EXTERNAL – BOWED

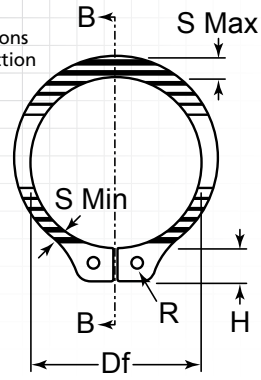
DESCRIPTION

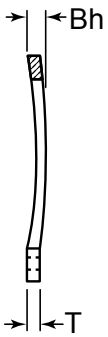
A BSH retaining ring is designed to compensate for accumulated tolerances on a shaft. Once snapped into the groove, bowed rings exert a force or a "preload" on the retained parts for the range specified.

HOW TO IDENTIFY

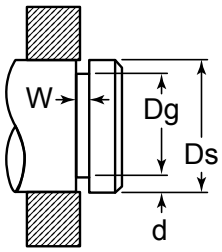
1. Verify bowed external design and appearance.
2. Measure the shaft diameter (Ds).
3. Measure the maximum ring cross section (S Max).
4. Measure the minimum ring cross section (S Min).
5. Measure the ring thickness (T).
6. Find the part in the chart.

Ring Dimensions with Section B-B

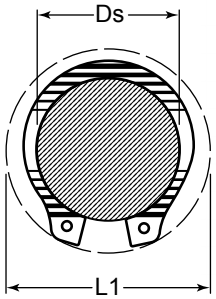




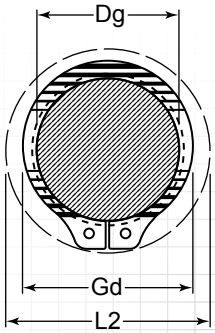
Sect. B-B



Groove Dimensions



Clearance Diameter Expanded Over Shaft



Clearance Diameter & Gauging Diameter Released in Groove.

Item #	Shaft Diameter	Groove Size					Ring Size & Weight							Clearance Diameter		Thrust Load[1] Sq. Corner Abutment	
		Diameter		Width		Depth	Free Diameter		Thickness[2]		Bow Height		Weight Per 1,000 pcs.	Expanded Over Shaft	Released in Groove	Ring Safety Factor of 4	Groove Safety Factor of 2
	Ds	Dg	Tol.	W	Tol.	d	Df	Tol.	T	Tol.	Bh	Tol.	lbs.	L1	L2	Pr lbs.	Pg lbs.
BSH-025	.250" (1/4)	.230"	±.0015" .0015"**	.040"		.010"	.225"	+.002/ -.004"	.025"	±.002"	.047"	±.006"	.21	.45"	.43"	599	175
BSH-027	.276"	.255"		.040"		.010"	.250"		.025"	±.002"	.047"	±.006"	.23	.48"	.46"	660	195
BSH-028	.281" (9/32)	.261"		.040"		.010"	.256"		.025"	±.002"	.047"	±.006"	.24	.49"	.47"	670	200
BSH-031	.312" (5/16)	.290"		.040"		.011"	.281"		.025"	±.002"	.047"	±.006"	.27	.54"	.52"	751	240
BSH-034	.344" (11/32)	.321"		.040"		.011"	.309"		.025"	±.002"	.047"	±.006"	.31	.57"	.55"	812	265
BSH-035	.354"	.330"	±.002" .002"**	.040"		.012"	.320"		.025"	±.002"	.047"	±.006"	.35	.59"	.57"	832	300
BSH-037	.375" (3/8)	.352"		.040"		.012"	.338"	+.002/ -.005"	.025"	±.002"	.047"	±.006"	.39	.61"	.59"	883	325
BSH-039	.394"	.369"		.040"		.012"	.354"		.025"	±.002"	.047"	±.006"	.42	.62"	.60"	954	335
BSH-040	.406" (13/32)	.382"		.040"		.012"	.366"		.025"	±.002"	.047"	±.006"	.43	.63"	.61"	964	350
BSH-043	.438" (7/16)	.412"		.040"	+.003/ -.000"	.013"	.395"		.025"	±.002"	.047"	±.006"	.50	.66"	.64"	1,035	400
BSH-046	.469" (15/32)	.443"		.040"		.013"	.428"		.025"	±.002"	.047"	±.006"	.54	.68"	.66"	1,117	450
BSH-050	.500" (1/2)	.468"		.055"		.016"	.461"		.035"	±.002"	.063"	±.007"	.91	.77"	.74"	1,675	550
BSH-055	.551"	.519"	±.002" .004"**	.055"		.016"	.509"		.035"	±.002"	.063"	±.007"	.90	.81"	.78"	1,827	600
BSH-056	.562" (9/16)	.530"		.055"		.016"	.521"		.035"	±.002"	.063"	±.007"	1.1	.82"	.79"	1,878	650
BSH-059	.594" (19/32)	.559"		.055"		.017"	.550"		.035"	±.002"	.063"	±.007"	1.2	.86"	.83"	1,979	750
BSH-062	.625" (5/8)	.588"		.055"		.018"	.579"	+.005/ -.010"	.035"	±.002"	.063"	±.007"	1.3	.90"	.87"	2,091	800
BSH-066	.669"	.629"	±.003" .004"**	.055"		.020"	.621"		.035"	±.002"	.063"	±.007"	1.4	.93"	.89"	2,233	950
BSH-066	.672" (43/64)	.631"		.055"		.020"	.621"		.035"	±.002"	.063"	±.007"	1.4	.93"	.89"	2,233	950
BSH-068	.688" (11/16)	.646"		.062"		.021"	.635"		.042"	±.002"	.073"	±.008"	1.8	1.01"	.97"	3,451	1,000
BSH-075	.750" (3/4)	.704"		.062"		.023"	.693"		.042"	±.002"	.073"	±.008"	2.1	1.09"	1.05"	3,756	1,200

Additional attribute data on adjacent page. ▶

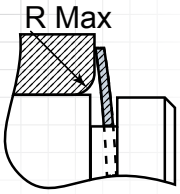
TO ORDER DIFFERENT MATERIAL/FINISHES, APPEND SUFFIX WITH YOUR CHOICE:
"NONE" • -BC • -SS • -ZD • -Z3

Prices, materials, dimensions, tolerances, designs, and grades subject to change without notice. © 2022 Huyett

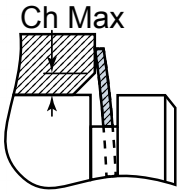
EXTERNAL – BOWED

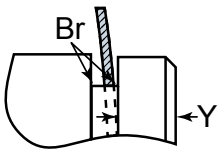
SUFFIX		MATERIAL/FINISH
###	=	CARBON SPRING STEEL, PHOSPHATE
###-BC	=	BERYLLIUM COPPER, PLAIN
###-SS	=	PH 15-7 MO STAINLESS STEEL, PLAIN
###-ZD	=	CARBON SPRING STEEL, ZINC YELLOW
###-Z3	=	CARBON SPRING STEEL, ZINC TRIVALENT

Material/finish combinations may not be available in all sizes.
More finishes available, see page 22 for a complete listing.

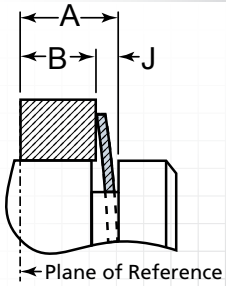


Maximum Corner
Radius (R Max) & Chamfer (Ch Max)
for Retained Part





Maximum Bottom Radii (Br),
square corners for ring sizes BSH-025 – BSH-035;
.005 for ring sizes BSH-037 – BSH-100;
.010 for ring sizes BSH-102 and over.



Outer Groove Location
A Max = B Min + J Max
A Min = B Max + J Min

Item #	Distance Outer Groove Wall to Face of Retained Part			Force Needed to Flatten Rings	Allowable Corner Radii & Chamfers		Max. Load w/R Max. or Ch Max.	Edge Margin	Lug Height		Maximum Section		Minimum Section		Hole Diameter		Gauging Dia.	RPM Limits Standard Material
	J Min.	J Max.	J Tol. Min/Max	lbs.	R Max.	Ch Max.	P'r lbs.	Y	H	Tol.	S Max.	Tol.	S Min.	Tol.	R	Tol.	Gd Min.	RPM
BSH-025	.030"	.038"	.008"	50	.018"	.011"	470	.030"	.080"	±.003"	.035"	±.003"	.025"	±.003"	.290"		.290"	80,000
BSH-027	.030"	.038"	.008"	50	.0175"	.0105"	470	.031"	.081"	±.003"	.035"	±.003"	.024"	±.003"	.315"		.315"	76,000
BSH-028	.030"	.038"	.008"	50	.020"	.012"	470	.030"	.080"	±.003"	.038"	±.003"	.0255"	±.003"	.326"		.326"	74,000
BSH-031	.030"	.038"	.008"	50	.020"	.012"	470	.033"	.087"	±.003"	.040"	±.003"	.026"	±.003"	.357"		.357"	70,000
BSH-034	.030"	.038"	.008"	45	.021"	.0125"	470	.033"	.087"	±.003"	.042"	±.003"	.0265"	±.003"	.390"		.390"	64,000
BSH-035	.030"	.038"	.008"	45	.023"	.014"	470	.036"	.087"	±.003"	.046"	±.003"	.029"	±.003"	.405"		.405"	62,000
BSH-037	.030"	.038"	.008"	45	.026"	.0155"	470	.036"	.088"	±.003"	.050"	±.003"	.0305"	±.003"	.433"		.433"	60,000
BSH-039	.030"	.038"	.008"	40	.027"	.016"	470	.037"	.087"	±.003"	.052"	±.003"	.031"	±.003"	.452"		.452"	56,500
BSH-040	.030"	.038"	.008"	40	.0285"	.017"	470	.036"	.087"	±.003"	.054"	±.003"	.033"	±.003"	.468"		.468"	55,000
BSH-043	.030"	.038"	.008"	35	.029"	.0175"	470	.039"	.088"	±.003"	.055"	±.003"	.033"	±.003"	.501"	+.010/	.501"	50,000
BSH-046	.030"	.038"	.008"	35	.031"	.018"	470	.039"	.088"	±.003"	.060"	±.003"	.035"	±.003"	.540"	-.002"	.540"	42,000
BSH-050	.042"	.053"	.011"	90	.034"	.020"	910	.048"	.108"	±.003"	.065"	±.004"	.040"	±.004"	.574"		.574"	40,000
BSH-055	.042"	.053"	.011"	85	.027"	.0165"	910	.048"	.108"	±.003"	.053"	±.004"	.036"	±.004"	.611"		.611"	36,000
BSH-056	.042"	.053"	.011"	80	.038"	.023"	910	.048"	.108"	±.003"	.072"	±.004"	.041"	±.004"	.644"		.644"	35,000
BSH-059	.042"	.053"	.011"	70	.0395"	.0235"	910	.052"	.109"	±.003"	.076"	±.004"	.043"	±.004"	.680"		.680"	32,000
BSH-062	.042"	.053"	.011"	60	.0415"	.025"	910	.055"	.110"	±.003"	.080"	±.004"	.045"	±.004"	.715"		.715"	30,000
BSH-066	.042"	.053"	.011"	50	.040"	.024"	910	.060"	.110"	±.003"	.082"	±.004"	.043"	±.004"	.756"		.756"	29,000
BSH-066	.042"	.053"	.011"	50	.040"	.024"	910	.060"	.110"	±.003"	.082"	±.004"	.043"	±.004"	.758"		.758"	29,000
BSH-068	.049"	.060"	.011"	70	.042"	.025"	1,340	.063"	.136"	±.004"	.084"	±.005"	.048"	±.005"	.779"		.779"	28,000
BSH-075	.049"	.060"	.011"	65	.046"	.0275"	1,340	.069"	.136"	±.004"	.092"	±.005"	.051"	±.005"	.850"		.850"	26,500

◀ *Additional attribute data on adjacent page.*

Larger sizes may be available upon request.
For hardness specifications, see page 107.

** F.I.M. (Full Indicator Movement) – Maximum allowable deviation of runout between groove and shaft.
[1] Based on housings/shafts made of cold rolled steel. For more information on thrust load and safety factor see pages 14 & 15.
[2] For plated rings add .002" to the listed maximum thickness. Maximum thickness will be a minimum of .0002" less than the listed groove width (W) minimum.

STACKED OPTIONS AVAILABLE, SEE HUYETT.COM FOR MORE DETAILS

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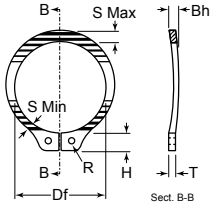
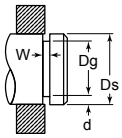
EXTERNAL – BOWED





HOW TO IDENTIFY

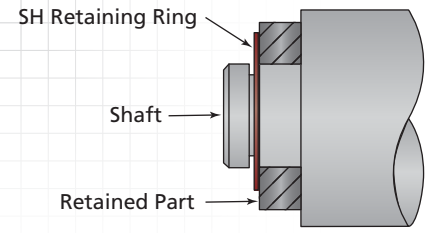
1. Verify bowed external design and appearance.
2. Measure the shaft diameter (Ds).
3. Measure the maximum ring cross section (S Max).
4. Measure the minimum ring cross section (S Min).
5. Measure the ring thickness (T).
6. Find the part in the chart.

Item #	Shaft Diameter	Groove Size					Ring Size & Weight							Clearance Diameter		Thrust Load[1] Sq. Corner Abutment	
		Diameter		Width		Depth	Free Diameter		Thickness[2]		Bow Height		Weight Per 1,000 pcs.	Expanded Over Shaft	Released in Groove	Ring Safety Factor of 4	Groove Safety Factor of 2
	Ds	Dg	Tol.	W	Tol.	d	Df	Tol.	T	Tol.	Bh	Tol.	lbs.	L1	L2	Pr lbs.	Pg lbs.
BSH-078	.781" (25/32)	.733"	±.003 .004"**	.062"	+.003/ -.000"	.024"	.722"	+.005/ -.010"	.042"	±.002"	.073"	±.008"	2.2	1.12"	1.08"	3,959	1,300
BSH-081	.812" (13/16)	.762"		.062"		.025"	.751"		.042"	±.002"	.073"	±.008"	2.5	1.15"	1.10"	4,060	1,450
BSH-087	.875" (7/8)	.821"		.062"		.027"	.810"		.042"	±.002"	.073"	±.008"	2.8	1.21"	1.16"	4,365	1,650
BSH-093	.938" (15/16)	.882"		.062"		.028"	.867"		.042"	±.002"	.073"	±.008"	3.1	1.34"	1.29"	4,720	1,850
BSH-098	.984" (63/64)	.926"		.062"		.029"	.910"		.042"	±.002"	.073"	±.008"	3.5	1.39"	1.34"	4,923	2,000
BSH-100	1.000" (1)	.940"		.062"		.030"	.925"		.042"	±.002"	.073"	±.008"	3.6	1.41"	1.35"	5,024	2,100
BSH-102	1.023"	.961"		.062"		.031"	.946"		.042"	±.002"	.073"	±.008"	3.9	1.43"	1.37"	5,126	2,250
BSH-106	1.062" (1-1/16)	.998"	±.004 .005"**	.070"		.032"	.982"	+.010/ -.015"	.050"	±.002"	.085"	±.012"	4.8	1.5"	1.44"	6,293	2,400
BSH-112	1.125" (1-1/8)	1.059"		.070"		.033"	1.041"		.050"	±.002"	.085"	±.012"	5.1	1.55"	1.49"	6,699	2,600
BSH-118	1.188" (1-3/16)	1.118"		.070"		.035"	1.098"		.050"	±.002"	.085"	±.012"	5.6	1.61"	1.54"	7,105	2,950
BSH-125	1.250" (1-1/4)	1.176"		.070"		.037"	1.156"		.050"	±.002"	.085"	±.012"	5.9	1.69"	1.62"	7,460	3,250
BSH-131	1.312" (1-5/16)	1.232"		.070"		.040"	1.214"		.050"	±.002"	.085"	±.012"	6.8	1.75"	1.67"	7,866	3,700
BSH-137	1.375" (1-3/8)	1.291"		.070"		.042"	1.272"		.050"	±.002"	.085"	±.012"	7.2	1.8"	1.72"	8,222	4,100
BSH-143	1.438" (1-7/16)	1.350"		.070"		.044"	1.333"		.050"	±.002"	.085"	±.012"	8.1	1.87"	1.79"	8,628	4,500
BSH-150	1.500" (1-1/2)	1.406"		.070"		.047"	1.387"		.050"	±.002"	.085"	±.012"	9.0	1.99"	1.90"	8,932	5,000
BSH-162	1.625" (1-5/8)	1.529"	±.005" .005"**	.096"	+.005/ -.000"	.048"	1.503"	+.013/ -.020"	.062"	±.003"	.115"	±.015"	13.2	2.17"	2.08"	12,028	5,500
BSH-175	1.750" (1-3/4)	1.650"		.096"		.050"	1.618"		.062"	±.003"	.115"	±.015"	15.3	2.31"	2.21"	12,992	6,200

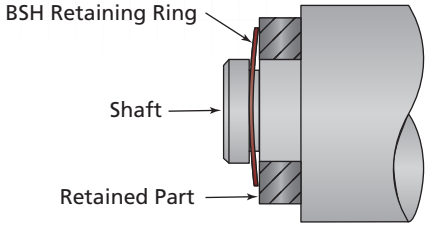
Additional attribute data on adjacent page. ▶

TO ORDER DIFFERENT MATERIAL/FINISHES, APPEND SUFFIX WITH YOUR CHOICE:
"NONE" • -BC • -SS • -ZD • -Z3

ACCUMULATED TOLERANCES



This component was originally held in place by a basic SH retaining ring. But there was play in the assembly since the parts were made on the low side of the tolerances.



The manufacturer switched to the BSH bowed retaining ring. The curved shape of the ring compensated for the slightly undersized pieces and held the components tightly in place.

WHAT ARE ACCUMULATED TOLERANCES?

In manufacturing, parts cannot be produced to an exact dimension. For example, a part that must be .500" thick, may be produced at a tolerance of +.001/-.001". The plus and minus dimensions are tolerances, and simply mean that parts produced on the high side (.501") or on the low side (.499") are within tolerance. Parts made on the low side of the tolerance will be loose or have play on the shaft when a standard ring is installed. Parts made on the high side of the tolerance will extend further into the groove and prevent a standard ring from being fully installed. BE/BHO/BSH bowed retaining rings are designed to compensate for accumulated tolerance by acting like a spring once installed into a groove.

FOR DETAILED SPECIFICATIONS AND TOLERANCES, VISIT HUYETT.COM.

Prices, materials, dimensions, tolerances, designs, and grades subject to change without notice. © 2022 Huyett

EXTERNAL – BOWED

SUFFIX	MATERIAL/FINISH
###	= CARBON SPRING STEEL, PHOSPHATE
###-BC	= BERYLLIUM COPPER, PLAIN
###-SS	= PH 15-7 MO STAINLESS STEEL, PLAIN
###-ZD	= CARBON SPRING STEEL, ZINC YELLOW
###-Z3	= CARBON SPRING STEEL, ZINC TRIVALENT

Material/finish combinations may not be available in all sizes.
More finishes available, see page 22 for a complete listing.

Item #	Distance Outer Groove Wall to Face of Retained Part			Force Needed to Flatten Rings	Allowable Corner Radii & Chamfers		Max. Load w/R Max. or Ch Max.	Edge Margin	Lug Height		Maximum Section		Minimum Section		Hole Diameter		Gauging Dia.	RPM Limits Standard Material
	J Min.	J Max.	J Tol. Min/Max	lbs.	R Max.	Ch Max.	P'r lbs.	Y	H	Tol.	S Max.	Tol.	S Min.	Tol.	R	Tol.	Gd Min.	RPM
BSH-078	.049"	.060"	.011"	60	.047"	.028"	1,340	.072"	.136"	±.004"	.094"	±.005"	.052"	±.005"	.883"	+.010/ -.002"	.883"	25,500
BSH-081	.049"	.060"	.011"	55	.047"	.028"	1,340	.075"	.136"	±.004"	.096"	±.005"	.054"	±.005"	.914"		.914"	24,500
BSH-087	.049"	.060"	.011"	45	.051"	.035"	1,340	.081"	.137"	±.004"	.104"	±.005"	.057"	±.005"	.987"		.987"	23,000
BSH-093	.049"	.060"	.011"	40	.055"	.033"	1,340	.084"	.166"	±.004"	.110"	±.005"	.063"	±.005"	1.054"	+.015/ -.002"	1.054"	21,500
BSH-098	.049"	.060"	.011"	40	.056"	.0335"	1,340	.087"	.167"	±.004"	.114"	±.005"	.0645"	±.005"	1.106"		1.106"	20,500
BSH-100	.049"	.060"	.011"	35	.057"	.034"	1,340	.090"	.167"	±.004"	.116"	±.005"	.065"	±.005"	1.122"		1.122"	20,000
BSH-102	.049"	.060"	.011"	35	.058"	.035"	1,340	.093"	.168"	±.004"	.118"	±.005"	.066"	±.005"	1.147"		1.147"	19,500
BSH-106	.057"	.068"	.011"	60	.060"	.036"	1,950	.096"	.181"	±.004"	.122"	±.006"	.069"	±.006"	1.192"		1.192"	19,000
BSH-112	.057"	.068"	.011"	55	.063"	.038"	1,950	.099"	.182"	±.004"	.128"	±.006"	.071"	±.006"	1.261"		1.261"	18,800
BSH-118	.057"	.068"	.011"	50	.064"	.0385"	1,950	.105"	.182"	±.004"	.132"	±.006"	.072"	±.006"	1.325"		1.325"	18,000
BSH-125	.057"	.068"	.011"	45	.068"	.041"	1,950	.111"	.183"	±.004"	.140"	±.006"	.076"	±.006"	1.396"		1.396"	17,000
BSH-131	.057"	.068"	.011"	40	.068"	.041"	1,950	.120"	.183"	±.004"	.146"	±.006"	.0765"	±.006"	1.458"		1.458"	16,500
BSH-137	.057"	.068"	.011"	35	.072"	.043"	1,950	.126"	.184"	±.004"	.152"	±.006"	.082"	±.006"	1.529"		1.529"	16,000
BSH-143	.057"	.068"	.011"	30	.076"	.045"	1,950	.132"	.184"	±.004"	.160"	±.006"	.086"	±.006"	1.600"		1.600"	15,000
BSH-150	.057"	.068"	.011"	30	.079"	.047"	1,950	.141"	.214"	±.004"	.168"	±.006"	.091"	±.006"	1.668"		1.668"	14,800
BSH-162	.069"	.094"	.025"	55	.087"	.052"	3,000	.144"	.235"	±.004"	.180"	±.006"	.097"	±.006"	1.812"		1.812"	13,200
BSH-175	.069"	.094"	.025"	50	.091"	.054"	3,000	.150"	.237"	±.004"	.188"	±.006"	.101"	±.006"	1.945"		1.945"	12,200

◀ *Additional attribute data on adjacent page.*

Larger sizes may be available upon request.

** F.I.M. (Full Indicator Movement) – Maximum allowable deviation of runout between groove and shaft.

1 Based on housings/shafts made of cold rolled steel. For more information on thrust load and safety factor see pages 14 & 15.

2 For plated rings add .002" to the listed maximum thickness. Maximum thickness will be a minimum of .0002" less than the listed groove width (W) minimum.

HARDNESS RANGES: BSH RINGS

Material		Size Range	Scale	Rockwell Hardness
(blank)	Carbon Steel, (SAE 1060-1090)	25 – 46 50 – 81 87 – 102 106+	30N 30N C C	69.5 – 73 66 – 71 47 – 53 47 – 52
-SS	Stainless Steel, (PH 15-7 Mo)	25 – 81 87+	30N C	63 – 69.5 44 – 51
-BC	Beryllium Copper	18 – 23 25 – 102 106+	15N 30N C	77 – 82•• 54 – 62 34 – 43

•• Hardness cannot be checked with any degree of accuracy directly on these rings.

INSTALLATION TOOLS AVAILABLE, SEE PAGE 248

STACKED OPTIONS AVAILABLE, SEE HUYETT.COM FOR MORE DETAILS

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