.032	**.046**	2	1/8	1-1/2		17032	40.00	17032-C3	45.70
.032	**.249**	4	3/8	2-1/2		21032	69.90	21032-C3	83.30
.035	**.020**	2	1/8	1-1/2		67835	43.30	67835-C3	49.00
.035	**.046**	2	1/8	1-1/2		17035	40.00	17035-C3	45.70
.035	**.046**	2	3/16	4	***LONG!***	31635	69.70	31635-C3	77.60
.035	**.058**	4	3/16	2		67635	61.00	67635-C3	67.80
.035	**.125**	2	1/4	2		941535	60.50	941535-C3	67.30
.035	**.249**	4	3/8	2-1/2		21035	69.90	21035-C3	83.30
.037	**.107**	4	3/16	2		68037	59.00	68037-C3	65.80
.039 (1 mm)	**.020**	2	1/8	1-1/2		67839	43.30	67839-C3	49.00
.039 (1 mm)	**.046**	2	1/8	1-1/2		17039	40.00	17039-C3	45.70
.039 (1 mm)	**.046**	2	3/16	4	***LONG!***	31639	69.70	31639-C3	77.60
.039 (1 mm)	**.058**	4	3/16	2		67639	61.00	67639-C3	67.80
.039 (1 mm)	**.100**	2	3/16	2		45339	52.60	45339-C3	59.40
.039 (1 mm)	**.107**	4	3/16	2		68039	52.60	68039-C3	59.40
.039 (1 mm)	**.154**	4	1/4	2		946639	77.30	946639-C3	86.50
.039 (1 mm)	**.249**	4	3/8	2-1/2		21039	69.90	21039-C3	83.30

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.040	**.020**	2	1/8	1-1/2		45340	43.30	45340-C3	49.00
.040	**.046**	2	3/16	2		17040	51.10	17040-C3	57.90
.040	**.107**	4	1/4	2		68040	77.30	68040-C3	86.50
.040	**.249**	4	3/8	2-1/2		21040	84.60	21040-C3	98.00
.043	**.046**	2	3/16	2		17043	51.10	17043-C3	57.90
.043	**.058**	4	3/16	2		67643	61.00	67643-C3	67.80
.043	**.249**	4	3/8	2-1/2		21043	84.60	21043-C3	98.00
.045	**.046**	2	3/16	2		17045	51.10	17045-C3	57.90
.045	**.058**	4	3/16	2		67645	61.00	67645-C3	67.80
.047 (3/64)	**.020**	2	1/8	1-1/2		67847	43.30	67847-C3	49.00
.047 (3/64)	**.046**	2	3/16	2		17047	51.10	17047-C3	57.90
.047 (3/64)	**.046**	2	3/16	4	***LONG!***	31647	69.70	31647-C3	77.60
.047 (3/64)	**.058**	4	3/16	2		67647	61.00	67647-C3	67.80
.047 (3/64)	**.107**	4	1/4	2		68047	77.30	68047-C3	86.50
.047 (3/64)	**.125**	2	1/4	2		45347	60.50	45347-C3	69.70
.047 (3/64)	**.249**	4	3/8	2-1/2		21047	84.60	21047-C3	98.00
.050	**.020**	2	1/8	1-1/2		67850	43.30	67850-C3	49.00
.050	**.046**	2	3/16	2		17050	51.10	17050-C3	57.90
.050	**.046**	2	1/4	4	***LONG!***	31650	82.80	31650-C3	90.50
.050	**.058**	4	3/16	2		67650	61.00	67650-C3	67.80
.050	**.107**	4	1/4	2		68050	77.30	68050-C3	86.50
.050	**.125**	2	1/4	2		45350	60.50	45350-C3	69.70
.050	**.249**	4	3/8	2-1/2		21050	84.60	21050-C3	98.00
.052	**.107**	4	1/4	2		68052	77.30	68052-C3	86.50
.055	**.046**	2	3/16	2		17055	51.10	17055-C3	57.90
.055	**.058**	4	3/16	2		67655	61.00	67655-C3	67.80
.055	**.107**	4	1/4	2		68055	77.30	68055-C3	86.50
.058	**.107**	4	1/4	2		68058	77.30	68058-C3	86.50
.060	**.020**	2	3/16	2		67860	53.10	67860-C3	59.90
.060	**.046**	2	3/16	2		17060	51.10	17060-C3	57.90
.060	**.046**	2	1/4	4	***LONG!***	31660	82.80	31660-C3	90.50
.060	**.058**	4	3/16	2		67660	61.00	67660-C3	67.80
.060	**.107**	4	1/4	2		68060	77.30	68060-C3	86.50
.060	**.125**	2	1/4	2		45360	60.50	45360-C3	69.70
.060	**.154**	4	5/16	2-1/2		946660	89.20	946660-C3	100.40
.060	**.249**	4	1/2	3		21060	94.30	21060-C3	108.40
.062 (1/16)	**.020**	2	3/16	2		67862	53.10	67862-C3	59.90
.062 (1/16)	**.046**	2	3/16	2		17062	51.10	17062-C3	57.90
.062 (1/16)	**.046**	2	1/4	4	***LONG!***	31662	82.80	31662-C3	90.50
.062 (1/16)	**.046**	4	3/16	2		806062	61.00	806062-C3	66.00
.062 (1/16)	**.058**	4	3/16	2		67662	61.00	67662-C3	67.80
.062 (1/16)	**.107**	4	1/4	2		68062	77.30	68062-C3	86.50
.062 (1/16)	**.125**	2	1/4	2		45362	60.50	45362-C3	69.70
.062 (1/16)	**.154**	4	5/16	2-1/2		946662	89.20	946662-C3	100.40
.062 (1/16)	**.249**	4	1/2	3		21062	94.30	21062-C3	112.70
.065	**.046**	2	3/16	2		17065	51.10	17065-C3	57.90

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.070	**.046**	2	3/16	2		17070	51.10	17070-C3	57.90
.070	**.058**	4	1/4	2		67670	77.30	67670-C3	86.50
.070	**.107**	4	1/4	2		68070	77.30	68070-C3	86.50
.072	**.046**	2	1/4	2		17072	58.60	17072-C3	67.80
.072	**.249**	4	1/2	3		21072	98.80	21072-C3	117.20
.075	**.046**	2	1/4	2		17075	58.60	17075-C3	67.80
.078 (5/64)	**.020**	2	3/16	2		67878	59.00	67878-C3	65.80
.078 (5/64)	**.046**	2	1/4	2		17078	58.60	17078-C3	67.80
.078 (5/64)	**.046**	2	1/4	4	***LONG!***	31678	82.80	31678-C3	90.50
.078 (5/64)	**.058**	4	1/4	2		67678	77.30	67678-C3	86.50
.078 (5/64)	**.107**	4	5/16	2-1/2		68078	89.20	68078-C3	100.40
.078 (5/64)	**.125**	2	5/16	2-1/2		941578	89.20	941578-C3	100.40
.078 (5/64)	**.154**	4	5/16	2-1/2		946678	89.20	946678-C3	100.40
.078 (5/64)	**.249**	4	1/2	3		21078	98.80	21078-C3	117.20
.080	**.046**	2	1/4	2		17080	58.60	17080-C3	67.80
.080	**.058**	4	1/4	2		67680	77.30	67680-C3	86.50
.080	**.107**	4	5/16	2-1/2		68080	89.20	68080-C3	100.40
.085	**.046**	2	1/4	2		17085	58.60	17085-C3	67.80
.089	**.045**	2	1/4	2		17089	58.60	17089-C3	67.80
.089	**.107**	4	5/16	2-1/2		68089	89.20	68089-C3	100.40
.089	**.248**	4	1/2	3		21089	98.80	21089-C3	117.20
.090	**.045**	2	1/4	2		17090	58.60	17090-C3	67.80
.090	**.058**	4	1/4	2		67690	77.30	67690-C3	86.50
.090	**.107**	4	5/16	2-1/2		68090	89.20	68090-C3	100.40
.093 (3/32)	**.045**	2	1/4	2		17093	58.60	17093-C3	67.80
.093 (3/32)	**.045**	2	5/16	4	***LONG!***	31693	109.00	31693-C3	121.50
.093 (3/32)	**.058**	4	1/4	2		67693	77.30	67693-C3	86.50
.093 (3/32)	**.107**	4	5/16	2-1/2		68093	89.20	68093-C3	100.40
.093 (3/32)	**.125**	2	5/16	2-1/2		941593	89.20	941593-C3	100.40
.093 (3/32)	**.154**	4	3/8	2-1/2		946693	109.30	946693-C3	122.70
.093 (3/32)	**.248**	4	1/2	3		21093	100.60	21093-C3	119.00
.095	**.045**	2	1/4	2		17095	58.60	17095-C3	67.80
.100	**.045**	2	1/4	2		17100	58.60	17100-C3	67.80
.100	**.045**	2	5/16	4	***LONG!***	31700	109.00	31700-C3	121.50
.100	**.058**	4	5/16	2-1/2		77800	89.60	77800-C3	100.80
.100	**.107**	4	5/16	2-1/2		68100	89.60	68100-C3	100.80
.100	**.125**	2	3/8	2-1/2		941600	107.50	941600-C3	116.50
.100	**.248**	4	1/2	3		21100	100.60	21100-C3	119.00
.109 (7/64)	**.058**	2	5/16	2-1/2		17109	89.60	17109-C3	100.80
.109 (7/64)	**.107**	4	3/8	2-1/2		68109	109.30	68109-C3	122.70
.118 (3 mm)	**.058**	2	5/16	2-1/2		17118	89.60	17118-C3	100.80
.118 (3 mm)	**.107**	4	3/8	2-1/2		68118	109.30	68118-C3	122.70
.118 (3 mm)	**.125**	2	3/8	2-1/2		941618	107.50	941618-C3	116.50
.118 (3 mm)	**.248**	4	1/2	3		21118	127.60	21118-C3	146.00

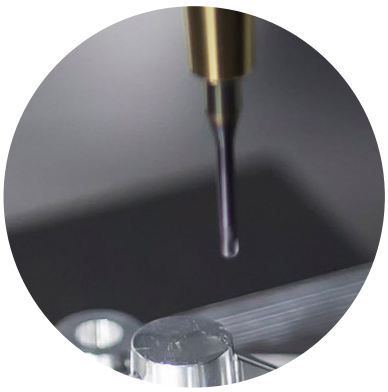
continued on next page

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.046**	2	5/16	2-1/2		948425	87.00	948425-C3	98.20
.125 (1/8)	**.046**	4	5/16	2-1/2		805908	89.60	805908-C3	97.50
.125 (1/8)	**.058**	2	5/16	2-1/2		17125	89.60	17125-C3	100.80
.125 (1/8)	**.058**	2	3/8	4	***LONG!***	31725	130.20	31725-C3	137.30
.125 (1/8)	**.107**	4	3/8	2-1/2		68125	109.30	68125-C3	122.70
.125 (1/8)	**.125**	2	7/16	2-1/2		941608	145.70	941608-C3	162.70
.125 (1/8)	**.154**	4	7/16	2-1/2		946725	145.70	946725-C3	162.70
.125 (1/8)	**.248**	4	5/8	3-1/2		21125	162.00	21125-C3	182.00
.140 (9/64)	**.058**	2	3/8	2-1/2		17140	107.50	17140-C3	120.90
.140 (9/64)	**.107**	4	7/16	2-1/2		68140	145.70	68140-C3	162.70
.156 (5/32)	**.058**	2	3/8	2-1/2		17156	107.50	17156-C3	120.90
.156 (5/32)	**.107**	4	7/16	2-1/2		68156	145.70	68156-C3	162.70
.156 (5/32)	**.248**	4	5/8	3-1/2		21156	178.40	21156-C3	198.40
.172 (11/64)	**.058**	2	7/16	2-1/2		17172	162.00	17172-C3	179.00
.187 (3/16)	**.058**	2	7/16	2-1/2		17187	162.00	17187-C3	179.00
.187 (3/16)	**.107**	4	1/2	3		68187	170.00	68187-C3	188.40
.187 (3/16)	**.125**	2	5/8	3-1/2		941612	193.80	941612-C3	207.20
.187 (3/16)	**.248**	4	5/8	3-1/2		21187	191.20	21187-C3	211.20
.197 (5 mm)	**.058**	2	1/2	3		17197	170.00	17197-C3	188.40
.197 (5 mm)	**.107**	4	5/8	3-1/2		68197	255.20	68197-C3	275.20
.219 (7/32)	**.058**	2	1/2	3		17219	171.60	17219-C3	190.00
.219 (7/32)	**.107**	4	5/8	3-1/2		68219	255.20	68219-C3	275.20
.236 (6 mm)	**.107**	2	5/8	3-1/2		17236	257.80	17236-C3	277.80
.236 (6 mm)	**.107**	4	5/8	3-1/2		68236	255.20	68236-C3	275.20
.250 (1/4)	**.058**	2	5/8	3-1/2		17199	257.80	17199-C3	277.80
.250 (1/4)	**.107**	2	5/8	3-1/2		17250	255.20	17250-C3	275.20
.250 (1/4)	**.107**	4	5/8	3-1/2		68250	255.20	68250-C3	275.20
.250 (1/4)	**.154**	4	3/4	4		946750	284.00	946750-C3	307.10
.250 (1/4)	**.247**	4	3/4	4		21250	284.00	21250-C3	307.10
.312 (5/16)	**.247**	4	1	4		21312	401.20	21312-C3	434.30
.375 (3/8)	**.246**	4	1	4		21375	438.00	21375-C3	471.10



4 Essential Corner Rounding End Mill Decisions

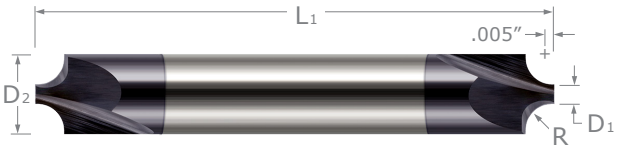
Are you machining the front corner or back corner of your part? Do you need a flared or unflared tool? Our "In the Loupe" blog post **4 Essential Corner Rounding End Mill Decisions** helps you ensure you're selecting the right tool for your job.

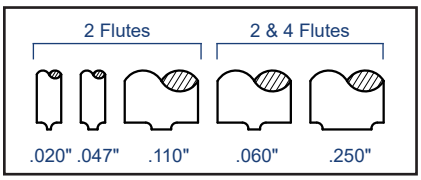
Read more on harveyperformance.com/in-the-loupe/

NEW SIZES!

CORNER ROUNDING END MILLS

2 & 4 Flute – Unflared





- Unflared shoulder and pilot for full radius form
- Double-ended
- Axial depth of cut = radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.005	**.020**	2	1/8	1-1/2		932205	41.70			932205-C3	47.40		
.005	**.047**	2	1/8	1-1/2		46005	32.10	46005-C1	37.80	46005-C3	37.80	46005-C4	49.30
.008	**.047**	2	1/8	1-1/2		46008	32.10	46008-C1	37.80	46008-C3	37.80		
.010	**.020**	2	1/8	1-1/2		932210	41.70			932210-C3	47.40		
.010	**.047**	2	1/8	1-1/2		46010	31.60	46010-C1	37.30	46010-C3	37.30	46010-C4	48.80
.010	**.250**	4	3/8	2-1/2		44010	55.30			44010-C3	68.70		
.012	**.047**	2	1/8	1-1/2		46012	32.10	46012-C1	37.80	46012-C3	37.80		
.015 (1/64)	**.020**	2	1/8	1-1/2		932215	41.70			932215-C3	47.40		
.015 (1/64)	**.047**	2	1/8	1-1/2		46015	31.60	46015-C1	37.30	46015-C3	37.30	46015-C4	48.80
.015 (1/64)	**.047**	2	3/16	4	***LONG!***	928015	64.00			928015-C3	71.90		
.015 (1/64)	**.060**	4	1/8	1-1/2		929915	50.30			929915-C3	56.00		
.015 (1/64)	**.250**	4	3/8	2-1/2		44015	55.30			44015-C3	68.70		
.018	**.047**	2	1/8	1-1/2		46018	32.10	46018-C1	37.80	46018-C3	37.80		
.020	**.020**	2	1/8	1-1/2		932220	41.70			932220-C3	47.40		
.020	**.047**	2	1/8	1-1/2		46020	31.60	46020-C1	37.30	46020-C3	37.30	46020-C4	48.80
.020	**.047**	2	3/16	4	***LONG!***	928020	64.00			928020-C3	71.90		
.020	**.250**	4	3/8	2-1/2		44020	55.30			44020-C3	68.70		
.022	**.047**	2	1/8	1-1/2		46022	32.10	46022-C1	37.80	46022-C3	37.80		
.025	**.020**	2	1/8	1-1/2		932225	41.70			932225-C3	47.40		
.025	**.047**	2	1/8	1-1/2		46025	31.60	46025-C1	37.30	46025-C3	37.30	46025-C4	48.80
.025	**.250**	4	3/8	2-1/2		44025	55.30			44025-C3	68.70		
.027	**.047**	2	1/8	1-1/2		46027	32.10	46027-C1	37.80	46027-C3	37.80		
.030	**.047**	2	1/8	1-1/2		46030	32.10	46030-C1	37.80	46030-C3	37.80	46030-C4	49.30
.030	**.250**	4	3/8	2-1/2		44030	60.60			44030-C3	74.00		
.031 (1/32)	**.020**	2	1/8	1-1/2		932231	41.70			932231-C3	47.40		
.031 (1/32)	**.047**	2	1/8	1-1/2		46031	31.60	46031-C1	37.30	46031-C3	37.30	46031-C4	48.80
.031 (1/32)	**.047**	2	3/16	4	***LONG!***	928031	64.00			928031-C3	71.90		
.031 (1/32)	**.060**	4	1/8	1-1/2		929931	50.30			929931-C3	56.00		
.031 (1/32)	**.250**	4	3/8	2-1/2		44031	60.60			44031-C3	74.00		
.032	**.047**	2	1/8	1-1/2		46032	35.70	46032-C1	41.40	46032-C3	41.40		
.035	**.047**	2	1/8	1-1/2		46035	35.70	46035-C1	41.40	46035-C3	41.40		
.039 (1 mm)	**.047**	2	1/8	1-1/2		46039	35.70	46039-C1	41.40	46039-C3	41.40	46039-C4	52.90
.039 (1 mm)	**.250**	4	3/8	2-1/2		44039	60.60			44039-C3	74.00		

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NEW SIZES!

CORNER ROUNDING END MILLS

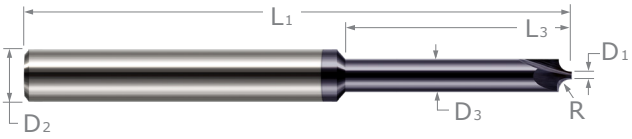
2 & 4 Flute – Unflared (cont.)

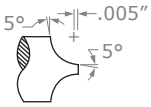
continued from previous page

	RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
	R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.043	**.047**	2	3/16	2		46043	42.30	46043-C1	49.10	46043-C3	49.10		
	.047 (3/64)	**.047**	2	3/16	2		46047	41.70	46047-C1	48.50	46047-C3	48.50	46047-C4	65.50
	.047 (3/64)	**.250**	4	3/8	2-1/2		44047	60.60			44047-C3	74.00		
	.050	**.047**	2	3/16	2		46050	41.70	46050-C1	48.50	46050-C3	48.50	46050-C4	65.50
	.050	**.250**	4	3/8	2-1/2		44050	60.60			44050-C3	74.00		
	.055	**.047**	2	3/16	2		46055	41.70	46055-C1	48.50	46055-C3	48.50		
	.060	**.047**	2	3/16	2		46060	43.00	46060-C1	49.80	46060-C3	49.80	46060-C4	66.80
	.060	**.250**	4	1/2	3		44060	85.60			44060-C3	104.00		
	.062 (1/16)	**.047**	2	3/16	2		46062	42.30	46062-C1	49.10	46062-C3	49.10	46062-C4	66.10
	.062 (1/16)	**.047**	2	1/4	4	***LONG!***	928062	76.40			928062-C3	85.50		
	.062 (1/16)	**.060**	4	3/16	2		929962	56.60			929962-C3	63.40		
NEW	.062 (1/16)	**.110**	2	1/4	2		793462	48.70			793462-C3	57.90		
	.062 (1/16)	**.250**	4	1/2	3		44062	85.60			44062-C3	104.00		
	.067	**.047**	2	3/16	2		46067	43.00	46067-C1	49.80	46067-C3	49.80		
	.072	**.047**	2	1/4	2		46072	49.50	46072-C1	58.50	46072-C3	58.70		
	.078 (5/64)	**.047**	2	1/4	2		46078	48.70	46078-C1	57.70	46078-C3	57.90	46078-C4	75.80
	.078 (5/64)	**.250**	4	1/2	3		44078	85.60			44078-C3	104.00		
	.089	**.047**	2	1/4	2		46089	49.50	46089-C1	58.50	46089-C3	58.70		
	.093 (3/32)	**.047**	2	1/4	2		46093	49.50	46093-C1	58.50	46093-C3	58.70	46093-C4	76.60
	.093 (3/32)	**.047**	2	5/16	4	***LONG!***	928093	89.60			928093-C3	102.10		
	.093 (3/32)	**.060**	4	1/4	2		929993	70.20			929993-C3	79.40		
	.093 (3/32)	**.250**	4	1/2	3		44093	96.30			44093-C3	114.70		
	.100	**.047**	2	1/4	2		46100	48.70	46100-C1	57.70	46100-C3	57.90	46100-C4	75.80
	.104	**.060**	2	5/16	2-1/2		46104	68.70	46104-C1	79.90	46104-C3	79.90		
	.109 (7/64)	**.060**	2	5/16	2-1/2		46109	67.60	46109-C1	78.80	46109-C3	78.80		
	.118 (3 mm)	**.060**	2	5/16	2-1/2		46118	68.70	46118-C1	79.90	46118-C3	79.90	46118-C4	95.80
	.118 (3 mm)	**.250**	4	1/2	3		44118	96.30			44118-C3	114.70		
	.125 (1/8)	**.060**	2	5/16	2-1/2		46125	68.70	46125-C1	79.90	46125-C3	79.90	46125-C4	95.80
	.125 (1/8)	**.060**	2	3/8	4	***LONG!***	928125	136.10			928125-C3	150.60		
NEW	.125 (1/8)	**.110**	2	3/8	3		793508	112.60			793508-C3	123.80		
	.125 (1/8)	**.250**	4	5/8	3-1/2		44125	141.20			44125-C3	161.20		
	.140 (9/64)	**.060**	2	3/8	2-1/2		46140	78.90	46140-C1	92.30	46140-C3	92.30		
	.156 (5/32)	**.060**	2	3/8	2-1/2		46156	85.30	46156-C1	98.70	46156-C3	98.70		
	.156 (5/32)	**.250**	4	5/8	3-1/2		44156	151.80			44156-C3	171.80		
	.172 (11/64)	**.060**	2	7/16	2-1/2		46172	140.10	46172-C1	156.80	46172-C3	157.10		
	.187 (3/16)	**.060**	2	7/16	2-1/2		46187	144.40	46187-C1	161.10	46187-C3	161.40		
	.187 (3/16)	**.250**	4	5/8	3-1/2		44187	166.00			44187-C3	186.00		
	.197 (5 mm)	**.060**	2	1/2	3		46197	200.40	46197-C1	218.20	46197-C3	218.80		
	.219 (7/32)	**.060**	2	1/2	3		46219	192.40	46219-C1	210.20	46219-C3	210.80		
	.236 (6 mm)	**.110**	2	5/8	3-1/2		46236	256.90	46236-C1	276.90	46236-C3	276.90		
	.250 (1/4)	**.110**	2	5/8	3-1/2		46250	256.90	46250-C1	276.90	46250-C3	276.90		
	.250 (1/4)	**.250**	4	3/4	4		44250	269.40			44250-C3	292.50		
	.312 (5/16)	**.250**	2	1	4		46312	399.00	46312-C1	432.10	46312-C3	432.10		
	.375 (3/8)	**.250**	2	1	4		46375	434.80	46375-C1	467.90	46375-C3	467.90		

CORNER ROUNDING END MILLS

Long Reach – Flared



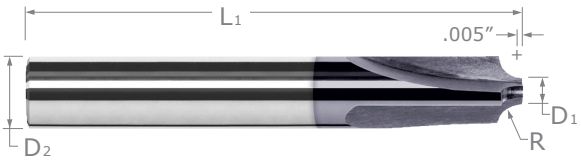


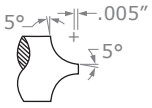
- **Reduced diameter for clearance along walls and in small features**
- Small pilot design for miniature holes, narrow slots and small inside corners
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Axial depth of cut = radius plus .005" • 2 flutes • Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIAMETER	NECK DIAMETER	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D1 +.000" −.001"	D3	L3 +.010" −.000"	D2	L1	2 FL	PRICE	2 FL	PRICE
.005	.010	**.031**	.156	1/8	1-1/2	994605	37.50		
	.010	**.031**	.250	1/8	1-1/2	56905	37.50		
	.010	**.031**	.375	1/8	1-1/2	57305	38.60		
	.020	**.031**	.156	1/8	1-1/2	992205	37.50	992205-C3	42.10
	.020	**.031**	.250	1/8	1-1/2	55705	37.50	55705-C3	42.10
	.020	**.031**	.375	1/8	1-1/2	56005	38.60		
	.020	**.062**	.312	1/8	1-1/2	990905	37.50		
	.020	**.062**	.500	1/8	1-1/2	57505	37.50		
	.020	**.062**	.750	1/8	2	55305	38.60		
	.020	**.093**	.750	1/8	2	57405	43.00		
	.020	**.093**	1.125	1/8	2	54305	43.00		
.008	.010	**.031**	.156	1/8	1-1/2	994608	37.50	994608-C3	42.10
	.010	**.031**	.250	1/8	1-1/2	56908	37.50		
	.010	**.031**	.375	1/8	1-1/2	57308	38.60		
.010	.010	**.031**	.156	1/8	1-1/2	994610	37.50	994610-C3	42.10
	.010	**.031**	.250	1/8	1-1/2	56910	37.50	56910-C3	42.10
	.010	**.031**	.375	1/8	1-1/2	57310	38.60		
	.020	**.062**	.312	1/8	1-1/2	990910	37.50	990910-C3	42.10
	.020	**.062**	.500	1/8	1-1/2	57510	37.50	57510-C3	42.10
	.020	**.062**	.750	1/8	2	55310	38.60		
	.020	**.093**	.750	1/8	2	57410	43.00		
	.020	**.093**	1.125	1/8	2	54310	43.00		
.015	.020	**.062**	.312	1/8	1-1/2	990915	37.50	990915-C3	42.10
	.020	**.062**	.500	1/8	1-1/2	57515	37.50	57515-C3	42.10
	.020	**.062**	.750	1/8	2	55315	38.60		
	.020	**.093**	.750	1/8	2	57415	43.00		
	.020	**.093**	1.125	1/8	2	54315	43.00		
.020	.020	**.062**	.312	1/8	1-1/2	990920	37.50	990920-C3	42.10
	.020	**.062**	.500	1/8	1-1/2	57520	37.50	57520-C3	42.10
	.020	**.062**	.750	1/8	2	55320	38.60		
	.020	**.093**	.750	1/8	2	57420	43.00		
	.020	**.093**	1.125	1/8	2	54320	43.00		
.025	.020	**.093**	.750	1/8	2	57425	43.00		
	.020	**.093**	1.125	1/8	2	54325	43.00		
.030	.020	**.093**	.750	1/8	2	57430	43.00	57430-C3	47.60
	.020	**.093**	1.125	1/8	2	54330	43.00		
.031	.020	**.093**	.750	1/8	2	57431	43.00	57431-C3	47.60
	.020	**.093**	1.125	1/8	2	54331	43.00		

CORNER ROUNDING END MILLS

3 Flute – Flared



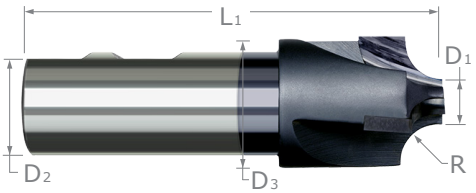


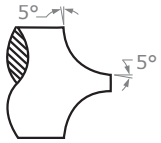
- Single end
- Cutting on radius, flares, and end only (not center cutting)
- 5° flares tangent at pilot and shoulder to avoid steps
- Axial depth of cut ≈ radius plus .005″
- 3 flutes
- Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1	D_2	L_1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)	.058	1/8	1-1/2	933415	30.90	933415-C3	35.50
.031 (1/32)	.058	1/8	1-1/2	933431	30.90	933431-C3	35.50
.062 (1/16)	.058	3/16	2	933462	39.50	933462-C3	44.50
.062 (1/16)	.154	5/16	2-1/2	928262	67.60	928262-C3	75.50
.093 (3/32)	.058	1/4	2	933493	58.00	933493-C3	64.80
.093 (3/32)	.154	3/8	2-1/2	928293	77.10	928293-C3	86.10
.125 (1/8)	.058	5/16	2-1/2	933508	67.60	933508-C3	75.50
.125 (1/8)	.248	5/8	3-1/2	973008	112.90	973008-C3	126.30
.187 (3/16)	.058	7/16	2-1/2	933512	110.70	933512-C3	121.90
.187 (3/16)	.248	5/8	3-1/2	973012	128.00	973012-C3	141.40

CORNER ROUNDING END MILLS

3 Flute – Flared – Carbide Tipped



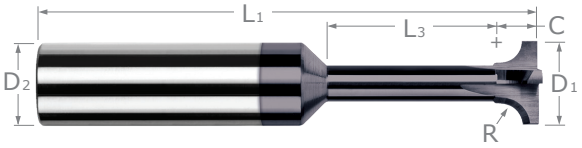


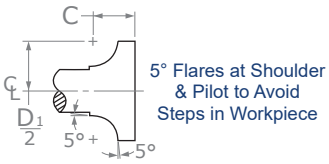
- Carbide tipped - cutting on radius and flares only
- 5° flares tangent to radius at pilot and shoulder to avoid steps
- 3 flutes
- Weldon flat
- CNC ground in the USA

RADIUS	PILOT DIAMETER	HEAD DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R	D_1	D_3	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/4	13/32	1	3/4	3-1/4	45016	205.40	45016-C3	227.50
5/16	13/32	1-1/8	7/8	3-1/2	45020	210.50	45020-C3	228.20
3/8	13/32	1-1/4	7/8	3-3/4	45024	218.00	45024-C3	236.60
7/16	13/32	1-3/8	1	4	45028	244.20	45028-C3	271.80
1/2	13/32	1-1/2	1	4	45032	270.10	45032-C3	292.20
5/8	21/32	2	1-1/4	4-1/4	45040	335.00	45040-C3	362.60

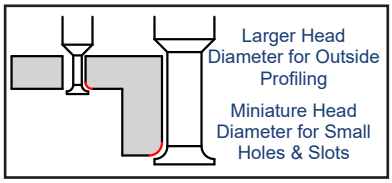
CORNER ROUNDING END MILLS

Back Corner Rounding End Mills – Flared





- Designed to mill radius on backside of workpiece
- 5° flares at neck and shoulder to avoid steps
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Cutting on radius and flares only
- Solid carbide
- CNC ground in the USA



RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D1 +.000" −.002"		L3	C +.003" −.001" *		D2	L1	TOOL #	PRICE	TOOL #	PRICE
.005	.030	.017	.062	.025	3	1/8	1-1/2	57705	60.50	57705-C3	65.10
.005	.060	.047	.250	.025	3	1/8	1-1/2	58005	60.50	58005-C3	65.10
.005	.115	.102	.875	.025	3	1/8	2	59805	63.00	59805-C3	67.60
.008	.075	.056	.312	.028	3	1/8	1-1/2	58708	60.50	58708-C3	65.10
.008	.187	.144	.500	.070	3	3/16	2	16008	64.20	16008-C3	69.20
.010	.045	.022	.078	.030	3	1/8	1-1/2	60910	60.50	60910-C3	65.10
.010	.075	.052	.281	.030	3	1/8	1-1/2	58710	60.50	58710-C3	65.10
.010	.187	.140	.500	.072	3	3/16	2	16010	64.20	16010-C3	69.20
.012	.075	.048	.250	.032	3	1/8	1-1/2	58712	60.50	58712-C3	65.10
.015 (1/64)	.060	.027	.093	.035	3	1/8	1-1/2	58515	60.50	58515-C3	65.10
.015 (1/64)	.090	.057	.312	.035	3	1/8	1-1/2	59715	60.50	59715-C3	65.10
.015 (1/64)	.187	.130	.500	.077	3	3/16	2	16015	64.20	16015-C3	69.20
.015 (1/64)	.187	.130	1.000	.077	3	3/16	2-1/2	992815	65.20	992815-C3	70.20
.020	.075	.032	.109	.040	3	1/8	1-1/2	59220	60.50	59220-C3	65.10
.020	.115	.072	.375	.040	3	1/8	1-1/2	60420	60.50	60420-C3	65.10
.020	.187	.120	.500	.082	3	3/16	2	16020	64.20	16020-C3	69.20
.022	.187	.116	.500	.084	3	3/16	2	16022	64.20	16022-C3	69.20
.025	.090	.037	.125	.055	3	1/8	1-1/2	60125	60.50	60125-C3	65.10
.025	.187	.110	.500	.087	3	3/16	2	16025	64.20	16025-C3	69.20
.027	.187	.106	.500	.089	3	3/16	2	16027	64.20	16027-C3	69.20
.030	.115	.052	.187	.060	3	1/8	1-1/2	60630	60.50	60630-C3	65.10
.030	.187	.100	.500	.092	3	3/16	2	16030	64.20	16030-C3	69.20
.030	.187	.100	1.000	.092	3	3/16	2-1/2	992830	65.20	992830-C3	70.20
.031 (1/32)	.115	.050	.156	.061	3	1/8	1-1/2	60631	60.50	60631-C3	65.10
.031 (1/32)	.187	.098	.500	.093	3	3/16	2	16031	64.20	16031-C3	69.20
.031 (1/32)	.187	.098	1.000	.093	3	3/16	2-1/2	992831	65.20	992831-C3	70.20
.035	.250	.153	.500	.097	3	1/4	2-1/2	16035	69.90	16035-C3	76.70
.039 (1 mm)	.250	.145	.500	.101	3	1/4	2-1/2	16039	69.90	16039-C3	76.70
.039 (1 mm)	.250	.145	1.000	.101	3	1/4	2-1/2	992839	69.90	992839-C3	76.70
.040	.250	.143	.500	.102	3	1/4	2-1/2	16040	69.90	16040-C3	76.70
.045	.250	.133	.500	.107	3	1/4	2-1/2	16045	69.90	16045-C3	76.70

*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).

continued on next page

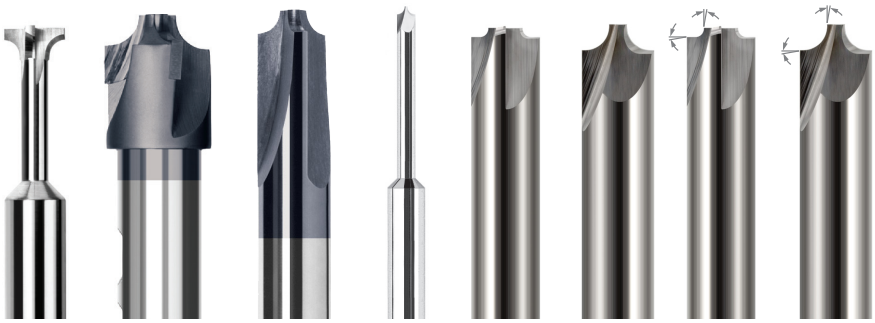
CORNER ROUNDING END MILLS

Back Corner Rounding End Mills – Flared (cont.)

continued from previous page

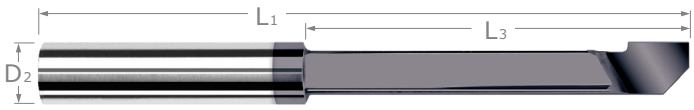
RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1 +.000″ −.002″		L_3	C +.003″ −.001″*		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.047 (3/64)	.250	.128	.625	.109	3	1/4	2-1/2	16047	69.90	16047-C3	76.70
.047 (3/64)	.250	.128	1.250	.109	3	1/4	3	992847	76.30	992847-C3	83.10
.050	.250	.122	.375	.112	3	1/4	2-1/2	985050	69.90	985050-C3	76.70
.050	.250	.122	.625	.112	3	1/4	2-1/2	16050	69.90	16050-C3	76.70
.050	.250	.122	1.250	.112	3	1/4	3	992850	76.30	992850-C3	83.10
.055	.250	.113	.625	.117	3	1/4	2-1/2	16055	69.90	16055-C3	76.70
.060	.312	.164	.437	.122	3	5/16	2-1/2	985060	95.70	985060-C3	103.60
.060	.312	.165	.875	.122	3	5/16	2-1/2	16060	95.70	16060-C3	103.60
.062 (1/16)	.312	.160	.437	.124	3	5/16	2-1/2	985062	95.70	985062-C3	103.60
.062 (1/16)	.312	.161	.875	.124	3	5/16	2-1/2	16062	95.70	16062-C3	103.60
.062 (1/16)	.312	.160	1.250	.124	3	5/16	3	992862	101.10	992862-C3	109.00
.070	.375	.207	.875	.132	3	3/8	2-1/2	16070	109.60	16070-C3	118.60
.078 (5/64)	.375	.191	.500	.171	3	3/8	2-1/2	985078	109.60	985078-C3	118.60
.078 (5/64)	.375	.191	1.000	.171	3	3/8	2-1/2	16078	109.60	16078-C3	118.60
.078 (5/64)	.375	.191	1.500	.171	3	3/8	3	992878	117.80	992878-C3	126.80
.080	.375	.187	1.000	.173	3	3/8	2-1/2	16080	109.60	16080-C3	118.60
.090	.375	.167	1.000	.183	3	3/8	2-1/2	16090	109.60	16090-C3	118.60
.093 (3/32)	.375	.161	.500	.186	3	3/8	2-1/2	985093	109.60	985093-C3	118.60
.093 (3/32)	.375	.161	1.000	.186	3	3/8	2-1/2	16093	109.60	16093-C3	118.60
.093 (3/32)	.375	.161	1.500	.186	3	3/8	3	992893	117.80	992893-C3	126.80
.100	.500	.272	.500	.193	4	1/2	3	985100	157.90	985100-C3	171.30
.100	.500	.272	1.000	.193	4	1/2	3	16100	157.90	16100-C3	171.30
.118 (3 mm)	.500	.236	1.000	.211	4	1/2	3	1613M	157.90	1613M-C3	171.30
.125 (1/8)	.500	.222	.500	.218	4	1/2	3	985108	157.90	985108-C3	171.30
.125 (1/8)	.500	.222	1.000	.218	4	1/2	3	16108	157.90	16108-C3	171.30
.125 (1/8)	.500	.222	1.500	.218	4	1/2	3-1/2	992908	163.90	992908-C3	177.30
.156 (5/32)	.625	.284	1.000	.250	4	5/8	3-1/2	16110	213.90	16110-C3	227.30
.187 (3/16)	.625	.222	1.000	.281	4	5/8	3-1/2	16112	213.90	16112-C3	227.30
.250 (1/4)	1.000	.471	1.500	.376	4	1	4	16116	321.10	16116-C3	343.20

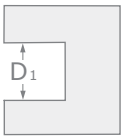
*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).



Check Out All of Our Corner Rounding Solutions!

BORING BARS



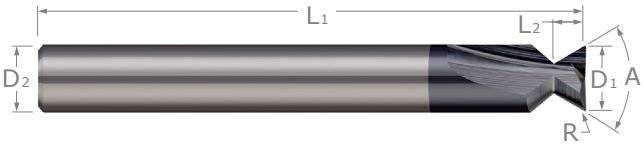


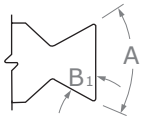
- Helical back rake flute improves accuracy and chip flow
- Square neck improves rigidity and has less deflection
- Tip is ground to sharp corner
- 70% stronger than round neck design
- Solid carbide
- CNC ground in the USA

Helical Back Rake Design!

MIN. BORE DIAMETER	MAX BORE DEPTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1	L_3	D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.031	**5/32**	1/8	1-1/2	29030	33.20	29030-C3	37.80
.036	**5/32**	1/8	1-1/2	29035	33.20		
.042	**1/4**	1/8	1-1/2	29040	30.30	29040-C3	34.90
.052	**5/16**	1/8	1-1/2	29050	29.40	29050-C3	34.00
.057	**5/16**	1/8	1-1/2	29055	29.40		
.062	**3/8**	1/8	1-1/2	29060	29.40	29060-C3	34.00
.062	**1/2**	1/8	1-1/2	29060L	31.00	29060L-C3	35.60
.072	**7/16**	1/8	1-1/2	29070	29.40	29070-C3	34.00
.082	**1/2**	1/8	1-1/2	29080	29.40		
.087	**1/2**	1/8	1-1/2	29085	29.40		
.087	**5/8**	1/8	2	29085L	34.60		
.092	**1/2**	1/8	1-1/2	29090	29.40	29090-C3	34.00
.092	**5/8**	1/8	2	29090L	34.60	29090L-C3	39.20
.102	**9/16**	1/8	1-1/2	29100	29.40	29100-C3	34.00
.102	**5/8**	1/8	2	29100L	34.60	29100L-C3	39.20
.112	**9/16**	1/8	1-1/2	29110	29.40	29110-C3	34.00
.112	**5/8**	1/8	2	29110L	34.60	29110L-C3	39.20
.120	**5/8**	1/8	1-1/2	29120	29.40	29120-C3	34.00
.120	**3/4**	1/8	2	29120L	34.60	29120L-C3	39.20
.135	**3/4**	5/32	2	29135	32.90	29135-C3	37.90
.150	**3/4**	3/16	2	29150	33.80	29150-C3	38.80
.150	**1**	3/16	2	29150L	40.30	29150L-C3	45.30
.150	**1-1/2**	3/16	2-1/2	29150XL	43.00	29150XL-C3	48.00
.180	**1**	3/16	2	29180	33.80	29180-C3	38.80
.180	**1-1/2**	3/16	2-1/2	29180L	40.90	29180L-C3	45.90
.180	**2**	3/16	3	29180XL	53.40	29180XL-C3	58.40
.210	**1**	1/4	2	29210	35.20	29210-C3	42.00
.210	**1-1/2**	1/4	2-1/2	29210L	41.50	29210L-C3	48.30
.210	**2**	1/4	3	29210XL	51.00	29210XL-C3	57.80
.240	**1**	1/4	2	29240	35.20	29240-C3	42.00
.240	**1-1/2**	1/4	2-1/2	29240L	41.50	29240L-C3	48.30
.240	**2**	1/4	3	29240XL	61.20	29240XL-C3	68.00
.300	**1**	5/16	2-1/2	29300	85.10	29300-C3	93.00
.360	**2**	3/8	3	29360	111.70	29360-C3	120.70

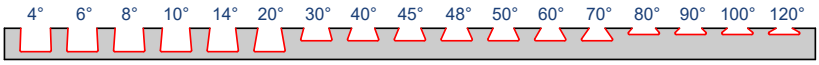
DOVETAIL CUTTERS





B1 = 90 - (A / 2)
A = 180 - 2B1

- Offered with sharp corner, .003", .005", or .010" Corner Radius
- Solid carbide
- CNC ground in the USA



Stocked in *Seventeen* Included Angles!

INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.020″ −.000″		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
4°	1/16	.125	.054	.005	2	1/8	1-1/2	930004	90.40	930004-C3	95.00
	3/32	.187	.081	.010	2	1/8	1-1/2	991406	87.70	991406-C3	92.30
	1/8	.250	.108	SHARP!	2	1/8	1-1/2	883608	90.40	883608-C3	95.00
	1/8	.250	.108	.010	2	1/8	1-1/2	991408	91.90	991408-C3	96.50
	3/16	.375	.161	SHARP!	2	3/16	2	883612	93.10	883612-C3	98.10
	3/16	.375	.162	.010	2	3/16	2	991412	94.60	991412-C3	99.60
	1/4	.500	.215	SHARP!	2	1/4	2	883616	116.50	883616-C3	123.30
	1/4	.500	.216	.010	2	1/4	2	991416	118.50	991416-C3	125.30
	3/8	.750	.323	SHARP!	3	3/8	2-1/2	883624	134.90	883624-C3	143.90
	3/8	.750	.323	.010	3	3/8	2-1/2	991424	136.90	991424-C3	145.90
	1/2	1.000	.431	.010	3	1/2	3	991432	185.60	991432-C3	199.00
6°	1/16	.125	.049	.005	2	1/8	1-1/2	932304	90.40	932304-C3	95.00
	3/32	.187	.074	.010	2	1/8	1-1/2	989206	87.70	989206-C3	92.30
	1/8	.250	.099	SHARP!	2	1/8	1-1/2	891208	88.90	891208-C3	93.50
	1/8	.250	.100	.010	2	1/8	1-1/2	989208	90.40	989208-C3	95.00
	3/16	.375	.148	SHARP!	2	3/16	2	891212	91.40	891212-C3	96.40
	3/16	.375	.149	.010	2	3/16	2	989212	92.90	989212-C3	97.90
	1/4	.500	.198	SHARP!	2	1/4	2	891216	115.30	891216-C3	122.10
	1/4	.500	.199	.010	2	1/4	2	989216	117.20	989216-C3	124.00
	3/8	.750	.296	SHARP!	3	3/8	2-1/2	891224	133.10	891224-C3	142.10
	3/8	.750	.297	.010	3	3/8	2-1/2	989224	135.20	989224-C3	144.20
	1/2	1.000	.396	.010	3	1/2	3	989232	183.20	989232-C3	196.60
8°	1/8	.218	.096	.010	2	1/8	1-1/2	984808	87.70	984808-C3	92.30
	3/16	.281	.150	.010	2	3/16	2	984812	90.30	984812-C3	95.30
	1/4	.375	.199	.010	2	1/4	2	984816	114.60	984816-C3	121.40
10°	1/32	.047	.023	SHARP!	2	1/8	1-1/2	990102	85.60	990102-C3	90.20
	1/16	.093	.046	SHARP!	2	1/8	1-1/2	990104	85.60	990104-C3	90.20
	1/16	.093	.047	.005	2	1/8	1-1/2	61504	87.20	61504-C3	91.80
	5/64	.109	.060	.005	2	1/8	1-1/2	61505	87.20	61505-C3	91.80
	3/32	.125	.071	SHARP!	2	1/8	1-1/2	990106	82.80	990106-C3	87.40
	3/32	.125	.073	.010	2	1/8	1-1/2	27006	84.30	27006-C3	88.90
	1/8	.187	.092	SHARP!	2	1/8	1-1/2	990108	82.80	990108-C3	87.40
	1/8	.187	.094	.010	2	1/8	1-1/2	27008	84.30	27008-C3	88.90
	3/16	.250	.144	SHARP!	2	3/16	2	990112	85.30	990112-C3	90.30
	3/16	.250	.146	.010	2	3/16	2	27012	87.00	27012-C3	92.00
	1/4	.312	.195	SHARP!	2	1/4	2	990116	108.20	990116-C3	115.00
	1/4	.312	.197	.010	2	1/4	2	27016	110.40	27016-C3	117.20

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10°	5/16	.375	.247	SHARP!	3	5/16	2-1/2	990120	114.50	990120-C3	122.40
	5/16	.375	.249	.010	3	5/16	2-1/2	27020	116.40	27020-C3	124.30
	3/8	.500	.288	SHARP!	3	3/8	2-1/2	990124	123.20	990124-C3	132.20
	3/8	.500	.289	.010	3	3/8	2-1/2	27024	125.40	27024-C3	134.40
	1/2	.625	.391	SHARP!	3	1/2	3	990132	170.80	990132-C3	184.20
	1/2	.625	.392	.010	3	1/2	3	27032	173.70	27032-C3	187.10
14°	1/16	.093	.040	.005	2	1/8	1-1/2	873404	87.20	873404-C3	91.80
	3/32	.125	.065	.010	2	1/8	1-1/2	979406	84.30	979406-C3	88.90
	1/8	.187	.082	.010	2	1/8	1-1/2	979408	84.30	979408-C3	88.90
	3/16	.250	.129	.010	2	3/16	2	979412	87.00	979412-C3	92.00
	1/4	.312	.176	.010	2	1/4	2	979416	110.40	979416-C3	117.20
	5/16	.375	.223	.010	3	5/16	2-1/2	979420	116.40	979420-C3	124.30
	3/8	.500	.255	.010	3	3/8	2-1/2	979424	125.40	979424-C3	134.40
	1/2	.625	.349	.010	3	1/2	3	979432	173.70	979432-C3	187.10
20°	1/32	.031	.020	SHARP!	2	1/8	1-1/2	986002	72.10	986002-C3	76.70
	1/16	.062	.040	SHARP!	2	1/8	1-1/2	986004	72.10	986004-C3	76.70
	1/16	.062	.042	.005	2	1/8	1-1/2	62304	73.60	62304-C3	78.20
	5/64	.078	.052	.005	2	1/8	1-1/2	62305	73.60	62305-C3	78.20
	3/32	.093	.060	SHARP!	2	1/8	1-1/2	986006	69.10	986006-C3	73.70
	3/32	.093	.064	.010	2	1/8	1-1/2	16406	70.70	16406-C3	75.30
	1/8	.125	.081	SHARP!	2	1/8	1-1/2	986008	69.40	986008-C3	74.00
	1/8	.125	.085	.010	2	1/8	1-1/2	16408	70.70	16408-C3	75.30
	3/16	.187	.122	SHARP!	2	3/16	2	986012	72.00	986012-C3	77.00
	3/16	.187	.125	.010	2	3/16	2	16412	73.20	16412-C3	78.20
	1/4	.250	.162	SHARP!	2	1/4	2	986016	90.70	986016-C3	97.50
	1/4	.250	.163	.005	2	1/4	2	62316	92.40	62316-C3	99.20
	1/4	.250	.166	.010	2	1/4	2	16416	92.40	16416-C3	99.20
	5/16	.312	.202	SHARP!	3	5/16	2-1/2	986020	99.20	986020-C3	107.10
	5/16	.312	.206	.010	3	5/16	2-1/2	16420	101.10	16420-C3	109.00
	3/8	.375	.243	SHARP!	3	3/8	2-1/2	986024	104.50	986024-C3	113.50
	3/8	.375	.247	.010	3	3/8	2-1/2	16424	106.20	16424-C3	115.20
	1/2	.500	.324	SHARP!	3	1/2	3	986032	143.70	986032-C3	157.10
	1/2	.500	.328	.010	3	1/2	3	16432	146.40	16432-C3	159.80
	5/8	.625	.409	.010	4	5/8	3	16440	167.70	16440-C3	181.10
	3/4	.750	.489	.010	4	3/4	3	16448	177.00	16448-C3	191.50
30°	1/32	.020	.020	SHARP!	2	1/8	1-1/2	983302	72.10	983302-C3	76.70
	1/16	.040	.041	SHARP!	2	1/8	1-1/2	983304	72.10	983304-C3	76.70
	1/16	.045	.041	.005	2	1/8	1-1/2	63404	73.60	63404-C3	78.20
	5/64	.055	.052	.005	2	1/8	1-1/2	63405	73.60	63405-C3	78.20
	3/32	.062	.060	SHARP!	2	1/8	1-1/2	983306	69.10	983306-C3	73.70
	3/32	.078	.057	.010	2	1/8	1-1/2	16506	70.70	16506-C3	75.30
	1/8	.082	.081	SHARP!	2	1/8	1-1/2	983308	69.40	983308-C3	74.00
	1/8	.093	.081	.010	2	1/8	1-1/2	16508	70.70	16508-C3	75.30
	3/16	.125	.121	SHARP!	2	3/16	2	983312	70.40	983312-C3	75.40
	3/16	.125	.127	.010	2	3/16	2	16512	71.80	16512-C3	76.80
	1/4	.156	.166	SHARP!	2	1/4	2	983316	89.20	983316-C3	96.00
	1/4	.156	.172	.010	2	1/4	2	16516	90.70	16516-C3	97.50

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	5/16	.218	.196	SHARP!	3	5/16	2-1/2	983320	97.40	983320-C3	105.30
	5/16	.187	.218	.010	3	5/16	2-1/2	16520	99.30	16520-C3	107.20
	3/8	.250	.241	SHARP!	3	3/8	2-1/2	983324	102.50	983324-C3	111.50
	3/8	.250	.243	.005	3	3/8	2-1/2	63424	104.50	63424-C3	113.50
	3/8	.250	.247	.010	3	3/8	2-1/2	16524	104.50	16524-C3	113.50
	1/2	.312	.333	SHARP!	3	1/2	3	983332	141.20	983332-C3	154.60
	1/2	.312	.339	.010	3	1/2	3	16532	143.70	16532-C3	157.10
	5/8	.375	.430	.010	4	5/8	3	16540	165.00	16540-C3	178.40
	3/4	.500	.488	.010	4	3/4	3	16548	174.50	16548-C3	189.00
40°	1/16	.035	.037	SHARP!	2	1/8	1-1/2	977804	72.10	977804-C3	76.70
	1/16	.040	.037	.005	2	1/8	1-1/2	64604	73.60	64604-C3	78.20
	5/64	.050	.046	.005	2	1/8	1-1/2	64605	73.60	64605-C3	78.20
	3/32	.062	.056	.010	2	1/8	1-1/2	28506	70.70	28506-C3	75.30
	1/8	.078	.068	SHARP!	2	1/8	1-1/2	977808	69.40	977808-C3	74.00
	1/8	.093	.066	.010	2	1/8	1-1/2	28508	70.70	28508-C3	75.30
	3/16	.109	.108	SHARP!	2	3/16	2	977812	72.00	977812-C3	77.00
	3/16	.125	.105	.010	2	3/16	2	28512	73.20	28512-C3	78.20
	1/4	.156	.136	SHARP!	2	1/4	2	977816	90.70	977816-C3	97.50
	1/4	.156	.145	.010	2	1/4	2	28516	92.40	28516-C3	99.20
	5/16	.187	.176	SHARP!	3	5/16	2-1/2	977820	99.20	977820-C3	107.10
	5/16	.187	.185	.010	3	5/16	2-1/2	28520	101.10	28520-C3	109.00
	3/8	.218	.216	SHARP!	3	3/8	2-1/2	977824	104.50	977824-C3	113.50
	3/8	.250	.202	.010	3	3/8	2-1/2	28524	106.20	28524-C3	115.20
	1/2	.312	.273	SHARP!	3	1/2	3	977832	143.70	977832-C3	157.10
	1/2	.312	.281	.010	3	1/2	3	28532	146.40	28532-C3	159.80
	5/8	.375	.361	.010	4	5/8	3	28540	167.70	28540-C3	181.10
	3/4	.500	.395	.010	4	3/4	3	28548	177.00	28548-C3	191.50
45°	1/8	.093	.058	.010	2	1/8	1-1/2	928408	76.90	928408-C3	81.50
	3/16	.125	.094	.010	2	3/16	2	928412	79.50	928412-C3	84.50
	1/4	.156	.121	SHARP!	2	1/4	2	874516	97.70	874516-C3	104.50
	1/4	.156	.131	.010	2	1/4	2	928416	99.20	928416-C3	106.00
	3/8	.250	.168	SHARP!	3	3/8	2-1/2	874524	113.00	874524-C3	122.00
	3/8	.250	.178	.010	3	3/8	2-1/2	928424	114.50	928424-C3	123.50
	1/2	.312	.242	SHARP!	3	1/2	3	874532	154.90	874532-C3	168.30
	1/2	.312	.251	.010	3	1/2	3	928432	157.40	928432-C3	170.80
48°	1/16	.035	.036	.005	2	1/8	1-1/2	896504	71.80	896504-C3	76.40
	5/64	.045	.043	.005	2	1/8	1-1/2	896505	71.80	896505-C3	76.40
	3/32	.050	.059	.010	2	1/8	1-1/2	16606	68.30	16606-C3	72.90
	1/8	.070	.063	SHARP!	2	1/8	1-1/2	973108	66.80	973108-C3	71.40
	1/8	.093	.053	.010	2	1/8	1-1/2	16608	68.30	16608-C3	72.90
	3/16	.109	.090	SHARP!	2	3/16	2	973112	70.20	973112-C3	75.20
	3/16	.125	.087	.010	2	3/16	2	16612	71.60	16612-C3	76.60
	1/4	.156	.111	SHARP!	2	1/4	2	973116	88.30	973116-C3	95.10
	1/4	.156	.122	.010	2	1/4	2	16616	90.00	16616-C3	96.80
	5/16	.187	.157	.010	3	5/16	2-1/2	16620	98.80	16620-C3	106.70

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
48°	3/8	.250	.152	SHARP!	3	3/8	2-1/2	973124	102.00	973124-C3	111.00
	3/8	.250	.163	.010	3	3/8	2-1/2	16624	103.80	16624-C3	112.80
	1/2	.312	.222	SHARP!	3	1/2	3	973132	140.60	973132-C3	154.00
	1/2	.312	.233	.010	3	1/2	3	16632	143.00	16632-C3	156.40
50°	1/8	.093	.050	.010	2	1/8	1-1/2	926208	69.90	926208-C3	74.50
	3/16	.125	.082	.010	2	3/16	2	926212	73.40	926212-C3	78.40
	1/4	.156	.116	.010	2	1/4	2	926216	95.10	926216-C3	101.90
	3/8	.250	.153	.010	3	3/8	2-1/2	926224	108.80	926224-C3	117.80
	1/2	.312	.220	.010	3	1/2	3	926232	151.10	926232-C3	164.50
60°	1/32	.014	.015	SHARP!	2	1/8	1-1/2	995202	68.90	995202-C3	73.50
	1/16	.028	.030	SHARP!	2	1/8	1-1/2	995204	70.40	995204-C3	75.00
	1/16	.032	.028	.003	2	1/8	1-1/2	811404	71.80	811404-C3	76.40
	1/16	.032	.032	.005	2	1/8	1-1/2	65104	71.80	65104-C3	76.40
	5/64	.035	.038	SHARP!	2	1/8	1-1/2	995205	70.40	995205-C3	75.00
	5/64	.040	.039	.005	2	1/8	1-1/2	65105	71.80	65105-C3	76.40
	3/32	.040	.047	SHARP!	2	1/8	1-1/2	995206	66.80	995206-C3	71.40
	3/32	.045	.056	.010	2	1/8	1-1/2	16706	68.30	16706-C3	72.90
	1/8	.056	.060	SHARP!	2	1/8	1-1/2	995208	66.80	995208-C3	71.40
	1/8	.062	.056	.003	2	1/8	1-1/2	811408	68.30	811408-C3	72.90
	1/8	.062	.061	.005	2	1/8	1-1/2	65108	68.30	65108-C3	71.90
	1/8	.062	.068	.010	2	1/8	1-1/2	16708	68.30	16708-C3	72.90
	5/32	.070	.075	SHARP!	2	3/16	2	995210	70.20	995210-C3	75.20
	5/32	.078	.081	.010	2	3/16	2	16710	71.60	16710-C3	76.60
	3/16	.085	.089	SHARP!	2	3/16	2	995212	70.20	995212-C3	75.20
	3/16	.093	.083	.003	2	3/16	2	811412	71.60	811412-C3	76.60
	3/16	.093	.087	.005	2	3/16	2	65112	71.60	65112-C3	76.60
	3/16	.093	.095	.010	2	3/16	2	16712	71.60	16712-C3	76.60
	3/16	.109	.104	.030	2	3/16	2	845112	71.60	845112-C3	76.60
	1/4	.118	.114	SHARP!	2	1/4	2	995216	86.80	995216-C3	93.60
	1/4	.125	.109	.003	2	1/4	2	811416	88.30	811416-C3	95.10
	1/4	.125	.113	.005	2	1/4	2	65116	88.30	65116-C3	94.00
	1/4	.125	.120	.010	2	1/4	2	16716	88.30	16716-C3	95.10
	1/4	.140	.131	.030	2	1/4	2	845116	88.30	845116-C3	95.10
	5/16	.141	.150	SHARP!	3	5/16	2-1/2	995220	95.10	995220-C3	103.00
	5/16	.156	.138	.005	3	5/16	2-1/2	65120	96.80	65120-C3	104.70
	5/16	.156	.147	.010	3	5/16	2-1/2	16720	96.80	16720-C3	104.70
	3/8	.156	.195	SHARP!	3	3/8	2-1/2	995224	99.30	995224-C3	108.30
	3/8	.187	.166	.005	3	3/8	2-1/2	65124	101.40	65124-C3	109.00
	3/8	.187	.174	.010	3	3/8	2-1/2	16724	101.40	16724-C3	110.40
	7/16	.187	.222	SHARP!	3	7/16	2-3/4	995228	107.30	995228-C3	118.50
	7/16	.218	.200	.010	3	7/16	2-3/4	16728	109.90	16728-C3	121.10
	1/2	.218	.248	SHARP!	3	1/2	3	995232	138.00	995232-C3	151.40
	1/2	.250	.219	.005	3	1/2	3	65132	140.60	65132-C3	152.00
	1/2	.250	.226	.010	3	1/2	3	16732	140.60	16732-C3	154.00
	1/2	.250	.255	.030	3	1/2	3	845132	138.50	845132-C3	149.90

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

DOVETAIL CUTTERS

(cont.)

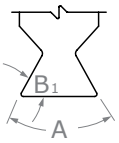
continued from previous page

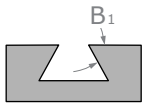
INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	5/8	.281	.301	SHARP!	4	5/8	3	995240	206.20	995240-C3	219.60
	5/8	.312	.279	.010	4	5/8	3	16740	208.80	16740-C3	222.20
	3/4	.343	.354	SHARP!	4	3/4	3	995248	247.80	995248-C3	262.30
	3/4	.375	.332	.010	4	3/4	3	16748	250.30	16748-C3	264.80
	1	.500	.437	.010	4	1	4	16764	443.90	16764-C3	466.00
70°	1/4	.109	.116	.010	2	1/4	2	832316	95.10	832316-C3	101.90
	1/2	.218	.213	.010	3	1/2	3	832332	151.10	832332-C3	164.50
80°	1/4	.093	.117	.010	2	1/4	2	827916	95.10	827916-C3	101.90
	1/2	.187	.209	.010	3	1/2	3	827932	151.10	827932-C3	164.50
90°	1/32	.008	.015	SHARP!	2	1/8	1-1/2	992002	70.40	992002-C3	75.00
	1/16	.023	.030	.005	2	1/8	1-1/2	66304	71.80	66304-C3	76.40
	5/64	.027	.038	.005	2	1/8	1-1/2	66305	71.80	66305-C3	76.40
	3/32	.025	.043	SHARP!	2	1/8	1-1/2	992006	66.80	992006-C3	71.40
	3/32	.031	.059	.010	2	1/8	1-1/2	16806	68.30	16806-C3	72.90
	1/8	.034	.057	SHARP!	2	1/8	1-1/2	992008	65.80	992008-C3	70.40
	1/8	.040	.059	.005	2	1/8	1-1/2	66308	67.20	66308-C3	70.90
	1/8	.040	.073	.010	2	1/8	1-1/2	16808	67.20	16808-C3	71.80
	5/32	.047	.090	.010	2	3/16	2	16810	71.60	16810-C3	76.60
	3/16	.052	.084	SHARP!	2	3/16	2	992012	70.20	992012-C3	75.20
	3/16	.047	.122	.010	2	3/16	2	16812	71.60	16812-C3	76.60
	1/4	.068	.114	SHARP!	2	1/4	2	992016	86.80	992016-C3	93.60
	1/4	.062	.140	.005	2	1/4	2	66316	88.30	66316-C3	94.00
	1/4	.063	.154	.010	2	1/4	2	16816	88.30	16816-C3	95.10
	5/16	.085	.143	SHARP!	3	5/16	2-1/2	992020	95.10	992020-C3	103.00
	5/16	.093	.155	.010	3	5/16	2-1/2	16820	96.80	16820-C3	104.70
	3/8	.105	.165	SHARP!	3	3/8	2-1/2	992024	99.30	992024-C3	108.30
	3/8	.109	.171	.005	3	3/8	2-1/2	66324	101.40	66324-C3	109.00
	3/8	.125	.153	.010	3	3/8	2-1/2	16824	101.40	16824-C3	110.40
	7/16	.141	.185	.010	3	7/16	2-3/4	16828	109.90	16828-C3	121.10
	1/2	.141	.218	SHARP!	3	1/2	3	992032	138.00	992032-C3	151.40
	1/2	.156	.202	.005	3	1/2	3	66332	140.60	66332-C3	152.00
	1/2	.156	.216	.010	3	1/2	3	16832	140.60	16832-C3	154.00
	1/2	.172	.241	.030	3	1/2	3	833932	140.60	833932-C3	152.00
	5/8	.187	.279	.010	4	5/8	3	16840	208.80	16840-C3	222.20
	3/4	.218	.342	.010	4	3/4	3	16848	250.30	16848-C3	264.80
100°	1/8	.040	.065	.010	2	1/8	1-1/2	964408	71.90	964408-C3	76.50
	3/16	.047	.110	.010	2	3/16	2	964412	75.50	964412-C3	80.50
	1/4	.062	.137	.010	2	1/4	2	964416	95.10	964416-C3	101.90
	3/8	.093	.188	.010	3	3/8	2-1/2	964424	108.60	964424-C3	117.60
	1/2	.125	.237	.010	3	1/2	3	964432	150.90	964432-C3	164.30
120°	1/8	.039	.045	.010	2	1/8	1-1/2	959908	71.90	959908-C3	76.50
	3/16	.047	.079	.010	2	3/16	2	959912	75.50	959912-C3	80.50
	1/4	.062	.090	.010	2	1/4	2	959916	95.10	959916-C3	101.90
	3/8	.093	.107	.010	3	3/8	2-1/2	959924	108.60	959924-C3	117.60
	1/2	.109	.177	.010	3	1/2	3	959932	150.90	959932-C3	164.30

*Diameter measured over radii (not to theoretical sharp corner).

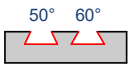
DOVETAIL CUTTERS

Sight Groove Dovetail Cutters





Off the Shoulder Angle
$B_1 = 90 - (A / 2)$
$A = 180 - 2B_1$



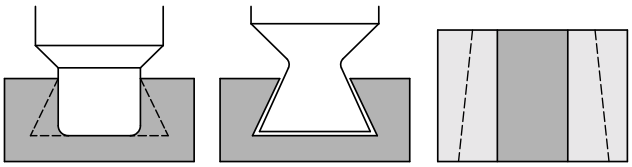
Stocked in *Two* Included Angles!

- Designed for milling dovetail grooves for Sight Attachments
- Diameters match common brand standards
- Offered with sharp corner
- Solid carbide
- CNC ground in the USA

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.020"}_{-.000"}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
50°	.330	.093	.242	3	3/8	2-1/2	806833	106.70	806833-C3	115.70
	.344	.125	.226	3	3/8	2-1/2	806834	106.70	806834-C3	115.70
	.495	.250	.261	3	1/2	3	806849	149.00	806849-C3	162.40
60°	.300	.093	.191	3	5/16	2-1/2	806730	95.10	806730-C3	103.00
	.359	.125	.213	3	3/8	2-1/2	806735	99.30	806735-C3	108.30

RECOMMENDED SIGHT GROOVE DOVETAIL MILLING TECHNIQUES

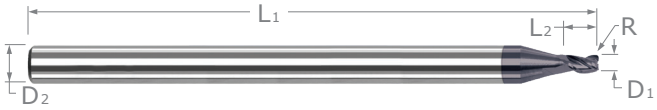
- Use an endmill that is smaller than the top of the groove width to slot.
- With required dovetail, mill groove down the centerline of slot to shape the rest of the dovetail groove
- Since most sights are press fitted, filing or additional adjustments may be required to ensure proper sight fit.
  - Angle the dovetail cutter slightly to create a slightly larger width on one side of the groove.
  - Dovetail should finish on same location on other side of the groove to create a trapezoidal shaped slot.
  - The sight itself can be adjusted by using an appropriate file to shape male dovetail until desired fitting.



Mill Slot | Mill on Center | Angle Dovetail to Widen One Side

DOVETAIL CUTTERS

O-Ring Slotting End Mills



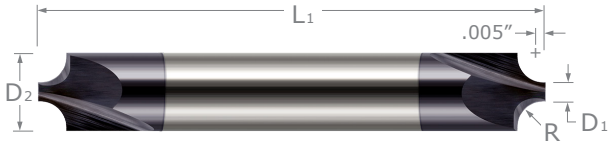
Ideal for Slotting O-Ring Dovetail Grooves!

- Optimized for O-Ring grooves
- Diameters designed to gland width opening
- Stub flute length for improved strength
- Corner radius to match Parker Hannifin standards
- High helix and optimized geometry for improved performance
- 3 Flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.055	.015	.065	1/8	1-1/2	56510	25.00	56510-C3	29.60	56510-C8	33.80
.085	.015	.100	1/8	1-1/2	56520	25.00	56520-C3	29.60	56520-C8	33.80
.115	.031	.140	1/8	1-1/2	56530	25.00	56530-C3	29.60	56530-C8	33.80
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.176	.031	.210	3/16	2	56540	27.90	56540-C3	32.90	56540-C8	36.80
.236	.062	.280	1/4	2-1/2	56550	36.80	56550-C3	43.60	56550-C8	50.30
.323	.093	.380	3/8	2-1/2	56560	52.40	56560-C3	61.40	56560-C8	74.30

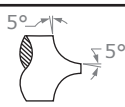
DOVETAIL CUTTERS

O-Ring Corner Rounding End Mills



For Creating Radius on Top Part of O-Ring Dovetail Groove

- Radius matches Parker Hannifin standards
- Double-ended
- Flares are tangent to radius
- Design ensures smooth, blended form on part
- Depth of cut = radius plus .005"
- 2 flutes
- Solid carbide
- CNC ground in the USA



5° Flares At Shoulder and Pilot to Avoid Steps in Workpiece

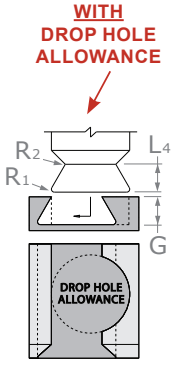
O-RING X-SECTION	RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	R $^{+.0005''}_{-.0005''}$	D_1	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.070	.005	.046	1/8	1-1/2	17005	40.00	17005-C3	45.70
.103	.010	.046	1/8	1-1/2	17010	40.00	17010-C3	45.70
.139	.010	.046	1/8	1-1/2	17010	40.00	17010-C3	45.70
.210	.015	.046	1/8	1-1/2	17015	40.00	17015-C3	45.70
.275	.015	.046	1/8	1-1/2	17015	40.00	17015-C3	45.70
.375	.020	.046	1/8	1-1/2	17020	40.00	17020-C3	45.70

DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

Designed to Parker Hannifin O-Ring Standards

With Drop Hole Allowance



- **Designed for milling full dovetail grooves with drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (ORD 5700/USA, ORD 5700)
- Undersized cutter design allows climb milling on both faces of groove for improved finish
- Mills both top and bottom radii
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

O-RING X-SECTION	CUTTER DIA.*	GLAND DEPTH	CORNER RADIUS	NECK DIA.*	NECK RADIUS	RADIUS CENTER	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.000''}_{-.002''}$	G	R_1 $^{+.001''}_{-.001''}$		R_2 $^{+.001''}_{-.001''}$	L_4 $^{+.001''}_{-.001''}$	D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.070	.079	.051	.015	.054	.005	.047	1/8	1-1/2	23807†	70.00	23807-C3†	74.60	23807-C8†	76.80
.070	.084	.054	.015	.056	.005	.050	1/8	1-1/2	56307Δ	70.00	56307-C3Δ	74.60	56307-C8Δ	76.80
.103	.135	.082	.015	.088	.010	.073	3/16	2	23814	72.90	23814-C3	77.90	23814-C8	79.70
.139	.172	.112	.031	.116	.010	.103	3/16	2	23821	72.90	23821-C3	77.90	23821-C8	79.70
.210	.284	.172	.031	.179	.015	.158	5/16	2-1/2	23828	96.40	23828-C3	104.30	23828-C8	111.90
.275	.362	.232	.062	.237	.015	.219	3/8	2-1/2	23835	111.70	23835-C3	120.70	23835-C8	130.50
.375	.488	.317	.093	.327	.020	.299	1/2	3	23842	143.00	23842-C3	156.40	23842-C8	165.10

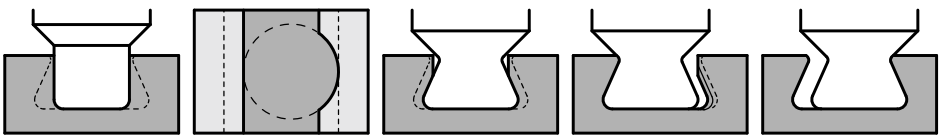
*Diameter measured over radii (not to theoretical sharp corner). †Meets ORD 5700/USA spec. ΔMeets ORD 5700 spec. All other tools meet BOTH specifications.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

With Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Mill off-center drop hole.
- Insert O-Ring Cutter through drop hole at full axial depth and mill single pass down center of groove. Please note that cutter is contacting both sides of part and it may be necessary to reduce the feed rate (up to 40%).
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.

For radial calculations, search for keyword ORINGGUIDE on www.harveytool.com



O-Ring Slotting End Mills

◀ *See page 363*

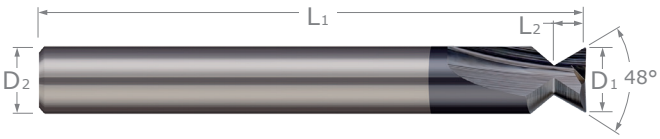
- ***Ideal for slotting o-ring dovetail grooves!***
- ***Achieve the right slot width and shape without radial stepovers!***

Designed to Parker Hannifin O-Ring Standards

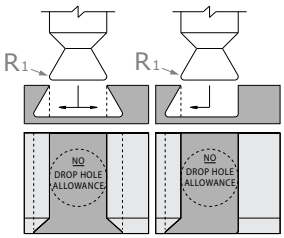
DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

Without Drop Hole Allowance



WITHOUT DROP HOLE ALLOWANCE



- **Designed for milling half dovetails or full dovetails with no drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (tools meet both specs: ORD 5700/USA, ORD 5700)
- Mills bottom radius only
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

O-RING X-SECTION	CUTTER DIA.*	LOC	CORNER RADIUS	NECK DIA.**	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″	R_1 +.001″ −.001″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.070	.055	.054	.015	.023	1/8	1-1/2	23907	68.40	23907-C3	73.00	23907-C8	75.20
.103	.083	.085	.015	.024	1/8	1-1/2	23914	68.40	23914-C3	73.00	23914-C8	75.20
.139	.113	.115	.031	.044	1/8	1-1/2	23921	68.40	23921-C3	73.00	23921-C8	75.20
.210	.171	.176	.031	.048	3/16	2	23928	71.30	23928-C3	76.30	23928-C8	78.60
.275	.231	.238	.062	.086	1/4	2	23935	93.40	23935-C3	100.20	23935-C8	100.70
.375	.315	.323	.093	.128	3/8	2-1/2	23942	109.10	23942-C3	118.10	23942-C8	127.90

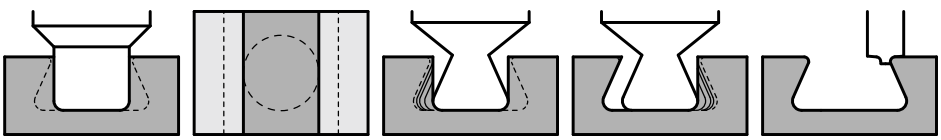
*Diameter measured over radii (not to theoretical sharp corner). **Diameter at length of cut.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

Without Drop Hole Allowance

- Tools are very fragile. Reduced neck profile and small o-ring groove size result in weakened tool for this difficult application. Always reconsider the potential to use the WITH drop hole allowance.
- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Cutter into slot at full axial depth.
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.
- These tools are able to mill both Full and Half O-Ring grooves. As such, a corner radius at the top of the part must be machined for final groove form (see series 170xx).

For radial calculations, search for keyword ORINGGUIDE on www.harveytool.com



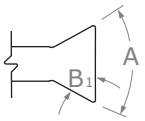
O-Ring Corner Rounding End Mills

◀ *See page 363*

- ***Ideal for creating radius on top part of o-ring dovetail groove!***
- ***Design ensures smooth, blended form on part!***

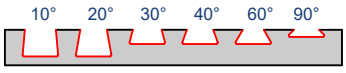
DOVETAIL CUTTERS

Long Reach



$B_1 = 90 - (A / 2)$
$A = 180 - 2B_1$

- Reduced neck for long reach machining
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

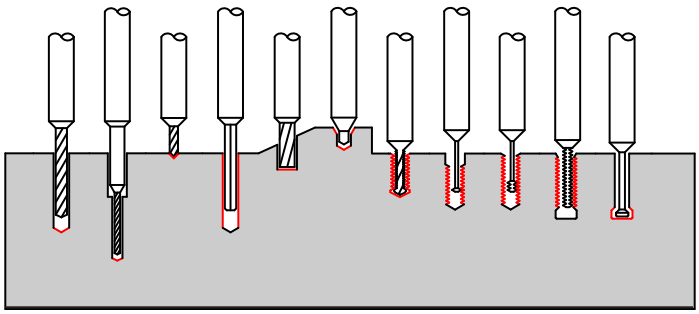


Stocked in *Six* Included Angles!

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	NECK LENGTH	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.187	.094	.125	.010	2	1/8	1-1/2	899108	96.20	899108-C3	100.80
	1/4	.312	.197	.250	.010	2	1/4	2	899116	122.40	899116-C3	129.20
	1/2	.625	.392	.250	.010	3	1/2	3	899132	185.80	899132-C3	199.20
20°	1/8	.125	.085	.125	.010	2	1/8	1-1/2	877408	84.20	877408-C3	88.80
	1/4	.250	.166	.250	.010	2	1/4	2	877416	106.70	877416-C3	113.50
	1/2	.500	.328	.250	.010	3	1/2	3	877432	162.00	877432-C3	175.40
30°	1/16	.045	.041	.062	.005	2	1/8	1-1/2	849904	87.20	849904-C3	91.80
	3/32	.078	.057	.093	.010	2	1/8	1-1/2	914806	84.20	914806-C3	88.80
	1/8	.093	.081	.125	.010	2	1/8	1-1/2	914808	84.20	914808-C3	88.80
	3/16	.125	.127	.187	.010	2	3/16	2	914812	87.40	914812-C3	92.40
	1/4	.156	.172	.250	.010	2	1/4	2	914816	104.90	914816-C3	111.70
	3/8	.250	.247	.250	.010	3	3/8	2-1/2	914824	156.90	914824-C3	165.90
	1/2	.312	.339	.250	.010	3	1/2	3	914832	159.50	914832-C3	172.90
40°	1/8	.093	.066	.125	.010	2	1/8	1-1/2	864008	87.20	864008-C3	91.80
	1/4	.156	.145	.250	.010	2	1/4	2	864016	104.90	864016-C3	111.70
	1/2	.312	.281	.250	.010	3	1/2	3	864032	159.50	864032-C3	172.90
60°	1/16	.032	.032	.062	.005	2	1/8	1-1/2	865504	84.60	865504-C3	89.20
	3/32	.045	.056	.093	.010	2	1/8	1-1/2	925306	81.70	925306-C3	86.30
	1/8	.056	.060	.125	***SHARP!***	2	1/8	1-1/2	865908	80.20	865908-C3	84.80
	1/8	.062	.068	.125	.010	2	1/8	1-1/2	925308	81.70	925308-C3	86.30
	3/16	.093	.095	.187	.010	2	3/16	2	925312	85.20	925312-C3	90.20
	1/4	.118	.114	.250	***SHARP!***	2	1/4	2	865916	101.10	865916-C3	107.90
	1/4	.125	.120	.250	.010	2	1/4	2	925316	102.70	925316-C3	109.50
	3/8	.187	.174	.250	.010	3	3/8	2-1/2	925324	114.50	925324-C3	123.50
	1/2	.218	.248	.250	***SHARP!***	3	1/2	3	865932	153.20	865932-C3	166.60
	1/2	.250	.226	.250	.010	3	1/2	3	925332	155.70	925332-C3	169.10
90°	1/16	.023	.030	.062	.005	2	1/8	1-1/2	885704	84.60	885704-C3	89.20
	3/32	.031	.059	.093	.010	2	1/8	1-1/2	931006	81.70	931006-C3	86.30
	1/8	.034	.057	.125	***SHARP!***	2	1/8	1-1/2	884608	80.20	884608-C3	84.80
	1/8	.040	.073	.125	.010	2	1/8	1-1/2	931008	80.40	931008-C3	85.00
	3/16	.047	.122	.187	.010	2	3/16	2	931012	85.20	931012-C3	90.20
	1/4	.068	.114	.250	***SHARP!***	2	1/4	2	884616	101.10	884616-C3	107.90
	1/4	.062	.154	.250	.010	2	1/4	2	931016	102.70	931016-C3	109.50
	3/8	.125	.153	.250	.010	3	3/8	2-1/2	931024	114.50	931024-C3	123.50
	1/2	.141	.218	.250	***SHARP!***	3	1/2	3	884632	153.20	884632-C3	166.60
	1/2	.156	.216	.250	.010	3	1/2	3	931032	155.70	931032-C3	169.10

*Diameter measured over radii (not to theoretical sharp corner).

HOLEMAKING & THREADING



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- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Select carbide grade for improved tool life
- CNC ground in the USA

Double Margin Design for Exceptional Hole Accuracy

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0100	#87	.254 mm	.047	**1.20 mm**	(3x)	3 mm	50 mm	CSG0100-C6	39.70
.0110	#85	.279 mm	.053	**1.35 mm**	(3x)	3 mm	50 mm	CSG0110-C6	39.70
.0120	#83	.304 mm	.057	**1.45 mm**	(3x)	3 mm	50 mm	CSG0120-C6	39.70
.0130	#81	.330 mm	.061	**1.55 mm**	(3x)	3 mm	50 mm	CSG0130-C6	39.70
.0144	#79	.368 mm	.069	**1.75 mm**	(3x)	3 mm	50 mm	CSG0144-C6	39.70
.0150		.381 mm	.071	**1.80 mm**	(3x)	3 mm	50 mm	CSG0150-C6	39.70
.0150		.381 mm	.102	**2.60 mm**	(5x)	3 mm	50 mm	BGN0150-C6	41.00
.0150		.381 mm	.146	**3.70 mm**	(8x)	3 mm	50 mm	ARY0150-C6	41.60
.0156 (1/64)		.396 mm	.075	**1.90 mm**	(3x)	3 mm	50 mm	CSG0156-C6	39.70
.0156 (1/64)		.396 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BGN0156-C6	41.00
.0156 (1/64)		.396 mm	.154	**3.90 mm**	(8x)	3 mm	50 mm	ARY0156-C6	41.60
.0156 (1/64)		.396 mm	.185	**4.70 mm**	(10x)	3 mm	50 mm	DXT0156-C6	42.80
.0156 (1/64)		.396 mm	.213	**5.40 mm**	(12x)	3 mm	50 mm	EFG0156-C6	44.10
.0160	#78	.406 mm	.079	**2.00 mm**	(3x)	3 mm	50 mm	CSG0160-C6	39.70
.0160	#78	.406 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BGN0160-C6	41.00
.0160	#78	.406 mm	.157	**4.00 mm**	(8x)	3 mm	50 mm	ARY0160-C6	41.60
.0160	#78	.406 mm	.220	**5.60 mm**	(12x)	3 mm	50 mm	EFG0160-C6	44.10
.0170		.431 mm	.083	**2.10 mm**	(3x)	3 mm	50 mm	CSG0170-C6	39.70
.0170		.431 mm	.165	**4.20 mm**	(8x)	3 mm	50 mm	ARY0170-C6	41.60
.0180	#77	.457 mm	.087	**2.20 mm**	(3x)	3 mm	50 mm	CSG0180-C6	39.70
.0180	#77	.457 mm	.122	**3.10 mm**	(5x)	3 mm	50 mm	BGN0180-C6	41.00
.0180	#77	.457 mm	.177	**4.50 mm**	(8x)	3 mm	50 mm	ARY0180-C6	41.60
.0180	#77	.457 mm	.244	**6.20 mm**	(12x)	3 mm	50 mm	EFG0180-C6	44.10
.0190		.482 mm	.091	**2.30 mm**	(3x)	3 mm	50 mm	CSG0190-C6	38.40
.0190		.482 mm	.185	**4.70 mm**	(8x)	3 mm	50 mm	ARY0190-C6	40.20
.0196		.500 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	CSG0196-C6	38.40
.0196		.500 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BGN0196-C6	39.20
.0196		.500 mm	.193	**4.90 mm**	(8x)	3 mm	50 mm	ARY0196-C6	40.20
.0196		.500 mm	.228	**5.80 mm**	(10x)	3 mm	50 mm	DXT0196-C6	41.50
.0196		.500 mm	.268	**6.80 mm**	(12x)	3 mm	50 mm	EFG0196-C6	42.80
.0200	#76	.508 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	CSG0200-C6	38.40
.0200	#76	.508 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BGN0200-C6	39.20
.0200	#76	.508 mm	.197	**5.00 mm**	(8x)	3 mm	50 mm	ARY0200-C6	40.20
.0200	#76	.508 mm	.276	**7.00 mm**	(12x)	3 mm	50 mm	EFG0200-C6	42.80

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0210	#75	.533 mm	.098	**2.50 mm**	(3x)	3 mm	50 mm	CSG0210-C6	38.40
.0210	#75	.533 mm	.142	**3.60 mm**	(5x)	3 mm	50 mm	BGN0210-C6	39.20
.0210	#75	.533 mm	.205	**5.20 mm**	(8x)	3 mm	50 mm	ARY0210-C6	40.20
.0210	#75	.533 mm	.291	**7.40 mm**	(12x)	3 mm	50 mm	EFG0210-C6	42.80
.0220		.558 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	CSG0220-C6	38.40
.0220		.558 mm	.213	**5.40 mm**	(8x)	3 mm	50 mm	ARY0220-C6	40.20
.0225	#74	.571 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	CSG0225-C6	38.40
.0225	#74	.571 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BGN0225-C6	39.20
.0225	#74	.571 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	ARY0225-C6	40.20
.0225	#74	.571 mm	.307	**7.80 mm**	(12x)	3 mm	50 mm	EFG0225-C6	42.80
.0230		.584 mm	.110	**2.80 mm**	(3x)	3 mm	50 mm	CSG0230-C6	38.40
.0230		.584 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	ARY0230-C6	40.20
.0236		.600 mm	.114	**2.90 mm**	(3x)	3 mm	50 mm	CSG0236-C6	38.40
.0236		.600 mm	.228	**5.80 mm**	(8x)	3 mm	50 mm	ARY0236-C6	40.20
.0240	#73	.609 mm	.114	**2.90 mm**	(3x)	3 mm	50 mm	CSG0240-C6	38.40
.0240	#73	.609 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BGN0240-C6	39.20
.0240	#73	.609 mm	.236	**6.00 mm**	(8x)	3 mm	50 mm	ARY0240-C6	40.20
.0240	#73	.609 mm	.331	**8.40 mm**	(12x)	3 mm	50 mm	EFG0240-C6	42.80
.0250	#72	.635 mm	.118	**3.00 mm**	(3x)	3 mm	50 mm	CSG0250-C6	38.40
.0250	#72	.635 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BGN0250-C6	39.20
.0250	#72	.635 mm	.244	**6.20 mm**	(8x)	3 mm	50 mm	ARY0250-C6	40.20
.0250	#72	.635 mm	.346	**8.80 mm**	(12x)	3 mm	50 mm	EFG0250-C6	42.80
.0260	#71	.660 mm	.122	**3.10 mm**	(3x)	3 mm	50 mm	CSG0260-C6	38.40
.0260	#71	.660 mm	.173	**4.40 mm**	(5x)	3 mm	50 mm	BGN0260-C6	39.20
.0260	#71	.660 mm	.252	**6.40 mm**	(8x)	3 mm	50 mm	ARY0260-C6	40.20
.0260	#71	.660 mm	.354	**9.00 mm**	(12x)	3 mm	50 mm	EFG0260-C6	42.80
.0270		.685 mm	.130	**3.30 mm**	(3x)	3 mm	50 mm	CSG0270-C6	38.40
.0270		.685 mm	.260	**6.60 mm**	(8x)	3 mm	50 mm	ARY0270-C6	40.20
.0275		.700 mm	.130	**3.30 mm**	(3x)	3 mm	50 mm	CSG0275-C6	38.40
.0275		.700 mm	.268	**6.80 mm**	(8x)	3 mm	50 mm	ARY0275-C6	40.20
.0280	#70	.711 mm	.134	**3.40 mm**	(3x)	3 mm	50 mm	CSG0280-C6	38.40
.0280	#70	.711 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BGN0280-C6	39.20
.0280	#70	.711 mm	.276	**7.00 mm**	(8x)	3 mm	50 mm	ARY0280-C6	40.20
.0280	#70	.711 mm	.386	**9.80 mm**	(12x)	3 mm	50 mm	EFG0280-C6	42.80
.0292	#69	.741 mm	.138	**3.50 mm**	(3x)	3 mm	50 mm	CSG0292-C6	38.40
.0292	#69	.741 mm	.197	**5.00 mm**	(5x)	3 mm	50 mm	BGN0292-C6	39.20
.0292	#69	.741 mm	.283	**7.20 mm**	(8x)	3 mm	50 mm	ARY0292-C6	40.20
.0292	#69	.741 mm	.394	**10.00 mm**	(12x)	3 mm	50 mm	EFG0292-C6	42.80
.0300		.762 mm	.142	**3.60 mm**	(3x)	3 mm	50mm	CSG0300-C6	38.90
.0300		.762 mm	.205	**5.20 mm**	(5x)	3 mm	50 mm	BGN0300-C6	39.90
.0300		.762 mm	.291	**7.40 mm**	(8x)	3 mm	50 mm	ARY0300-C6	40.20
.0310	#68	.787 mm	.146	**3.70 mm**	(3x)	3 mm	50 mm	CSG0310-C6	38.90
.0310	#68	.787 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BGN0310-C6	39.90
.0310	#68	.787 mm	.299	**7.60 mm**	(8x)	3 mm	50 mm	ARY0310-C6	40.20
.0310	#68	.787 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	EFG0310-C6	43.60

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.150	**3.80 mm**	(3x)	3 mm	50 mm	CSG0312-C6	38.90
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BGN0312-C6	39.90
.0312 (1/32)		.793 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	ARY0312-C6	41.00
.0312 (1/32)		.793 mm	.370	**9.40 mm**	(10x)	3 mm	50 mm	DXT0312-C6	42.30
.0312 (1/32)		.793 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	EFG0312-C6	43.60
.0315		.800 mm	.150	**3.80 mm**	(3x)	3 mm	50 mm	CSG0315-C6	38.90
.0315		.800 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	ARY0315-C6	41.00
.0320	#67	.812 mm	.154	**3.90 mm**	(3x)	3 mm	50 mm	CSG0320-C6	38.90
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BGN0320-C6	39.90
.0320	#67	.812 mm	.315	**8.00 mm**	(8x)	3 mm	50 mm	ARY0320-C6	41.00
.0320	#67	.812 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	EFG0320-C6	43.60
.0330	#66	.838 mm	.157	**4.00 mm**	(3x)	3 mm	50 mm	CSG0330-C6	38.90
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BGN0330-C6	39.90
.0330	#66	.838 mm	.323	**8.20 mm**	(8x)	3 mm	50 mm	ARY0330-C6	41.00
.0330	#66	.838 mm	.453	**11.50 mm**	(12x)	3 mm	50 mm	EFG0330-C6	43.60
.0350	#65	.889 mm	.165	**4.20 mm**	(3x)	3 mm	50 mm	CSG0350-C6	38.90
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BGN0350-C6	39.90
.0350	#65	.889 mm	.339	**8.60 mm**	(8x)	3 mm	50 mm	ARY0350-C6	41.00
.0350	#65	.889 mm	.472	**12.00 mm**	(12x)	3 mm	50 mm	EFG0350-C6	43.60
.0354		.900 mm	.165	**4.20 mm**	(3x)	3 mm	50 mm	CSG0354-C6	38.90
.0354		.900 mm	.346	**8.80 mm**	(8x)	3 mm	50 mm	ARY0354-C6	41.00
.0360	#64	.914 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	CSG0360-C6	38.90
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BGN0360-C6	39.90
.0360	#64	.914 mm	.354	**9.00 mm**	(8x)	3 mm	50 mm	ARY0360-C6	41.00
.0360	#64	.914 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	EFG0360-C6	43.60
.0370	#63	.939 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	CSG0370-C6	38.90
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BGN0370-C6	39.90
.0370	#63	.939 mm	.362	**9.20 mm**	(8x)	3 mm	50 mm	ARY0370-C6	41.00
.0370	#63	.939 mm	.512	**13.00 mm**	(12x)	3 mm	50 mm	EFG0370-C6	43.60
.0380	#62	.965 mm	.181	**4.60 mm**	(3x)	3 mm	50 mm	CSG0380-C6	38.90
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BGN0380-C6	39.90
.0380	#62	.965 mm	.370	**9.40 mm**	(8x)	3 mm	50 mm	ARY0380-C6	41.00
.0380	#62	.965 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	EFG0380-C6	43.60
.0390	#61	.990 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	CSG0390-C6	38.90
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BGN0390-C6	39.90
.0390	#61	.990 mm	.378	**9.60 mm**	(8x)	3 mm	50 mm	ARY0390-C6	41.00
.0390	#61	.990 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	EFG0390-C6	43.60
.0393		1.000 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	CSG0393-C6	42.30
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BGN0393-C6	43.30
.0393		1.000 mm	.386	**9.80 mm**	(8x)	3 mm	50 mm	ARY0393-C6	43.90
.0393		1.000 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	DXT0393-C6	45.50
.0393		1.000 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	EFG0393-C6	46.80
.0400	#60	1.016 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	CSG0400-C6	42.30
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BGN0400-C6	43.30
.0400	#60	1.016 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ARY0400-C6	43.90
.0400	#60	1.016 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	EFG0400-C6	46.80

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0410	#59	1.041 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	CSG0410-C6	42.30
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BGN0410-C6	43.30
.0410	#59	1.041 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ARY0410-C6	43.90
.0410	#59	1.041 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	EFG0410-C6	46.80
.0420	#58	1.066 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	CSG0420-C6	42.30
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BGN0420-C6	43.30
.0420	#58	1.066 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ARY0420-C6	43.90
.0420	#58	1.066 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	EFG0420-C6	46.80
.0430	#57	1.092 mm	.205	**5.20 mm**	(3x)	3 mm	50 mm	CSG0430-C6	42.30
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BGN0430-C6	43.30
.0430	#57	1.092 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ARY0430-C6	43.90
.0430	#57	1.092 mm	.591	**15.00 mm**	(12x)	3 mm	50 mm	EFG0430-C6	46.80
.0450		1.143 mm	.213	**5.40 mm**	(3x)	3 mm	50 mm	CSG0450-C6	42.30
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BGN0450-C6	43.30
.0450		1.143 mm	.433	**11.00 mm**	(8x)	3 mm	50 mm	ARY0450-C6	43.90
.0465	#56	1.181 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	CSG0465-C6	42.30
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BGN0465-C6	43.30
.0465	#56	1.181 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ARY0465-C6	43.90
.0465	#56	1.181 mm	.630	**16.00 mm**	(12x)	3 mm	63 mm	EFG0465-C6	46.80
.0468 (3/64)		1.190 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	CSG0468-C6	42.30
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BGN0468-C6	43.30
.0468 (3/64)		1.190 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ARY0468-C6	43.90
.0468 (3/64)		1.190 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	DXT0468-C6	45.50
.0468 (3/64)		1.190 mm	.650	**16.50 mm**	(12x)	3 mm	63 mm	EFG0468-C6	46.80
.0492		1.250 mm	.236	**6.00 mm**	(3x)	3 mm	50 mm	CSG0492-C6	42.30
.0492		1.250 mm	.472	**12.00 mm**	(8x)	3 mm	50 mm	ARY0492-C6	47.10
.0500		1.270 mm	.236	**6.00 mm**	(3x)	3 mm	50 mm	CSG0500-C6	42.30
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BGN0500-C6	43.30
.0500		1.270 mm	.492	**12.50 mm**	(8x)	3 mm	50 mm	ARY0500-C6	43.90
.0500		1.270 mm	.689	**17.50 mm**	(12x)	3 mm	63 mm	EFG0500-C6	46.80
.0520	#55	1.320 mm	.244	**6.20 mm**	(3x)	3 mm	50 mm	CSG0520-C6	42.30
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BGN0520-C6	43.30
.0520	#55	1.320 mm	.512	**13.00 mm**	(8x)	3 mm	50 mm	ARY0520-C6	43.90
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	EFG0520-C6	46.80
.0550	#54	1.397 mm	.260	**6.60 mm**	(3x)	3 mm	50 mm	CSG0550-C6	42.30
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BGN0550-C6	43.30
.0550	#54	1.397 mm	.531	**13.50 mm**	(8x)	3 mm	50 mm	ARY0550-C6	43.90
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	EFG0550-C6	46.80
.0590		1.500 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	CSG0590-C6	45.60
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BGN0590-C6	46.50
.0590		1.500 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ARY0590-C6	47.10
.0590		1.500 mm	.689	**17.50 mm**	(10x)	3 mm	63 mm	DXT0590-C6	48.40
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	EFG0590-C6	49.80
.0595	#53	1.511 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	CSG0595-C6	45.60
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BGN0595-C6	46.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0595	#53	1.511 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ARY0595-C6	47.10
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	EFG0595-C6	49.80
.0600		1.524 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	CSG0600-C6	45.60
.0600		1.524 mm	.591	**15.00 mm**	(8x)	3 mm	50 mm	ARY0600-C6	47.10
.0625 (1/16)		1.587 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	CSG0625-C6	45.60
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BGN0625-C6	46.50
.0625 (1/16)		1.587 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ARY0625-C6	47.10
.0625 (1/16)		1.587 mm	.728	**18.50 mm**	(10x)	3 mm	63 mm	DXT0625-C6	48.40
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	EFG0625-C6	49.80
.0635	#52	1.612 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	CSG0635-C6	45.60
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BGN0635-C6	46.50
.0635	#52	1.612 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ARY0635-C6	47.10
.0635	#52	1.612 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	EFG0635-C6	49.80
.0670	#51	1.701 mm	.315	**8.00 mm**	(3x)	3 mm	50 mm	CSG0670-C6	45.60
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BGN0670-C6	46.50
.0670	#51	1.701 mm	.650	**16.50 mm**	(8x)	3 mm	63 mm	ARY0670-C6	47.10
.0670	#51	1.701 mm	.906	**23.00 mm**	(12x)	3 mm	63 mm	EFG0670-C6	49.80
.0700	#50	1.778 mm	.335	**8.50 mm**	(3x)	3 mm	50 mm	CSG0700-C6	45.60
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BGN0700-C6	46.50
.0700	#50	1.778 mm	.689	**17.50 mm**	(8x)	3 mm	63 mm	ARY0700-C6	47.10
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	EFG0700-C6	49.80
.0730	#49	1.854 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	CSG0730-C6	45.60
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BGN0730-C6	46.50
.0730	#49	1.854 mm	.709	**18.00 mm**	(8x)	3 mm	63 mm	ARY0730-C6	47.10
.0730	#49	1.854 mm	.984	**25.00 mm**	(12x)	3 mm	63 mm	EFG0730-C6	49.80
.0760	#48	1.930 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	CSG0760-C6	45.60
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BGN0760-C6	46.50
.0760	#48	1.930 mm	.748	**19.00 mm**	(8x)	3 mm	63 mm	ARY0760-C6	47.10
.0760	#48	1.930 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	EFG0760-C6	49.80
.0781 (5/64)		1.984 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	CSG0781-C6	45.60
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BGN0781-C6	46.50
.0781 (5/64)		1.984 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ARY0781-C6	47.10
.0781 (5/64)		1.984 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	DXT0781-C6	48.40
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	EFG0781-C6	49.80
.0785	#47	1.993 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	CSG0785-C6	48.70
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BGN0785-C6	50.10
.0785	#47	1.993 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ARY0785-C6	47.10
.0785	#47	1.993 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	EFG0785-C6	54.00
.0787		2.000 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	CSG0787-C6	48.70
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BGN0787-C6	50.10
.0787		2.000 mm	.768	**19.50 mm**	(8x)	4 mm	63 mm	ARY0787-C6	51.30
.0787		2.000 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	DXT0787-C6	52.60
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	EFG0787-C6	54.00
.0800		2.032 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	CSG0800-C6	48.70
.0800		2.032 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ARY0800-C6	51.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0810	#46	2.057 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	CSG0810-C6	48.70
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BGN0810-C6	50.10
.0810	#46	2.057 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ARY0810-C6	51.30
.0810	#46	2.057 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	EFG0810-C6	54.00
.0820	#45	2.082 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	CSG0820-C6	48.70
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BGN0820-C6	50.10
.0820	#45	2.082 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ARY0820-C6	51.30
.0820	#45	2.082 mm	1.142	**29.00 mm**	(12x)	4 mm	75 mm	EFG0820-C6	54.00
.0860	#44	2.184 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	CSG0860-C6	48.70
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BGN0860-C6	50.10
.0860	#44	2.184 mm	.827	**21.00 mm**	(8x)	4 mm	63 mm	ARY0860-C6	51.30
.0860	#44	2.184 mm	1.181	**30.00 mm**	(12x)	4 mm	75 mm	EFG0860-C6	54.00
.0890	#43	2.260 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	CSG0890-C6	48.70
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BGN0890-C6	50.10
.0890	#43	2.260 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	ARY0890-C6	51.30
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	EFG0890-C6	54.00
.0900		2.286 mm	.433	**11.00 mm**	(3x)	4 mm	50 mm	CSG0900-C6	48.70
.0900		2.286 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	ARY0900-C6	51.30
.0935	#42	2.374 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	CSG0935-C6	48.70
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BGN0935-C6	50.10
.0935	#42	2.374 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ARY0935-C6	51.30
.0935	#42	2.374 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	EFG0935-C6	54.00
.0937 (3/32)		2.381 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	CSG0937-C6	48.70
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BGN0937-C6	50.10
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ARY0937-C6	51.30
.0937 (3/32)		2.381 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	DXT0937-C6	52.60
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	EFG0937-C6	54.00
.0960	#41	2.438 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	CSG0960-C6	48.70
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BGN0960-C6	50.10
.0960	#41	2.438 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ARY0960-C6	51.30
.0960	#41	2.438 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	EFG0960-C6	54.00
.0980	#40	2.489 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG0980-C6	48.70
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BGN0980-C6	50.10
.0980	#40	2.489 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ARY0980-C6	51.30
.0980	#40	2.489 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	EFG0980-C6	54.00
.0984		2.500 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG0984-C6	51.60
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BGN0984-C6	53.20
.0984		2.500 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ARY0984-C6	54.50
.0984		2.500 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	EFG0984-C6	55.80
.0995	#39	2.527 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG0995-C6	51.60
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BGN0995-C6	53.20
.0995	#39	2.527 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ARY0995-C6	54.50
.0995	#39	2.527 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	EFG0995-C6	57.20
.1000		2.540 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG1000-C6	51.60
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BGN1000-C6	53.20
.1000		2.540 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ARY1000-C6	54.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1015	#38	2.578 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG1015-C6	51.60
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BGN1015-C6	53.20
.1015	#38	2.578 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ARY1015-C6	54.50
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	EFG1015-C6	57.20
.1040	#37	2.641 mm	.492	**12.50 mm**	(3x)	4 mm	50 mm	CSG1040-C6	51.60
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BGN1040-C6	53.20
.1040	#37	2.641 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	ARY1040-C6	54.50
.1040	#37	2.641 mm	1.417	**36.00 mm**	(12x)	4 mm	75 mm	EFG1040-C6	57.20
.1065	#36	2.705 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	CSG1065-C6	51.60
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BGN1065-C6	53.20
.1065	#36	2.705 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	ARY1065-C6	54.50
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	EFG1065-C6	57.20
.1093 (7/64)		2.778 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	CSG1093-C6	51.60
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BGN1093-C6	53.20
.1093 (7/64)		2.778 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ARY1093-C6	54.50
.1093 (7/64)		2.778 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	DXT1093-C6	55.80
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	EFG1093-C6	57.20
.1100	#35	2.794 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	CSG1100-C6	51.60
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BGN1100-C6	53.20
.1100	#35	2.794 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ARY1100-C6	54.50
.1100	#35	2.794 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	EFG1100-C6	57.20
.1110	#34	2.819 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	CSG1110-C6	51.60
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BGN1110-C6	53.20
.1110	#34	2.819 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ARY1110-C6	54.50
.1110	#34	2.819 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	EFG1110-C6	57.20
.1130	#33	2.870 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	CSG1130-C6	51.60
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BGN1130-C6	53.20
.1130	#33	2.870 mm	1.102	**28.00 mm**	(8x)	4 mm	63 mm	ARY1130-C6	54.50
.1130	#33	2.870 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	EFG1130-C6	57.20
.1160	#32	2.946 mm	.551	**14.00 mm**	(3x)	4 mm	50 mm	CSG1160-C6	51.60
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BGN1160-C6	53.20
.1160	#32	2.946 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	ARY1160-C6	54.50
.1160	#32	2.946 mm	1.575	**40.00 mm**	(12x)	4 mm	75 mm	EFG1160-C6	57.20
.1181		3.000 mm	.571	**14.50 mm**	(3x)	4 mm	50 mm	CSG1181-C6	52.90
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BGN1181-C6	54.20
.1181		3.000 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	ARY1181-C6	55.60
.1181		3.000 mm	1.378	**35.00 mm**	(10x)	4 mm	75 mm	DXT1181-C6	56.80
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	EFG1181-C6	58.20
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.571	**14.50 mm**	(3x)	6 mm	63 mm	CSG1200-C6	59.30
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BGN1200-C6	50.00
.1200	#31	3.048 mm	1.181	**30.00 mm**	(8x)	6 mm	75 mm	ARY1200-C6	62.40
.1200	#31	3.048 mm	1.654	**42.00 mm**	(12x)	6 mm	100 mm	EFG1200-C6	64.90
.1250 (1/8)		3.175 mm	.591	**15.00 mm**	(3x)	6 mm	63 mm	CSG1250-C6	59.30
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BGN1250-C6	60.50

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1250 (1/8)		3.175 mm	1.220	**31.00 mm**	(8x)	6 mm	75 mm	ARY1250-C6	62.40
.1250 (1/8)		3.175 mm	1.457	**37.00 mm**	(10x)	6 mm	100 mm	DXT1250-C6	63.60
.1250 (1/8)		3.175 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	EFG1250-C6	64.90
.1285	#30	3.263 mm	.630	**16.00 mm**	(3x)	6 mm	63 mm	CSG1285-C6	59.30
.1285	#30	3.263 mm	1.220	**32.00 mm**	(8x)	6 mm	75 mm	ARY1285-C6	62.40
.1360	#29	3.454 mm	.630	**16.00 mm**	(3x)	6 mm	63 mm	CSG1360-C6	59.30
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BGN1360-C6	60.50
.1360	#29	3.454 mm	1.339	**34.00 mm**	(8x)	6 mm	75 mm	ARY1360-C6	62.40
.1360	#29	3.454 mm	1.890	**48.00 mm**	(12x)	6 mm	100 mm	EFG1360-C6	64.90
.1405	#28	3.568 mm	.669	**17.00 mm**	(3x)	6 mm	63 mm	CSG1405-C6	59.30
.1405	#28	3.568 mm	1.378	**35.00 mm**	(8x)	6 mm	75 mm	ARY1405-C6	62.40
.1406 (9/64)		3.571 mm	.669	**17.00 mm**	(3x)	6 mm	63 mm	CSG1406-C6	59.30
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BGN1406-C6	60.50
.1406 (9/64)		3.571 mm	1.378	**35.00 mm**	(8x)	6 mm	75 mm	ARY1406-C6	62.40
.1406 (9/64)		3.571 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	EFG1406-C6	64.90
.1440	#27	3.657 mm	.669	**17.00 mm**	(3x)	6 mm	63 mm	CSG1440-C6	59.30
.1440	#27	3.657 mm	1.417	**36.00 mm**	(8x)	6 mm	100 mm	ARY1440-C6	62.40
.1470	#26	3.733 mm	.709	**18.00 mm**	(3x)	6 mm	63 mm	CSG1470-C6	59.30
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BGN1470-C6	60.50
.1470	#26	3.733 mm	1.417	**36.00 mm**	(8x)	6 mm	100 mm	ARY1470-C6	62.40
.1470	#26	3.733 mm	2.047	**52.00 mm**	(12x)	6 mm	100 mm	EFG1470-C6	64.90
.1495	#25	3.797 mm	.709	**18.00 mm**	(3x)	6 mm	63 mm	CSG1495-C6	59.30
.1495	#25	3.797 mm	1.457	**37.00 mm**	(8x)	6 mm	100 mm	ARY1495-C6	62.40
.1520	#24	3.860 mm	.709	**18.00 mm**	(3x)	6 mm	63 mm	CSG1520-C6	59.30
.1520	#24	3.860 mm	1.496	**38.00 mm**	(8x)	6 mm	100 mm	ARY1520-C6	62.40
.1540	#23	3.911 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1540-C6	59.30
.1540	#23	3.911 mm	1.496	**38.00 mm**	(8x)	6 mm	100 mm	ARY1540-C6	62.40
.1562 (5/32)		3.968 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1562-C6	59.30
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BGN1562-C6	60.50
.1562 (5/32)		3.968 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ARY1562-C6	62.40
.1562 (5/32)		3.968 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	EFG1562-C6	64.90
.1570	#22	3.987 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1570-C6	59.30
.1570	#22	3.987 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ARY1570-C6	62.40
.1574		4.000 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1574-C6	59.30
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BGN1574-C6	60.50
.1574		4.000 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ARY1574-C6	62.40
.1590	#21	4.038 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1590-C6	59.30
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BGN1590-C6	60.50
.1590	#21	4.038 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ARY1590-C6	62.40
.1590	#21	4.038 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	EFG1590-C6	64.90
.1610	#20	4.089 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1610-C6	59.30
.1610	#20	4.089 mm	1.575	**40.00 mm**	(8x)	6 mm	100 mm	ARY1610-C6	62.40
.1660	#19	4.216 mm	.787	**20.00 mm**	(3x)	6 mm	63 mm	CSG1660-C6	59.30
.1660	#19	4.216 mm	1.654	**42.00 mm**	(8x)	6 mm	100 mm	ARY1660-C6	62.40

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1695	#18	4.305 mm	.787	**20.00 mm**	(3x)	6 mm	63 mm	CSG1695-C6	59.30
.1695	#18	4.305 mm	1.654	**42.00 mm**	(8x)	6 mm	100 mm	ARY1695-C6	62.40
.1718 (11/64)		4.365 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	CSG1718-C6	59.30
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BGN1718-C6	60.50
.1718 (11/64)		4.365 mm	1.654	**42.00 mm**	(8x)	6 mm	100 mm	ARY1718-C6	62.40
.1730	#17	4.394 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	CSG1730-C6	59.30
.1730	#17	4.394 mm	1.654	**42.00 mm**	(8x)	6 mm	100 mm	ARY1730-C6	62.40
.1770	#16	4.495 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	CSG1770-C6	59.30
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BGN1770-C6	60.50
.1770	#16	4.495 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	ARY1770-C6	62.40
.1770	#16	4.495 mm	2.441	**62.00 mm**	(12x)	6 mm	125 mm	EFG1770-C6	64.90
.1800	#15	4.572 mm	.866	**22.00 mm**	(3x)	6 mm	63 mm	CSG1800-C6	59.30
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BGN1800-C6	60.50
.1800	#15	4.572 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	ARY1800-C6	62.40
.1800	#15	4.572 mm	2.441	**62.00 mm**	(12x)	6 mm	125 mm	EFG1800-C6	64.90
.1820	#18	4.622 mm	.866	**22.00 mm**	(3x)	6 mm	63 mm	CSG1820-C6	59.30
.1820	#18	4.622 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	ARY1820-C6	62.40
.1850	#13	4.700 mm	.866	**22.00 mm**	(3x)	6 mm	63 mm	CSG1850-C6	59.30
.1850	#13	4.700 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	ARY1850-C6	62.40
.1875 (3/16)		4.762 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	CSG1875-C6	59.30
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BGN1875-C6	60.50
.1875 (3/16)		4.762 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	ARY1875-C6	62.40
.1875 (3/16)		4.762 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	EFG1875-C6	64.90
.1890	#12	4.800 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	CSG1890-C6	59.30
.1890	#12	4.800 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	ARY1890-C6	62.40
.1910	#11	4.851 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	CSG1910-C6	59.30
.1910	#11	4.851 mm	1.890	**48.00 mm**	(8x)	6 mm	100 mm	ARY1910-C6	62.40
.1935	#10	4.914 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	CSG1935-C6	59.30
.1935	#10	4.914 mm	1.890	**48.00 mm**	(8x)	6 mm	100 mm	ARY1935-C6	62.40
.1960	#9	4.978 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG1960-C6	59.30
.1960	#9	4.978 mm	1.890	**48.00 mm**	(8x)	6 mm	100 mm	ARY1960-C6	62.40
.1968		5.000 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG1968-C6	59.30
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BGN1968-C6	60.50
.1968		5.000 mm	1.890	**48.00 mm**	(8x)	6 mm	100 mm	ARY1968-C6	62.40
.1990	#8	5.054 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG1990-C6	59.30
.1990	#8	5.054 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ARY1990-C6	62.40
.2009	#7	5.105 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG2009-C6	59.30
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BGN2009-C6	60.50
.2009	#7	5.105 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ARY2009-C6	62.40
.2031 (13/64)		5.159 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG2031-C6	59.30
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BGN2031-C6	60.50
.2031 (13/64)		5.159 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ARY2031-C6	62.40
.2040	#6	5.181 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG2040-C6	59.30
.2040	#6	5.181 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ARY2040-C6	62.40
.2055	#5	5.219 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	CSG2055-C6	59.30
.2055	#5	5.219 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ARY2055-C6	62.40

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.2090	#4	5.308 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	CSG2090-C6	59.30
.2090	#4	5.308 mm	2.047	**52.00 mm**	(8x)	6 mm	100 mm	ARY2090-C6	62.40
.2129	#3	5.410 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	CSG2129-C6	59.30
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BGN2129-C6	60.50
.2129	#3	5.410 mm	2.047	**52.00 mm**	(8x)	6 mm	100 mm	ARY2129-C6	62.40
.2187 (7/32)		5.556 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	CSG2187-C6	59.30
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BGN2187-C6	60.50
.2187 (7/32)		5.556 mm	2.126	**54.00 mm**	(8x)	6 mm	100 mm	ARY2187-C6	62.40
.2210	#2	5.613 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	CSG2210-C6	59.30
.2210	#2	5.613 mm	2.126	**54.00 mm**	(8x)	6 mm	100 mm	ARY2210-C6	62.40
.2280	#1	5.791 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	CSG2280-C6	59.30
.2280	#1	5.791 mm	2.205	**56.00 mm**	(8x)	6 mm	100 mm	ARY2280-C6	62.40
.2340	A	5.943 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	CSG2340-C6	59.30
.2340	A	5.943 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	ARY2340-C6	62.40
.2343 (15/64)		5.953 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	CSG2343-C6	59.30
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BGN2343-C6	60.50
.2343 (15/64)		5.953 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	ARY2343-C6	62.40
.2362		6.000 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	CSG2362-C6	59.30
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BGN2362-C6	60.50
.2362		6.000 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	ARY2362-C6	62.40
.2380	B	6.045 mm	1.102	**28.00 mm**	(3x)	8 mm	75 mm	CSG2380-C6	61.30
.2380	B	6.045 mm	2.283	**58.00 mm**	(8x)	8 mm	100 mm	ARY2380-C6	64.20
.2420	C	6.146 mm	1.181	**30.00 mm**	(3x)	8 mm	75 mm	CSG2420-C6	61.30
.2420	C	6.146 mm	2.362	**60.00 mm**	(8x)	8 mm	100 mm	ARY2420-C6	64.20
.2460	D	6.248 mm	1.181	**30.00 mm**	(3x)	8 mm	75 mm	CSG2460-C6	61.30
.2460	D	6.248 mm	2.362	**60.00 mm**	(8x)	8 mm	100 mm	ARY2460-C6	64.20
.2500 (1/4)	E	6.350 mm	1.181	**30.00 mm**	(3x)	8 mm	75 mm	CSG2500-C6	61.30
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BGN2500-C6	62.50
.2500 (1/4)	E	6.350 mm	2.441	**62.00 mm**	(8x)	8 mm	125 mm	ARY2500-C6	64.20

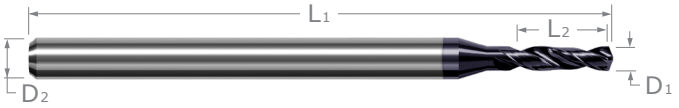
SPEEDS & FEEDS (Miniature High Performance Drills – Hardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%. For 12x, reduce to 65%). Pecking cycles are recommended to avoid chip pacing and breakage. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For higher hardness materials, peck depths should be .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Hardness	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
Hardened Steels	38-45 Rc	150	.00029	.00060	.00090	.00119	.00150	.00179	.00240	.00359	.00480
	46-55 Rc	90	.00022	.00045	.00068	.00089	.00112	.00134	.00180	.00269	.00360
	56-68 Rc	40	.00014	.00030	.00045	.00060	.00075	.00089	.00120	.00180	.00240

MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels



Available for 3x, 5x, 8x, 10x, & 12x Hole Depths!

- Optimized for drilling prehardened medium alloy steels, stainless steels, and tool steels up to 45Rc
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Specialized Flute Shape for Improved Chip Evacuation

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0078		.200 mm	.037	**.95 mm**	(3x)	3 mm	50 mm	DHE0078-C3	39.70
.0078		.200 mm	.053	**1.35 mm**	(5x)	3 mm	50 mm	BVT0078-C3	40.80
.0079		.201 mm	.053	**1.35 mm**	(5x)	3 mm	50 mm	BVT0079-C3	40.80
.0083	#91	.210 mm	.039	**1.00 mm**	(3x)	3 mm	50 mm	DHE0083-C3	39.70
.0083	#91	.210 mm	.055	**1.40 mm**	(5x)	3 mm	50 mm	BVT0083-C3	40.80
.0087	#90	.221 mm	.041	**1.05 mm**	(3x)	3 mm	50 mm	DHE0087-C3	39.70
.0087	#90	.221 mm	.059	**1.50 mm**	(5x)	3 mm	50 mm	BVT0087-C3	40.80
.0091	#89	.231 mm	.043	**1.10 mm**	(3x)	3 mm	50 mm	DHE0091-C3	39.70
.0091	#89	.231 mm	.061	**1.55 mm**	(5x)	3 mm	50 mm	BVT0091-C3	40.80
.0095	#88	.241 mm	.045	**1.15 mm**	(3x)	3 mm	50 mm	DHE0095-C3	39.70
.0095	#88	.241 mm	.065	**1.65 mm**	(5x)	3 mm	50 mm	BVT0095-C3	40.80
.0100	#87	.254 mm	.047	**1.20 mm**	(3x)	3 mm	50 mm	DHE0100-C3	38.70
.0100	#87	.254 mm	.067	**1.70 mm**	(5x)	3 mm	50 mm	BVT0100-C3	39.70
.0100	#87	.254 mm	.098	**2.50 mm**	(8x)	3 mm	50 mm	ADS0100-C3	42.60
.0100	#87	.254 mm	.118	**3.00 mm**	(10x)	3 mm	50 mm	EXP0100-C3	43.90
.0100	#87	.254 mm	.138	**3.50 mm**	(12x)	3 mm	50 mm	CHT0100-C3	45.50
.0105	#86	.266 mm	.049	**1.25 mm**	(3x)	3 mm	50 mm	DHE0105-C3	38.70
.0105	#86	.266 mm	.071	**1.80 mm**	(5x)	3 mm	50 mm	BVT0105-C3	39.70
.0105	#86	.266 mm	.102	**2.60 mm**	(8x)	3 mm	50 mm	ADS0105-C3	42.60
.0105	#86	.266 mm	.146	**3.70 mm**	(12x)	3 mm	50 mm	CHT0105-C3	45.50
.0110	#85	.279 mm	.053	**1.35 mm**	(3x)	3 mm	50 mm	DHE0110-C3	38.70
.0110	#85	.279 mm	.075	**1.90 mm**	(5x)	3 mm	50 mm	BVT0110-C3	39.70
.0110	#85	.279 mm	.106	**2.70 mm**	(8x)	3 mm	50 mm	ADS0110-C3	42.60
.0110	#85	.279 mm	.130	**3.30 mm**	(10x)	3 mm	50 mm	EXP0110-C3	43.90
.0110	#85	.279 mm	.150	**3.80 mm**	(12x)	3 mm	50 mm	CHT0110-C3	45.50
.0115	#84	.292 mm	.055	**1.40 mm**	(3x)	3 mm	50 mm	DHE0115-C3	38.70
.0115	#84	.292 mm	.079	**2.00 mm**	(5x)	3 mm	50 mm	BVT0115-C3	39.70
.0115	#84	.292 mm	.110	**2.80 mm**	(8x)	3 mm	50 mm	ADS0115-C3	42.60
.0115	#84	.292 mm	.157	**4.00 mm**	(12x)	3 mm	50 mm	CHT0115-C3	45.50
.0118		.300 mm	.079	**2.00 mm**	(5x)	3 mm	50 mm	BVT0118-C3	39.70
.0118		.300 mm	.161	**4.10 mm**	(12x)	3 mm	50 mm	CHT0118-C3	45.50
.0120	#83	.304 mm	.057	**1.45 mm**	(3x)	3 mm	50 mm	DHE0120-C3	38.70
.0120	#83	.304 mm	.083	**2.10 mm**	(5x)	3 mm	50 mm	BVT0120-C3	39.70
.0120	#83	.304 mm	.118	**3.00 mm**	(8x)	3 mm	50 mm	ADS0120-C3	42.60
.0120	#83	.304 mm	.142	**3.60 mm**	(10x)	3 mm	50 mm	EXP0120-C3	43.90
.0120	#83	.304 mm	.165	**4.20 mm**	(12x)	3 mm	50 mm	CHT0120-C3	45.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0125	#82	.317 mm	.059	**1.50 mm**	(3x)	3 mm	50 mm	DHE0125-C3	38.70
.0125	#82	.317 mm	.083	**2.10 mm**	(5x)	3 mm	50 mm	BVT0125-C3	39.70
.0125	#82	.317 mm	.122	**3.10 mm**	(8x)	3 mm	50 mm	ADS0125-C3	42.60
.0125	#82	.317 mm	.173	**4.40 mm**	(12x)	3 mm	50 mm	CHT0125-C3	45.50
.0130	#81	.330 mm	.061	**1.55 mm**	(3x)	3 mm	50 mm	DHE0130-C3	38.70
.0130	#81	.330 mm	.087	**2.20 mm**	(5x)	3 mm	50 mm	BVT0130-C3	39.70
.0130	#81	.330 mm	.126	**3.20 mm**	(8x)	3 mm	50 mm	ADS0130-C3	42.60
.0130	#81	.330 mm	.154	**3.90 mm**	(10x)	3 mm	50 mm	EXP0130-C3	43.90
.0130	#81	.330 mm	.177	**4.50 mm**	(12x)	3 mm	50 mm	CHT0130-C3	45.50
.0135	#80	.342 mm	.065	**1.65 mm**	(3x)	3 mm	50 mm	DHE0135-C3	38.70
.0135	#80	.342 mm	.091	**2.30 mm**	(5x)	3 mm	50 mm	BVT0135-C3	39.70
.0135	#80	.342 mm	.130	**3.30 mm**	(8x)	3 mm	50 mm	ADS0135-C3	42.60
.0135	#80	.342 mm	.185	**4.70 mm**	(12x)	3 mm	50 mm	CHT0135-C3	45.50
.0140		.355 mm	.067	**1.70 mm**	(3x)	3 mm	50 mm	DHE0140-C3	38.70
.0140		.355 mm	.094	**2.40 mm**	(5x)	3 mm	50 mm	BVT0140-C3	39.70
.0140		.355 mm	.138	**3.50 mm**	(8x)	3 mm	50 mm	ADS0140-C3	42.60
.0140		.355 mm	.193	**4.90 mm**	(12x)	3 mm	50 mm	CHT0140-C3	45.50
.0144	#79	.368 mm	.069	**1.75 mm**	(3x)	3 mm	50 mm	DHE0144-C3	38.70
.0144	#79	.368 mm	.098	**2.50 mm**	(5x)	3 mm	50 mm	BVT0144-C3	39.70
.0144	#79	.368 mm	.142	**3.60 mm**	(8x)	3 mm	50 mm	ADS0144-C3	42.60
.0144	#79	.368 mm	.169	**4.30 mm**	(10x)	3 mm	50 mm	EXP0144-C3	43.90
.0144	#79	.368 mm	.197	**5.00 mm**	(12x)	3 mm	50 mm	CHT0144-C3	45.50
.0150		.381 mm	.071	**1.80 mm**	(3x)	3 mm	50 mm	DHE0150-C3	38.70
.0150		.381 mm	.102	**2.60 mm**	(5x)	3 mm	50 mm	BVT0150-C3	39.70
.0150		.381 mm	.146	**3.70 mm**	(8x)	3 mm	50 mm	ADS0150-C3	42.60
.0150		.381 mm	.205	**5.20 mm**	(12x)	3 mm	50 mm	CHT0150-C3	45.50
.0156 (1/64)		.396 mm	.075	**1.90 mm**	(3x)	3 mm	50 mm	DHE0156-C3	38.70
.0156 (1/64)		.396 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BVT0156-C3	39.70
.0156 (1/64)		.396 mm	.154	**3.90 mm**	(8x)	3 mm	50 mm	ADS0156-C3	42.60
.0156 (1/64)		.396 mm	.185	**4.70 mm**	(10x)	3 mm	50 mm	EXP0156-C3	43.90
.0156 (1/64)		.396 mm	.213	**5.40 mm**	(12x)	3 mm	50 mm	CHT0156-C3	45.50
.0157		.400 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BVT0157-C3	39.70
.0157		.400 mm	.220	**5.60 mm**	(12x)	3 mm	50 mm	CHT0157-C3	45.50
.0160	#78	.406 mm	.079	**2.00 mm**	(3x)	3 mm	50 mm	DHE0160-C3	38.70
.0160	#78	.406 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BVT0160-C3	39.70
.0160	#78	.406 mm	.157	**4.00 mm**	(8x)	3 mm	50 mm	ADS0160-C3	42.60
.0160	#78	.406 mm	.189	**4.80 mm**	(10x)	3 mm	50 mm	EXP0160-C3	43.90
.0160	#78	.406 mm	.220	**5.60 mm**	(12x)	3 mm	50 mm	CHT0160-C3	45.50
.0170		.431 mm	.083	**2.10 mm**	(3x)	3 mm	50 mm	DHE0170-C3	38.70
.0170		.431 mm	.114	**2.90 mm**	(5x)	3 mm	50 mm	BVT0170-C3	39.70
.0170		.431 mm	.165	**4.20 mm**	(8x)	3 mm	50 mm	ADS0170-C3	42.60
.0170		.431 mm	.236	**6.00 mm**	(12x)	3 mm	50 mm	CHT0170-C3	45.50
.0180	#77	.457 mm	.087	**2.20 mm**	(3x)	3 mm	50 mm	DHE0180-C3	38.70
.0180	#77	.457 mm	.122	**3.10 mm**	(5x)	3 mm	50 mm	BVT0180-C3	39.70
.0180	#77	.457 mm	.177	**4.50 mm**	(8x)	3 mm	50 mm	ADS0180-C3	42.90
.0180	#77	.457 mm	.213	**5.40 mm**	(10x)	3 mm	50 mm	EXP0180-C3	43.90
.0180	#77	.457 mm	.244	**6.20 mm**	(12x)	3 mm	50 mm	CHT0180-C3	45.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0190		.482 mm	.091	**2.30 mm**	(3x)	3 mm	50 mm	DHE0190-C3	38.70
.0190		.482 mm	.130	**3.30 mm**	(5x)	3 mm	50 mm	BVT0190-C3	39.70
.0190		.482 mm	.185	**4.70 mm**	(8x)	3 mm	50 mm	ADS0190-C3	42.60
.0190		.482 mm	.260	**6.60 mm**	(12x)	3 mm	50 mm	CHT0190-C3	45.50
.0196		.500 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	DHE0196-C3	38.20
.0196		.500 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BVT0196-C3	39.10
.0196		.500 mm	.193	**4.90 mm**	(8x)	3 mm	50 mm	ADS0196-C3	42.90
.0196		.500 mm	.228	**5.80 mm**	(10x)	3 mm	50 mm	EXP0196-C3	44.10
.0196		.500 mm	.268	**6.80 mm**	(12x)	3 mm	50 mm	CHT0196-C3	44.40
.0200	#76	.508 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	DHE0200-C3	38.20
.0200	#76	.508 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BVT0200-C3	39.10
.0200	#76	.508 mm	.197	**5.00 mm**	(8x)	3 mm	50 mm	ADS0200-C3	42.90
.0200	#76	.508 mm	.228	**6.00 mm**	(10x)	3 mm	50 mm	EXP0200-C3	44.10
.0200	#76	.508 mm	.276	**7.00 mm**	(12x)	3 mm	50 mm	CHT0200-C3	44.40
.0210	#75	.533 mm	.098	**2.50 mm**	(3x)	3 mm	50 mm	DHE0210-C3	38.20
.0210	#75	.533 mm	.142	**3.60 mm**	(5x)	3 mm	50 mm	BVT0210-C3	39.10
.0210	#75	.533 mm	.205	**5.20 mm**	(8x)	3 mm	50 mm	ADS0210-C3	42.90
.0210	#75	.533 mm	.244	**6.20 mm**	(10x)	3 mm	50 mm	EXP0210-C3	44.10
.0210	#75	.533 mm	.291	**7.40 mm**	(12x)	3 mm	50 mm	CHT0210-C3	44.40
.0220		.558 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	DHE0220-C3	38.20
.0220		.558 mm	.150	**3.80 mm**	(5x)	3 mm	50 mm	BVT0220-C3	39.10
.0220		.558 mm	.213	**5.40 mm**	(8x)	3 mm	50 mm	ADS0220-C3	42.90
.0220		.558 mm	.299	**7.60 mm**	(12x)	3 mm	50 mm	CHT0220-C3	44.40
.0225	#74	.571 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	DHE0225-C3	38.20
.0225	#74	.571 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BVT0225-C3	39.10
.0225	#74	.571 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	ADS0225-C3	42.90
.0225	#74	.571 mm	.268	**6.80 mm**	(10x)	3 mm	50 mm	EXP0225-C3	44.10
.0225	#74	.571 mm	.307	**7.80 mm**	(12x)	3 mm	50 mm	CHT0225-C3	44.40
.0230		.584 mm	.110	**2.80 mm**	(3x)	3 mm	50 mm	DHE0230-C3	38.20
.0230		.584 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BVT0230-C3	39.10
.0230		.584 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	ADS0230-C3	42.90
.0230		.584 mm	.315	**8.00 mm**	(12x)	3 mm	50 mm	CHT0230-C3	44.40
.0236		.600 mm	.157	**4.00 mm**	(5x)	3 mm	50 mm	BVT0236-C3	39.10
.0236		.600 mm	.323	**8.20 mm**	(12x)	3 mm	50 mm	CHT0236-C3	44.40
.0240	#73	.609 mm	.114	**2.90 mm**	(3x)	3 mm	50 mm	DHE0240-C3	38.20
.0240	#73	.609 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BVT0240-C3	39.10
.0240	#73	.609 mm	.236	**6.00 mm**	(8x)	3 mm	50 mm	ADS0240-C3	42.90
.0240	#73	.609 mm	.283	**7.20 mm**	(10x)	3 mm	50 mm	EXP0240-C3	44.10
.0240	#73	.609 mm	.331	**8.40 mm**	(12x)	3 mm	50 mm	CHT0240-C3	44.40
.0250	#72	.635 mm	.118	**3.00 mm**	(3x)	3 mm	50 mm	DHE0250-C3	38.20
.0250	#72	.635 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BVT0250-C3	39.10
.0250	#72	.635 mm	.244	**6.20 mm**	(8x)	3 mm	50 mm	ADS0250-C3	42.90
.0250	#72	.635 mm	.291	**7.40 mm**	(10x)	3 mm	50 mm	EXP0250-C3	44.10
.0250	#72	.635 mm	.346	**8.80 mm**	(12x)	3 mm	50 mm	CHT0250-C3	44.40
.0260	#71	.660 mm	.122	**3.10 mm**	(3x)	3 mm	50 mm	DHE0260-C3	38.20
.0260	#71	.660 mm	.173	**4.40 mm**	(5x)	3 mm	50 mm	BVT0260-C3	39.10
.0260	#71	.660 mm	.252	**6.40 mm**	(8x)	3 mm	50 mm	ADS0260-C3	42.90

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0260	#71	.660 mm	.307	**7.80 mm**	(10x)	3 mm	50 mm	EXP0260-C3	44.10
.0260	#71	.660 mm	.354	**9.00 mm**	(12x)	3 mm	50 mm	CHT0260-C3	44.40
.0270		.685 mm	.130	**3.30 mm**	(3x)	3 mm	50 mm	DHE0270-C3	38.20
.0270		.685 mm	.181	**4.60 mm**	(5x)	3 mm	50 mm	BVT0270-C3	39.10
.0270		.685 mm	.260	**6.60 mm**	(8x)	3 mm	50 mm	ADS0270-C3	42.90
.0270		.685 mm	.370	**9.40 mm**	(12x)	3 mm	50 mm	CHT0270-C3	44.40
.0275		.700 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BVT0275-C3	39.10
.0275		.700 mm	.378	**9.60 mm**	(12x)	3 mm	50 mm	CHT0275-C3	44.40
.0280	#70	.711 mm	.134	**3.40 mm**	(3x)	3 mm	50 mm	DHE0280-C3	38.20
.0280	#70	.711 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BVT0280-C3	39.10
.0280	#70	.711 mm	.276	**7.00 mm**	(8x)	3 mm	50 mm	ADS0280-C3	42.90
.0280	#70	.711 mm	.331	**8.40 mm**	(10x)	3 mm	50 mm	EXP0280-C3	44.10
.0280	#70	.711 mm	.386	**9.80 mm**	(12x)	3 mm	50 mm	CHT0280-C3	44.40
.0292	#69	.741 mm	.138	**3.50 mm**	(3x)	3 mm	50 mm	DHE0292-C3	38.20
.0292	#69	.741 mm	.197	**5.00 mm**	(5x)	3 mm	50 mm	BVT0292-C3	39.10
.0292	#69	.741 mm	.283	**7.20 mm**	(8x)	3 mm	50 mm	ADS0292-C3	42.90
.0292	#69	.741 mm	.346	**8.80 mm**	(10x)	3 mm	50 mm	EXP0292-C3	44.10
.0292	#69	.741 mm	.394	**10.00 mm**	(12x)	3 mm	50 mm	CHT0292-C3	44.40
.0300		.762 mm	.142	**3.60 mm**	(3x)	3 mm	50 mm	DHE0300-C3	38.20
.0300		.762 mm	.205	**5.20 mm**	(5x)	3 mm	50 mm	BVT0300-C3	39.10
.0300		.762 mm	.291	**7.40 mm**	(8x)	3 mm	50 mm	ADS0300-C3	42.90
.0300		.762 mm	.413	**10.50 mm**	(12x)	3 mm	50 mm	CHT0300-C3	44.40
.0310	#68	.787 mm	.146	**3.70 mm**	(3x)	3 mm	50 mm	DHE0310-C3	38.70
.0310	#68	.787 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0310-C3	39.50
.0310	#68	.787 mm	.299	**7.60 mm**	(8x)	3 mm	50 mm	ADS0310-C3	42.90
.0310	#68	.787 mm	.362	**9.20 mm**	(10x)	3 mm	50 mm	EXP0310-C3	44.10
.0310	#68	.787 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0310-C3	45.60
.0312 (1/32)		.793 mm	.150	**3.80 mm**	(3x)	3 mm	50 mm	DHE0312-C3	38.70
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0312-C3	39.50
.0312 (1/32)		.793 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	ADS0312-C3	42.90
.0312 (1/32)		.793 mm	.370	**9.40 mm**	(10x)	3 mm	50 mm	EXP0312-C3	44.10
.0312 (1/32)		.793 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0312-C3	45.60
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0315-C3	39.50
.0315		.800 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0315-C3	45.60
.0320	#67	.812 mm	.154	**3.90 mm**	(3x)	3 mm	50 mm	DHE0320-C3	38.70
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0320-C3	39.50
.0320	#67	.812 mm	.315	**8.00 mm**	(8x)	3 mm	50 mm	ADS0320-C3	42.90
.0320	#67	.812 mm	.378	**9.60 mm**	(10x)	3 mm	50 mm	EXP0320-C3	44.10
.0320	#67	.812 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0320-C3	45.60
.0330	#66	.838 mm	.157	**4.00 mm**	(3x)	3 mm	50 mm	DHE0330-C3	38.70
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BVT0330-C3	39.50
.0330	#66	.838 mm	.323	**8.20 mm**	(8x)	3 mm	50 mm	ADS0330-C3	42.90
.0330	#66	.838 mm	.386	**9.80 mm**	(10x)	3 mm	50 mm	EXP0330-C3	44.10
.0330	#66	.838 mm	.453	**11.50 mm**	(12x)	3 mm	50 mm	CHT0330-C3	45.60
.0350	#65	.889 mm	.165	**4.20 mm**	(3x)	3 mm	50 mm	DHE0350-C3	38.70
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BVT0350-C3	39.50
.0350	#65	.889 mm	.339	**8.60 mm**	(8x)	3 mm	50 mm	ADS0350-C3	42.90

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0350	#65	.889 mm	.413	**10.50 mm**	(10x)	3 mm	50 mm	EXP0350-C3	44.10
.0350	#65	.889 mm	.472	**12.00 mm**	(12x)	3 mm	50 mm	CHT0350-C3	45.60
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BVT0354-C3	37.60
.0354		.900 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	CHT0354-C3	45.60
.0360	#64	.914 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	DHE0360-C3	38.70
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BVT0360-C3	39.50
.0360	#64	.914 mm	.354	**9.00 mm**	(8x)	3 mm	50 mm	ADS0360-C3	42.90
.0360	#64	.914 mm	.413	**10.50 mm**	(10x)	3 mm	50 mm	EXP0360-C3	44.10
.0360	#64	.914 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	CHT0360-C3	45.60
.0370	#63	.939 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	DHE0370-C3	38.70
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BVT0370-C3	39.50
.0370	#63	.939 mm	.362	**9.20 mm**	(8x)	3 mm	50 mm	ADS0370-C3	42.90
.0370	#63	.939 mm	.433	**11.00 mm**	(10x)	3 mm	50 mm	EXP0370-C3	44.10
.0370	#63	.939 mm	.512	**13.00 mm**	(12x)	3 mm	50 mm	CHT0370-C3	45.60
.0380	#62	.965 mm	.181	**4.60 mm**	(3x)	3 mm	50 mm	DHE0380-C3	38.70
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BVT0380-C3	39.50
.0380	#62	.965 mm	.370	**9.40 mm**	(8x)	3 mm	50 mm	ADS0380-C3	42.90
.0380	#62	.965 mm	.453	**11.50 mm**	(10x)	3 mm	50 mm	EXP0380-C3	44.10
.0380	#62	.965 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	CHT0380-C3	45.60
.0390	#61	.990 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	DHE0390-C3	38.70
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BVT0390-C3	39.50
.0390	#61	.990 mm	.378	**9.60 mm**	(8x)	3 mm	50 mm	ADS0390-C3	42.90
.0390	#61	.990 mm	.453	**11.50 mm**	(10x)	3 mm	50 mm	EXP0390-C3	44.10
.0390	#61	.990 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	CHT0390-C3	45.60
.0393		1.000 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	DHE0393-C3	42.30
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BVT0393-C3	43.30
.0393		1.000 mm	.386	**9.80 mm**	(8x)	3 mm	50 mm	ADS0393-C3	45.90
.0393		1.000 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	EXP0393-C3	47.30
.0393		1.000 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	CHT0393-C3	48.70
.0400	#60	1.016 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	DHE0400-C3	42.30
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BVT0400-C3	43.30
.0400	#60	1.016 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ADS0400-C3	45.90
.0400	#60	1.016 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	EXP0400-C3	47.30
.0400	#60	1.016 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	CHT0400-C3	48.70
.0410	#59	1.041 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	DHE0410-C3	42.30
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BVT0410-C3	43.30
.0410	#59	1.041 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ADS0410-C3	45.90
.0410	#59	1.041 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	EXP0410-C3	47.30
.0410	#59	1.041 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	CHT0410-C3	48.70
.0420	#58	1.066 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	DHE0420-C3	42.30
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BVT0420-C3	43.30
.0420	#58	1.066 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ADS0420-C3	45.90
.0420	#58	1.066 mm	.492	**12.50 mm**	(10x)	3 mm	50 mm	EXP0420-C3	47.30
.0420	#58	1.066 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	CHT0420-C3	48.70
.0430	#57	1.092 mm	.205	**5.20 mm**	(3x)	3 mm	50 mm	DHE0430-C3	42.30
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BVT0430-C3	43.30
.0430	#57	1.092 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ADS0430-C3	45.90
.0430	#57	1.092 mm	.512	**13.00 mm**	(10x)	3 mm	50 mm	EXP0430-C3	47.30
.0430	#57	1.092 mm	.591	**15.00 mm**	(12x)	3 mm	50 mm	CHT0430-C3	48.70

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BVT0450-C3	43.30
.0450		1.143 mm	.610	**15.50 mm**	(12x)	3 mm	50 mm	CHT0450-C3	48.70
.0465	#56	1.181 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	DHE0465-C3	42.30
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BVT0465-C3	43.30
.0465	#56	1.181 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ADS0465-C3	45.90
.0465	#56	1.181 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	EXP0465-C3	47.30
.0465	#56	1.181 mm	.630	**16.00 mm**	(12x)	3 mm	63 mm	CHT0465-C3	48.70
.0468 (3/64)		1.190 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	DHE0468-C3	42.30
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BVT0468-C3	43.30
.0468 (3/64)		1.190 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ADS0468-C3	45.90
.0468 (3/64)		1.190 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	EXP0468-C3	47.30
.0468 (3/64)		1.190 mm	.650	**16.50 mm**	(12x)	3 mm	63 mm	CHT0468-C3	48.70
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BVT0492-C3	43.30
.0492		1.250 mm	.669	**17.00 mm**	(12x)	3 mm	63 mm	CHT0492-C3	48.70
.0500		1.270 mm	.236	**6.00 mm**	(3x)	3 mm	50 mm	DHE0500-C3	42.30
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BVT0500-C3	43.30
.0500		1.270 mm	.492	**12.50 mm**	(8x)	3 mm	50 mm	ADS0500-C3	45.90
.0500		1.270 mm	.591	**15.00 mm**	(10x)	3 mm	50 mm	EXP0500-C3	47.30
.0500		1.270 mm	.689	**17.50 mm**	(12x)	3 mm	63 mm	CHT0500-C3	48.70
.0520	#55	1.320 mm	.244	**6.20 mm**	(3x)	3 mm	50 mm	DHE0520-C3	42.30
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BVT0520-C3	43.30
.0520	#55	1.320 mm	.512	**13.00 mm**	(8x)	3 mm	50 mm	ADS0520-C3	45.90
.0520	#55	1.320 mm	.610	**15.50 mm**	(10x)	3 mm	50 mm	EXP0520-C3	47.30
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	CHT0520-C3	48.70
.0550	#54	1.397 mm	.260	**6.60 mm**	(3x)	3 mm	50 mm	DHE0550-C3	42.30
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BVT0550-C3	43.30
.0550	#54	1.397 mm	.531	**13.50 mm**	(8x)	3 mm	50 mm	ADS0550-C3	45.90
.0550	#54	1.397 mm	.650	**16.50 mm**	(10x)	3 mm	63 mm	EXP0550-C3	47.30
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	CHT0550-C3	48.70
.0590		1.500 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	DHE0590-C3	45.80
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BVT0590-C3	46.60
.0590		1.500 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ADS0590-C3	49.30
.0590		1.500 mm	.689	**17.50 mm**	(10x)	3 mm	63 mm	EXP0590-C3	50.80
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	CHT0590-C3	52.20
.0595	#53	1.511 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	DHE0595-C3	45.80
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BVT0595-C3	46.60
.0595	#53	1.511 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ADS0595-C3	49.30
.0595	#53	1.511 mm	.709	**18.00 mm**	(10x)	3 mm	63 mm	EXP0595-C3	50.80
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	CHT0595-C3	52.20
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BVT0600-C3	46.60
.0600		1.524 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	CHT0600-C3	52.20
.0625 (1/16)		1.587 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	DHE0625-C3	45.80
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BVT0625-C3	46.60
.0625 (1/16)		1.587 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ADS0625-C3	49.30
.0625 (1/16)		1.587 mm	.728	**18.50 mm**	(10x)	3 mm	63 mm	EXP0625-C3	50.80
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	CHT0625-C3	52.20

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0635	#52	1.612 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	DHE0635-C3	45.80
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BVT0635-C3	46.60
.0635	#52	1.612 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ADS0635-C3	49.30
.0635	#52	1.612 mm	.748	**19.00 mm**	(10x)	3 mm	63 mm	EXP0635-C3	50.80
.0635	#52	1.612 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	CHT0635-C3	52.20
.0670	#51	1.701 mm	.315	**8.00 mm**	(3x)	3 mm	50 mm	DHE0670-C3	45.80
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BVT0670-C3	46.60
.0670	#51	1.701 mm	.650	**16.50 mm**	(8x)	3 mm	63 mm	ADS0670-C3	49.30
.0670	#51	1.701 mm	.787	**20.00 mm**	(10x)	3 mm	63 mm	EXP0670-C3	50.80
.0670	#51	1.701 mm	.906	**23.00 mm**	(12x)	3 mm	63 mm	CHT0670-C3	52.20
.0700	#50	1.778 mm	.335	**8.50 mm**	(3x)	3 mm	50 mm	DHE0700-C3	45.80
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BVT0700-C3	46.60
.0700	#50	1.778 mm	.689	**17.50 mm**	(8x)	3 mm	63 mm	ADS0700-C3	49.30
.0700	#50	1.778 mm	.827	**21.00 mm**	(10x)	3 mm	63 mm	EXP0700-C3	50.80
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	CHT0700-C3	52.20
.0730	#49	1.854 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	DHE0730-C3	45.80
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BVT0730-C3	46.60
.0730	#49	1.854 mm	.709	**18.00 mm**	(8x)	3 mm	63 mm	ADS0730-C3	49.30
.0730	#49	1.854 mm	.866	**22.00 mm**	(10x)	3 mm	63 mm	EXP0730-C3	50.80
.0730	#49	1.854 mm	.984	**25.00 mm**	(12x)	3 mm	63 mm	CHT0730-C3	52.20
.0760	#48	1.930 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	DHE0760-C3	45.80
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BVT0760-C3	46.60
.0760	#48	1.930 mm	.748	**19.00 mm**	(8x)	3 mm	63 mm	ADS0760-C3	49.30
.0760	#48	1.930 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	EXP0760-C3	50.80
.0760	#48	1.930 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	CHT0760-C3	52.20
.0781 (5/64)		1.984 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	DHE0781-C3	45.80
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BVT0781-C3	46.60
.0781 (5/64)		1.984 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ADS0781-C3	49.30
.0781 (5/64)		1.984 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	EXP0781-C3	49.50
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	CHT0781-C3	52.20
.0785	#47	1.993 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	DHE0785-C3	45.80
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BVT0785-C3	46.60
.0785	#47	1.993 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ADS0785-C3	49.30
.0785	#47	1.993 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	EXP0785-C3	50.80
.0785	#47	1.993 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	CHT0785-C3	52.20
.0787		2.000 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	DHE0787-C3	45.80
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BVT0787-C3	50.30
.0787		2.000 mm	.768	**19.50 mm**	(8x)	4 mm	63 mm	ADS0787-C3	52.90
.0787		2.000 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	EXP0787-C3	54.50
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	CHT0787-C3	56.00
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BVT0800-C3	50.30
.0800		2.032 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	CHT0800-C3	56.00
.0810	#46	2.057 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	DHE0810-C3	45.80
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BVT0810-C3	50.30
.0810	#46	2.057 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ADS0810-C3	52.90
.0810	#46	2.057 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	EXP0810-C3	54.50
.0810	#46	2.057 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	CHT0810-C3	56.00

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0820	#45	2.082 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	DHE0820-C3	45.80
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BVT0820-C3	50.30
.0820	#45	2.082 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ADS0820-C3	52.90
.0820	#45	2.082 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	EXP0820-C3	54.50
.0820	#45	2.082 mm	1.142	**29.00 mm**	(12x)	4 mm	75 mm	CHT0820-C3	56.00
.0860	#44	2.184 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	DHE0860-C3	45.80
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BVT0860-C3	50.30
.0860	#44	2.184 mm	.827	**21.00 mm**	(8x)	4 mm	63 mm	ADS0860-C3	52.90
.0860	#44	2.184 mm	1.024	**26.00 mm**	(10x)	4 mm	63 mm	EXP0860-C3	54.50
.0860	#44	2.184 mm	1.181	**30.00 mm**	(12x)	4 mm	75 mm	CHT0860-C3	56.00
.0890	#43	2.260 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	DHE0890-C3	45.80
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BVT0890-C3	50.30
.0890	#43	2.260 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	ADS0890-C3	52.90
.0890	#43	2.260 mm	1.063	**27.00 mm**	(10x)	4 mm	63 mm	EXP0890-C3	54.50
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	CHT0890-C3	56.00
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BVT0900-C3	50.30
.0900		2.286 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	CHT0900-C3	56.00
.0935	#42	2.374 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	DHE0935-C3	45.80
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BVT0935-C3	50.30
.0935	#42	2.374 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ADS0935-C3	52.90
.0935	#42	2.374 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	EXP0935-C3	54.50
.0935	#42	2.374 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	CHT0935-C3	56.00
.0937 (3/32)		2.381 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	DHE0937-C3	49.00
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BVT0937-C3	50.30
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ADS0937-C3	52.90
.0937 (3/32)		2.381 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	EXP0937-C3	54.50
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	CHT0937-C3	55.80
.0960	#41	2.438 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	DHE0960-C3	49.00
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BVT0960-C3	50.30
.0960	#41	2.438 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ADS0960-C3	52.90
.0960	#41	2.438 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	EXP0960-C3	54.50
.0960	#41	2.438 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	CHT0960-C3	55.80
.0980	#40	2.489 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE0980-C3	49.00
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT0980-C3	50.30
.0980	#40	2.489 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ADS0980-C3	52.90
.0980	#40	2.489 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	EXP0980-C3	54.50
.0980	#40	2.489 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	CHT0980-C3	55.80
.0984		2.500 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE0984-C3	51.80
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT0984-C3	53.50
.0984		2.500 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ADS0984-C3	56.10
.0984		2.500 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	EXP0984-C3	57.40
.0984		2.500 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	CHT0984-C3	58.80
.0995	#39	2.527 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE0995-C3	51.80
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT0995-C3	53.50
.0995	#39	2.527 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ADS0995-C3	56.10
.0995	#39	2.527 mm	1.181	**30.00 mm**	(10x)	4 mm	75 mm	EXP0995-C3	57.40
.0995	#39	2.527 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	CHT0995-C3	58.80

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1000		2.540 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE1000-C3	51.80
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT1000-C3	53.50
.1000		2.540 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ADS1000-C3	56.10
.1000		2.540 mm	1.181	**30.00 mm**	(10x)	4 mm	75 mm	EXP1000-C3	57.40
.1000		2.540 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	CHT1000-C3	58.80
.1015	#38	2.578 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE1015-C3	51.80
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT1015-C3	53.50
.1015	#38	2.578 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ADS1015-C3	56.10
.1015	#38	2.578 mm	1.181	**30.00 mm**	(10x)	4 mm	75 mm	EXP1015-C3	57.40
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	CHT1015-C3	58.80
.1040	#37	2.641 mm	.492	**12.50 mm**	(3x)	4 mm	50 mm	DHE1040-C3	51.80
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BVT1040-C3	53.50
.1040	#37	2.641 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	ADS1040-C3	56.10
.1040	#37	2.641 mm	1.220	**31.00 mm**	(10x)	4 mm	75 mm	EXP1040-C3	57.40
.1040	#37	2.641 mm	1.417	**36.00 mm**	(12x)	4 mm	75 mm	CHT1040-C3	58.80
.1065	#36	2.705 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	DHE1065-C3	51.80
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BVT1065-C3	53.50
.1065	#36	2.705 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	ADS1065-C3	56.10
.1065	#36	2.705 mm	1.260	**32.00 mm**	(10x)	4 mm	75 mm	EXP1065-C3	57.40
.1065	#36	2.705 mm	1.417	**37.00 mm**	(12x)	4 mm	75 mm	CHT1065-C3	58.80
.1093 (7/64)		2.778 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	DHE1093-C3	51.80
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1093-C3	53.50
.1093 (7/64)		2.778 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ADS1093-C3	56.10
.1093 (7/64)		2.778 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	EXP1093-C3	57.40
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	CHT1093-C3	58.80
.1100	#35	2.794 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	DHE1100-C3	51.80
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1100-C3	53.50
.1100	#35	2.794 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ADS1100-C3	56.10
.1100	#35	2.794 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	EXP1100-C3	57.40
.1100	#35	2.794 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	CHT1100-C3	58.80
.1110	#34	2.819 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	DHE1110-C3	51.80
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1110-C3	53.50
.1110	#34	2.819 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ADS1110-C3	56.10
.1110	#34	2.819 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	EXP1110-C3	57.40
.1110	#34	2.819 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	CHT1110-C3	58.80
.1130	#33	2.870 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	DHE1130-C3	51.80
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1130-C3	53.50
.1130	#33	2.870 mm	1.102	**28.00 mm**	(8x)	4 mm	63 mm	ADS1130-C3	56.10
.1130	#33	2.870 mm	1.339	**34.00 mm**	(10x)	4 mm	75 mm	EXP1130-C3	57.40
.1130	#33	2.870 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	CHT1130-C3	58.80
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BVT1160-C3	53.50
.1160	#32	2.946 mm	1.575	**40.00 mm**	(12x)	4 mm	75 mm	CHT1160-C3	58.80
.1181		3.000 mm	.571	**14.50 mm**	(3x)	4 mm	50 mm	DHE1181-C3	51.80
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BVT1181-C3	53.50
.1181		3.000 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	ADS1181-C3	56.10
.1181		3.000 mm	1.378	**35.00 mm**	(10x)	4 mm	75 mm	EXP1181-C3	57.40
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	CHT1181-C3	58.80

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.571	**14.50 mm**	(3x)	6 mm	63 mm	DHE1200-C3	58.10
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BVT1200-C3	59.80
.1200	#31	3.048 mm	1.181	**30.00 mm**	(8x)	6 mm	75 mm	ADS1200-C3	62.50
.1200	#31	3.048 mm	1.417	**36.00 mm**	(10x)	6 mm	100 mm	EXP1200-C3	63.70
.1200	#31	3.048 mm	1.654	**42.00 mm**	(12x)	6 mm	100 mm	CHT1200-C3	65.00
.1240		3.149 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BVT1240-C3	59.80
.1240		3.149 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	CHT1240-C3	65.00
.1250 (1/8)		3.175 mm	.591	**15.00 mm**	(3x)	6 mm	63 mm	DHE1250-C3	58.10
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BVT1250-C3	59.80
.1250 (1/8)		3.175 mm	1.220	**31.00 mm**	(8x)	6 mm	75 mm	ADS1250-C3	62.50
.1250 (1/8)		3.175 mm	1.457	**37.00 mm**	(10x)	6 mm	100 mm	EXP1250-C3	63.70
.1250 (1/8)		3.175 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	CHT1250-C3	65.00
.1260		3.200 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BVT1260-C3	59.80
.1260		3.200 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	CHT1260-C3	65.00
.1285	#30	3.263 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BVT1285-C3	59.80
.1285	#30	3.263 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	CHT1285-C3	65.00
.1360	#29	3.454 mm	.630	**16.00 mm**	(3x)	6 mm	63 mm	DHE1360-C3	58.10
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BVT1360-C3	59.80
.1360	#29	3.454 mm	1.339	**34.00 mm**	(8x)	6 mm	75 mm	ADS1360-C3	62.50
.1360	#29	3.454 mm	1.575	**40.00 mm**	(10x)	6 mm	100 mm	EXP1360-C3	63.70
.1360	#29	3.454 mm	1.890	**48.00 mm**	(12x)	6 mm	100 mm	CHT1360-C3	65.00
.1405	#28	3.568 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BVT1405-C3	59.80
.1405	#28	3.568 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	CHT1405-C3	65.00
.1406 (9/64)		3.571 mm	.669	**17.00 mm**	(3x)	6 mm	63 mm	DHE1406-C3	58.10
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BVT1406-C3	59.80
.1406 (9/64)		3.571 mm	1.378	**35.00 mm**	(8x)	6 mm	75 mm	ADS1406-C3	62.50
.1406 (9/64)		3.571 mm	1.654	**42.00 mm**	(10x)	6 mm	100 mm	EXP1406-C3	63.70
.1406 (9/64)		3.571 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	CHT1406-C3	65.00
.1417		3.600 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BVT1417-C3	59.80
.1417		3.600 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	CHT1417-C3	65.00
.1440	#27	3.657 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BVT1440-C3	59.80
.1440	#27	3.657 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	CHT1440-C3	65.00
.1470	#26	3.733 mm	.709	**18.00 mm**	(3x)	6 mm	63 mm	DHE1470-C3	58.10
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1470-C3	59.80
.1470	#26	3.733 mm	1.417	**36.00 mm**	(8x)	6 mm	100 mm	ADS1470-C3	62.50
.1470	#26	3.733 mm	1.732	**44.00 mm**	(10x)	6 mm	100 mm	EXP1470-C3	63.70
.1470	#26	3.733 mm	2.047	**52.00 mm**	(12x)	6 mm	100 mm	CHT1470-C3	65.00
.1495	#25	3.797 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1495-C3	59.80
.1495	#25	3.797 mm	2.047	**52.00 mm**	(12x)	6 mm	100 mm	CHT1495-C3	65.00
.1520	#24	3.860 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1520-C3	59.80
.1520	#24	3.860 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	CHT1520-C3	65.00
.1540	#23	3.911 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1540-C3	59.80
.1540	#23	3.911 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	CHT1540-C3	65.00
.1562 (5/32)		3.968 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	DHE1562-C3	58.10
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1562-C3	59.80
.1562 (5/32)		3.968 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ADS1562-C3	62.50
.1562 (5/32)		3.968 mm	1.811	**46.00 mm**	(10x)	6 mm	100 mm	EXP1562-C3	63.70
.1562 (5/32)		3.968 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	CHT1562-C3	65.00

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1570	#22	3.987 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1570-C3	59.80
.1570	#22	3.987 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	CHT1570-C3	65.00
.1574		4.000 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	DHE1574-C3	58.10
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BVT1574-C3	59.80
.1574		4.000 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ADS1574-C3	62.50
.1574		4.000 mm	1.890	**48.00 mm**	(10x)	6 mm	100 mm	EXP1574-C3	63.70
.1574		4.000 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	CHT1574-C3	65.00
.1590	#21	4.038 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	DHE1590-C3	58.10
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BVT1590-C3	59.80
.1590	#21	4.038 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ADS1590-C3	62.50
.1590	#21	4.038 mm	1.890	**48.00 mm**	(10x)	6 mm	100 mm	EXP1590-C3	63.70
.1590	#21	4.038 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	CHT1590-C3	65.00
.1610	#20	4.089 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BVT1610-C3	59.80
.1610	#20	4.089 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	CHT1610-C3	65.00
.1660	#19	4.216 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BVT1660-C3	59.80
.1660	#19	4.216 mm	2.283	**58.00 mm**	(12x)	6 mm	100 mm	CHT1660-C3	65.00
.1695	#18	4.305 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1695-C3	59.80
.1695	#18	4.305 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	CHT1695-C3	65.00
.1718 (11/64)		4.365 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	DHE1718-C3	58.10
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1718-C3	59.80
.1718 (11/64)		4.365 mm	1.654	**42.00 mm**	(8x)	6 mm	100 mm	ADS1718-C3	62.50
.1718 (11/64)		4.365 mm	2.047	**52.00 mm**	(10x)	6 mm	100 mm	EXP1718-C3	63.70
.1718 (11/64)		4.365 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	CHT1718-C3	65.00
.1730	#17	4.394 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1730-C3	59.80
.1730	#17	4.394 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	CHT1730-C3	65.00
.1770	#16	4.495 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	DHE1770-C3	58.10
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1770-C3	59.80
.1770	#16	4.495 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	ADS1770-C3	62.50
.1770	#16	4.495 mm	2.047	**52.00 mm**	(10x)	6 mm	100 mm	EXP1770-C3	63.70
.1770	#16	4.495 mm	2.441	**62.00 mm**	(12x)	6 mm	125 mm	CHT1770-C3	65.00
.1800	#15	4.572 mm	.866	**22.00 mm**	(3x)	6 mm	63 mm	DHE1800-C3	58.10
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1800-C3	59.80
.1800	#15	4.572 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	ADS1800-C3	62.50
.1800	#15	4.572 mm	2.126	**54.00 mm**	(10x)	6 mm	100 mm	EXP1800-C3	63.70
.1800	#15	4.572 mm	2.441	**62.00 mm**	(12x)	6 mm	125 mm	CHT1800-C3	65.00
.1820	#14	4.622 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BVT1820-C3	59.80
.1820	#14	4.622 mm	2.520	**64.00 mm**	(12x)	6 mm	125 mm	CHT1820-C3	65.00
.1850	#13	4.700 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BVT1850-C3	59.80
.1850	#13	4.700 mm	2.520	**64.00 mm**	(12x)	6 mm	125 mm	CHT1850-C3	65.00
.1875 (3/16)		4.762 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	DHE1875-C3	58.10
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BVT1875-C3	59.80
.1875 (3/16)		4.762 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	ADS1875-C3	62.50
.1875 (3/16)		4.762 mm	2.205	**56.00 mm**	(10x)	6 mm	100 mm	EXP1875-C3	63.70
.1875 (3/16)		4.762 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	CHT1875-C3	65.00
.1890	#12	4.800 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BVT1890-C3	59.80
.1890	#12	4.800 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	CHT1890-C3	65.00
.1910	#11	4.851 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BVT1910-C3	59.80
.1910	#11	4.851 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	CHT1910-C3	65.00

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1935	#10	4.914 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT1935-C3	59.80
.1935	#10	4.914 mm	2.677	**68.00 mm**	(12x)	6 mm	125 mm	CHT1935-C3	65.00
.1960	#9	4.978 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT1960-C3	59.80
.1960	#9	4.978 mm	2.677	**68.00 mm**	(12x)	6 mm	125 mm	CHT1960-C3	65.00
.1968		5.000 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	DHE1968-C3	58.10
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT1968-C3	59.80
.1968		5.000 mm	1.890	**48.00 mm**	(8x)	6 mm	100 mm	ADS1968-C3	62.50
.1968		5.000 mm	2.283	**58.00 mm**	(10x)	6 mm	100 mm	EXP1968-C3	63.70
.1968		5.000 mm	2.677	**68.00 mm**	(12x)	6 mm	125 mm	CHT1968-C3	65.00
.1990	#8	5.054 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT1990-C3	59.80
.1990	#8	5.054 mm	2.756	**70.00 mm**	(12x)	6 mm	125 mm	CHT1990-C3	65.00
.2009	#7	5.105 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	DHE2009-C3	58.10
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT2009-C3	59.80
.2009	#7	5.105 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ADS2009-C3	62.50
.2009	#7	5.105 mm	2.362	**60.00 mm**	(10x)	6 mm	100 mm	EXP2009-C3	63.70
.2009	#7	5.105 mm	2.756	**70.00 mm**	(12x)	6 mm	125 mm	CHT2009-C3	65.00
.2031 (13/64)		5.159 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	DHE2031-C3	58.10
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT2031-C3	59.80
.2031 (13/64)		5.159 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	ADS2031-C3	62.50
.2031 (13/64)		5.159 mm	2.362	**60.00 mm**	(10x)	6 mm	100 mm	EXP2031-C3	63.70
.2031 (13/64)		5.159 mm	2.756	**70.00 mm**	(12x)	6 mm	125 mm	CHT2031-C3	65.00
.2040	#6	5.181 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT2040-C3	59.80
.2040	#6	5.181 mm	2.835	**72.00 mm**	(12x)	6 mm	125 mm	CHT2040-C3	65.00
.2055	#5	5.219 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BVT2055-C3	59.80
.2055	#5	5.219 mm	2.835	**72.00 mm**	(12x)	6 mm	125 mm	CHT2055-C3	65.00
.2090		5.308 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BVT2090-C3	59.80
.2090		5.308 mm	2.835	**72.00 mm**	(12x)	6 mm	125 mm	CHT2090-C3	65.00
.2129	#3	5.410 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	DHE2129-C3	58.10
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BVT2129-C3	59.80
.2129	#3	5.410 mm	2.047	**52.00 mm**	(8x)	6 mm	100 mm	ADS2129-C3	62.50
.2129	#3	5.410 mm	2.520	**64.00 mm**	(10x)	6 mm	125 mm	EXP2129-C3	63.70
.2129	#3	5.410 mm	2.913	**74.00 mm**	(12x)	6 mm	125 mm	CHT2129-C3	65.00
.2165		5.500 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BVT2165-C3	59.80
.2165		5.500 mm	2.992	**76.00 mm**	(12x)	6 mm	125 mm	CHT2165-C3	65.00
.2187 (7/32)		5.556 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	DHE2187-C3	58.10
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BVT2187-C3	59.80
.2187 (7/32)		5.556 mm	2.126	**54.00 mm**	(8x)	6 mm	100 mm	ADS2187-C3	62.50
.2187 (7/32)		5.556 mm	2.598	**66.00 mm**	(10x)	6 mm	125 mm	EXP2187-C3	63.70
.2187 (7/32)		5.556 mm	2.992	**76.00 mm**	(12x)	6 mm	125 mm	CHT2187-C3	65.00
.2205		5.600 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BVT2205-C3	59.80
.2205		5.600 mm	3.071	**78.00 mm**	(12x)	6 mm	125 mm	CHT2205-C3	65.00
.2210	#2	5.613 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BVT2210-C3	59.80
.2210	#2	5.613 mm	3.071	**78.00 mm**	(12x)	6 mm	125 mm	CHT2210-C3	65.00
.2280	#1	5.791 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BVT2280-C3	59.80
.2280	#1	5.791 mm	3.150	**80.00 mm**	(12x)	6 mm	125 mm	CHT2280-C3	65.00
.2340	A	5.943 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BVT2340-C3	59.80
.2340	A	5.943 mm	3.228	**82.00 mm**	(12x)	6 mm	125 mm	CHT2340-C3	65.00

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

continued from previous page

DRILL DIAMETER inch	wire	metric	FLUTE LENGTH inch	metric	hole depth	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED 2 FL	PRICE
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1		
.2343 (15/64)		5.953 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	DHE2343-C3	58.10
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BVT2343-C3	59.80
.2343 (15/64)		5.953 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	ADS2343-C3	62.50
.2343 (15/64)		5.953 mm	2.756	**70.00 mm**	(10x)	6 mm	125 mm	EXP2343-C3	63.70
.2343 (15/64)		5.953 mm	3.228	**82.00 mm**	(12x)	6 mm	125 mm	CHT2343-C3	65.00
.2362		6.000 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	DHE2362-C3	58.10
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BVT2362-C3	59.80
.2362		6.000 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	ADS2362-C3	62.50
.2362		6.000 mm	2.756	**70.00 mm**	(10x)	6 mm	125 mm	EXP2362-C3	63.70
.2362		6.000 mm	3.228	**82.00 mm**	(12x)	6 mm	125 mm	CHT2362-C3	65.00
.2380	B	6.045 mm	1.575	**40.00 mm**	(5x)	8 mm	100 mm	BVT2380-C3	61.90
.2380	B	6.045 mm	3.307	**84.00 mm**	(12x)	8 mm	125 mm	CHT2380-C3	67.10
.2420	C	6.146 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BVT2420-C3	61.90
.2420	C	6.146 mm	3.307	**84.00 mm**	(12x)	8 mm	125 mm	CHT2420-C3	67.10
.2460	D	6.248 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BVT2460-C3	61.90
.2460	D	6.248 mm	3.386	**86.00 mm**	(12x)	8 mm	150 mm	CHT2460-C3	67.10
.2500 (1/4)	E	6.350 mm	1.181	**30.00 mm**	(3x)	8 mm	75 mm	DHE2500-C3	58.10
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BVT2500-C3	59.80
.2500 (1/4)	E	6.350 mm	2.441	**62.00 mm**	(8x)	8 mm	125 mm	ADS2500-C3	62.50
.2500 (1/4)	E	6.350 mm	2.913	**74.00 mm**	(10x)	8 mm	125 mm	EXP2500-C3	63.70
.2500 (1/4)	E	6.350 mm	3.465	**88.00 mm**	(12x)	8 mm	150 mm	CHT2500-C3	65.00

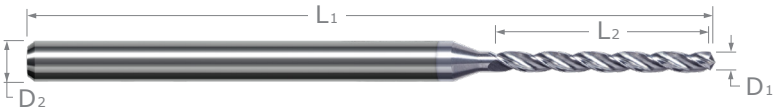
SPEEDS & FEEDS (Miniature High Performance Drills – Prehardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths and a material hardness of 29-37 Rc. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). For ferrous materials at 38-45 Rc, reduce IPR (for 3x and 5x, reduce to 80%; for 8x and 10x, reduce to 60%; for 12x, reduce to 52%). Pecking cycles are recommended to avoid chip packing and breakage. For materials at 29-37 Rc, initial peck depth should be 2-3x Diameter with each subsequent peck at 1-2x Diameter. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys



Available for 3x, 5x, 8x, 10x, & 12x Hole Depths!

- Optimized for drilling aluminum and aluminum alloys with excellent performance in unfilled plastics, copper, brass, and bronze alloys
- Special 3 flute design to maximize chip flow, hole accuracy, and finish
- 130° point angle
- Polished flute valleys and TiB_2 coating prevent built-up edge and extend tool life
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Special 3 Flute Design to Maximize Chip Flow, Hole Accuracy, and Finish

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0150		.381 mm	.071	**1.80 mm**	(3x)	3 mm	50 mm	AVA0150-C8	43.10
.0150		.381 mm	.102	**2.60 mm**	(5x)	3 mm	50 mm	BAF0150-C8	44.10
.0150		.381 mm	.205	**5.20 mm**	(12x)	3 mm	50 mm	DQW0150-C8	49.70
.0156 (1/64)		.396 mm	.075	**1.90 mm**	(3x)	3 mm	50 mm	AVA0156-C8	43.10
.0156 (1/64)		.396 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BAF0156-C8	44.10
.0156 (1/64)		.396 mm	.154	**3.90 mm**	(8x)	3 mm	50 mm	CBG0156-C8	47.10
.0156 (1/64)		.396 mm	.185	**4.70 mm**	(10x)	3 mm	50 mm	ERY0156-C8	48.40
.0156 (1/64)		.396 mm	.213	**5.40 mm**	(12x)	3 mm	50 mm	DQW0156-C8	49.70
.0160	#78	.406 mm	.079	**2.00 mm**	(3x)	3 mm	50 mm	AVA0160-C8	43.10
.0160	#78	.406 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BAF0160-C8	44.10
.0160	#78	.406 mm	.157	**4.00 mm**	(8x)	3 mm	50 mm	CBG0160-C8	47.10
.0160	#78	.406 mm	.189	**4.80 mm**	(10x)	3 mm	50 mm	ERY0160-C8	48.40
.0160	#78	.406 mm	.220	**5.60 mm**	(12x)	3 mm	50 mm	DQW0160-C8	49.70
.0170		.431 mm	.114	**2.90 mm**	(5x)	3 mm	50 mm	BAF0170-C8	44.10
.0170		.431 mm	.236	**6.00 mm**	(12x)	3 mm	50 mm	DQW0170-C8	49.70
.0180	#77	.457 mm	.087	**2.20 mm**	(3x)	3 mm	50 mm	AVA0180-C8	43.10
.0180	#77	.457 mm	.122	**3.10 mm**	(5x)	3 mm	50 mm	BAF0180-C8	44.10
.0180	#77	.457 mm	.177	**4.50 mm**	(8x)	3 mm	50 mm	CBG0180-C8	47.10
.0180	#77	.457 mm	.213	**5.40 mm**	(10x)	3 mm	50 mm	ERY0180-C8	48.40
.0180	#77	.457 mm	.244	**6.20 mm**	(12x)	3 mm	50 mm	DQW0180-C8	49.70
.0190		.482 mm	.130	**3.30 mm**	(5x)	3 mm	50 mm	BAF0190-C8	44.10
.0190		.482 mm	.260	**6.60 mm**	(12x)	3 mm	50 mm	DQW0190-C8	49.70
.0196		.500 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	AVA0196-C8	42.60
.0196		.500 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BAF0196-C8	43.60
.0196		.500 mm	.193	**4.90 mm**	(8x)	3 mm	50 mm	CBG0196-C8	46.60
.0196		.500 mm	.228	**5.80 mm**	(10x)	3 mm	50 mm	ERY0196-C8	47.70
.0196		.500 mm	.268	**6.80 mm**	(12x)	3 mm	50 mm	DQW0196-C8	49.00
.0200	#76	.508 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	AVA0200-C8	42.60
.0200	#76	.508 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BAF0200-C8	43.60
.0200	#76	.508 mm	.197	**5.00 mm**	(8x)	3 mm	50 mm	CBG0200-C8	46.60
.0200	#76	.508 mm	.236	**6.00 mm**	(10x)	3 mm	50 mm	ERY0200-C8	47.70
.0200	#76	.508 mm	.276	**7.00 mm**	(12x)	3 mm	50 mm	DQW0200-C8	49.00
.0210	#75	.533 mm	.098	**2.50 mm**	(3x)	3 mm	50 mm	AVA0210-C8	42.60
.0210	#75	.533 mm	.142	**3.60 mm**	(5x)	3 mm	50 mm	BAF0210-C8	43.60
.0210	#75	.533 mm	.205	**5.20 mm**	(8x)	3 mm	50 mm	CBG0210-C8	46.60
.0210	#75	.533 mm	.244	**6.20 mm**	(10x)	3 mm	50 mm	ERY0210-C8	47.70
.0210	#75	.533 mm	.291	**7.40 mm**	(12x)	3 mm	50 mm	DQW0210-C8	49.00

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0220		.558 mm	.150	**3.80 mm**	(5x)	3 mm	50 mm	BAF0220-C8	43.60
.0220		.558 mm	.299	**7.60 mm**	(12x)	3 mm	50 mm	DQW0220-C8	49.00
.0225	#74	.571 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	AVA0225-C8	42.60
.0225	#74	.571 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BAF0225-C8	43.60
.0225	#74	.571 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	CBG0225-C8	46.60
.0225	#74	.571 mm	.268	**6.80 mm**	(10x)	3 mm	50 mm	ERY0225-C8	47.70
.0225	#74	.571 mm	.307	**7.80 mm**	(12x)	3 mm	50 mm	DQW0225-C8	49.00
.0230		.584 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BAF0230-C8	43.60
.0230		.584 mm	.315	**8.00 mm**	(12x)	3 mm	50 mm	DQW0230-C8	49.00
.0236		.600 mm	.157	**4.00 mm**	(5x)	3 mm	50 mm	BAF0236-C8	43.60
.0236		.600 mm	.323	**8.20 mm**	(12x)	3 mm	50 mm	DQW0236-C8	49.00
.0240	#73	.609 mm	.114	**2.90 mm**	(3x)	3 mm	50 mm	AVA0240-C8	42.60
.0240	#73	.609 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BAF0240-C8	43.60
.0240	#73	.609 mm	.236	**6.00 mm**	(8x)	3 mm	50 mm	CBG0240-C8	46.60
.0240	#73	.609 mm	.283	**7.20 mm**	(10x)	3 mm	50 mm	ERY0240-C8	47.70
.0240	#73	.609 mm	.331	**8.40 mm**	(12x)	3 mm	50 mm	DQW0240-C8	49.00
.0250	#72	.635 mm	.118	**3.00 mm**	(3x)	3 mm	50 mm	AVA0250-C8	42.60
.0250	#72	.635 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BAF0250-C8	43.60
.0250	#72	.635 mm	.244	**6.20 mm**	(8x)	3 mm	50 mm	CBG0250-C8	46.60
.0250	#72	.635 mm	.291	**7.40 mm**	(10x)	3 mm	50 mm	ERY0250-C8	47.70
.0250	#72	.635 mm	.346	**8.80 mm**	(12x)	3 mm	50 mm	DQW0250-C8	49.00
.0260	#71	.660 mm	.122	**3.10 mm**	(3x)	3 mm	50 mm	AVA0260-C8	42.60
.0260	#71	.660 mm	.173	**4.40 mm**	(5x)	3 mm	50 mm	BAF0260-C8	43.60
.0260	#71	.660 mm	.252	**6.40 mm**	(8x)	3 mm	50 mm	CBG0260-C8	46.60
.0260	#71	.660 mm	.307	**7.80 mm**	(10x)	3 mm	50 mm	ERY0260-C8	47.70
.0260	#71	.660 mm	.354	**9.00 mm**	(12x)	3 mm	50 mm	DQW0260-C8	49.00
.0270		.685 mm	.181	**4.60 mm**	(5x)	3 mm	50 mm	BAF0270-C8	43.60
.0270		.685 mm	.370	**9.40 mm**	(12x)	3 mm	50 mm	DQW0270-C8	49.00
.0275		.700 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BAF0275-C8	43.60
.0275		.700 mm	.378	**9.60 mm**	(12x)	3 mm	50 mm	DQW0275-C8	49.00
.0280	#70	.711 mm	.134	**3.40 mm**	(3x)	3 mm	50 mm	AVA0280-C8	42.60
.0280	#70	.711 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BAF0280-C8	43.60
.0280	#70	.711 mm	.276	**7.00 mm**	(8x)	3 mm	50 mm	CBG0280-C8	46.60
.0280	#70	.711 mm	.331	**8.40 mm**	(10x)	3 mm	50 mm	ERY0280-C8	47.70
.0280	#70	.711 mm	.386	**9.80 mm**	(12x)	3 mm	50 mm	DQW0280-C8	49.00
.0292	#69	.741 mm	.138	**3.50 mm**	(3x)	3 mm	50 mm	AVA0292-C8	42.60
.0292	#69	.741 mm	.197	**5.00 mm**	(5x)	3 mm	50 mm	BAF0292-C8	43.60
.0292	#69	.741 mm	.283	**7.20 mm**	(8x)	3 mm	50 mm	CBG0292-C8	46.60
.0292	#69	.741 mm	.346	**8.80 mm**	(10x)	3 mm	50 mm	ERY0292-C8	47.70
.0292	#69	.741 mm	.394	**10.00 mm**	(12x)	3 mm	50 mm	DQW0292-C8	49.00
.0300		.762 mm	.205	**5.20 mm**	(5x)	3 mm	50 mm	BAF0300-C8	43.60
.0300		.762 mm	.413	**10.50 mm**	(12x)	3 mm	50 mm	DQW0300-C8	49.00
.0310	#68	.787 mm	.146	**3.70 mm**	(3x)	3 mm	50 mm	AVA0310-C8	42.60
.0310	#68	.787 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0310-C8	43.60
.0310	#68	.787 mm	.299	**7.60 mm**	(8x)	3 mm	50 mm	CBG0310-C8	46.60
.0310	#68	.787 mm	.362	**9.20 mm**	(10x)	3 mm	50 mm	ERY0310-C8	48.20
.0310	#68	.787 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0310-C8	49.70
.0312 (1/32)		.793 mm	.150	**3.80 mm**	(3x)	3 mm	50 mm	AVA0312-C8	42.60
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0312-C8	43.60

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0312 (1/32)		.793 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	CBG0312-C8	46.60
.0312 (1/32)		.793 mm	.370	**9.40 mm**	(10x)	3 mm	50 mm	ERY0312-C8	48.20
.0312 (1/32)		.793 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0312-C8	49.70
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0315-C8	43.60
.0315		.800 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0315-C8	49.70
.0320	#67	.812 mm	.154	**3.90 mm**	(3x)	3 mm	50 mm	AVA0320-C8	42.60
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0320-C8	43.60
.0320	#67	.812 mm	.315	**8.00 mm**	(8x)	3 mm	50 mm	CBG0320-C8	46.60
.0320	#67	.812 mm	.378	**9.60 mm**	(10x)	3 mm	50 mm	ERY0320-C8	48.20
.0320	#67	.812 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0320-C8	49.70
.0330	#66	.838 mm	.157	**4.00 mm**	(3x)	3 mm	50 mm	AVA0330-C8	42.60
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BAF0330-C8	43.60
.0330	#66	.838 mm	.323	**8.20 mm**	(8x)	3 mm	50 mm	CBG0330-C8	46.60
.0330	#66	.838 mm	.386	**9.80 mm**	(10x)	3 mm	50 mm	ERY0330-C8	48.20
.0330	#66	.838 mm	.453	**11.50 mm**	(12x)	3 mm	50 mm	DQW0330-C8	49.70
.0350	#65	.889 mm	.165	**4.20 mm**	(3x)	3 mm	50 mm	AVA0350-C8	42.60
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BAF0350-C8	43.60
.0350	#65	.889 mm	.339	**8.60 mm**	(8x)	3 mm	50 mm	CBG0350-C8	46.60
.0350	#65	.889 mm	.413	**10.50 mm**	(10x)	3 mm	50 mm	ERY0350-C8	48.20
.0350	#65	.889 mm	.472	**12.00 mm**	(12x)	3 mm	50 mm	DQW0350-C8	49.70
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BAF0354-C8	43.60
.0354		.900 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	DQW0354-C8	49.70
.0360	#64	.914 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	AVA0360-C8	42.60
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BAF0360-C8	43.60
.0360	#64	.914 mm	.354	**9.00 mm**	(8x)	3 mm	50 mm	CBG0360-C8	46.60
.0360	#64	.914 mm	.413	**10.50 mm**	(10x)	3 mm	50 mm	ERY0360-C8	48.20
.0360	#64	.914 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	DQW0360-C8	49.70
.0370	#63	.939 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	AVA0370-C8	42.60
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BAF0370-C8	43.60
.0370	#63	.939 mm	.362	**9.20 mm**	(8x)	3 mm	50 mm	CBG0370-C8	46.60
.0370	#63	.939 mm	.433	**11.00 mm**	(10x)	3 mm	50 mm	ERY0370-C8	48.20
.0370	#63	.939 mm	.512	**13.00 mm**	(12x)	3 mm	50 mm	DQW0370-C8	49.70
.0380	#62	.965 mm	.181	**4.60 mm**	(3x)	3 mm	50 mm	AVA0380-C8	42.60
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BAF0380-C8	43.60
.0380	#62	.965 mm	.370	**9.40 mm**	(8x)	3 mm	50 mm	CBG0380-C8	46.60
.0380	#62	.965 mm	.453	**11.50 mm**	(10x)	3 mm	50 mm	ERY0380-C8	48.20
.0380	#62	.965 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	DQW0380-C8	49.70
.0390	#61	.990 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	AVA0390-C8	42.60
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BAF0390-C8	43.60
.0390	#61	.990 mm	.378	**9.60 mm**	(8x)	3 mm	50 mm	CBG0390-C8	46.60
.0390	#61	.990 mm	.453	**11.50 mm**	(10x)	3 mm	50 mm	ERY0390-C8	48.20
.0390	#61	.990 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	DQW0390-C8	49.70
.0393		1.000 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	AVA0393-C8	44.40
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BAF0393-C8	45.50
.0393		1.000 mm	.386	**9.80 mm**	(8x)	3 mm	50 mm	CBG0393-C8	47.80
.0393		1.000 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	ERY0393-C8	49.30
.0393		1.000 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	DQW0393-C8	50.70

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.0400	#60	1.016 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	AVA0400-C8	44.40
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BAF0400-C8	45.50
.0400	#60	1.016 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	CBG0400-C8	47.80
.0400	#60	1.016 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	ERY0400-C8	49.30
.0400	#60	1.016 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	DQW0400-C8	50.70
.0410	#59	1.041 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	AVA0410-C8	44.40
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BAF0410-C8	45.50
.0410	#59	1.041 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	CBG0410-C8	47.80
.0410	#59	1.041 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	ERY0410-C8	49.30
.0410	#59	1.041 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	DQW0410-C8	50.70
.0420	#58	1.066 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	AVA0420-C8	44.40
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BAF0420-C8	45.50
.0420	#58	1.066 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	CBG0420-C8	47.80
.0420	#58	1.066 mm	.492	**12.50 mm**	(10x)	3 mm	50 mm	ERY0420-C8	49.30
.0420	#58	1.066 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	DQW0420-C8	50.70
.0430	#57	1.092 mm	.205	**5.20 mm**	(3x)	3 mm	50 mm	AVA0430-C8	44.40
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BAF0430-C8	45.50
.0430	#57	1.092 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	CBG0430-C8	47.80
.0430	#57	1.092 mm	.512	**13.00 mm**	(10x)	3 mm	50 mm	ERY0430-C8	49.30
.0430	#57	1.092 mm	.591	**15.00 mm**	(12x)	3 mm	50 mm	DQW0430-C8	50.70
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BAF0450-C8	45.50
.0450		1.143 mm	.610	**15.50 mm**	(12x)	3 mm	50 mm	DQW0450-C8	50.70
.0465	#56	1.181 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	AVA0465-C8	44.40
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BAF0465-C8	45.50
.0465	#56	1.181 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	CBG0465-C8	47.80
.0465	#56	1.181 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	ERY0465-C8	49.30
.0465	#56	1.181 mm	.630	**16.00 mm**	(12x)	3 mm	63 mm	DQW0465-C8	50.70
.0468 (3/64)		1.190 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	AVA0468-C8	44.40
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BAF0468-C8	45.50
.0468 (3/64)		1.190 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	CBG0468-C8	47.80
.0468 (3/64)		1.190 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	ERY0468-C8	49.30
.0468 (3/64)		1.190 mm	.650	**16.50 mm**	(12x)	3 mm	63 mm	DQW0468-C8	50.70
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BAF0492-C8	45.50
.0492		1.250 mm	.669	**17.00 mm**	(12x)	3 mm	63 mm	DQW0492-C8	50.70
.0500		1.270 mm	.236	**6.00 mm**	(3x)	3 mm	50 mm	AVA0500-C8	44.40
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BAF0500-C8	45.50
.0500		1.270 mm	.492	**12.50 mm**	(8x)	3 mm	50 mm	CBG0500-C8	47.80
.0500		1.270 mm	.591	**15.00 mm**	(10x)	3 mm	50 mm	ERY0500-C8	49.30
.0500		1.270 mm	.689	**17.50 mm**	(12x)	3 mm	63 mm	DQW0500-C8	50.70
.0520	#55	1.320 mm	.244	**6.20 mm**	(3x)	3 mm	50 mm	AVA0520-C8	44.40
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BAF0520-C8	45.50
.0520	#55	1.320 mm	.512	**13.00 mm**	(8x)	3 mm	50 mm	CBG0520-C8	47.80
.0520	#55	1.320 mm	.610	**15.50 mm**	(10x)	3 mm	50 mm	ERY0520-C8	49.30
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	DQW0520-C8	50.70
.0550	#54	1.397 mm	.260	**6.60 mm**	(3x)	3 mm	50 mm	AVA0550-C8	44.40
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BAF0550-C8	45.50
.0550	#54	1.397 mm	.531	**13.50 mm**	(8x)	3 mm	50 mm	CBG0550-C8	47.80

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0550	#54	1.397 mm	.650	**16.50 mm**	(10x)	3 mm	63 mm	ERY0550-C8	49.30
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	DQW0550-C8	50.70
.0590		1.500 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	AVA0590-C8	44.90
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BAF0590-C8	45.90
.0590		1.500 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	CBG0590-C8	47.80
.0590		1.500 mm	.689	**17.50 mm**	(10x)	3 mm	63 mm	ERY0590-C8	49.80
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	DQW0590-C8	51.60
.0595	#53	1.511 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	AVA0595-C8	44.90
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BAF0595-C8	45.90
.0595	#53	1.511 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	CBG0595-C8	47.80
.0595	#53	1.511 mm	.709	**18.00 mm**	(10x)	3 mm	63 mm	ERY0595-C8	49.80
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	DQW0595-C8	51.60
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BAF0600-C8	45.90
.0600		1.524 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	DQW0600-C8	51.60
.0625 (1/16)		1.587 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	AVA0625-C8	44.90
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BAF0625-C8	45.90
.0625 (1/16)		1.587 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	CBG0625-C8	48.70
.0625 (1/16)		1.587 mm	.728	**18.50 mm**	(10x)	3 mm	63 mm	ERY0625-C8	50.10
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	DQW0625-C8	51.60
.0635	#52	1.612 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	AVA0635-C8	44.90
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BAF0635-C8	45.90
.0635	#52	1.612 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	CBG0635-C8	48.70
.0635	#52	1.612 mm	.748	**19.00 mm**	(10x)	3 mm	63 mm	ERY0635-C8	50.10
.0635	#52	1.612 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	DQW0635-C8	51.60
.0670	#51	1.701 mm	.315	**8.00 mm**	(3x)	3 mm	50 mm	AVA0670-C8	44.90
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BAF0670-C8	45.90
.0670	#51	1.701 mm	.650	**16.50 mm**	(8x)	3 mm	63 mm	CBG0670-C8	48.70
.0670	#51	1.701 mm	.787	**20.00 mm**	(10x)	3 mm	63 mm	ERY0670-C8	50.10
.0670	#51	1.701 mm	.906	**23.00 mm**	(12x)	3 mm	63 mm	DQW0670-C8	51.60
.0700	#50	1.778 mm	.335	**8.50 mm**	(3x)	3 mm	50 mm	AVA0700-C8	44.90
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BAF0700-C8	45.90
.0700	#50	1.778 mm	.689	**17.50 mm**	(8x)	3 mm	63 mm	CBG0700-C8	48.70
.0700	#50	1.778 mm	.827	**21.00 mm**	(10x)	3 mm	63 mm	ERY0700-C8	50.10
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	DQW0700-C8	51.60
.0730	#49	1.854 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	AVA0730-C8	44.90
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BAF0730-C8	45.90
.0730	#49	1.854 mm	.709	**18.00 mm**	(8x)	3 mm	63 mm	CBG0730-C8	48.70
.0730	#49	1.854 mm	.866	**22.00 mm**	(10x)	3 mm	63 mm	ERY0730-C8	50.10
.0730	#49	1.854 mm	.984	**25.00 mm**	(12x)	3 mm	63 mm	DQW0730-C8	51.60
.0760	#48	1.930 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	AVA0760-C8	44.90
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BAF0760-C8	45.90
.0760	#48	1.930 mm	.748	**19.00 mm**	(8x)	3 mm	63 mm	CBG0760-C8	48.70
.0760	#48	1.930 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	ERY0760-C8	50.10
.0760	#48	1.930 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	DQW0760-C8	51.60
.0781 (5/64)		1.984 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	AVA0781-C8	44.90
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BAF0781-C8	45.90
.0781 (5/64)		1.984 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	CBG0781-C8	48.70

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0781 (5/64)		1.984 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	ERY0781-C8	50.10
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	DQW0781-C8	51.60
.0785	#47	1.993 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	AVA0785-C8	44.90
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BAF0785-C8	45.90
.0785	#47	1.993 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	CBG0785-C8	48.70
.0785	#47	1.993 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	DQW0785-C8	51.60
.0787		2.000 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	AVA0787-C8	46.10
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BAF0787-C8	47.10
.0787		2.000 mm	.768	**19.50 mm**	(8x)	4 mm	63 mm	CBG0787-C8	49.80
.0787		2.000 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	ERY0787-C8	51.20
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	DQW0787-C8	52.60
.0800		2.032 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	AVA0800-C8	46.10
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BAF0800-C8	47.10
.0800		2.032 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	CBG0800-C8	49.80
.0800		2.032 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	DQW0800-C8	52.60
.0810	#46	2.057 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	AVA0810-C8	46.10
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BAF0810-C8	47.10
.0810	#46	2.057 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	CBG0810-C8	49.80
.0810	#46	2.057 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	ERY0810-C8	51.20
.0810	#46	2.057 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	DQW0810-C8	52.60
.0820	#45	2.082 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	AVA0820-C8	46.10
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BAF0820-C8	47.10
.0820	#45	2.082 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	CBG0820-C8	49.80
.0820	#45	2.082 mm	1.142	**29.00 mm**	(12x)	4 mm	75 mm	DQW0820-C8	52.60
.0860	#44	2.184 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	AVA0860-C8	46.10
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BAF0860-C8	47.10
.0860	#44	2.184 mm	.827	**21.00 mm**	(8x)	4 mm	63 mm	CBG0860-C8	49.80
.0860	#44	2.184 mm	1.024	**26.00 mm**	(10x)	4 mm	63 mm	ERY0860-C8	51.20
.0860	#44	2.184 mm	1.181	**30.00 mm**	(12x)	4 mm	75 mm	DQW0860-C8	52.60
.0890	#43	2.260 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	AVA0890-C8	46.10
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BAF0890-C8	47.10
.0890	#43	2.260 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	CBG0890-C8	49.80
.0890	#43	2.260 mm	1.063	**27.00 mm**	(10x)	4 mm	63 mm	ERY0890-C8	51.20
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	DQW0890-C8	52.60
.0900		2.286 mm	.433	**11.00 mm**	(3x)	4 mm	50 mm	AVA0900-C8	46.10
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BAF0900-C8	47.10
.0900		2.286 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	CBG0900-C8	49.80
.0900		2.286 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	DQW0900-C8	52.60
.0935	#42	2.374 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	AVA0935-C8	46.10
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BAF0935-C8	47.10
.0935	#42	2.374 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	CBG0935-C8	49.80
.0935	#42	2.374 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	ERY0935-C8	51.20
.0935	#42	2.374 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	DQW0935-C8	52.60
.0937 (3/32)		2.381 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	AVA0937-C8	46.10
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BAF0937-C8	47.10
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	CBG0937-C8	49.80
.0937 (3/32)		2.381 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	ERY0937-C8	51.20
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	DQW0937-C8	52.60

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0960	#41	2.438 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	AVA0960-C8	46.10
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BAF0960-C8	47.10
.0960	#41	2.438 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	CBG0960-C8	49.80
.0960	#41	2.438 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	ERY0960-C8	51.20
.0960	#41	2.438 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	DQW0960-C8	52.60
.0980	#40	2.489 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	AVA0980-C8	46.10
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF0980-C8	47.10
.0980	#40	2.489 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	CBG0980-C8	49.80
.0980	#40	2.489 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	ERY0980-C8	51.20
.0980	#40	2.489 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	DQW0980-C8	52.60
.0984		2.500 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	AVA0984-C8	46.50
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF0984-C8	47.50
.0984		2.500 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	CBG0984-C8	50.20
.0984		2.500 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	ERY0984-C8	51.60
.0984		2.500 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	DQW0984-C8	52.90
.0995	#39	2.527 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	AVA0995-C8	46.50
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF0995-C8	47.50
.0995	#39	2.527 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	CBG0995-C8	50.20
.0995	#39	2.527 mm	1.181	**30.00 mm**	(10x)	4 mm	75 mm	ERY0995-C8	51.60
.0995	#39	2.527 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	DQW0995-C8	52.90
.1000		2.540 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	AVA1000-C8	46.50
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF1000-C8	47.50
.1000		2.540 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	CBG1000-C8	50.20
.1000		2.540 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	DQW1000-C8	52.90
.1015	#38	2.578 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	AVA1015-C8	46.50
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF1015-C8	47.50
.1015	#38	2.578 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	CBG1015-C8	50.20
.1015	#38	2.578 mm	1.181	**30.00 mm**	(10x)	4 mm	75 mm	ERY1015-C8	51.60
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	DQW1015-C8	52.90
.1040	#37	2.641 mm	.492	**12.50 mm**	(3x)	4 mm	50 mm	AVA1040-C8	46.50
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BAF1040-C8	47.50
.1040	#37	2.641 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	CBG1040-C8	50.20
.1040	#37	2.641 mm	1.220	**31.00 mm**	(10x)	4 mm	75 mm	ERY1040-C8	51.60
.1040	#37	2.641 mm	1.417	**36.00 mm**	(12x)	4 mm	75 mm	DQW1040-C8	52.90
.1065	#36	2.705 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	AVA1065-C8	46.50
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BAF1065-C8	47.50
.1065	#36	2.705 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	CBG1065-C8	50.20
.1065	#36	2.705 mm	1.260	**32.00 mm**	(10x)	4 mm	75 mm	ERY1065-C8	51.60
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	DQW1065-C8	52.90
.1093 (7/64)		2.778 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	AVA1093-C8	46.50
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1093-C8	47.50
.1093 (7/64)		2.778 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	CBG1093-C8	50.20
.1093 (7/64)		2.778 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	ERY1093-C8	51.60
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	DQW1093-C8	52.90
.1100	#35	2.794 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	AVA1100-C8	46.50
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1100-C8	47.50
.1100	#35	2.794 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	CBG1100-C8	50.20
.1100	#35	2.794 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	ERY1100-C8	51.60

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.1100	#35	2.794 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	DQW1100-C8	52.90
.1110	#34	2.819 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	AVA1110-C8	46.50
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1110-C8	47.50
.1110	#34	2.819 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	CBG1110-C8	50.20
.1110	#34	2.819 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	ERY1110-C8	51.60
.1110	#34	2.819 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	DQW1110-C8	52.90
.1130	#33	2.870 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	AVA1130-C8	46.50
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1130-C8	47.50
.1130	#33	2.870 mm	1.102	**28.00 mm**	(8x)	4 mm	63 mm	CBG1130-C8	50.20
.1130	#33	2.870 mm	1.339	**34.00 mm**	(10x)	4 mm	75 mm	ERY1130-C8	51.60
.1130	#33	2.870 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	DQW1130-C8	52.90
.1160	#32	2.946 mm	.551	**14.00 mm**	(3x)	4 mm	50 mm	AVA1160-C8	46.50
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BAF1160-C8	47.50
.1160	#32	2.946 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	CBG1160-C8	50.20
.1160	#32	2.946 mm	1.575	**40.00 mm**	(12x)	4 mm	75 mm	DQW1160-C8	52.90
.1181		3.000 mm	.571	**14.50 mm**	(3x)	4 mm	50 mm	AVA1181-C8	47.50
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BAF1181-C8	48.70
.1181		3.000 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	CBG1181-C8	51.20
.1181		3.000 mm	1.378	**35.00 mm**	(10x)	4 mm	75 mm	ERY1181-C8	52.60
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	DQW1181-C8	54.00
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.1200	#31	3.048 mm	.571	**14.50 mm**	(3x)	6 mm	63 mm	AVA1200-C8	58.80
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BAF1200-C8	60.00
.1200	#31	3.048 mm	1.181	**30.00 mm**	(8x)	6 mm	75 mm	CBG1200-C8	61.30
.1200	#31	3.048 mm	1.654	**42.00 mm**	(12x)	6 mm	100 mm	DQW1200-C8	63.80
.1250 (1/8)		3.175 mm	.591	**15.00 mm**	(3x)	6 mm	63 mm	AVA1250-C8	58.80
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BAF1250-C8	60.00
.1250 (1/8)		3.175 mm	1.220	**31.00 mm**	(8x)	6 mm	75 mm	CBG1250-C8	61.30
.1250 (1/8)		3.175 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	DQW1250-C8	63.80
.1285	#30	3.263 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BAF1285-C8	60.00
.1285	#30	3.263 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	DQW1285-C8	63.80
.1360	#29	3.454 mm	.630	**16.00 mm**	(3x)	6 mm	63 mm	AVA1360-C8	58.80
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BAF1360-C8	60.00
.1360	#29	3.454 mm	1.339	**34.00 mm**	(8x)	6 mm	75 mm	CBG1360-C8	61.30
.1360	#29	3.454 mm	1.575	**40.00 mm**	(10x)	6 mm	100 mm	ERY1360-C8	62.60
.1360	#29	3.454 mm	1.890	**48.00 mm**	(12x)	6 mm	100 mm	DQW1360-C8	63.80
.1405	#28	3.568 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BAF1405-C8	60.00
.1405	#28	3.568 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	DQW1405-C8	63.80
.1406 (9/64)		3.571 mm	.669	**17.00 mm**	(3x)	6 mm	63 mm	AVA1406-C8	58.80
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BAF1406-C8	60.00
.1406 (9/64)		3.571 mm	1.378	**35.00 mm**	(8x)	6 mm	75 mm	CBG1406-C8	61.30
.1406 (9/64)		3.571 mm	1.654	**42.00 mm**	(10x)	6 mm	100 mm	ERY1406-C8	62.60
.1406 (9/64)		3.571 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	DQW1406-C8	63.80
.1440	#27	3.657 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BAF1440-C8	60.00
.1440	#27	3.657 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	DQW1440-C8	63.80
.1470	#26	3.733 mm	.709	**18.00 mm**	(3x)	6 mm	63 mm	AVA1470-C8	58.80
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1470-C8	60.00
.1470	#26	3.733 mm	1.417	**36.00 mm**	(8x)	6 mm	100 mm	CBG1470-C8	61.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.1470	#26	3.733 mm	1.732	**44.00 mm**	(10x)	6 mm	100 mm	ERY1470-C8	62.60
.1470	#26	3.733 mm	2.047	**52.00 mm**	(12x)	6 mm	100 mm	DQW1470-C8	63.80
.1495	#25	3.797 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1495-C8	60.00
.1495	#25	3.797 mm	2.047	**52.00 mm**	(12x)	6 mm	100 mm	DQW1495-C8	63.80
.1520	#24	3.860 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1520-C8	60.00
.1520	#24	3.860 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	DQW1520-C8	63.80
.1540	#23	3.911 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1540-C8	60.00
.1540	#23	3.911 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	DQW1540-C8	63.80
.1562 (5/32)		3.968 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	AVA1562-C8	58.80
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1562-C8	60.00
.1562 (5/32)		3.968 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	CBG1562-C8	61.30
.1562 (5/32)		3.968 mm	1.811	**46.00 mm**	(10x)	6 mm	100 mm	ERY1562-C8	62.60
.1562 (5/32)		3.968 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	DQW1562-C8	63.80
.1570	#22	3.987 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1570-C8	60.00
.1570	#22	3.987 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	DQW1570-C8	63.80
.1574		4.000 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	AVA1574-C8	58.80
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BAF1574-C8	60.00
.1574		4.000 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	CBG1574-C8	61.30
.1574		4.000 mm	1.890	**48.00 mm**	(10x)	6 mm	100 mm	ERY1574-C8	62.60
.1574		4.000 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	DQW1574-C8	63.80
.1590	#21	4.038 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	AVA1590-C8	58.80
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BAF1590-C8	60.00
.1590	#21	4.038 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	CBG1590-C8	61.30
.1590	#21	4.038 mm	1.890	**48.00 mm**	(10x)	6 mm	100 mm	ERY1590-C8	62.60
.1590	#21	4.038 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	DQW1590-C8	63.80
.1610	#20	4.089 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BAF1610-C8	60.00
.1610	#20	4.089 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	DQW1610-C8	63.80
.1660	#19	4.216 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BAF1660-C8	60.00
.1660	#19	4.216 mm	2.283	**58.00 mm**	(12x)	6 mm	100 mm	DQW1660-C8	63.80
.1695	#18	4.305 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1695-C8	60.00
.1695	#18	4.305 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	DQW1695-C8	63.80
.1718 (11/64)		4.365 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	AVA1718-C8	58.80
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1718-C8	60.00
.1718 (11/64)		4.365 mm	1.654	**42.00 mm**	(8x)	6 mm	100 mm	CBG1718-C8	61.30
.1718 (11/64)		4.365 mm	2.047	**52.00 mm**	(10x)	6 mm	100 mm	ERY1718-C8	62.60
.1718 (11/64)		4.365 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	DQW1718-C8	63.80
.1730	#17	4.394 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1730-C8	60.00
.1730	#17	4.394 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	DQW1730-C8	63.80
.1770	#16	4.495 mm	.827	**21.00 mm**	(3x)	6 mm	63 mm	AVA1770-C8	58.80
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1770-C8	60.00
.1770	#16	4.495 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	CBG1770-C8	61.30
.1770	#16	4.495 mm	2.047	**52.00 mm**	(10x)	6 mm	100 mm	ERY1770-C8	62.60
.1770	#16	4.495 mm	2.441	**62.00 mm**	(12x)	6 mm	125 mm	DQW1770-C8	63.80
.1800	#15	4.572 mm	.866	**22.00 mm**	(3x)	6 mm	63 mm	AVA1800-C8	58.80
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1800-C8	60.00
.1800	#15	4.572 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	CBG1800-C8	61.30
.1800	#15	4.572 mm	2.126	**54.00 mm**	(10x)	6 mm	100 mm	ERY1800-C8	62.60
.1800	#15	4.572 mm	2.441	**62.00 mm**	(12x)	6 mm	125 mm	DQW1800-C8	63.80

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.1820	#14	4.622 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BAF1820-C8	60.00
.1820	#14	4.622 mm	2.520	**64.00 mm**	(12x)	6 mm	125 mm	DQW1820-C8	63.80
.1850	#13	4.700 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BAF1850-C8	60.00
.1850	#13	4.700 mm	2.520	**64.00 mm**	(12x)	6 mm	125 mm	DQW1850-C8	63.80
.1875 (3/16)		4.762 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	AVA1875-C8	58.80
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BAF1875-C8	60.00
.1875 (3/16)		4.762 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	CBG1875-C8	61.30
.1875 (3/16)		4.762 mm	2.205	**56.00 mm**	(10x)	6 mm	100 mm	ERY1875-C8	62.60
.1875 (3/16)		4.762 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	DQW1875-C8	63.80
.1890	#12	4.800 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BAF1890-C8	60.00
.1890	#12	4.800 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	DQW1890-C8	63.80
.1910	#11	4.851 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BAF1910-C8	60.00
.1910	#11	4.851 mm	2.598	**66.00 mm**	(12x)	6 mm	125 mm	DQW1910-C8	63.80
.1935	#10	4.914 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF1935-C8	60.00
.1935	#10	4.914 mm	2.677	**68.00 mm**	(12x)	6 mm	125 mm	DQW1935-C8	63.80
.1960	#9	4.978 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF1960-C8	60.00
.1960	#9	4.978 mm	2.677	**68.00 mm**	(12x)	6 mm	125 mm	DQW1960-C8	63.80
.1968		5.000 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	AVA1968-C8	58.80
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF1968-C8	60.00
.1968		5.000 mm	1.890	**48.00 mm**	(8x)	6 mm	100 mm	CBG1968-C8	61.30
.1968		5.000 mm	2.283	**58.00 mm**	(10x)	6 mm	100 mm	ERY1968-C8	62.60
.1968		5.000 mm	2.677	**68.00 mm**	(12x)	6 mm	125 mm	DQW1968-C8	63.80
.1990	#8	5.054 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF1990-C8	60.00
.1990	#8	5.054 mm	2.756	**70.00 mm**	(12x)	6 mm	125 mm	DQW1990-C8	63.80
.2009	#7	5.105 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	AVA2009-C8	58.80
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF2009-C8	60.00
.2009	#7	5.105 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	CBG2009-C8	61.30
.2009	#7	5.105 mm	2.362	**60.00 mm**	(10x)	6 mm	100 mm	ERY2009-C8	62.60
.2009	#7	5.105 mm	2.756	**70.00 mm**	(12x)	6 mm	125 mm	DQW2009-C8	63.80
.2031 (13/64)		5.159 mm	.945	**24.00 mm**	(3x)	6 mm	63 mm	AVA2031-C8	58.80
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF2031-C8	60.00
.2031 (13/64)		5.159 mm	1.969	**50.00 mm**	(8x)	6 mm	100 mm	CBG2031-C8	61.30
.2031 (13/64)		5.159 mm	2.362	**60.00 mm**	(10x)	6 mm	100 mm	ERY2031-C8	62.60
.2031 (13/64)		5.159 mm	2.756	**70.00 mm**	(12x)	6 mm	125 mm	DQW2031-C8	63.80
.2040	#6	5.181 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF2040-C8	60.00
.2040	#6	5.181 mm	2.835	**72.00 mm**	(12x)	6 mm	125 mm	DQW2040-C8	63.80
.2055	#5	5.219 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BAF2055-C8	60.00
.2055	#5	5.219 mm	2.835	**72.00 mm**	(12x)	6 mm	125 mm	DQW2055-C8	63.80
.2090	#4	5.308 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BAF2090-C8	60.00
.2090	#4	5.308 mm	2.835	**72.00 mm**	(12x)	6 mm	125 mm	DQW2090-C8	63.80
.2129	#3	5.410 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	AVA2129-C8	58.80
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BAF2129-C8	60.00
.2129	#3	5.410 mm	2.047	**52.00 mm**	(8x)	6 mm	100 mm	CBG2129-C8	61.30
.2129	#3	5.410 mm	2.520	**64.00 mm**	(10x)	6 mm	125 mm	ERY2129-C8	62.60
.2129	#3	5.410 mm	2.913	**74.00 mm**	(12x)	6 mm	125 mm	DQW2129-C8	63.80
.2187 (7/32)		5.556 mm	1.024	**26.00 mm**	(3x)	6 mm	75 mm	AVA2187-C8	58.80
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BAF2187-C8	60.00
.2187 (7/32)		5.556 mm	2.126	**54.00 mm**	(8x)	6 mm	100 mm	CBG2187-C8	61.30

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.2187 (7/32)		5.556 mm	2.598	**66.00 mm**	(10x)	6 mm	125 mm	ERY2187-C8	62.60
.2187 (7/32)		5.556 mm	2.992	**76.00 mm**	(12x)	6 mm	125 mm	DQW2187-C8	63.80
.2210	#2	5.613 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BAF2210-C8	60.00
.2210	#2	5.613 mm	3.071	**78.00 mm**	(12x)	6 mm	125 mm	DQW2210-C8	63.80
.2280	#1	5.791 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BAF2280-C8	60.00
.2280	#1	5.791 mm	3.150	**80.00 mm**	(12x)	6 mm	125 mm	DQW2280-C8	63.80
.2340	A	5.943 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BAF2340-C8	60.00
.2340	A	5.943 mm	3.228	**82.00 mm**	(12x)	6 mm	125 mm	DQW2340-C8	63.80
.2343 (15/64)		5.953 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	AVA2343-C8	58.80
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BAF2343-C8	60.00
.2343 (15/64)		5.953 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	CBG2343-C8	61.30
.2343 (15/64)		5.953 mm	2.756	**70.00 mm**	(10x)	6 mm	125 mm	ERY2343-C8	62.60
.2343 (15/64)		5.953 mm	3.228	**82.00 mm**	(12x)	6 mm	125 mm	DQW2343-C8	63.80
.2362		6.000 mm	1.102	**28.00 mm**	(3x)	6 mm	75 mm	AVA2362-C8	58.80
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BAF2362-C8	60.00
.2362		6.000 mm	2.283	**58.00 mm**	(8x)	6 mm	100 mm	CBG2362-C8	61.30
.2362		6.000 mm	2.756	**70.00 mm**	(10x)	6 mm	125 mm	ERY2362-C8	62.60
.2362		6.000 mm	3.228	**82.00 mm**	(12x)	6 mm	125 mm	DQW2362-C8	63.80
.2380	B	6.045 mm	1.575	**40.00 mm**	(5x)	8 mm	100 mm	BAF2380-C8	62.10
.2380	B	6.045 mm	3.307	**84.00 mm**	(12x)	8 mm	125 mm	DQW2380-C8	65.90
.2420	C	6.146 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BAF2420-C8	62.10
.2420	C	6.146 mm	3.307	**84.00 mm**	(12x)	8 mm	125 mm	DQW2420-C8	65.90
.2460	D	6.248 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BAF2460-C8	62.10
.2460	D	6.248 mm	3.386	**86.00 mm**	(12x)	8 mm	150 mm	DQW2460-C8	65.90
.2500 (1/4)	E	6.350 mm	1.181	**30.00 mm**	(3x)	8 mm	75 mm	AVA2500-C8	58.80
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BAF2500-C8	60.00
.2500 (1/4)	E	6.350 mm	2.441	**62.00 mm**	(8x)	8 mm	125 mm	CBG2500-C8	61.30
.2500 (1/4)	E	6.350 mm	2.913	**74.00 mm**	(10x)	8 mm	125 mm	ERY2500-C8	62.60
.2500 (1/4)	E	6.350 mm	3.465	**88.00 mm**	(12x)	8 mm	150 mm	DQW2500-C8	63.80
.2570	F	6.528 mm	1.732	**44.00 mm**	(5x)	8 mm	100 mm	BAF2570-C8	68.20
.2812 (9/32)		7.142 mm	1.890	**48.00 mm**	(5x)	8 mm	100 mm	BAF2812-C8	68.20
.3125 (5/16)		7.937 mm	2.126	**54.00 mm**	(5x)	8 mm	100 mm	BAF3125-C8	68.20
.3150		8.000 mm	2.126	**54.00 mm**	(5x)	8 mm	100 mm	BAF3150-C8	68.20
.3750 (3/8)		9.525 mm	2.520	**64.00 mm**	(5x)	10 mm	125 mm	BAF3750-C8	117.00
.3937		10.000 mm	2.677	**68.00 mm**	(5x)	10 mm	125 mm	BAF3937-C8	117.00
.4375 (7/16)		11.112 mm	2.992	**76.00 mm**	(5x)	12 mm	125 mm	BAF4375-C8	148.50
.4724		12.000 mm	3.228	**82.00 mm**	(5x)	12 mm	125 mm	BAF4724-C8	148.50
.5000 (1/2)		12.700 mm	3.386	**86.00 mm**	(5x)	16 mm	150 mm	BAF5000-C8	261.00

See Speeds & Feeds on next page

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

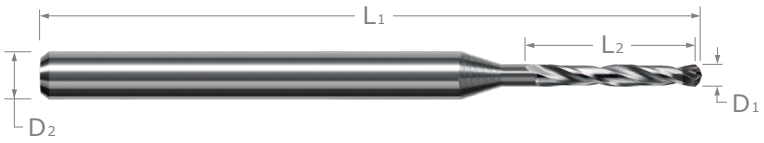
SPEEDS & FEEDS (Miniature High Performance Drills – Aluminum Alloys)

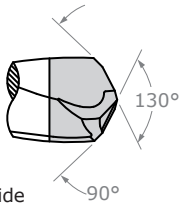
Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x diameter with each subsequent peck at 2-3x diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: ≤ 28 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
		.015	.031	.047	.062	.078	.093	.125	.187	.250
Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx)	450	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00071	.00147	.00223	.00295	.00371	.00442	.00594	.00889	.01188
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
Wrought - 5%-8% Si (4xxx)	600									
Wrought - 8%-12% Si (4xxx)	480									
Magnesium Alloys	900	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320
Zinc Alloys	480									
Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00063	.00131	.00199	.00262	.00329	.00393	.00528	.00790	.01056
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
Plastics: Unfilled Plastics	500	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320
Reinforced Plastics	350	.00063	.00131	.00199	.00329	.00393	.00528	.00790	.01056	.01584

MINIATURE HIGH PERFORMANCE DRILLS

PCD Diamond – Double Angle





- PCD diamond brazed on entire end of solid carbide body allows for increased tool life over carbide
- Full PCD tip allows for positive cutting geometry
- Double angle point geometry for superior performance in preventing push-out and delamination in layered composites
- Recommended work piece material: aluminum, copper, brass, bronze, plastic, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- h6 shank tolerance for high precision tool holders

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BCF0937	523.40
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BCF1181	523.40
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BCF1250	481.50
.1299		3.300 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BCF1299	481.50
.1650		4.190 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BCF1650	532.20
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BCF1875	532.20
.1910	#11	4.851 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BCF1910	532.20
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BCF2500	612.80
.2510		6.375 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BCF2510	612.80

For PCD End Mills, see pages 200 and 201.

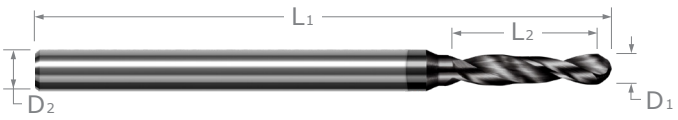
SPEEDS & FEEDS (Miniature High Performance Drills – PCD Diamond)

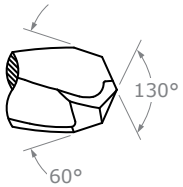
Important Note: Values in table are in inches and are based on 5x drill lengths. Since the melting point varies greatly from in plastics, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. For Metal Matrix Composites with aluminum, pecking should begin when part thickness is more than 1x Diameter and a feed reduction of 30%. For titanium, pecking should begin when part thickness is more than .5x Diameter and a feed reduction of 50% with a subsequent peck .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Type	Hardness	SFM	Chip Load (IPR) By Drill Diameter				
				.078	.093	.125	.187	.250
Unfilled Plastics ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, (55 < 85 Shore D)	800 - 1200	.0037	.0045	.0060	.0090	.0120
Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500 - 800	.0041	.0049	.0066	.0099	.0132
Filled Plastics Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, (55 < 85 Shore D)	800 - 1200	.0037	.0045	.0060	.0090	.0120
Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500 - 800	.0041	.0049	.0066	.0099	.0132
	Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400 - 600	.0041	.0049	.0066	.0099	.0132
	Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350 - 500	.0034	.0040	.0054	.0081	.0108
Fiber Reinforced Plastics FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350 - 500	.0041	.0049	.0066	.0099	.0132
G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200 - 300	.0034	.0040	.0054	.0081	.0108
Metal Matrix Composites	Aluminum/Composite Layered		320 - 500	.0041	.0049	.0066	.0099	.0132
	Titanium/Composite Layered		160 - 260	.0030	.0036	.0048	.0072	.0096
Graphite POCO 3			400 - 600	.0043	.0051	.0069	.0103	.0138
Green Ceramic & Green Carbide			100 - 300	.0039	.0047	.0063	.0094	.0126

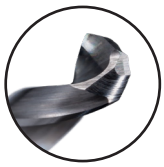
MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle





- Optimized for drilling layered composites with excellent performance in virgin plastics and other composite materials
- Double angle point geometry for superior performance in preventing push-out and delamination in layered composites
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Double Angle Point Geometry Prevents Delamination

COMPOSITES

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	DDA0312-C4	54.40
.0314		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	DDA0315-C4	54.40
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	DDA0320-C4	54.40
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	DDA0330-C4	54.40
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	DDA0350-C4	54.40
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	DDA0354-C4	54.40
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	DDA0360-C4	54.40
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	DDA0370-C4	54.40
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	DDA0380-C4	54.40
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	DDA0390-C4	54.40
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	DDA0393-C4	55.80
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	DDA0400-C4	55.80
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	DDA0410-C4	55.80
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	DDA0420-C4	55.80
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	DDA0430-C4	55.80
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	DDA0450-C4	55.80
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	DDA0465-C4	55.80
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	DDA0468-C4	55.80
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	DDA0492-C4	55.80
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	DDA0500-C4	55.80
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	DDA0520-C4	55.80
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	DDA0550-C4	55.80
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	DDA0590-C4	56.60
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	DDA0595-C4	56.60
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	DDA0600-C4	56.60
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	DDA0625-C4	56.60
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	DDA0635-C4	56.60
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	DDA0670-C4	56.60

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	DDA0700-C4	56.60
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	DDA0730-C4	56.60
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	DDA0760-C4	56.60
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	DDA0781-C4	56.60
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	DDA0785-C4	56.60
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	DDA0787-C4	57.60
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	DDA0800-C4	57.60
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	DDA0810-C4	57.60
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	DDA0820-C4	57.60
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	DDA0860-C4	57.60
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	DDA0890-C4	57.60
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	DDA0900-C4	57.60
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	DDA0935-C4	57.60
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	DDA0937-C4	57.60
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	AWS0937-C4	59.20
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	DDA0960-C4	57.60
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA0980-C4	57.60
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA0984-C4	58.00
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA0995-C4	58.00
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA1000-C4	58.00
.1000		2.540 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	AWS1000-C4	59.20
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA1015-C4	58.00
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	DDA1040-C4	58.00
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	DDA1065-C4	58.00
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1093-C4	58.00
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1100-C4	58.00
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1110-C4	58.00
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1130-C4	58.00
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	DDA1160-C4	58.00
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	DDA1181-C4	59.40
.1181		3.000 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	AWS1181-C4	60.90
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	DDA1200-C4	70.20
.1250 (1/8)		3.175 mm	.590	**15.00 mm**	(3x)	6 mm	63 mm	BAA1250-C4	69.00
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	DDA1250-C4	70.20
.1250 (1/8)		3.175 mm	1.220	**31.00 mm**	(8x)	6 mm	75 mm	AWS1250-C4	72.10
.1285	#30	3.263 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	DDA1285-C4	70.20
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	DDA1360-C4	70.20
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	DDA1406-C4	70.20
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	DDA1470-C4	70.20
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	DDA1562-C4	70.20
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	DDA1574-C4	70.20
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	DDA1590-C4	70.20

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

continued from previous page

DRILL DIAMETER inch	wire	metric	FLUTE LENGTH inch	metric	hole depth	SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND 2 FL	PRICE
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1		
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	DDA1718-C4	70.20
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	DDA1770-C4	70.20
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	DDA1800-C4	70.20
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	DDA1875-C4	70.20
.1875 (3/16)		4.762 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	AWS1875-C4	72.10
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	DDA1968-C4	70.20
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	DDA2009-C4	70.20
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	DDA2031-C4	70.20
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	DDA2129-C4	70.20
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	DDA2187-C4	70.20
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	DDA2343-C4	70.20
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	DDA2362-C4	70.20
.2500 (1/4)	E	6.350 mm	1.181	**30.00 mm**	(3x)	8 mm	75 mm	BAA2500-C4	69.00
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	DDA2500-C4	70.20
.2500 (1/4)	E	6.350 mm	2.441	**62.00 mm**	(8x)	8 mm	125 mm	AWS2500-C4	72.10

SPEEDS & FEEDS (Miniature High Performance Drills – Composites)

Important Note: Posted chiploads are for the double angle drills. For brad point drills, reduce chiploads by approx. 10%. Since the melting point varies greatly from plastic to plastic, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. Look at our online speeds and feeds for more information. For complete speeds and feeds charts, please go to www.harveytool.com.

Material Type		Type	Hardness	SFM	Chip Load Per Revolution (IPR) By Cutter Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250
Unfilled Plastics	ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108
	Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
Filled Plastics	Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108
	Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
		Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400-600	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
		Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350-500	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097
Fiber Reinforced	FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350-500	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
	G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200-300	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point

- Optimized for drilling glass or carbon fiber filled and reinforced composites with excellent performance in other filled, layered, and woven composite materials
- Center and OD spur point geometry for accurate scoring action, prevents fraying, uncut fibers, and tear out
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Brad Point Prevents Fraying & Tear Out

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0312-C4	46.90
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0315-C4	46.90
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0320-C4	46.90
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BSW0330-C4	46.90
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0350-C4	46.90
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0354-C4	46.90
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BSW0360-C4	46.90
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BSW0370-C4	46.90
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0380-C4	46.90
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0390-C4	46.90
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0393-C4	49.10
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0400-C4	49.10
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BSW0410-C4	49.10
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BSW0420-C4	49.10
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BSW0430-C4	49.10
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BSW0450-C4	49.10
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0465-C4	49.10
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0468-C4	49.10
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0492-C4	49.10
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0500-C4	49.10
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BSW0520-C4	49.10
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BSW0550-C4	49.10
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0590-C4	49.10
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0595-C4	49.10
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0600-C4	49.10
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0625-C4	49.10
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BSW0635-C4	49.10
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BSW0670-C4	49.10
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BSW0700-C4	49.10
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BSW0730-C4	49.10
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BSW0760-C4	49.10
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0781-C4	49.10
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0785-C4	49.10
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0787-C4	51.00

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point (cont.)

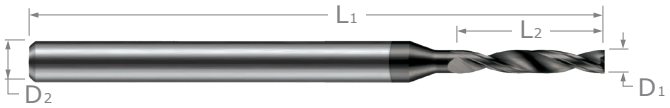
continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0800-C4	51.00
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0810-C4	51.00
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0820-C4	51.00
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BSW0860-C4	51.00
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0890-C4	51.00
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0900-C4	51.00
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0935-C4	51.70
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0937-C4	51.70
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0960-C4	51.70
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0980-C4	51.70
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0984-C4	52.10
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0995-C4	52.10
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1000-C4	52.10
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1015-C4	52.10
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1040-C4	52.10
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1065-C4	52.10
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1093-C4	52.10
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1100-C4	52.10
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1110-C4	52.10
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1130-C4	52.10
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1160-C4	52.10
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1181-C4	52.10
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1200-C4	60.10
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1250-C4	60.10
.1285	#30	3.263 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BSW1285-C4	60.10
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BSW1360-C4	60.10
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BSW1406-C4	60.10
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1470-C4	60.10
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1562-C4	60.10
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1574-C4	60.10
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1590-C4	60.10
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1718-C4	60.10
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1770-C4	60.10
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1800-C4	60.10
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BSW1875-C4	60.10
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW1968-C4	60.10
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2009-C4	60.10
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2031-C4	60.10
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BSW2129-C4	60.10
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BSW2187-C4	60.10
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2343-C4	60.10
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2362-C4	60.10
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BSW2500-C4	60.10

PLEASE SEE SPEEDS & FEEDS ON PAGE 406

MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom



Ideal for Inclined & Rounded Surfaces

- Flat bottom design (no point angle and no dish) allows for drilling on irregular surfaces and reduces burrs on break through
- Ideal for drilling on inclined and rounded surfaces, creating flat bottom holes, tilted drilling for angled holes, and drilling intersecting holes, half holes, shoulders, or thin plates
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

No Point Angle & No Dish Allows for Drilling on Irregular Surfaces

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	FBD0312-C3	43.40	FBD0312-C8	46.40
.0314		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	FBD0315-C3	43.40	FBD0315-C8	46.40
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	FBD0320-C3	43.40	FBD0320-C8	46.40
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	FBD0330-C3	43.40	FBD0330-C8	46.40
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	FBD0350-C3	43.40	FBD0350-C8	46.40
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	FBD0354-C3	43.40	FBD0354-C8	46.40
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	FBD0360-C3	43.40	FBD0360-C8	46.40
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	FBD0370-C3	43.40	FBD0370-C8	46.40
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	FBD0380-C3	43.40	FBD0380-C8	46.40
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	FBD0390-C3	43.40	FBD0390-C8	46.40
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	FBD0393-C3	47.60	FBD0393-C8	50.60
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	FBD0400-C3	47.60	FBD0400-C8	50.60
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	FBD0410-C3	47.60	FBD0410-C8	50.60
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	FBD0420-C3	47.60	FBD0420-C8	50.60
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	FBD0430-C3	47.60	FBD0430-C8	50.60
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	FBD0450-C3	47.60	FBD0450-C8	50.60
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	FBD0465-C3	47.60	FBD0465-C8	50.60
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	FBD0468-C3	47.60	FBD0468-C8	50.60
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	FBD0492-C3	47.60	FBD0492-C8	50.60
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	FBD0500-C3	47.60	FBD0500-C8	50.60
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	FBD0520-C3	47.60	FBD0520-C8	50.60
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	FBD0550-C3	47.60	FBD0550-C8	50.60
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	FBD0590-C3	51.20	FBD0590-C8	54.20
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	FBD0595-C3	51.20	FBD0595-C8	54.20
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	FBD0600-C3	51.20	FBD0600-C8	54.20
.0625 (1/16)		1.587 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	FBF0625-C3	50.00	FBF0625-C8	53.00
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	FBD0625-C3	51.20	FBD0625-C8	54.20
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	FBD0635-C3	51.20	FBD0635-C8	54.20
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	FBD0670-C3	51.20	FBD0670-C8	54.20
.0700	#50	1.778 mm	.334	**8.50 mm**	(3x)	3 mm	50 mm	FBF0700-C3	50.00	FBF0700-C8	53.00
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	FBD0700-C3	51.20	FBD0700-C8	54.20

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	FBD0730-C3	51.20	FBD0730-C8	54.20
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	FBD0760-C3	51.20	FBD0760-C8	54.20
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	FBD0781-C3	51.20	FBD0781-C8	54.20
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	FBD0785-C3	51.20	FBD0785-C8	54.20
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	FBD0787-C3	55.20	FBD0787-C8	58.20
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	FBD0800-C3	55.20	FBD0800-C8	58.20
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	FBD0810-C3	55.20	FBD0810-C8	58.20
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	FBD0820-C3	55.20	FBD0820-C8	58.20
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	FBD0860-C3	55.20	FBD0860-C8	58.20
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	FBD0890-C3	55.20	FBD0890-C8	58.20
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	FBD0900-C3	55.20	FBD0900-C8	58.20
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	FBD0935-C3	55.20	FBD0935-C8	58.20
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	FBD0937-C3	55.20	FBD0937-C8	58.20
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	FBD0960-C3	55.20	FBD0960-C8	58.20
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD0980-C3	55.20	FBD0980-C8	58.20
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD0984-C3	58.50	FBD0984-C8	61.60
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD0995-C3	58.50	FBD0995-C8	61.60
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD1000-C3	58.50	FBD1000-C8	61.60
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD1015-C3	58.50	FBD1015-C8	61.60
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	FBD1040-C3	58.50	FBD1040-C8	61.60
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	FBD1065-C3	58.50	FBD1065-C8	61.60
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1093-C3	58.50	FBD1093-C8	61.60
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1100-C3	58.50	FBD1100-C8	61.60
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1110-C3	58.50	FBD1110-C8	61.60
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1130-C3	58.50	FBD1130-C8	61.60
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	FBD1160-C3	58.50	FBD1160-C8	61.60
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	FBD1181-C3	58.50	FBD1181-C8	61.60
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.1200	#31	3.048 mm	.570	**14.50 mm**	(3x)	6 mm	63 mm	FBF1200-C3	64.40	FBF1200-C8	67.30
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	FBD1200-C3	65.60	FBD1200-C8	68.50
.1250 (1/8)		3.175 mm	.590	**15.00 mm**	(3x)	6 mm	63 mm	FBF1250-C3	64.40	FBF1250-C8	67.30
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	FBD1250-C3	65.60	FBD1250-C8	68.50
.1360	#29	3.454 mm	.629	**16.00 mm**	(3x)	6 mm	63 mm	FBF1360-C3	64.40	FBF1360-C8	67.30
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	FBD1360-C3	65.60	FBD1360-C8	68.50
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	FBD1406-C3	65.60	FBD1406-C8	68.50
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	FBD1470-C3	65.60	FBD1470-C8	68.50
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	FBD1562-C3	65.60	FBD1562-C8	68.50
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	FBD1574-C3	65.60	FBD1574-C8	68.50
.1590	#21	4.038 mm	.748	**19.00 mm**	(3x)	6 mm	75 mm	FBF1590-C3	64.40	FBF1590-C8	67.30
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	FBD1590-C3	65.60	FBD1590-C8	68.50
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	FBD1718-C3	65.60	FBD1718-C8	68.50
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	FBD1770-C3	65.60	FBD1770-C8	68.50
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	FBD1800-C3	65.60	FBD1800-C8	68.50
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	FBD1875-C3	65.60	FBD1875-C8	68.50
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	FBD1968-C3	65.60	FBD1968-C8	68.50
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	FBD2009-C3	65.60	FBD2009-C8	68.50

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	FBD2031-C3	65.60	FBD2031-C8	68.50
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	FBD2129-C3	65.60	FBD2129-C8	68.50
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	FBD2187-C3	65.60	FBD2187-C8	68.50
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	FBD2343-C3	65.60	FBD2343-C8	68.50
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	FBD2362-C3	65.60	FBD2362-C8	68.50
.2500 (1/4)	E	6.350 mm	1.181	**30.00 mm**	(3x)	8 mm	100 mm	FBF2500-C3	64.40	FBF2500-C8	67.30
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	FBD2500-C3	65.60	FBD2500-C8	68.50

SPEEDS & FEEDS (Miniature High Performance Drills – Flat Bottom)

Important Note: Values in table are for a fully enclosed tool that is 1x diameter into the workpiece. A starting hole is required on a flat surface. For drilling on inclined or rounded surfaces please refer to the complete speeds and feeds chart available online at www.harveytool.com. Values in table are also based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For Ferrous materials at 38-45 Rc reduce IPR to 80% of the chart value. Pecking cycles are recommended to avoid chip packing and breakage. Initial Peck must fully submerge the drill point into the material. Do not use a pecking cycle for half-hole drilling or any situation where the drill is not fully enclosed in the material during the drilling operation. For steels at 29-37 Rc, an initial peck should be 2-3x Diameter, and each subsequent peck should be 1-2x Diameter. For harder steels at 38-45 Rc, 1-2x Diameter is recommended for an initial peck, and each subsequent peck should be .5-1x Diameter. For Non-Ferrous Materials, an initial peck should be 3-5x Diameter, and each subsequent peck should be 2-3x Diameter.

Coating	Material	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
AlTiN Hardness: 29-37 Rc (279-344 HBn)	**Carbon Steels** Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
TiB_2 Hardness: ≤ 28 Rc (≤ 271 HBn)	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	450	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
	Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00065	.00134	.00203	.00268	.00337	.00402	.00540	.00808	.01080
	Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
	Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
	Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
	Wrought - 5%-8% Si (4xxx)	600									
	Wrought - 8%-12% Si (4xxx)	480									
	Magnesium Alloys	900	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Zinc Alloys	480									
	Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
	Plastics: Unfilled Plastics	500	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Reinforced Plastics	350	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through

Available in 12x & 20x Flute Lengths!

- Drill up to 20x diameter in depth
- Coolant through design for improved chip removal and heat reduction at the drill tip
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- h6 shank tolerance for high precision tool holders
- AlTiN coated for improved lubricity and heat resistance
- CNC ground in Germany
- Solid carbide

Coolant Through Design for Improved Chip Removal

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	ACD0520-C3	160.90
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	ACD0550-C3	160.90
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0590-C3	160.90
.0590		1.500 mm	1.280	**32.50 mm**	(20x)	3 mm	75 mm	CXZ0590-C3	191.10
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0595-C3	160.90
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	ACD0625-C3	160.90
.0625 (1/16)		1.587 mm	1.358	**34.50 mm**	(20x)	3 mm	75 mm	CXZ0625-C3	191.10
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	ACD0700-C3	160.90
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	ACD0781-C3	160.90
.0781 (5/64)		1.984 mm	1.693	**43.00 mm**	(20x)	3 mm	100 mm	CXZ0781-C3	191.10
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	ACD0787-C3	166.60
.0787		2.000 mm	1.732	**44.00 mm**	(20x)	4 mm	100 mm	CXZ0787-C3	211.80
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	ACD0890-C3	166.60
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	ACD0937-C3	166.60
.0937 (3/32)		2.381 mm	2.047	**52.00 mm**	(20x)	4 mm	100 mm	CXZ0937-C3	211.80
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	ACD1015-C3	166.60
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	ACD1065-C3	166.60
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	ACD1093-C3	166.60
.1093 (7/64)		2.778 mm	2.362	**60.00 mm**	(20x)	4 mm	100 mm	CXZ1093-C3	211.80
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	ACD1181-C3	166.60
.1181		3.000 mm	2.559	**65.00 mm**	(20x)	4 mm	100 mm	CXZ1181-C3	211.80

See Speeds & Feeds on next page

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through (cont.)

SPEEDS & FEEDS (Miniature High Performance Drills – Deep Hole)

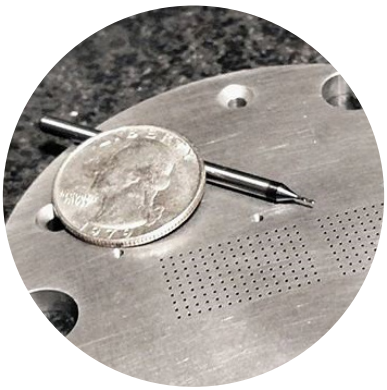
Important Note: Values in table are in inches and are based on 12x length drills and a material hardness of 29-37 Rc. For longer lengths and higher hardness materials, table values of IPR must be reduced (for 20x, reduce to 75%). For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter							
		.031	.047	.062	.078	.093	.125	.187	.250
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00101	.00153	.00201	.00253	.00302	.00406 20020	.00607	.00811
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Tool Steels A, L, O, P, W series	125	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
D, H, M, T, S series	90	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Titanium Alloys	100	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507

Deep Hole Drilling Guidelines

For best results, the following steps are recommended:

- For hole depths of 12x Diameter or greater, drill a pilot hole up to 1.5x D in depth using a drill with 3x LOF or shorter.
- Insert primary drill at low speed (~500 rpm) and start coolant flow.
- Increase speed and feed to recommended parameters.
- Under optimal conditions, it is possible to feed to full hole depth without pecking. If necessary, use 2-4 pecks to get to full hole depth.
- After reaching desired hole depth, reduce speed (~500 RPM) before retracting the drill.
- Cutting oil is recommended. As an alternative, it is possible to use emulsions with EP additives. Use a fine mesh prefilter (=5µm) on spindle through coolant to prevent a blockage of the coolant hole. A minimum coolant pressure of 600-800 PSI is recommended.



Selecting the Right Harvey Tool Miniature Drill

With so many different types of miniature drills to choose from, it can be tough to identify the right solution for your specific job. Learn how to choose right the first time in our "In the Loupe" blog post **Selecting the Right Miniature Drill**.

Read more on harveyperformance.com/in-the-loupe/

MINIATURE DRILLS

Miniature Drills Down to .002"

- For tools .020″ and smaller, there is an intermediate neck diameter as pictured above
- 130° drill point
- Carbide
- CNC ground in Germany

DRILL DIAMETER			FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
inch	wire	metric							
D_1 $^{+.0000″}_{-.0003″}$ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.0020		.050 mm	.023	1/8	1-1/2	810020**	36.60		
.0020		.050 mm	.028	1/8	1-1/2	20020	36.60		
.0039	#102	.100 mm	.026	1/8	1-1/2	810039**	26.00		
.0039	#102	.100 mm	.039	1/8	1-1/2	20039	26.00		
.0051	#99	.130 mm	.034	1/8	1-1/2	810051**	25.40		
.0051	#99	.130 mm	.056	1/8	1-1/2	20051	25.40		
.0059	#97	.150 mm	.040	1/8	1-1/2	810059**	23.60		
.0059	#97	.150 mm	.066	1/8	1-1/2	20059	23.60		
.0063	#96		.042	1/8	1-1/2	810063**	23.60		
.0063	#96		.066	1/8	1-1/2	20063	23.60		
.0067	#95		.066	1/8	1-1/2	20067	23.60		
.0069		.175 mm	.066	1/8	1-1/2	20069	23.60		
.0071	#94		.106	1/8	1-1/2	20071	21.50		
.0075	#93		.106	1/8	1-1/2	20075	21.50		
.0079	#92	.200 mm	.054	1/8	1-1/2	810079**	18.00	810079-C3**	22.60
.0079	#92	.200 mm	.160	1/8	1-1/2	20079	18.00	20079-C3	22.60
.0083	#91		.160	1/8	1-1/2	20083	18.00	20083-C3	22.60
.0087	#90		.126	1/8	1-1/2	20087	18.00	20087-C3	22.60
.0089		.225 mm	.160	1/8	1-1/2	20089	18.00	20089-C3	22.60
.0091	#89		.160	1/8	1-1/2	20091	17.60	20091-C3	22.20
.0095	#88		.064	1/8	1-1/2	810095**	17.60	810095-C3**	22.20
.0095	#88		.160	1/8	1-1/2	20095	17.60	20095-C3	22.20
.0098		.250 mm	.066	1/8	1-1/2	810098**	17.60	810098-C3**	22.20
.0098		.250 mm	.160	1/8	1-1/2	20098	17.60	20098-C3	22.20
.0100	#87		.068	1/8	1-1/2	810100**	17.60	810100-C3**	22.20
.0100	#87		.160	1/8	1-1/2	20100	17.60	20100-C3	22.20
.0105	#86		.160	1/8	1-1/2	20105	17.60	20105-C3	22.20
.0108		.275 mm	.160	1/8	1-1/2	20108	17.60	20108-C3	22.20
.0110	#85		.160	1/8	1-1/2	20110	17.60	20110-C3	22.20
.0115	#84		.180	1/8	1-1/2	20115	17.60	20115-C3	22.20
.0118		.300 mm	.180	1/8	1-1/2	20118	17.60	20118-C3	22.20

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

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MINIATURE DRILLS

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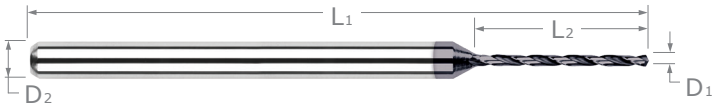

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DRILL DIAMETER			FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
inch	wire	metric							
D_1 $^{+.0000"}_{-.0003"}$ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.0120	#83		.080	1/8	1-1/2	810120	15.90	810120-C3	20.50
.0120	#83		.230	1/8	1-1/2	20120	15.90	20120-C3	20.50
.0125	#82		.230	1/8	1-1/2	20125	15.90	20125-C3	20.50
.0130	#81		.230	1/8	1-1/2	20130	15.90	20130-C3	20.50
.0135	#80		.270	1/8	1-1/2	20135	15.50	20135-C3	20.10
.0138		.350 mm	.270	1/8	1-1/2	20138	15.50	20138-C3	20.10
.0145	#79		.100	1/8	1-1/2	810145	15.50	810145-C3	20.10
.0145	#79		.270	1/8	1-1/2	20145	15.50	20145-C3	20.10
.0157		.400 mm	.105	1/8	1-1/2	810157	15.50	810157-C3	20.10
.0157		.400 mm	.270	1/8	1-1/2	20157	15.50	20157-C3	20.10
.0160	#78		.270	1/8	1-1/2	20160	15.50	20160-C3	20.10
.0168			.270	1/8	1-1/2	20168	15.50	20168-C3	20.10
.0177		.450 mm	.270	1/8	1-1/2	20177	15.50	20177-C3	20.10
.0180	#77		.120	1/8	1-1/2	810180	14.40	810180-C3	19.00
.0180	#77		.270	1/8	1-1/2	20180	14.40	20180-C3	19.00
.0197		.500 mm	.275	1/8	1-1/2	20197	14.40	20197-C3	19.00
.0200	#76		.135	1/8	1-1/2	810200	14.40	810200-C3	19.00
.0200	#76		.275	1/8	1-1/2	20200	14.40	20200-C3	19.00
.0210	#75		.275	1/8	1-1/2	20205	14.40	20205-C3	19.00
.0225	#74		.150	1/8	1-1/2	810210	14.40	810210-C3	19.00
.0225	#74		.275	1/8	1-1/2	20210	14.40	20210-C3	19.00
.0236		.600 mm	.275	1/8	1-1/2	20214	14.40	20214-C3	19.00
.0240	#73		.275	1/8	1-1/2	20215	14.40	20215-C3	19.00
.0250	#72		.170	1/8	1-1/2	810220	14.40	810220-C3	19.00
.0250	#72		.275	1/8	1-1/2	20220	14.40	20220-C3	19.00
.0260	#71		.275	1/8	1-1/2	20225	14.40	20225-C3	19.00
.0276		.700 mm	.335	1/8	1-1/2	20229	14.40	20229-C3	19.00
.0280	#70		.335	1/8	1-1/2	20230	14.40	20230-C3	19.00
.0292	#69		.335	1/8	1-1/2	20235	14.40	20235-C3	19.00
.0302			.395	1/8	1-1/2	20240	14.40	20240-C3	19.00
.0310	#68		.210	1/8	1-1/2	810245	13.50	810245-C3	18.10
.0310	#68		.395	1/8	1-1/2	20245	13.50	20245-C3	18.10
.0312 (1/32)			.210	1/8	1-1/2	810250	13.50	810250-C3	18.10
.0312 (1/32)			.395	1/8	1-1/2	20250	13.50	20250-C3	18.10
.0315		.800 mm	.395	1/8	1-1/2	20253	13.50	20253-C3	18.10
.0320	#67		.395	1/8	1-1/2	20255	13.50	20255-C3	18.10

* Tolerance for all AlTiN coating is +.0002"/−.0003".

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MINIATURE DRILLS

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED 2 FL	UNCOATED PRICE	AlTiN COATED 2 FL	AlTiN COATED PRICE
D_1 $^{+.0000''}_{-.0003''}$ *			L_2	D_2	L_1				
.0330	#66		.395	1/8	1-1/2	20260	13.50	20260-C3	18.10
.0350	#65		.395	1/8	1-1/2	20265	13.50	20265-C3	18.10
.0354		.900 mm	.395	1/8	1-1/2	20267	13.50	20267-C3	18.10
.0360	#64		.395	1/8	1-1/2	20270	13.50	20270-C3	18.10
.0370	#63		.395	1/8	1-1/2	20275	13.50	20275-C3	18.10
.0380	#62		.395	1/8	1-1/2	20280	13.50	20280-C3	18.10
.0390	#61		.395	1/8	1-1/2	20285	13.50	20285-C3	18.10
.0394		1.000 mm	.395	1/8	1-1/2	20290	13.50	20290-C3	18.10
.0400	#60		.395	1/8	1-1/2	20295	13.50	20295-C3	18.10
.0410	#59		.395	1/8	1-1/2	20300	13.50	20300-C3	18.10
.0420	#58		.395	1/8	1-1/2	20305	13.50	20305-C3	18.10
.0430	#57		.395	1/8	1-1/2	20310	13.50	20310-C3	18.10
.0433		1.100 mm	.395	1/8	1-1/2	20311	13.50	20311-C3	18.10
.0440			.395	1/8	1-1/2	20315	13.50	20315-C3	18.10
.0465	#56		.395	1/8	1-1/2	20320	13.50	20320-C3	18.10
.0469 (3/64)			.395	1/8	1-1/2	20325	13.50	20325-C3	18.10
.0472		1.200 mm	.395	1/8	1-1/2	20327	13.50	20327-C3	18.10
.0492		1.250 mm	.395	1/8	1-1/2	20330	13.50	20330-C3	18.10
.0500		1.270 mm	.395	1/8	1-1/2	20332	13.50	20332-C3	18.10
.0512		1.300 mm	.413	1/8	1-1/2	20335	13.50	20335-C3	18.10
.0520	#55		.413	1/8	1-1/2	20340	13.50	20340-C3	18.10
.0520	#55		.500	1/8	1-1/2	815340	13.50	815340-C3	18.10
.0531		1.350 mm	.413	1/8	1-1/2	20345	13.50	20345-C3	18.10
.0550	#54		.413	1/8	1-1/2	20350	13.50	20350-C3	18.10
.0550	#54		.525	1/8	1-1/2	815350	13.50	815350-C3	18.10
.0571		1.450 mm	.413	1/8	1-1/2	20355	13.50	20355-C3	18.10
.0591		1.500 mm	.413	1/8	1-1/2	20360	13.50	20360-C3	18.10
.0595	#53		.413	1/8	1-1/2	20365	13.50	20365-C3	18.10
.0595	#53		.575	1/8	2	815365	14.20	815365-C3	18.80
.0610		1.550 mm	.413	1/8	1-1/2	20370	13.50	20370-C3	18.10
.0625 (1/16)			.413	1/8	1-1/2	20375	13.50	20375-C3	18.10
.0625 (1/16)			.600	1/8	2	815375	14.20	815375-C3	18.80
D_1 $^{+.0000''}_{-.0005''}$ **			L_2	D_2	L_1				
.0630		1.600 mm	.413	1/8	1-1/2	20376	13.50	20376-C3	18.10
.0635	#52		.413	1/8	1-1/2	20377	13.50	20377-C3	18.10
.0635	#52		.600	1/8	2	815377	14.20	815377-C3	18.80
.0670	#51		.413	1/8	1-1/2	20384	13.50	20384-C3	18.10
.0670	#51		.650	1/8	2	815384	14.20	815384-C3	18.80

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Tolerance for AlTiN coating is +.0002"/−.0005".

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MINIATURE DRILLS

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED 2 FL	UNCOATED PRICE	AlTiN COATED 2 FL	AlTiN COATED PRICE
D_1 $^{+.0000"}_{-.0005"}$ **			L_2	D_2	L_1				
.0700	#50		.413	1/8	1-1/2	20390	13.50	20390-C3	18.10
.0700	#50		.700	1/8	2	815390	14.20	815390-C3	18.80
.0730	#49		.413	1/8	1-1/2	20396	13.50	20396-C3	18.10
.0760	#48		.413	1/8	1-1/2	20402	13.50	20402-C3	18.10
.0760	#48		.750	1/8	2	815402	14.20	815402-C3	18.80
.0781 (5/64)			.413	1/8	1-1/2	20407	13.50	20407-C3	18.10
.0781 (5/64)			.750	1/8	2	815407	14.20	815407-C3	18.80
.0785	#47		.413	1/8	1-1/2	20408	13.50	20408-C3	18.10
.0787		2.000 mm	.413	1/8	1-1/2	20409	13.50	20409-C3	18.10
.0810	#46		.413	1/8	1-1/2	20414	13.50	20414-C3	18.10
.0810	#46		.800	1/8	2	815414	14.20	815414-C3	18.80
.0820	#45		.413	1/8	1-1/2	20416	13.50	20416-C3	18.10
.0860	#44		.413	1/8	1-1/2	20424	13.50	20424-C3	18.10
.0890	#43		.413	1/8	1-1/2	20430	13.50	20430-C3	18.10
.0890	#43		.850	1/8	2	815430	14.20	815430-C3	18.80
.0935	#42		.413	1/8	1-1/2	20439	13.50	20439-C3	18.10
.0938 (3/32)			.413	1/8	1-1/2	20440	13.50	20440-C3	18.10
.0938 (3/32)			.900	1/8	2	815440	14.20	815440-C3	18.80
.0960	#41		.413	1/8	1-1/2	20445	13.50	20445-C3	18.10
.0980	#40		.413	1/8	1-1/2	20449	13.50	20449-C3	18.10
.0984		2.500 mm	.413	1/8	1-1/2	20450	13.50	20450-C3	18.10
.0995	#39		.413	1/8	1-1/2	20453	13.50	20453-C3	18.10
.1015	#38		.413	1/8	1-1/2	20457	13.50	20457-C3	18.10
.1040	#37		.413	1/8	1-1/2	20462	13.50	20462-C3	18.10
.1065	#36		.413	1/8	1-1/2	20467	13.50	20467-C3	18.10
.1094 (7/64)			.413	1/8	1-1/2	20473	13.50	20473-C3	18.10
.1094 (7/64)			1.100	1/8	2-1/2	815473	14.20	815473-C3	18.80
.1100	#35		.413	1/8	1-1/2	20475	13.50	20475-C3	18.10
.1110	#34		.413	1/8	1-1/2	20477	13.50	20477-C3	18.10
.1130	#33		.413	1/8	1-1/2	20481	13.50	20481-C3	18.10
.1160	#32		.413	1/8	1-1/2	20487	13.50	20487-C3	18.10
.1181		3.000 mm	.413	1/8	1-1/2	20491	13.50	20491-C3	18.10
.1200	#31		.413	1/8	1-1/2	20493	13.50	20493-C3	18.10
.1250 (1/8)			.413	1/8	1-1/2	20498	13.50	20498-C3	18.10
.1250 (1/8)			1.200	1/8	2-1/2	815498	14.20	815498-C3	18.80

** Tolerance for AlTiN coating is +.0002"/−.0005".

NEW SIZES!

MINIATURE DRILLS

Spotting Drills

Stocked in 9 Included Angles

- Thinned web to reduce walking
- Self-centering point geometry
- 2 flutes
- Solid carbide
- CNC ground in the USA

INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
A +1° −1°	D1	L2			D2	L1		2 FL	PRICE	2 FL	PRICE
60°	.020	.060 (3x)	.0020	I	1/8	1-1/2		932720	29.20	932720-C3	33.80
	.030	.090 (3x)	.0030	I	1/8	1-1/2		932730	28.60	932730-C3	33.20
	.031 (1/32)	.093 (3x)	.0030	I	1/8	1-1/2		932731	28.60	932731-C3	33.20
	.045	.135 (3x)	.0030	I	1/8	1-1/2		932745	24.80	932745-C3	29.40
	.060	.180 (3x)	.0050	I	1/8	1-1/2		932760	28.60	932760-C3	33.20
	.062 (1/16)	.186 (3x)	.0050	I	1/8	1-1/2		932762	28.60	932762-C3	33.20
	.090	.270 (3x)	.0050	I	1/8	1-1/2		932790	28.60	932790-C3	33.20
	.093 (3/32)	.279 (3x)	.0060	I	1/8	1-1/2		932793	28.60	932793-C3	33.20
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2		932808	28.60	932808-C3	33.20
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2		932811	28.60	932811-C3	33.20
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2		932812	25.70	932812-C3	30.70
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2		932816	31.00	932816-C3	37.80
82°	.010	.030 (3x)	.0015	I	1/8	1-1/2		983110	34.20	983110-C3	38.80
	.020	.060 (3x)	.0020	I	1/8	1-1/2		983120	29.20	983120-C3	33.80
	.030	.090 (3x)	.0030	I	1/8	1-1/2		983130	27.60	983130-C3	32.20
	.045	.135 (3x)	.0030	I	1/8	1-1/2		983145	24.80	983145-C3	29.40
	.060	.180 (3x)	.0050	I	1/8	1-1/2		983160	24.50	983160-C3	29.10
	.090	.270 (3x)	.0050	I	1/8	1-1/2		983190	23.40	983190-C3	28.00
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2		983208	22.20	983208-C3	26.80
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2		965208	22.20	965208-C3	26.80
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2		965212	25.70	965212-C3	30.70
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2		965216	31.90	965216-C3	38.70
90°	.008	.024 (3x)	.0015	I	1/8	1-1/2		11408	41.60	11408-C3	46.20
	.010	.030 (3x)	.0015	I	1/8	1-1/2		11410	33.10	11410-C3	37.70
	.010	.030 (3x)	.0015	I	1/8	3	*LONG!*	987910	39.70	987910-C3	44.30
	.012	.036 (3x)	.0015	I	1/8	1-1/2		11412	41.60	11412-C3	46.20
	.015 (1/64)	.045 (3x)	.0015	I	1/8	1-1/2		11415	33.10	11415-C3	37.70
	.020	.060 (3x)	.0020	I	1/8	1-1/2		11420	28.60	11420-C3	33.20
	.020	.060 (3x)	.0020	I	1/8	3	*LONG!*	987920	35.20	987920-C3	39.80
	.025	.075 (3x)	.0020	I	1/8	1-1/2		11425	28.60	11425-C3	33.20
	.030	.045 (1.5x)	.0030	I	1/8	1-1/2		816030	26.40	816030-C3	33.20
	.030	.090 (3x)	.0030	I	1/8	1-1/2		11430	26.40	11430-C3	31.00
	.030	.090 (3x)	.0030	I	1/8	3	*LONG!*	987930	33.40	987930-C3	38.00
	.031 (1/32)	.093 (3x)	.0030	I	1/8	1-1/2		11431	26.40	11431-C3	31.00
	.035	.105 (3x)	.0030	I	1/8	1-1/2		11435	26.40	11435-C3	31.00
	.039 (1 mm)	.117 (3x)	.0030	I	1/8	1-1/2		11439	26.40	11439-C3	31.00

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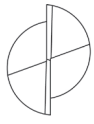
End View

TYPE I

On center design reduces walking and minimizes flat at bottom of spot. Ideally suited for starting smaller diameter drills and shallow spots.


End View

TYPE II

Ahead of center design improves tip strength. Ideally suited for larger diameter drills and tougher materials.

NEW SIZES!

MINIATURE DRILLS

Spotting Drills (cont.)

continued from previous page

	INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
	A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1		2 FL	PRICE	2 FL	PRICE
		.040	.120	(3x)	.0030	I	1/8	1-1/2		11440	24.20	11440-C3	28.80
		.045	.135	(3x)	.0030	I	1/8	1-1/2		11445	24.20	11445-C3	28.80
		.045	.135	(3x)	.0030	I	1/8	3	LONG!	987945	31.00	987945-C3	35.60
		.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2		11447	24.20	11447-C3	28.80
		.050	.150	(3x)	.0040	I	1/8	1-1/2		11450	24.20	11450-C3	28.80
		.055	.165	(3x)	.0040	I	1/8	1-1/2		11455	24.20	11455-C3	28.80
		.060	.090	(1.5x)	.0050	I	1/8	1-1/2		816060	23.90	816060-C3	28.90
		.060	.180	(3x)	.0050	I	1/8	1-1/2		11460	23.90	11460-C3	28.50
		.060	.180	(3x)	.0050	I	1/8	3	LONG!	987960	30.60	987960-C3	35.20
		.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2		11462	23.90	11462-C3	28.50
		.070	.210	(3x)	.0050	I	1/8	1-1/2		11470	23.90	11470-C3	28.50
		.075	.225	(3x)	.0050	I	1/8	1-1/2		11475	23.90	11475-C3	28.50
		.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2		11478	23.90	11478-C3	28.50
		.080	.240	(3x)	.0050	I	1/8	1-1/2		11480	23.90	11480-C3	28.50
		.090	.135	(1.5x)	.0050	I	1/8	1-1/2		816090	22.50	816090-C3	27.50
		.090	.270	(3x)	.0050	I	1/8	1-1/2		11490	22.50	11490-C3	27.10
		.090	.270	(3x)	.0050	I	1/8	3	LONG!	987990	29.40	987990-C3	34.00
		.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2		11493	22.50	11493-C3	27.10
		.100	.300	(3x)	.0060	I	1/8	1-1/2		11500	22.50	11500-C3	27.10
		.109 (7/64)	.327	(3x)	.0080	I	1/8	1-1/2		11509	22.50	11509-C3	27.10
		.118 (3 mm)	.354	(3x)	.0080	I	1/8	1-1/2		1153M	22.50	1153M-C3	27.10
	90°	.125 (1/8)	.188	(1.5x)	.0100	I	1/8	1-1/2		816108	21.00	816108-C3	26.00
		.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2		11525	21.00	11525-C3	25.60
		.125 (1/8)	.375	(3x)	.0100	I	1/8	3	LONG!	988008	28.60	988008-C3	33.20
NEW		.125 (1/8)	.188	(1.5x)	.0100	II	1/8	1-1/2		787708	21.00	787708-C3	25.60
		.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2		37508	21.00	37508-C3	25.60
		.125 (1/8)	.375	(3x)	.0100	II	1/8	4	LONG!	55808	30.40	55808-C3	35.40
		.140 (9/64)	.375	(2.5x)	.0100	II	3/16	2		37509	30.00	37509-C3	35.00
		.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2		37510	25.00	37510-C3	30.00
		.187 (3/16)	.625	(3.5x)	.0130	I	3/16	2		803912	24.20	803912-C3	29.20
NEW		.187 (3/16)	.312	(1.5x)	.0130	II	3/16	2		787712	24.20	787712-C3	29.20
		.187 (3/16)	.625	(3.5x)	.0130	II	3/16	2		37512	24.20	37512-C3	29.20
		.187 (3/16)	.625	(3.5x)	.0130	II	3/16	4	LONG!	55812	37.30	55812-C3	44.10
		.218 (7/32)	.750	(3.5x)	.0150	II	1/4	2-1/2		37514	38.40	37514-C3	45.20
		.236 (6 mm)	.750	(3x)	.0160	II	1/4	2-1/2		37515	38.40	37515-C3	45.20
		.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2		803916	30.10	803916-C3	36.90
NEW		.250 (1/4)	.375	(1.5x)	.0180	II	1/4	2-1/2		787716	30.10	787716-C3	36.90
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2		37516	30.10	37516-C3	36.90
		.250 (1/4)	.750	(3x)	.0180	II	1/4	6	LONG!	55816	50.50	55816-C3	59.50
		.312 (5/16)	.750	(2.5x)	.0220	II	5/16	2-1/2		37520	51.60	37520-C3	59.50
NEW		.375 (3/8)	.500	(1.5x)	.0270	II	3/8	2-1/2		787724	54.70	787724-C3	63.70
		.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2		37524	54.70	37524-C3	63.70
		.500 (1/2)	1.000	(2x)	.0350	II	1/2	3		37532	94.50	37532-C3	107.90
		.030	.090	(3x)	.0030	I	1/8	1-1/2		975830	27.60	975830-C3	32.20
		.060	.180	(3x)	.0050	I	1/8	1-1/2		975860	24.50	975860-C3	29.10
		.090	.270	(3x)	.0050	I	1/8	1-1/2		975890	24.80	975890-C3	29.40
	100°	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2		975908	22.20	975908-C3	26.80
		.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2		955908	22.20	955908-C3	26.80
		.187 (3/16)	.625	(3x)	.0130	II	3/16	2		955912	25.70	955912-C3	30.70
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2		955916	31.90	955916-C3	38.70

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NEW SIZES!

MINIATURE DRILLS

Spotting Drills (cont.)

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INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1	2 FL	PRICE	2 FL	PRICE	
	.010	.030	(3x)	.0015	I	1/8	1-1/2	11610	33.10	11610-C3	37.70	
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2	11615	33.10	11615-C3	37.70	
	.020	.060	(3x)	.0020	I	1/8	1-1/2	11620	28.60	11620-C3	33.20	
	.025	.075	(3x)	.0020	I	1/8	1-1/2	11625	28.60	11625-C3	33.20	
	.030	.090	(3x)	.0030	I	1/8	1-1/2	11630	26.40	11630-C3	31.00	
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2	11631	26.40	11631-C3	31.00	
	.040	.120	(3x)	.0030	I	1/8	1-1/2	11640	24.20	11640-C3	28.80	
	.045	.135	(3x)	.0030	I	1/8	1-1/2	11645	24.20	11645-C3	28.80	
	.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2	11647	24.20	11647-C3	28.80	
	.050	.150	(3x)	.0040	I	1/8	1-1/2	11650	24.20	11650-C3	28.80	
	.055	.165	(3x)	.0040	I	1/8	1-1/2	11655	24.20	11655-C3	28.80	
	.060	.180	(3x)	.0050	I	1/8	1-1/2	11660	23.90	11660-C3	28.50	
	.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	11662	23.90	11662-C3	28.50	
120°	.070	.210	(3x)	.0050	I	1/8	1-1/2	11670	23.90	11670-C3	28.50	
	.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	11678	23.90	11678-C3	28.50	
	.090	.270	(3x)	.0050	I	1/8	1-1/2	11690	22.50	11690-C3	27.10	
	.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	11693	22.50	11693-C3	27.10	
	.100	.300	(3x)	.0060	I	1/8	1-1/2	11700	22.50	11700-C3	27.10	
	.118 (3 mm)	.354	(3x)	.0080	I	1/8	1-1/2	1173M	22.50	1173M-C3	27.10	
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	11725	21.00	11725-C3	25.60	
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	38208	21.00	38208-C3	25.60	
	.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2	38210	46.80	38210-C3	51.80	
	.187 (3/16)	.625	(3.5x)	.0130	I	3/16	2	804012	24.20	804012-C3	29.20	
	.187 (3/16)	.625	(3.5x)	.0130	II	3/16	2	38212	24.20	38212-C3	29.20	
	.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2	804016	30.10	804016-C3	36.90	
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	38216	30.10	38216-C3	36.90	
	.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2	38224	54.70	38224-C3	63.70	
	.030	.090	(3x)	.0030	I	1/8	1-1/2	839530	30.40	839530-C3	34.90	
	.060	.180	(3x)	.0050	I	1/8	1-1/2	839560	30.40	839560-C3	34.90	
130°	.090	.270	(3x)	.0050	I	1/8	1-1/2	839590	30.40	839590-C3	34.90	
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	839608	31.90	839608-C3	36.30	
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	847016	33.30	847016-C3	40.10	
	.010	.030	(3x)	.0015	I	1/8	1-1/2	39810	34.20	39810-C3	38.80	
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2	39815	34.20	39815-C3	38.80	
	.020	.030	(1.5x)	.0020	I	1/8	1-1/2	815820	29.20	815820-C3	33.80	NEW
	.020	.060	(3x)	.0020	I	1/8	1-1/2	39820	29.20	39820-C3	33.80	
	.025	.075	(3x)	.0020	I	1/8	1-1/2	39825	29.20	39825-C3	33.80	
	.030	.045	(1.5x)	.0030	I	1/8	1-1/2	815830	27.60	815830-C3	32.60	
	.030	.090	(3x)	.0030	I	1/8	1-1/2	39830	27.60	39830-C3	32.20	
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2	39831	27.60	39831-C3	32.20	
140°	.040	.060	(1.5x)	.0030	I	1/8	1-1/2	815840	24.80	815840-C3	29.40	NEW
	.040	.120	(3x)	.0030	I	1/8	1-1/2	39840	24.80	39840-C3	29.40	
	.045	.135	(3x)	.0030	I	1/8	1-1/2	39845	24.80	39845-C3	29.40	
	.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2	39847	24.80	39847-C3	29.40	
	.050	.150	(3x)	.0040	I	1/8	1-1/2	39850	24.80	39850-C3	29.40	
	.055	.165	(3x)	.0040	I	1/8	1-1/2	39855	24.80	39855-C3	29.40	
	.060	.090	(1.5x)	.0050	I	1/8	1-1/2	815860	24.50	815860-C3	29.10	
	.060	.180	(3x)	.0050	I	1/8	1-1/2	39860	24.50	39860-C3	29.10	
	.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	39862	24.50	39862-C3	29.10	

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NEW SIZES!

MINIATURE DRILLS

Spotting Drills (cont.)

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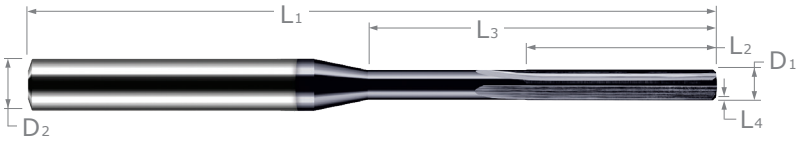
INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1	2 FL	PRICE	2 FL	PRICE
140°	.070	.210	(3x)	.0050	I	1/8	1-1/2	39870	24.50	39870-C3	29.10
	.075	.225	(3x)	.0050	I	1/8	1-1/2	39875	24.50	39875-C3	29.10
	.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	39878	24.50	39878-C3	29.10
	.090	.135	(1.5x)	.0050	I	1/8	1-1/2	815890	23.40	815890-C3	28.00
	.090	.270	(3x)	.0050	I	1/8	1-1/2	39890	23.40	39890-C3	28.00
	.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	39893	23.40	39893-C3	28.00
	.100	.300	(3x)	.0060	I	1/8	1-1/2	39900	23.40	39900-C3	28.00
	.118 (3mm)	.354	(3x)	.0080	I	1/8	1-1/2	3993M	23.40	3993M-C3	28.00
	.125 (1/8)	.188	(1.5x)	.0100	I	1/8	1-1/2	815908	22.20	815908-C3	26.80
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	39925	22.20	39925-C3	26.80
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	41008	22.20	41008-C3	26.80
	.140 (9/64)	.375	(2.5x)	.0100	II	3/16	2	41009	25.70	41009-C3	30.70
	.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2	41010	25.70	41010-C3	30.70
	.187 (3/16)	.625	(3x)	.0130	I	3/16	2	804112	25.70	804112-C3	30.70
	.187 (3/16)	.625	(3x)	.0130	II	3/16	2	41012	25.70	41012-C3	30.70
	.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2	804116	31.90	804116-C3	38.70
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	41016	31.90	41016-C3	38.70
	.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2	41024	56.30	41024-C3	65.30
NEW 150°	.020	.060	(3x)	.0020	I	1/8	1-1/2	961120	27.60	961120-C3	32.20
	.030	.090	(3x)	.0030	I	1/8	1-1/2	961130	27.60	961130-C3	32.20
	.040	.120	(3x)	.0030	I	1/8	1-1/2	961140	24.80	961140-C3	29.40
	.045	.135	(3x)	.0030	I	1/8	1-1/2	961145	24.80	961145-C3	29.40
	.047	.141	(3x)	.0040	I	1/8	1-1/2	961147	24.80	961147-C3	29.40
	.060	.180	(3x)	.0050	I	1/8	1-1/2	961160	24.50	961160-C3	29.10
	.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	961162	24.80	961162-C3	29.40
	.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	961178	24.80	961178-C3	29.40
	.090	.270	(3x)	.0050	I	1/8	1-1/2	961190	24.80	961190-C3	29.40
	.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	961193	24.80	961193-C3	29.40
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	961208	22.20	961208-C3	26.80
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	949508	22.20	949508-C3	26.80
	.187 (3/16)	.625	(3x)	.0130	II	3/16	2	949512	25.70	949512-C3	30.70
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	949516	31.90	949516-C3	38.70
170°	.060	.180	(3x)	.0050	I	1/8	1-1/2	893660	24.80	893660-C3	29.40
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	893708	24.80	893708-C3	29.40
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	893716	31.90	893716-C3	38.70

MINIATURE REAMERS



	D_1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0080		.062	.100	.0013	4	1/8	1-1/2	RSB0080	50.30	RSB0080-C3	54.70
.0083	#91	.062	.100	.0014	4	1/8	1-1/2	RSB0083	50.30	RSB0083-C3	54.70
.0085		.062	.109	.0014	4	1/8	1-1/2	RSB0085	50.30	RSB0085-C3	54.70
.0087	#90	.062	.109	.0015	4	1/8	1-1/2	RSB0087	50.30	RSB0087-C3	54.70
.0090		.062	.118	.0015	4	1/8	1-1/2	RSB0090	50.30	RSB0090-C3	54.70
.0091	#89	.062	.118	.0015	4	1/8	1-1/2	RSB0091	50.30	RSB0091-C3	54.70
.0095	#88	.062	.118	.0016	4	1/8	1-1/2	RSB0095	50.30	RSB0095-C3	54.70
.0100	#87	.078	.125	.0017	4	1/8	1-1/2	RSB0100	50.30	RSB0100-C3	54.70
.0105	#86	.078	.125	.0018	4	1/8	1-1/2	RSB0105	50.30	RSB0105-C3	54.70
.0110	#85	.078	.141	.0018	4	1/8	1-1/2	RSB0110	50.30	RSB0110-C3	54.70
.0115	#84	.078	.141	.0019	4	1/8	1-1/2	RSB0115	50.30	RSB0115-C3	54.70
.0120	#83	.093	.156	.0020	4	1/8	1-1/2	RSB0120	50.30	RSB0120-C3	54.70
.0125	#82	.093	.172	.0021	4	1/8	1-1/2	RSB0125	50.30	RSB0125-C3	54.70
.0130	#81	.093	.172	.0022	4	1/8	1-1/2	RSB0130	50.30	RSB0130-C3	54.70
.0135	#80	.109	.187	.0023	4	1/8	1-1/2	RSB0135	50.30	RSB0135-C3	54.70
.0140		.109	.187	.0023	4	1/8	1-1/2	RSB0140	50.30	RSB0140-C3	54.70
.0145	#79	.109	.187	.0024	4	1/8	1-1/2	RSB0145	50.30	RSB0145-C3	54.70
.0150		.109	.187	.0025	4	1/8	1-1/2	RSB0150	50.30	RSB0150-C3	54.70
.0155		.109	.187	.0026	4	1/8	1-1/2	RSB0155	50.30	RSB0155-C3	54.70
.0160	#78	.125	.218	.0027	4	1/8	1-1/2	RSB0160	37.90	RSB0160-C3	42.30
.0165		.125	.218	.0019	4	1/8	1-1/2	RSB0165	37.90	RSB0165-C3	42.30
.0170		.125	.218	.0020	4	1/8	1-1/2	RSB0170	37.90	RSB0170-C3	42.30
.0175		.125	.218	.0020	4	1/8	1-1/2	RSB0175	37.90	RSB0175-C3	42.30
.0180	#77	.140	.250	.0021	4	1/8	1-1/2	RSB0180	37.90	RSB0180-C3	42.30
.0185		.140	.250	.0021	4	1/8	1-1/2	RSB0185	37.90	RSB0185-C3	42.30
.0190		.140	.250	.0022	4	1/8	1-1/2	RSB0190	37.90	RSB0190-C3	42.30
.0195		.140	.250	.0022	4	1/8	1-1/2	RSB0195	37.90	RSB0195-C3	42.30
.0200	#76	.140	.250	.0023	4	1/8	1-1/2	RSB0200	37.90	RSB0200-C3	42.30
.0205		.140	.250	.0024	4	1/8	1-1/2	RSB0205	37.90	RSB0205-C3	42.30
.0210	#75	.172	.281	.0024	4	1/8	1-1/2	RSB0210	37.90	RSB0210-C3	42.30
.0215		.172	.281	.0025	4	1/8	1-1/2	RSB0215	37.90	RSB0215-C3	42.30
.0220		.172	.281	.0025	4	1/8	1-1/2	RSB0220	37.90	RSB0220-C3	42.30
.0225	#74	.172	.281	.0026	4	1/8	1-1/2	RSB0225	37.90	RSB0225-C3	42.30
.0230		.172	.281	.0026	4	1/8	1-1/2	RSB0230	37.90	RSB0230-C3	42.30
.0235		.172	.281	.0027	4	1/8	1-1/2	RSB0235	37.90	RSB0235-C3	42.30
.0240	#73	.187	.312	.0028	4	1/8	1-1/2	RSB0240	37.90	RSB0240-C3	42.30
.0245		.187	.312	.0028	4	1/8	1-1/2	RSB0245	37.90	RSB0245-C3	42.30
.0250	#72	.187	.312	.0029	4	1/8	1-1/2	RSB0250	37.90	RSB0250-C3	42.30
.0255		.187	.312	.0029	4	1/8	1-1/2	RSB0255	37.90	RSB0255-C3	42.30
.0260	#71	.187	.312	.0030	4	1/8	1-1/2	RSB0260	37.90	RSB0260-C3	42.30
.0265		.187	.312	.0030	4	1/8	1-1/2	RSB0265	37.90	RSB0265-C3	42.30

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0270		.218	.375	.0031	4	1/8	2	RSB0270	37.90	RSB0270-C3	42.30
.0275		.218	.375	.0032	4	1/8	2	RSB0275	37.90	RSB0275-C3	42.30
.0280	#70	.218	.375	.0032	4	1/8	2	RSB0280	37.90	RSB0280-C3	42.30
.0285		.218	.375	.0033	4	1/8	2	RSB0285	37.90	RSB0285-C3	42.30
.0290		.218	.375	.0033	4	1/8	2	RSB0290	37.90	RSB0290-C3	42.30
.0292	#69	.218	.375	.0034	4	1/8	2	RSB0292	37.90	RSB0292-C3	42.30
.0295 (.75 mm)		.218	.375	.0034	4	1/8	2	RSB0295	37.90	RSB0295-C3	42.30
.0300		.218	.375	.0035	4	1/8	2	RSB0300	37.90	RSB0300-C3	42.30
.0305		.218	.375	.0035	4	1/8	2	RSB0305	37.90	RSB0305-C3	42.30
.0310	#68	.218	.375	.0036	4	1/8	2	RSB0310	37.90	RSB0310-C3	42.30
.0315 (.80 mm)		.218	.375	.0036	4	1/8	2	RSB0315	37.90	RSB0315-C3	42.30
.0320	#67	.250	.437	.0037	4	1/8	2	RSB0320	37.90	RSB0320-C3	42.30
.0325		.250	.437	.0037	4	1/8	2	RSB0325	37.90	RSB0325-C3	42.30
.0330	#66	.250	.437	.0038	4	1/8	2	RSB0330	37.90	RSB0330-C3	42.30
.0335 (.85 mm)		.250	.437	.0039	4	1/8	2	RSB0335	37.90	RSB0335-C3	42.30
.0340		.250	.437	.0039	4	1/8	2	RSB0340	37.90	RSB0340-C3	42.30
.0345		.250	.437	.0040	4	1/8	2	RSB0345	37.90	RSB0345-C3	42.30
.0350	#65	.250	.437	.0040	4	1/8	2	RSB0350	37.90	RSB0350-C3	42.30
.0355		.250	.437	.0041	4	1/8	2	RSB0355	37.90	RSB0355-C3	42.30
.0360	#64	.281	.500	.0041	4	1/8	2	RSB0360	37.90	RSB0360-C3	42.30
.0365		.281	.500	.0042	4	1/8	2	RSB0365	37.90	RSB0365-C3	42.30
.0370	#63	.281	.500	.0043	4	1/8	2	RSB0370	37.90	RSB0370-C3	42.30
.0375		.281	.500	.0043	4	1/8	2	RSB0375	37.90	RSB0375-C3	42.30
.0380	#62	.281	.500	.0044	4	1/8	2	RSB0380	37.90	RSB0380-C3	42.30
.0385		.281	.500	.0044	4	1/8	2	RSB0385	37.90	RSB0385-C3	42.30
.0390	#61	.281	.500	.0045	4	1/8	2	RSB0390	37.90	RSB0390-C3	42.30
.0395		.281	.500	.0045	4	1/8	2	RSB0395	37.90	RSB0395-C3	42.30
.0400	#60	.281	.500	.0046	4	1/8	2	RSB0400	37.90	RSB0400-C3	42.30
.0405		.281	.500	.0047	4	1/8	2	RSB0405	37.90	RSB0405-C3	42.30
.0410	#59	.281	.500	.0047	4	1/8	2	RSB0410	37.90	RSB0410-C3	42.30
.0415		.281	.500	.0048	4	1/8	2	RSB0415	37.90	RSB0415-C3	42.30
.0420	#58	.281	.500	.0048	4	1/8	2	RSB0420	37.90	RSB0420-C3	42.30
.0425		.312	.562	.0049	4	1/8	2	RSB0425	37.90	RSB0425-C3	42.30
.0430	#57	.312	.562	.0049	4	1/8	2	RSB0430	37.90	RSB0430-C3	42.30
.0435		.312	.562	.0050	4	1/8	2	RSB0435	37.90	RSB0435-C3	42.30
.0440		.312	.562	.0044	4	1/8	2	RSB0440	37.90	RSB0440-C3	42.30
.0445		.312	.562	.0045	4	1/8	2	RSB0445	37.90	RSB0445-C3	42.30
.0450		.312	.562	.0045	4	1/8	2	RSB0450	37.90	RSB0450-C3	42.30
.0455		.312	.562	.0046	4	1/8	2	RSB0455	37.90	RSB0455-C3	42.30
.0460		.312	.562	.0046	4	1/8	2	RSB0460	37.90	RSB0460-C3	42.30
.0465	#56	.312	.562	.0047	4	1/8	2	RSB0465	37.90	RSB0465-C3	42.30
.0469 (3/64)		.312	.562	.0047	4	1/8	2	RSB0469	31.80	RSB0469-C3	36.20
.0470		.312	.562	.0047	4	1/8	2	RSB0470	31.80	RSB0470-C3	36.20
.0475		.312	.562	.0048	4	1/8	2	RSB0475	31.80	RSB0475-C3	36.20
.0480		.375	.625	.0048	4	1/8	2	RSB0480	31.80	RSB0480-C3	36.20
.0485		.375	.625	.0049	4	1/8	2	RSB0485	31.80	RSB0485-C3	36.20
.0490		.375	.625	.0049	4	1/8	2	RSB0490	31.80	RSB0490-C3	36.20
.0495		.375	.625	.0050	4	1/8	2	RSB0495	31.80	RSB0495-C3	36.20
.0500		.375	.625	.0050	4	1/8	2	RSB0500	31.80	RSB0500-C3	36.20

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0505		.375	.625	.0051	4	1/8	2	RSB0505	31.80	RSB0505-C3	36.20
.0510		.375	.625	.0051	4	1/8	2	RSB0510	31.80	RSB0510-C3	36.20
.0515		.375	.625	.0052	4	1/8	2	RSB0515	31.80	RSB0515-C3	36.20
.0520	#55	.375	.625	.0052	4	1/8	2	RSB0520	31.80	RSB0520-C3	36.20
.0525		.375	.625	.0053	4	1/8	2	RSB0525	31.80	RSB0525-C3	36.20
.0530		.437	.687	.0053	4	1/8	2	RSB0530	31.80	RSB0530-C3	36.20
.0535		.437	.687	.0054	4	1/8	2	RSB0535	31.80	RSB0535-C3	36.20
.0540		.437	.687	.0054	4	1/8	2	RSB0540	31.80	RSB0540-C3	36.20
.0545		.437	.687	.0055	4	1/8	2	RSB0545	31.80	RSB0545-C3	36.20
.0550	#54	.437	.687	.0055	4	1/8	2	RSB0550	31.80	RSB0550-C3	36.20
.0555		.437	.750	.0056	4	1/8	2	RSB0555	31.80	RSB0555-C3	36.20
.0560		.437	.750	.0056	4	1/8	2	RSB0560	31.80	RSB0560-C3	36.20
.0565		.437	.750	.0057	4	1/8	2	RSB0565	31.80	RSB0565-C3	36.20
.0570		.437	.750	.0057	4	1/8	2	RSB0570	31.80	RSB0570-C3	36.20
.0575		.437	.750	.0058	4	1/8	2	RSB0575	31.80	RSB0575-C3	36.20
.0580		.437	.750	.0058	4	1/8	2	RSB0580	31.80	RSB0580-C3	36.20
.0585		.437	.750	.0059	4	1/8	2	RSB0585	31.80	RSB0585-C3	36.20
.0590		.437	.750	.0059	4	1/8	2	RSB0590	31.80	RSB0590-C3	36.20
.0595	#53	.437	.750	.0060	4	1/8	2	RSB0595	31.80	RSB0595-C3	36.20
.0600		.437	.812	.0060	4	1/8	2	RSB0600	31.80	RSB0600-C3	36.20
.0605		.437	.812	.0061	4	1/8	2	RSB0605	31.80	RSB0605-C3	36.20
.0610 (1.55 mm)		.437	.812	.0061	4	1/8	2	RSB0610	31.80	RSB0610-C3	36.20
.0615		.437	.812	.0062	4	1/8	2	RSB0615	31.80	RSB0615-C3	36.20
.0620		.437	.812	.0062	4	1/8	2	RSB0620	31.80	RSB0620-C3	36.20
.0625 (1/16)		.437	.812	.0063	4	1/8	2	RSB0625	31.80	RSB0625-C3	36.20
.0630 (1.60 mm)		.437	.812	.0063	4	1/8	2	RSB0630	31.80	RSB0630-C3	36.20
.0635	#52	.437	.812	.0064	4	1/8	2	RSB0635	31.80	RSB0635-C3	36.20
.0640		.437	.812	.0064	4	1/8	2	RSB0640	31.80	RSB0640-C3	36.20
.0650 (1.65 mm)		.437	.812	.0065	4	1/8	2	RSB0650	31.80	RSB0650-C3	36.20
.0660		.500	.875	.0066	4	1/8	2	RSB0660	31.80	RSB0660-C3	36.20
.0670	#51	.500	.875	.0067	4	1/8	2	RSB0670	31.80	RSB0670-C3	36.20
.0680		.500	.875	.0068	4	1/8	2	RSB0680	31.80	RSB0680-C3	36.20
.0690		.500	.875	.0062	4	1/8	2	RSB0690	31.80	RSB0690-C3	36.20
.0700	#50	.562	.937	.0063	4	1/8	2	RSB0700	31.80	RSB0700-C3	36.20
.0710		.562	.937	.0064	4	1/8	2	RSB0710	31.80	RSB0710-C3	36.20
.0720		.562	.937	.0065	4	1/8	2	RSB0720	31.80	RSB0720-C3	36.20
.0730	#49	.562	.937	.0066	4	1/8	2	RSB0730	31.80	RSB0730-C3	36.20
.0740		.562	.937	.0067	4	1/8	2	RSB0740	31.80	RSB0740-C3	36.20
.0750		.562	1.000	.0068	4	1/8	2	RSB0750	31.80	RSB0750-C3	36.20
.0760	#48	.562	1.000	.0068	4	1/8	2	RSB0760	31.80	RSB0760-C3	36.20
.0765		.562	1.000	.0069	4	1/8	2	RSB0765	31.80	RSB0765-C3	36.20
.0770		.562	1.000	.0069	4	1/8	2	RSB0770	31.80	RSB0770-C3	36.20
.0775		.562	1.000	.0070	4	1/8	2	RSB0775	31.80	RSB0775-C3	36.20
.0780		.562	1.000	.0070	4	1/8	2	RSB0780	31.80	RSB0780-C3	36.20
.0781 (5/64)		.562	1.000	.0070	4	1/8	2	RSB0781	31.80	RSB0781-C3	36.20
.0785	#47	.562	1.000	.0071	4	1/8	2	RSB0785	31.80	RSB0785-C3	36.20
.0787 (2.00 mm)		.562	1.000	.0071	4	1/8	2	RSB0787	31.80	RSB0787-C3	36.20
.0790		.562	1.000	.0071	4	1/8	2	RSB0790	31.80	RSB0790-C3	36.20
.0795		.562	1.000	.0072	4	1/8	2	RSB0795	31.80	RSB0795-C3	36.20

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020"}_{-.000"}$	L_3 $^{+.020"}_{-.000"}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0800		.562	1.000	.0072	4	1/8	2	RSB0800	31.80	RSB0800-C3	36.20
.0810	#46	.562	1.000	.0073	4	1/8	2	RSB0810	31.80	RSB0810-C3	36.20
.0820	#45	.562	1.000	.0074	4	1/8	2	RSB0820	31.80	RSB0820-C3	36.20
.0830		.562	1.000	.0075	4	1/8	2	RSB0830	31.80	RSB0830-C3	36.20
.0840		.625	1.125	.0076	4	1/8	2-1/2	RSB0840	31.80	RSB0840-C3	36.20
.0850		.625	1.125	.0077	4	1/8	2-1/2	RSB0850	31.80	RSB0850-C3	36.20
.0860	#44	.625	1.125	.0077	4	1/8	2-1/2	RSB0860	31.80	RSB0860-C3	36.20
.0870		.625	1.125	.0078	4	1/8	2-1/2	RSB0870	31.80	RSB0870-C3	36.20
.0880		.625	1.125	.0079	4	1/8	2-1/2	RSB0880	31.80	RSB0880-C3	36.20
.0890	#43	.625	1.125	.0080	4	1/8	2-1/2	RSB0890	31.80	RSB0890-C3	36.20
.0900		.625	1.125	.0081	4	1/8	2-1/2	RSB0900	31.80	RSB0900-C3	36.20
.0910		.625	1.125	.0082	4	1/8	2-1/2	RSB0910	31.80	RSB0910-C3	36.20
.0920		.625	1.125	.0083	4	1/8	2-1/2	RSB0920	31.80	RSB0920-C3	36.20
.0925 (2.35 mm)		.687	1.250	.0083	4	1/8	2-1/2	RSB0925	31.80	RSB0925-C3	36.20
.0930		.687	1.250	.0084	4	1/8	2-1/2	RSB0930	31.80	RSB0930-C3	36.20
.0935	#42	.687	1.250	.0084	4	1/8	2-1/2	RSB0935	31.80	RSB0935-C3	36.20
.0937 (3/32)		.687	1.250	.0084	4	1/8	2-1/2	RSB0937	31.80	RSB0937-C3	36.20
.0940		.687	1.250	.0085	4	1/8	2-1/2	RSB0940	31.80	RSB0940-C3	36.20
.0945 (2.40 mm)		.687	1.250	.0085	4	1/8	2-1/2	RSB0945	31.80	RSB0945-C3	36.20
.0950		.687	1.250	.0086	4	1/8	2-1/2	RSB0950	31.80	RSB0950-C3	36.20
.0960	#41	.687	1.250	.0086	4	1/8	2-1/2	RSB0960	31.80	RSB0960-C3	36.20
.0970		.687	1.250	.0087	4	1/8	2-1/2	RSB0970	31.80	RSB0970-C3	36.20
.0980	#40	.687	1.250	.0088	4	1/8	2-1/2	RSB0980	31.80	RSB0980-C3	36.20
.0990		.687	1.250	.0089	4	1/8	2-1/2	RSB0990	31.80	RSB0990-C3	36.20
.0995	#39	.687	1.250	.0090	4	1/8	2-1/2	RSB0995	31.80	RSB0995-C3	36.20
.1000		.750	1.375	.0090	4	1/8	2-1/2	RSB1000	31.80	RSB1000-C3	36.20
.1010		.750	1.375	.0091	4	1/8	2-1/2	RSB1010	31.80	RSB1010-C3	36.20
.1015	#38	.750	1.375	.0091	4	1/8	2-1/2	RSB1015	31.80	RSB1015-C3	36.20
.1020		.750	1.375	.0092	4	1/8	2-1/2	RSB1020	31.80	RSB1020-C3	36.20
.1030		.750	1.375	.0093	4	1/8	2-1/2	RSB1030	31.80	RSB1030-C3	36.20
.1040	#37	.750	1.375	.0094	4	1/8	2-1/2	RSB1040	31.80	RSB1040-C3	36.20
.1050		.750	1.375	.0095	4	1/8	2-1/2	RSB1050	31.80	RSB1050-C3	36.20
.1060		.750	1.375	.0095	4	1/8	2-1/2	RSB1060	31.80	RSB1060-C3	36.20
.1065	#36	.750	1.375	.0096	4	1/8	2-1/2	RSB1065	31.80	RSB1065-C3	36.20
.1070		.750	1.375	.0096	4	1/8	2-1/2	RSB1070	31.80	RSB1070-C3	36.20
.1080		.750	1.375	.0097	4	1/8	2-1/2	RSB1080	31.80	RSB1080-C3	36.20
.1083 (2.75 mm)		.750	1.375	.0097	4	1/8	2-1/2	RSB1083	31.80	RSB1083-C3	36.20
.1085		.750	1.375	.0098	4	1/8	2-1/2	RSB1085	31.80	RSB1085-C3	36.20
.1090		.750	1.375	.0098	4	1/8	2-1/2	RSB1090	31.80	RSB1090-C3	36.20
.1094 (7/64)		.750	1.375	.0098	4	1/8	2-1/2	RSB1094	31.80	RSB1094-C3	36.20
.1100	#35	.750	1.375	.0099	4	1/8	2-1/2	RSB1100	31.80	RSB1100-C3	36.20
.1105		.750	1.375	.0099	4	1/8	2-1/2	RSB1105	31.80	RSB1105-C3	36.20
.1110	#34	.750	1.375	.0100	4	1/8	2-1/2	RSB1110	31.80	RSB1110-C3	36.20
.1120		.750	1.375	.0101	4	1/8	2-1/2	RSB1120	31.80	RSB1120-C3	36.20
.1130	#33	.750	1.500	.0102	4	1/8	2-1/2	RSB1130	31.80	RSB1130-C3	36.20
.1140		.750	1.500	.0103	4	1/8	2-1/2	RSB1140	31.80	RSB1140-C3	36.20
.1150		.750	1.500	.0104	4	1/8	2-1/2	RSB1150	31.80	RSB1150-C3	36.20
.1160	#32	.750	1.500	.0104	4	1/8	2-1/2	RSB1160	31.80	RSB1160-C3	36.20
.1170		.750	1.500	.0105	4	1/8	2-1/2	RSB1170	31.80	RSB1170-C3	36.20

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1180		.750	1.500	.0106	4	1/8	2-1/2	RSB1180	31.80	RSB1180-C3	36.20
.1190		.750	1.500	.0107	4	1/8	2-1/2	RSB1190	31.80	RSB1190-C3	36.20
.1200	#31	.750	1.500	.0108	4	1/8	2-1/2	RSB1200	31.80	RSB1200-C3	36.20
.1210		.750	1.500	.0109	4	1/8	2-1/2	RSB1210	31.80	RSB1210-C3	36.20
.1220 (3.10 mm)		.750	1.500	.0110	4	1/8	2-1/2	RSB1220	31.80	RSB1220-C3	36.20
D_1*		L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1230		.750	1.500	.0111	4	3/16	3	RSB1230	37.30	RSB1230-C3	42.10
.1235		.750	1.500	.0111	4	3/16	3	RSB1235	37.30	RSB1235-C3	42.10
.1240		.750	1.500	.0112	4	3/16	3	RSB1240	37.30	RSB1240-C3	42.10
.1245		.750	1.500	.0112	4	3/16	3	RSB1245	37.30	RSB1245-C3	42.10
.1250 (1/8)		.750	1.500	.0113	4	3/16	3	RSB1250	37.30	RSB1250-C3	42.10
.1255		.750	1.500	.0113	4	3/16	3	RSB1255	37.30	RSB1255-C3	42.10
.1260 (3.20 mm)		.750	1.500	.0113	4	3/16	3	RSB1260	37.30	RSB1260-C3	42.10
.1265		.750	1.500	.0114	4	3/16	3	RSB1265	37.30	RSB1265-C3	42.10
.1285	#30	.750	1.500	.0116	4	3/16	3	RSB1285	37.30	RSB1285-C3	42.10
.1360	#29	.750	1.625	.0122	4	3/16	3	RSB1360	37.30	RSB1360-C3	42.10
.1390		.750	1.625	.0125	4	3/16	3	RSB1390	37.30	RSB1390-C3	42.10
.1395		.750	1.625	.0126	4	3/16	3	RSB1395	37.30	RSB1395-C3	42.10
.1400		.750	1.625	.0126	4	3/16	3	RSB1400	37.30	RSB1400-C3	42.10
.1405	#28	.750	1.625	.0126	4	3/16	3	RSB1405	37.30	RSB1405-C3	42.10
.1406 (9/64)		.750	1.625	.0127	4	3/16	3	RSB1406	37.30	RSB1406-C3	42.10
.1410		.750	1.625	.0127	4	3/16	3	RSB1410	37.30	RSB1410-C3	42.10
.1415		.750	1.625	.0127	4	3/16	3	RSB1415	37.30	RSB1415-C3	42.10
.1420		.750	1.625	.0128	4	3/16	3	RSB1420	37.30	RSB1420-C3	42.10
.1440	#27	.750	1.625	.0130	4	3/16	3	RSB1440	37.30	RSB1440-C3	42.10
.1470	#26	.875	1.750	.0132	4	3/16	3	RSB1470	37.30	RSB1470-C3	42.10
.1495	#25	.875	1.750	.0135	4	3/16	3	RSB1495	37.30	RSB1495-C3	42.10
.1520	#24	.875	1.750	.0137	4	3/16	3	RSB1520	37.30	RSB1520-C3	42.10
.1540	#23	.875	1.750	.0139	4	3/16	3	RSB1540	37.30	RSB1540-C3	42.10
.1545		.875	1.750	.0139	4	3/16	3	RSB1545	37.30	RSB1545-C3	42.10
.1550		.875	1.750	.0140	4	3/16	3	RSB1550	37.30	RSB1550-C3	42.10
.1555		.875	1.750	.0140	4	3/16	3	RSB1555	37.30	RSB1555-C3	42.10
.1560		.875	1.750	.0140	4	3/16	3	RSB1560	37.30	RSB1560-C3	42.10
.1562 (5/32)		.875	1.750	.0141	4	3/16	3	RSB1562	37.30	RSB1562-C3	42.10
.1565		.875	1.750	.0141	4	3/16	3	RSB1565	37.30	RSB1565-C3	42.10
.1570	#22	.875	1.750	.0141	4	3/16	3	RSB1570	37.30	RSB1570-C3	42.10
.1575 (4.00 mm)		.875	1.750	.0142	4	3/16	3	RSB1575	37.30	RSB1575-C3	42.10
.1580		.875	1.875	.0142	4	3/16	3	RSB1580	37.30	RSB1580-C3	42.10
.1585		.875	1.875	.0143	4	3/16	3	RSB1585	37.30	RSB1585-C3	42.10
.1590	#21	.875	1.875	.0143	4	3/16	3	RSB1590	37.30	RSB1590-C3	42.10
.1610	#20	.875	1.875	.0145	4	3/16	3	RSB1610	37.30	RSB1610-C3	42.10
.1660	#19	.875	1.875	.0149	4	3/16	3	RSB1660	37.30	RSB1660-C3	42.10
.1695	#18	1.000	2.000	.0153	4	3/16	4	RSB1695	41.40	RSB1695-C3	47.80
.1705		1.000	2.000	.0153	4	3/16	4	RSB1705	41.40	RSB1705-C3	47.80
.1710		1.000	2.000	.0154	4	3/16	4	RSB1710	41.40	RSB1710-C3	47.80
.1715		1.000	2.000	.0154	4	3/16	4	RSB1715	41.40	RSB1715-C3	47.80
.1719 (11/64)		1.000	2.000	.0155	4	3/16	4	RSB1719	41.40	RSB1719-C3	47.80

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1725		1.000	2.000	.0155	4	3/16	4	RSB1725	41.40	RSB1725-C3	47.80
.1730	#17	1.000	2.000	.0156	4	3/16	4	RSB1730	41.40	RSB1730-C3	47.80
.1735		1.000	2.000	.0156	4	3/16	4	RSB1735	41.40	RSB1735-C3	47.80
.1770	#16	1.000	2.000	.0159	4	3/16	4	RSB1770	41.40	RSB1770-C3	47.80
.1800	#15	1.000	2.125	.0162	4	3/16	4	RSB1800	41.40	RSB1800-C3	47.80
.1820	#14	1.000	2.125	.0164	4	3/16	4	RSB1820	41.40	RSB1820-C3	47.80
.1850 (4.70 mm)	#13	1.000	2.125	.0167	4	1/4	4	RSB1850	50.00	RSB1850-C3	56.80
.1860		1.000	2.125	.0167	4	1/4	4	RSB1860	50.00	RSB1860-C3	56.80
.1865		1.000	2.125	.0168	4	1/4	4	RSB1865	50.00	RSB1865-C3	56.80
.1870		1.000	2.125	.0168	4	1/4	4	RSB1870	50.00	RSB1870-C3	56.80
.1875 (3/16)		1.000	2.125	.0169	4	1/4	4	RSB1875	50.00	RSB1875-C3	56.80
.1880		1.000	2.125	.0169	4	1/4	4	RSB1880	50.00	RSB1880-C3	56.80
.1885		1.000	2.125	.0170	4	1/4	4	RSB1885	50.00	RSB1885-C3	56.80
.1890	#12	1.000	2.125	.0170	4	1/4	4	RSB1890	50.00	RSB1890-C3	56.80
.1910	#11	1.000	2.125	.0172	4	1/4	4	RSB1910	50.00	RSB1910-C3	57.60
.1935	#10	1.000	2.125	.0174	4	1/4	4	RSB1935	50.00	RSB1935-C3	57.60
.1960	#9	1.000	2.125	.0176	4	1/4	4	RSB1960	50.00	RSB1960-C3	57.60
.1969 (5.00 mm)		1.000	2.125	.0177	4	1/4	4	RSB1969	52.40	RSB1969-C3	60.00
.1990	#8	1.000	2.125	.0179	4	1/4	4	RSB1990	52.40	RSB1990-C3	60.00
.2010	#7	1.000	2.125	.0181	4	1/4	4	RSB2010	52.40	RSB2010-C3	60.00
.2015		1.000	2.125	.0181	4	1/4	4	RSB2015	52.40	RSB2015-C3	60.00
.2020		1.000	2.125	.0182	4	1/4	4	RSB2020	52.40	RSB2020-C3	60.00
.2025		1.000	2.125	.0182	4	1/4	4	RSB2025	52.40	RSB2025-C3	60.00
.2031 (13/64)		1.000	2.250	.0183	4	1/4	4	RSB2031	53.20	RSB2031-C3	60.70
.2035		1.000	2.250	.0183	4	1/4	4	RSB2035	53.20	RSB2035-C3	60.70
.2040	#6	1.000	2.250	.0184	4	1/4	4	RSB2040	53.20	RSB2040-C3	60.70
.2045		1.000	2.250	.0184	4	1/4	4	RSB2045	53.20	RSB2045-C3	60.70
.2055	#5	1.000	2.250	.0185	4	1/4	4	RSB2055	53.20	RSB2055-C3	60.70
.2090	#4	1.000	2.250	.0188	4	1/4	4	RSB2090	53.20	RSB2090-C3	60.70
.2130	#3	1.000	2.250	.0192	4	1/4	4	RSB2130	53.20	RSB2130-C3	60.70
.2170		1.000	2.375	.0195	4	1/4	4	RSB2170	53.20	RSB2170-C3	60.70
.2175		1.000	2.375	.0196	4	1/4	4	RSB2175	53.20	RSB2175-C3	60.70
.2180		1.000	2.375	.0196	4	1/4	4	RSB2180	53.20	RSB2180-C3	60.70
.2185		1.000	2.375	.0197	4	1/4	4	RSB2185	53.20	RSB2185-C3	60.70
.2187 (7/32)		1.000	2.375	.0197	4	1/4	4	RSB2187	53.20	RSB2187-C3	60.70
.2190		1.000	2.375	.0197	4	1/4	4	RSB2190	53.20	RSB2190-C3	60.70
.2195		1.000	2.375	.0198	4	1/4	4	RSB2195	53.20	RSB2195-C3	60.70
.2200		1.000	2.375	.0198	4	1/4	4	RSB2200	53.20	RSB2200-C3	60.70
.2205 (5.60 mm)		1.000	2.375	.0198	4	1/4	4	RSB2205	53.20	RSB2205-C3	60.70
.2210	#2	1.000	2.375	.0199	4	1/4	4	RSB2210	53.20	RSB2210-C3	60.70
.2280	#1	1.125	2.500	.0182	6	1/4	4	RSB2280	57.70	RSB2280-C3	65.30
.2330		1.125	2.500	.0186	6	1/4	4	RSB2330	57.70	RSB2330-C3	65.30
.2335		1.125	2.500	.0187	6	1/4	4	RSB2335	57.70	RSB2335-C3	65.30
.2340	A	1.125	2.500	.0187	6	1/4	4	RSB2340	57.70	RSB2340-C3	65.30
.2344 (15/64)		1.125	2.500	.0188	6	1/4	4	RSB2344	57.70	RSB2344-C3	65.30
.2350		1.125	2.500	.0188	6	1/4	4	RSB2350	57.70	RSB2350-C3	65.30
.2355		1.125	2.500	.0188	6	1/4	4	RSB2355	57.70	RSB2355-C3	65.30
.2360		1.125	2.500	.0189	6	1/4	4	RSB2360	57.70	RSB2360-C3	65.30

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.030"}_{-.000"}$	L_3 $^{+.030"}_{-.000"}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.2362 (6.00 mm)		1.125	2.500	.0189	6	1/4	4	RSB2362	57.70	RSB2362-C3	65.30
.2380	B	1.125	2.500	.0190	6	1/4	4	RSB2380	57.70	RSB2380-C3	65.30
.2420	C	1.125	2.500	.0194	6	1/4	4	RSB2420	57.70	RSB2420-C3	65.30
.2460	D	1.125	2.500	.0197	6	1/4	4	RSB2460	57.70	RSB2460-C3	65.30
.2485		1.125	2.750	.0199	6	5/16	4	RSB2485	60.50	RSB2485-C3	69.80
.2490		1.125	2.750	.0199	6	5/16	4	RSB2490	60.50	RSB2490-C3	69.80
.2495		1.125	2.750	.0200	6	5/16	4	RSB2495	60.50	RSB2495-C3	69.80
.2500 (1/4)	E	1.125	2.750	.0200	6	5/16	4	RSB2500	60.50	RSB2500-C3	69.80
.2505		1.125	2.750	.0200	6	5/16	4	RSB2505	60.50	RSB2505-C3	69.80
.2510		1.125	2.750	.0201	6	5/16	4	RSB2510	60.50	RSB2510-C3	69.80
.2515		1.125	2.750	.0201	6	5/16	4	RSB2515	60.50	RSB2515-C3	69.80
.2570	F	1.125	2.750	.0206	6	5/16	4	RSB2570	60.50	RSB2570-C3	69.80

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

SPEEDS & FEEDS (Miniature Reamers)

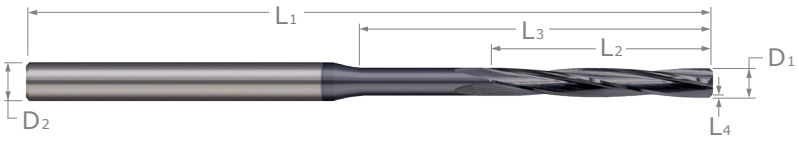
Important Note: Values in table are based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

In order to maintain appropriate stock removal amounts based on the reamer size, a hole should be pre-drilled at a diameter that is 90-94% of the finished reamed hole diameter. For example, for a finished reamed hole diameter of .0625", the pre-drilled hole diameter should be in the range of .056"-.058". The pre-drilled hole should not be smaller than 85% of the finished reamed hole diameter.

Material	SFM	Chip Load IPR (Inches Per Revolution) By Reamer Diameter								
		.015	.031	.047	.062	.078	.093	.125	.187	.250
Aluminum Alloys Casting (2xx, 5xx, 7xx, 8xx)	450	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00036	.00075	.00114	.00151	.00190	.00226	.00304	.00454	.00608
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
Wrought - 5%-8% Si (4xxx)	600									
Wrought - 8%-12% Si (4xxx)	480									
Magnesium Alloys	900	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675
Zinc Alloys	480									
Copper Alloys High Coppers - 90%+ (C1xxxx)	170	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Tool Steels A, L, O, P, W series	125	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
D, H, M, T, S series	90	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Titanium Alloys	100	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338

MINIATURE REAMERS

Right Hand Spiral



	D1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Helical flutes increase shearing action on chamfer for superior finish
- Right hand spiral flutes for increased chip evacuation in blind hole applications
- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D1*		L2 +.020″ −.000″	L3 +.020″ −.000″	L4		D2 (h6)	L1	TOOL #	PRICE	TOOL #	PRICE
.0100	#87	.078	.125	.0017	4	1/8	1-1/2	RRH0100	52.80	RRH0100-C3	57.40
.0150		.109	.187	.0025	4	1/8	1-1/2	RRH0150	52.80	RRH0150-C3	59.60
.0200	#76	.140	.250	.0023	4	1/8	1-1/2	RRH0200	39.80	RRH0200-C3	46.60
.0250	#72	.187	.312	.0029	4	1/8	1-1/2	RRH0250	39.80	RRH0250-C3	46.60
.0300		.218	.375	.0035	4	1/8	2	RRH0300	39.80	RRH0300-C3	46.60
.0305		.218	.375	.0035	4	1/8	2	RRH0305	39.80	RRH0305-C3	46.60
.0310	#68	.218	.375	.0036	4	1/8	2	RRH0310	39.80	RRH0310-C3	46.60
.0315 (.80 mm)		.218	.375	.0036	4	1/8	2	RRH0315	39.80	RRH0315-C3	44.80
.0350	#65	.250	.437	.0040	4	1/8	2	RRH0350	39.80	RRH0350-C3	44.80
.0400	#60	.281	.500	.0046	4	1/8	2	RRH0400	39.80	RRH0400-C3	44.80
.0500		.375	.625	.0050	4	1/8	2	RRH0500	33.40	RRH0500-C3	38.00
.0600		.437	.812	.0060	4	1/8	2	RRH0600	33.40	RRH0600-C3	38.00
.0620		.437	.812	.0062	4	1/8	2	RRH0620	33.40	RRH0620-C3	38.00
.0625 (1/16)		.437	.812	.0063	4	1/8	2	RRH0625	33.40	RRH0625-C3	38.00
.0630 (1.60 mm)		.437	.812	.0063	4	1/8	2	RRH0630	33.40	RRH0630-C3	38.00
.0700	#50	.562	.937	.0063	4	1/8	2	RRH0700	33.40	RRH0700-C3	38.00
.0781 (5/64)		.562	1.000	.0070	4	1/8	2	RRH0781	33.40	RRH0781-C3	38.00
.0800		.562	1.000	.0072	4	1/8	2	RRH0800	33.40	RRH0800-C3	38.00
.0900		.625	1.125	.0081	4	1/8	2-1/2	RRH0900	33.40	RRH0900-C3	38.00
.0935	#42	.687	1.250	.0084	4	1/8	2-1/2	RRH0935	33.40	RRH0935-C3	38.00
.0937 (3/32)		.687	1.250	.0084	4	1/8	2-1/2	RRH0937	33.40	RRH0937-C3	38.00
.0940		.687	1.250	.0085	4	1/8	2-1/2	RRH0940	33.40	RRH0940-C3	38.00
.0950		.687	1.250	.0086	4	1/8	2-1/2	RRH0950	33.40	RRH0950-C3	38.00
.1000		.750	1.375	.0090	4	1/8	2-1/2	RRH1000	33.40	RRH1000-C3	38.00

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

Right Hand Spiral (cont.)

continued from previous page

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.030"}_{-.000"}$	L_3 $^{+.030"}_{-.000"}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1245		.750	1.500	.0112	4	3/16	3	RRH1245	39.20	RRH1245-C3	44.20
.1250 (1/8)		.750	1.500	.0113	4	3/16	3	RRH1250	39.20	RRH1250-C3	44.20
.1255		.750	1.500	.0113	4	3/16	3	RRH1255	39.20	RRH1255-C3	44.20
.1285	#30	.750	1.500	.0116	4	3/16	3	RRH1285	39.20	RRH1285-C3	44.20
.1560		.875	1.750	.0140	4	3/16	3	RRH1560	39.20	RRH1560-C3	44.20
.1575 (4.00 mm)		.875	1.750	.0142	4	3/16	3	RRH1575	39.20	RRH1575-C3	44.20
.1870		1.000	2.125	.0168	4	1/4	4	RRH1870	52.50	RRH1870-C3	60.40
.1875 (3/16)		1.000	2.125	.0169	4	1/4	4	RRH1875	52.50	RRH1875-C3	60.40
.1880		1.000	2.125	.0169	4	1/4	4	RRH1880	52.50	RRH1880-C3	60.40

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

PLEASE SEE SPEEDS & FEEDS ON PAGE 428

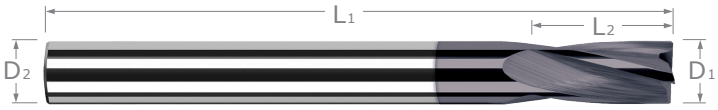
View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com

NEW SIZES!

COUNTERBORES

Flat Bottom



For Spot Facing or Counterboring on Irregular Surfaces

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Center cutting
- Can be used for flat bottom reaming or straightening misaligned holes
- 15° helix
- 4 flutes
- Solid carbide
- Ground with full cylindrical margin (not side cutting)
- AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- CNC ground in the USA

	CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
	D_1 +.0000″ −.0005″*	L_2 +.030″ −.000″	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
NEW	.0200	.060	1/8	1-1/2	23320	29.60	23320-C3	34.20		
NEW	.0300	1/8	1/8	1-1/2	23330	29.60	23330-C3	34.20		
	.0312 (1/32)	1/8	1/8	1-1/2	23331	29.60	23331-C3	34.20		
	.0394 (1 mm)	5/32	1/8	1-1/2	2331M	29.60	2331M-C3	34.20		
NEW	.0400	5/32	1/8	1-1/2	23340	29.60	23340-C3	34.20		
	.0469 (3/64)	3/16	1/8	1-1/2	23347	29.60	23347-C3	34.20		
NEW	.0500	3/16	1/8	1-1/2	23350	29.60	23350-C3	34.20		
	.0550	1/4	1/8	1-1/2	23355	29.60	23355-C3	34.60		
NEW	.0600	1/4	1/8	1-1/2	23360	29.60	23360-C3	34.20		
	.0625 (1/16)	1/4	1/8	1-1/2	23362	29.60	23362-C3	34.20	23362-C6	36.40
	.0700	9/32	1/8	1-1/2	23370	29.60	23370-C3	34.60		
	.0781 (5/64)	5/16	1/8	1-1/2	23378	29.60	23378-C3	34.20		
	.0787 (2 mm)	5/16	1/8	1-1/2	2332M	29.60	2332M-C3	34.20		
NEW	.0800	5/16	1/8	1-1/2	23380	29.60	23380-C3	34.20		
	.0900	3/8	1/8	1-1/2	23390	29.60	23390-C3	36.40		
	.0937 (3/32)	3/8	1/8	1-1/2	23393	29.60	23393-C3	34.20	23393-C6	36.40
	.1094 (7/64)	3/8	1/8	1-1/2	23407	29.60	23407-C3	34.20		
	.1181 (3 mm)	3/8	1/8	1-1/2	2343M	29.60	2343M-C3	34.20	2343M-C6	36.40
	.1250 (1/8)	1/2	1/8	1-1/2	23408	29.60	23408-C3	34.20	23408-C6	36.40
	.1406 (9/64)	9/16	3/16	2	23409	28.40	23409-C3	33.40		
	.1562 (5/32)	5/8	3/16	2	23410	28.40	23410-C3	33.40		
	.1575 (4 mm)	5/8	3/16	2	2344M	28.40	2344M-C3	33.40		
	.1719 (11/64)	5/8	3/16	2	23411	28.40	23411-C3	33.40		
	.1875 (3/16)	3/4	3/16	2	23412	28.40	23412-C3	33.40	23412-C6	35.70
	.1968 (5 mm)	3/4	1/4	2-1/2	2345M	38.70	2345M-C3	45.50		
	.2031 (13/64)	3/4	1/4	2-1/2	23413	38.70	23413-C3	45.50		
	.2187 (7/32)	3/4	1/4	2-1/2	23414	38.70	23414-C3	45.50		
	.2344 (15/64)	7/8	1/4	2-1/2	23415	38.70	23415-C3	45.50		
	.2362 (6 mm)	7/8	1/4	2-1/2	2346M	38.70	2346M-C3	45.50	2346M-C6	48.70
	.2500 (1/4)	7/8	1/4	2-1/2	23416	38.70	23416-C3	45.50	23416-C6	48.70
	.2656 (17/64)	7/8	5/16	2-1/2	23417	47.80	23417-C3	55.70		
	.2812 (9/32)	7/8	5/16	2-1/2	23418	47.80	23418-C3	55.70		
	.2969 (19/64)	7/8	5/16	2-1/2	23419	47.80	23419-C3	55.70		

continued on next page

NEW SIZES!

COUNTERBORES

Flat Bottom (cont.)

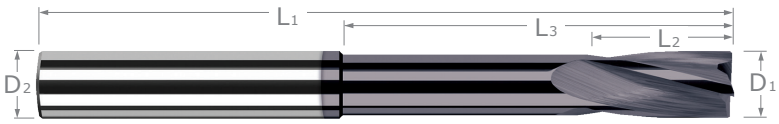
continued from previous page

CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
D_1 $^{+.0000''}_{-.0005''}$*	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.3125 (5/16)	1	5/16	2-1/2	23420	47.80	23420-C3	55.70		
.3150 (8 mm)	1	3/8	2-1/2	2348M	57.10	2348M-C3	66.10		
.3281 (21/64)	1	3/8	2-1/2	23421	57.10	23421-C3	66.10		
.3437 (11/32)	1	3/8	2-1/2	23422	57.10	23422-C3	66.10		
.3594 (23/64)	1	3/8	2-1/2	23423	57.10	23423-C3	66.10		
.3750 (3/8)	1	3/8	2-1/2	23424	57.10	23424-C3	66.10	23424-C6	68.30
.3937 (10 mm)	1	7/16	2-3/4	2340M	70.40	2340M-C3	81.60		
.4062 (13/32)	1	7/16	2-3/4	23426	70.40	23426-C3	81.60		
.4375 (7/16)	1	7/16	2-3/4	23428	70.40	23428-C3	81.60		
.4687 (15/32)	1	1/2	3	23430	92.50	23430-C3	105.90		
.4724 (12 mm)	1	1/2	3	23476	92.50	23476-C3	105.90		
.5000 (1/2)	1	1/2	3	23432	92.50	23432-C3	105.90		
.5625 (9/16)	1-1/2	5/8	3-1/2	23436	131.40	23436-C3	144.80		
.6250 (5/8)	1-1/2	5/8	3-1/2	23440	147.10	23440-C3	160.50		
.6875 (11/16)	1-1/2	3/4	4	23444	213.10	23444-C3	227.60		
.7500 (3/4)	1-1/2	3/4	4	23448	213.10	23448-C3	227.60		

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/–.0005".

COUNTERBORES

Flat Bottom – Long Reach



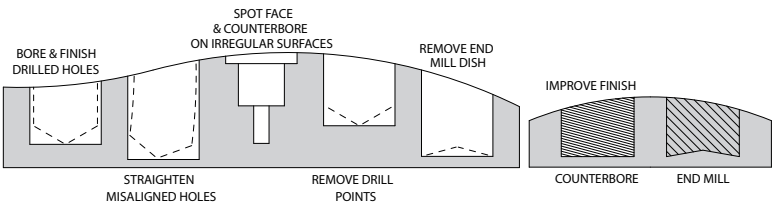
Undersized Neck to Avoid Heeling

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes
- Center cutting
- Ground with full cylindrical margin (not side cutting)
- 15° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	FLUTE LENGTH	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0000″ −.0005″*	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.0312 (1/32)	1/8	1/4	1/8	2-1/2	25431	34.50	25431-C3	39.10
.0394 (1 mm)	5/32	5/16	1/8	2-1/2	2541M	34.50	2541M-C3	39.10
.0469 (3/64)	3/16	3/8	1/8	2-1/2	25447	34.50	25447-C3	39.10
.0625 (1/16)	1/4	1/2	1/8	2-1/2	25462	34.50	25462-C3	39.10
.0781 (5/64)	5/16	5/8	1/8	2-1/2	25478	34.50	25478-C3	39.10
.0787 (2 mm)	5/16	5/8	1/8	2-1/2	2542M	34.50	2542M-C3	39.10
.0937 (3/32)	3/8	3/4	1/8	2-1/2	25493	34.50	25493-C3	39.10
.1094 (7/64)	3/8	7/8	1/8	2-1/2	25507	34.50	25507-C3	39.10
.1181 (3 mm)	3/8	1	1/8	2-1/2	2553M	34.50	2553M-C3	39.10
.1250 (1/8)	1/2	1	1/8	2-1/2	25508	34.50	25508-C3	39.10
.1406 (9/64)	9/16	1-1/8	3/16	3	25509	42.00	25509-C3	47.00
.1562 (5/32)	5/8	1-1/4	3/16	3	25510	42.00	25510-C3	47.00
.1575 (4 mm)	5/8	1-1/4	3/16	3	2554M	42.00	2554M-C3	47.00
.1719 (11/64)	5/8	1-3/8	3/16	3	25511	42.00	25511-C3	47.00
.1875 (3/16)	3/4	1-1/2	3/16	3	25512	42.00	25512-C3	47.00
.1968 (5 mm)	3/4	1-9/16	1/4	4	2555M	58.20	2555M-C3	66.10
.2031 (13/64)	3/4	1-5/8	1/4	4	25513	55.80	25513-C3	63.70
.2187 (7/32)	3/4	1-3/4	1/4	4	25514	55.80	25514-C3	63.70
.2344 (15/64)	7/8	1-7/8	1/4	4	25515	55.80	25515-C3	63.70
.2362 (6 mm)	7/8	1-7/8	1/4	4	2556M	58.20	2556M-C3	66.10
.2500 (1/4)	7/8	2	1/4	4	25516	55.80	25516-C3	63.70
.2656 (17/64)	7/8	2-1/8	5/16	4	25517	70.70	25517-C3	80.20
.2812 (9/32)	7/8	2-1/4	5/16	4	25518	70.70	25518-C3	80.20
.2969 (19/64)	7/8	2-3/8	5/16	4	25519	70.70	25519-C3	80.20
.3125 (5/16)	1	2-1/2	5/16	4	25520	70.70	25520-C3	80.20
.3150 (8 mm)	1	2-1/2	3/8	4	2558M	91.20	2558M-C3	103.50
.3437 (11/32)	1	2-3/4	3/8	4	25522	85.30	25522-C3	97.60
.3750 (3/8)	1	3	3/8	4	25524	85.30	25524-C3	97.60
.3937 (10 mm)	1	3	7/16	4	2550M	106.00	2550M-C3	119.40
.4375 (7/16)	1	3	7/16	4	25528	99.00	25528-C3	112.40
.5000 (1/2)	1	3	1/2	4	25532	121.40	25532-C3	134.80

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

APPLICATIONS:

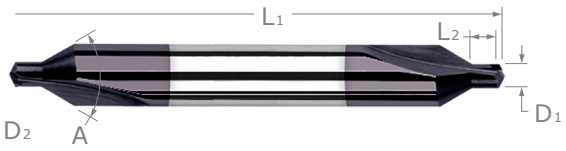


SPOT EFFECTIVELY. The flat bottom removes end mill dish or drill points while effectively spotting on irregular surfaces.

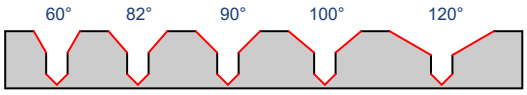
HOLD POSITION. The full cylindrical margin and back taper are not side cutting and won't grab or deflect.

CONTROL FINISH. The slow helix with a low rake avoids part engagement and helps to control finish.

COMBINED DRILL & COUNTERSINKS



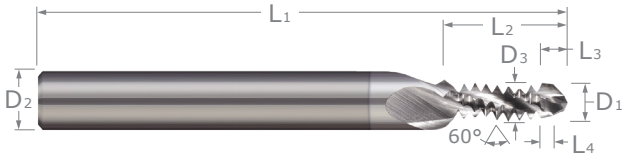
- 60°, 82°, 90°, 100°, and 120° included angles - plain type
- 2 flutes
- 118° included tip angle
- Double-ended
- Solid carbide
- CNC ground in the USA

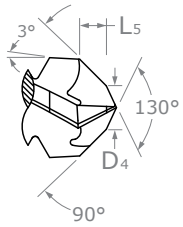


Stocked in *Five* Angles!

INCLUDED ANGLE	SIZE	DRILL DIAMETER	DRILL LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°		D_1 +.0015″ +.0005″	L_2 +.005″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
60°	0000	1/64	1/64	1/8	1-1/2	11002	31.60	11002-C3	37.30
	000	.020	.020	1/8	1-1/2	11005	24.00	11005-C3	29.70
	00	.025	.025	1/8	1-1/2	11010	18.80	11010-C3	24.50
	0	1/32	1/32	1/8	1-1/2	11020	18.80	11020-C3	24.50
	1	3/64	3/64	1/8	1-1/2	11030	15.80	11030-C3	21.50
	2	5/64	5/64	3/16	2	11040	24.00	11040-C3	30.80
	3	7/64	7/64	1/4	2	11050	27.30	11050-C3	36.50
	4	1/8	1/8	5/16	2-1/2	11060	37.30	11060-C3	48.50
	5	3/16	3/16	7/16	2-3/4	11070	55.70	11070-C3	72.40
82°	00	.025	.025	1/8	1-1/2	25610	19.90	25610-C3	25.60
	0	1/32	1/32	1/8	1-1/2	25620	19.90	25620-C3	25.60
	1	3/64	3/64	1/8	1-1/2	25630	16.70	25630-C3	22.40
	2	5/64	5/64	3/16	2	25640	25.70	25640-C3	32.50
	3	7/64	7/64	1/4	2	25650	29.00	25650-C3	38.20
	4	1/8	1/8	5/16	2-1/2	25660	39.40	25660-C3	50.60
	5	3/16	3/16	7/16	2-3/4	25670	59.20	25670-C3	75.90
90°	0000	1/64	1/64	1/8	1-1/2	17902	32.60	17902-C3	38.30
	000	.020	.020	1/8	1-1/2	17905	24.80	17905-C3	30.50
	00	.025	.025	1/8	1-1/2	17910	19.40	17910-C3	25.10
	0	1/32	1/32	1/8	1-1/2	17920	19.40	17920-C3	25.10
	1	3/64	3/64	1/8	1-1/2	17930	16.30	17930-C3	22.00
	2	5/64	5/64	3/16	2	17940	24.80	17940-C3	31.10
	3	7/64	7/64	1/4	2	17950	28.20	17950-C3	36.80
	4	1/8	1/8	5/16	2-1/2	17960	38.30	17960-C3	49.50
	5	3/16	3/16	7/16	2-3/4	17970	57.40	17970-C3	73.10
100°	0	1/32	1/32	1/8	1-1/2	849520	22.30	849520-C3	27.40
	1	3/64	3/64	1/8	1-1/2	849530	18.70	849530-C3	24.30
	2	5/64	5/64	3/16	2	849540	28.40	849540-C3	34.00
	3	7/64	7/64	1/4	2	849550	32.20	849550-C3	39.70
	4	1/8	1/8	5/16	2-1/2	849560	43.70	849560-C3	52.60
120°	2	5/64	5/64	3/16	2	822540	28.40	822540-C3	33.00
	3	7/64	7/64	1/4	2	822550	32.20	822550-C3	37.20
	4	1/8	1/8	5/16	2-1/2	822560	43.70	822560-C3	48.70

COMBINATION DRILL / THREAD MILLS

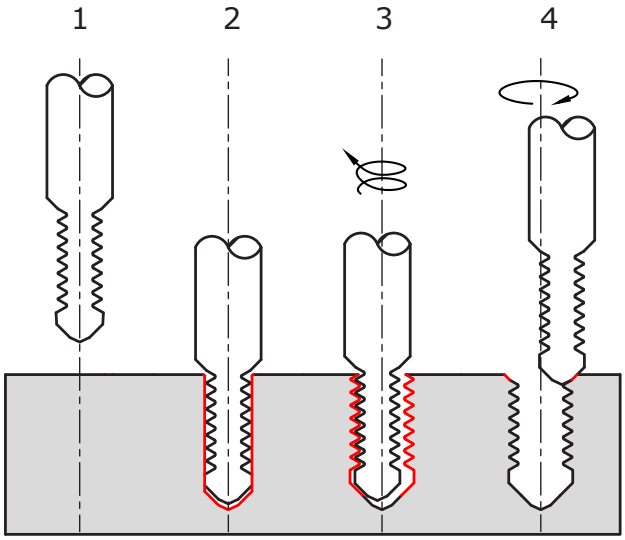




- Designed for combined drilling, threading, thread relief cutting, and chamfering
- One cutter for 4 different operations saves time on tool changes and leaves more room in the tool carousel
- Length of cut includes transition angle, allowing for optional 45° chamfer pass
- Optimized for cutting non-ferrous materials such as aluminum, unfilled plastics, copper, brass, and bronze alloys
- Recommended for cutting, threading and chamfering through holes
- 3 flutes to center
- Cuts internal 60° UN threads
- 90° included back chamfer
- Solid carbide
- CNC ground in the USA

THREAD SIZE	DRILL DIAMETER	LENGTH OF CUT	THREAD DIAMETER	SECONDARY POINT ANGLE DIAMETER	LENGTH OF TIP	LENGTH OF THREAD RELIEF	CHAMFER LENGTH	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
	D_1 +.0005″ −.0005″	L_2 +.030″ −.000″	D_3 +.0005″ −.0005″	D_4	L_3	L_4	L_5	D_2	L_1	3 FL	PRICE	3 FL	PRICE
4-40	.0876	.2513	.085	.0356	.0580	.0250	.0247	1/8	2	820616	107.40	820616-C8	117.40
6-32	.1076	.3323	.100	.0475	.0707	.0312	.0284	3/16	2	820622	110.80	820622-C8	120.90
8-32	.1336	.3652	.115	.0735	.0767	.0312	.0284	3/16	2	820628	118.60	820628-C8	128.90
10-24	.1494	.4966	.120	.0760	.0939	.0416	.0345	1/4	2	820634	124.50	820634-C8	135.50
10-32	.1596	.4681	.120	.0995	.0828	.0312	.0284	1/4	2	820636	124.50	820636-C8	135.00
1/4-20	.2013	.7154	.180	.1172	.1168	.0500	.0394	3/8	2-1/2	820644	148.30	820644-C8	160.00
1/4-28	.2152	.7078	.180	.1494	.1016	.0357	.0310	3/8	2-1/2	820646	148.30	820646-C8	159.50
5/16-18	.2584	.8750	.240	.1671	.1372	.0555	.0427	3/8	2-1/2	820654	162.00	820654-C8	173.60
5/16-24	.2719	.8248	.240	.1985	.1224	.0416	.0345	3/8	2-1/2	820656	182.20	820656-C8	194.40
3/8-16	.3141	1.019	.285	.2140	.1592	.0625	.0468	1/2	3	820664	216.60	820664-C8	229.80
7/16-20	.3888	1.154	.335	.3047	.1605	.0500	.0394	1/2	3-1/2	820676	234.10	820676-C8	247.90
1/2-13	.4251	1.279	.350	.3064	.2036	.0769	.0553	5/8	3-1/2	820684	241.60	820684-C8	270.90

Combination Drill/Thread Mills Order of Operations

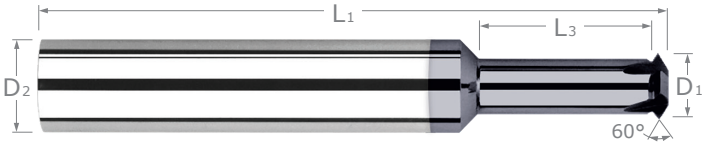


1. Approach the workpiece by centering the tool along the axis of the anticipated hole.
2. Drill a hole to the desired depth. For simultaneous chamfering, use the full length of cut to engage on the transition of the tool.
3. To begin thread, lift drill up by ½x - 1x pitch, then helically interpolate up 1 pitch. Return tool to center axis of the hole for retraction.
4. Re-engage the tool on top of the hole to create, increase, or finish the chamfer if desired.

NEW SIZES!

THREAD MILLING CUTTERS

Single Form – UN Threads



- Single thread form – can mill multiple pitches
- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide
- CNC ground in the USA

For thread fit chart, search for keyword THREADFIT on *www.harveytool.com*

Stocked in Multiple Reach Lengths!

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
00	.032	.016	**1/16**	2	1/8	1-1/2	71001	73.00	71001-C3	77.60		
00	.032	.016	**3/32**	2	1/8	1-1/2	41401	77.30	41401-C3	81.90		
0	.044	.024	**3/32**	2	1/8	1-1/2	71002	70.40	71002-C3	75.00	71002-C4	82.10
0	.044	.024	**1/8**	2	1/8	1-1/2	41402	74.80	41402-C3	79.40	41402-C4	86.50
0	.044	.024	**3/16**	2	1/8	1-1/2	54202	80.40	54202-C3	85.00	54202-C4	92.10
0	.044	.024	**1/4**	2	1/8	1-1/2	993902	84.10	993902-C3	88.70		
0	.044	.024	**5/16**	2	1/8	1-1/2	901202	87.70	901202-C3	92.30		
1	.054	.032	**1/8**	2	1/8	1-1/2	71004	70.40	71004-C3	75.00	71004-C4	82.10
1	.054	.032	**3/16**	2	1/8	1-1/2	41404	74.80	41404-C3	79.40	41404-C4	86.50
1	.054	.032	**1/4**	2	1/8	1-1/2	54204	80.40	54204-C3	85.00	54204-C4	92.10
1	.054	.032	**5/16**	2	1/8	1-1/2	993904	84.10	993904-C3	88.70		
1	.054	.032	**3/8**	2	1/8	1-1/2	901204	87.70	901204-C3	92.30		
2	.064	.038	**5/32**	2	1/8	1-1/2	71006	70.40	71006-C3	75.00	71006-C4	82.10
2	.064	.038	**7/32**	2	1/8	1-1/2	41406	74.80	41406-C3	79.40	41406-C4	86.50
2	.064	.038	**5/16**	2	1/8	1-1/2	54206	80.40	54206-C3	85.00	54206-C4	92.10
2	.064	.038	**7/16**	2	1/8	1-1/2	993906	84.10	993906-C3	88.70		
2	.064	.038	**9/16**	2	1/8	1-1/2	901206	87.70	901206-C3	92.30		
3	.072	.040	**5/32**	2	1/8	1-1/2	71008	70.40	71008-C3	75.00	71008-C4	82.10
3	.072	.040	**1/4**	2	1/8	1-1/2	41408	74.80	41408-C3	79.40	41408-C4	86.50
3	.072	.040	**3/8**	2	1/8	1-1/2	54208	80.40	54208-C3	85.00	54208-C4	92.10
3	.072	.040	**1/2**	2	1/8	1-1/2	993908	84.10	993908-C3	88.70		
4	.080	.040	**1/8**	2	3/16	2	71010	70.60	71010-C3	75.60	71010-C4	86.70
4	.080	.040	**1/4**	2	3/16	2	41410	75.00	41410-C3	80.00	41410-C4	91.10
4	.080	.040	**5/16**	2	3/16	2	821410	77.90	821410-C3	82.90		
4	.080	.040	**3/8**	2	3/16	2	54210	80.80	54210-C3	85.80	54210-C4	96.90
4	.080	.040	**1/2**	2	3/16	2	993910	84.80	993910-C3	89.80		
4	.080	.040	**5/8**	2	3/16	2	901210	89.00	901210-C3	94.00		
5	.093	.050	**3/16**	4	3/16	2	71015	70.40	71015-C3	75.40		
5	.093	.050	**3/8**	4	3/16	2	41415	74.80	41415-C3	79.80	41415-C4	90.90
5	.093	.050	**1/2**	4	3/16	2	54215	80.40	54215-C3	85.40		
5	.093	.050	**5/8**	4	3/16	2	993915	84.80	993915-C3	89.80		

continued on next page

NEW SIZES!

THREAD MILLING CUTTERS

Single Form – UN Threads (cont.)

continued from previous page

	THREAD SIZE	CUTTER DIA. D_1 $^{+.000''}_{-.002''}$	NECK DIA.	MAX DEPTH OF THREAD L_3 $^{+.020''}_{-.000''}$	FLUTES	SHANK DIA. D_2	OVERALL LENGTH L_1	UNCOATED TOOL #	UNCOATED PRICE	AlTiN COATED TOOL #	AlTiN COATED PRICE	AMORPHOUS DIAMOND TOOL #	AMORPHOUS DIAMOND PRICE
	6	.098	.050	**5/32**	4	3/16	2	932920	70.60	932920-C3	75.60		
	6	.098	.050	**1/4**	4	3/16	2	71020	70.60	71020-C3	75.60	71020-C4	86.70
	6	.098	.050	**5/16**	4	3/16	2	822720	72.60	822720-C3	79.40		
	6	.098	.050	**3/8**	4	3/16	2	41420	75.00	41420-C3	80.00	41420-C4	91.10
	6	.098	.050	**1/2**	4	3/16	2	54220	80.80	54220-C3	85.80	54220-C4	96.90
	6	.098	.050	**5/8**	4	3/16	2	993920	84.80	993920-C3	89.80		
	6	.098	.050	**3/4**	4	3/16	2	901220	89.00	901220-C3	94.00		
	8	.120	.070	**7/32**	4	1/4	2-1/2	932930	71.60	932930-C3	78.40		
	8	.120	.070	**5/16**	4	1/4	2-1/2	71030	72.40	71030-C3	79.20	71030-C4	90.70
	8	.120	.070	**3/8**	4	1/4	2-1/2	820330	74.80	820330-C3	81.60		
	8	.120	.070	**1/2**	4	1/4	2-1/2	41430	77.30	41430-C3	84.10	41430-C4	95.60
	8	.120	.070	**9/16**	4	1/4	2-1/2	821430	79.90	821430-C3	84.50		
	8	.120	.070	**5/8**	4	1/4	2-1/2	54230	82.60	54230-C3	89.40	54230-C4	100.90
	8	.120	.070	**3/4**	4	1/4	2-1/2	993930	89.00	993930-C3	95.80		
	8	.120	.070	**7/8**	4	1/4	2-1/2	901230	94.30	901230-C3	101.10		
	10	.135	.070	**7/32**	4	1/4	2-1/2	932940	71.60	932940-C3	78.40		
	10	.135	.070	**5/16**	4	1/4	2-1/2	71040	72.40	71040-C3	79.20	71040-C4	90.70
	10	.135	.070	**3/8**	4	1/4	2-1/2	820340	74.80	820340-C3	81.60		
	10	.135	.070	**1/2**	4	1/4	2-1/2	41440	77.30	41440-C3	84.10	41440-C4	95.60
	10	.135	.070	**5/8**	4	1/4	2-1/2	54240	82.60	54240-C3	89.40	54240-C4	100.90
	10	.135	.070	**7/8**	4	1/4	2-1/2	993940	89.00	993940-C3	95.80		
	10	.135	.070	**1-1/8**	4	1/4	2-1/2	901240	94.30	901240-C3	101.10		
	12	.160	.095	**3/8**	4	1/4	2-1/2	71045	72.40	71045-C3	79.20		
NEW	12	.160	.095	**1/2**	4	1/4	2-1/2	822745	74.80	822745-C3	81.60		
	12	.160	.095	**5/8**	4	1/4	2-1/2	41445	77.30	41445-C3	84.10		
	12	.160	.095	**7/8**	4	1/4	2-1/2	54245	82.60	54245-C3	89.40		
	1/4	.180	.115	**5/16**	4	1/4	2-1/2	932950	71.60	932950-C3	78.40		
	1/4	.180	.115	**1/2**	4	1/4	2-1/2	71050	72.40	71050-C3	79.20	71050-C4	90.70
	1/4	.180	.115	**5/8**	4	1/4	2-1/2	822750	74.80	822750-C3	81.60		
	1/4	.180	.115	**3/4**	4	1/4	2-1/2	41450	77.30	41450-C3	84.10	41450-C4	95.60
	1/4	.180	.115	**1**	4	1/4	2-1/2	54250	82.60	54250-C3	89.40	54250-C4	100.90
	1/4	.180	.115	**1-1/4**	4	1/4	2-1/2	993950	89.00	993950-C3	95.80		
	1/4	.180	.115	**1-1/2**	4	1/4	3	901250	94.30	901250-C3	101.10		
	5/16	.240	.160	**1/2**	4	1/4	2-1/2	71055	72.40	71055-C3	79.20	71055-C4	90.70
	5/16	.240	.160	**5/8**	4	1/4	2-1/2	822755	74.80	822755-C3	81.60		
	5/16	.240	.160	**3/4**	4	1/4	2-1/2	41455	77.30	41455-C3	84.10	41455-C4	95.60
	5/16	.240	.160	**1**	4	1/4	2-1/2	54255	85.30	54255-C3	92.10	54255-C4	103.60
	5/16	.240	.160	**1-1/4**	4	1/4	2-1/2	993955	89.00	993955-C3	95.80		
	5/16	.240	.160	**1-1/2**	4	1/4	3	901255	94.30	901255-C3	101.10		
	3/8	.300	.218	**3/4**	4	3/8	2-1/2	71060	94.30	71060-C3	102.20	71060-C4	116.40
	3/8	.300	.218	**7/8**	4	3/8	2-1/2	822760	96.60	822760-C3	105.60		
	3/8	.300	.218	**1**	4	3/8	2-1/2	41460	99.00	41460-C3	108.00	41460-C4	121.10
	3/8	.300	.218	**1-1/4**	4	3/8	2-1/2	54260	104.30	54260-C3	113.30	54260-C4	126.40
	3/8	.300	.218	**1-1/2**	4	3/8	3	993960	108.20	993960-C3	117.20		
	3/8	.300	.218	**1-3/4**	4	3/8	3	901260	112.10	901260-C3	121.10		

continued on next page

NEW SIZES!

THREAD MILLING CUTTERS

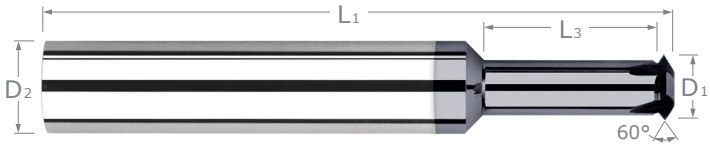
Single Form – UN Threads (cont.)

continued from previous page

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
	D_1 $^{+.000''}_{-.002''}$		L_3 $^{+.020''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
7/16	.340	.230	**3/4**	4	3/8	2-1/2	71065	106.20	71065-C3	115.20			
7/16	.340	.230	**1**	4	3/8	2-1/2	41465	110.70	41465-C3	119.70			
1/2	.388	.250	**3/4**	4	1/2	3	71070	106.20	71070-C3	119.60			
1/2	.388	.250	**1**	4	1/2	3	822770	108.70	822770-C3	122.10			
1/2	.388	.250	**1-1/4**	4	1/2	3	41470	111.20	41470-C3	124.60	41470-C4	137.80	
1/2	.388	.250	**1-3/4**	4	1/2	4	54270	118.50	54270-C3	131.90			
1/2	.388	.250	**2-1/4**	4	1/2	4	993970	123.60	993970-C3	137.00			
1/2	.388	.250	**2-3/4**	4	1/2	6	901270	128.40	901270-C3	141.80			
9/16	.400	.270	**7/8**	6	1/2	3	71073	111.00	71073-C3	124.40			NEW
9/16	.400	.270	**1-1/4**	6	1/2	3	41473	111.00	41473-C3	124.40			NEW
5/8	.450	.300	**1**	6	1/2	3	71075	111.00	71075-C3	124.40			
5/8	.450	.300	**1-3/8**	6	1/2	3	41475	116.20	41475-C3	129.60			
3/4	.495	.325	**1**	6	1/2	3	71080	111.00	71080-C3	124.40			
3/4	.495	.325	**1-3/8**	6	1/2	3	41480	116.20	41480-C3	129.60			
3/4	.495	.325	**1-3/4**	6	1/2	4	54280	122.30	54280-C3	135.70			
3/4	.495	.325	**2-1/4**	6	1/2	4	993980	127.70	993980-C3	141.10			
3/4	.495	.325	**2-3/4**	6	1/2	6	901280	132.90	901280-C3	146.30			
7/8	.590	.400	**1-1/4**	6	5/8	3-1/2	71085	150.90	71085-C3	164.30			NEW
7/8	.590	.400	**1-1/2**	6	5/8	3-1/2	41485	159.30	41485-C3	172.70			NEW
1	.620	.420	**1-5/16**	6	5/8	3-1/2	71090	150.90	71090-C3	164.30			
1	.620	.420	**1-3/4**	6	5/8	3-1/2	41490	159.30	41490-C3	172.70			

THREAD MILLING CUTTERS

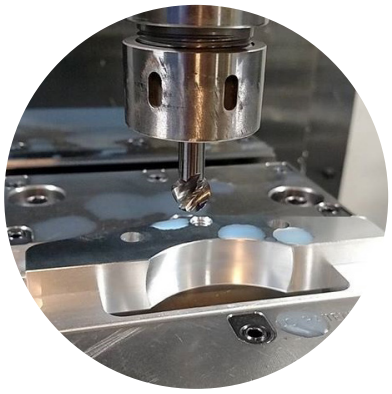
Single Form – Metric



For thread fit chart, search for keyword THREADFIT on *www.harveytool.com*

- Single thread form – can mill multiple pitches
- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.00 mm −.05 mm		L_3 +.50 mm −.00 mm		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M1.6	1.16 mm	.696 mm	**2.10 mm**	2	3 mm	38 mm	890316	74.80	890316-C3	79.40
M1.6	1.16 mm	.696 mm	**3.50 mm**	2	3 mm	38 mm	882116	74.80	882116-C3	79.40
M2	1.50 mm	.900 mm	**2.70 mm**	2	3 mm	38 mm	890319	74.80	890319-C3	79.40
M2	1.50 mm	.900 mm	**4.50 mm**	2	3 mm	38 mm	882119	74.80	882119-C3	79.40
M2	1.50 mm	.900 mm	**7.00 mm**	2	3 mm	38 mm	826519	77.00	826519-C3	81.60
M2.5	1.90 mm	1.140 mm	**3.50 mm**	2	3 mm	38 mm	890322	74.80	890322-C3	79.40
M2.5	1.90 mm	1.140 mm	**5.80 mm**	2	3 mm	38 mm	882122	74.80	882122-C3	79.40
M3	2.30 mm	1.380 mm	**4.00 mm**	4	3 mm	38 mm	890324	74.80	890324-C3	79.40
M3	2.30 mm	1.380 mm	**6.80 mm**	4	3 mm	38 mm	882124	74.80	882124-C3	79.40
M3	2.30 mm	1.380 mm	**11.00 mm**	4	3 mm	38 mm	826524	77.00	826524-C3	81.60
M4	3.00 mm	1.800 mm	**5.50 mm**	4	3 mm	38 mm	890326	75.90	890326-C3	80.50
M4	3.00 mm	1.800 mm	**9.00 mm**	4	3 mm	38 mm	882126	77.00	882126-C3	81.60
M4	3.00 mm	1.800 mm	**14.00 mm**	4	3 mm	38 mm	826526	79.30	826526-C3	83.90
M5	4.00 mm	2.400 mm	**7.00 mm**	4	4 mm	50 mm	890328	77.00	890328-C3	82.00
M5	4.00 mm	2.400 mm	**12.00 mm**	4	4 mm	50 mm	882128	79.30	882128-C3	84.30
M5	4.00 mm	2.400 mm	**19.00 mm**	4	4 mm	50 mm	826528	81.90	826528-C3	86.90
M6	4.80 mm	2.880 mm	**8.50 mm**	4	6 mm	50 mm	890330	75.90	890330-C3	82.70
M6	4.80 mm	2.880 mm	**14.00 mm**	4	6 mm	50 mm	882130	77.00	882130-C3	83.80
M6	4.80 mm	2.880 mm	**23.00 mm**	4	6 mm	63 mm	826530	83.00	826530-C3	89.80
M8	6.00 mm	3.600 mm	**11.00 mm**	4	6 mm	50 mm	890332	77.00	890332-C3	83.80
M8	6.00 mm	3.600 mm	**18.00 mm**	4	6 mm	50 mm	882132	81.90	882132-C3	88.70
M10	8.00 mm	4.800 mm	**15.00 mm**	4	8 mm	63 mm	890334	99.80	890334-C3	107.70
M10	8.00 mm	4.800 mm	**24.00 mm**	4	8 mm	63 mm	882134	105.00	882134-C3	112.90
M16	13.70 mm	8.220 mm	**25.00 mm**	6	14 mm	75 mm	890339	117.70	890339-C3	131.10
M16	13.70 mm	8.220 mm	**42.00 mm**	6	14 mm	89 mm	882139	129.60	882139-C3	143.00



★★★★★

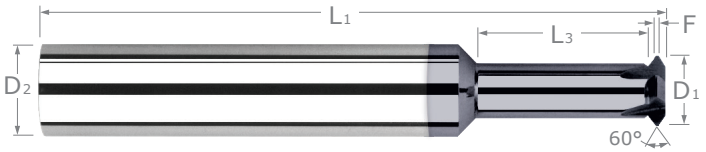
"Love these @harveytool lollipops. Undercutting a full radius for a pillow block bearing."

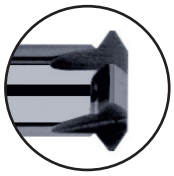
— @rydelfab

Follow us on Instagram @harveytool!

THREAD MILLING CUTTERS

Single Form – UN Threads – For Hardened Steels





Tip of Included Angle Ground to a Flat for Increased Wear Resistance

- **Designed for threading hardened steels 46-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° UN threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention
- CNC ground in the USA

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.000″ −.002″	F +.0000″ −.0005″		L_3 +.020″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
0	80	.044	.0013	.028	**3/32**	3	1/8	1-1/2	986602-C6	85.50
0	80	.044	.0013	.028	**1/8**	3	1/8	1-1/2	993102-C6	89.10
0	80	.044	.0013	.028	**3/16**	3	1/8	1-1/2	959502-C6	93.20
0	80	.044	.0013	.028	**1/4**	3	1/8	1-1/2	930302-C6	97.30
0	80	.044	.0013	.028	**5/16**	3	1/8	1-1/2	898902-C6	101.00
1	64-72	.054	.0014	.034	**1/8**	3	1/8	1-1/2	986604-C6	85.50
1	64-72	.054	.0014	.034	**3/16**	3	1/8	1-1/2	993104-C6	89.10
1	64-72	.054	.0014	.034	**1/4**	3	1/8	1-1/2	959504-C6	93.20
1	64-72	.054	.0014	.034	**5/16**	3	1/8	1-1/2	930304-C6	97.10
2	56-64	.064	.0016	.041	**5/32**	3	1/8	1-1/2	986606-C6	85.50
2	56-64	.064	.0016	.041	**7/32**	3	1/8	1-1/2	993106-C6	89.10
2	56-64	.064	.0016	.041	**5/16**	3	1/8	1-1/2	959506-C6	93.20
2	56-64	.064	.0016	.041	**7/16**	3	1/8	1-1/2	930306-C6	97.30
3	48-56	.072	.0018	.046	**5/32**	3	1/8	1-1/2	986608-C6	85.50
3	48-56	.072	.0018	.046	**1/4**	3	1/8	1-1/2	993108-C6	89.10
3	48-56	.072	.0018	.046	**3/8**	3	1/8	1-1/2	959508-C6	93.20
4	40-48	.080	.0021	.050	**5/32**	3	3/16	2	986610-C6	86.10
4	40-48	.080	.0021	.050	**1/4**	3	3/16	2	993110-C6	91.20
4	40-48	.080	.0021	.050	**3/8**	3	3/16	2	959510-C6	95.00
4	40-48	.080	.0021	.050	**1/2**	3	3/16	2	930310-C6	99.00
4	40-48	.080	.0021	.050	**5/8**	3	3/16	2	898910-C6	102.90
5	40-44	.093	.0023	.063	**3/16**	4	3/16	2	986615-C6	91.20
5	40-44	.093	.0023	.063	**1/2**	4	3/16	2	959515-C6	95.00
5	40-44	.093	.0023	.063	**5/8**	4	3/16	2	930315-C6	99.00
6	32-40	.098	.0025	.062	**1/4**	4	3/16	2	986620-C6	86.10
6	32-40	.098	.0025	.062	**3/8**	4	3/16	2	993120-C6	91.20
6	32-40	.098	.0025	.062	**1/2**	4	3/16	2	959520-C6	95.00
6	32-40	.098	.0025	.062	**5/8**	4	3/16	2	930320-C6	99.00
8	32-36	.120	.0028	.084	**5/16**	4	1/4	2-1/2	986630-C6	90.40
8	32-36	.120	.0028	.084	**1/2**	4	1/4	2-1/2	993130-C6	95.70
8	32-36	.120	.0028	.084	**5/8**	4	1/4	2-1/2	959530-C6	100.70
8	32-36	.120	.0028	.084	**3/4**	4	1/4	2-1/2	930330-C6	105.70
8	32-36	.120	.0028	.084	**7/8**	4	1/4	2-1/2	898930-C6	110.70
10	24-36	.135	.0028	.086	**5/16**	5	1/4	2-1/2	986640-C6	90.40
10	24-36	.135	.0028	.086	**1/2**	5	1/4	2-1/2	993140-C6	95.70

*Tools are designed to produce an 83% depth of thread maximum.

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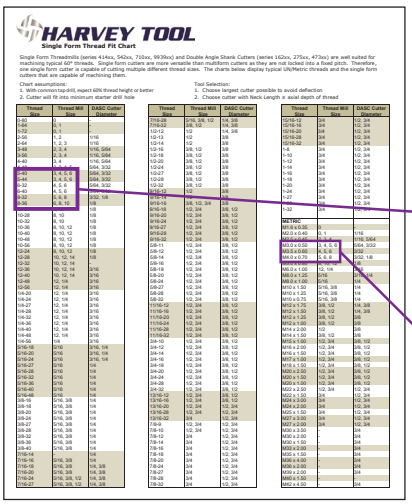
THREAD MILLING CUTTERS

Single Form – UN Threads – For Hardened Steels (cont.)

continued from previous page

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.000″ −.002″	F +.0000″ −.0005″		L_3 +.020″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
10	24-36	.135	.0028	.086	**5/8**	5	1/4	2-1/2	959540-C6	100.70
10	24-36	.135	.0028	.086	**7/8**	5	1/4	2-1/2	930340-C6	105.70
10	24-36	.135	.0028	.086	**1-1/8**	5	1/4	2-1/2	898940-C6	110.70
12	24-32	.160	.0030	.111	**3/8**	5	1/4	2-1/2	986645-C6	90.40
12	24-32	.160	.0030	.111	**5/8**	5	1/4	2-1/2	993145-C6	100.70
1/4	20-32	.180	.0030	.122	**5/16**	5	1/4	2-1/2	845750-C6	90.40
1/4	20-32	.180	.0030	.122	**1/2**	5	1/4	2-1/2	986650-C6	95.70
1/4	20-32	.180	.0030	.122	**3/4**	5	1/4	2-1/2	993150-C6	100.70
1/4	20-32	.180	.0030	.122	**1**	5	1/4	2-1/2	959550-C6	105.70
1/4	20-32	.180	.0030	.122	**1-1/4**	5	1/4	2-1/2	930350-C6	110.50
5/16	18-28	.240	.0036	.174	**3/8**	5	1/4	2-1/2	845755-C6	90.40
5/16	18-28	.240	.0036	.174	**1/2**	5	1/4	2-1/2	986655-C6	95.70
5/16	18-28	.240	.0036	.174	**3/4**	5	1/4	2-1/2	993155-C6	100.70
5/16	18-28	.240	.0036	.174	**1**	5	1/4	2-1/2	959555-C6	105.70
5/16	18-28	.240	.0036	.174	**1-1/4**	5	1/4	2-1/2	930355-C6	110.50
3/8	16-28	.300	.0036	.227	**1/2**	5	3/8	2-1/2	845760-C6	116.60
3/8	16-28	.300	.0036	.227	**3/4**	5	3/8	2-1/2	986660-C6	121.70
3/8	16-28	.300	.0036	.227	**1**	5	3/8	2-1/2	993160-C6	126.80
3/8	16-28	.300	.0036	.227	**1-1/4**	5	3/8	2-1/2	959560-C6	131.90
3/8	16-28	.300	.0036	.227	**1-1/2**	5	3/8	3	930360-C6	136.90
1/2	12-18	.388	.0056	.294	**3/4**	5	1/2	3	986670-C6	134.40
1/2	12-18	.388	.0056	.294	**1-1/4**	5	1/2	3	993170-C6	143.40
1/2	12-18	.388	.0056	.294	**1-3/4**	5	1/2	4	959570-C6	148.60
1/2	12-18	.388	.0056	.294	**2-1/4**	5	1/2	4	930370-C6	153.60
3/4	10-16	.495	.0063	.385	**1**	6	1/2	3	986680-C6	142.50
3/4	10-16	.495	.0063	.385	**1-3/8**	6	1/2	3	993180-C6	154.40
3/4	10-16	.495	.0063	.385	**1-3/4**	6	1/2	4	959580-C6	166.50
3/4	10-16	.495	.0063	.385	**2-1/4**	6	1/2	4	930380-C6	178.50
1	8-14	.620	.0071	.480	**1-5/16**	6	5/8	3-1/2	986690-C6	168.70
1	8-14	.620	.0071	.480	**1-3/4**	6	5/8	3-1/2	993190-C6	180.80

*Tools are designed to produce an 83% depth of thread maximum.


HARVEY TOOL
Single Form Thread Fit Chart

5-40	3, 4, 5, 6
5-44	3, 4, 5, 6
6-32	4, 5, 6
6-40	4, 5, 6
8-32	5, 6, 8

M3.0 x 0.50	3, 4, 5, 6
M3.5 x 0.60	4, 5, 6
M4.0 x 0.70	5, 6, 8

SINGLE FORM THREAD FIT CHARTS

Our single form thread milling cutters can produce a range of thread sizes, from common UN threads to metric threads.

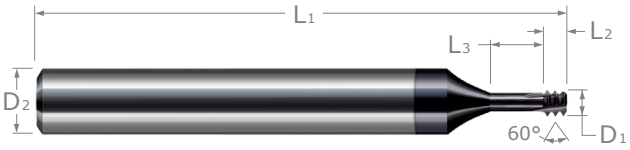
For example, our 5 thread size single form cutters (pictured left) can produce a range of thread sizes from 5-40 to 8-32 as well as M3.0 x 0.50 to M4.0 x 0.70.

For help with choosing the right thread mill, please call our Technical Support Team at **800-645-5609**.

To download the thread fit charts, search for keyword THREADFIT on www.harveytool.com

THREAD MILLING CUTTERS

Tri-Form – UN Threads



Left-Hand Cut, Left Hand Spiral Design

Left-Hand Cut, Left-Hand Spiral Design

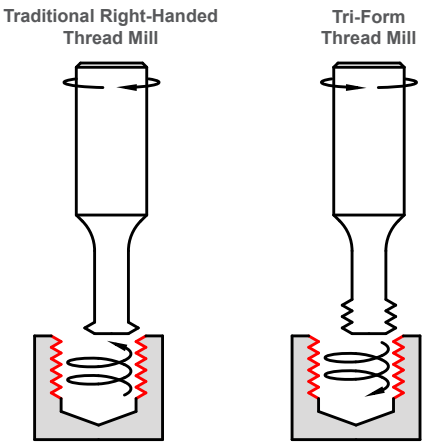
- **Designed for threading in hardened steels and difficult-to-machine materials**
- Left-hand cut, left-hand spiral design for climb milling from top to bottom of right-hand threads
- Three forms and helical design reduces tool pressure and deflection resulting in accurate threads
- Cuts internal 60° UN threads
- Able to cut larger threads of the same pitch
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE
2-56	.065	.053	.042	**3/32**	3	1/4	2-1/2	899910-C6	166.20
2-56	.065	.053	.042	**5/32**	3	1/4	2-1/2	896410-C6	173.10
4-40	.085	.075	.053	**3/32**	3	1/4	2-1/2	899916-C6	166.20
4-40	.085	.075	.053	**5/32**	3	1/4	2-1/2	896416-C6	173.10
6-32	.100	.093	.061	**5/32**	3	1/4	2-1/2	899922-C6	166.20
6-32	.100	.093	.061	**1/4**	3	1/4	2-1/2	896422-C6	173.10
8-32	.126	.093	.087	**7/32**	3	1/4	2-1/2	899928-C6	154.40
8-32	.126	.093	.087	**5/16**	3	1/4	2-1/2	896428-C6	161.40
10-24	.138	.125	.086	**7/32**	3	1/4	2-1/2	899934-C6	154.40
10-24	.138	.125	.086	**5/16**	3	1/4	2-1/2	896434-C6	161.40
10-32	.145	.093	.106	**7/32**	3	1/4	2-1/2	899936-C6	154.40
10-32	.145	.093	.106	**5/16**	3	1/4	2-1/2	896436-C6	161.40
1/4-20	.187	.150	.124	**5/16**	3	1/4	2-1/2	899944-C6	154.40
1/4-20	.187	.150	.124	**1/2**	3	1/4	2-1/2	896444-C6	161.40
1/4-28	.197	.107	.151	**5/16**	3	1/4	2-1/2	899946-C6	154.40
1/4-28	.197	.107	.151	**1/2**	3	1/4	2-1/2	896446-C6	161.40
5/16-18	.236	.166	.166	**3/8**	3	1/4	2-1/2	899954-C6	154.40
5/16-18	.236	.166	.166	**1/2**	3	1/4	2-1/2	896454-C6	161.40
3/8-16	.264	.187	.186	**1/2**	3	5/16	2-1/2	899964-C6	162.80
3/8-16	.264	.187	.186	**3/4**	3	5/16	2-1/2	896464-C6	169.80

Tri-Form Thread Mills

Our Tri-Form Thread Mills are unlike traditional right-handed thread mills, as they have a left-hand cut, left-hand spiral design.

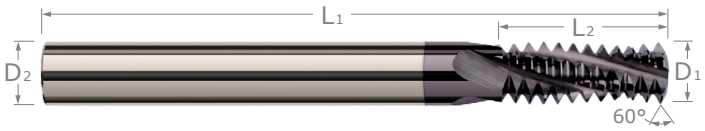
- Improves thread accuracy and surface finish by climb milling from the top to the bottom of a hole.
- Tri-Form Thread Mills eliminate the need to arc-in when engaging the tool, which reduces radial pressure and deflection.



NEW SIZES!

THREAD MILLING CUTTERS

Multi-Form – UN Threads



- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

	THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
		D_1 +.0005" −.0005"	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	2-56	.065	.125	3*	1/8	2	70010	85.10	70010-C3	89.70	70010-C8	91.90
	3-48	.075	.167	3*	1/8	2	70012	89.90	70012-C3	94.50		
	4-40	.085	.175	3*	1/8	2	70016	89.90	70016-C3	94.50	70016-C8	96.70
	5-44	.095	.228	3	1/8	2	70020	89.90	70020-C3	94.50		
	6-32	.100	.218	3	1/8	2	70022	93.00	70022-C3	97.60	70022-C8	99.80
	8-32	.115	.250	3	1/8	2	70028	99.80	70028-C3	104.40	70028-C8	106.60
	8-36	.115	.250	3	1/8	2	70031	99.80	70031-C3	104.40		
	10-24	.120	.312	3	1/8	2	70034	104.90	70034-C3	109.50	70034-C8	111.70
	10-28	.120	.312	3	1/8	2	70035	107.00	70035-C3	111.60		
	10-32	.120	.312	3	1/8	2	70036	104.90	70036-C3	109.50	70036-C8	111.70
	1/4-20	.180	.500	3	3/16	2-1/2	70044	125.50	70044-C3	130.50	70044-C8	132.30
	1/4-28	.180	.500	3	3/16	2-1/2	70046	125.50	70046-C3	130.50	70046-C8	132.30
	5/16-18	.235	.625	3	1/4	2-1/2	70054	135.80	70054-C3	142.60	70054-C8	143.10
	5/16-24	.235	.625	3	1/4	2-1/2	70056	153.50	70056-C3	160.30	70056-C8	160.80
	3/8-16	.285	.750	4	5/16	3	70064	182.70	70064-C3	190.60	70064-C8	198.20
	3/8-24	.285	.750	4	5/16	3	70066	182.70	70066-C3	190.60	70066-C8	198.20
	7/16-14	.305	.750	4	5/16	3	70074	182.70	70074-C3	190.60	70074-C8	198.20
	7/16-20	.335	.875	4	3/8	3-1/2	70076	197.10	70076-C3	206.10	70076-C8	215.90
	1/2-13	.350	.875	4	3/8	3-1/2	70084	203.60	70084-C3	212.60		
NEW	1/2-20	.370	1.000	6	3/8	3-1/2	70086	213.80	70086-C3	222.80		
NEW	1/2-32	.370	1.000	6	3/8	3-1/2	70089	213.80	70089-C3	222.80		
	9/16-12	.370	.875	4	3/8	3-1/2	70092	203.60	70092-C3	212.60		
	9/16-18	.370	.875	4	3/8	3-1/2	70094	203.60	70094-C3	212.60		
	5/8-11	.470	1.250	4	1/2	3-1/2	70104	251.70	70104-C3	265.10		
	3/4-10	.495	1.250	4	1/2	3-1/2	70124	251.70	70124-C3	265.10		
	3/4-12	.495	1.250	4	1/2	3-1/2	70126	251.70	70126-C3	265.10		
	3/4-16	.490	1.250	4	1/2	3-1/2	70128	256.90	70128-C3	270.30		
	7/8-9	.620	1.375	4	5/8	4	70132	375.20	70132-C3	389.70		
	7/8-14	.490	1.250	4	1/2	3-1/2	70134	256.90	70134-C3	270.30		
	1-8	.620	1.375	4	5/8	4	70154	375.20	70154-C3	389.70		
NEW	1-12	.745	1.500	6	3/4	4	70158	478.60	70158-C3	493.10		

*Straight flutes

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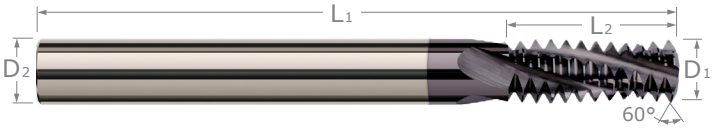
THREAD MILLING CUTTERS

Multi-Form – UN Threads – For Hardened Steels



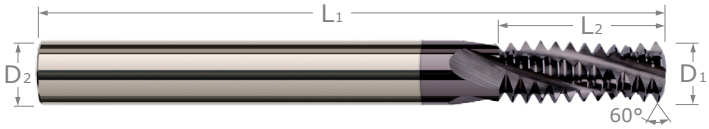
- Designed for threading hardened steels 46-68 Rc
- Cuts internal and external 60° UN threads
- Mill right hand and left hand threads
- Able to cut larger threads of the same pitch
- Variable helix design reduces chatter and harmonics and produces more accurate threads
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	PRICE
4-40	.085	.180	3	1/8	2	836716-C6	110.50
6-32	.100	.218	3	1/8	2	836722-C6	114.10
8-32	.115	.250	3	1/8	2	836728-C6	122.10
10-24	.120	.312	3	3/16	2	836734-C6	128.20
10-32	.120	.312	3	3/16	2	836736-C6	128.20
1/4-20	.180	.500	3	3/16	2-1/2	836744-C6	152.60
1/4-28	.180	.500	3	3/16	2-1/2	836746-C6	152.60
5/16-18	.240	.625	3	1/4	2-1/2	836754-C6	166.80
5/16-24	.240	.625	3	1/4	2-1/2	836756-C6	187.60
3/8-16	.285	.750	4	5/16	3	836764-C6	223.00
3/8-24	.285	.750	4	5/16	3	836766-C6	223.00
7/16-20	.335	.875	4	3/8	3-1/2	836776-C6	241.00
1/2-13	.350	.875	4	3/8	3-1/2	836784-C6	248.70
3/4-16	.495	1.250	4	1/2	3-1/2	836798-C6	316.10

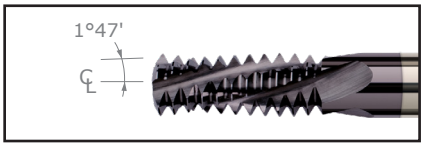
NEW SIZE!

THREAD MILLING CUTTERS

Multi-Form – N.P.T. Threads



- Cuts internal and external 60° National Pipe Taper (N.P.T.) threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA



	THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
		D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	1/16, 1/8-27	.245*	.437	3	1/4	2-1/2	70204	136.50	70204-C3	143.30	70204-C8	143.80
	1/4, 3/8-18	.305*	.625	4	5/16	3	70214	187.00	70214-C3	194.90	70214-C8	202.50
NEW	1/4, 3/8-18	.363*	.680	4	3/8	3-1/2	790414	198.90	790414-C3	207.90		
	1/2, 3/4-14	.495*	.875	4	1/2	3-1/2	70226	218.10	70226-C3	231.50		
	1,2-11.5	.620*	1.125	4	5/8	4	70232	308.20	70232-C3	322.70		

*Major cutter diameter

THREAD MILLING CUTTERS

N.P.T. Tapered End Mills – Square

1°47' Angle for NPT threads

- 1°47' angle for preparation of parts prior to internal or external NPT thread milling
- Length of cut and diameters designed for range of standard NPT dimensions
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	END DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
1°47'	.200	**.625** (3x)	1/4	2	912282	56.10	912282-C6	66.10
	.300	**.900** (3x)	3/8	2-1/2	912286	70.00	912286-C6	81.20
	.400	**1.250** (3x)	1/2	3	912292	94.10	912292-C6	108.60

N.P.T. Thread Fit Chart		
Thread Mill Tool #	Thread Size	Tapered End Mill Tool #
70204	1/16, 1/8-27	912282
70214, 790914	1/4, 3/8-18	912282, 912286
70226	1/2, 3/4-14	912286
70232	1, 2-11.5	912292

THREAD MILLING CUTTERS

Multi-Form – Metric

- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.085	.178	3	1/8	2	16903	110.20	16903-C3	114.80
M4-0.70	.115	.276	3	1/8	2	16907	110.20	16907-C3	114.80
M4.5-0.75	.120	.250	3	1/8	2	16909	110.20	16909-C3	114.80
M5-0.80	.120	.312	3	1/8	2	16911	110.20	16911-C3	114.80
M6-1.00	.170	.500	3	3/16	2-1/2	16917	133.70	16917-C3	138.70
M8-1.25	.235	.625	3	1/4	2-1/2	16923	143.70	16923-C3	150.50
M10-1.50	.300	.750	4	5/16	3	16929	193.70	16929-C3	201.60
M12-1.75	.360	.875	4	3/8	3-1/2	16935	215.50	16935-C3	224.50
M14-1.50	.370	.875	4	3/8	3-1/2	16941	215.50	16941-C3	224.50
M16-2.00	.470	1.250	4	1/2	3-1/2	16947	265.30	16947-C3	278.70
M18-1.50	.490	1.250	4	1/2	3-1/2	16953	265.30	16953-C3	278.70
M20-2.50	.495	1.250	4	1/2	3-1/2	16959	265.30	16959-C3	278.70

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THREAD MILLING CUTTERS

Multi-Form – Coolant-Through – UN Threads

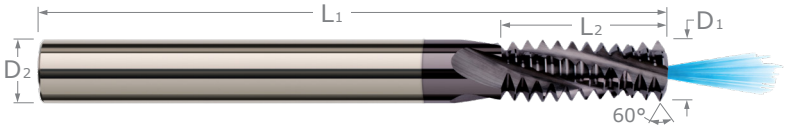
- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° UN threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

Coolant-Fed for Chip Removal

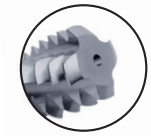
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10-24	.145	.312	3	3/16	2-3/8	17334	106.20	17334-C3	111.20
10-32	.150	.312	3	3/16	2-3/8	17336	106.20	17336-C3	111.20
1/4-20	.180	.500	3	3/16	2-3/8	17344	128.70	17344-C3	133.70
1/4-28	.180	.500	3	3/16	2-3/8	17346	128.70	17346-C3	133.70
5/16-18	.235	.625	3	1/4	2-3/8	17354	138.60	17354-C3	145.40
5/16-24	.235	.625	3	1/4	2-3/8	17356	161.90	17356-C3	168.70
3/8-16	.285	.750	4	5/16	3	17364	186.70	17364-C3	194.60
3/8-24	.285	.750	4	5/16	3	17366	186.70	17366-C3	194.60
7/16-14	.305	.750	4	5/16	3	17374	186.70	17374-C3	194.60
7/16-20	.335	.875	4	3/8	3	17376	201.20	17376-C3	210.20
1/2-13	.350	.875	4	3/8	3	17384	207.60	17384-C3	216.60

THREAD MILLING CUTTERS

Multi-Form – Coolant-Through – Metric



- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° Metric threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA



Coolant-Fed for Chip Removal

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.085	.1780	3	1/8	2	819624	116.20	819624-C3	120.80
M4-0.70	.115	.2760	3	1/8	2	819626	116.20	819626-C3	120.80
M5-0.80	.120	.3125	3	1/8	2	819628	116.20	819628-C3	123.00
M6-1.00	.170	.5000	3	3/16	2-1/2	819630	141.10	819630-C3	145.70
M8-1.25	.235	.6250	3	1/4	2-1/2	819632	151.60	819632-C3	158.40

THREAD MILLING CUTTERS

Multi-Form – Long Flute – UN Threads

Designed for Deep Threaded Applications!

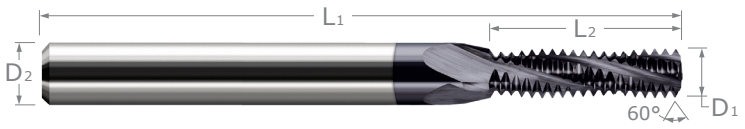
- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° UN threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
2-56	.069	.215	3*	1/8	2	987110	104.00	987110-C3	108.60	987110-C8	110.80
3-48	.079	.250	3	1/8	2	987112	109.20	987112-C3	113.80		
4-40	.089	.275	3	1/8	2	987116	109.20	987116-C3	113.80	987116-C8	116.00
6-32	.110	.375	3	1/8	2	987122	109.20	987122-C3	113.80	987122-C8	116.00
8-32	.131	.407	3	3/16	2-1/2	987128	116.20	987128-C3	121.20	987128-C8	123.00
8-36	.131	.417	3	3/16	2-1/2	987131	122.20	987131-C3	127.20		
10-24	.145	.500	3	3/16	2-1/2	987134	143.40	987134-C3	148.40	987134-C8	150.20
10-32	.150	.500	3	3/16	2-1/2	987136	143.40	987136-C3	148.40	987136-C8	150.20
1/4-20	.195	.750	3	1/4	2-1/2	987144	145.80	987144-C3	152.60	987144-C8	153.10
1/4-28	.195	.750	3	1/4	2-1/2	987146	145.80	987146-C3	152.60	987146-C8	153.10
5/16-18	.245	.944	3	5/16	3	987154	189.20	987154-C3	197.10		
5/16-24	.245	.958	3	5/16	3	987156	194.20	987156-C3	202.10		
3/8-16	.300	1.125	4	3/8	3-1/2	987164	225.60	987164-C3	234.60		
3/8-24	.300	1.125	4	3/8	3-1/2	987166	232.10	987166-C3	241.10		
7/16-20	.350	1.300	4	3/8	3-1/2	987176	232.10	987176-C3	241.10		
1/2-13	.400	1.308	4	1/2	3-1/2	987184	235.50	987184-C3	248.90		

*Straight flutes

THREAD MILLING CUTTERS

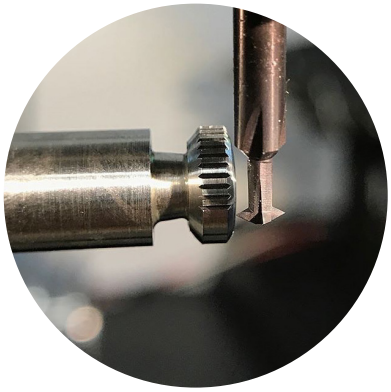
Multi-Form – Long Flute – Metric



Designed for Deep Threaded Applications!

- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° metric threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.090	.276	3	1/8	2	842903	128.60	842903-C3	133.20
M4-0.70	.124	.441	3	3/16	2-1/2	842907	131.80	842907-C3	136.80
M5-0.80	.155	.504	3	3/16	2-1/2	842911	129.00	842911-C3	134.00
M6-1.00	.186	.748	3	1/4	2-1/2	842917	152.50	842917-C3	159.30
M8-1.25	.245	.984	3	5/16	2-1/2	842923	196.10	842923-C3	204.00
M10-1.50	.311	1.122	4	3/8	3-1/2	842929	246.00	842929-C3	255.00
M16-2.00	.490	1.890	4	1/2	3-1/2	842947	318.00	842947-C3	331.40



★★★★★

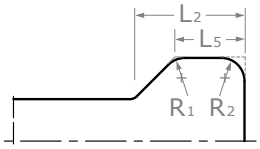
"Using my @harveytool 60 degree double angle cutter to mill some texture into a crown for a 1 in 30 piece."

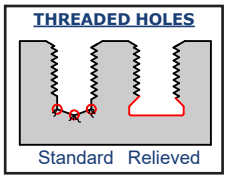
— @horological

Follow us on Instagram @harveytool!

THREAD MILLING CUTTERS

Thread Relief Cutter





- Tool designed to relieve stress concentrations at corners of undercut and bottom of last thread to prevent fracture and failure
- Relief is typically done before threading operation to avoid damaging the thread forms
- Chamfer eliminates burrs and partial threads at last thread
- Flattens bottom of hole to achieve maximum thread depth
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIA. D_1 +.000″ −.001″	LOC L_2 +.002″ −.000″	WIDTH (TSC) L_5	RADIUS 1 R_1 +.001″ −.001″	RADIUS 2 R_2 +.001″ −.001″	NECK DIA. D_3	NECK LENGTH L_3 +.010″ −.000″	RADIAL DOC	SHANK DIA. D_2	OAL L_1	UNCOATED 4 FL	UNCOATED PRICE	AlTiN COATED 4 FL	AlTiN COATED PRICE
.066	.029	.015	.000	.005	.036	.172	.014	1/8	1-1/2	896602	53.50	896602-C3	58.10
.075	.030	.015	.000	.005	.042	.187	.015	1/8	1-1/2	877502	51.30	877502-C3	55.90
.084	.038	.020	.000	.005	.045	.218	.018	3/16	2	988804	49.80	988804-C3	54.80
.102	.049	.025	.000	.010	.051	.281	.024	3/16	2	985707	50.70	985707-C3	55.70

D_1 +.000″ −.002″	L_2 +.005″ −.000″	L_5	R_1 +.001″ −.001″	R_2 +.001″ −.001″	D_3	L_3 +.030″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.125	.054	.030	.000	.010	.074	.343	.024	1/4	2-1/2	979609	61.60	979609-C3	68.40
.142	.050	.020	.000	.010	.078	.359	.030	1/4	2-1/2	975405	63.00	975405-C3	69.80
.168	.050	.020	.000	.010	.103	.422	.030	1/4	2-1/2	955305	61.60	955305-C3	68.40
.193	.055	.020	.000	.010	.118	.547	.035	1/4	2-1/2	952505	63.30	952505-C3	70.10
.193	.075	.040	.015	.015	.118	.547	.035	1/4	2-1/2	952516	63.30	952516-C3	70.10
.245	.072	.030	.000	.010	.155	.797	.042	1/4	2-1/2	946009	65.70	946009-C3	72.50
.245	.102	.060	.020	.020	.155	.797	.042	1/4	2-1/2	946027	65.70	946027-C3	72.50
.355	.086	.030	.000	.010	.236	1.078	.056	3/8	2-1/2	942909	102.30	942909-C3	111.30
.355	.116	.060	.020	.020	.236	1.078	.056	3/8	2-1/2	942927	102.30	942927-C3	111.30
.355	.136	.080	.030	.030	.236	1.078	.056	3/8	2-1/2	942931	102.30	942931-C3	111.30

View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

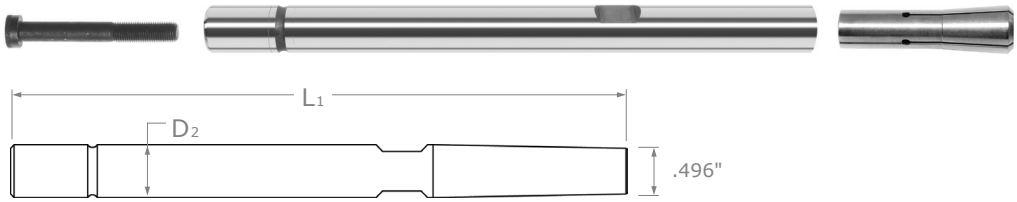
Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com

TOOL HOLDERS

Browse a fully stocked and expanded offering of Tool Holders and Collets, including Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, ER Performance Collets, and accompanying nuts and wrenches. When your machine setup includes a Harvey Tool holder and collet, you can rest assured that you'll maximize tool performance and repeatability.

TOOL HOLDERS

Extended Reach Tool Holders & Collets



- Center gripping collet with threaded draw screw
- More accurate than traditional single-set screw type holders
- High precision concentricity and rigidity
- Maximum T.I.R. of .0002" from shank to collet pocket
- Quick tool changes
- Coolant through capable
- Wrench included
- Collet not included — choose from many sizes
- Two offsetting flats to maintain T.I.R.
- Use with mills, lathes, and grinders

Center Gripping Collet Design.
Choose from Six Sizes!

Tool Holders

SHANK DIAMETER	OVERALL LENGTH	TOOL HOLDERS (Collet Not Included)	
D_2	L_1	TOOL #	PRICE
1/2	3	36730	214.40
1/2	5	36750	225.80
1/2	6	36760	239.30

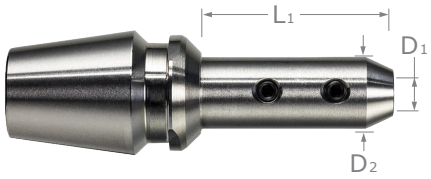
Collets

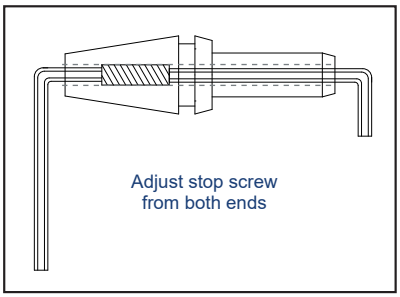
mm & in

COLLET SIZE	TOOL #	PRICE
1/8	36810	71.40
3/16	36820	71.40
1/4	36830	71.40
3 mm	36840	71.40
4 mm	36850	71.40
6 mm	36860	71.40

TOOL HOLDERS

Solid ER Integrated Tool Holders



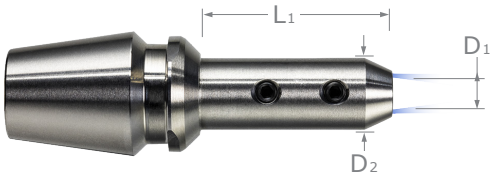


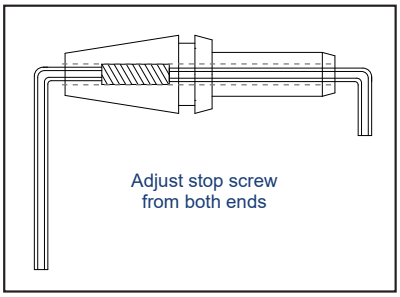
- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches
- Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Stop screw can be adjusted from both ends of holder

BORE DIAMETER	SHAFT DIAMETER	PROJECTION LENGTH	TAPER	TOOL HOLDERS	
D_1	D_2	L_1		TOOL #	PRICE
.1250	9.5 mm	16 mm	ER16	83001	262.50
.1250	9.5 mm	25 mm	ER16	83003	262.50
.1875	9.5 mm	16 mm	ER16	83002	262.50
.1875	9.5 mm	25 mm	ER16	83004	262.50
.2500	12.5 mm	14 mm	ER20	83005	307.50
.2500	12.5 mm	25 mm	ER20	83006	307.50

TOOL HOLDERS

Solid ER Integrated Tool Holders – Coolant-Through



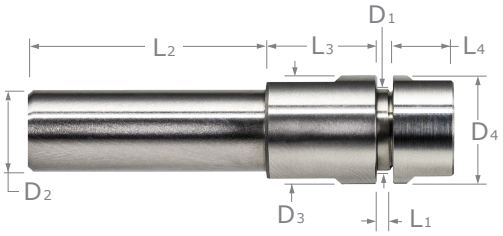


- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches
- Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Compatible with coolant through holders
- Stop screw can be adjusted from both ends of holder

BORE DIAMETER	SHAFT DIAMETER	PROJECTION LENGTH	TAPER	TOOL HOLDERS	
D_1	D_2	L_1		TOOL #	PRICE
.1250	9.5 mm	25 mm	ER16	83203	337.50

SAW ARBORS

Straight Shank



- Maximum T.I.R. of .0001”
- Straight shank allows for chucking at multiple depths
- Key not included

ARBOR DIAMETER	ARBOR LENGTH	SHANK DIAMETER	SHANK LENGTH	FLANGE DIAMETER	FLANGE LENGTH	NUT DIAMETER	NUT LENGTH	THREAD LENGTH (IN FRONT OF ARBOR)	SAW ARBORS	
D_1	L_1	D_2	L_2	D_3	L_3	D_4	L_4		TOOL #	PRICE
.375	.050	.375	1.40	.500	.500	.500	.276	.300	84101	234.00
.500	.050	.500	1.40	.625	.500	.625	.276	.300	84102	234.00
1.000	.125	.750	2.00	1.250	1.500	1.250	.437	.500	84103	299.00

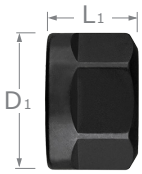
For Slitting Saws, see pages 341 and 342.

ER COLLETS

- Maximum T.I.R. of .0004”
- High polished finish helps resists oxidation
- Related nut and wrench sold separately

SIZE	BORE DIAMETER	CLAMP RANGE	ER COLLETS	
	D_1		TOOL #	PRICE
ER11	1/8	.086 - .125	82401	15.20
ER16	1/8	.086 - .125	82402	16.60
ER16	3/16	.148 - .187	82403	16.60
ER16	1/4	.211 - .250	82404	16.60

ER COLLETS
Nuts



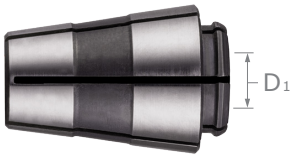
- Special anti-friction coating increases clamping pressure of tool shank

SIZE	HEAD DIAMETER	NUT LENGTH	THREAD SIZE	MAX TORQUE	ER NUTS	
	D_1	L_1			TOOL #	PRICE
ER11	19 mm	12 mm	M14 x 0.75	25 ft. lbs	82461	28.40
ER16	27.5 mm	18 mm	M22 x 1.5	42 ft. lbs	82462	28.40

ER COLLETS
Wrenches

SIZE	LENGTH	WIDTH	THICKNESS	ER WRENCHES	
				TOOL #	PRICE
ER11	4.80	1.50	0.20	82481	13.60
ER16	5.60	2.00	0.20	82482	13.60

ER PERFORMANCE COLLETS

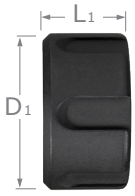


- Specialized, low profile design reduces radial distortion and improves repeatability during tool changeover
- Maximum T.I.R. of .0002”
- Works with any ER holder or spindle
- High polished finish helps resist oxidation
- Related nut and wrench sold separately

SIZE	BORE DIAMETER	CLAMP RANGE	ER PERFORMANCE COLLETS	
	D_1		TOOL #	PRICE
ER11	1/8	.1050 - .1250	85501	35.40
ER16	1/8	.1050 - .1250	85502	35.40
ER16	3/16	.1470 - .1875	85503	35.40
ER16	1/4	.2100 - .2500	85504	35.40

ER PERFORMANCE COLLETS

Nuts



- Provides increased clamping pressure on tool shank which reduces vibration and increases tool life
- Allows collet to sit further into the collet pocket, creating a more concentric tool
- Special anti-friction coating increases clamping pressure of tool shank

SIZE	HEAD DIAMETER	NUT LENGTH	THREAD SIZE	MAX TORQUE	ER PERFORMANCE NUTS	
	D_1	L_1			TOOL #	PRICE
ER11	18 mm	12 mm	M14 x 0.75	25 ft. lbs	85561	34.60
ER16	26 mm	14 mm	M22 x 1.5	42 ft. lbs	85562	34.60

ER PERFORMANCE COLLETS

Wrenches

SIZE	LENGTH	WIDTH	THICKNESS	ER PERFORMANCE WRENCHES	
				TOOL #	PRICE
ER11	Please see page 443 for ER11 Wrench size				
ER16	6.50	2.20	0.20	85582	33.80

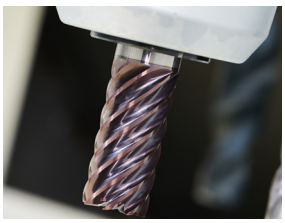
IN THE LOUPE

Your Source for Machining Solutions

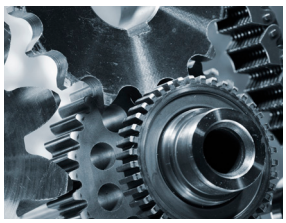
Our corporate blog, In the Loupe, is dedicated to machining how-tos, technical tips, and tool selection guides. Access helpful resources at any time and share them easily with fellow machinists at www.harveyperformance.com/in-the-loupe/.

How to Avoid Common Part Finish Problems

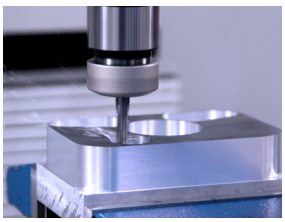
Optimize Roughing with Chipbreaker Tooling



Why Flute Count Matters

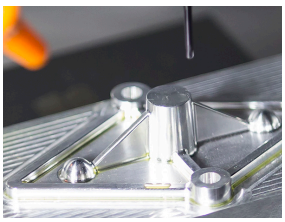


Titanium Machining Guide

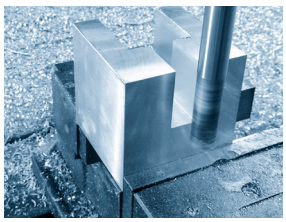


How to Avoid 4 Major Types of Tool Wear

Ball Nose Milling Strategy



Corner Engagement: How to Machine Corners



Introduction to High Efficiency Milling

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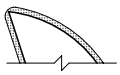
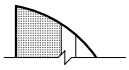
COATINGS & SUBSTRATES CHART

Coating/ Substrate:	TiN Titanium Nitride -C1	AlTiN Aluminum Titanium Nitride -C3	AlTiN Nano Aluminum Titanium Nitride Nano -C6
Application/ Benefits:	• General purpose coating for machining ferrous materials.	• High performance coating in ferrous materials. • Excellent high temperature resistance and hardness. • Maintains high surface hardness at elevated temperatures improving tool life and allowing faster feed rates. • Produces aluminum oxide layer at high temperature which reduces thermal conductivity, transferring heat into the chip. • Excellent in dry machining, machining titanium alloys, inconel, stainless alloys and cast iron. • Not recommended for use in aluminum and aluminum alloys.	• Premium coating in ferrous materials. • Latest generation AlTiN coating mixed with silicon to produce a unique nanocomposite coating. This structure improves hardness, heat resistance, and toughness over traditional AlTiN coatings. • Superior results, extended tool life and reduced cycle times over traditional AlTiN coatings in demanding applications where setup minimizes runout and vibration. • Not recommended for use in aluminum and aluminum alloys.
Materials:	Ferrous Materials & Exotic Metals		
	General Purpose Ferrous Materials	Alloy steels, stainless steels, tool steels, titanium, inconel, nickel and other aerospace materials	Hardened steels, hardened stainless, nickel based alloys, tool steels, titanium alloys, inconel and other aerospace materials
Color:	Gold	Dark Gray / Black	Blue / Black
Structure:	Mono-layer	Multi-layer	Nano Composite Multi-layer
Hardness (HV 0.05):	2447 (24 GPa)	3569 (35 GPa)	4181 (41 GPa)
Coefficient of Friction:	.40	.70	.40
Coating Thickness (microns):	2 - 5	2 - 5	1 - 4
Max. Working Temp:	1000° F	1400° F	2100° F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

COATINGS & SUBSTRATES CHART

ZrN Zirconium Nitride -C7	**TiB_2** Titanium Diboride -C8	**Amorphous Diamond** Diamond-Like Coating -C4	**CVD Diamond (4 µm)** Crystalline CVD Diamond	**CVD Diamond (9 µm)** Crystalline CVD Diamond	**PCD Diamond** Polycrystalline Diamond
• High hardness, lubricity and abrasion resistance. • Improves performance over uncoated carbide in a wide variety of non-ferrous materials. • Less expensive alternative to diamond.	• Primary benefit over other non-ferrous coatings is extremely low affinity to aluminum. • Prevents build-up on cutting edge, chip packing and extends tool life. • Recommended in Aluminum Alloys and Magnesium Alloys. • Not ideally suited for abrasive varieties of these alloys.	• A PVD amorphous diamond coating which improves lubricity and wear resistance in non-ferrous materials. • Coating is thin relative to CVD diamond, preventing edge rounding. • Sharp edges improve results (performance and finish) over CVD in certain abrasive, non-ferrous materials (copper, brass, high silicon aluminum). • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thin coating maintains sharper edge.	• True Crystalline CVD diamond is grown directly into a carbide end mill. • Dramatically improves hardness. • Hardness improves abrasion resistance and allows higher feed rates than uncoated carbide. • Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics. • Thinner CVD layer yields a sharper cutting edge compared to the standard CVD coating and leaves a smoother finish on non-ferrous materials • Low temperature threshold makes diamond unsuitable for ferrous applications.  4 µm CVD diamond layer for a balance between wear resistance and edge sharpness.	• True Crystalline CVD diamond is grown directly into a carbide end mill. • Dramatically improves hardness. • Hardness improves abrasion resistance and allows higher feed rates than uncoated carbide. • Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics. • Diamond layer approx 5 times thicker than Amorphous Diamond, improving wear resistance. • Low temperature threshold makes diamond unsuitable for ferrous applications.  9 µm diamond layer for increased wear resistance.	• PCD diamond is manufactured as a carbide backed flat wafer. The wafer is brazed to a carbide body to form an end mill. • PCD has excellent hardness and abrasion resistance, and is the thickest diamond layer we offer. • Sharply ground cutting edges and thick diamond layer combine the sharp edge benefits of Amorphous Diamond with the abrasion resistance of CVD Diamond. • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thickest diamond layer ground to sharp edge.
Non-Ferrous & Non-Metallic Materials					
Abrasive non-ferrous alloys such as Brass, Bronze, Copper and Abrasive Aluminum Alloys	Aluminum Alloys, Magnesium Alloys	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc	Graphite, Composites, Green Carbide, Green Ceramics	Graphite, Composites, Green Carbide, Green Ceramics	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc, Green Carbide, Green Ceramics
Light Gold / Champagne	Light Gray / Silver	Charcoal / Gray	Gray	Gray	Gray / Black
Mono-layer	Mono-layer	Mono-layer	True Crystalline CVD Multi-Layer	True Crystalline CVD Multi-Layer	Polycrystalline Diamond (Carbide Backed)
2243 (22 GPa)	2804 (27.5 GPa)	7954 - 8973 (78 - 88 GPa)	8973 - 9993 (88 - 98 GPa)	8973 - 9993 (88 - 98 GPa)	8973 - 9993 (88 - 98 GPa)
.40	.35	.10	.05 - .30	.05 - .30	.05 - .20
2 - 5	1 - 3	.5 - 2.5	3 - 5	8 - 10	.010" - .030" Solid PCD Layer
1100° F	900° F	750° F	1100° F	1100° F	1100° F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

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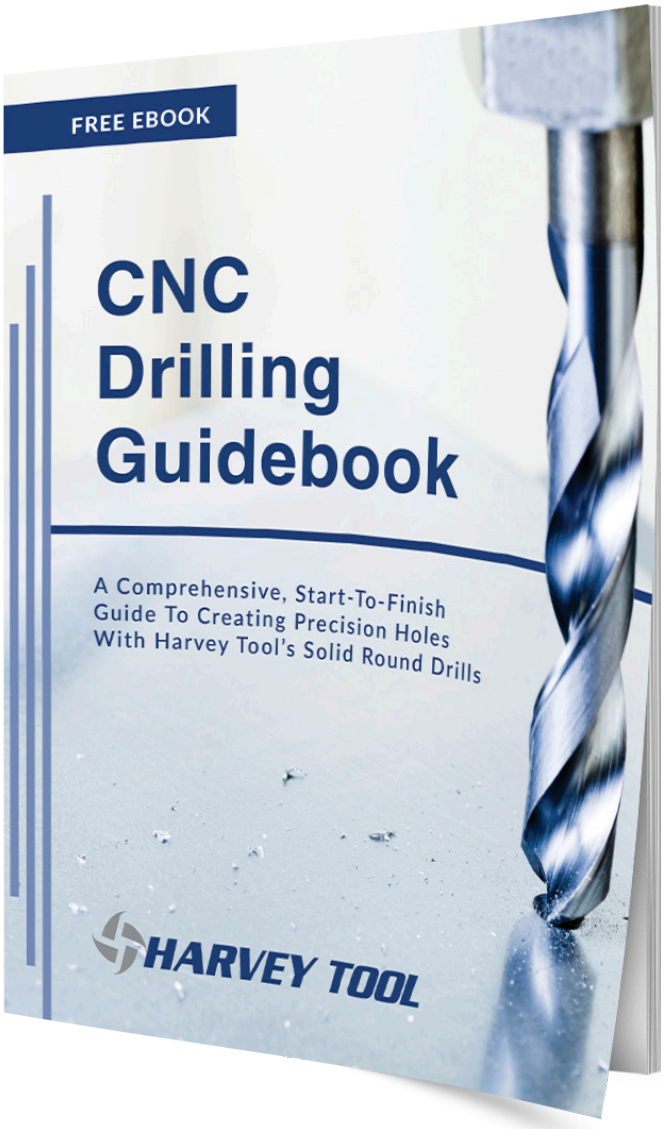

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ALPHABETICAL INDEX

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