



Wave Springs & Retaining Rings

+44 (0) 1435 866011 | www.tfc.eu.com



Introduction

TFC Wave Springs

TFC Europe Ltd has been the leading European supplier of Smalley Retaining Rings and Flat Wire Wave Spring products for more than thirty years. With a National and European network of logistic service centres employing over one hundred people, our highly trained internal and field based application engineers are readily available to assist in the selection of the ideal product to suit your application.

This catalogue contains details of our extensive standard ranges, most of which are available off-the-shelf for immediate delivery. However, all of our Smalley wave spring and retaining ring products are manufactured using a unique edge-winding manufacturing process which, unlike traditional die-stamped products, totally eliminates any tooling charges. This process greatly increases design flexibility and enables us to provide over 80% of our Smalley products as special designs. Prototype batch samples can be supplied economically and, if necessary, the design can be amended at the pre-production stage without compromising your finished product design.

TFC is an ISO 9001:2000 approved company incorporating design status. We pride ourselves in the the level of customer service we offer and would welcome your comments and your design challenges in order to continually improve this vital aspect of our business.

Contents

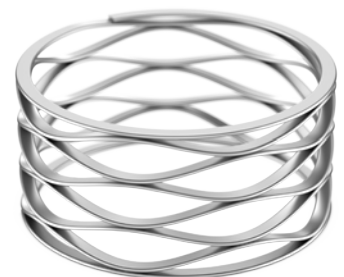
Page	Description	Product Code
04	Products: Retaining Rings & Wave Springs	
05	Manufacture: General Information	
06	Specials are Standard	
07	Quality Assurance	

Wave Springs

08	Introduction	
11	Spring Applications	
12	Bearing Pre-Load Springs (Metric)	YSSB
14	Bearing Cross Reference Chart	
16	Single Turn Springs (Imperial)	YSSR
18	Narrow Section Wave Springs (Imperial)	YSSR - N
19	Wavo (Round Wire) Single Turn (Imperial)	YRW
20	Crest-To-Crest® Springs (Metric)	YCM/YCMS
27	Crest-To-Crest® Springs (Imperial)	YC/YCS
34	Linear Springs (Imperial)	YLS

Retaining Rings

36	Introduction	
37	Retaining Rings: Types & Special Designs	
38	Selection Guide	
39	Ring Applications	
40	Assembly Methods	



Internal Retaining Rings

Metric Ranges

42	Light Duty Rings
44	Aerospace Rings
46	DIN Rings
48	Snap Rings
50	Hoopster® Rings

Imperial Ranges

51	Hoopster® Rings
52	Light Duty Rings
54	WaveRing Series
55	Medium Duty Rings
58	Medium Heavy Duty Rings
60	Heavy Duty Series
62	Snap Rings
64	Snap Rings
66	Snap Rings
67	ID/OD Lock

External Retaining Rings

Metric Ranges

68	Light Duty Rings
70	Aerospace Rings
72	DIN Rings
74	Snap Rings
76	Hoopster® Rings

Imperial Ranges

77	Hoopster® Rings
78	Light Duty Rings
80	WaveRing Series
81	Medium Duty Rings
84	Medium Heavy Duty Rings
86	Heavy Duty Series
88	Snap Rings (Imperial)
90	Snap Rings (Imperial)
92	Snap Rings (Imperial)

Laminar Seal Rings

93	Introduction
94	Selection Guide
96	Data Tables

Engineering

101	Engineering Support
102	Spring Design and Checklist
104	Ring Design and Checklist
109	Materials and Finishes

XVHM
XEH
XDNH
XFH
XHHM/XHHMU



XHH/XHHU
XVH
YWHW
XWH
XWHT
XWHM
XFHE
XXAH
XXDH



XVSM
XES
XDNS
XFS
XHSM



XHS
XVS
YWSW
XWS
XWST
XWSM
XFSE
XXAS
XXDS



Products

Retaining Rings & Wave Springs

Products

All of TFC's Wave Springs and Retaining Rings are manufactured by Smalley's unique edge-winding manufacturing process. This eliminates any tooling charges, greatly increases design flexibility, and reduces lead times as tooling dies do not have to be produced.



Retaining Rings

Unlike die-stamped products, Spirolox Retaining Rings and Snap Rings are coiled on edge to the exact diameter required. They have a uniform cross-section (or to use our terminology, no lugs to interfere within the assembly) and are free of burrs. Spirolox Retaining Rings meet military and aerospace specifications and are found in thousands of mechanical products around the world.



Wave Springs

Wave springs are precise flat wire compression springs that fit into assemblies where other springs cannot. Since the overall lengths and operating heights of wave springs are lower than those of conventional round wire springs, they will often reduce the size of an assembly by as much as 50%. Of course, this will also reduce the part weight and raw material cost of every spring produced.

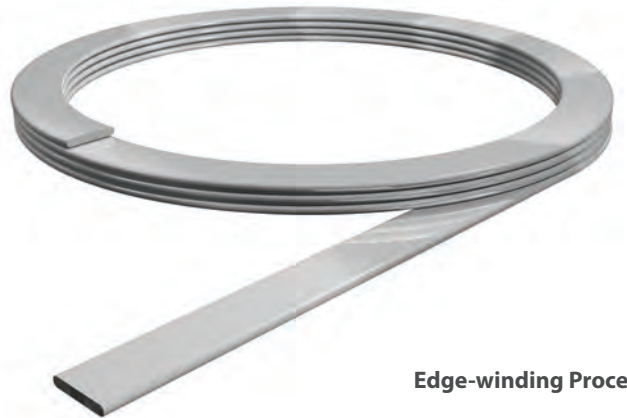
General Information

Manufacturing

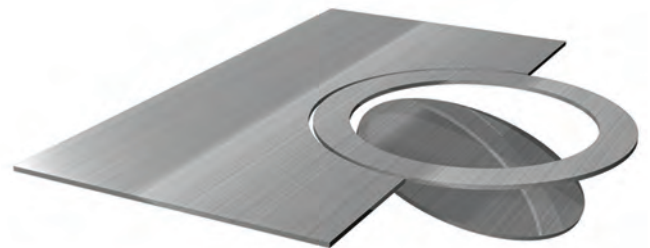
Edge-winding, also known as, “The No-Tooling-Cost Process”, is Smalley’s precision forming operation that coils pre-tempered flat wire on edge to create a near-perfect circle. (Visualise a Slinky®, the coiled metal toy which has delighted generations of children.)

Circular-Grain metallurgy gives our products strength and stability far superior to that of conventional retaining rings and wave washers which are simply stamped through the metal grain. Smalley edge-wound products can be coiled to your exact specification in any diameter and with any number of turns (layers or coils), effectively eliminating material waste.

As flexible as it is precise, our edge-winding process accommodates your design changes without the need for additional tooling and die modifications. This facilitates your developmental work, allowing us to produce your low-quantity custom orders and your working prototypes quickly and economically. Even after your initial prototype is produced, or in mid-stream production, our edge-winding process allows us to alter your design or dimensions with simple machine adjustments or a change in raw material size. After the revised specifications are approved, we complete and document the final setup. We then quickly resume production of your order, whether it consists of one part or one million.



Edge-winding Process

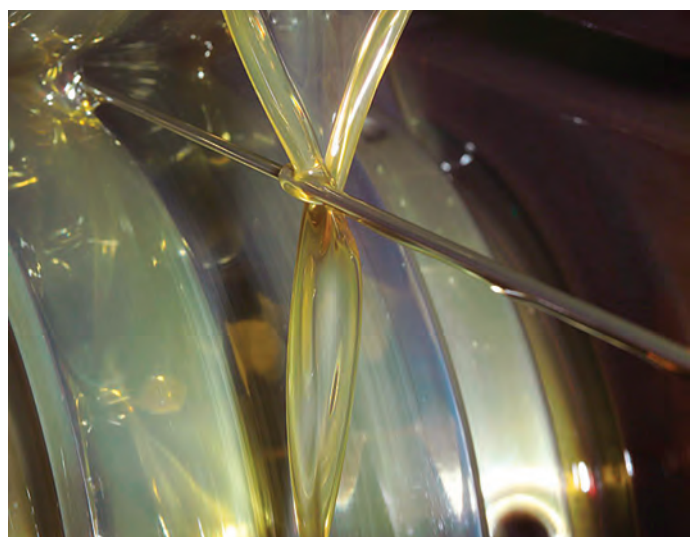


Conventional Stamping Process

Prototypes

About the easiest way to test a theoretical design is to produce a working prototype – a task at which Smalley excels.

A prime example is the development of a custom wave spring. We can adjust dimensions, by changing the number of waves and the number of turns, and trying different combinations of spring variables. Finally, we test for function, before production, so we know we have it right. Smalley-produced prototypes are also the most economical way to provide results on a trial-and-error basis. From one to a thousand pieces, we can produce, try, modify, and reproduce your design as often as necessary — all without special tooling costs.



Wire Flattening

Specials Are Standard

While TFC have thousands of standard stock retaining rings and wave springs available in carbon steel and stainless steel, many applications require a ring or spring outside the standard range to be designed to meet specific parameters.

A common misconception of special designs is the cost. Smalley's 'no-tooling' method of manufacture gives us the flexibility to quickly and economically manufacture any volume of parts in different diameters, thicknesses, materials and finishes.

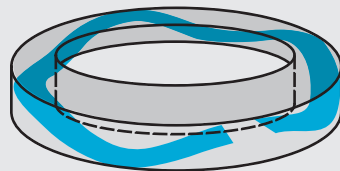
Should you need any help with your part selection or you are unable to find a standard part to meet your requirements, please do not hesitate to contact our engineering department for immediate assistance. Tel: +44 (0) 1435 866011 or Email: Design@tfc.eu.com

Spring Design

Although wave spring applications are extremely diverse, there is a basic set of rules for defining spring requirements. Those requirements are used to select a stock/standard spring or design a special spring to meet the specifications.

Operating Environment

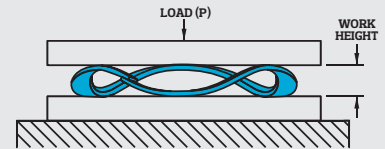
High temperature, dynamic loading (fatigue), a corrosive media or other unusual operating conditions must be considered in spring applications. Solutions to various environmental conditions may require selection of a special raw material to meet operational requirements.



Working cavity

The working cavity usually consists of a bore in which the spring operates and/or a shaft over which the spring clears. The spring stays positioned by piloting in the bore or on the shaft.

The distance between the loading surfaces defines the work height of the spring.



Load requirement

The load requirement is defined by the amount of axial force the spring must produce when installed at its work height. Some applications require multiple working heights, where loads at 2 or more operating heights are critical and must be considered in the design.



Retaining Ring Design

Spiral Retaining Ring and Snap Ring applications can be analysed with a straight forward set of design calculations. There are four main areas that should be considered in most applications prior to selecting a standard part or designing a custom ring.

DIMENSIONAL SIZES. The bore or shaft diameters are essential for the identification of a ring. If a groove is pre-machined then the diameter and width of the groove should be taken into consideration.

MATERIAL SELECTION. See our Material Selection Guide on pages 108 - 111.

LOAD CAPACITY. Understanding the load capacity of a retaining ring assembly is essential to determining the risk of failure due to thrust loading. The capacity of the assembly requires calculations for both ring shear and groove deformation. Values for these are provided within this catalogue's tables of standard rings.

ROTATIONAL CAPACITY. A retaining ring operating on a rotating shaft can be limited by centrifugal forces. Failure may occur when these centrifugal forces are great enough to lift the ring from the groove. The maximum recommended RPM for all standard external retaining rings is listed on page 107.

Quality Assurance

At TFC we realise that Quality runs through the entire business, not just our products. We have continually invested in the right people to provide superior market knowledge and customer service. Our supply chain partners, from manufacturers to logistics and information technology are carefully chosen to fit our commitment to Quality.

Quality assured since 1981

ISO 9001 certificate is available to download from our website and Certificates of Conformity are available on request.



Traceability

All products are batch traceable and can be supplied in accordance with REACH, RoHs and Weee.

Full material certification is also available on many items upon request.

In conjunction with our manufacturing team at Smalley Steel Ring Company, we are committed to a quality policy that requires conformance to specification with controlled lot variation about the target, statistical quality control (SPC), defect prevention, and annual improvement in process and product. This is a companywide commitment involving every employee. Each person works towards excellence, individually and cooperatively, to provide superior products and services.

A history of quality and strict compliance with military and aerospace standards has earned us an approved supplier status with many leading original equipment manufacturers (OEM's) worldwide. TFC has worked diligently to become the preferred source for Smalley Spirolox Retaining Rings and Wave Springs.

In accordance with the requirements of our ISO approvals, we have established and are continuously improving our quality systems. Use of the latest technology has helped us achieve and maintain the world-class quality associated with the Smalley name for more than thirty years.

SPC tools are used to assure the capability and stability of Smalley's coiling process. To begin with, they identify common dimensions to monitor and special causes of variation in the product. Data is then collected and analysed on these critical dimensions. Disciplined sampling is undertaken and measurements are taken during in-line and final inspection, and yet again, during pre-shipping inspection.

We make formal QC in-house training programs mandatory for many of our employees involved with the manufacture and supply of our Smalley products. This training has noticeably developed quality awareness and responsibility at all levels and our employees have a clear understanding of what is expected of our processes.

Smalley's machine capability studies help to identify sources of variation before they become a problem. The capabilities of all production machinery is analysed in primary and secondary operations, heat treating, and finishing. In addition meticulous procedures are followed to determine the reproducibility and repeatability of gauging systems.

Due to the careful documentation of our quality, many of our Smalley product customers have found that they can reduce or even eliminate their incoming inspections and a significant number have also revised their policy of dual sourcing and confidently rely on TFC as their single source of Spirolox Retaining Rings, Wave Springs, Snap Rings, Linear Springs and other Smalley wire forms.

Wave Spring Introduction

All Springs Are Not Equal®

TFC's Smalley Wave Springs offer the unique advantage of space savings when used to replace coil springs. By reducing spring operating height, wave springs also produce a decrease in the spring cavity. With a smaller assembly size and less material used in the manufacturing process, a cost saving is realised.

Wave springs operate as load bearing devices. They take up play and compensate for dimensional variations within assemblies. A virtually unlimited range of forces can be produced whereby loads build either gradually or abruptly to reach a predetermined working height. This establishes a precise spring rate in which load is proportional to deflection.

Functional requirements are necessary for both dynamic and static spring applications. Special performance characteristics are individually built into each spring to satisfy a variety of precise operating conditions. Typically, a wave spring will occupy an extremely small area for the amount of work it performs. The use of this product is demanded, but not limited to tight axial and radial space constraints.

Product Performance

With their smooth, circular coiled sinusoidal wave form, and rolled round edges of pre-tempered raw material, Smalley's edge-wound Wave Springs offer many advantages over die stamped products.

Loads and spring rates are more accurate, more predictable, and may be tolerated better than 50 percent tighter than stampings. The force of a Smalley Wave Spring will increase at a uniform rate throughout most of its available deflection.

By any criteria, our wave springs offer their users higher dependability and better performance. Since they are produced from full hard, pre-tempered raw material, there is no risk of distorting the spring during a hardening heat treatment. By contrast, subsequent manufacturing procedures for stamped wavy washers can lead to problems such as fatigue cracking and inaccurate or inconsistent loading between springs. All told, the metallurgy, the mechanical properties and the uniform dimensional stability of our edge-wound wave springs provide a component for precision quality applications.



Smalley Wave Spring

Coil Spring

Wave Spring Introduction

Wave Spring Types

Gap & Overlap Type

Conventional Gap and Overlap type wave springs are used in a wide variety of applications. For short deflections and low-medium forces, they function with precision and dependability.

These two types of Smalley Wave Springs permit radial expansion or growth in diameter within a cavity, without the binding or hang-up normally associated with die stamped wave washers. Just as their terms imply, the gap type is split to retain a gap between the ends, while the overlap type has overlapping ends. Therefore, the ends are free to move circumferentially as the spring outside diameter grows during compression.

For example, the O.D. of a Gap Type Wave Spring would fit 0,50 mm loose per side in a bore. Its I.D. clears a shaft by 0,25 mm per side. As the spring is deflected, the O.D. and I.D. grow larger until the O.D. contacts the bore.

Continued deflection causes the gap ends to move closer together while the O.D. presses against the bore. An Overlap Type Wave Spring permits this type of cycling action in a similar manner.



Gap Type Wave Spring



Overlap Type Wave Spring

Find these on pages 12- 18

Crest-to-Crest®

Crest-to-Crest Wave Springs are pre-stacked in series, decreasing the spring rate proportionally to the number of turns. Uses are typically applications requiring low-medium spring rates and large deflections with low-medium forces. Among major advantages, this design eliminates the need to keep the wave crests aligned. The need to use a key locating device, or to insert a shim between individual springs is not necessary. Because the spring is integrally formed, the wave peaks hold their configuration.

As a replacement for helical compression springs, Crest-to-Crest springs can develop similar forces, yet occupy one-half ($\frac{1}{2}$) or less the axial space. This allows for strict space constraints. Crest-to-Crest Wave Springs will maintain the same force and load specifications of a conventional round wire spring, but with the advantages of resultant lowered and compacted operating heights, free heights, and solid heights.



Find these on pages 20 - 33

Wave Spring Introduction

Wave Spring Types (continued)

Crest-to-Crest with Optional Shim Ends

Crest-to-Crest Wave Springs are also available with squared-shim ends. Shim ends provide a 360° contact surface when compared to the wave point contact of plain ends. The shim-ends, under load, more evenly distribute the spring's force upon adjacent components. This feature is similar to the concept of double-disc grinding springs for a flat surface. Shim ends have also been used to affix springs to mating components, as a flat locating surface that may be attached by various methods in the assembly.



Find these on pages 20 – 33

Nested

Nested Wave Springs are pre-stacked in parallel from one continuous filament of flat wire. The need to stack individual springs for higher loads is no longer necessary. Nested springs result in a spring rate that increases proportionally to the number of turns. They can exert tremendous forces, yet maintain the precision of a circular-grain wave spring. In many applications, Nested Wave Springs replace Belleville Springs, particularly in cases where a high but accurate force is needed.



WAVO®

Wavo Springs are produced from round-section wire to provide higher loads while maintaining the accurate loading found in wave springs. As an alternative to Belleville Springs, the Wavo provides similar loads but with an accurate, predictable spring rate.



Find these on page 19

Linear Springs

Linear Springs are a continuous wave formed (marcelled) wire length produce from spring tempered materials. They act as a load bearing device having approximately the same load/deflection characteristics as a wave spring.

Forces act linearly or radially depending on the installed position. Axial pressure is obtained by laying the spring flat in a straight line. Circular wrapping the spring produces a radial force or outward pressure. Linear springs are available cut to length or as a continuous coil, for the user to cut as needed.

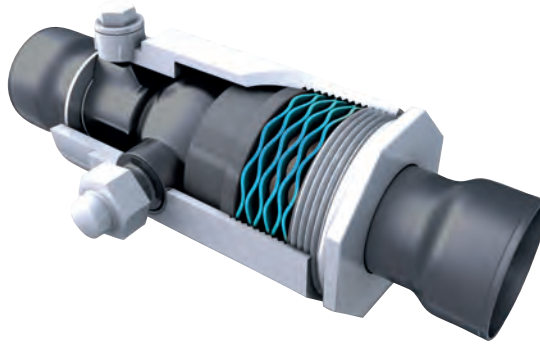


Find these on pages 34 – 35

Spring Applications



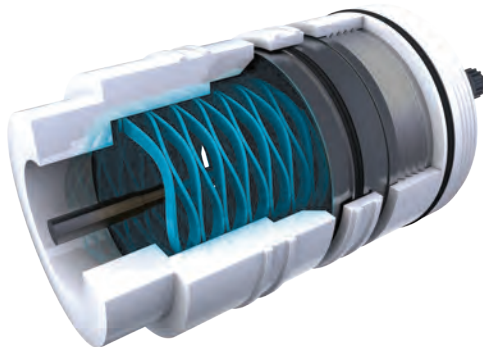
A. Pressure Relief Valve



B. Flow Valve



C. Low Voltage Connector



D. Oil Valve



E. Ball Valve



F. Quick Disconnect

A. Pressure Relief Valve

An exact load applied to the top sealing plate was accomplished using a flat wire wave spring. Air pressure entering the top slots forces the plate away from the sealing surface providing the pressure relief mechanism.

D. Oil Valve

The force provided by the Crest-to-Crest Wave Spring in this oil valve application precisely regulates the amount of oil that is released. The Crest-to-Crest spring provides accurate resistance in a small space, allowing the overall size of the valve to be greatly reduced.

B. Flow Valve

As fluid pressure increases the Crest-to-Crest Wave Spring precisely controls the linear displacement of the piston, which positions the orifice for proper fluid flow. Because of the space saving offered by our Crest-to-Crest design, the valve can be made smaller.

E. Ball Valve

A Smalley Crest-to-Crest Wave Spring is used to reduce the overall spring height in this application. The wave spring allows the seat to oscillate on the ball, keeping a tight seal in the operating position. The reduction in spring height and resulting smaller spring cavity also reduce the weight of the valve.

C. Low Voltage Connector

A Bayonet Connector couples as the male end rotates and follows the groove contour in the female end. A 2-Turn Nested Spirawave Wave Spring provides the pre-load between the two halves. A 2-Turn Nested Spring is necessary to develop a higher load in very tight radial and axial space.

F. Quick Disconnect

The sliding member of the disconnect is held in its forward/locked position against the retaining ring, by the Crest-to-Crest Spring. As the user slides the member in the opposite direction compressing the spring, the detent balls align with a groove and release.

Bearing Pre-Load Springs (Metric)

YSSB Series – Overlap

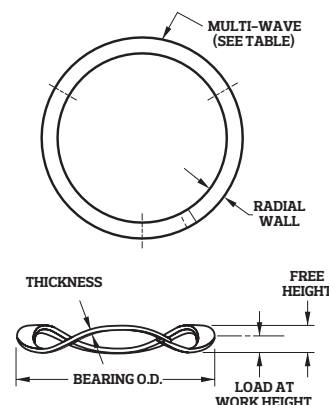
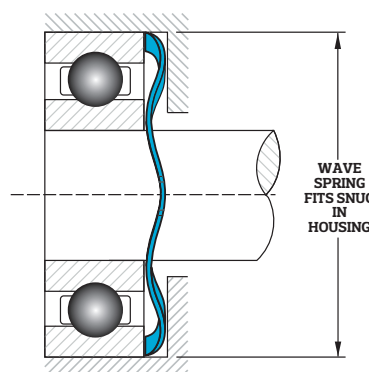
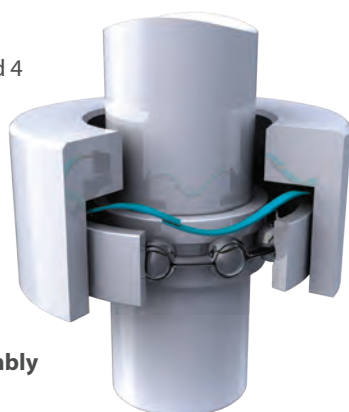
Smalley circular-grain bearing pre-load Wave Springs eliminate play and minimise bearing noise. The constant light/medium pressure they apply removes play between the ball bearings and the bearings' inner and outer races. Pre-loading can reduce the possibility of bearing damage due to vibration (vibratory loading) and wear due to repetitive and non-repetitive runout.

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel

Springs listed below are 3 and 4 waves **Overlap Type**.

Bearing Assembly



Metric (mm)	Part No. ¹	Bearing O.D. ²	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Thickness	Radial Wall	Spring Rate ⁴
	YSSB-0063	16,00	11,28	44,5	1,57	2,29	3	0,25	1,98	65
	YSSB-0075	19,00	14,28	53,4	1,57	3,05	3	0,25	1,98	35
	YSSB-0087	22,00	16,46	62,3	1,57	2,79	3	0,30	2,39	48
	YSSB-0095	24,00	18,46	66,7	1,57	3,56	3	0,30	2,39	35
	YSSB-0102	26,00	18,22	71,2	1,98	2,54	3	0,41	3,38	111
	YSSB-0110	28,00	20,22	75,6	1,98	2,79	3	0,41	3,38	85
	YSSB-0118	30,00	22,22	84,5	1,98	3,30	3	0,41	3,38	66
	YSSB-0126	32,00	24,22	89,0	1,98	3,81	3	0,41	3,38	52
	YSSB-0138	35,00	27,22	97,9	1,98	4,57	3	0,41	3,38	38
	YSSB-0146	37,00	28,72	102,3	1,98	3,81	3	0,46	3,63	58
	YSSB-0158	40,00	31,72	111,2	1,98	5,08	3	0,46	3,63	37
	YSSB-0165	42,00	33,72	115,7	1,98	3,05	4	0,46	3,63	99
	YSSB-0185	47,00	38,72	129,0	1,98	3,81	4	0,46	3,63	68
	YSSB-0205	52,00	43,11	142,4	2,36	3,56	4	0,61	3,76	121
	YSSB-0217	55,00	46,11	151,3	2,36	3,81	4	0,61	3,76	100
	YSSB-0244	62,00	51,69	169,1	2,36	4,32	4	0,61	4,52	85
	YSSB-0268	68,00	57,17	186,9	2,77	4,32	4	0,76	4,78	131
	YSSB-0276	70,00	59,17	191,3	2,77	4,32	4	0,76	4,78	119
	YSSB-0284	72,00	61,17	195,8	2,77	4,57	4	0,76	4,78	108
	YSSB-0295	75,00	64,17	204,7	2,77	5,08	4	0,76	4,78	94
	YSSB-0315	80,00	68,66	218,0	2,77	5,59	4	0,76	4,78	76
	YSSB-0335	85,00	71,38	231,4	2,77	5,59	4	0,76	5,92	83
	YSSB-0354	90,00	76,38	249,2	2,77	6,35	4	0,76	5,92	68
	YSSB-0374	95,00	81,38	262,5	2,77	7,37	4	0,76	5,92	57

¹ Add suffix "-S17" for 17-7 stainless steel. ² Wave springs fit snug in housing. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

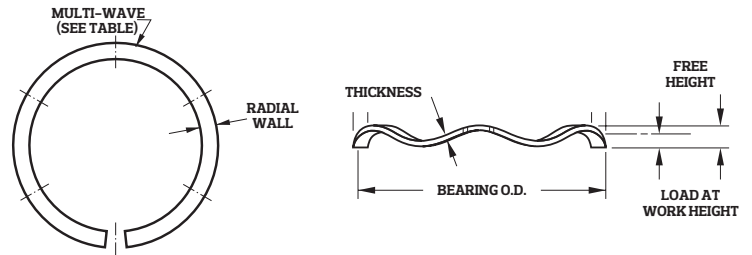
Bearing Pre-Load Springs (Metric)

YSSB Series – Gap

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel

Springs listed below are 5 waves and up, **Gap Type**.



Metric (mm)	Part No. ¹	Bearing O.D. ²	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Thickness	Radial Wall	Spring Rate ⁴
	YSSB-0394	100,00	86,38	275,9	2,77	4,57	5	0,76	5,92	157
	YSSB-0413	105,00	91,38	289,2	2,77	5,08	5	0,76	5,92	134
	YSSB-0433	110,00	96,38	302,6	2,77	5,33	5	0,76	5,92	115
	YSSB-0453	115,00	101,38	315,9	3,18	6,35	5	0,76	5,92	99
	YSSB-0472	120,00	106,38	329,3	3,18	7,11	5	0,76	5,92	86
	YSSB-0492	125,00	111,38	342,6	3,18	7,62	5	0,76	5,92	76
	YSSB-0512	130,00	116,38	356,0	3,18	8,64	5	0,76	5,92	67
	YSSB-0532	135,00	121,38	369,3	3,18	9,40	5	0,76	5,92	59
	YSSB-0551	140,00	126,38	382,7	3,18	6,86	6	0,76	5,92	108
	YSSB-0571	145,00	131,38	396,0	3,18	7,37	6	0,76	5,92	97
	YSSB-0591	150,00	136,38	404,9	3,18	7,87	6	0,76	5,92	87
	YSSB-0630	160,00	146,38	440,5	3,18	9,40	6	0,76	5,92	71
	YSSB-0650	165,00	151,38	453,9	3,18	10,41	6	0,76	5,92	64
	YSSB-0669	170,00	156,38	467,2	3,18	11,18	6	0,76	5,92	58
	YSSB-0689	175,00	154,16	480,6	3,96	8,13	6	0,81	9,53	116
	YSSB-0709	180,00	159,16	493,9	3,96	8,64	6	0,81	9,53	105
	YSSB-0728	185,00	164,16	507,3	3,96	9,14	6	0,81	9,53	97
	YSSB-0748	190,00	169,16	520,6	3,96	9,91	6	0,81	9,53	88
	YSSB-0787	200,00	179,16	547,3	3,96	7,11	7	0,81	9,53	174
	YSSB-0807	205,00	184,16	560,7	3,96	7,37	7	0,81	9,53	161
	YSSB-0827	210,00	189,16	578,5	3,96	7,87	7	0,81	9,53	149
	YSSB-0847	215,00	194,16	591,8	3,96	8,38	7	0,81	9,53	138
	YSSB-0866	220,00	199,16	605,2	3,96	8,64	7	0,81	9,53	128
	YSSB-0886	225,00	204,16	618,5	3,96	7,11	8	0,81	9,53	203
	YSSB-0906	230,00	209,16	631,9	3,96	6,10	9	0,81	9,53	303
	YSSB-0925	235,00	214,16	645,2	3,96	6,35	9	0,81	9,53	283
	YSSB-0945	240,00	219,16	658,6	3,96	6,35	9	0,81	9,53	265
	YSSB-0984	250,00	229,16	685,3	3,96	6,86	9	0,81	9,53	232
	YSSB-1024	260,00	239,16	712,0	3,96	7,37	9	0,81	9,53	205
	YSSB-1043	265,00	244,16	725,3	3,96	7,62	9	0,81	9,53	193
	YSSB-1063	270,00	249,16	743,1	3,96	8,13	9	0,81	9,53	182
	YSSB-1102	280,00	259,16	769,8	3,96	8,64	9	0,81	9,53	162
	YSSB-1142	290,00	269,16	796,5	3,96	9,40	9	0,81	9,53	144
	YSSB-1181	300,00	279,16	823,2	3,96	10,41	9	0,81	9,53	129
	YSSB-1221	310,00	289,16	849,9	3,96	7,11	9	1,07	9,53	264
	YSSB-1260	320,00	299,16	876,6	3,96	7,62	9	1,07	9,53	239
	YSSB-1339	340,00	319,16	934,5	3,96	8,64	9	1,07	9,53	198
	YSSB-1378	350,00	329,16	961,1	3,96	9,40	9	1,07	9,53	180
	YSSB-1417	360,00	339,16	987,9	3,96	7,62	10	1,07	9,53	271
	YSSB-1457	370,00	349,16	1014,6	3,96	8,13	10	1,07	9,53	249
	YSSB-1496	380,00	359,16	1041,3	3,96	8,64	10	1,07	9,53	229
	YSSB-1535	390,00	369,16	1072,4	3,96	9,14	10	1,07	9,53	211
	YSSB-1575	400,00	379,16	1099,1	3,96	9,65	10	1,07	9,53	196
	YSSB-1614	410,00	382,82	1125,8	3,96	8,38	10	1,07	12,70	251
	YSSB-1654	420,00	392,82	1152,5	3,96	8,89	10	1,07	12,70	233
	YSSB-1693	430,00	402,82	1179,2	3,96	7,62	11	1,07	12,70	317
	YSSB-1732	440,00	412,82	1205,9	3,96	8,13	11	1,07	12,70	295
	YSSB-1811	460,00	432,82	1263,7	3,96	8,89	11	1,07	12,70	256
	YSSB-1890	480,00	452,82	1317,1	3,96	8,13	12	1,07	12,70	318
	YSSB-1969	500,00	472,82	1370,5	3,96	8,89	12	1,07	12,70	280
	YSSB-2126	540,00	512,82	1481,8	3,96	8,89	13	1,07	12,70	303
	YSSB-2284	580,00	552,82	1593,0	3,96	8,89	14	1,07	12,70	327

¹ Add suffix "-S17" for 17-7 stainless steel. ² Wave springs fit snug in housing. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Bearing Cross Reference Chart

Use this cross-reference guide to select the appropriate wave spring for your bearing size. The numbers represent typical standard bearing part numbers and/or the suffix of a standard bearing size.



Stock items available in:

- Carbon steel
- 17-7 PH stainless steel

	Part No. ¹	Bearing O.D. ²	Bearing Part Numbers						
			Extra Small	Extremely Light	Extra Light	Narrow	Light	Medium	Heavy
Metric (mm)	YSSB-0063	16,00	34	—	—	—	—	—	—
	YSSB-0075	19,00	35. 36	—	—	—	—	—	—
	YSSB-0087	22,00	37, 38	00	—	—	—	—	—
	YSSB-0095	24,00	38KV	01	—	—	—	—	—
	YSSB-0102	26,00	39	—	100	—	—	—	—
	YSSB-0110	28,00	—	02	101	—	—	—	—
	YSSB-0118	30,00	—	03	—	—	200	—	—
	YSSB-0126	32,00	—	—	102	02	201	—	—
	YSSB-0138	35,00	—	—	103	—	202	300	—
	YSSB-0146	37,00	—	04	—	03	—	301	—
	YSSB-0158	40,00	—	—	—	—	203	—	—
	YSSB-0165	42,00	—	05	104	04	—	302	—
	YSSB-0185	47,00	—	06	105	—	204	303	—
	YSSB-0205	52,00	—	—	—	05	205	304	—
	YSSB-0217	55,00	—	07	106	—	—	—	—
	YSSB-0244	62,00	—	08	107	06	206	305	403
	YSSB-0268	68,00	—	09	108	—	—	—	—
	YSSB-0276	70,00	—	—	—	07	—	—	—
	YSSB-0284	72,00	—	10	—	—	207	306	404
	YSSB-0295	75,00	—	—	109	—	—	—	—
	YSSB-0315	80,00	—	11	110	08	208	307	405
	YSSB-0335	85,00	—	12	—	09	209	—	—
	YSSB-0354	90,00	—	13	111	10	210	308	406
	YSSB-0374	95,00	—	—	112	—	—	—	—
	YSSB-0394	100,00	—	14	113	11	211	309	407
	YSSB-0413	105,00	—	15	—	12	—	—	—
	YSSB-0433	110,00	—	16	114	—	212	310	408
	YSSB-0453	115,00	—	—	115	13	—	—	—
	YSSB-0472	120,00	—	17	—	14	213	311	409
	YSSB-0492	125,00	—	18	116	—	214	—	—
	YSSB-0512	130,00	—	19	117	15	215	312	410
	YSSB-0532	135,00	—	—	—	16	—	—	—
	YSSB-0551	140,00	—	20	118	—	216	313	411
	YSSB-0571	145,00	—	21	119	17	—	—	—
	YSSB-0591	150,00	—	22	120	18	217	314	412
	YSSB-0630	160,00	—	—	121	19	218	315	413
	YSSB-0650	165,00	—	24	—	20	—	—	—
	YSSB-0669	170,00	—	—	122	—	219	316	—

¹ Add suffix "-S17" for 17-7 stainless steel. ² Wave springs fit snug in housing.

Bearing Cross Reference Chart

	Part No. ¹	Bearing O.D. ²	Bearing Part Numbers						
			Extra Small	Extremely Light	Extra Light	Narrow	Light	Medium	Heavy
Metric (mm)	YSSB-0689	175,00	—	—	—	22 ³	—	—	—
	YSSB-0709	180,00	—	26	124	21	220	317	414
	YSSB-0728	185,00	—	—	—	22 ³	—	—	—
	YSSB-0748	190,00	—	28	—	24	221	318	415
	YSSB-0787	200,00	—	—	126	—	222	319	416
	YSSB-0807	205,00	—	—	—	26	—	—	—
	YSSB-0827	210,00	—	30	128	—	—	—	417
	YSSB-0847	215,00	—	—	—	—	224	320	—
	YSSB-0866	220,00	—	32	—	28	—	—	—
	YSSB-0886	225,00	—	—	130	—	—	321	418
	YSSB-0906	230,00	—	34	—	—	226	—	—
	YSSB-0925	235,00	—	—	—	30	—	—	—
	YSSB-0945	240,00	—	—	132	—	—	—	—
	YSSB-0984	250,00	—	36	—	32	28	—	419
	YSSB-1024	260,00	—	38	134	—	—	324	—
	YSSB-1043	265,00	—	—	—	34	—	—	420
	YSSB-1063	270,00	—	—	—	—	230	—	—
	YSSB-1102	280,00	—	40	136	36	—	326	—
	YSSB-1142	290,00	—	—	138	—	232	—	421
	YSSB-1181	300,00	—	—	—	38	—	328	—
	YSSB-1221	310,00	—	—	140	—	234	—	—
	YSSB-1260	320,00	—	—	—	40	236	330	422
	YSSB-1339	340,00	—	—	144	42	238	332	—
	YSSB-1378	350,00	—	—	—	44	—	—	—
	YSSB-1417	360,00	—	—	148	—	240	334	—
	YSSB-1457	370,00	—	—	—	46	—	—	—
	YSSB-1496	380,00	—	—	—	—	—	336	—
	YSSB-1535	390,00	—	—	—	48	—	—	—
	YSSB-1575	400,00	—	—	152	—	244	338	—
	YSSB-1614	410,00	—	—	—	50	—	—	—
	YSSB-1654	420,00	—	—	156	—	—	340	—
	YSSB-1693	430,00	—	—	—	52	—	—	—
	YSSB-1732	440,00	—	—	—	—	248	342	—
	YSSB-1811	460,00	—	—	160	56	—	344	—
	YSSB-1890	480,00	—	—	164	—	252	—	—
	YSSB-1969	500,00	—	—	—	64	256	348	—
	YSSB-2126	540,00	—	—	—	—	260	352	—
	YSSB-2284	580,00	—	—	—	—	264	356	—

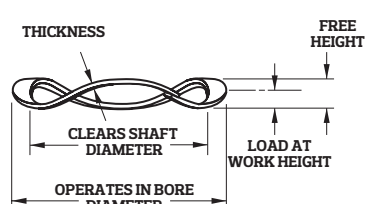
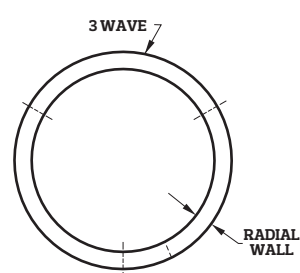
¹ Add suffix "-S17" for 17-7 stainless steel. ² Wave springs fit snug in housing.

Single Turn Springs (Imperial)

YSSR Series – Overlap

Conventional Gap and Overlap Type Wave Springs are used in a wide variety of applications. For short deflections and low-medium forces, they function with precision and dependability.

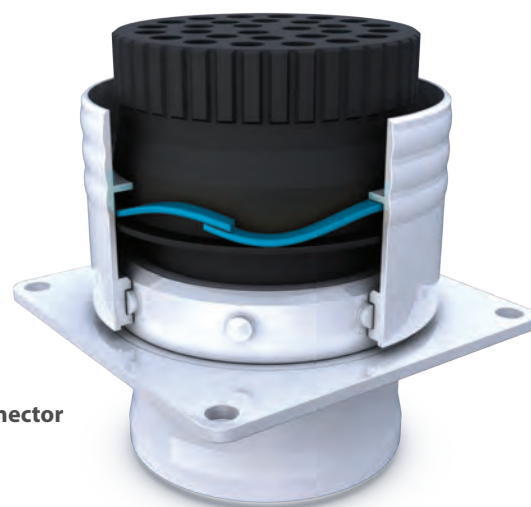
These two types of Smalley Wave Springs permit radial expansion or growth in diameter within a cavity, without the binding or hang-up normally associated with die stamped wave washers. Just as their terms imply, the gap type is split to retain a gap between the ends, while the overlap type has overlapping ends. Thus, the ends are free to move circumferentially as the spring outside diameter grows during compression.



Stock items available in:

- Carbon steel
- 17-7 PH stainless steel

Springs listed below are 3 wave **Overlap Type**.



Bayonet Connector

Imperial (in.)	Part No. ¹	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ²	Number of Waves	Thickness	Radial Wall	Spring Rate ³
	YSSR-0050	0,500	0,390	7	0,050	0,085	3	0,008	0,040	200
	YSSR-0062	0,625	0,480	10	0,050	0,095	3	0,010	0,058	222
	YSSR-0075	0,750	0,500	14	0,062	0,160	3	0,010	0,078	143
	YSSR-0087	0,875	0,620	16	0,062	0,130	3	0,012	0,094	235
	YSSR-0100	1,000	0,780	18	0,062	0,160	3	0,012	0,094	184
	YSSR-0112	1,125	0,840	20	0,078	0,130	3	0,016	0,133	385
	YSSR-0125	1,250	0,960	22	0,078	0,150	3	0,016	0,133	306
	YSSR-0137	1,375	1,090	24	0,078	0,190	3	0,016	0,133	214
	YSSR-0150	1,500	1,170	26	0,078	0,170	3	0,018	0,143	283
	YSSR-0162	1,625	1,310	28	0,078	0,200	3	0,018	0,143	230

¹ Add suffix "-S17" for 17-7 stainless steel. ² Reference dimension. ³ Theoretical dimension; measured in lb/in.

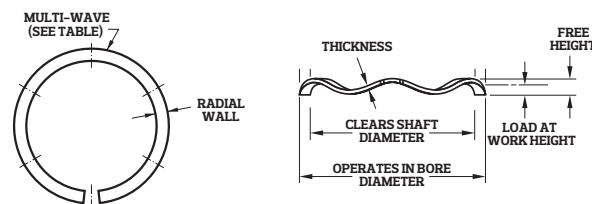
Single Turn Springs (Imperial)

YSSR Series – Gap

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel

Springs listed below are 4 waves and up, **Gap Type**.



Imperial (in.)	Part No. ¹	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ²	Number of Waves	Thickness	Radial Wall	Spring Rate ³
	YSSR-0175	1,750	1,440	30	0,078	0,140	4	0,018	0,143	484
	YSSR-0187	1,875	1,560	32	0,078	0,150	4	0,018	0,143	444
	YSSR-0200	2,000	1,680	34	0,093	0,140	4	0,024	0,150	723
	YSSR-0212	2,125	1,800	36	0,093	0,150	4	0,024	0,150	632
	YSSR-0225	2,250	1,930	38	0,093	0,170	4	0,024	0,150	494
	YSSR-0237	2,375	1,990	40	0,093	0,160	4	0,024	0,178	597
	YSSR-0250	2,500	2,120	42	0,093	0,170	4	0,024	0,178	545
	YSSR-0262	2,625	2,240	44	0,093	0,190	4	0,024	0,178	454
	YSSR-0275	2,750	2,340	46	0,109	0,170	4	0,030	0,188	754
	YSSR-0287	2,875	2,470	48	0,109	0,180	4	0,030	0,188	676
	YSSR-0300	3,000	2,590	50	0,109	0,190	4	0,030	0,188	617
	YSSR-0312	3,125	2,710	52	0,109	0,210	4	0,030	0,188	515
	YSSR-0325	3,250	2,750	54	0,109	0,200	4	0,030	0,233	593
	YSSR-0337	3,375	2,840	56	0,109	0,220	4	0,030	0,233	505
	YSSR-0350	3,500	3,000	58	0,109	0,230	4	0,030	0,233	479
	YSSR-0362	3,625	3,120	60	0,109	0,240	4	0,030	0,233	458
	YSSR-0375	3,750	3,250	62	0,109	0,260	4	0,030	0,233	411
	YSSR-0387	3,875	3,370	64	0,109	0,300	4	0,030	0,233	335
	YSSR-0400	4,000	3,500	66	0,109	0,190	5	0,030	0,233	815
	YSSR-0412	4,125	3,620	67	0,109	0,200	5	0,030	0,233	736
	YSSR-0425	4,250	3,740	69	0,109	0,210	5	0,030	0,233	683
	YSSR-0437	4,375	3,860	70	0,109	0,210	5	0,030	0,233	693
	YSSR-0450	4,500	3,990	72	0,109	0,230	5	0,030	0,233	595
	YSSR-0462	4,625	4,110	73	0,125	0,270	5	0,030	0,233	503
	YSSR-0475	4,750	4,240	75	0,125	0,310	5	0,030	0,233	405
	YSSR-0487	4,875	4,370	76	0,125	0,290	5	0,030	0,233	461
	YSSR-0500	5,000	4,490	78	0,125	0,310	5	0,030	0,233	422
	YSSR-0512	5,125	4,610	80	0,125	0,340	5	0,030	0,233	372
	YSSR-0525	5,250	4,740	82	0,125	0,370	5	0,030	0,233	335
	YSSR-0537	5,375	4,860	84	0,125	0,380	5	0,030	0,233	329
	YSSR-0550	5,500	4,990	86	0,125	0,250	6	0,030	0,233	688
	YSSR-0562	5,625	5,110	88	0,125	0,270	6	0,030	0,233	607
	YSSR-0575	5,750	5,240	90	0,125	0,280	6	0,030	0,233	581
	YSSR-0587	5,875	5,360	92	0,125	0,300	6	0,030	0,233	526
	YSSR-0600	6,000	5,490	94	0,125	0,300	6	0,030	0,233	537
	YSSR-0612	6,125	5,610	96	0,125	0,310	6	0,030	0,233	519
	YSSR-0625	6,250	5,730	98	0,125	0,340	6	0,030	0,233	456
	YSSR-0637	6,375	5,860	100	0,125	0,350	6	0,030	0,233	444
	YSSR-0650	6,500	5,980	102	0,125	0,390	6	0,030	0,233	385
	YSSR-0675	6,750	6,230	104	0,125	0,420	6	0,030	0,233	353
	YSSR-0700	7,000	6,160	106	0,156	0,320	6	0,032	0,375	646
	YSSR-0725	7,250	6,440	108	0,156	0,350	6	0,032	0,375	557
	YSSR-0750	7,500	6,690	110	0,156	0,360	6	0,032	0,375	539
	YSSR-0775	7,750	6,940	114	0,156	0,380	6	0,032	0,375	509
	YSSR-0800	8,000	7,190	118	0,156	0,390	6	0,032	0,375	504
	YSSR-0825	8,250	7,440	122	0,156	0,430	6	0,032	0,375	445
	YSSR-0850	8,500	7,680	126	0,156	0,340	7	0,032	0,375	685
	YSSR-0875	8,750	7,930	130	0,156	0,340	7	0,032	0,375	707
	YSSR-0900	9,000	8,180	134	0,156	0,290	8	0,032	0,375	1000
	YSSR-0950	9,500	8,680	142	0,156	0,240	9	0,032	0,375	1690
	YSSR-1000	10,000	9,170	150	0,156	0,290	9	0,032	0,375	1119
	YSSR-1050	10,500	9,670	158	0,156	0,310	9	0,032	0,375	1026
	YSSR-1100	11,000	10,170	166	0,156	0,350	9	0,032	0,375	856
	YSSR-1150	11,500	10,660	174	0,156	0,360	9	0,032	0,375	853
	YSSR-1200	12,000	11,160	182	0,156	0,440	9	0,032	0,375	641
	YSSR-1250	12,500	11,660	190	0,156	0,350	10	0,032	0,375	979
	YSSR-1300	13,000	12,160	198	0,156	0,410	10	0,032	0,375	780
	YSSR-1350	13,500	12,650	206	0,156	0,430	10	0,032	0,375	752
	YSSR-1400	14,000	13,150	214	0,156	0,300	12	0,032	0,375	1486
	YSSR-1450	14,500	13,650	221	0,156	0,320	12	0,032	0,375	1348
	YSSR-1500	15,000	14,130	230	0,156	0,350	12	0,032	0,375	1186
	YSSR-1550	15,500	14,640	239	0,156	0,310	13	0,032	0,375	1552
	YSSR-1600	16,000	15,140	248	0,156	0,340	13	0,032	0,375	1348

¹ Add suffix "-S17" for 17-7 stainless steel. ² Reference dimension. ³ Theoretical dimension; measured in lb/in.

Narrow Section Wave Springs (Imperial)

YSSR-N Series – Gap

Smalley narrow section wave springs were originally designed to pre-load packings in telescoping hydraulic cylinders.

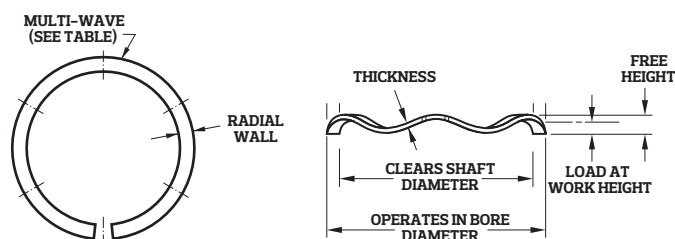
They have also found other applications where working space is highly limited. This Smalley Wave Spring series is designed to fit into a bore with a light snap to assure perfect concentricity between the wave spring and assembly. When these narrow section wave springs are compressed, radial expansion is taken up by the gap in the spring to eliminate binding.



Stock items available in:

- Carbon steel
- 17-7 PH stainless steel

Springs listed below are 4 waves and up, **Gap Type**.



	Part No. ¹	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ²	Number of Waves	Thickness	Radial Wall	Spring Rate ³
Imperial (in.)	YSSR-0325-N	3,250	2,820	54	0,109	0,200	4	0,030	0,188	593
	YSSR-0337-N	3,375	2,940	56	0,109	0,220	4	0,030	0,188	505
	YSSR-0350-N	3,500	3,070	58	0,109	0,260	4	0,030	0,188	384
	YSSR-0362-N	3,625	3,190	60	0,109	0,270	4	0,030	0,188	373
	YSSR-0375-N	3,750	3,320	62	0,109	0,280	4	0,030	0,188	363
	YSSR-0387-N	3,875	3,440	64	0,109	0,310	4	0,030	0,188	318
	YSSR-0400-N	4,000	3,570	66	0,109	0,200	5	0,030	0,188	725
	YSSR-0412-N	4,125	3,690	67	0,109	0,200	5	0,030	0,188	736
	YSSR-0425-N	4,250	3,820	69	0,109	0,240	5	0,030	0,188	527
	YSSR-0437-N	4,375	3,940	70	0,109	0,210	5	0,030	0,188	693
	YSSR-0450-N	4,500	4,070	72	0,109	0,280	5	0,030	0,188	421
	YSSR-0462-N	4,625	4,190	73	0,125	0,270	5	0,030	0,188	503
	YSSR-0475-N	4,750	4,320	75	0,125	0,320	5	0,030	0,188	385
	YSSR-0487-N	4,875	4,440	76	0,125	0,320	5	0,030	0,188	390
	YSSR-0500-N	5,000	4,570	78	0,125	0,350	5	0,030	0,188	347
	YSSR-0512-N	5,125	4,690	80	0,125	0,350	5	0,030	0,188	356
	YSSR-0525-N	5,250	4,820	82	0,125	0,360	5	0,030	0,188	349
	YSSR-0537-N	5,375	4,940	84	0,125	0,440	5	0,030	0,188	267
	YSSR-0550-N	5,500	5,070	86	0,125	0,280	6	0,030	0,188	555
	YSSR-0562-N	5,625	5,190	88	0,125	0,290	6	0,030	0,188	533
	YSSR-0575-N	5,750	5,320	90	0,125	0,340	6	0,030	0,188	419
	YSSR-0587-N	5,875	5,440	92	0,125	0,340	6	0,030	0,188	428
	YSSR-0600-N	6,000	5,570	94	0,125	0,340	6	0,030	0,188	437
	YSSR-0612-N	6,125	5,690	96	0,125	0,280	7	0,030	0,188	619
	YSSR-0625-N	6,250	5,820	98	0,125	0,280	7	0,030	0,188	632
	YSSR-0637-N	6,375	5,940	100	0,125	0,300	7	0,030	0,188	571
	YSSR-0650-N	6,500	6,070	102	0,125	0,300	7	0,030	0,188	583
	YSSR-0675-N	6,750	6,320	104	0,125	0,300	7	0,030	0,188	594
	YSSR-0700-N	7,000	6,480	106	0,156	0,320	7	0,030	0,233	646
	YSSR-0725-N	7,250	6,730	108	0,156	0,330	7	0,030	0,233	621
	YSSR-0750-N	7,500	6,980	110	0,156	0,360	7	0,030	0,233	539
	YSSR-0775-N	7,750	7,230	114	0,156	0,380	7	0,030	0,233	509

¹ Add suffix "-S17" for 17-7 stainless steel. ² Reference dimension. ³ Theoretical dimension; measured in lb/in.

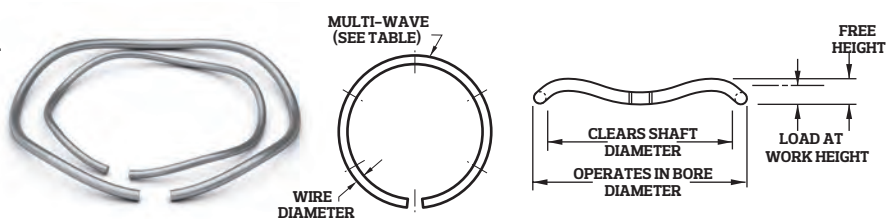
Wavo (Round Wire) Single Turn (Imperial)

YRW Series

Round wire, high load springs ideal for reduced cavity applications.

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Imperial (in.)	Part No. ¹	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ²	Number of Waves	Wire Diameter	Spring Rate ³
	YRW-0050	0,500	0,408	35	0,052	0,062	3	0,031	3500
	YRW-0062	0,625	0,517	50	0,064	0,077	3	0,038	3846
	YRW-0075	0,750	0,628	70	0,076	0,092	3	0,045	4375
	YRW-0087	0,875	0,740	80	0,086	0,104	3	0,051	4444
	YRW-0100	1,000	0,855	90	0,095	0,116	3	0,056	4286
	YRW-0112	1,125	0,967	100	0,102	0,127	3	0,060	4000
	YRW-0125	1,250	1,081	110	0,110	0,138	3	0,065	3929
	YRW-0137	1,375	1,223	120	0,095	0,121	4	0,056	4615
	YRW-0150	1,500	1,339	130	0,102	0,128	4	0,060	5000
	YRW-0162	1,625	1,444	140	0,110	0,137	4	0,065	5185
	YRW-0175	1,750	1,564	150	0,113	0,144	4	0,067	4839
	YRW-0187	1,875	1,682	160	0,119	0,155	4	0,070	4444
	YRW-0200	2,000	1,803	170	0,124	0,165	4	0,072	4146
	YRW-0212	2,125	1,906	180	0,129	0,162	4	0,076	5455
	YRW-0225	2,250	2,023	190	0,136	0,168	4	0,080	5938
	YRW-0237	2,375	2,141	200	0,141	0,178	4	0,083	5405
	YRW-0250	2,500	2,261	210	0,144	0,185	4	0,085	5122
	YRW-0262	2,625	2,374	220	0,153	0,203	4	0,090	4400
	YRW-0275	2,750	2,497	230	0,154	0,212	4	0,091	3966
	YRW-0287	2,875	2,618	240	0,158	0,210	4	0,093	4615
	YRW-0300	3,000	2,767	250	0,141	0,179	5	0,083	6579
	YRW-0312	3,125	2,878	260	0,144	0,184	5	0,085	6500
	YRW-0325	3,250	2,992	270	0,153	0,190	5	0,090	7297
	YRW-0337	3,375	3,115	280	0,154	0,195	5	0,091	6829
	YRW-0350	3,500	3,236	290	0,158	0,201	5	0,093	6744
	YRW-0362	3,625	3,356	300	0,161	0,206	5	0,095	6667
	YRW-0375	3,750	3,475	310	0,166	0,212	5	0,098	6739
	YRW-0387	3,875	3,595	320	0,170	0,208	5	0,100	8421
	YRW-0400	4,000	3,718	330	0,170	0,225	5	0,100	6000
	YRW-0412	4,125	3,827	335	0,175	0,221	5	0,105	7283
	YRW-0425	4,250	3,948	345	0,178	0,225	5	0,105	7340
	YRW-0437	4,375	4,063	350	0,187	0,240	5	0,110	6604
	YRW-0450	4,500	4,185	360	0,187	0,247	5	0,110	6000
	YRW-0462	4,625	4,310	365	0,187	0,253	5	0,110	5530
	YRW-0475	4,750	4,431	375	0,190	0,257	5	0,112	5597
	YRW-0487	4,875	4,555	380	0,190	0,264	5	0,112	5135
	YRW-0500	5,000	4,672	390	0,195	0,265	5	0,116	5571
	YRW-0512	5,125	4,772	400	0,200	0,274	5	0,118	5405
	YRW-0525	5,250	4,893	410	0,204	0,279	5	0,120	5467
	YRW-0537	5,375	5,037	420	0,187	0,245	6	0,110	7241
	YRW-0550	5,500	5,162	430	0,187	0,251	6	0,110	6719
	YRW-0562	5,625	5,283	440	0,190	0,245	6	0,112	8000
	YRW-0575	5,750	5,406	450	0,190	0,251	6	0,112	7377
	YRW-0587	5,875	5,524	460	0,197	0,262	6	0,116	7077
	YRW-0600	6,000	5,644	470	0,200	0,268	6	0,118	6912

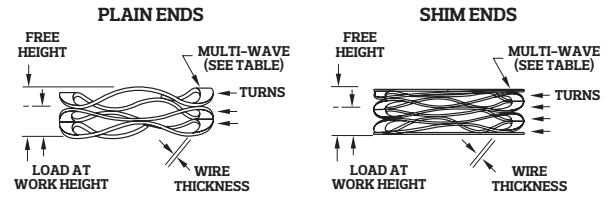
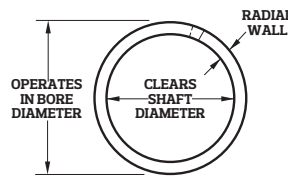
¹ Add suffix "-S17" for 17-7 stainless steel. ² Reference dimension. ³ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



* Not available with shim ends

Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM06-L1*	6	4	6	0,61	1,52	2,5	3	0,13	0,51	6,59
	YCM06-L2*	6	4	6	0,81	2,03	2,5	4	0,13	0,51	4,92
	YCM06-L3*	6	4	6	1,02	2,54	2,5	5	0,13	0,51	3,95
	YCM06-L4*	6	4	6	1,22	3,05	2,5	6	0,13	0,51	3,28
	YCM06-L5*	6	4	6	1,42	3,56	2,5	7	0,13	0,51	2,80
	YCM06-L6*	6	4	6	1,63	4,06	2,5	8	0,13	0,51	2,47
	YCM06-L7*	6	4	6	1,83	4,57	2,5	9	0,13	0,51	2,19
	YCM06-L8*	6	4	6	2,24	5,59	2,5	11	0,13	0,51	1,79
	YCM06-L9*	6	4	6	2,64	6,60	2,5	13	0,13	0,51	1,52
	YCM06-M1*	6	4	12	0,74	1,52	2,5	3	0,15	0,61	15,38
	YCM06-M2*	6	4	12	0,97	2,03	2,5	4	0,15	0,61	11,32
	YCM06-M3*	6	4	12	1,22	2,54	2,5	5	0,15	0,61	9,09
	YCM06-M4*	6	4	12	1,47	3,05	2,5	6	0,15	0,61	7,59
	YCM06-M5*	6	4	12	1,70	3,56	2,5	7	0,15	0,61	6,45
	YCM06-M6*	6	4	12	1,96	4,06	2,5	8	0,15	0,61	5,71
	YCM06-M7*	6	4	12	2,18	4,57	2,5	9	0,15	0,61	5,02
	YCM06-M8*	6	4	12	2,69	5,59	2,5	11	0,15	0,61	4,14
	YCM06-M9*	6	4	12	3,18	6,60	2,5	13	0,15	0,61	3,51
	YCM08-L1	8	5	15	1,70	2,82	2,5	3	0,20	0,81	13,39
	YCM08-L2	8	5	15	2,39	3,76	2,5	4	0,20	0,81	10,95
	YCM08-L3	8	5	15	2,74	4,70	2,5	5	0,20	0,81	7,65
	YCM08-L4	8	5	15	3,56	5,64	2,5	6	0,20	0,81	7,21
	YCM08-L5	8	5	15	4,01	6,58	2,5	7	0,20	0,81	5,84
	YCM08-L6	8	5	15	4,57	7,52	2,5	8	0,20	0,81	5,08
	YCM08-L7	8	5	15	5,26	8,46	2,5	9	0,20	0,81	4,69
	YCM08-L8	8	5	15	6,35	10,34	2,5	11	0,20	0,81	3,76
	YCM08-L9	8	5	15	7,37	12,22	2,5	13	0,20	0,81	3,09
	YCM08-M1	8	5	30	1,78	2,82	2,5	3	0,25	0,81	28,85
	YCM08-M2	8	5	30	2,54	3,76	2,5	4	0,25	0,81	24,59
	YCM08-M3	8	5	30	3,05	4,70	2,5	5	0,25	0,81	18,18
	YCM08-M4	8	5	30	3,81	5,64	2,5	6	0,25	0,81	16,39
	YCM08-M5	8	5	30	4,32	6,58	2,5	7	0,25	0,81	13,27
	YCM08-M6	8	5	30	4,95	7,52	2,5	8	0,25	0,81	11,67
	YCM08-M7	8	5	30	5,59	8,46	2,5	9	0,25	0,81	10,45
	YCM08-M8	8	5	30	6,86	10,34	2,5	11	0,25	0,81	8,62
	YCM08-M9	8	5	30	7,87	12,22	2,5	13	0,25	0,81	6,90
	YCM10-L1	10	7	18	1,91	3,96	2,5	3	0,20	0,81	8,78
	YCM10-L2	10	7	18	2,54	5,28	2,5	4	0,20	0,81	6,57
	YCM10-L3	10	7	18	3,15	6,60	2,5	5	0,20	0,81	5,22
	YCM10-L4	10	7	18	3,78	7,92	2,5	6	0,20	0,81	4,35
	YCM10-L5	10	7	18	4,42	9,25	2,5	7	0,20	0,81	3,73
	YCM10-L6	10	7	18	5,05	10,57	2,5	8	0,20	0,81	3,26
	YCM10-L7	10	7	18	5,69	11,89	2,5	9	0,20	0,81	2,90
	YCM10-L8	10	7	18	6,32	13,21	2,5	10	0,20	0,81	2,61
	YCM10-L9	10	7	18	6,96	14,53	2,5	11	0,20	0,81	2,38
	YCM10-M1	10	7	35	2,03	3,96	2,5	3	0,28	0,81	18,13
	YCM10-M2	10	7	35	2,79	5,28	2,5	4	0,28	0,81	14,06
	YCM10-M3	10	7	35	3,56	6,60	2,5	5	0,28	0,81	11,51
	YCM10-M4	10	7	35	4,32	7,92	2,5	6	0,28	0,81	9,72
	YCM10-M5	10	7	35	5,08	9,25	2,5	7	0,28	0,81	8,39
	YCM10-M6	10	7	35	5,84	10,57	2,5	8	0,28	0,81	7,40
	YCM10-M7	10	7	35	6,60	11,89	2,5	9	0,28	0,81	6,62
	YCM10-M8	10	7	35	7,37	13,21	2,5	10	0,28	0,81	5,99
	YCM10-M9	10	7	35	8,13	14,53	2,5	11	0,28	0,81	5,47
	YCM12-L1	12	9	20	1,47	4,34	2,5	3	0,20	1,02	6,97
	YCM12-L2	12	9	20	1,98	5,79	2,5	4	0,20	1,02	5,25
	YCM12-L3	12	9	20	2,46	7,24	2,5	5	0,20	1,02	4,18
	YCM12-L4	12	9	20	2,95	8,69	2,5	6	0,20	1,02	3,48
	YCM12-L5	12	9	20	3,45	10,13	2,5	7	0,20	1,02	2,99
	YCM12-L6	12	9	20	3,94	11,58	2,5	8	0,20	1,02	2,62
	YCM12-L7	12	9	20	4,45	13,03	2,5	9	0,20	1,02	2,33
	YCM12-L8	12	9	20	4,93	14,48	2,5	10	0,20	1,02	2,09
	YCM12-L9	12	9	20	5,44	15,93	2,5	11	0,20	1,02	1,91

¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM12-M1	12	8,5	40	2,36	4,34	2,5	3	0,28	1,17	20,20
	YCM12-M2	12	8,5	40	3,18	5,79	2,5	4	0,28	1,17	15,33
	YCM12-M3	12	8,5	40	3,96	7,24	2,5	5	0,28	1,17	12,20
	YCM12-M4	12	8,5	40	4,75	8,69	2,5	6	0,28	1,17	10,15
	YCM12-M5	12	8,5	40	5,54	10,13	2,5	7	0,28	1,17	8,71
	YCM12-M6	12	8,5	40	6,32	11,58	2,5	8	0,28	1,17	7,60
	YCM12-M7	12	8,5	40	7,11	13,03	2,5	9	0,28	1,17	6,76
	YCM12-M8	12	8,5	40	7,92	14,48	2,5	10	0,28	1,17	6,10
	YCM12-M9	12	8,5	40	8,71	15,93	2,5	11	0,28	1,17	5,54
	YCM12-H1	12	8,5	60	1,98	4,34	2,5	3	0,30	1,14	25,42
	YCM12-H2	12	8,5	60	2,64	5,79	2,5	4	0,30	1,14	19,05
	YCM12-H3	12	8,5	60	3,30	7,24	2,5	5	0,30	1,14	15,23
	YCM12-H4	12	8,5	60	3,99	8,69	2,5	6	0,30	1,14	12,77
	YCM12-H5	12	8,5	60	4,65	10,13	2,5	7	0,30	1,14	10,95
	YCM12-H6	12	8,5	60	5,31	11,58	2,5	8	0,30	1,14	9,57
	YCM12-H7	12	8,5	60	5,97	13,03	2,5	9	0,30	1,14	8,50
	YCM12-H8	12	8,5	60	6,63	14,48	2,5	10	0,30	1,14	7,64
	YCM12-H9	12	8,5	60	7,29	15,93	2,5	11	0,30	1,14	6,94
	YCM14-L1	14	10	22	2,18	4,95	2,5	3	0,23	1,47	7,94
	YCM14-L2	14	10	22	2,95	6,60	2,5	4	0,23	1,47	6,03
	YCM14-L3	14	10	22	3,71	8,26	2,5	5	0,23	1,47	4,84
	YCM14-L4	14	10	22	4,52	9,91	2,5	6	0,23	1,47	4,08
	YCM14-L5	14	10	22	5,33	11,56	2,5	7	0,23	1,47	3,53
	YCM14-L6	14	10	22	6,17	13,21	2,5	8	0,23	1,47	3,13
	YCM14-L7	14	10	22	7,01	14,86	2,5	9	0,23	1,47	2,80
	YCM14-L8	14	10	22	7,85	16,51	2,5	10	0,23	1,47	2,54
	YCM14-L9	14	10	22	8,71	18,16	2,5	11	0,23	1,47	2,33
	YCM14-M1	14	10	50	2,18	4,95	2,5	3	0,30	1,52	18,05
	YCM14-M2	14	10	50	2,95	6,60	2,5	4	0,30	1,52	13,70
	YCM14-M3	14	10	50	3,71	8,26	2,5	5	0,30	1,52	10,99
	YCM14-M4	14	10	50	4,52	9,91	2,5	6	0,30	1,52	9,28
	YCM14-M5	14	10	50	5,33	11,56	2,5	7	0,30	1,52	8,03
	YCM14-M6	14	10	50	6,17	13,21	2,5	8	0,30	1,52	7,10
	YCM14-M7	14	10	50	7,01	14,86	2,5	9	0,30	1,52	6,37
	YCM14-M8	14	10	50	7,85	16,51	2,5	10	0,30	1,52	5,77
	YCM14-M9	14	10	50	8,71	18,16	2,5	11	0,30	1,52	5,29
	YCM14-H1	14	9	80	3,15	4,95	2,5	3	0,38	1,52	44,44
	YCM14-H2	14	9	80	4,19	6,60	2,5	4	0,38	1,52	33,20
	YCM14-H3	14	9	80	5,26	8,26	2,5	5	0,38	1,52	26,67
	YCM14-H4	14	9	80	6,30	9,91	2,5	6	0,38	1,52	22,16
	YCM14-H5	14	9	80	7,34	11,56	2,5	7	0,38	1,52	18,96
	YCM14-H6	14	9	80	8,41	13,21	2,5	8	0,38	1,52	16,67
	YCM14-H7	14	9	80	9,45	14,86	2,5	9	0,38	1,52	14,79
	YCM14-H8	14	9	80	10,49	16,51	2,5	10	0,38	1,52	13,29
	YCM14-H9	14	9	80	11,56	18,16	2,5	11	0,38	1,52	12,12
	YCM15-L1	15	11	25	2,57	5,18	2,5	3	0,25	1,47	9,58
	YCM15-L2	15	11	25	3,43	6,91	2,5	4	0,25	1,47	7,18
	YCM15-L3	15	11	25	4,27	8,64	2,5	5	0,25	1,47	5,72
	YCM15-L4	15	11	25	5,13	10,36	2,5	6	0,25	1,47	4,78
	YCM15-L5	15	11	25	5,99	12,09	2,5	7	0,25	1,47	4,10
	YCM15-L6	15	11	25	6,83	13,82	2,5	8	0,25	1,47	3,58
	YCM15-L7	15	11	25	7,70	15,54	2,5	9	0,25	1,47	3,19
	YCM15-L8	15	11	25	8,53	17,27	2,5	10	0,25	1,47	2,86
	YCM15-L9	15	11	25	9,40	19,00	2,5	11	0,25	1,47	2,60
	YCM15-M1	15	10	50	3,43	5,18	3,5	3	0,23	1,47	28,57
	YCM15-M2	15	10	50	4,57	6,91	3,5	4	0,23	1,47	21,37
	YCM15-M3	15	10	50	5,72	8,64	3,5	5	0,23	1,47	17,12
	YCM15-M4	15	10	50	6,86	10,36	3,5	6	0,23	1,47	14,29
	YCM15-M5	15	10	50	8,00	12,09	3,5	7	0,23	1,47	12,22
	YCM15-M6	15	10	50	9,14	13,82	3,5	8	0,23	1,47	10,68
	YCM15-M7	15	10	50	10,29	15,54	3,5	9	0,23	1,47	9,52
	YCM15-M8	15	10	50	11,43	17,27	3,5	10	0,23	1,47	8,56
	YCM15-M9	15	10	50	12,57	19,00	3,5	11	0,23	1,47	7,78

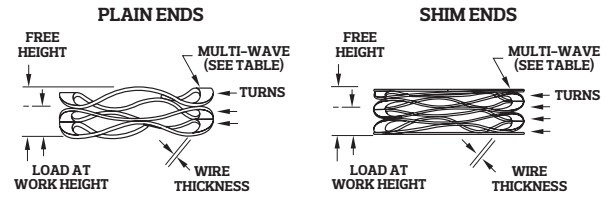
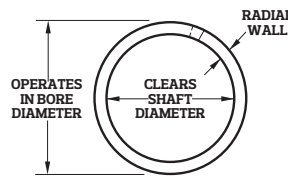
¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM15-H1	15	10	80	3,20	5,18	3,5	3	0,25	1,47	40,40
	YCM15-H2	15	10	80	4,19	6,91	3,5	4	0,25	1,47	29,41
	YCM15-H3	15	10	80	5,23	8,64	3,5	5	0,25	1,47	23,46
	YCM15-H4	15	10	80	6,27	10,36	3,5	6	0,25	1,47	19,56
	YCM15-H5	15	10	80	7,32	12,09	3,5	7	0,25	1,47	16,77
	YCM15-H6	15	10	80	8,36	13,82	3,5	8	0,25	1,47	14,65
	YCM15-H7	15	10	80	9,40	15,54	3,5	9	0,25	1,47	13,03
	YCM15-H8	15	10	80	10,46	17,27	3,5	10	0,25	1,47	11,75
	YCM15-H9	15	10	80	11,51	19,00	3,5	11	0,25	1,47	10,68
	YCM16-L1	16	11	25	2,11	5,41	2,5	3	0,25	1,47	7,58
	YCM16-L2	16	11	25	2,79	7,21	2,5	4	0,25	1,47	5,66
	YCM16-L3	16	11	25	3,51	9,02	2,5	5	0,25	1,47	4,54
	YCM16-L4	16	11	25	4,19	10,82	2,5	6	0,25	1,47	3,77
	YCM16-L5	16	11	25	4,90	12,62	2,5	7	0,25	1,47	3,24
	YCM16-L6	16	11	25	6,30	16,23	2,5	9	0,25	1,47	2,52
	YCM16-L7	16	11	25	7,70	19,84	2,5	11	0,25	1,47	2,06
	YCM16-L8	16	11	25	9,09	23,44	2,5	13	0,25	1,47	1,74
	YCM16-M1	16	11	55	3,63	5,41	3,5	3	0,25	1,47	30,90
	YCM16-M2	16	11	55	4,83	7,21	3,5	4	0,25	1,47	23,11
	YCM16-M3	16	11	55	6,05	9,02	3,5	5	0,25	1,47	18,52
	YCM16-M4	16	11	55	7,24	10,82	3,5	6	0,25	1,47	15,36
	YCM16-M5	16	11	55	8,46	12,62	3,5	7	0,25	1,47	13,22
	YCM16-M6	16	11	55	10,87	16,23	3,5	9	0,25	1,47	10,26
	YCM16-M7	16	11	55	13,28	19,84	3,5	11	0,25	1,47	8,38
	YCM16-M8	16	11	55	15,70	23,44	3,5	13	0,25	1,47	7,11
	YCM16-H1	16	11	90	3,30	5,41	3,5	3	0,30	1,52	42,65
	YCM16-H2	16	11	90	4,57	7,21	3,5	4	0,30	1,52	34,09
	YCM16-H3	16	11	90	5,59	9,02	3,5	5	0,30	1,52	26,24
	YCM16-H4	16	11	90	6,86	10,82	3,5	6	0,30	1,52	22,73
	YCM16-H5	16	11	90	7,87	12,62	3,5	7	0,30	1,52	18,95
	YCM16-H6	16	11	90	10,16	16,23	3,5	9	0,30	1,52	14,83
	YCM16-H7	16	11	90	12,45	19,84	3,5	11	0,30	1,52	12,18
	YCM16-H8	16	11	90	14,73	23,44	3,5	13	0,30	1,52	10,33
	YCM18-L1	18	13	30	3,63	5,72	3,5	3	0,20	1,80	14,35
	YCM18-L2	18	13	30	4,75	7,62	3,5	4	0,20	1,80	10,45
	YCM18-L3	18	13	30	5,94	9,53	3,5	5	0,20	1,80	8,36
	YCM18-L4	18	13	30	7,14	11,43	3,5	6	0,20	1,80	6,99
	YCM18-L5	18	13	30	8,31	13,34	3,5	7	0,20	1,80	5,96
	YCM18-L6	18	13	30	10,69	17,15	3,5	9	0,20	1,80	4,64
	YCM18-L7	18	13	30	14,25	22,86	3,5	12	0,20	1,80	3,48
	YCM18-M1	18	13	55	3,68	5,72	3,5	3	0,25	1,83	26,96
	YCM18-M2	18	13	55	4,98	7,62	3,5	4	0,25	1,83	20,83
	YCM18-M3	18	13	55	6,22	9,53	3,5	5	0,25	1,83	16,62
	YCM18-M4	18	13	55	7,47	11,43	3,5	6	0,25	1,83	13,89
	YCM18-M5	18	13	55	8,74	13,34	3,5	7	0,25	1,83	11,96
	YCM18-M6	18	13	55	11,23	17,15	3,5	9	0,25	1,83	9,29
	YCM18-M7	18	13	55	14,96	22,86	3,5	12	0,25	1,83	6,96
	YCM18-H1	18	13	90	3,84	5,72	3,5	3	0,30	1,83	47,87
	YCM18-H2	18	13	90	5,13	7,62	3,5	4	0,30	1,83	36,14
	YCM18-H3	18	13	90	6,40	9,53	3,5	5	0,30	1,83	28,75
	YCM18-H4	18	13	90	7,70	11,43	3,5	6	0,30	1,83	24,13
	YCM18-H5	18	13	90	8,97	13,34	3,5	7	0,30	1,83	20,59
	YCM18-H6	18	13	90	11,53	17,15	3,5	9	0,30	1,83	16,01
	YCM18-H7	18	13	90	15,37	22,86	3,5	12	0,30	1,83	12,02
	YCM20-L1	20	15	35	2,72	6,32	3,5	3	0,20	1,80	9,72
	YCM20-L2	20	15	35	3,61	8,43	3,5	4	0,20	1,80	7,26
	YCM20-L3	20	15	35	4,52	10,54	3,5	5	0,20	1,80	5,81
	YCM20-L4	20	15	35	5,41	12,65	3,5	6	0,20	1,80	4,83
	YCM20-L5	20	15	35	6,32	14,76	3,5	7	0,20	1,80	4,15
	YCM20-L6	20	15	35	8,13	18,97	3,5	9	0,20	1,80	3,23
	YCM20-L7	20	15	35	10,82	25,30	3,5	12	0,20	1,80	2,42
	YCM20-M1	20	14	70	3,05	6,32	3,5	3	0,25	1,98	21,41
	YCM20-M2	20	14	70	4,06	8,43	3,5	4	0,25	1,98	16,02
	YCM20-M3	20	14	70	5,08	10,54	3,5	5	0,25	1,98	12,82

¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM20-M4	20	14	70	6,27	12,65	3,5	6	0,25	1,98	10,97
	YCM20-M5	20	14	70	7,32	14,76	3,5	7	0,25	1,98	9,41
	YCM20-M6	20	14	70	9,17	18,97	3,5	9	0,25	1,98	7,14
	YCM20-M7	20	14	70	12,22	25,30	3,5	12	0,25	1,98	5,35
	YCM20-H1	20	14	100	4,24	6,32	3,5	3	0,33	2,01	48,08
	YCM20-H2	20	14	100	5,66	8,43	3,5	4	0,33	2,01	36,10
	YCM20-H3	20	14	100	7,06	10,54	3,5	5	0,33	2,01	28,74
	YCM20-H4	20	14	100	8,48	12,65	3,5	6	0,33	2,01	23,98
	YCM20-H5	20	14	100	9,91	14,76	3,5	7	0,33	2,01	20,62
	YCM20-H6	20	14	100	12,73	18,97	3,5	9	0,33	2,01	16,03
	YCM20-H7	20	14	100	16,97	25,30	3,5	12	0,33	2,01	12,00
	YCM25-L1	25	19	50	2,06	6,63	3,5	3	0,25	2,18	10,94
	YCM25-L2	25	19	50	2,74	8,84	3,5	4	0,25	2,18	8,20
	YCM25-L3	25	19	50	3,43	11,05	3,5	5	0,25	2,18	6,56
	YCM25-L4	25	19	50	4,11	13,26	3,5	6	0,25	2,18	5,46
	YCM25-L5	25	19	50	4,80	15,47	3,5	7	0,25	2,18	4,69
	YCM25-L6	25	19	50	6,20	19,89	3,5	9	0,25	2,18	3,65
	YCM25-L7	25	19	50	8,26	26,52	3,5	12	0,25	2,18	2,74
	YCM25-M1	25	19	80	2,95	6,63	3,5	3	0,30	2,39	21,74
	YCM25-M2	25	19	80	3,94	8,84	3,5	4	0,30	2,39	16,33
	YCM25-M3	25	19	80	4,90	11,05	3,5	5	0,30	2,39	13,01
	YCM25-M4	25	19	80	5,89	13,26	3,5	6	0,30	2,39	10,85
	YCM25-M5	25	19	80	6,88	15,47	3,5	7	0,30	2,39	9,31
	YCM25-M6	25	19	80	8,84	19,89	3,5	9	0,30	2,39	7,24
	YCM25-M7	25	19	80	11,79	26,52	3,5	12	0,30	2,39	5,43
	YCM25-H1	25	19	110	4,04	6,63	3,5	3	0,38	2,39	42,47
	YCM25-H2	25	19	110	5,38	8,84	3,5	4	0,38	2,39	31,79
	YCM25-H3	25	19	110	6,73	11,05	3,5	5	0,38	2,39	25,46
	YCM25-H4	25	19	110	8,08	13,26	3,5	6	0,38	2,39	21,24
	YCM25-H5	25	19	110	9,40	15,47	3,5	7	0,38	2,39	18,12
	YCM25-H6	25	19	110	12,12	19,89	3,5	9	0,38	2,39	14,16
	YCM25-H7	25	19	110	16,15	26,52	3,5	12	0,38	2,39	10,61
	YCM28-L1	28	22	50	3,76	7,24	3,5	3	0,30	2,39	14,37
	YCM28-L2	28	22	50	5,00	9,65	3,5	4	0,30	2,39	10,75
	YCM28-L3	28	22	50	6,27	12,07	3,5	5	0,30	2,39	8,62
	YCM28-L4	28	22	50	7,52	14,48	3,5	6	0,30	2,39	7,18
	YCM28-L5	28	22	50	8,79	16,89	3,5	7	0,30	2,39	6,17
	YCM28-L6	28	22	50	10,03	19,30	3,5	8	0,30	2,39	5,39
	YCM28-L7	28	22	50	11,28	21,72	3,5	9	0,30	2,39	4,79
	YCM28-L8	28	22	50	13,79	26,54	3,5	11	0,30	2,39	3,92
	YCM28-L9	28	22	50	16,31	31,37	3,5	13	0,30	2,39	3,32
	YCM28-M1	28	22	80	4,39	7,24	3,5	3	0,38	2,39	28,07
	YCM28-M2	28	22	80	5,84	9,65	3,5	4	0,38	2,39	21,00
	YCM28-M3	28	22	80	7,32	12,07	3,5	5	0,38	2,39	16,84
	YCM28-M4	28	22	80	8,79	14,48	3,5	6	0,38	2,39	14,06
	YCM28-M5	28	22	80	10,24	16,89	3,5	7	0,38	2,39	12,03
	YCM28-M6	28	22	80	11,71	19,30	3,5	8	0,38	2,39	10,54
	YCM28-M7	28	22	80	13,18	21,72	3,5	9	0,38	2,39	9,37
	YCM28-M8	28	22	80	16,10	26,54	3,5	11	0,38	2,39	7,66
	YCM28-M9	28	22	80	19,02	31,37	3,5	13	0,38	2,39	6,48
	YCM28-H1	28	22	130	4,57	7,24	3,5	3	0,46	2,39	48,69
	YCM28-H2	28	22	130	6,07	9,65	3,5	4	0,46	2,39	36,31
	YCM28-H3	28	22	130	7,59	12,07	3,5	5	0,46	2,39	29,02
	YCM28-H4	28	22	130	9,12	14,48	3,5	6	0,46	2,39	24,25
	YCM28-H5	28	22	130	10,64	16,89	3,5	7	0,46	2,39	20,80
	YCM28-H6	28	22	130	12,17	19,30	3,5	8	0,46	2,39	18,23
	YCM28-H7	28	22	130	13,69	21,72	3,5	9	0,46	2,39	16,19
	YCM28-H8	28	22	130	16,71	26,54	3,5	11	0,46	2,39	13,22
	YCM28-H9	28	22	130	19,76	31,37	3,5	13	0,46	2,39	11,20
	YCM30-L1	30	24	50	3,18	7,62	3,5	3	0,30	2,39	11,26
	YCM30-L2	30	24	50	4,22	10,16	3,5	4	0,30	2,39	8,42
	YCM30-L3	30	24	50	5,28	12,70	3,5	5	0,30	2,39	6,74
	YCM30-L4	30	24	50	6,32	15,24	3,5	6	0,30	2,39	5,61
	YCM30-L5	30	24	50	7,39	17,78	3,5	7	0,30	2,39	4,81

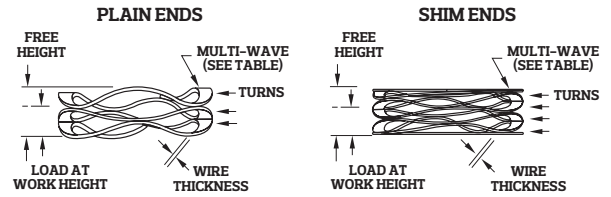
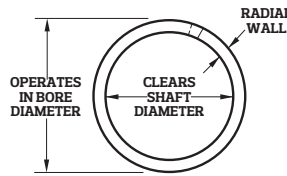
¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM30-L6	30	24	50	8,43	20,32	3,5	8	0,30	2,39	4,21
	YCM30-L7	30	24	50	9,50	22,86	3,5	9	0,30	2,39	3,74
	YCM30-L8	30	24	50	11,61	27,94	3,5	11	0,30	2,39	3,06
	YCM30-L9	30	24	50	13,72	33,02	3,5	13	0,30	2,39	2,59
	YCM30-M1	30	24	90	3,51	7,62	3,5	3	0,38	2,39	21,90
	YCM30-M2	30	24	90	4,70	10,16	3,5	4	0,38	2,39	16,48
	YCM30-M3	30	24	90	5,87	12,70	3,5	5	0,38	2,39	13,18
	YCM30-M4	30	24	90	7,04	15,24	3,5	6	0,38	2,39	10,98
	YCM30-M5	30	24	90	8,20	17,78	3,5	7	0,38	2,39	9,39
	YCM30-M6	30	24	90	9,37	20,32	3,5	8	0,38	2,39	8,22
	YCM30-M7	30	24	90	10,54	22,86	3,5	9	0,38	2,39	7,31
	YCM30-M8	30	24	90	12,90	27,94	3,5	11	0,38	2,39	5,98
	YCM30-M9	30	24	90	15,24	33,02	3,5	13	0,38	2,39	5,06
	YCM30-H1	30	24	130	4,19	7,62	3,5	3	0,46	2,39	37,90
	YCM30-H2	30	24	130	5,59	10,16	3,5	4	0,46	2,39	28,45
	YCM30-H3	30	24	130	6,99	12,70	3,5	5	0,46	2,39	22,77
	YCM30-H4	30	24	130	8,38	15,24	3,5	6	0,46	2,39	18,95
	YCM30-H5	30	24	130	9,78	17,78	3,5	7	0,46	2,39	16,25
	YCM30-H6	30	24	130	11,18	20,32	3,5	8	0,46	2,39	14,22
	YCM30-H7	30	24	130	12,57	22,86	3,5	9	0,46	2,39	12,63
	YCM30-H8	30	24	130	15,37	27,94	3,5	11	0,46	2,39	10,34
	YCM30-H9	30	24	130	18,16	33,02	3,5	13	0,46	2,39	8,75
	YCM35-L1	35	27	70	3,94	8,38	3,5	3	0,36	3,18	15,77
	YCM35-L2	35	27	70	5,23	11,18	3,5	4	0,36	3,18	11,76
	YCM35-L3	35	27	70	6,55	13,97	3,5	5	0,36	3,18	9,43
	YCM35-L4	35	27	70	7,87	16,76	3,5	6	0,36	3,18	7,87
	YCM35-L5	35	27	70	9,17	19,56	3,5	7	0,36	3,18	6,74
	YCM35-L6	35	27	70	10,49	22,35	3,5	8	0,36	3,18	5,90
	YCM35-L7	35	27	70	11,81	25,15	3,5	9	0,36	3,18	5,25
	YCM35-L8	35	27	70	14,43	30,73	3,5	11	0,36	3,18	4,29
	YCM35-L9	35	27	70	17,04	36,32	3,5	13	0,36	3,18	3,63
	YCM35-M1	35	27	110	4,14	8,38	3,5	3	0,41	3,38	25,94
	YCM35-M2	35	27	110	5,51	11,18	3,5	4	0,41	3,38	19,40
	YCM35-M3	35	27	110	6,88	13,97	3,5	5	0,41	3,38	15,51
	YCM35-M4	35	27	110	8,26	16,76	3,5	6	0,41	3,38	12,94
	YCM35-M5	35	27	110	9,63	19,56	3,5	7	0,41	3,38	11,08
	YCM35-M6	35	27	110	11,02	22,35	3,5	8	0,41	3,38	9,71
	YCM35-M7	35	27	110	12,40	25,15	3,5	9	0,41	3,38	8,63
	YCM35-M8	35	27	110	15,14	30,73	3,5	11	0,41	3,38	7,06
	YCM35-M9	35	27	110	17,91	36,32	3,5	13	0,41	3,38	5,98
	YCM35-H1	35	27	160	4,04	8,38	3,5	3	0,46	3,38	36,87
	YCM35-H2	35	27	160	5,38	11,18	3,5	4	0,46	3,38	27,59
	YCM35-H3	35	27	160	6,73	13,97	3,5	5	0,46	3,38	22,10
	YCM40-L1	40	30	100	2,90	9,14	3,5	3	0,41	3,38	16,03
	YCM40-L2	40	30	100	3,86	12,19	3,5	4	0,41	3,38	12,00
	YCM40-L3	40	30	100	4,80	15,24	3,5	5	0,41	3,38	9,58
	YCM40-L4	40	30	100	5,77	18,29	3,5	6	0,41	3,38	7,99
	YCM40-L5	40	30	100	6,73	21,34	3,5	7	0,41	3,38	6,84
	YCM40-L6	40	30	100	7,70	24,38	3,5	8	0,41	3,38	6,00
	YCM40-L7	40	30	100	8,66	27,43	3,5	9	0,41	3,38	5,33
	YCM40-L8	40	30	100	10,59	33,53	3,5	11	0,41	3,38	4,36
	YCM40-L9	40	30	100	12,52	39,62	3,5	13	0,41	3,38	3,69
	YCM40-M1	40	30	150	5,44	9,14	3,5	3	0,53	3,63	40,54
	YCM40-M2	40	30	150	7,24	12,19	3,5	4	0,53	3,63	30,30
	YCM40-M3	40	30	150	9,04	15,24	3,5	5	0,53	3,63	24,19
	YCM40-M4	40	30	150	10,85	18,29	3,5	6	0,53	3,63	20,16
	YCM40-M5	40	30	150	12,65	21,34	3,5	7	0,53	3,63	17,26

¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM40-M6	40	30	150	14,48	24,38	3,5	8	0,53	3,63	15,15
	YCM40-M7	40	30	150	16,28	27,43	3,5	9	0,53	3,63	13,45
	YCM40-M8	40	30	150	19,89	33,53	3,5	11	0,53	3,63	11,00
	YCM40-M9	40	30	150	23,50	39,62	3,5	13	0,53	3,63	9,31
	YCM40-H1	40	30	300	5,66	9,14	4,5	3	0,46	3,38	86,21
	YCM40-H2	40	30	300	7,54	12,19	4,5	4	0,46	3,38	64,52
	YCM40-H3	40	30	300	9,42	15,24	4,5	5	0,46	3,38	51,55
	YCM40-H4	40	30	300	11,33	18,29	4,5	6	0,46	3,38	43,10
	YCM40-H5	40	30	300	13,21	21,34	4,5	7	0,46	3,38	36,90
	YCM40-H6	40	30	300	15,09	24,38	4,5	8	0,46	3,38	32,29
	YCM40-H7	40	30	300	16,97	27,43	4,5	9	0,46	3,38	28,68
	YCM40-H8	40	30	300	20,75	33,53	4,5	11	0,46	3,38	23,47
	YCM40-H9	40	30	300	24,54	39,62	4,5	13	0,46	3,38	19,89
	YCM45-L1	45	35	110	3,38	9,91	3,5	3	0,46	3,63	16,85
	YCM45-L2	45	35	110	4,52	13,21	3,5	4	0,46	3,63	12,66
	YCM45-L3	45	35	110	5,64	16,51	3,5	5	0,46	3,63	10,12
	YCM45-L4	45	35	110	6,76	19,81	3,5	6	0,46	3,63	8,43
	YCM45-L5	45	35	110	7,90	23,11	3,5	7	0,46	3,63	7,23
	YCM45-L6	45	35	110	9,02	26,42	3,5	8	0,46	3,63	6,32
	YCM45-L7	45	35	110	10,16	29,72	3,5	9	0,46	3,63	5,62
	YCM45-L8	45	35	110	12,40	36,32	3,5	11	0,46	3,63	4,60
	YCM45-L9	45	35	110	14,66	42,93	3,5	13	0,46	3,63	3,89
	YCM45-M1	45	35	225	5,33	9,91	4,5	3	0,46	3,63	49,13
	YCM45-M2	45	35	225	6,99	13,21	4,5	4	0,46	3,63	36,17
	YCM45-M3	45	35	225	9,14	16,51	4,5	5	0,46	3,63	30,53
	YCM45-M4	45	35	225	10,80	19,81	4,5	6	0,46	3,63	24,97
	YCM45-M5	45	35	225	12,70	23,11	4,5	7	0,46	3,63	21,61
	YCM45-M6	45	35	225	14,48	26,42	4,5	8	0,46	3,63	18,84
	YCM45-M7	45	35	225	16,26	29,72	4,5	9	0,46	3,63	16,72
	YCM45-M8	45	35	225	19,81	36,32	4,5	11	0,46	3,63	13,63
	YCM45-M9	45	35	225	23,37	42,93	4,5	13	0,46	3,63	11,50
	YCM45-H1	45	35	400	6,43	9,91	4,5	3	0,61	3,76	114,94
	YCM45-H2	45	35	400	8,38	13,21	4,5	4	0,61	3,76	82,82
	YCM45-H3	45	35	400	11,20	16,51	4,5	5	0,61	3,76	75,33
	YCM45-H4	45	35	400	12,95	19,81	4,5	6	0,61	3,76	58,31
	YCM45-H5	45	35	400	15,37	23,11	4,5	7	0,61	3,76	51,68
	YCM45-H6	45	35	400	17,27	26,42	4,5	8	0,61	3,76	43,72
	YCM45-H7	45	35	400	19,68	29,72	4,5	9	0,61	3,76	39,88
	YCM45-H8	45	35	400	24,26	36,32	4,5	11	0,61	3,76	33,17
	YCM45-H9	45	35	400	28,45	42,93	4,5	13	0,61	3,76	27,62
	YCM50-L1	50	40	110	4,83	10,29	3,5	3	0,53	3,63	20,15
	YCM50-L2	50	40	110	6,10	13,72	3,5	4	0,53	3,63	14,44
	YCM50-L3	50	40	110	7,87	17,15	3,5	5	0,53	3,63	11,85
	YCM50-L4	50	40	110	9,40	20,57	3,5	6	0,53	3,63	9,85
	YCM50-L5	50	40	110	11,30	24,00	3,5	7	0,53	3,63	8,66
	YCM50-L6	50	40	110	12,70	27,43	3,5	8	0,53	3,63	7,47
	YCM50-L7	50	40	110	14,99	30,86	3,5	9	0,53	3,63	6,93
	YCM50-L8	50	40	110	18,16	37,72	3,5	11	0,53	3,63	5,62
	YCM50-L9	50	40	110	21,34	44,58	3,5	13	0,53	3,63	4,73
	YCM50-L10	50	40	110	24,64	51,44	3,5	15	0,53	3,63	4,10
	YCM50-M1	50	40	225	4,62	10,29	4,5	3	0,46	3,63	39,68
	YCM50-M2	50	40	225	6,35	13,72	4,5	4	0,46	3,63	30,53
	YCM50-M3	50	40	225	7,49	17,15	4,5	5	0,46	3,63	23,29
	YCM50-M4	50	40	225	8,89	20,57	4,5	6	0,46	3,63	19,26
	YCM50-M5	50	40	225	10,54	24,00	4,5	7	0,46	3,63	16,72
	YCM50-M6	50	40	225	11,89	27,43	4,5	8	0,46	3,63	14,48
	YCM50-M7	50	40	225	13,59	30,86	4,5	9	0,46	3,63	13,03
	YCM50-M8	50	40	225	16,71	37,72	4,5	11	0,46	3,63	10,71
	YCM50-M9	50	40	225	19,61	44,58	4,5	13	0,46	3,63	9,01
	YCM50-M10	50	40	225	22,48	51,44	4,5	15	0,46	3,63	7,77
	YCM50-H1	50	40	400	5,92	10,29	4,5	3	0,61	3,76	91,53
	YCM50-H2	50	40	400	7,80	13,72	4,5	4	0,61	3,76	67,57
	YCM50-H3	50	40	400	10,16	17,15	4,5	5	0,61	3,76	57,22
	YCM50-H4	50	40	400	11,79	20,57	4,5	6	0,61	3,76	45,56
	YCM50-H5	50	40	400	14,15	24,00	4,5	7	0,61	3,76	40,61
	YCM50-H6	50	40	400	15,62	27,43	4,5	8	0,61	3,76	33,87

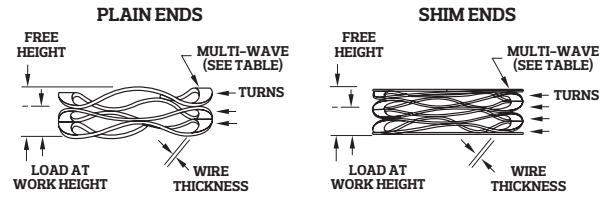
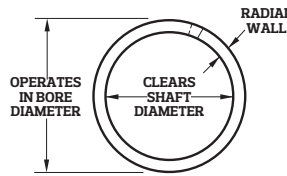
¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Metric)

YCM/YCMS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Metric (mm)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YCM50-H7	50	40	400	17,91	30,86	4,5	9	0,61	3,76	30,89
	YCM50-H8	50	40	400	21,54	37,72	4,5	11	0,61	3,76	24,72
	YCM50-H9	50	40	400	25,65	44,58	4,5	13	0,61	3,76	21,13
	YCM50-H10	50	40	400	29,21	51,44	4,5	15	0,61	3,76	17,99
	YCM55-L1	55	45	125	5,59	11,05	3,5	3	0,61	3,76	22,89
	YCM55-L2	55	45	125	7,72	14,73	3,5	4	0,61	3,76	17,83
	YCM55-L3	55	45	125	9,68	18,41	3,5	5	0,61	3,76	14,30
	YCM55-L4	55	45	125	11,48	22,10	3,5	6	0,61	3,76	11,77
	YCM55-L5	55	45	125	13,92	25,78	3,5	7	0,61	3,76	10,54
	YCM55-L6	55	45	125	15,52	29,46	3,5	8	0,61	3,76	8,97
	YCM55-L7	55	45	125	18,41	33,15	3,5	9	0,61	3,76	8,49
	YCM55-L8	55	45	125	21,67	40,51	3,5	11	0,61	3,76	6,63
	YCM55-L9	55	45	125	25,65	47,88	3,5	13	0,61	3,76	5,62
	YCM55-L10	55	45	125	29,77	55,25	3,5	15	0,61	3,76	4,91
	YCM55-M1	55	45	250	3,10	11,05	4,5	3	0,46	3,63	31,45
	YCM55-M2	55	45	250	4,11	14,73	4,5	4	0,46	3,63	23,54
	YCM55-M3	55	45	250	5,16	18,41	4,5	5	0,46	3,63	18,85
	YCM55-M4	55	45	250	6,20	22,10	4,5	6	0,46	3,63	15,72
	YCM55-M5	55	45	250	7,21	25,78	4,5	7	0,46	3,63	13,46
	YCM55-M6	55	45	250	8,26	29,46	4,5	8	0,46	3,63	11,79
	YCM55-M7	55	45	250	9,27	33,15	4,5	9	0,46	3,63	10,47
	YCM55-M8	55	45	250	11,33	40,51	4,5	11	0,46	3,63	8,57
	YCM55-M9	55	45	250	13,41	47,88	4,5	13	0,46	3,63	7,25
	YCM55-M10	55	45	250	15,47	55,25	4,5	15	0,46	3,63	6,28
	YCM55-H1	55	45	400	5,31	11,05	4,5	3	0,61	3,76	69,69
	YCM55-H2	55	45	400	7,24	14,73	4,5	4	0,61	3,76	53,40
	YCM55-H3	55	45	400	9,09	18,41	4,5	5	0,61	3,76	42,87
	YCM55-H4	55	45	400	10,64	22,10	4,5	6	0,61	3,76	34,90
	YCM55-H5	55	45	400	12,24	25,78	4,5	7	0,61	3,76	29,54
	YCM55-H6	55	45	400	14,10	29,46	4,5	8	0,61	3,76	26,04
	YCM55-H7	55	45	400	15,82	33,15	4,5	9	0,61	3,76	23,08
	YCM55-H8	55	45	400	19,30	40,51	4,5	11	0,61	3,76	18,86
	YCM55-H9	55	45	400	23,11	47,88	4,5	13	0,61	3,76	16,15
	YCM55-H10	55	45	400	26,54	55,25	4,5	15	0,61	3,76	13,93
	YCM60-L1	60	50	135	5,59	11,43	4,5	3	0,46	3,63	23,12
	YCM60-L2	60	50	135	7,47	15,24	4,5	4	0,46	3,63	17,37
	YCM60-L3	60	50	135	9,32	19,05	4,5	5	0,46	3,63	13,87
	YCM60-L4	60	50	135	11,20	22,86	4,5	6	0,46	3,63	11,58
	YCM60-L5	60	50	135	13,06	26,67	4,5	7	0,46	3,63	9,92
	YCM60-L6	60	50	135	14,94	30,48	4,5	8	0,46	3,63	8,69
	YCM60-L7	60	50	135	16,79	34,29	4,5	9	0,46	3,63	7,71
	YCM60-L8	60	50	135	20,52	41,91	4,5	11	0,46	3,63	6,31
	YCM60-L9	60	50	135	24,26	49,53	4,5	13	0,46	3,63	5,34
	YCM60-L10	60	50	135	27,99	57,15	4,5	15	0,46	3,63	4,63
	YCM60-M1	60	50	275	6,65	11,43	4,5	3	0,61	3,76	57,53
	YCM60-M2	60	50	275	8,86	15,24	4,5	4	0,61	3,76	43,10
	YCM60-M3	60	50	275	11,07	19,05	4,5	5	0,61	3,76	34,46
	YCM60-M4	60	50	275	13,28	22,86	4,5	6	0,61	3,76	28,71
	YCM60-M5	60	50	275	15,49	26,67	4,5	7	0,61	3,76	24,60
	YCM60-M6	60	50	275	17,70	30,48	4,5	8	0,61	3,76	21,52
	YCM60-M7	60	50	275	19,94	34,29	4,5	9	0,61	3,76	19,16
	YCM60-M8	60	50	275	24,36	41,91	4,5	11	0,61	3,76	15,67
	YCM60-M9	60	50	275	28,78	49,53	4,5	13	0,61	3,76	13,25
	YCM60-M10	60	50	275	33,22	57,15	4,5	15	0,61	3,76	11,49
	YCM60-H1	60	50	450	7,75	11,43	4,5	3	0,76	4,01	122,28
	YCM60-H2	60	50	450	10,31	15,24	4,5	4	0,76	4,01	91,28
	YCM60-H3	60	50	450	12,90	19,05	4,5	5	0,76	4,01	73,17
	YCM60-H4	60	50	450	15,47	22,86	4,5	6	0,76	4,01	60,89
	YCM60-H5	60	50	450	18,06	26,67	4,5	7	0,76	4,01	52,26
	YCM60-H6	60	50	450	20,62	30,48	4,5	8	0,76	4,01	45,64
	YCM60-H7	60	50	450	23,22	34,29	4,5	9	0,76	4,01	40,65
	YCM60-H8	60	50	450	28,37	41,91	4,5	11	0,76	4,01	33,23
	YCM60-H9	60	50	450	33,53	49,53	4,5	13	0,76	4,01	28,13
	YCM60-H10	60	50	450	38,68	57,15	4,5	15	0,76	4,01	24,36

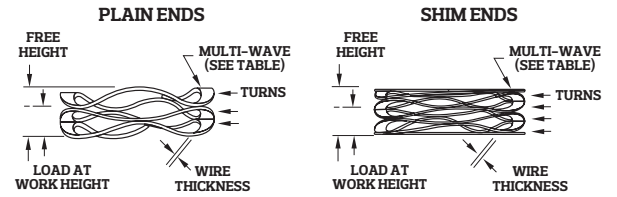
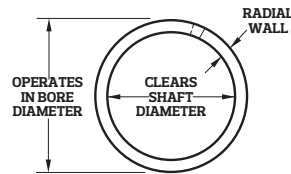
¹ Use "YCM" prefix for plain ends. Use "YCMS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in N/mm.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



* Not available with shim ends

Imperial (in.)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YC025-L1*	0,250	0,150	2	0,033	0,075	2,5	3	0,006	0,024	48
	YC025-L2*	0,250	0,150	2	0,050	0,100	2,5	4	0,006	0,024	40
	YC025-L3*	0,250	0,150	2	0,060	0,125	2,5	5	0,006	0,024	31
	YC025-L4*	0,250	0,150	2	0,075	0,150	2,5	6	0,006	0,024	27
	YC025-L5*	0,250	0,150	2	0,085	0,175	2,5	7	0,006	0,024	22
	YC025-L6*	0,250	0,150	2	0,095	0,200	2,5	8	0,006	0,024	19
	YC025-L7*	0,250	0,150	2	0,120	0,225	2,5	9	0,006	0,024	19
	YC025-L8*	0,250	0,150	2	0,140	0,275	2,5	11	0,006	0,024	15
	YC025-L9*	0,250	0,150	2	0,170	0,325	2,5	13	0,006	0,024	13
	YC025-M1*	0,250	0,150	5	0,037	0,075	2,5	3	0,008	0,024	132
	YC025-M2*	0,250	0,150	5	0,048	0,100	2,5	4	0,008	0,024	96
	YC025-M3*	0,250	0,150	5	0,065	0,125	2,5	5	0,008	0,024	83
	YC025-M4*	0,250	0,150	5	0,075	0,150	2,5	6	0,008	0,024	67
	YC025-M5*	0,250	0,150	5	0,090	0,175	2,5	7	0,008	0,024	59
	YC025-M6*	0,250	0,150	5	0,100	0,200	2,5	8	0,008	0,024	50
	YC025-M7*	0,250	0,150	5	0,120	0,225	2,5	9	0,008	0,024	48
	YC025-M8*	0,250	0,150	5	0,148	0,275	2,5	11	0,008	0,024	39
	YC025-M9*	0,250	0,150	5	0,175	0,325	2,5	13	0,008	0,024	33
	YC031-L1	0,312	0,200	3	0,070	0,114	2,5	3	0,008	0,032	68
	YC031-L2	0,312	0,200	3	0,096	0,152	2,5	4	0,008	0,032	54
	YC031-L3	0,312	0,200	3	0,118	0,190	2,5	5	0,008	0,032	42
	YC031-L4	0,312	0,200	3	0,145	0,228	2,5	6	0,008	0,032	36
	YC031-L5	0,312	0,200	3	0,165	0,266	2,5	7	0,008	0,032	30
	YC031-L6	0,312	0,200	3	0,195	0,304	2,5	8	0,008	0,032	28
	YC031-L7	0,312	0,200	3	0,215	0,342	2,5	9	0,008	0,032	24
	YC031-L8	0,312	0,200	3	0,262	0,418	2,5	11	0,008	0,032	19
	YC031-L9	0,312	0,200	3	0,309	0,494	2,5	13	0,008	0,032	16
	YC031-M1	0,312	0,200	6	0,072	0,114	2,5	3	0,010	0,032	143
	YC031-M2	0,312	0,200	6	0,096	0,152	2,5	4	0,010	0,032	107
	YC031-M3	0,312	0,200	6	0,123	0,190	2,5	5	0,010	0,032	90
	YC031-M4	0,312	0,200	6	0,144	0,228	2,5	6	0,010	0,032	71
	YC031-M5	0,312	0,200	6	0,176	0,266	2,5	7	0,010	0,032	67
	YC031-M6	0,312	0,200	6	0,197	0,304	2,5	8	0,010	0,032	56
	YC031-M7	0,312	0,200	6	0,227	0,342	2,5	9	0,010	0,032	52
	YC031-M8	0,312	0,200	6	0,278	0,418	2,5	11	0,010	0,032	43
	YC031-M9	0,312	0,200	6	0,336	0,494	2,5	13	0,010	0,032	38
	YC037-L1	0,375	0,250	4	0,062	0,150	2,5	3	0,008	0,032	45
	YC037-L2	0,375	0,250	4	0,098	0,200	2,5	4	0,008	0,032	39
	YC037-L3	0,375	0,250	4	0,108	0,250	2,5	5	0,008	0,032	28
	YC037-L4	0,375	0,250	4	0,135	0,300	2,5	6	0,008	0,032	24
	YC037-L5	0,375	0,250	4	0,150	0,350	2,5	7	0,008	0,032	20
	YC037-L6	0,375	0,250	4	0,184	0,400	2,5	8	0,008	0,032	19
	YC037-L7	0,375	0,250	4	0,195	0,450	2,5	9	0,008	0,032	16
	YC037-L8	0,375	0,250	4	0,228	0,500	2,5	10	0,008	0,032	15
	YC037-L9	0,375	0,250	4	0,240	0,550	2,5	11	0,008	0,032	13
	YC037-M1	0,375	0,250	7	0,081	0,150	2,5	3	0,011	0,032	101
	YC037-M2	0,375	0,250	7	0,119	0,200	2,5	4	0,011	0,032	86
	YC037-M3	0,375	0,250	7	0,145	0,250	2,5	5	0,011	0,032	67
	YC037-M4	0,375	0,250	7	0,180	0,300	2,5	6	0,011	0,032	58
	YC037-M5	0,375	0,250	7	0,202	0,350	2,5	7	0,011	0,032	47
	YC037-M6	0,375	0,250	7	0,240	0,400	2,5	8	0,011	0,032	44
	YC037-M7	0,375	0,250	7	0,262	0,450	2,5	9	0,011	0,032	37
	YC037-M8	0,375	0,250	7	0,298	0,500	2,5	10	0,011	0,032	35
	YC037-M9	0,375	0,250	7	0,327	0,550	2,5	11	0,011	0,032	31

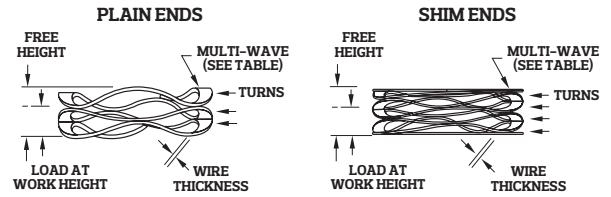
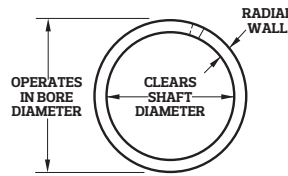
¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Imperial (in.)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YC043-L1	0,437	0,281	4	0,063	0,165	2,5	3	0,008	0,040	39
	YC043-L2	0,437	0,281	4	0,093	0,220	2,5	4	0,008	0,040	31
	YC043-L3	0,437	0,281	4	0,109	0,275	2,5	5	0,008	0,040	24
	YC043-L4	0,437	0,281	4	0,143	0,330	2,5	6	0,008	0,040	21
	YC043-L5	0,437	0,281	4	0,160	0,385	2,5	7	0,008	0,040	18
	YC043-L6	0,437	0,281	4	0,195	0,440	2,5	8	0,008	0,040	16
	YC043-L7	0,437	0,281	4	0,210	0,495	2,5	9	0,008	0,040	14
	YC043-L8	0,437	0,281	4	0,240	0,550	2,5	10	0,008	0,040	13
	YC043-L9	0,437	0,281	4	0,260	0,605	2,5	11	0,008	0,040	12
	YC043-M1	0,437	0,281	8	0,082	0,165	2,5	3	0,011	0,046	96
	YC043-M2	0,437	0,281	8	0,115	0,220	2,5	4	0,011	0,046	76
	YC043-M3	0,437	0,281	8	0,142	0,275	2,5	5	0,011	0,046	60
	YC043-M4	0,437	0,281	8	0,179	0,330	2,5	6	0,011	0,046	53
	YC043-M5	0,437	0,281	8	0,198	0,385	2,5	7	0,011	0,046	43
	YC043-M6	0,437	0,281	8	0,231	0,440	2,5	8	0,011	0,046	38
	YC043-M7	0,437	0,281	8	0,255	0,495	2,5	9	0,011	0,046	33
	YC043-M8	0,437	0,281	8	0,290	0,550	2,5	10	0,011	0,046	31
	YC043-M9	0,437	0,281	8	0,319	0,605	2,5	11	0,011	0,046	28
	YC050-L1	0,500	0,312	5	0,062	0,180	2,5	3	0,008	0,056	42
	YC050-L2	0,500	0,312	5	0,090	0,240	2,5	4	0,008	0,056	33
	YC050-L3	0,500	0,312	5	0,107	0,300	2,5	5	0,008	0,056	26
	YC050-L4	0,500	0,312	5	0,136	0,360	2,5	6	0,008	0,056	22
	YC050-L5	0,500	0,312	5	0,150	0,420	2,5	7	0,008	0,056	19
	YC050-L6	0,500	0,312	5	0,180	0,480	2,5	8	0,008	0,056	17
	YC050-L7	0,500	0,312	5	0,195	0,540	2,5	9	0,008	0,056	14
	YC050-L8	0,500	0,312	5	0,220	0,600	2,5	10	0,008	0,056	13
	YC050-L9	0,500	0,312	5	0,240	0,660	2,5	11	0,008	0,056	12
	YC050-M1	0,500	0,312	10	0,065	0,180	2,5	3	0,010	0,058	87
	YC050-M2	0,500	0,312	10	0,092	0,240	2,5	4	0,010	0,058	68
	YC050-M3	0,500	0,312	10	0,114	0,300	2,5	5	0,010	0,058	54
	YC050-M4	0,500	0,312	10	0,147	0,360	2,5	6	0,010	0,058	47
	YC050-M5	0,500	0,312	10	0,162	0,420	2,5	7	0,010	0,058	39
	YC050-M6	0,500	0,312	10	0,196	0,480	2,5	8	0,010	0,058	35
	YC050-M7	0,500	0,312	10	0,207	0,540	2,5	9	0,010	0,058	30
	YC050-M8	0,500	0,312	10	0,246	0,600	2,5	10	0,010	0,058	28
	YC050-M9	0,500	0,312	10	0,264	0,660	2,5	11	0,010	0,058	25
	YC050-H1	0,500	0,312	15	0,075	0,180	2,5	3	0,012	0,060	143
	YC050-H2	0,500	0,312	15	0,110	0,240	2,5	4	0,012	0,060	115
	YC050-H3	0,500	0,312	15	0,136	0,300	2,5	5	0,012	0,060	91
	YC050-H4	0,500	0,312	15	0,167	0,360	2,5	6	0,012	0,060	78
	YC050-H5	0,500	0,312	15	0,182	0,420	2,5	7	0,012	0,060	63
	YC050-H6	0,500	0,312	15	0,216	0,480	2,5	8	0,012	0,060	57
	YC050-H7	0,500	0,312	15	0,240	0,540	2,5	9	0,012	0,060	50
	YC050-H8	0,500	0,312	15	0,280	0,600	2,5	10	0,012	0,060	47
	YC050-H9	0,500	0,312	15	0,312	0,660	2,5	11	0,012	0,060	43
	YC056-L1	0,562	0,375	5	0,080	0,195	2,5	3	0,009	0,058	43
	YC056-L2	0,562	0,375	5	0,125	0,260	2,5	4	0,009	0,058	37
	YC056-L3	0,562	0,375	5	0,135	0,325	2,5	5	0,009	0,058	26
	YC056-L4	0,562	0,375	5	0,180	0,390	2,5	6	0,009	0,058	24
	YC056-L5	0,562	0,375	5	0,190	0,455	2,5	7	0,009	0,058	19
	YC056-L6	0,562	0,375	5	0,230	0,520	2,5	8	0,009	0,058	17
	YC056-L7	0,562	0,375	5	0,260	0,585	2,5	9	0,009	0,058	15
	YC056-L8	0,562	0,375	5	0,285	0,650	2,5	10	0,009	0,058	14
	YC056-L9	0,562	0,375	5	0,315	0,715	2,5	11	0,009	0,058	13

¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
Imperial (in.)	YC056-M1	0,562	0,375	11	0,086	0,195	2,5	3	0,012	0,060	101
	YC056-M2	0,562	0,375	11	0,123	0,260	2,5	4	0,012	0,060	80
	YC056-M3	0,562	0,375	11	0,145	0,325	2,5	5	0,012	0,060	61
	YC056-M4	0,562	0,375	11	0,187	0,390	2,5	6	0,012	0,060	54
	YC056-M5	0,562	0,375	11	0,209	0,455	2,5	7	0,012	0,060	45
	YC056-M6	0,562	0,375	11	0,253	0,520	2,5	8	0,012	0,060	41
	YC056-M7	0,562	0,375	11	0,273	0,585	2,5	9	0,012	0,060	35
	YC056-M8	0,562	0,375	11	0,318	0,650	2,5	10	0,012	0,060	33
	YC056-M9	0,562	0,375	11	0,343	0,715	2,5	11	0,012	0,060	30
	YC056-H1	0,562	0,375	18	0,093	0,195	2,5	3	0,015	0,060	176
	YC056-H2	0,562	0,375	18	0,136	0,260	2,5	4	0,015	0,060	145
	YC056-H3	0,562	0,375	18	0,165	0,325	2,5	5	0,015	0,060	113
	YC056-H4	0,562	0,375	18	0,212	0,390	2,5	6	0,015	0,060	101
	YC056-H5	0,562	0,375	18	0,245	0,455	2,5	7	0,015	0,060	86
	YC056-H6	0,562	0,375	18	0,282	0,520	2,5	8	0,015	0,060	76
	YC056-H7	0,562	0,375	18	0,323	0,585	2,5	9	0,015	0,060	69
	YC056-H8	0,562	0,375	18	0,360	0,650	2,5	10	0,015	0,060	62
	YC056-H9	0,562	0,375	18	0,408	0,715	2,5	11	0,015	0,060	59
	YC062-L1	0,625	0,450	6	0,055	0,180	2,5	3	0,010	0,058	48
	YC062-L2	0,625	0,450	6	0,068	0,240	2,5	4	0,010	0,058	35
	YC062-L3	0,625	0,450	6	0,085	0,300	2,5	5	0,010	0,058	28
	YC062-L4	0,625	0,450	6	0,106	0,360	2,5	6	0,010	0,058	24
	YC062-L5	0,625	0,450	6	0,128	0,420	2,5	7	0,010	0,058	21
	YC062-L6	0,625	0,450	6	0,165	0,540	2,5	9	0,010	0,058	16
	YC062-L7	0,625	0,450	6	0,202	0,660	2,5	11	0,010	0,058	13
	YC062-L8	0,625	0,450	6	0,238	0,780	2,5	13	0,010	0,058	11
	YC062-M1	0,625	0,450	12	0,104	0,180	3,5	3	0,010	0,058	158
	YC062-M2	0,625	0,450	12	0,130	0,240	3,5	4	0,010	0,058	109
	YC062-M3	0,625	0,450	12	0,175	0,300	3,5	5	0,010	0,058	96
	YC062-M4	0,625	0,450	12	0,206	0,360	3,5	6	0,010	0,058	78
	YC062-M5	0,625	0,450	12	0,246	0,420	3,5	7	0,010	0,058	69
	YC062-M6	0,625	0,450	12	0,317	0,540	3,5	9	0,010	0,058	54
	YC062-M7	0,625	0,450	12	0,386	0,660	3,5	11	0,010	0,058	44
	YC062-M8	0,625	0,450	12	0,454	0,780	3,5	13	0,010	0,058	37
	YC062-H1	0,625	0,450	20	0,102	0,180	3,5	3	0,012	0,060	256
	YC062-H2	0,625	0,450	20	0,135	0,240	3,5	4	0,012	0,060	190
	YC062-H3	0,625	0,450	20	0,175	0,300	3,5	5	0,012	0,060	160
	YC062-H4	0,625	0,450	20	0,205	0,360	3,5	6	0,012	0,060	129
	YC062-H5	0,625	0,450	20	0,245	0,420	3,5	7	0,012	0,060	114
	YC062-H6	0,625	0,450	20	0,315	0,540	3,5	9	0,012	0,060	89
	YC062-H7	0,625	0,450	20	0,390	0,660	3,5	11	0,012	0,060	74
	YC062-H8	0,625	0,450	20	0,465	0,780	3,5	13	0,012	0,060	63
	YC075-L1	0,750	0,550	7	0,142	0,250	3,5	3	0,008	0,071	65
	YC075-L2	0,750	0,550	7	0,187	0,333	3,5	4	0,008	0,071	48
	YC075-L3	0,750	0,550	7	0,246	0,417	3,5	5	0,008	0,071	41
	YC075-L4	0,750	0,550	7	0,285	0,500	3,5	6	0,008	0,071	33
	YC075-L5	0,750	0,550	7	0,348	0,583	3,5	7	0,008	0,071	30
	YC075-L6	0,750	0,550	7	0,446	0,750	3,5	9	0,008	0,071	23
	YC075-L7	0,750	0,550	7	0,580	1,000	3,5	12	0,008	0,071	17
	YC075-M1	0,750	0,550	13	0,159	0,250	3,5	3	0,010	0,078	143
	YC075-M2	0,750	0,550	13	0,203	0,333	3,5	4	0,010	0,078	100
	YC075-M3	0,750	0,550	13	0,270	0,417	3,5	5	0,010	0,078	88
	YC075-M4	0,750	0,550	13	0,314	0,500	3,5	6	0,010	0,078	70
	YC075-M5	0,750	0,550	13	0,381	0,583	3,5	7	0,010	0,078	64
	YC075-M6	0,750	0,550	13	0,489	0,750	3,5	9	0,010	0,078	50
	YC075-M7	0,750	0,550	13	0,649	1,000	3,5	12	0,010	0,078	37
	YC075-H1	0,750	0,550	22	0,169	0,250	3,5	3	0,013	0,079	272
	YC075-H2	0,750	0,550	22	0,215	0,333	3,5	4	0,013	0,079	186
	YC075-H3	0,750	0,550	22	0,291	0,417	3,5	5	0,013	0,079	175
	YC075-H4	0,750	0,550	22	0,335	0,500	3,5	6	0,013	0,079	133
	YC075-H5	0,750	0,550	22	0,405	0,583	3,5	7	0,013	0,079	124
	YC075-H6	0,750	0,550	22	0,526	0,750	3,5	9	0,013	0,079	98
	YC075-H7	0,750	0,550	22	0,699	1,000	3,5	12	0,013	0,079	73

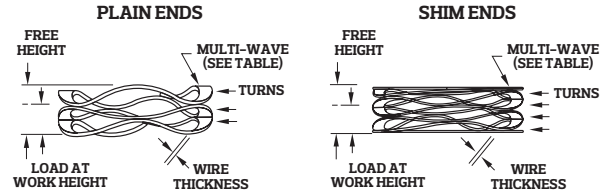
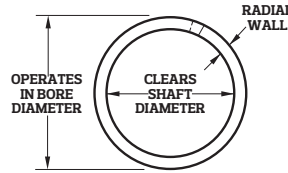
¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Imperial (in.)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YC087-L1	0,875	0,600	12	0,117	0,250	3,5	3	0,010	0,086	90
	YC087-L2	0,875	0,600	12	0,158	0,333	3,5	4	0,010	0,086	69
	YC087-L3	0,875	0,600	12	0,207	0,417	3,5	5	0,010	0,086	57
	YC087-L4	0,875	0,600	12	0,242	0,500	3,5	6	0,010	0,086	47
	YC087-L5	0,875	0,600	12	0,287	0,583	3,5	7	0,010	0,086	41
	YC087-L6	0,875	0,600	12	0,378	0,750	3,5	9	0,010	0,086	32
	YC087-L7	0,875	0,600	12	0,498	1,000	3,5	12	0,010	0,086	24
	YC087-M1	0,875	0,600	18	0,124	0,250	3,5	3	0,012	0,094	148
	YC087-M2	0,875	0,600	18	0,164	0,333	3,5	4	0,012	0,094	108
	YC087-M3	0,875	0,600	18	0,214	0,417	3,5	5	0,012	0,094	89
	YC087-M4	0,875	0,600	18	0,252	0,500	3,5	6	0,012	0,094	76
	YC087-M5	0,875	0,600	18	0,296	0,583	3,5	7	0,012	0,094	66
	YC087-M6	0,875	0,600	18	0,385	0,750	3,5	9	0,012	0,094	50
	YC087-M7	0,875	0,600	18	0,509	1,000	3,5	12	0,012	0,094	38
	YC087-H1	0,875	0,600	25	0,166	0,250	3,5	3	0,015	0,094	298
	YC087-H2	0,875	0,600	25	0,214	0,333	3,5	4	0,015	0,094	210
	YC087-H3	0,875	0,600	25	0,278	0,417	3,5	5	0,015	0,094	180
	YC087-H4	0,875	0,600	25	0,327	0,500	3,5	6	0,015	0,094	145
	YC087-H5	0,875	0,600	25	0,395	0,583	3,5	7	0,015	0,094	133
	YC087-H6	0,875	0,600	25	0,510	0,750	3,5	9	0,015	0,094	104
	YC087-H7	0,875	0,600	25	0,670	1,000	3,5	12	0,015	0,094	78
	YC100-L1	1,000	0,730	12	0,084	0,250	3,5	3	0,010	0,086	72
	YC100-L2	1,000	0,730	12	0,108	0,333	3,5	4	0,010	0,086	53
	YC100-L3	1,000	0,730	12	0,145	0,417	3,5	5	0,010	0,086	44
	YC100-L4	1,000	0,730	12	0,165	0,500	3,5	6	0,010	0,086	36
	YC100-L5	1,000	0,730	12	0,201	0,583	3,5	7	0,010	0,086	31
	YC100-L6	1,000	0,730	12	0,258	0,750	3,5	9	0,010	0,086	24
	YC100-L7	1,000	0,730	12	0,342	1,000	3,5	12	0,010	0,086	18
	YC100-L8	1,000	0,730	12	0,445	1,250	3,5	15	0,010	0,086	15
	YC100-L9	1,000	0,730	12	0,519	1,500	3,5	18	0,010	0,086	12
	YC100-L10	1,000	0,730	12	0,633	1,750	3,5	21	0,010	0,086	11
	YC100-L11	1,000	0,730	12	0,710	2,000	3,5	24	0,010	0,086	9
	YC100-M1	1,000	0,730	18	0,087	0,250	3,5	3	0,012	0,094	110
	YC100-M2	1,000	0,730	18	0,113	0,333	3,5	4	0,012	0,094	82
	YC100-M3	1,000	0,730	18	0,148	0,417	3,5	5	0,012	0,094	67
	YC100-M4	1,000	0,730	18	0,175	0,500	3,5	6	0,012	0,094	55
	YC100-M5	1,000	0,730	18	0,212	0,583	3,5	7	0,012	0,094	49
	YC100-M6	1,000	0,730	18	0,276	0,750	3,5	9	0,012	0,094	38
	YC100-M7	1,000	0,730	18	0,360	1,000	3,5	12	0,012	0,094	28
	YC100-M8	1,000	0,730	18	0,452	1,250	3,5	15	0,012	0,094	23
	YC100-M9	1,000	0,730	18	0,549	1,500	3,5	18	0,012	0,094	19
	YC100-M10	1,000	0,730	18	0,650	1,750	3,5	21	0,012	0,094	16
	YC100-M11	1,000	0,730	18	0,720	2,000	3,5	24	0,012	0,094	14
	YC100-H1	1,000	0,730	25	0,131	0,250	3,5	3	0,015	0,094	210
	YC100-H2	1,000	0,730	25	0,174	0,333	3,5	4	0,015	0,094	157
	YC100-H3	1,000	0,730	25	0,227	0,417	3,5	5	0,015	0,094	132
	YC100-H4	1,000	0,730	25	0,266	0,500	3,5	6	0,015	0,094	107
	YC100-H5	1,000	0,730	25	0,319	0,583	3,5	7	0,015	0,094	95
	YC100-H6	1,000	0,730	25	0,406	0,750	3,5	9	0,015	0,094	73
	YC100-H7	1,000	0,730	25	0,541	1,000	3,5	12	0,015	0,094	54
	YC100-H8	1,000	0,730	25	0,688	1,250	3,5	15	0,015	0,094	45
	YC100-H9	1,000	0,730	25	0,813	1,500	3,5	18	0,015	0,094	36
	YC100-H10	1,000	0,730	25	0,957	1,750	3,5	21	0,015	0,094	32
	YC100-H11	1,000	0,730	25	1,083	2,000	3,5	24	0,015	0,094	27

¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
Imperial (in.)	YC112-L1	1,125	0,850	12	0,146	0,300	3,5	3	0,012	0,094	78
	YC112-L2	1,125	0,850	12	0,186	0,400	3,5	4	0,012	0,094	56
	YC112-L3	1,125	0,850	12	0,250	0,500	3,5	5	0,012	0,094	48
	YC112-L4	1,125	0,850	12	0,295	0,600	3,5	6	0,012	0,094	39
	YC112-L5	1,125	0,850	12	0,344	0,700	3,5	7	0,012	0,094	34
	YC112-L6	1,125	0,850	12	0,392	0,800	3,5	8	0,012	0,094	29
	YC112-L7	1,125	0,850	12	0,488	1,000	3,5	10	0,012	0,094	23
	YC112-L8	1,125	0,850	12	0,659	1,300	3,5	13	0,012	0,094	19
	YC112-L9	1,125	0,850	12	0,807	1,600	3,5	16	0,012	0,094	15
	YC112-L10	1,125	0,850	12	1,017	2,000	3,5	20	0,012	0,094	12
	YC112-M1	1,125	0,850	20	0,160	0,300	3,5	3	0,015	0,094	143
	YC112-M2	1,125	0,850	20	0,202	0,400	3,5	4	0,015	0,094	101
	YC112-M3	1,125	0,850	20	0,270	0,500	3,5	5	0,015	0,094	87
	YC112-M4	1,125	0,850	20	0,318	0,600	3,5	6	0,015	0,094	71
	YC112-M5	1,125	0,850	20	0,381	0,700	3,5	7	0,015	0,094	63
	YC112-M6	1,125	0,850	20	0,427	0,800	3,5	8	0,015	0,094	54
	YC112-M7	1,125	0,850	20	0,536	1,000	3,5	10	0,015	0,094	43
	YC112-M8	1,125	0,850	20	0,708	1,300	3,5	13	0,015	0,094	34
	YC112-M9	1,125	0,850	20	0,861	1,600	3,5	16	0,015	0,094	27
	YC112-M10	1,125	0,850	20	1,088	2,000	3,5	20	0,015	0,094	22
	YC112-H1	1,125	0,850	30	0,178	0,300	3,5	3	0,018	0,094	246
	YC112-H2	1,125	0,850	30	0,229	0,400	3,5	4	0,018	0,094	175
	YC112-H3	1,125	0,850	30	0,303	0,500	3,5	5	0,018	0,094	152
	YC112-H4	1,125	0,850	30	0,350	0,600	3,5	6	0,018	0,094	120
	YC112-H5	1,125	0,850	30	0,421	0,700	3,5	7	0,018	0,094	108
	YC112-H6	1,125	0,850	30	0,470	0,800	3,5	8	0,018	0,094	91
	YC112-H7	1,125	0,850	30	0,593	1,000	3,5	10	0,018	0,094	74
	YC112-H8	1,125	0,850	30	0,787	1,300	3,5	13	0,018	0,094	58
	YC112-H9	1,125	0,850	30	0,956	1,600	3,5	16	0,018	0,094	47
	YC112-H10	1,125	0,850	30	1,202	2,000	3,5	20	0,018	0,094	38
	YC125-L1	1,250	1,000	12	0,084	0,300	3,5	3	0,012	0,094	56
	YC125-L2	1,250	1,000	12	0,113	0,400	3,5	4	0,012	0,094	42
	YC125-L3	1,250	1,000	12	0,149	0,500	3,5	5	0,012	0,094	34
	YC125-L4	1,250	1,000	12	0,172	0,600	3,5	6	0,012	0,094	28
	YC125-L5	1,250	1,000	12	0,207	0,700	3,5	7	0,012	0,094	24
	YC125-L6	1,250	1,000	12	0,227	0,800	3,5	8	0,012	0,094	21
	YC125-L7	1,250	1,000	12	0,301	1,000	3,5	10	0,012	0,094	17
	YC125-L8	1,250	1,000	12	0,395	1,300	3,5	13	0,012	0,094	13
	YC125-L9	1,250	1,000	12	0,467	1,600	3,5	16	0,012	0,094	11
	YC125-L10	1,250	1,000	12	0,591	2,000	3,5	20	0,012	0,094	9
	YC125-M1	1,250	1,000	20	0,124	0,300	3,5	3	0,015	0,094	114
	YC125-M2	1,250	1,000	20	0,165	0,400	3,5	4	0,015	0,094	85
	YC125-M3	1,250	1,000	20	0,215	0,500	3,5	5	0,015	0,094	70
	YC125-M4	1,250	1,000	20	0,253	0,600	3,5	6	0,015	0,094	58
	YC125-M5	1,250	1,000	20	0,303	0,700	3,5	7	0,015	0,094	50
	YC125-M6	1,250	1,000	20	0,341	0,800	3,5	8	0,015	0,094	44
	YC125-M7	1,250	1,000	20	0,427	1,000	3,5	10	0,015	0,094	35
	YC125-M8	1,250	1,000	20	0,577	1,300	3,5	13	0,015	0,094	28
	YC125-M9	1,250	1,000	20	0,692	1,600	3,5	16	0,015	0,094	22
	YC125-M10	1,250	1,000	20	0,866	2,000	3,5	20	0,015	0,094	18
	YC125-H1	1,250	1,000	30	0,158	0,300	3,5	3	0,019	0,094	210
	YC125-H2	1,250	1,000	30	0,210	0,400	3,5	4	0,019	0,094	158
	YC125-H3	1,250	1,000	30	0,272	0,500	3,5	5	0,019	0,094	132
	YC125-H4	1,250	1,000	30	0,320	0,600	3,5	6	0,019	0,094	107
	YC125-H5	1,250	1,000	30	0,384	0,700	3,5	7	0,019	0,094	95
	YC125-H6	1,250	1,000	30	0,433	0,800	3,5	8	0,019	0,094	82
	YC125-H7	1,250	1,000	30	0,538	1,000	3,5	10	0,019	0,094	65
	YC125-H8	1,250	1,000	30	0,717	1,300	3,5	13	0,019	0,094	51
	YC125-H9	1,250	1,000	30	0,878	1,600	3,5	16	0,019	0,094	42
	YC125-H10	1,250	1,000	30	1,103	2,000	3,5	20	0,019	0,094	33

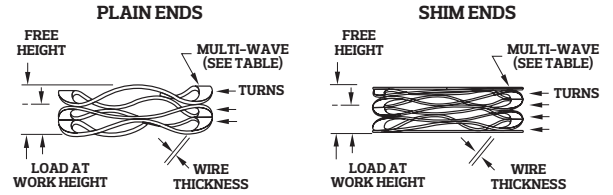
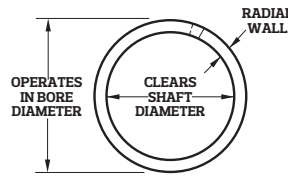
¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



Imperial (in.)	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
	YC137-L1	1,375	1,030	15	0,075	0,300	3,5	3	0,012	0,122	67
	YC137-L2	1,375	1,030	15	0,099	0,400	3,5	4	0,012	0,122	50
	YC137-L3	1,375	1,030	15	0,129	0,500	3,5	5	0,012	0,122	40
	YC137-L4	1,375	1,030	15	0,155	0,600	3,5	6	0,012	0,122	34
	YC137-L5	1,375	1,030	15	0,179	0,700	3,5	7	0,012	0,122	29
	YC137-L6	1,375	1,030	15	0,206	0,800	3,5	8	0,012	0,122	25
	YC137-L7	1,375	1,030	15	0,256	1,000	3,5	10	0,012	0,122	20
	YC137-L8	1,375	1,030	15	0,341	1,300	3,5	13	0,012	0,122	16
	YC137-L9	1,375	1,030	15	0,424	1,600	3,5	16	0,012	0,122	13
	YC137-L10	1,375	1,030	15	0,530	2,000	3,5	20	0,012	0,122	10
	YC137-M1	1,375	1,030	25	0,142	0,300	3,5	3	0,016	0,133	158
	YC137-M2	1,375	1,030	25	0,186	0,400	3,5	4	0,016	0,133	117
	YC137-M3	1,375	1,030	25	0,240	0,500	3,5	5	0,016	0,133	96
	YC137-M4	1,375	1,030	25	0,281	0,600	3,5	6	0,016	0,133	78
	YC137-M5	1,375	1,030	25	0,340	0,700	3,5	7	0,016	0,133	69
	YC137-M6	1,375	1,030	25	0,384	0,800	3,5	8	0,016	0,133	60
	YC137-M7	1,375	1,030	25	0,486	1,000	3,5	10	0,016	0,133	49
	YC137-M8	1,375	1,030	25	0,632	1,300	3,5	13	0,016	0,133	37
	YC137-M9	1,375	1,030	25	0,788	1,600	3,5	16	0,016	0,133	31
	YC137-M10	1,375	1,030	25	0,982	2,000	3,5	20	0,016	0,133	25
	YC137-H1	1,375	1,030	35	0,149	0,300	3,5	3	0,018	0,133	232
	YC137-H2	1,375	1,030	35	0,189	0,400	3,5	4	0,018	0,133	166
	YC137-H3	1,375	1,030	35	0,247	0,500	3,5	5	0,018	0,133	138
	YC137-H4	1,375	1,030	35	0,287	0,600	3,5	6	0,018	0,133	112
	YC137-H5	1,375	1,030	35	0,343	0,700	3,5	7	0,018	0,133	98
	YC137-H6	1,375	1,030	35	0,390	0,800	3,5	8	0,018	0,133	85
	YC137-H7	1,375	1,030	35	0,490	1,000	3,5	10	0,018	0,133	69
	YC137-H8	1,375	1,030	35	0,646	1,300	3,5	13	0,018	0,133	54
	YC137-H9	1,375	1,030	35	0,793	1,600	3,5	16	0,018	0,133	43
	YC137-H10	1,375	1,030	35	1,000	2,000	3,5	20	0,018	0,133	35
	YC150-L1	1,500	1,140	20	0,129	0,300	3,5	3	0,016	0,133	117
	YC150-L2	1,500	1,140	20	0,164	0,400	3,5	4	0,016	0,133	85
	YC150-L3	1,500	1,140	20	0,213	0,500	3,5	5	0,016	0,133	70
	YC150-L4	1,500	1,140	20	0,247	0,600	3,5	6	0,016	0,133	57
	YC150-L5	1,500	1,140	20	0,301	0,700	3,5	7	0,016	0,133	50
	YC150-L6	1,500	1,140	20	0,337	0,800	3,5	8	0,016	0,133	43
	YC150-L7	1,500	1,140	20	0,430	1,000	3,5	10	0,016	0,133	35
	YC150-L8	1,500	1,140	20	0,565	1,300	3,5	13	0,016	0,133	27
	YC150-L9	1,500	1,140	20	0,694	1,600	3,5	16	0,016	0,133	22
	YC150-L10	1,500	1,140	20	0,866	2,000	3,5	20	0,016	0,133	18
	YC150-M1	1,500	1,140	35	0,122	0,300	3,5	3	0,018	0,133	197
	YC150-M2	1,500	1,140	35	0,158	0,400	3,5	4	0,018	0,133	145
	YC150-M3	1,500	1,140	35	0,206	0,500	3,5	5	0,018	0,133	119
	YC150-M4	1,500	1,140	35	0,241	0,600	3,5	6	0,018	0,133	97
	YC150-M5	1,500	1,140	35	0,291	0,700	3,5	7	0,018	0,133	86
	YC150-M6	1,500	1,140	35	0,324	0,800	3,5	8	0,018	0,133	74
	YC150-M7	1,500	1,140	35	0,409	1,000	3,5	10	0,018	0,133	59
	YC150-M8	1,500	1,140	35	0,540	1,300	3,5	13	0,018	0,133	46
	YC150-M9	1,500	1,140	35	0,657	1,600	3,5	16	0,018	0,133	37
	YC150-M10	1,500	1,140	35	0,835	2,000	3,5	20	0,018	0,133	30
	YC150-H1	1,500	1,140	60	0,166	0,300	4,5	3	0,018	0,133	448
	YC150-H2	1,500	1,140	60	0,216	0,400	4,5	4	0,018	0,133	326
	YC150-H3	1,500	1,140	60	0,278	0,500	4,5	5	0,018	0,133	270
	YC150-H4	1,500	1,140	60	0,329	0,600	4,5	6	0,018	0,133	221
	YC150-H5	1,500	1,140	60	0,390	0,700	4,5	7	0,018	0,133	194
	YC150-H6	1,500	1,140	60	0,443	0,800	4,5	8	0,018	0,133	168
	YC150-H7	1,500	1,140	60	0,555	1,000	4,5	10	0,018	0,133	135
	YC150-H8	1,500	1,140	60	0,726	1,300	4,5	13	0,018	0,133	105
	YC150-H9	1,500	1,140	60	0,890	1,600	4,5	16	0,018	0,133	85
	YC150-H10	1,500	1,140	60	1,119	2,000	4,5	20	0,018	0,133	68

¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

Crest-To-Crest® Springs (Imperial)

YC/YCS Series

	Part No. ^{1,2}	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height ³	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate ⁴
Imperial (in.)	YC175-L1	1,750	1,340	25	0,155	0,375	3,5	3	0,018	0,143	114
	YC175-L2	1,750	1,340	25	0,200	0,500	3,5	4	0,018	0,143	83
	YC175-L3	1,750	1,340	25	0,265	0,625	3,5	5	0,018	0,143	69
	YC175-L4	1,750	1,340	25	0,310	0,750	3,5	6	0,018	0,143	57
	YC175-L5	1,750	1,340	25	0,367	0,870	3,5	7	0,018	0,143	50
	YC175-L6	1,750	1,340	25	0,415	1,000	3,5	8	0,018	0,143	43
	YC175-L7	1,750	1,340	25	0,523	1,250	3,5	10	0,018	0,143	34
	YC175-L8	1,750	1,340	25	0,638	1,500	3,5	12	0,018	0,143	29
	YC175-L9	1,750	1,340	25	0,737	1,750	3,5	14	0,018	0,143	25
	YC175-L10	1,750	1,340	25	0,844	2,000	3,5	16	0,018	0,143	22
	YC175-M1	1,750	1,340	50	0,188	0,375	4,5	3	0,018	0,143	267
	YC175-M2	1,750	1,340	50	0,244	0,500	4,5	4	0,018	0,143	195
	YC175-M3	1,750	1,340	50	0,315	0,625	4,5	5	0,018	0,143	161
	YC175-M4	1,750	1,340	50	0,374	0,750	4,5	6	0,018	0,143	133
	YC175-M5	1,750	1,340	50	0,452	0,870	4,5	7	0,018	0,143	120
	YC175-M6	1,750	1,340	50	0,505	1,000	4,5	8	0,018	0,143	101
	YC175-M7	1,750	1,340	50	0,629	1,250	4,5	10	0,018	0,143	81
	YC175-M8	1,750	1,340	50	0,768	1,500	4,5	12	0,018	0,143	68
	YC175-M9	1,750	1,340	50	0,899	1,750	4,5	14	0,018	0,143	59
	YC175-M10	1,750	1,340	50	1,026	2,000	4,5	16	0,018	0,143	51
	YC175-H1	1,750	1,340	90	0,232	0,375	4,5	3	0,024	0,148	629
	YC175-H2	1,750	1,340	90	0,314	0,500	4,5	4	0,024	0,148	484
	YC175-H3	1,750	1,340	90	0,409	0,625	4,5	5	0,024	0,148	417
	YC175-H4	1,750	1,340	90	0,482	0,750	4,5	6	0,024	0,148	336
	YC175-H5	1,750	1,340	90	0,577	0,870	4,5	7	0,024	0,148	307
	YC175-H6	1,750	1,340	90	0,651	1,000	4,5	8	0,024	0,148	258
	YC175-H7	1,750	1,340	90	0,813	1,250	4,5	10	0,024	0,148	206
	YC175-H8	1,750	1,340	90	0,980	1,500	4,5	12	0,024	0,148	173
	YC175-H9	1,750	1,340	90	1,147	1,750	4,5	14	0,024	0,148	149
	YC175-H10	1,750	1,340	90	1,317	2,000	4,5	16	0,024	0,148	132
	YC200-L1	2,000	1,600	25	0,094	0,375	3,5	3	0,018	0,143	89
	YC200-L2	2,000	1,600	25	0,120	0,500	3,5	4	0,018	0,143	66
	YC200-L3	2,000	1,600	25	0,158	0,625	3,5	5	0,018	0,143	54
	YC200-L4	2,000	1,600	25	0,179	0,750	3,5	6	0,018	0,143	44
	YC200-L5	2,000	1,600	25	0,217	0,870	3,5	7	0,018	0,143	38
	YC200-L6	2,000	1,600	25	0,243	1,000	3,5	8	0,018	0,143	33
	YC200-L7	2,000	1,600	25	0,306	1,250	3,5	10	0,018	0,143	26
	YC200-L8	2,000	1,600	25	0,365	1,500	3,5	12	0,018	0,143	22
	YC200-L9	2,000	1,600	25	0,433	1,750	3,5	14	0,018	0,143	19
	YC200-L10	2,000	1,600	25	0,490	2,000	3,5	16	0,018	0,143	17
	YC200-M1	2,000	1,600	50	0,140	0,375	4,5	3	0,018	0,143	213
	YC200-M2	2,000	1,600	50	0,184	0,500	4,5	4	0,018	0,143	158
	YC200-M3	2,000	1,600	50	0,245	0,625	4,5	5	0,018	0,143	132
	YC200-M4	2,000	1,600	50	0,278	0,750	4,5	6	0,018	0,143	106
	YC200-M5	2,000	1,600	50	0,345	0,870	4,5	7	0,018	0,143	95
	YC200-M6	2,000	1,600	50	0,395	1,000	4,5	8	0,018	0,143	83
	YC200-M7	2,000	1,600	50	0,498	1,250	4,5	10	0,018	0,143	66
	YC200-M8	2,000	1,600	50	0,593	1,500	4,5	12	0,018	0,143	55
	YC200-M9	2,000	1,600	50	0,694	1,750	4,5	14	0,018	0,143	47
	YC200-M10	2,000	1,600	50	0,800	2,000	4,5	16	0,018	0,143	42
	YC200-H1	2,000	1,600	90	0,197	0,375	4,5	3	0,024	0,148	506
	YC200-H2	2,000	1,600	90	0,258	0,500	4,5	4	0,024	0,148	372
	YC200-H3	2,000	1,600	90	0,332	0,625	4,5	5	0,024	0,148	307
	YC200-H4	2,000	1,600	90	0,389	0,750	4,5	6	0,024	0,148	249
	YC200-H5	2,000	1,600	90	0,465	0,870	4,5	7	0,024	0,148	222
	YC200-H6	2,000	1,600	90	0,525	1,000	4,5	8	0,024	0,148	189
	YC200-H7	2,000	1,600	90	0,661	1,250	4,5	10	0,024	0,148	153
	YC200-H8	2,000	1,600	90	0,781	1,500	4,5	12	0,024	0,148	125
	YC200-H9	2,000	1,600	90	0,941	1,750	4,5	14	0,024	0,148	111
	YC200-H10	2,000	1,600	90	1,069	2,000	4,5	16	0,024	0,148	97

¹ Use "YC" prefix for plain ends. Use "YCS" prefix for squared-shim ends. ² Add suffix "-S17" for 17-7 stainless steel. ³ Reference dimension. ⁴ Theoretical dimension; measured in lb/in.

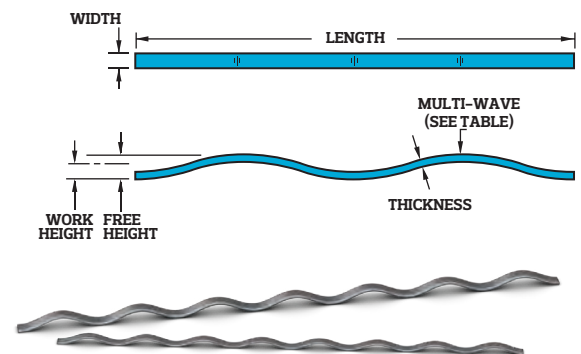
Linear Springs (Imperial)

YLS Series

Smalley Linear Springs are a continuous wave formed (marcelled) wire length produced from spring tempered materials. They act as a load bearing device having approximately the same load/deflection characteristics as a wave spring. Axial pressure is obtained by laying the expander flat in a straight line.

Stock items available in:

- Carbon steel
- 17-7 PH stainless steel



	Part No. ¹	Number of Waves	Thickness	Width	Length	Free Height ²	Load (lb)	Work Height	Spring Rate ³
Imperial (in.)	YLS12188-1	1	0.012	0.188	1.500	0.225	1.5	0.125	11
	YLS12188-2	2	0.012	0.188	3.000	0.225	5.6	0.125	91
	YLS12188-3	3	0.012	0.188	4.500	0.225	10.4	0.125	136
	YLS12188-4	4	0.012	0.188	6.000	0.225	14.8	0.125	182
	YLS12250-1	1	0.012	0.250	1.500	0.225	2.2	0.125	15
	YLS12250-2	2	0.012	0.250	3.000	0.225	7.8	0.125	121
	YLS12250-3	3	0.012	0.250	4.500	0.225	13.9	0.125	181
	YLS12250-4	4	0.012	0.250	6.000	0.225	19.8	0.125	242
	YLS12312-1	1	0.012	0.312	1.500	0.225	2.9	0.125	19
	YLS12312-2	2	0.012	0.312	3.000	0.225	10.2	0.125	151
	YLS12312-3	3	0.012	0.312	4.500	0.225	17.6	0.125	226
	YLS12312-4	4	0.012	0.312	6.000	0.225	26.0	0.125	302
	YLS12375-1	1	0.012	0.375	1.500	0.225	3.5	0.125	23
	YLS12375-2	2	0.012	0.375	3.000	0.225	11.3	0.125	181
	YLS12375-3	3	0.012	0.375	4.500	0.225	20.1	0.125	272
	YLS12375-4	4	0.012	0.375	6.000	0.225	25.2	0.125	362
	YLS20188-1	1	0.020	0.188	1.875	0.250	3.0	0.150	27
	YLS20188-2	2	0.020	0.188	3.750	0.250	11.4	0.150	215
	YLS20188-3	3	0.020	0.188	5.625	0.250	23.5	0.150	323
	YLS20188-4	4	0.020	0.188	7.500	0.250	32.5	0.150	431
	YLS20250-1	1	0.020	0.250	1.875	0.250	5.6	0.150	36
	YLS20250-2	2	0.020	0.250	3.750	0.250	17.6	0.150	286
	YLS20250-3	3	0.020	0.250	5.625	0.250	31.7	0.150	430
	YLS20250-4	4	0.020	0.250	7.500	0.250	44.9	0.150	573
	YLS20312-1	1	0.020	0.312	1.875	0.250	6.0	0.150	45
	YLS20312-2	2	0.020	0.312	3.750	0.250	20.5	0.150	357
	YLS20312-3	3	0.020	0.312	5.625	0.250	34.9	0.150	536
	YLS20312-4	4	0.020	0.312	7.500	0.250	50.8	0.150	715
	YLS20375-1	1	0.020	0.375	1.875	0.250	6.4	0.150	54
	YLS20375-2	2	0.020	0.375	3.750	0.250	23.3	0.150	430
	YLS20375-3	3	0.020	0.375	5.625	0.250	52.0	0.150	644
	YLS20375-4	4	0.020	0.375	7.500	0.250	74.5	0.150	859
	YLS25188-1	1	0.025	0.188	2.250	0.275	3.5	0.175	30
	YLS25188-2	2	0.025	0.188	4.500	0.275	15.4	0.175	243
	YLS25188-3	3	0.025	0.188	6.750	0.275	27.9	0.175	365
	YLS25188-4	4	0.025	0.188	9.000	0.275	42.5	0.175	487
	YLS25250-1	1	0.025	0.250	2.250	0.275	6.5	0.175	40
	YLS25250-2	2	0.025	0.250	4.500	0.275	21.7	0.175	324
	YLS25250-3	3	0.025	0.250	6.750	0.275	34.7	0.175	486
	YLS25250-4	4	0.025	0.250	9.000	0.275	50.5	0.175	647
	YLS25312-1	1	0.025	0.312	2.250	0.275	6.6	0.175	51
	YLS25312-2	2	0.025	0.312	4.500	0.275	24.0	0.175	404
	YLS25312-3	3	0.025	0.312	6.750	0.275	43.2	0.175	606
	YLS25312-4	4	0.025	0.312	9.000	0.275	62.0	0.175	808
	YLS25375-1	1	0.025	0.375	2.250	0.275	7.7	0.175	61
	YLS25375-2	2	0.025	0.375	4.500	0.275	29.4	0.175	486
	YLS25375-3	3	0.025	0.375	6.750	0.275	53.8	0.175	728
	YLS25375-4	4	0.025	0.375	9.000	0.275	76.9	0.175	971

¹ Add suffix "-S17" for 17-7 stainless steel. ² Reference dimension. ³ Theoretical calculation; measured in lb/in.

Linear Springs (Imperial)

YLS Series

Imperial (in.)	Part No. ¹	Number of Waves	Thickness	Width	Length	Free Height ²	Load (lb)	Work Height	Spring Rate ³
	YLS38188-1	1	0.038	0.188	2.625	0.300	7.5	0.200	67
	YLS38188-2	2	0.038	0.188	5.250	0.300	25.0	0.200	538
	YLS38188-3	3	0.038	0.188	7.875	0.300	61.0	0.200	808
	YLS38188-4	4	0.038	0.188	10.500	0.300	90.0	0.200	1077
	YLS38250-1	1	0.038	0.250	2.625	0.300	11.9	0.200	89
	YLS38250-2	2	0.038	0.250	5.250	0.300	45.7	0.200	716
	YLS38250-3	3	0.038	0.250	7.875	0.300	74.3	0.200	1074
	YLS38250-4	4	0.038	0.250	10.500	0.300	111.5	0.200	1432
	YLS38312-1	1	0.038	0.312	2.625	0.300	9.9	0.200	112
	YLS38312-2	2	0.038	0.312	5.250	0.300	49.3	0.200	893
	YLS38312-3	3	0.038	0.312	7.875	0.300	88.0	0.200	1340
	YLS38312-4	4	0.038	0.312	10.500	0.300	160.7	0.200	1787
	YLS38375-1	1	0.038	0.375	2.625	0.300	16.9	0.200	134
	YLS38375-2	2	0.038	0.375	5.250	0.300	61.7	0.200	1074
	YLS38375-3	3	0.038	0.375	7.875	0.300	105.0	0.200	1611
	YLS38375-4	4	0.038	0.375	10.500	0.300	153.0	0.200	2148
	YLS45188-1	1	0.045	0.188	3.000	0.325	9.0	0.225	75
	YLS45188-2	2	0.045	0.188	6.000	0.325	36.0	0.225	599
	YLS45188-3	3	0.045	0.188	9.000	0.325	65.0	0.225	898
	YLS45188-4	4	0.045	0.188	12.000	0.325	89.0	0.225	1198
	YLS45250-1	1	0.045	0.250	3.000	0.325	12.5	0.225	100
	YLS45250-2	2	0.045	0.250	6.000	0.325	42.5	0.225	797
	YLS45250-3	3	0.045	0.250	9.000	0.325	83.0	0.225	1195
	YLS45250-4	4	0.045	0.250	12.000	0.325	120.5	0.225	1593
	YLS45312-1	1	0.045	0.312	3.000	0.325	14.7	0.225	124
	YLS45312-2	2	0.045	0.312	6.000	0.325	60.3	0.225	994
	YLS45312-3	3	0.045	0.312	9.000	0.325	108.9	0.225	1491
	YLS45312-4	4	0.045	0.312	12.000	0.325	131.0	0.225	1988
	YLS45375-1	1	0.045	0.375	3.000	0.325	20.4	0.225	149
	YLS45375-2	2	0.045	0.375	6.000	0.325	73.1	0.225	1195
	YLS45375-3	3	0.045	0.375	9.000	0.325	133.5	0.225	1792
	YLS45375-4	4	0.045	0.375	12.000	0.325	190.0	0.225	2390
	YLS62188-1	1	0.062	0.188	3.375	0.350	14.3	0.250	138
	YLS62188-2	2	0.062	0.188	6.750	0.350	67.5	0.250	1100
	YLS62188-3	3	0.062	0.188	10.125	0.350	105.5	0.250	1650
	YLS62188-4	4	0.062	0.188	13.500	0.350	159.5	0.250	2200
	YLS62250-1	1	0.062	0.250	3.375	0.350	22.5	0.250	183
	YLS62250-2	2	0.062	0.250	6.750	0.350	104.0	0.250	1463
	YLS62250-3	3	0.062	0.250	10.125	0.350	161.0	0.250	2195
	YLS62250-4	4	0.062	0.250	13.500	0.350	234.0	0.250	2926
	YLS62312-1	1	0.062	0.312	3.375	0.350	27.8	0.250	228
	YLS62312-2	2	0.062	0.312	6.750	0.350	104.0	0.250	1826
	YLS62312-3	3	0.062	0.312	10.125	0.350	174.5	0.250	2739
	YLS62312-4	4	0.062	0.312	13.500	0.350	262.5	0.250	3652
	YLS62375-1	1	0.062	0.375	3.375	0.350	42.0	0.250	274
	YLS62375-2	2	0.062	0.375	6.750	0.350	139.5	0.250	2195
	YLS62375-3	3	0.062	0.375	10.125	0.350	240.0	0.250	3292
	YLS62375-4	4	0.062	0.375	13.500	0.350	353.0	0.250	4389

¹ Add suffix "-S17" for 17-7 stainless steel. ² Reference dimension. ³ Theoretical calculation; measured in lb/in.



Rotary Vane Pump

Smalley Linear Springs are used to radially load the bottom of the vanes in the pump. The springs energise the vanes against the bore for better sealing.

Retaining Rings

Introduction

Advantages of Spirolox® Retaining Rings

Spirolox Retaining Rings have no lugs to interfere in your assembly. Spirolox Rings are manufactured by coiling the ring from flat wire.

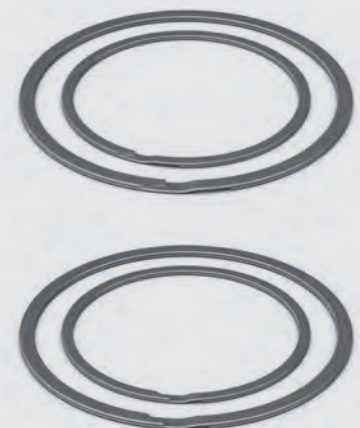
This unique process produces a retaining ring that has no protruding ears or burrs to interfere with your assembly. Because coiling produces a retaining ring with no scrap, the Spirolox Ring can be economically produced in carbon steel, stainless steel, coppers, and many other alloys.

TFC offers over 6000 standard parts, which are readily available in both carbon and stainless steel. If you require special designs, take advantage of Smalley's No-Tooling-Cost process; a process perfect for large runs, prototypes and midstream design changes. Whatever your application, we have the cost-effective and innovative design solution.



Spirolox Retaining Rings offer many advantages over stamped retaining rings

- No gap - 360° retaining surface
- No protruding lugs to interfere with mating components (uniform cross-section)
- Economically produced in stainless steel because the coiling process produces no scrap
- No-Tooling-Charge on special designs
- Easy installation and removal



Find these from page 42

Retaining Rings

Other Ring Types & Special Designs

Snap Rings

Another popular choice of retaining ring configurations is the well known Snap Ring. Produced by edge-winding with no special tooling charges, Snap Rings have been specified for many years in the automotive and heavy equipment industries as a standard choice of engineers.

TFC has hundreds of standard Snap Rings in stock, in carbon steel and stainless steel and in both inch and metric sizes. Special or custom designs can be produced quickly and economically utilising Smalley's precision No-Tooling-Cost manufacturing process.

Snap Rings can withstand high forces and impact loads and are easily installed and removed from their internal or external groove for field servicing your product.



Find these on pages
48 – 49, 62 – 66, 74 – 75, 88 – 92

Hoopster Rings

Hoopster Retaining Rings offer an innovative way to retain components. Hoopsters have a minimal radial projection and a shallow groove depth. The low profile Hoopsters are ideal for applications with thin wall cylinders. Ends flex for simple assembly and removal with no special tools required.



Find these on pages 50 – 51, 76 – 77

WaveRing®

The WaveRing is a spiral retaining ring with an axial wave form. It acts like a standard retaining ring with the additional feature of compressibility. It compensates for the overall length tolerance of stacked components, while still acting as a retaining ring. Once assembled the WaveRing will reduce looseness and vibration in the assembly.

Designed to fit into a groove, the WaveRing applies pressure in two directions: against the groove wall and against the assembly components. Single, double or multiple turns in the WaveRing are possible as well as a choice of materials, including our standard 17-7 PH stainless and carbon steel.



Find these on pages 54 & 80

Special Rings

A major segment of Smalley manufacturing is in "special" or prototype retaining rings. Common specials include balanced, multi-turn (4,5,6 turns and more) and special ends in diameters from 5 mm – 3000 mm (0,200 in – 120 in) and larger. TFC engineers are on hand to help you design a ring specific to your application. Because there are no tooling costs, no job is too big or too little. Prototypes can be quickly and economically produced to test a design in days rather than weeks.



See pages 104 – 107

Selection Guide

Interchange Listing

Retaining rings are interchangeable with both inch and metric retaining ring grooves. We offer free samples of all stock retaining rings to test in your application.

Cross reference a standard stamped ring or snap ring to find the appropriate Smalley Retaining Ring to fit your application.

TFC Part Ref	Spirolox® Series	Military IL-DTL-27426	Aerospace AS3219M	Metric Aerospace A4035	European Specification DIN	Waldes Truarc	Eaton	Industrial Retaining Ring	Other Rings	Anderton
XVH	UR	---	---	---	Groove Interchange Only Use a Spiral Retaining Ring to fit into the same groove of these stamped Retaining Rings (circlips).					
XVS	US	---	---	---						
XWH	RR	/3	AS4299 AS3217	---						
XWS	RD	/1	AS4299 AS3218	---						
XWHT	RRT	---	---	---	---	---	NAN	---	UHB	---
XWST	RST	---	---	---	---	---	XAN	---	USC	---
XWHM	RRN	/4	AS4299 AS3215	---	---	N5000 5008	IN	3000 4000	HO HOI UHO	N1300
XWSM	RSN	/2	AS4299 AS3216	---	---	5100 5108	EN	3100 4100	SH SHI USH	N1400
XDNH	---	---	---	---	DIN 472	---	---	---	DHO	D1300
XDNS	---	---	---	---	DIN 471	---	---	---	DSH	D1400
XEH	---	---	---	MA 4017	---	---	---	---	---	---
XES	---	---	---	MA 4016	---	---	---	---	---	---
XFH	---	---	---	---	DIN 472	---	---	---	DHOD	D1300
XFS	---	---	---	---	DIN 471	---	---	---	DSHD	D1400
XXAH	---	---	---	---	---	---	NAN	---	UHB	---
XXAS	---	---	---	---	---	---	XAN	---	USC	---
XXDH	---	---	---	---	---	---	ND	---	HN	---
XXDS	---	---	---	---	---	---	XD	---	SNL	---
XXNH	---	---	---	---	---	---	IN	---	UHO	--
XXNS	---	---	---	---	---	---	EN	---	USH	--

* Military & Aerospace parts may require additional finishes & inspection procedures to conform to standard. Please contact our TFC's engineering team for details.
Tel: +44 (0) 1435 866011 or Email: Design@tfc.eu.com

Choose by the Thrust Capacity needed

Metric Units (mm)			
Series	Load ¹	Housing	Shaft
Light Duty ²	18,03	XVHM	XVSM
DIN Series	36,55	XDNH	XDNS
Aerospace Series	38,96	XEH	XES
Snap Rings	36,53	XFH	XFS

Representative example shows the load capacity (kN) for a 50 mm ring.
Manufactured to DIN groove specifications.

Metric Units (inches)			
Series	Load ¹	Housing	Shaft
Light Duty	4100	XVH	XVS
Medium Duty	4950	XWH	XWS
Medium Heavy Duty	7070	XWHT	XWST
Heavy Duty	8340	XWHM	XWSM
Snap Rings	8341	XFHE	XFSE
WaveRing	—	YWHW	YWSW

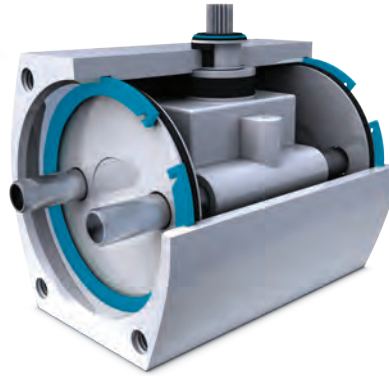
¹ Representative example shows the load capacity (lb) for a 2" ring.

Still not sure? Use TFC's most popular series,
Medium Duty XWH (internal) or XWS (external). Ask for a free sample.

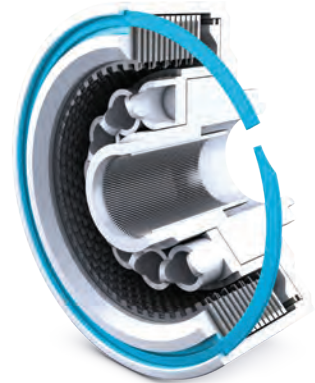
Ring Applications



A. Ratchet Wrench



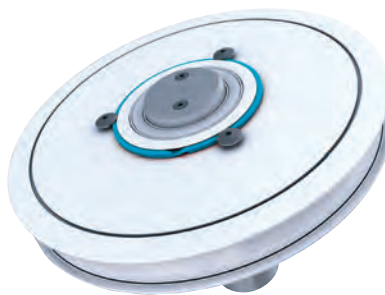
B. Actuator Valve



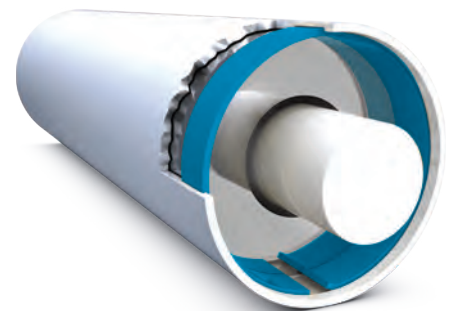
C. Pneumatic Clutch



D. Hip Replacement



E. Belt Pulley



F. Cylinder Housing

A. Ratchet Wrench

This single-turn (it is actually $1\frac{1}{2}$ turns) External Retaining Ring retains the internal mechanical components of the ratchet wrench. The additional $\frac{1}{2}$ turn provides that little extra strength needed to prevent the ring from dislodging when the wrench is dropped.

D. Hip Replacement

A titanium Spirolox Retaining Ring is used in this hip replacement application to secure the shell and the liner together to form the socket of the new hip. Smalley's manufacturing process allows for the economical production of special alloy products.

B. Actuator Valve

High thrust capacity was needed and a constant section ring was selected to absorb the occasional shock loading of the pistons.

E. Belt Pulley

Three hold down screws and a 2-Turn Spirolox Ring form a bi-directional shoulder. The shaft is inserted through the pulley and the retaining ring rests on the pulley face securing the shaft in one direction. Movement is prevented in the other direction with the three screws clamping down on the ring.

C. Pneumatic Clutch

The internal components of this clutch are held in the housing using a heavy-duty constant section ring ring. Field servicing was often necessary and the snap ring was the ideal solution to the design requirement.

F. Cylinder Housing

The Hoopster Retaining Ring in this application allows for a shallow groove in the cylinder housing without compromising the ability to have high forces applied to the Hoopster. Because the cylinder is thin, a normal retaining ring groove could not be used.

Assembly Methods

Manual Installation

Manual installation on an individual or low production basis is accomplished as follows:

- Separate the ring coils and insert one end of the ring into the groove.
- Wind the ring by pressing down around the circumference until the entire ring is inserted into the groove.

Housing:



Shaft:



Semi-Automated and Automated Installation

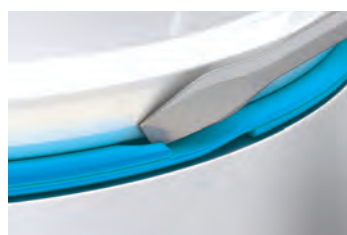
For higher speed and automated assembly operations, simple tooling or assembly fixtures can be designed.

External installation on a shaft can be accomplished with a plunger and tapered plug. The plug, angled at approximately 6 degrees, is centered over the shaft end. A loose fitting plunger pushes the ring into position over the tapered plug. An arbor press or air cylinder is commonly used to automate this assembly operation.

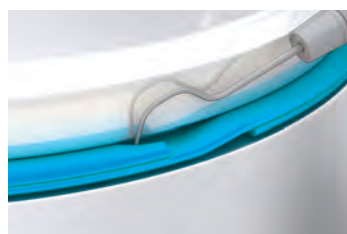


Assembly Methods

Internal retaining ring installation is accomplished in a similar manner. A tapered bore, which acts as a ring contracting guide, and a plunger pushes the retaining ring into position. Tooling for ring installation should have hardened working surfaces to minimise wear.



Using Screwdriver



Using Dental Pick



Removal

Smalley Retaining Rings are supplied standard with removal notches to enable easy extraction from a groove.

The notch is provided to form a small gap between the ring end and the shaft or housing, permitting a blunt object to be inserted at the end of the ring to pry the free end out radially and up.

- Insert a screwdriver or dental pick behind the removal notch.
- Use the tool to pry out the first end of the ring.
- Manually spiral the ring around until it is free from the groove.

Tooling

TFC's Spirolox Retaining Ring removal tool, part number XRT-107, fits between the layers of a multiple turn retaining ring in order to access the removal notch.

The end of the tool bit is slotted for the tip of the notch end to pass through. Once inserted, the ring end may be pulled out radially and up.

Visit http://www.tfc.eu.com/files/Spirolox_Install__Removal_Guide.pdf for more information about installation and removal.

Light Duty Rings (Metric)

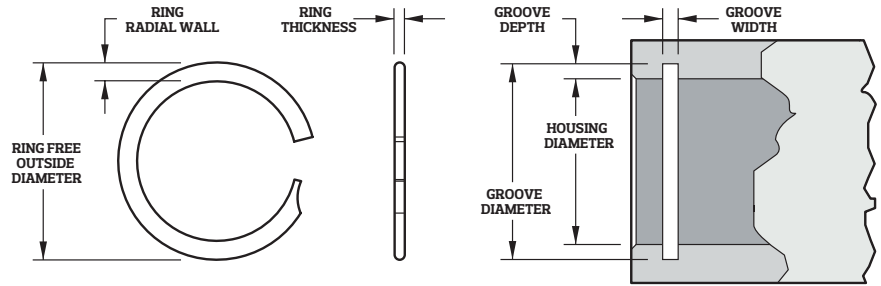
XVHM Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel



* No Removal Notch



Metric (mm)	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity				
			Outside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²	Ring Shear (N) ³		
	XVHM-6*	6,00	6,35	+0,25/-0,00	0,51		0,30		6,30	±0,05	0,38		439	1988		
	XVHM-7*	7,00	7,38		0,51		0,30		7,32		0,38		546	2320		
	XVHM-8*	8,00	8,44		0,64		0,38		8,36		0,46		702	3183		
	XVHM-9*	9,00	9,54	+0,30/-0,00	0,76		0,38		9,46		0,46		1003	3580		
	XVHM-10*	10,00	10,58		0,76		0,38		10,50		0,46		1238	3978		
	XVHM-11	11,00	11,68		0,89		0,38		11,60		0,46		1634	4388		
	XVHM-12	12,00	12,74	+0,33/-0,00	0,89		0,38		12,66		0,46		1930	4774		
	XVHM-13	13,00	13,80		1,14		0,46		13,72		0,56		2281	6261		
	XVHM-14	14,00	14,80		1,14		0,46		14,72		0,56		2456	6742		
	XVHM-15	15,00	15,80		1,14		0,46		15,72		0,56		2632	7224		
	XVHM-16	16,00	16,80		1,14		0,46		16,72		0,56		2807	7705		
	XVHM-17	17,00	17,82		1,14		0,46		17,72		0,56		2983	8187		
	XVHM-18	18,00	18,82		1,14		0,46		18,72		0,56		3158	8669		
	XVHM-19	19,00	19,86		1,14		0,46		19,76		0,56		3519	9150		
	XVHM-20	20,00	21,26		1,65		0,53		21,06		±0,08		0,66	+0,05/-0,00	5166	11097
	XVHM-21	21,00	22,27		1,65		0,53		22,06				0,66		5424	11652
	XVHM-22	22,00	23,28	1,65	0,53	23,06	0,66	5683	12207							
	XVHM-24	24,00	25,29	1,65	0,53	25,06	0,66	6199	13317							
	XVHM-25	25,00	26,30	1,65	0,53	26,06	0,66	6458	13872							
	XVHM-26	26,00	27,31	1,65	0,53	27,06	±0,10	0,66	6716	14427						
	XVHM-28	28,00	29,40	2,24	0,64	29,12		0,79	7642	16303						
	XVHM-29	29,00	30,41	2,24	0,64	30,12		0,79	7915	16885						
	XVHM-30	30,00	31,42	+0,38/-0,00	2,24	±0,10	0,64		31,12		0,79		8188		17467	
	XVHM-31	31,00	32,43		2,24		0,64		32,12		0,79		8461		18049	
	XVHM-32	32,00	33,44		2,24		0,64		33,12		0,79		8734	18632		
	XVHM-34	34,00	35,45		2,24		0,64		35,12		0,79		9279	19796		
	XVHM-35	35,00	36,47		2,24		0,64		36,12		0,79		9552	20378		
	XVHM-36	36,00	37,48		2,24		0,64		37,12		0,79		9825	20960		
	XVHM-37	37,00	38,49		2,24		0,64		38,12		0,79		10098	21543		
	XVHM-38	38,00	39,50		2,24		0,64		39,12		0,79		10371	22125		
	XVHM-40	40,00	41,94	+0,51/-0,00	3,00		0,79	±0,13	41,48		0,99		14426	28748		
	XVHM-42	42,00	43,96		3,00		0,79		43,48		0,99		15147	30185		
	XVHM-45	45,00	46,99		3,00		0,79		46,48		0,99		16229	32341		
	XVHM-47	47,00	49,00		3,00		0,79		48,48		0,99		16950	33779		
	XVHM-48	48,00	50,01		3,00		0,79		49,48		0,99		17311	34497		
	XVHM-50	50,00	52,04	+0,64/-0,00	3,00		0,79	±0,15	51,48		0,99		18032	35935		
	XVHM-52	52,00	54,55		4,01		0,79		53,94		0,99		24583	37372		
	XVHM-55	55,00	57,57		4,01		0,79		56,94		0,99		26001	39528		
	XVHM-56	56,00	58,58		4,01		0,79		57,94		0,99		26473	40247		
	XVHM-58	58,00	60,60		4,01		0,79		59,94		0,99		27419	41684		
	XVHM-60	60,00	62,64		4,01		0,79		61,94		0,99		28364	43122		
	XVHM-62	62,00	64,67		4,01		0,79		63,94		0,99		29310	44559		
	XVHM-63	63,00	65,69		4,01		0,79		64,94		0,99		29783	45278		
	XVHM-65	65,00	67,70		4,01		0,79		66,94		0,99		30728	46715		
	XVHM-68	68,00	70,72		4,01		0,79		69,94		0,99		32146	48871		
	XVHM-70	70,00	72,74	4,01	0,79	71,94	0,99	33092	50309							
	XVHM-72	72,00	74,77	4,01	0,79	73,94	0,99	34037	51746							
	XVHM-75	75,00	77,80	4,01	0,79	76,94	0,99	35456	53902							

¹ Add suffix "-S02" for 302 stainless steel. Add suffix "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2.

³ Based on a safety factor of 3.

Light Duty Rings (Metric)

XVHM Series

	Part No. ¹	Housing Diameter	Ring				Groove				Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness		Diameter	Width			Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XVHM-78	78,00	81,20	+0,76/-0,00	4,78	±0,13	0,99	±0,15	1,12	+0,08/-0,00	44477	70250
	XVHM-80	80,00	83,23		4,78		0,99		1,12		45617	72052
	XVHM-82	82,00	85,25		4,78		0,99		1,12		46757	73853
	XVHM-85	85,00	88,29		4,78		0,99		1,12		48468	76555
	XVHM-88	88,00	91,32		4,78		0,99		1,12		50179	79257
	XVHM-90	90,00	93,36		4,78		0,99		1,12		51319	81058
	XVHM-92	92,00	95,37		4,78		0,99		1,12		52460	82859
	XVHM-95	95,00	98,39		4,78		0,99		1,12		54170	85561
	XVHM-98	98,00	101,41		4,78		0,99		1,12		55881	88263
	XVHM-100	100,00	103,43		4,78		0,99		1,12		57021	90064
	XVHM-102	102,00	105,44		4,78		0,99		1,12		58162	91866
	XVHM-105	105,00	108,92	+0,89/-0,00	5,72		1,17	±0,18	1,32	+0,10/-0,00	71642	106440
	XVHM-110	110,00	113,98		5,72		1,17		1,32		75054	111508
	XVHM-112	112,00	116,01		5,72		1,17		1,32		76418	113536
	XVHM-115	115,00	119,12		5,72		1,17		1,32		80707	116577
	XVHM-120	120,00	124,30		5,72		1,17		1,32		87725	121645
	XVHM-125	125,00	129,47		5,72		1,17		1,32		95036	126714
	XVHM-130	130,00	134,66		5,72		1,17		1,32		103272	131783
	XVHM-135	135,00	139,83		5,72		1,55		1,70		111192	181299
	XVHM-140	140,00	145,00		5,72		1,55		1,70		119404	188013
	XVHM-145	145,00	150,17		5,72		1,55		1,70		127974	194907
	XVHM-150	150,00	155,30	+1,14/-0,00	6,73		1,55		1,70		137436	201443
	XVHM-155	155,00	160,46		6,73		1,55		1,70		146361	208158
	XVHM-160	160,00	165,64		6,73		1,55		1,70		155956	214872
	XVHM-165	165,00	170,82		6,73		1,55		1,70		165855	221587
	XVHM-170	170,00	175,99		6,73		1,55		1,70		176059	228302
	XVHM-175	175,00	181,17		6,73		1,55		1,70		186568	235017
	XVHM-180	180,00	186,35		6,73		1,55		1,70		197381	241731
	XVHM-185	185,00	191,52		6,73		1,55		1,70		208499	248446
	XVHM-190	190,00	196,70		6,73		1,55		1,70		219922	255161
	XVHM-195	195,00	201,87	+1,52/-0,00	7,62	±0,15	1,55	±0,20	1,70		231649	261876
	XVHM-200	200,00	207,05		7,62		1,55		1,70		243681	268590
	XVHM-210	210,00	217,40		7,62		1,55		1,70		268658	282020
	XVHM-220	220,00	227,76		8,76		1,93		2,08	+0,13/-0,00	294854	367882
	XVHM-230	230,00	238,11		8,76		1,93		2,08		322268	384604
	XVHM-240	240,00	248,46		8,76		1,93		2,08		350900	401326
	XVHM-250	250,00	258,81		8,76		1,93		2,08		380751	418048
	XVHM-260	260,00	269,17		9,65		1,93		2,08		411821	434770
	XVHM-270	270,00	279,52		9,65		1,93		2,08		444108	451492
	XVHM-280	280,00	289,87		9,65		1,93		2,08		477614	468214
	XVHM-290	290,00	300,22		9,65		1,93		2,08		512339	484936
	XVHM-300	300,00	310,58		9,65		1,93		2,08		548282	501658

¹ Add suffix "-S02" for 302 stainless steel. Add suffix "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2.

³ Based on a safety factor of 3.

Aerospace Rings (Metric)

XEH Series

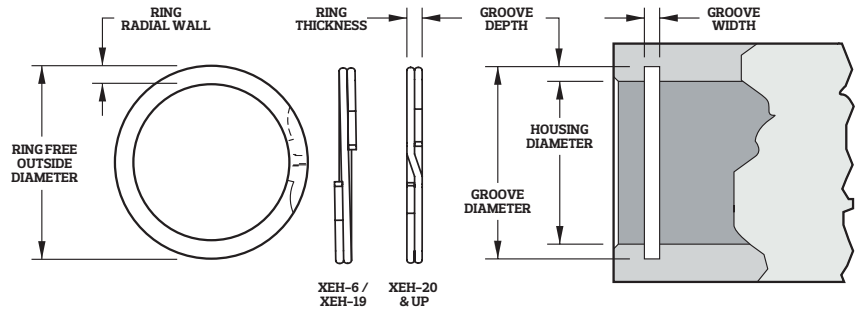
Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

MA 4017⁴



* No Removal Notch



	Part No. ¹	Housing Diameter	Ring			Groove		Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XEH-6*	6,00	6,35	0,33 - 0,53	0,38	6,30	0,51	440	1880
	XEH-7*	7,00	7,37	0,33 - 0,53	0,38	7,32	0,51	550	2190
	XEH-8*	8,00	8,51	0,51 - 0,71	0,38	8,43	0,51	840	2500
	XEH-9*	9,00	9,60	0,64 - 0,84	0,64	9,50	0,74	1100	4740
	XEH-10*	10,00	10,62	0,64 - 0,84	0,64	10,52	0,74	1270	5270
	XEH-11	11,00	11,79	0,76 - 0,96	0,64	11,71	0,74	1900	5790
	XEH-12	12,00	12,89	1,02 - 1,22	0,60	12,70	0,70	2050	7950
	XEH-13	13,00	13,95	1,02 - 1,22	0,89	13,75	1,00	2410	12110
	XEH-14	14,00	15,07	1,27 - 1,47	0,89	14,85	1,00	2930	13040
	XEH-15	15,00	16,14	1,27 - 1,47	0,89	15,90	1,00	3290	13970
	XEH-16	16,00	17,15	1,27 - 1,47	0,89	16,95	1,00	3740	14900
	XEH-17	17,00	18,32	1,52 - 1,73	0,89	18,05	1,00	4390	15830
	XEH-18	18,00	19,39	1,52 - 1,73	0,89	19,10	1,00	4820	16760
	XEH-19	19,00	20,48	1,52 - 1,73	0,89	20,17	1,00	5460	17690
	XEH-20	20,00	21,51	1,78 - 1,98	0,89	21,22	1,00	5940	18620
	XEH-21	21,00	22,56	1,78 - 1,98	0,89	22,27	1,00	6550	19550
	XEH-22	22,00	23,65	1,78 - 1,98	1,07	23,37	1,20	7390	24630
	XEH-23	23,00	24,69	2,03 - 2,24	1,07	24,42	1,20	7950	25750
	XEH-24	24,00	25,73	2,03 - 2,24	1,07	25,47	1,20	8650	26870
	XEH-25	25,00	27,03	2,03 - 2,24	1,07	26,67	1,20	10230	27990
	XEH-26	26,00	28,07	2,03 - 2,24	1,07	27,77	1,20	11270	29110
	XEH-27	27,00	29,11	2,49 - 2,69	1,27	28,87	1,40	12360	31170
	XEH-28	28,00	30,10	2,49 - 2,69	1,27	29,87	1,40	12820	32330
	XEH-29	29,00	31,21	2,49 - 2,69	1,27	30,95	1,40	13840	33480
	XEH-30	30,00	32,28	2,49 - 2,69	1,27	32,00	1,40	14610	34640
	XEH-31	31,00	33,32	2,49 - 2,69	1,27	33,05	1,40	15550	35790
	XEH-32	32,00	34,23	2,49 - 2,69	1,27	34,00	1,40	15880	36950
	XEH-34	34,00	36,46	2,87 - 3,07	1,27	36,20	1,40	18210	39260
	XEH-35	35,00	37,55	2,87 - 3,07	1,27	37,30	1,40	19600	40410
	XEH-36	36,00	38,68	2,87 - 3,07	1,27	38,40	1,40	21040	41560
	XEH-37	37,00	39,60	2,87 - 3,07	1,27	39,40	1,40	21620	42720
	XEH-38	38,00	40,77	2,87 - 3,07	1,27	40,50	1,40	23130	43870
	XEH-40	40,00	42,91	3,12 - 3,33	1,57	42,50	1,75	24350	57090
	XEH-42	42,00	45,01	3,12 - 3,33	1,57	44,60	1,75	26590	59950
	XEH-45	45,00	48,13	3,12 - 3,33	1,57	47,70	1,75	29590	64230
	XEH-46	46,00	49,28	3,12 - 3,33	1,57	48,80	1,75	31370	65660
	XEH-47	47,00	50,32	3,89 - 4,09	1,57	49,90	1,75	33190	67080
	XEH-48	48,00	51,46	3,89 - 4,09	1,57	51,00	1,75	35070	68510
	XEH-50	50,00	53,66	3,89 - 4,09	1,57	53,20	1,75	38960	71370
	XEH-52	52,00	54,30	3,12 - 3,33	1,25	53,79	1,42	22790	59090
	XEH-53	53,00	55,32	3,12 - 3,33	1,25	54,79	1,42	23230	60230
	XEH-55	55,00	57,38	3,38 - 3,58	1,25	56,85	1,42	24910	62500
	XEH-56	56,00	58,40	3,38 - 3,58	1,25	57,85	1,42	25360	63640
	XEH-58	58,00	60,43	3,38 - 3,58	1,25	59,85	1,42	26270	65910
	XEH-59	59,00	61,54	3,38 - 3,58	1,25	60,93	1,42	27870	67050
	XEH-60	60,00	62,57	3,38 - 3,58	1,25	61,99	1,42	29220	68180

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2.

³ Based on a safety factor of 3. ⁴ Contact TFC for details/information on how to order parts to be in compliance with this specification.

Aerospace Rings (Metric)

XEH Series

	Part No. ¹	Housing Diameter	Ring				Groove				Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness		Diameter	Width			Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XEH-61	61,00	63,65	+0,63/-0,00	3,63 - 3,84	1,25	±0,08	63,09	+0,10/-0,00	1,42	31190	69320
	XEH-62	62,00	64,70		3,63 - 3,84	1,25		64,09		1,42	31700	70460
	XEH-63	63,00	65,70		3,63 - 3,84	1,25		65,09		1,42	32220	71590
	XEH-64	64,00	66,77		3,63 - 3,84	1,25		66,19		1,42	34290	72730
	XEH-65	65,00	67,82		3,63 - 3,84	1,25		67,19		1,42	34820	73870
	XEH-66	66,00	68,80		3,63 - 3,84	1,25		68,19		1,42	35360	75000
	XEH-67	67,00	69,90		3,63 - 3,84	1,25		69,25		1,42	36870	76140
	XEH-68	68,00	70,94		3,89 - 4,09	1,25		70,29		1,42	38090	77270
	XEH-69	69,00	71,94		3,89 - 4,09	1,25		71,29		1,42	38650	78410
	XEH-70	70,00	72,94		3,89 - 4,09	1,25		72,29		1,42	39210	79550
	XEH-71	71,00	73,99	+0,76/-0,00	3,89 - 4,09	1,25	±0,15	73,29	+0,13/-0,00	1,42	39770	80680
	XEH-72	72,00	75,04		4,11 - 4,39	1,25		74,39		1,42	40910	81510
	XEH-75	75,00	78,07		4,11 - 4,39	1,25		77,39		1,42	43830	85230
	XEH-78	78,00	81,21		4,11 - 4,39	1,55		80,45		1,73	46730	109910
	XEH-80	80,00	83,22		4,37 - 4,62	1,55		82,49		1,73	48700	112730
	XEH-82	82,00	85,28		4,37 - 4,62	1,55		84,55		1,73	51120	115550
	XEH-85	85,00	88,38		4,62 - 4,88	1,55		87,65		1,73	55060	119780
	XEH-88	88,00	91,45		4,62 - 4,88	1,55		90,69		1,73	57860	124000
	XEH-90	90,00	93,58		4,88 - 5,13	1,55		92,79		1,73	61370	126820
	XEH-92	92,00	95,66		4,88 - 5,13	1,55		94,85		1,73	64070	129640
	XEH-95	95,00	98,69	+0,90/-0,00	4,88 - 5,13	1,55	±0,18	97,85	+0,15/-0,00	1,73	66160	133870
	XEH-98	98,00	101,83		5,13 - 5,38	1,55		100,99		1,73	71590	138090
	XEH-100	100,00	103,83		5,13 - 5,38	1,55		102,99		1,73	73050	140910
	XEH-102	102,00	106,00		5,38 - 5,64	1,55		105,15		1,73	78490	143730
	XEH-105	105,00	109,00		5,38 - 5,64	1,55		108,15		1,73	80800	147960
	XEH-108	108,00	112,22		5,64 - 5,89	1,55		111,31		1,73	87310	152190
	XEH-110	110,00	114,25		5,64 - 5,89	1,55		113,31		1,73	82140	155000
	XEH-112	112,00	116,44		5,89 - 6,15	1,55		115,45		1,73	94370	157820
	XEH-115	115,00	119,44		5,89 - 6,15	1,55		118,45		1,73	96890	162050
	XEH-120	120,00	124,54	+1,14/-0,00	6,20 - 6,45	1,83	±0,10	123,55		2,00	104030	199640
	XEH-125	125,00	129,59		6,20 - 6,45	1,83		128,55		2,00	108360	207960
	XEH-130	130,00	134,71		6,20 - 6,45	1,83		133,65		2,00	115860	216280
	XEH-135	135,00	139,74		6,20 - 6,45	1,83		138,62		2,00	119000	224600
	XEH-140	140,00	144,87		6,20 - 6,45	1,83		143,72		2,00	126820	232920
	XEH-145	145,00	150,04		6,20 - 6,45	1,83		148,82		2,00	134880	241230
	XEH-150	150,00	155,07		6,20 - 6,45	1,83		153,82		2,00	139530	249550
	XEH-155	155,00	160,72	+1,40/-0,00	7,72 - 8,03	2,18		159,40	±0,20	2,40	166080	307190
	XEH-160	160,00	165,74		7,72 - 8,03	2,18		164,40		2,40	171433	317100
	XEH-165	165,00	170,77		7,72 - 8,03	2,18		169,40		2,40	176790	327010
	XEH-170	170,00	176,05		7,72 - 8,03	2,18		174,60		2,40	190430	336920
	XEH-175	175,00	181,05		7,72 - 8,03	2,18		179,60		2,40	196030	346830
	XEH-180	180,00	186,38		7,72 - 8,03	2,18		184,88		2,40	213900	356740
	XEH-185	185,00	191,10		7,72 - 8,03	2,18		189,88		2,40	219840	366650
	XEH-190	190,00	196,45		7,72 - 8,03	2,18		194,88		2,40	225790	376560
	XEH-195	195,00	201,74		7,72 - 8,03	2,18		200,14		2,40	244070	386460
	XEH-200	200,00	206,76	+1,65/-0,00	7,72 - 8,03	2,18		205,14		2,40	250330	396370
	XEH-210	210,00	217,10		9,32 - 9,63	2,18		215,40		2,40	276140	416490
	XEH-220	220,00	227,40		9,32 - 9,63	2,18		225,64		2,40	257150	436010
	XEH-230	230,00	237,73		9,32 - 9,63	2,18		235,90		2,40	330450	455830
	XEH-240	240,00	247,80		9,32 - 9,63	2,18		245,90		2,40	344810	475650
	XEH-250	250,00	258,10		9,32 - 9,63	2,18		256,16		2,40	375010	495470
	XEH-260	260,00	268,43		9,32 - 9,63	2,18		266,40		2,40	405210	515290
	XEH-270	270,00	278,50		9,32 - 9,63	2,18		276,40		2,40	420790	535100
	XEH-280	280,00	288,82		9,32 - 9,63	2,18		286,66		2,40	454100	554920

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2.

³ Based on a safety factor of 3. ⁴ Contact TFC for details/information on how to order parts to be in compliance with this specification.

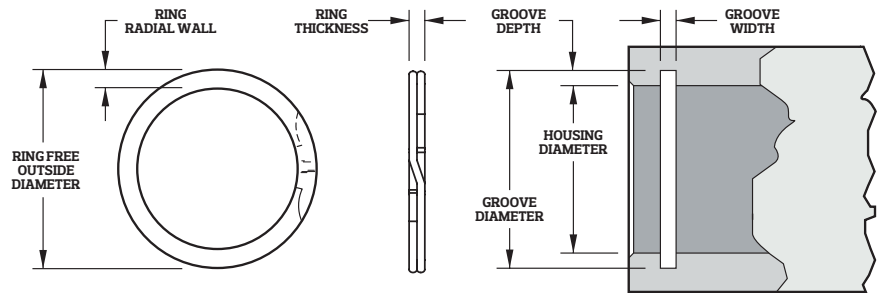
DIN Rings (Metric)

XDNH Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

Groove Compatible
with DIN 472



	Part No. ¹	Housing Diameter	Ring				Groove		Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness		Diameter	Width	Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XDNH-13	13,00	13,72	1,40	0,99		13,60	1,10	1901	13474
	XDNH-14	14,00	14,75	1,40	0,99		14,60	1,10	2047	14510
	XDNH-15	15,00	15,85	1,40	0,99		15,70	1,10	2559	15547
	XDNH-16	16,00	16,97	1,65	0,99		16,80	1,10	3119	16583
	XDNH-17	17,00	17,98	1,65	0,99		17,80	1,10	3314	17620
	XDNH-18	18,00	19,18	1,91	0,99		19,00	1,10	4386	18656
	XDNH-19	19,00	20,19	1,91	0,99		20,00	1,10	4630	19693
	XDNH-20	20,00	21,21	1,91	0,99		21,00	1,10	4874	20729
	XDNH-21	21,00	22,23	1,91	0,99		22,00	1,10	5117	21766
	XDNH-22	22,00	23,23	1,91	0,99		23,00	1,10	5361	22802
	XDNH-23	23,00	24,33	2,18	1,14		24,10	1,30	6165	23853
	XDNH-24	24,00	25,45	2,18	1,14		25,20	1,30	7018	24891
	XDNH-25	25,00	26,45	2,18	1,14		26,20	1,30	7310	25928
	XDNH-26	26,00	27,48	2,18	1,14		27,20	1,30	7603	26965
	XDNH-27	27,00	28,68	2,41	1,14		28,40	1,30	9211	28002
	XDNH-28	28,00	29,69	2,41	1,14		29,40	1,30	9552	29039
	XDNH-29	29,00	30,71	2,41	1,14		30,40	1,30	9893	30076
	XDNH-30	30,00	31,71	2,41	1,14		31,40	1,30	10235	31113
	XDNH-31	31,00	33,02	2,41	1,14		32,70	1,30	12842	32150
	XDNH-32	32,00	34,04	2,41	1,14		33,70	1,30	13256	33187
	XDNH-33	33,00	35,05	2,41	1,14		34,70	1,30	13670	34224
	XDNH-34	34,00	36,07	3,25	1,44		35,70	1,60	14085	44541
	XDNH-35	35,00	37,38	3,25	1,44		37,00	1,60	17058	45851
	XDNH-36	36,00	38,39	3,25	1,44		38,00	1,60	17545	47161
	XDNH-37	37,00	39,40	3,25	1,44		39,00	1,60	18032	48471
	XDNH-38	38,00	40,41	3,25	1,44		40,00	1,60	18520	49781
	XDNH-40	40,00	42,93	4,01	1,69		42,50	1,85	24368	61498
	XDNH-41	41,00	43,94	4,01	1,69		43,50	1,85	24977	63036
	XDNH-42	42,00	44,96	4,01	1,69		44,50	1,85	25586	64573
	XDNH-45	45,00	47,98	4,01	1,69		47,50	1,85	27414	69186
	XDNH-47	47,00	49,99	4,01	1,69		49,50	1,85	28633	72261
	XDNH-48	48,00	51,00	4,01	1,69		50,50	1,85	29242	73798
	XDNH-50	50,00	53,54	5,08	1,93		53,00	2,15	36552	87790
	XDNH-51	51,00	54,54	5,08	1,93		54,00	2,15	37283	89546
	XDNH-52	52,00	55,55	5,08	1,93		55,00	2,15	38014	91302
	XDNH-55	55,00	58,57	5,08	1,93		58,00	2,15	40207	96569
	XDNH-56	56,00	59,59	5,08	1,93		59,00	2,15	40938	98325
	XDNH-57	57,00	60,60	5,08	1,93		60,00	2,15	41669	100081
	XDNH-58	58,00	61,62	5,08	1,93		61,00	2,15	42400	101836
	XDNH-60	60,00	63,63	5,08	1,93		63,00	2,15	43863	105348
	XDNH-62	62,00	65,66	5,08	1,93		65,00	2,15	45325	108860
	XDNH-63	63,00	66,67	5,08	1,93		66,00	2,15	46056	110615
	XDNH-64	64,00	67,67	5,08	1,93		67,00	2,15	46787	112371

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

DIN Rings (Metric)

XDNH Series

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity	
			Outside Diameter		Radial Wall		Thickness		Diameter		Width	Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XDNH-65	65,00	68,67	+0,76/-0,00	5,08	±0,12	2,41	±0,08	68,00	+0,30/-0,00	2,65	47518	135725
	XDNH-67	67,00	70,67		5,08		2,41		70,00		2,65	48980	139901
	XDNH-68	68,00	71,67		5,08		2,41		71,00		2,65	49711	141989
	XDNH-70	70,00	73,67		5,08		2,41		73,00		2,65	51173	146165
	XDNH-72	72,00	75,67		5,08		2,41		75,00		2,65	52635	150341
	XDNH-75	75,00	78,68		5,08		2,41		78,00		2,65	54828	156605
	XDNH-76	76,00	79,68		5,08		2,41		79,00		2,65	55559	158694
	XDNH-78	78,00	81,69		5,08		2,41		81,00		2,65	57021	162870
	XDNH-80	80,00	84,19	+0,89/-0,00	6,05	±0,13	2,41	±0,10	83,50	+0,35/-0,00	2,65	68231	167046
	XDNH-82	82,00	86,20		6,05		2,41		85,50		2,65	69936	171222
	XDNH-85	85,00	89,20		6,05		2,91		88,50		3,15	72495	214309
	XDNH-88	88,00	92,21		6,05		2,91		91,50		3,15	75054	221873
	XDNH-90	90,00	94,21		6,05		2,91		93,50		3,15	76759	226915
	XDNH-92	92,00	96,22		6,05		2,91		95,50		3,15	78465	231958
	XDNH-95	95,00	99,24		6,05		2,91		98,50		3,15	81024	239522
	XDNH-98	98,00	102,26		6,05		2,91		101,50		3,15	83583	247086
	XDNH-100	100,00	104,29	+1,30/-0,00	6,05		2,91		103,50	+0,54/-0,00	3,15	85288	252128
	XDNH-102	102,00	106,79		6,73		3,89		106,00		4,15	99422	343778
	XDNH-105	105,00	109,79		6,73		3,89		109,00		4,15	102346	353889
	XDNH-108	108,00	112,80		6,73		3,89		112,00		4,15	105270	364000
	XDNH-110	110,00	114,83		6,73		3,89		114,00		4,15	107220	370741
	XDNH-112	112,00	116,84		6,73		3,89		116,00		4,15	109169	377482
	XDNH-115	115,00	119,86		6,73		3,89		119,00		4,15	112093	387593
	XDNH-120	120,00	124,92		6,73		3,89		124,00		4,15	116967	404445
	XDNH-125	125,00	129,97	+1,40/-0,00	6,73	±0,15	3,89		129,00	+0,63/-0,00	4,15	121840	421297
	XDNH-127	127,00	131,97		6,73		3,89		131,00		4,15	123790	428038
	XDNH-130	130,00	135,00		6,73		3,89		134,00		4,15	126714	438149
	XDNH-135	135,00	140,03		6,73		3,89		139,00		4,15	131588	455001
	XDNH-140	140,00	145,11		6,73		3,89		144,00		4,15	136461	471852
	XDNH-145	145,00	150,11		6,73		3,89		149,00		4,15	141335	488704
	XDNH-150	150,00	156,13		7,92		3,89		155,00		4,15	182761	505556
	XDNH-155	155,00	161,19	+1,78/-0,00	7,92		3,89	±0,13	160,00	+0,72/-0,00	4,15	188853	522408
	XDNH-160	160,00	166,22		7,92		3,89		165,00		4,15	194945	539260
	XDNH-165	165,00	171,27		7,92		3,89		170,00		4,15	201037	556112
	XDNH-170	170,00	176,33		7,92		3,89		175,00		4,15	207129	572964
	XDNH-175	175,00	181,36		7,92		3,89		180,00		4,15	213221	589815
	XDNH-180	180,00	186,39		7,92		3,89		185,00		4,15	219313	606667
	XDNH-185	185,00	191,44		7,92		3,89		190,00		4,15	225405	623519
	XDNH-190	190,00	196,47		7,92		3,89		195,00		4,15	231497	640371
	XDNH-195	195,00	201,52	+3,05/-0,00	7,92	±0,19	3,89		200,00	+0,81/-0,00	4,15	237589	657223
	XDNH-200	200,00	206,58		7,92		3,89		205,00		4,15	243681	674075
	XDNH-210	210,00	217,58		9,53		4,86		216,00		5,15	307038	884268
	XDNH-220	220,00	227,66		9,53		4,86		226,00		5,15	321659	926376
	XDNH-230	230,00	237,72		9,53		4,86		236,00		5,15	336280	968484
	XDNH-240	240,00	247,80		9,53		4,86		246,00		5,15	350900	1010592
	XDNH-250	250,00	257,89		9,53		4,86		256,00		5,15	365521	1052700
	XDNH-260	260,00	269,93	+3,56/-0,00	11,18		4,86	±0,22/-0,00	268,00	+0,89/-0,00	5,15	506856	1094808
	XDNH-270	270,00	280,01		11,18		4,86		278,00		5,15	526351	1136916
	XDNH-280	280,00	290,09		11,18		4,86		288,00		5,15	545845	1179024
	XDNH-290	290,00	300,15		11,18		4,86		298,00		5,15	565340	1221132
	XDNH-300	300,00	310,24		11,18		4,86		308,00		5,15	584834	1263241
	XDNH-310	310,00	322,25		12,70		5,87		320,00		6,20	755411	1576625
	XDNH-320	320,00	332,33		12,70		5,87		330,00		6,20	779779	1627484
	XDNH-330	330,00	342,42	+0,89/-0,00	12,70	±0,19	5,87		340,00	+0,89/-0,00	6,20	804147	1678342
	XDNH-340	340,00	352,50		12,70		5,87		350,00		6,20	828515	1729201
	XDNH-350	350,00	362,56		12,70		5,87		360,00		6,20	852883	1780060
	XDNH-360	360,00	372,64		12,70		5,87		370,00		6,20	877251	1830919
	XDNH-370	370,00	382,73		12,70		5,87		380,00		6,20	901619	1881778
	XDNH-380	380,00	392,79		12,70		5,87		390,00		6,20	925987	1932637
	XDNH-390	390,00	402,84		12,70		5,87		400,00		6,20	950355	1983496
	XDNH-400	400,00	412,93		12,70		5,87		410,00		6,20	974723	2034354

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

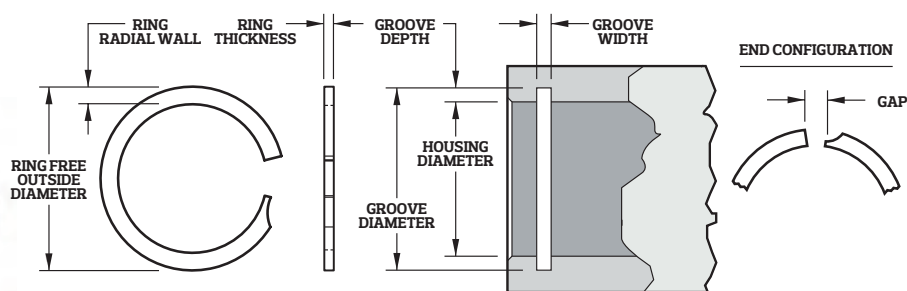
Snap Rings (Metric)

XFH Series

Stock items available in:

- Carbon steel
- 302 stainless steel

Groove Compatible
with DIN 472



	Part No. ¹	Housing Diameter	Ring			Groove		Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XFH-013	13,00	13,73	1,40	0,94	13,60	1,10	1931	10591
	XFH-014	14,00	14,74	1,40	0,94	14,60	1,10	2077	11396
	XFH-015	15,00	15,85	1,40	0,94	15,70	1,10	2602	12224
	XFH-016	16,00	16,90	1,65	0,94	16,80	1,10	3172	13029
	XFH-017	17,00	17,97	1,65	0,94	17,80	1,10	3367	13838
	XFH-018	18,00	19,18	1,90	0,94	19,00	1,10	4457	14666
	XFH-019	19,00	20,25	1,90	0,94	20,00	1,10	4702	15471
	XFH-020	20,00	21,20	1,90	0,94	21,00	1,10	4951	16276
	XFH-021	21,00	22,21	1,90	0,94	22,00	1,10	5200	17103
	XFH-022	22,00	23,22	1,90	0,94	23,00	1,10	5445	17913
	XFH-023	23,00	24,23	1,90	0,94	24,00	1,10	5698	18736
	XFH-024	24,00	25,40	2,15	1,15	25,20	1,30	6539	23927
	XFH-025	25,00	26,45	2,15	1,15	26,20	1,30	6806	24914
	XFH-026	26,00	27,46	2,15	1,15	27,20	1,30	7082	25929
	XFH-027	27,00	28,47	2,38	1,15	28,20	1,30	7353	26916
	XFH-028	28,00	29,68	2,38	1,15	29,40	1,30	9702	27904
	XFH-029	29,00	30,69	2,38	1,15	30,40	1,30	10053	28918
	XFH-030	30,00	31,79	2,38	1,15	31,40	1,30	10395	29905
	XFH-031	31,00	33,01	2,38	1,15	32,70	1,30	12660	30893
	XFH-032	32,00	33,93	2,38	1,15	33,70	1,30	13073	31907
	XFH-033	33,00	35,03	2,38	1,15	34,70	1,30	13478	32895
	XFH-034	34,00	36,04	3,25	1,44	35,70	1,60	13892	40319
	XFH-035	35,00	37,35	3,25	1,44	37,00	1,60	16899	41493
	XFH-036	36,00	38,36	3,25	1,44	38,00	1,60	17375	42663
	XFH-037	37,00	39,37	3,25	1,44	39,00	1,60	17869	43868
	XFH-038	38,00	40,44	3,25	1,44	40,00	1,60	18344	45043
	XFH-040	40,00	42,86	4,01	1,69	42,50	1,85	24265	55621
	XFH-041	41,00	43,91	4,01	1,69	43,50	1,85	24866	56995
	XFH-042	42,00	44,92	4,01	1,69	44,50	1,85	25484	58410
	XFH-045	45,00	47,88	4,01	1,69	47,50	1,85	27303	62578
	XFH-047	47,00	49,97	4,01	1,69	49,50	1,85	28504	65331
	XFH-048	48,00	50,98	4,01	1,69	50,50	1,85	29118	66741
	XFH-050	50,00	53,50	5,08	1,93	53,00	2,15	36529	75282
	XFH-051	51,00	54,43	5,08	1,93	54,00	2,15	37249	76776
	XFH-052	52,00	55,52	5,08	1,93	55,00	2,15	37974	78266
	XFH-055	55,00	58,55	5,08	1,93	58,00	2,15	40163	82777
	XFH-056	56,00	59,56	5,08	1,93	59,00	2,15	40906	84307
	XFH-057	57,00	60,68	5,08	1,93	60,00	2,15	41631	85797
	XFH-058	58,00	61,58	5,08	1,93	61,00	2,15	42352	87287
	XFH-060	60,00	63,60	5,08	1,93	63,00	2,15	43819	90308
	XFH-062	62,00	65,58	5,08	1,93	65,00	2,15	45283	93328
	XFH-063	63,00	66,63	5,08	1,93	66,00	2,15	46008	94823
	XFH-064	64,00	67,64	5,08	2,41	67,00	2,65	46751	114742

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Metric)

XFH Series

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness			Diameter	Width			Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XFH-065	65,00	68,70	5,08	2,41	±0,08		68,00	2,65	+0,30/-0,00		47471	116517
	XFH-067	67,00	70,54	5,08	2,41			70,00	2,65			48939	120115
	XFH-068	68,00	71,84	5,08	2,41			71,00	2,65			49660	121890
	XFH-070	70,00	73,64	5,08	2,41			73,00	2,65			51128	125489
	XFH-072	72,00	75,72	5,08	2,41			75,00	2,65			52591	129083
	XFH-075	75,00	78,75	5,08	2,41			78,00	2,65			54780	134456
	XFH-076	76,00	79,88	5,08	2,41			79,00	2,65			55505	136231
	XFH-078	78,00	81,73	5,08	2,41			81,00	2,65			56968	139830
	XFH-080	80,00	84,30	6,02	2,41			83,50	2,65			68342	143428
	XFH-082	82,00	86,32	6,02	2,41			85,50	2,65			70033	146978
	XFH-085	85,00	89,35	6,30	2,91	±0,13		88,50	3,15	+0,35/-0,00		72595	175046
	XFH-088	88,00	92,38	6,30	2,91			91,50	3,15			75175	181269
	XFH-090	90,00	94,70	6,30	2,91			93,50	3,15			76865	185353
	XFH-092	92,00	96,50	6,30	2,91			95,50	3,15			78582	189485
	XFH-095	95,00	99,62	6,30	2,91			98,50	3,15			81140	195659
	XFH-098	98,00	102,71	6,30	2,91			101,50	3,15			83702	201829
	XFH-100	100,00	104,50	6,30	2,91			103,50	3,15			85415	205962
	XFH-102	102,00	107,27	6,73	3,89			106,00	4,15	+0,54/-0,00		87127	269224
	XFH-105	105,00	109,96	6,73	3,89			109,00	4,15			102687	277133
	XFH-108	108,00	113,09	6,73	3,89			112,00	4,15			105619	285042
	XFH-110	110,00	115,10	6,73	3,89			114,00	4,15			107580	290340
	XFH-112	112,00	117,12	6,73	3,89			116,00	4,15			109520	295567
	XFH-115	115,00	120,15	6,73	3,89			119,00	4,15			112473	303547
	XFH-120	120,00	125,60	6,73	3,89			124,00	4,15			117344	316687
	XFH-125	125,00	130,25	6,73	3,89			129,00	4,15			122237	329893
	XFH-127	127,00	132,27	6,73	3,89			131,00	4,15			124199	335187
	XFH-130	130,00	135,30	6,73	3,89	±0,10		134,00	4,15	+0,63/-0,00		127130	343096
	XFH-135	135,00	140,35	6,73	3,89			139,00	4,15			132023	356303
	XFH-140	140,00	145,26	6,73	3,89			144,00	4,15			136916	369509
	XFH-145	145,00	150,45	6,73	3,89			149,00	4,15			141809	382716
	XFH-150	150,00	156,50	8,03	3,89			155,00	4,15			181986	395923
	XFH-155	155,00	161,55	8,03	3,89			160,00	4,15			188026	409063
	XFH-160	160,00	166,60	8,03	3,89			165,00	4,15			194094	422270
	XFH-165	165,00	171,70	8,03	3,89			170,00	4,15			200166	435476
	XFH-170	170,00	176,70	8,03	3,89			175,00	4,15			206237	448683
	XFH-175	175,00	181,75	8,03	3,89			180,00	4,15			212305	461890
	XFH-180	180,00	186,80	8,03	3,89	±0,15		185,00	4,15	+0,72/-0,00		218377	475097
	XFH-185	185,00	191,85	8,03	3,89			190,00	4,15			224417	488232
	XFH-190	190,00	197,15	8,03	3,89			195,00	4,15			230489	501439
	XFH-195	195,00	201,95	8,03	3,89			200,00	4,15			236556	514646
	XFH-200	200,00	207,00	8,03	3,89			205,00	4,15			242628	527853
	XFH-210	210,00	217,93	9,48	4,87			216,00	5,15			306763	657096
	XFH-220	220,00	228,20	9,48	4,87			226,00	5,15			321344	688327
	XFH-230	230,00	238,30	9,48	4,87			236,00	5,15			335961	719638
	XFH-240	240,00	248,40	9,48	4,87			246,00	5,15			350578	750953
	XFH-250	250,00	258,50	9,48	4,87	±0,13		256,00	5,15	+0,81/-0,00		365199	782264
	XFH-260	260,00	270,77	11,05	4,87			268,00	5,15			505300	813500
	XFH-270	270,00	280,70	11,05	4,87			278,00	5,15			524748	844811
	XFH-280	280,00	290,57	11,05	4,87			288,00	5,15			544,200	876126
	XFH-290	290,00	300,90	11,05	4,87			298,00	5,15			563599	907357
	XFH-300	300,00	311,00	11,05	4,87			308,00	5,15			583051	938673

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

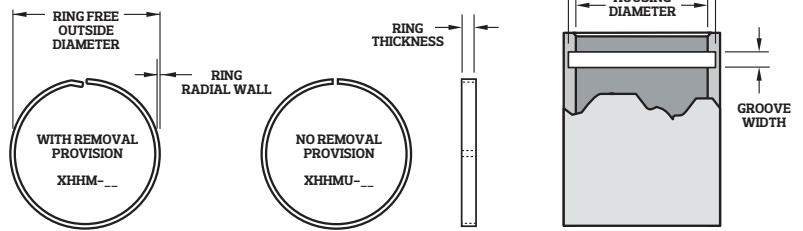
Hoopster® Rings (Metric)

XHHM/XHHMU Series

Stock items available in:

- Carbon steel
- 302 stainless steel

Select XHHM with bent end to facilitate easy removal.



	Part No. ^{1,2}	Housing Diameter	Ring			Groove		Groove Yield (N) ³
			Outside Diameter	Radial Wall	Thickness	Diameter ⁴	Width	
Metric (mm)	XHHM-10	10	10,63	0,43	1,14	10,43	1,27	1052
	XHHM-11	11	11,65	0,43	1,14	11,43	1,27	1157
	XHHM-12	12	12,67	0,43	1,14	12,43	1,27	1263
	XHHM-13	13	13,79	0,53	1,65	13,53	1,78	1690
	XHHM-14	14	14,81	0,53	1,65	14,53	1,78	1820
	XHHM-15	15	15,83	0,53	1,65	15,53	1,78	1950
	XHHM-16	16	16,85	0,53	1,65	16,53	1,78	2080
	XHHM-17	17	17,87	0,53	1,65	17,53	1,78	2210
	XHHM-18	18	18,97	0,61	2,24	18,61	2,36	2674
	XHHM-19	19	19,99	0,61	2,24	19,61	2,36	2822
	XHHM-20	20	21,01	0,61	2,24	20,61	2,36	2971
	XHHM-21	21	22,03	0,61	2,24	21,61	2,36	3119
	XHHM-22	22	23,05	0,61	2,24	22,61	2,36	3268
	XHHM-23	23	24,07	0,61	2,24	23,61	2,36	3417
	XHHM-24	24	25,09	0,61	2,24	24,61	2,36	3565
	XHHM-25	25	26,11	0,61	2,24	25,61	2,36	3714
	XHHM-26	26	27,28	0,76	3,00	26,76	3,12	4828
	XHHM-27	27	28,30	0,76	3,00	27,76	3,12	5013
	XHHM-28	28	29,32	0,76	3,00	28,76	3,12	5199
	XHHM-29	29	30,34	0,76	3,00	29,76	3,12	5385
	XHHM-30	30	31,36	0,76	3,00	30,76	3,12	5570
	XHHM-31	31	32,38	0,76	3,00	31,76	3,12	5756
	XHHM-32	32	33,40	0,76	3,00	32,76	3,12	5942
	XHHM-33	33	34,52	0,86	3,81	33,86	3,94	6945
	XHHM-34	34	35,54	0,86	3,81	34,86	3,94	7155
	XHHM-35	35	36,56	0,86	3,81	35,86	3,94	7365
	XHHM-36	36	37,58	0,86	3,81	36,86	3,94	7576
	XHHM-37	37	38,60	0,86	3,81	37,86	3,94	7786
	XHHM-38	38	39,62	0,86	3,81	38,86	3,94	7997
	XHHM-40	40	41,66	0,86	3,81	40,86	3,94	8418
	XHHM-41	41	42,68	0,86	3,81	41,86	3,94	8628
	XHHM-42	42	43,70	0,86	3,81	42,86	3,94	8838
	XHHM-45	45	46,87	0,97	4,75	45,97	4,88	10584
	XHHM-47	47	48,91	0,97	4,75	47,97	4,88	11054
	XHHM-48	48	49,93	0,97	4,75	48,97	4,88	11289
	XHHM-50	50	51,97	0,97	4,75	50,97	4,88	11760
	XHHM-51	51	52,99	0,97	4,75	51,97	4,88	11995
	XHHM-52	52	54,01	0,97	4,75	52,97	4,88	12230
	XHHM-55	55	57,07	0,97	4,75	55,97	4,90	12936
	XHHM-56	56	58,09	0,97	4,75	56,97	4,90	13171
	XHHM-57	57	59,11	0,97	4,75	57,97	4,90	13406
	XHHM-58	58	60,13	0,97	4,75	58,97	4,90	13641
	XHHM-60	60	62,17	0,97	4,75	60,97	4,90	14112
	XHHM-62	62	64,38	1,14	5,72	63,14	5,87	17268
	XHHM-63	63	65,40	1,14	5,72	64,14	5,87	17547
	XHHM-64	64	66,42	1,14	5,72	65,14	5,87	17826
	XHHM-65	65	67,44	1,14	5,72	66,14	5,87	18104
	XHHM-67	67	69,48	1,14	5,72	68,14	5,87	18661
	XHHM-68	68	70,50	1,14	5,72	69,14	5,87	18940
	XHHM-70	70	72,54	1,14	5,72	71,14	5,87	19497
	XHHM-72	72	74,58	1,14	5,72	73,14	5,87	20054
	XHHM-75	75	77,64	1,14	5,72	76,14	5,87	20889
	XHHM-76	76	78,66	1,14	5,72	77,14	5,87	21168

¹ Use "HHM" prefix for removal provision end. Use "HHMU" prefix for no removal provision. ² Add suffix "-S02" for 302 stainless steel.

³ Based on a groove material yield strength of 310 N/mm² and a safety factor of 2 ⁴ Sharp corners on the groove required

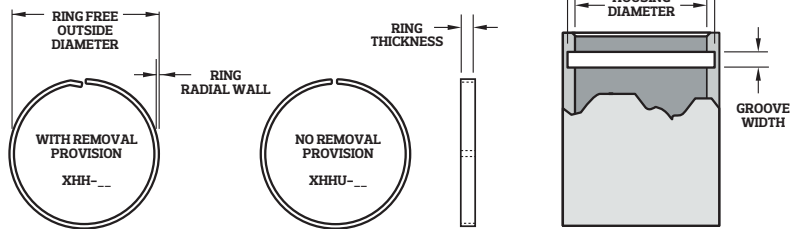
Hoopster® Rings (Imperial)

XHH/XHHU Series

Stock items available in:

- Carbon steel
- 302 stainless steel

Select XHH with bent end to facilitate easy removal.



	Part No. ^{1,2}	Housing Diameter	Ring			Groove		Groove Yield (lb) ³
			Outside Diameter	Radial Wall	Thickness	Diameter ⁴	Width	
Imperial (in.)	XHH-37	0,375	0,400	0,017	0,045	0,392	0,050	225
	XHH-43	0,437	0,463	0,017	0,045	0,454	0,050	263
	XHH-46	0,469	0,495	0,017	0,045	0,486	0,050	282
	XHH-50	0,500	0,531	0,021	0,065	0,521	0,070	371
	XHH-53	0,531	0,563	0,021	0,065	0,552	0,070	394
	XHH-56	0,562	0,594	0,021	0,065	0,583	0,070	417
	XHH-59	0,594	0,627	0,021	0,065	0,615	0,070	441
	XHH-62	0,625	0,659	0,021	0,065	0,646	0,070	464
	XHH-65	0,656	0,690	0,021	0,065	0,677	0,070	487
	XHH-68	0,688	0,723	0,021	0,065	0,709	0,070	511
	XHH-71	0,718	0,756	0,024	0,088	0,742	0,093	609
	XHH-75	0,750	0,789	0,024	0,088	0,774	0,093	636
	XHH-78	0,781	0,821	0,024	0,088	0,805	0,093	662
	XHH-81	0,812	0,852	0,024	0,088	0,836	0,093	689
	XHH-84	0,843	0,884	0,024	0,088	0,867	0,093	715
	XHH-87	0,875	0,917	0,024	0,088	0,899	0,093	742
	XHH-90	0,906	0,948	0,024	0,088	0,930	0,093	768
	XHH-93	0,938	0,981	0,024	0,088	0,962	0,093	796
	XHH-96	0,968	1,011	0,024	0,088	0,992	0,093	821
	XHH-100	1,000	1,044	0,024	0,088	1,024	0,093	848
	XHH-103	1,031	1,082	0,030	0,118	1,061	0,123	1093
	XHH-106	1,062	1,113	0,030	0,118	1,092	0,123	1126
	XHH-109	1,093	1,145	0,030	0,118	1,123	0,123	1159
	XHH-112	1,125	1,178	0,030	0,118	1,155	0,123	1193
	XHH-115	1,156	1,209	0,030	0,118	1,186	0,123	1226
	XHH-118	1,188	1,242	0,030	0,118	1,218	0,123	1260
	XHH-121	1,218	1,272	0,030	0,118	1,248	0,123	1291
	XHH-125	1,250	1,305	0,030	0,118	1,280	0,123	1325
	XHH-128	1,281	1,337	0,030	0,118	1,311	0,123	1358
	XHH-131	1,312	1,372	0,034	0,150	1,346	0,155	1577
	XHH-134	1,343	1,404	0,034	0,150	1,377	0,155	1614
	XHH-137	1,375	1,437	0,034	0,150	1,409	0,155	1652
	XHH-140	1,406	1,468	0,034	0,150	1,440	0,155	1690
	XHH-143	1,437	1,500	0,034	0,150	1,471	0,155	1727
	XHH-146	1,468	1,531	0,034	0,150	1,502	0,155	1765
	XHH-150	1,500	1,564	0,034	0,150	1,534	0,155	1802
	XHH-156	1,562	1,627	0,034	0,150	1,596	0,155	1877
	XHH-162	1,625	1,692	0,034	0,150	1,659	0,155	1953
	XHH-168	1,688	1,755	0,034	0,150	1,721	0,155	2028
	XHH-175	1,750	1,823	0,038	0,187	1,788	0,193	2350
	XHH-181	1,812	1,887	0,038	0,187	1,851	0,193	2434
	XHH-187	1,875	1,951	0,038	0,187	1,913	0,193	2518
	XHH-193	1,938	2,015	0,038	0,187	1,976	0,193	2603
	XHH-200	2,000	2,078	0,038	0,187	2,038	0,193	2686
	XHH-206	2,062	2,141	0,038	0,187	2,100	0,193	2769
	XHH-212	2,125	2,206	0,038	0,187	2,163	0,193	2854
	XHH-218	2,188	2,270	0,038	0,187	2,226	0,193	2939
	XHH-225	2,250	2,333	0,038	0,187	2,288	0,193	3022
	XHH-231	2,312	2,396	0,038	0,187	2,350	0,193	3105
	XHH-237	2,375	2,461	0,038	0,187	2,413	0,193	3190
	XHH-243	2,437	2,531	0,045	0,225	2,482	0,232	3876
	XHH-250	2,500	2,595	0,045	0,225	2,545	0,232	3976
	XHH-256	2,562	2,658	0,045	0,225	2,607	0,232	4075
	XHH-262	2,625	2,723	0,045	0,225	2,670	0,232	4175
	XHH-268	2,688	2,787	0,045	0,225	2,733	0,232	4275
	XHH-275	2,750	2,850	0,045	0,225	2,795	0,232	4374
	XHH-281	2,812	2,914	0,045	0,225	2,858	0,232	4472
	XHH-287	2,875	2,978	0,045	0,225	2,920	0,232	4572
	XHH-293	2,938	3,041	0,045	0,225	2,982	0,232	4673
	XHH-300	3,000	3,105	0,045	0,225	3,045	0,232	4771

¹ Use "HH" prefix for removal provision end. Use "HHU" prefix for no removal provision. ² Add suffix "-502" for 302 stainless steel.

³ Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ⁴ Sharp corners on the groove required,

Light Duty Rings (Imperial)

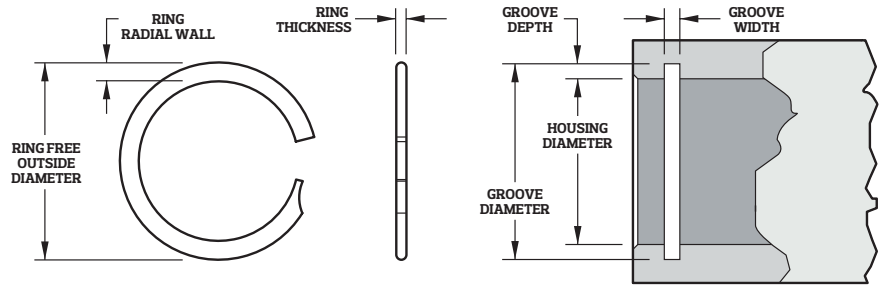
XVH Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel



* No Removal Notch



	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity		
			Outside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XVH-25*	0,250	0,264	+0,010/-0,000	0,020		0,012		0,262	±0,002	0,015		106	481
	XVH-31*	0,312	0,329		0,025		0,015		0,326		0,018		154	750
	XVH-37*	0,375	0,398		0,030		0,015		0,395		0,018		265	901
	XVH-43	0,437	0,466	+0,012/-0,000	0,030	0,015	0,463	0,018	402	1050				
	XVH-50	0,500	0,531	+0,013/-0,000	0,045	0,018	0,528	0,022	500	1300				
	XVH-56	0,562	0,593		0,045	0,018	0,590	0,022	560	1460				
	XVH-62	0,625	0,656		0,045	0,018	0,653	0,022	620	1630				
	XVH-68	0,687	0,719		0,045	0,018	0,715	0,022	680	1790				
	XVH-75	0,750	0,783		0,045	0,018	0,779	0,022	800	1950				
	XVH-81	0,812	0,862		0,065	0,021	0,854	±0,003	0,026	1210	2460			
	XVH-87	0,875	0,926	0,065	0,021	0,917	0,026		1300	2660				
	XVH-93	0,937	0,989	0,065	0,021	0,979	0,026		1390	2840				
	XVH-100	1,000	1,052	+0,015/-0,000	0,065	0,021	1,042	0,026	1480	3040				
	XVH-106	1,062	1,117		0,088	0,025	1,106	0,031	1650	3500				
	XVH-112	1,125	1,180		0,088	0,025	1,169	0,031	1750	3710				
	XVH-118	1,187	1,242		0,088	0,025	1,231	0,031	1850	3920				
	XVH-125	1,250	1,307		0,088	0,025	1,294	0,031	1940	4120				
	XVH-131	1,312	1,369		0,088	0,025	1,356	0,031	2040	4330				
	XVH-137	1,375	1,433		0,088	0,025	1,419	0,031	2140	4540				
	XVH-143	1,437	1,496		0,088	0,025	1,481	0,031	2240	4740				
	XVH-150	1,500	1,559	+0,015/-0,000	0,088	0,025	1,544	0,031	2330	4950				
	XVH-156	1,562	1,637		±0,004	0,118		1,619	±0,005	0,039	+0,003/-0,000	3200	6390	
	XVH-162	1,625	1,701			0,118		0,031		1,682		0,039	3330	6650
	XVH-168	1,687	1,763			0,118		0,031		1,744		0,039	3460	6900
	XVH-175	1,750	1,827			0,118		0,031		1,807		0,039	3590	7160
	XVH-181	1,812	1,890			0,118		0,031		1,869		0,039	3710	7410
	XVH-187	1,875	1,953	+0,020/-0,000		0,118		0,031		1,932		0,039	3840	7670
	XVH-193	1,937	2,016		0,118	0,031	1,994	0,039	3970	7920				
	XVH-200	2,000	2,079		0,118	0,031	2,057	0,039	4100	8180				
	XVH-206	2,062	2,162		+0,025/-0,000	0,158	±0,002	2,138	±0,006	0,039	+0,003/-0,000	5540	8430	
	XVH-212	2,125	2,226			0,158		0,031		2,201		0,039	5710	8690
	XVH-218	2,187	2,289			0,158		0,031		2,263		0,039	5870	8950
	XVH-225	2,250	2,352	0,158		0,031		2,326		0,039		6040	9200	
	XVH-231	2,312	2,415	0,158		0,031		2,388		0,039		6210	9460	
	XVH-237	2,375	2,478	0,158		0,031		2,451		0,039		6380	9720	
	XVH-243	2,437	2,541	+0,025/-0,000	0,158	0,031	2,513	0,039	6550	9970				
	XVH-250	2,500	2,605		0,158	0,031	2,576	0,039	6720	10230				
	XVH-256	2,562	2,667		0,158	0,031	2,638	0,039	6880	10480				
	XVH-262	2,625	2,731		0,158	0,031	2,701	0,039	7050	10740				
	XVH-268	2,687	2,794		0,158	0,031	2,763	0,039	7220	10990				
	XVH-275	2,750	2,857		0,158	0,031	2,826	0,039	7390	11250				
	XVH-281	2,812	2,920		0,158	0,031	2,888	0,039	7550	11500				
	XVH-287	2,875	2,983		0,158	0,031	2,951	0,039	7720	11760				
	XVH-293	2,937	3,046		0,158	0,031	3,013	0,039	7890	12010				
	XVH-300	3,000	3,110		0,158	0,031	3,076	0,039	8060	12270				

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Light Duty Rings (Imperial)

XVH Series

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity				
			Outside Diameter		Radial Wall		Thickness	Diameter		Width	Groove Yield (lb) ²	Ring Shear (lb) ³				
Imperial (in.)	XVH-306	3,062	3,188	+0,030/-0,000	0,188	±0,005	0,039	±0,002	3,154	±0,006	0,044	+0,003/-0,000	9960	15760		
	XVH-312	3,125	3,251		0,188		0,039		3,217		0,044		10160	16080		
	XVH-318	3,187	3,314		0,188		0,039		3,279		0,044		10360	16400		
	XVH-325	3,250	3,377		0,188		0,039		3,342		0,044		10570	16720		
	XVH-331	3,312	3,440		0,188		0,039		3,404		0,044		10770	17040		
	XVH-337	3,375	3,504		0,188		0,039		3,467		0,044		10970	17370		
	XVH-343	3,437	3,566		0,188		0,039		3,529		0,044		11180	17690		
	XVH-350	3,500	3,630		0,188		0,039		3,592		0,044		11380	18010		
	XVH-356	3,562	3,692		0,188		0,039		3,654		0,044		11580	18330		
	XVH-362	3,625	3,756		0,188		0,039		3,717		0,044		11790	18650		
	XVH-368	3,687	3,819	0,188	0,039	3,779	0,044	11990	18970							
	XVH-375	3,750	3,882	0,188	0,039	3,842	0,044	12190	19300							
	XVH-381	3,812	3,945	0,188	0,039	3,904	0,044	12400	19620							
	XVH-387	3,875	4,009	0,188	0,039	3,967	0,044	12600	19940							
	XVH-393	3,937	4,071	0,188	0,039	4,029	0,044	12800	20260							
	XVH-400	4,000	4,135	0,188	0,039	4,092	0,044	13010	20580							
	XVH-412	4,125	4,279	+0,035/-0,000	0,225	±0,005	0,046	±0,002	4,235	±0,006	0,052	+0,004/-0,000	16040	23850		
	XVH-425	4,250	4,405		0,225		0,046		4,360		0,052		16520	24570		
	XVH-437	4,375	4,531		0,225		0,046		4,485		0,052		17010	25290		
	XVH-450	4,500	4,658		0,225		0,046		4,610		0,052		17500	26010		
	XVH-462	4,625	4,784		0,225		0,046		4,735		0,052		17980	26740		
	XVH-475	4,750	4,910		0,225		0,046		4,860		0,052		18470	27460		
	XVH-487	4,875	5,036		0,225		0,046		4,985		0,052		18950	28180		
	XVH-500	5,000	5,163		0,225		0,046		5,110		±0,007		0,052	19440	28900	
	XVH-525	5,250	5,435		+0,045/-0,000		0,225		0,061				5,381	0,067	24490	40240
	XVH-550	5,500	5,694				0,225		0,061				5,638	0,067	26830	42160
	XVH-575	5,750	5,953	0,225		0,061	5,894	0,067	29260	44080						
	XVH-600	6,000	6,212	0,265		0,061	6,150	0,067	31810	45990						
	XVH-625	6,250	6,470	0,265		0,061	6,406	0,067	34460	47910						
	XVH-650	6,500	6,730	0,265		0,061	6,663	0,067	37680	49830						
	XVH-675	6,750	6,988	0,265		0,061	6,919	0,067	40560	51740						
	XVH-700	7,000	7,247	0,265		0,061	7,175	0,067	43540	53660						
	XVH-725	7,250	7,505	+0,060/-0,000		0,265	±0,004/-0,008	0,061	±0,008	7,431		0,067	46640	55580		
	XVH-750	7,500	7,765			0,265		0,061		7,688	0,067	49830	57490			
	XVH-775	7,750	8,023		0,300	0,061		7,944		0,067	53140	59410				
	XVH-800	8,000	8,282		0,300	0,061		8,200		0,067	56550	61320				
	XVH-825	8,250	8,541		0,300	0,061		8,456		0,067	60070	63240				
	XVH-850	8,500	8,800		0,300	0,061		8,713		0,067	64290	65160				
	XVH-875	8,750	9,059		0,345	0,076		8,969		0,082	68040	83570				
	XVH-900	9,000	9,317		+0,070/-0,000	0,345		0,076		9,225	0,082	71890	85950			
	XVH-925	9,250	9,576			0,345		0,076		9,481	0,082	75850	88340			
	XVH-950	9,500	9,835			0,345		0,076		9,738	0,082	79910	90730			
	XVH-975	9,750	10,094	0,345		0,076	9,994	0,082	84080	93120						
	XVH-1000	10,000	10,353	0,345		0,076	10,250	0,082	88360	95500						

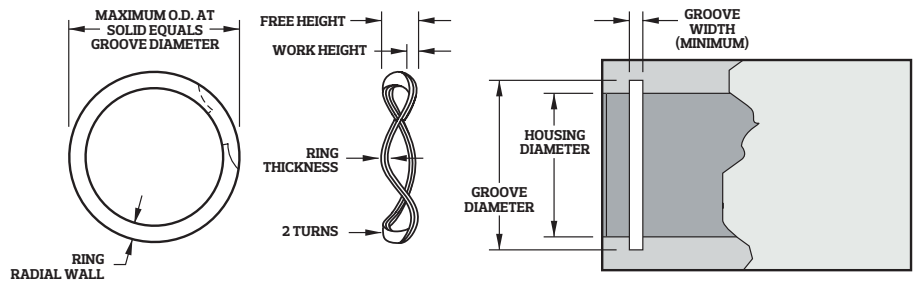
¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

WaveRing Series (Imperial)

YWHW Series

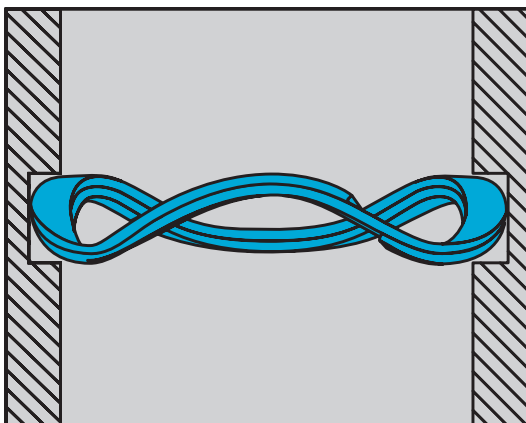
Stock items available in:

- Carbon steel
- 17-7PH stainless steel



	Part No. ¹	Housing Diameter	Load (lb) @ Work Height	Max. Free Height	Number of Waves	Ring		Crimp	Groove	
						Thickness	Radial Wall		Diameter	Width Min.
Imperial (in.)	YWHW-75	0,750	25 @ 0,080	0,114	3	0,035	0,065	N	0,796	0,119
	YWHW-87	0,875	30 @ 0,085	0,110	3	0,042	0,085	N	0,931	0,115
	YWHW-100	1,000	34 @ 0,085	0,120	3	0,042	0,085	N	1,066	0,125
	YWHW-112	1,125	38 @ 0,100	0,125	3	0,050	0,128	N	1,197	0,130
	YWHW-125	1,250	40 @ 0,100	0,135	3	0,050	0,128	N	1,330	0,140
	YWHW-137	1,375	45 @ 0,100	0,125	4	0,050	0,128	N	1,461	0,130
	YWHW-150	1,500	50 @ 0,100	0,135	4	0,050	0,128	N	1,594	0,140
	YWHW-162	1,625	55 @ 0,110	0,135	4	0,062	0,158	N	1,725	0,140
	YWHW-175	1,750	60 @ 0,110	0,140	4	0,062	0,158	N	1,858	0,145
	YWHW-187	1,875	63 @ 0,110	0,141	4	0,062	0,158	N	1,989	0,146
	YWHW-200	2,000	65 @ 0,110	0,150	4	0,062	0,158	N	2,122	0,155
	YWHW-212	2,125	70 @ 0,130	0,170	4	0,078	0,188	N	2,251	0,175
	YWHW-225	2,250	75 @ 0,130	0,175	4	0,078	0,188	N	2,382	0,180
	YWHW-237	2,375	80 @ 0,130	0,180	4	0,078	0,188	N	2,517	0,185
	YWHW-250	2,500	84 @ 0,130	0,183	4	0,078	0,188	N	2,648	0,188
	YWHW-262	2,625	88 @ 0,170	0,220	4	0,093	0,225	N	2,781	0,225
	YWHW-275	2,750	94 @ 0,170	0,229	4	0,093	0,225	N	2,914	0,234
	YWHW-287	2,875	97 @ 0,170	0,225	4	0,093	0,225	N	3,051	0,230
	YWHW-300	3,000	100 @ 0,170	0,230	4	0,093	0,225	N	3,182	0,235
	YWHW-312	3,125	103 @ 0,185	0,250	4	0,111	0,281	Y	3,315	0,255
	YWHW-325	3,250	106 @ 0,185	0,250	4	0,111	0,281	Y	3,446	0,255
	YWHW-350	3,500	115 @ 0,185	0,245	4	0,111	0,281	Y	3,710	0,250
	YWHW-362	3,625	117 @ 0,185	0,250	4	0,111	0,281	Y	3,841	0,250
	YWHW-375	3,750	121 @ 0,185	0,255	4	0,111	0,312	Y	3,974	0,260
	YWHW-387	3,875	126 @ 0,185	0,260	4	0,111	0,312	Y	4,107	0,265
	YWHW-400	4,000	130 @ 0,185	0,255	4	0,111	0,312	Y	4,240	0,260
	YWHW-412	4,125	134 @ 0,185	0,258	4	0,111	0,312	Y	4,365	0,263
	YWHW-425	4,250	140 @ 0,185	0,264	4	0,111	0,312	Y	4,490	0,269
	YWHW-450	4,500	150 @ 0,185	0,250	5	0,111	0,312	Y	4,740	0,255
	YWHW-475	4,750	160 @ 0,185	0,252	5	0,111	0,312	Y	4,995	0,257
	YWHW-500	5,000	170 @ 0,185	0,247	5	0,111	0,312	Y	5,260	0,252

¹ Add suffix "-S17" for stainless steel.



Gear Bracket Application

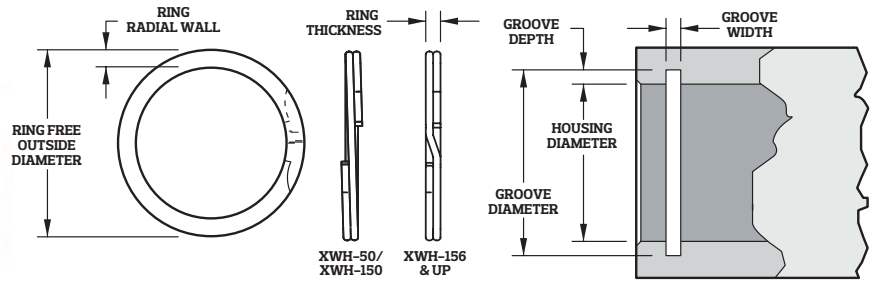
Medium Duty Rings (Imperial)

XWH Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

AS3217, AS4299,
MIL-DTL-27426/3



	Part No. ¹	Housing Diameter	Ring			Groove		Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWH-50	0,500	0,532	0,045	0,025	0,526	0,030	460	2000
	XWH-51	0,512	0,544	0,045	0,025	0,538	0,030	470	2050
	XWH-53	0,531	0,564	0,045	0,025	0,557	0,030	490	2130
	XWH-56	0,562	0,594	0,045	0,025	0,588	0,030	520	2250
	XWH-59	0,594	0,626	0,045	0,025	0,619	0,030	550	2380
	XWH-62	0,625	0,658	0,045	0,025	0,651	0,030	570	2500
	XWH-65	0,656	0,689	0,045	0,025	0,682	0,030	600	2630
	XWH-68	0,687	0,720	0,045	0,025	0,713	0,030	630	2750
	XWH-71	0,718	0,751	0,045	0,025	0,744	0,030	660	2870
	XWH-75	0,750	0,790	0,065	0,031	0,782	0,036	850	3360
	XWH-77	0,777	0,817	0,065	0,031	0,808	0,036	880	3480
	XWH-78	0,781	0,821	0,065	0,031	0,812	0,036	880	3500
	XWH-81	0,812	0,853	0,065	0,031	0,843	0,036	920	3640
	XWH-84	0,843	0,889	0,065	0,031	0,880	0,036	1130	3780
	XWH-86	0,866	0,913	0,065	0,031	0,903	0,036	1160	3880
	XWH-87	0,875	0,922	0,065	0,031	0,912	0,036	1180	3920
	XWH-90	0,906	0,949	0,065	0,031	0,939	0,036	1220	4060
	XWH-93	0,938	0,986	0,065	0,031	0,975	0,036	1260	4200
	XWH-96	0,968	1,025	0,075	0,037	1,015	0,042	1440	5180
	XWH-98	0,987	1,041	0,075	0,037	1,030	0,042	1470	5280
	XWH-100	1,000	1,054	0,075	0,037	1,043	0,042	1480	5350
	XWH-102	1,023	1,078	0,075	0,037	1,066	0,042	1520	5470
	XWH-103	1,031	1,084	0,075	0,037	1,074	0,042	1530	5510
	XWH-106	1,062	1,117	0,075	0,037	1,104	0,042	1580	5680
	XWH-109	1,093	1,147	0,075	0,037	1,135	0,042	1620	5840
	XWH-112	1,125	1,180	0,075	0,037	1,167	0,042	1670	6020
	XWH-115	1,156	1,210	0,075	0,037	1,198	0,042	1720	6180
	XWH-118	1,188	1,249	0,085	0,043	1,236	0,048	2020	7380
	XWH-121	1,218	1,278	0,085	0,043	1,266	0,048	2070	7570
	XWH-125	1,250	1,312	0,085	0,043	1,298	0,048	2120	7770
	XWH-128	1,281	1,342	0,085	0,043	1,329	0,048	2170	7960
	XWH-131	1,312	1,374	0,085	0,043	1,360	0,048	2230	8150
	XWH-134	1,343	1,408	0,085	0,043	1,395	0,048	2470	8350
	XWH-137	1,375	1,442	0,095	0,043	1,427	0,048	2530	8540
	XWH-140	1,406	1,472	0,095	0,043	1,458	0,048	2580	8740
	XWH-143	1,437	1,504	0,095	0,043	1,489	0,048	2640	8930
	XWH-145	1,456	1,523	0,095	0,043	1,508	0,048	2680	9050
	XWH-146	1,468	1,535	0,095	0,043	1,520	0,048	2700	9120
	XWH-150	1,500	1,567	0,095	0,043	1,552	0,048	2760	9320
	XWH-156	1,562	1,634	0,108	0,049	1,617	0,056	3090	10100
	XWH-157	1,574	1,649	0,108	0,049	1,633	0,056	3340	10180
	XWH-162	1,625	1,701	0,108	0,049	1,684	0,056	3350	10510
	XWH-165	1,653	1,730	0,108	0,049	1,712	0,056	3510	10690
	XWH-168	1,687	1,768	0,118	0,049	1,750	0,056	3700	10910
	XWH-175	1,750	1,834	0,118	0,049	1,813	0,056	3840	11310
	XWH-181	1,813	1,894	0,118	0,049	1,875	0,056	3970	11720
	XWH-185	1,850	1,937	0,118	0,049	1,917	0,056	4450	11960

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3

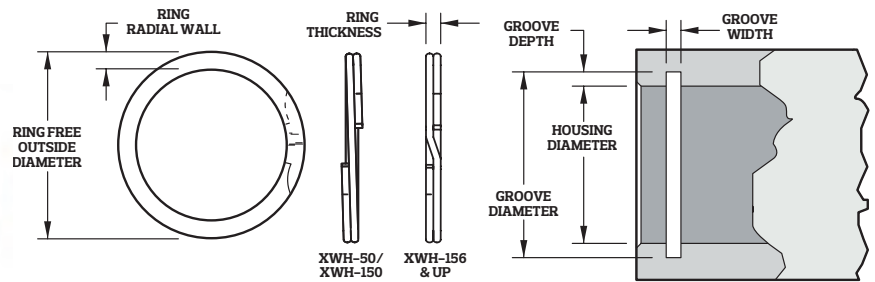
Medium Duty Rings (Imperial)

XWH Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

AS3217, AS4299,
MIL-DTL-27426/3



	Part No. ¹	Housing Diameter	Ring			Groove		Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWH-187	1,875	1,960	0,118	0,049	1,942	0,056	4510	12120
	XWH-193	1,938	2,025	0,118	0,049	2,005	0,056	4660	12530
	XWH-200	2,000	2,091	0,128	0,049	2,071	0,056	4950	12930
	XWH-204	2,047	2,138	0,128	0,049	2,118	0,056	5060	13240
	XWH-206	2,062	2,154	0,128	0,049	2,132	0,056	5100	13330
	XWH-212	2,125	2,217	0,128	0,049	2,195	0,056	5260	13740
	XWH-216	2,165	2,260	0,138	0,049	2,239	0,056	5660	14000
	XWH-218	2,188	2,284	0,138	0,049	2,262	0,056	5720	14150
	XWH-225	2,250	2,347	0,138	0,049	2,324	0,056	5890	14550
	XWH-231	2,312	2,413	0,138	0,049	2,390	0,056	6370	14950
	XWH-237	2,375	2,476	0,138	0,049	2,453	0,056	6550	15360
	XWH-243	2,437	2,543	0,148	0,049	2,519	0,056	7060	15760
	XWH-244	2,440	2,546	0,148	0,049	2,522	0,056	7070	15780
	XWH-250	2,500	2,606	0,148	0,049	2,582	0,056	7250	16160
	XWH-253	2,531	2,641	0,148	0,049	2,617	0,056	7690	16360
	XWH-256	2,562	2,673	0,148	0,049	2,648	0,056	7790	16560
	XWH-262	2,625	2,736	0,148	0,049	2,711	0,056	7980	16970
	XWH-267	2,677	2,789	0,158	0,049	2,767	0,056	8520	17310
	XWH-268	2,688	2,803	0,158	0,049	2,778	0,056	8550	17380
	XWH-275	2,750	2,865	0,158	0,049	2,841	0,056	8750	17780
	XWH-281	2,813	2,929	0,158	0,049	2,903	0,056	8950	18190
	XWH-283	2,834	2,954	0,168	0,049	2,928	0,056	9520	18320
	XWH-287	2,875	2,995	0,168	0,049	2,969	0,056	9550	18590
	XWH-293	2,937	3,058	0,168	0,049	3,031	0,056	9760	18990
	XWH-295	2,952	3,073	0,168	0,049	3,046	0,056	9810	19090
	XWH-300	3,000	3,122	0,168	0,061	3,096	0,068	10180	24150
	XWH-306	3,062	3,186	0,168	0,061	3,158	0,068	10390	24650
	XWH-312	3,125	3,251	0,178	0,061	3,223	0,068	10600	25150
	XWH-314	3,149	3,276	0,178	0,061	3,247	0,068	10680	25350
	XWH-318	3,187	3,311	0,178	0,061	3,283	0,068	10810	25650
	XWH-325	3,250	3,379	0,178	0,061	3,350	0,068	11490	26160
	XWH-331	3,312	3,446	0,188	0,061	3,416	0,068	12170	26660
	XWH-334	3,346	3,479	0,188	0,061	3,450	0,068	12300	26930
	XWH-337	3,375	3,509	0,188	0,061	3,479	0,068	12410	27170
	XWH-343	3,437	3,574	0,188	0,061	3,543	0,068	12880	27660
	XWH-350	3,500	3,636	0,188	0,061	3,606	0,068	13110	28170
	XWH-354	3,543	3,684	0,198	0,061	3,653	0,068	13770	28520
	XWH-356	3,562	3,703	0,198	0,061	3,672	0,068	13850	28670
	XWH-362	3,625	3,769	0,198	0,061	3,737	0,068	14350	29180
	XWH-368	3,687	3,832	0,198	0,061	3,799	0,068	14600	29680
	XWH-374	3,740	3,885	0,198	0,061	3,852	0,068	14800	30100
	XWH-375	3,750	3,894	0,198	0,061	3,862	0,068	14840	30180
	XWH-381	3,812	3,963	0,208	0,061	3,930	0,068	15900	30680
	XWH-387	3,875	4,025	0,208	0,061	3,993	0,068	16160	31190
	XWH-393	3,938	4,089	0,208	0,061	4,056	0,068	16420	31700
	XWH-400	4,000	4,157	0,218	0,061	4,124	0,068	17530	32200
	XWH-406	4,063	4,222	0,218	0,061	4,187	0,068	17810	32700
	XWH-412	4,125	4,284	0,218	0,061	4,249	0,068	18080	33200
	XWH-418	4,188	4,347	0,218	0,061	4,311	0,068	18350	33710
	XWH-425	4,250	4,416	0,228	0,061	4,380	0,068	19530	34210
	XWH-431	4,312	4,479	0,228	0,061	4,442	0,068	19810	34710
	XWH-433	4,330	4,497	0,228	0,061	4,460	0,068	19900	34850

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Medium Duty Rings (Imperial)

XWH Series

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness			Diameter	Width			Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWH-437	4,375	4,543	0,228	0,061	±0,003		4,505	0,068			20100	35210
	XWH-443	4,437	4,611	0,238	0,061			4,573	0,068			21330	35710
	XWH-450	4,500	4,674	0,238	0,061			4,636	0,068			21630	36220
	XWH-452	4,527	4,701	0,238	0,061			4,663	0,068			21760	36440
	XWH-456	4,562	4,737	0,238	0,061	±0,006		4,698	0,068			21930	36720
	XWH-462	4,625	4,803	0,250	0,072			4,765	0,079			22890	43940
	XWH-468	4,687	4,867	0,250	0,072			4,827	0,079			23190	44530
	XWH-472	4,724	4,903	0,250	0,072			4,864	0,079			23370	44880
	XWH-475	4,750	4,930	0,250	0,072	±0,006		4,890	0,079			23500	45130
	XWH-481	4,812	4,993	0,250	0,072			4,952	0,079			23810	45720
	XWH-487	4,875	5,055	0,250	0,072			5,015	0,079			24120	46310
	XWH-492	4,921	5,102	0,250	0,072			5,061	0,079			24350	46750
	XWH-493	4,937	5,122	0,250	0,072	±0,007		5,081	0,079			25130	46900
	XWH-500	5,000	5,185	0,250	0,072			5,144	0,079			25450	47500
	XWH-511	5,118	5,304	0,250	0,072			5,262	0,079			26050	48620
	XWH-512	5,125	5,311	0,250	0,072			5,269	0,079			26100	48690
	XWH-525	5,250	5,436	0,250	0,072	±0,004		5,393	0,079			26720	49880
	XWH-537	5,375	5,566	0,250	0,072			5,522	0,079			28120	51060
	XWH-550	5,500	5,693	0,250	0,072			5,647	0,079			28770	52250
	XWH-551	5,511	5,703	0,250	0,072			5,658	0,079			28830	52360
	XWH-562	5,625	5,818	0,250	0,072	±0,004		5,772	0,079			29400	53440
	XWH-570	5,708	5,909	0,250	0,072			5,861	0,079			31070	54230
	XWH-575	5,750	5,950	0,250	0,072			5,903	0,079			31300	54630
	XWH-587	5,875	6,077	0,250	0,072			6,028	0,079			31980	55810
	XWH-590	5,905	6,106	0,250	0,072	±0,008		6,058	0,079			32140	56100
	XWH-600	6,000	6,202	0,250	0,072			6,153	0,079			32660	57000
	XWH-612	6,125	6,349	0,312	0,086			6,297	0,094			37200	69500
	XWH-625	6,250	6,474	0,312	0,086			6,422	0,094			37990	70920
	XWH-629	6,299	6,524	0,312	0,086	±0,006/-0,000		6,471	0,094			38290	71480
	XWH-637	6,375	6,601	0,312	0,086			6,547	0,094			38750	72340
	XWH-650	6,500	6,726	0,312	0,086			6,672	0,094			39510	73760
	XWH-662	6,625	6,863	0,312	0,086			6,807	0,094			42620	75180
	XWH-669	6,692	6,931	0,312	0,086	±0,004		6,874	0,094			43050	75940
	XWH-675	6,750	6,987	0,312	0,086			6,932	0,094			43420	76600
	XWH-687	6,875	7,114	0,312	0,086			7,057	0,094			44220	78010
	XWH-700	7,000	7,239	0,312	0,086			7,182	0,094			45030	79430
	XWH-708	7,086	7,337	0,312	0,086	±0,008		7,278	0,094			48080	80410
	XWH-712	7,125	7,376	0,312	0,086			7,317	0,094			48350	80850
	XWH-725	7,250	7,501	0,312	0,086			7,442	0,094			49200	82270
	XWH-737	7,375	7,628	0,312	0,086			7,567	0,094			50050	83690
	XWH-748	7,480	7,734	0,312	0,086	±0,006/-0,000		7,672	0,094			50760	84880
	XWH-750	7,500	7,754	0,312	0,086			7,692	0,094			50890	85110
	XWH-762	7,625	7,890	0,312	0,086			7,827	0,094			54440	86520
	XWH-775	7,750	8,014	0,312	0,086			7,952	0,094			55330	87940
	XWH-787	7,875	8,131	0,312	0,086	±0,006/-0,000		8,077	0,094			63360	89360
	XWH-800	8,000	8,266	0,312	0,086			8,202	0,094			57110	90780
	XWH-825	8,250	8,528	0,375	0,086			8,462	0,094			61820	93620
	XWH-826	8,267	8,546	0,375	0,086			8,479	0,094			61940	93810
	XWH-846	8,464	8,744	0,375	0,086	±0,006/-0,000		8,676	0,094			63420	96050
	XWH-850	8,500	8,780	0,375	0,086			8,712	0,094			63690	96450
	XWH-875	8,750	9,041	0,375	0,086			8,972	0,094			68650	99290
	XWH-885	8,858	9,151	0,375	0,086			9,080	0,094			69500	100520
	XWH-900	9,000	9,293	0,375	0,086	±0,006/-0,000		9,222	0,094			70620	102130
	XWH-905	9,055	9,359	0,375	0,086			9,287	0,094			74250	102750
	XWH-925	9,250	9,555	0,375	0,086			9,482	0,094			75850	104960
	XWH-944	9,448	9,755	0,375	0,086			9,680	0,094			77470	107210
	XWH-950	9,500	9,806	0,375	0,086	±0,006/-0,000		9,732	0,094			77900	107800
	XWH-975	9,750	10,068	0,375	0,086			9,992	0,094			83390	110640
	XWH-1000	10,000	10,320	0,375	0,086			10,242	0,094			85530	113470
	XWH-1025	10,250	10,582	0,375	0,086			10,502	0,094			91290	116310
	XWH-1050	10,500	10,834	0,375	0,086	±0,006/-0,000		10,752	0,094			93520	119150
	XWH-1075	10,750	11,095	0,375	0,086			11,012	0,094			99540	121990
	XWH-1100	11,000	11,347	0,375	0,086			11,262	0,094			101860	124820

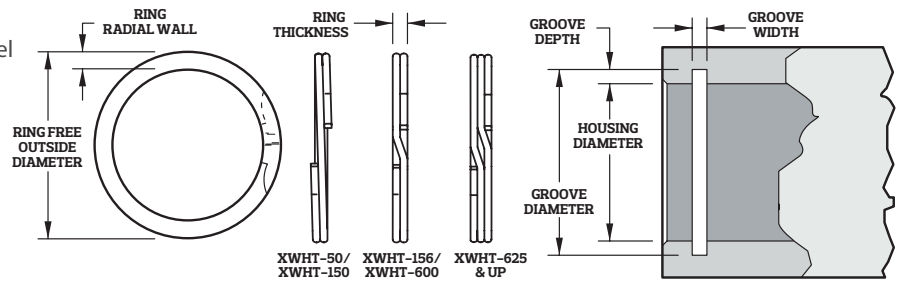
¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Medium Heavy Duty Rings (Imperial)

XWHT Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel



	Part No. ¹	Housing Diameter	Ring				Groove			Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness		Diameter	Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWHT-50	0,500	0,529	0,045	0,035	±0,002	0,524	0,039	±0,003/-0,000	420	2530
	XWHT-51	0,512	0,541	0,045	0,035	±0,003	0,536	0,039	±0,003/-0,000	430	2590
	XWHT-56	0,562	0,597	0,045	0,035	±0,003	0,592	0,039	±0,003/-0,000	600	2840
	XWHT-62	0,625	0,665	0,045	0,035	±0,003	0,659	0,039	±0,003/-0,000	750	3160
	XWHT-68	0,688	0,730	0,055	0,035	±0,002	0,724	0,039	±0,003/-0,000	880	3480
	XWHT-75	0,750	0,796	0,055	0,035	±0,002	0,790	0,039	±0,003/-0,000	1060	3790
	XWHT-77	0,777	0,825	0,065	0,042	±0,003	0,819	0,046	±0,003/-0,000	1150	4720
	XWHT-81	0,812	0,864	0,065	0,042	±0,003	0,857	0,046	±0,003/-0,000	1320	4930
	XWHT-86	0,866	0,919	0,065	0,042	±0,003	0,912	0,046	±0,003/-0,000	1410	5260
	XWHT-87	0,875	0,929	0,065	0,042	±0,003	0,922	0,046	±0,003/-0,000	1480	5310
	XWHT-90	0,901	0,957	0,065	0,042	±0,003	0,950	0,046	±0,003/-0,000	1590	5470
	XWHT-93	0,938	0,997	0,075	0,042	±0,003	0,989	0,046	±0,003/-0,000	1720	5690
	XWHT-100	1,000	1,063	0,075	0,042	±0,003	1,055	0,046	±0,003/-0,000	1980	6070
	XWHT-102	1,023	1,087	0,075	0,042	±0,003	1,079	0,046	±0,003/-0,000	2030	6210
	XWHT-106	1,062	1,129	0,078	0,050	±0,004	1,120	0,056	±0,004/-0,000	2180	7010
	XWHT-112	1,125	1,195	0,078	0,050	±0,004	1,185	0,056	±0,004/-0,000	2390	7420
	XWHT-118	1,188	1,260	0,088	0,050	±0,004	1,250	0,056	±0,004/-0,000	2600	7840
	XWHT-125	1,250	1,330	0,093	0,050	±0,004	1,320	0,056	±0,004/-0,000	3090	8250
	XWHT-131	1,312	1,395	0,093	0,050	±0,004	1,385	0,056	±0,004/-0,000	3430	8660
	XWHT-137	1,375	1,461	0,098	0,050	±0,004	1,450	0,056	±0,004/-0,000	3690	9070
	XWHT-143	1,438	1,526	0,103	0,050	±0,004	1,515	0,056	±0,004/-0,000	3960	9490
	XWHT-145	1,456	1,546	0,108	0,050	±0,004	1,535	0,056	±0,004/-0,000	4120	9610
	XWHT-150	1,500	1,591	0,108	0,050	±0,004	1,580	0,056	±0,004/-0,000	4240	9900
	XWHT-156	1,562	1,659	0,113	0,062	±0,005	1,647	0,068	±0,005/-0,000	4750	12780
	XWHT-162	1,625	1,727	0,113	0,062	±0,005	1,715	0,068	±0,005/-0,000	5170	13290
	XWHT-165	1,653	1,757	0,118	0,062	±0,005	1,745	0,068	±0,005/-0,000	5380	13520
	XWHT-168	1,688	1,793	0,118	0,062	±0,005	1,780	0,068	±0,005/-0,000	5490	13810
	XWHT-175	1,750	1,858	0,118	0,062	±0,005	1,845	0,068	±0,005/-0,000	5940	14320
	XWHT-181	1,812	1,923	0,123	0,062	±0,005	1,910	0,068	±0,005/-0,000	6280	14820
	XWHT-185	1,850	1,963	0,123	0,062	±0,005	1,949	0,068	±0,005/-0,000	6540	15130
	XWHT-187	1,875	1,989	0,128	0,062	±0,005	1,975	0,068	±0,005/-0,000	6630	15340
	XWHT-193	1,938	2,054	0,128	0,062	±0,003	2,040	0,068	±0,003/-0,000	6990	15850
	XWHT-200	2,000	2,125	0,138	0,062	±0,003	2,110	0,068	±0,003/-0,000	7780	16360
	XWHT-206	2,062	2,190	0,141	0,078	±0,006	2,175	0,086	±0,005/-0,000	8310	21220
	XWHT-212	2,125	2,255	0,141	0,078	±0,006	2,240	0,086	±0,005/-0,000	8710	21870
	XWHT-218	2,188	2,321	0,141	0,078	±0,006	2,305	0,086	±0,005/-0,000	9130	22520
	XWHT-225	2,250	2,386	0,141	0,078	±0,006	2,370	0,086	±0,005/-0,000	9540	23160
	XWHT-231	2,312	2,457	0,188	0,078	±0,006	2,440	0,086	±0,005/-0,000	10460	23800
	XWHT-237	2,375	2,522	0,188	0,078	±0,006	2,505	0,086	±0,005/-0,000	10910	24440
	XWHT-244	2,440	2,588	0,188	0,078	±0,006	2,570	0,086	±0,005/-0,000	11210	25110
	XWHT-250	2,500	2,653	0,188	0,078	±0,006	2,635	0,086	±0,005/-0,000	12020	25730
	XWHT-253	2,531	2,687	0,188	0,078	±0,006	2,668	0,086	±0,005/-0,000	12350	26050
	XWHT-256	2,562	2,720	0,188	0,093	±0,006	2,700	0,103	±0,005/-0,000	12500	29940
	XWHT-262	2,625	2,785	0,188	0,093	±0,006	2,765	0,103	±0,005/-0,000	12990	30680

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Medium Heavy Duty Rings (Imperial)

XWHT Series

	Part No. ¹	Housing Diameter	Ring						Groove				Thrust Capacity		
			Outside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³	
Imperial (in.)	XWHT-268	2,688	2,855	+0,025/-0,000	0,188	±0,005	0,093	±0,003	2,834	±0,006	0,103	+0,005/-0,000	13870	31410	
	XWHT-275	2,750	2,921		0,188		0,093		2,900		0,103		14580	32140	
	XWHT-281	2,813	2,987		0,188		0,093		2,965		0,103		15110	32880	
	XWHT-283	2,834	3,009		0,188		0,093		2,987		0,103		15430	33120	
	XWHT-287	2,875	3,053		0,188		0,093		3,030		0,103		15850	33600	
	XWHT-300	3,000	3,188		0,188		0,093		3,165		0,103		17600	35060	
	XWHT-306	3,062	3,253	+0,030/-0,000	0,250		0,111		3,230		0,120		18180	42710	
	XWHT-312	3,125	3,318		0,250		0,111		3,295		0,120		18780	43590	
	XWHT-315	3,156	3,354		0,250		0,111		3,328		0,120		19190	44040	
	XWHT-325	3,250	3,450		0,250		0,111		3,426		0,120		20220	45330	
	XWHT-334	3,346	3,550		0,250		0,111		3,525		0,120		21290	46670	
	XWHT-346	3,464	3,675		0,250		0,111		3,650		0,120		22770	48320	
	XWHT-350	3,500	3,716		0,250		0,111		3,690		0,120		23500	48820	
	XWHT-354	3,543	3,761		0,250		0,111		3,735		0,120		24040	49420	
	XWHT-356	3,562	3,783		0,250		0,111		3,756		0,120		24420	49690	
	XWHT-362	3,625	3,849		0,250		0,111		3,822		0,120		25370	50560	
	XWHT-375	3,750	3,982		0,250		0,111		3,955		0,120		27300	52310	
	XWHT-387	3,875	4,115		0,250		0,111		4,087		0,120		29030	54050	
	XWHT-393	3,938	4,178		0,250		0,111		4,150		0,120		29510	54930	
	XWHT-400	4,000	4,248		0,250		0,111		4,220		0,120		31100	55800	
	XWHT-412	4,125	4,373	+0,035/-0,000	0,312	±0,006	0,111		4,345		0,120		32070	57540	
	XWHT-425	4,250	4,500		0,312		0,111		4,470		0,120		33050	59280	
	XWHT-433	4,330	4,586		0,312		0,111		4,556		0,120		34590	60400	
	XWHT-450	4,500	4,768		0,312		0,111		4,735		0,120		37530	62770	
	XWHT-462	4,625	4,897		0,312		0,111		4,865		0,120		39230	64510	
	XWHT-475	4,750	5,028		0,312		0,111		4,995		0,120		41300	66260	
	XWHT-500	5,000	5,295		0,312		0,111		5,260		0,120		45950	69740	
	XWHT-525	5,250	5,559	+0,045/-0,000	0,375		±0,004		0,127	5,520	±0,007	0,139	+0,006/-0,000	50100	83790
	XWHT-537	5,375	5,685		0,375				0,127	5,645		0,139		51290	85780
	XWHT-550	5,500	5,810		0,375				0,127	5,770		0,139		52480	87780
	XWHT-575	5,750	6,062		0,375				0,127	6,020		0,139		54870	91770
	XWHT-600	6,000	6,314		0,375				0,127	6,270		0,139		57260	95760

Rings listed below are three-turn construction.

	Part No. ¹	Housing Diameter	Ring						Groove				Thrust Capacity	
			Outside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWHT-625	6,250	6,576	+0,055/-0,000	0,312	±0,006	0,165	±0,005	6,530	±0,008	0,174	+0,008/-0,000	61850	129590
	XWHT-650	6,500	6,837		0,312		0,165		6,790		0,174		66620	134780
	XWHT-662	6,625	6,973		0,312		0,165		6,925		0,174		70240	137370
	XWHT-675	6,750	7,104		0,312		0,165		7,055		0,174		73000	139960
	XWHT-700	7,000	7,366		0,312		0,165		7,315		0,174		78180	145140
	XWHT-725	7,250	7,628		0,375		0,189		7,575		0,209		83530	172190
	XWHT-750	7,500	7,895	0,375	0,189		7,840		0,209		90120		178130	
	XWHT-775	7,750	8,156	0,375	0,189		8,100		0,209		95870		184070	
	XWHT-800	8,000	8,418	0,375	0,189		8,360		0,209		101790		190000	
	XWHT-825	8,250	8,680	0,375	0,189		8,620		0,209		107880		195940	
	XWHT-850	8,500	8,942	0,375	0,189		8,880		0,209		114160		201880	
	XWHT-875	8,750	9,209	0,375	0,189		9,145		0,209		122460		207820	
	XWHT-900	9,000	9,471	0,375	0,189		9,405		0,209		129140		213750	
	XWHT-925	9,250	9,736	0,375	0,189		9,669		0,209		137310		219690	
	XWHT-950	9,500	9,999	0,375	0,189		9,930		0,209		144380		225630	
	XWHT-975	9,750	10,260	0,375	0,189		10,189		0,209		151620		231570	
	XWHT-1000	10,000	10,552	0,375	0,189		10,450		0,209		159040		237500	
	XWHT-1050	10,500	11,072	0,375	0,189		10,970		0,209		174420		249380	

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

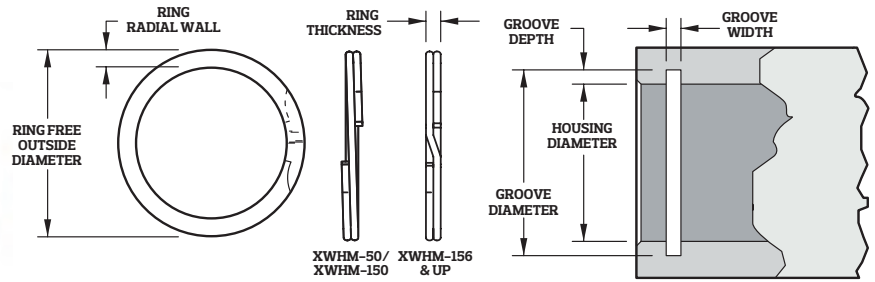
Heavy Duty Series (Imperial)

XWHM Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

AS3215, AS4299,
MIL-DTL-27426/4



* No Removal Notch

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity			
			Outside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³	
Imperial (in.)	XWHM-25*	0,250	0,270	+0,010/-0,000	0,020		0,015		0,268	±0,002	0,020	+0,003/-0,000	159	561	
	XWHM-31*	0,312	0,333		0,025		0,015		0,330		0,020		198	700	
	XWHM-37*	0,375	0,400		0,030		0,025		0,397		0,029		292	1442	
	XWHM-43	0,437	0,464		+0,012/-0,000		0,035		0,025		0,461		0,029	371	1680
	XWHM-50	0,500	0,538				0,045		0,035		0,530		0,039	530	2530
	XWHM-51	0,512	0,550		0,045		0,035		0,542		0,039		540	2590	
	XWHM-56	0,562	0,605		0,055		0,035		0,596		0,039		680	2840	
	XWHM-62	0,625	0,675		0,055		0,035		0,665		0,039		880	3160	
	XWHM-68	0,688	0,743		0,065		0,035		0,732		0,039		1070	3480	
	XWHM-75	0,750	0,807		0,065		0,035		0,796		0,039		1220	3790	
	XWHM-77	0,777	0,836		0,075		0,042		0,825		±0,003		0,046	1320	4720
	XWHM-81	0,812	0,873		0,075		0,042		0,862				0,046	1440	4930
	XWHM-86	0,866	0,931	0,075	0,042	0,920	0,046	1650	5260						
	XWHM-87	0,875	0,943	0,085	0,042	0,931	0,046	1730	5310						
	XWHM-90	0,901	0,972	0,085	0,042	0,959	0,046	1850	5470						
	XWHM-93	0,938	1,013	0,085	0,042	1,000	0,046	2060	5690						
	XWHM-100	1,000	1,080	+0,013/-0,000	0,085	0,042	1,066	±0,004	0,046	2330	6070				
	XWHM-102	1,023	1,105		0,085	0,042	1,091		0,046	2460	6210				
	XWHM-106	1,062	1,138		0,103	0,050	1,130		0,056	2550	7010				
	XWHM-112	1,125	1,205		0,103	0,050	1,197		0,056	2860	7420				
	XWHM-118	1,188	1,271		0,103	0,050	1,262		0,056	3110	7840				
	XWHM-125	1,250	1,339		0,103	0,050	1,330		0,056	3530	8250				
	XWHM-131	1,312	1,406		0,118	0,050	1,396		0,056	3900	8660				
	XWHM-137	1,375	1,471		0,118	0,050	1,461		0,056	4180	9070				
	XWHM-143	1,439	1,539		0,118	0,050	1,528		0,056	4580	9490				
	XWHM-145	1,456	1,559		0,118	0,050	1,548		0,056	4730	9610				
	XWHM-150	1,500	1,605		0,118	0,050	1,594		0,056	4980	9900				
	XWHM-156	1,562	1,675		+0,020/-0,000	0,128			1,658	±0,005	0,068	5300	12780		
	XWHM-162	1,625	1,742	0,128		1,725		0,068	5740		13290				
	XWHM-165	1,653	1,772	0,128		1,755		0,068	5960		13520				
	XWHM-168	1,688	1,810	0,128		1,792		0,068	6210		13810				
	XWHM-175	1,750	1,876	0,128		1,858		0,068	6680		14320				
	XWHM-181	1,812	1,940	0,128		1,922		0,068	7050		14820				
	XWHM-185	1,850	1,981	0,158		1,962		0,068	7320		15130				
	XWHM-187	1,875	2,008	0,158		1,989		0,068	7560		15340				
	XWHM-193	1,938	2,075	0,158		2,056		0,068	8080		15850				
	XWHM-200	2,000	2,142	0,158		2,122		0,068	8620		16360				
	XWHM-206	2,062	2,201	+0,025/-0,000		0,168		±0,003	2,186		±0,006	0,086	9040	21220	
	XWHM-212	2,125	2,267			0,168			2,251			0,086	9460	21870	
	XWHM-218	2,188	2,334		0,168	2,318	0,086		10050	22520					
	XWHM-225	2,250	2,399		0,168	2,382	0,086		10500	23160					
	XWHM-231	2,312	2,467		0,200	2,450	0,086		11280	23800					
	XWHM-237	2,375	2,535		0,200	2,517	0,086		11920	24440					
	XWHM-244	2,440	2,602		0,200	2,584	0,086		12420	25110					
	XWHM-250	2,500	2,667		0,200	2,648	0,086		13080	25730					
	XWHM-253	2,531	2,700		0,200	2,681	0,086		13420	26050					
	XWHM-256	2,562	2,733		+0,030/-0,000	0,225			2,714	+0,005/-0,000		0,103	13760	29940	
	XWHM-262	2,625	2,801			0,225			2,781			0,103	14470	30680	
XWHM-268	2,688	2,868	0,225			2,848			0,103			15200	31410		
XWHM-275	2,750	2,934	0,225	2,914		0,103		15940	32140						
XWHM-281	2,813	3,001	0,225	2,980		0,103		16700	32880						

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Heavy Duty Series (Imperial)

XWHM Series

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity	
			Outside Diameter		Radial Wall		Thickness	Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWHM-283	2,834	3,027	+0,030/-0,000	0,225	+0,004/-0,006	0,093	3,006	±0,006	0,103	+0,005/-0,000	17230	33120
	XWHM-287	2,875	3,072		0,225		0,093	3,051		0,103		17880	33600
	XWHM-300	3,000	3,204	+0,035/-0,000	0,225		0,093	3,182		0,103		18300	35060
	XWHM-306	3,062	3,271		0,281		0,111	3,248		0,120		20130	42710
	XWHM-312	3,125	3,338		0,281		0,111	3,315		0,120		20990	43590
	XWHM-315	3,157	3,371		0,281		0,111	3,348		0,120		21420	44040
	XWHM-325	3,250	3,470		0,281		0,111	3,446		0,120		22510	45330
	XWHM-334	3,346	3,571		0,281		0,111	3,546		0,120		23650	46670
	XWHM-347	3,464	3,701		0,281		0,111	3,675		0,120		25710	48320
	XWHM-350	3,500	3,736		0,281		0,111	3,710		0,120		25980	48820
	XWHM-354	3,543	3,781	+0,035/-0,000	0,281	+0,004/-0,008	0,111	3,755	±0,007	0,120	+0,006/-0,000	26550	49420
	XWHM-356	3,562	3,802		0,281		0,111	3,776		0,120		26940	49690
	XWHM-362	3,625	3,868		0,281		0,111	3,841		0,120		27670	50560
	XWHM-375	3,750	4,002		0,312		0,111	3,974		0,120		29690	52310
	XWHM-387	3,875	4,136		0,312		0,111	4,107		0,120		31770	54050
	XWHM-393	3,938	4,203		0,312		0,111	4,174		0,120		32850	54930
	XWHM-400	4,000	4,270		0,312		0,111	4,240		0,120		33930	55800
	XWHM-412	4,125	4,369		0,312		0,111	4,339		0,120		34990	57540
	XWHM-425	4,250	4,501		0,312		0,111	4,470		0,120		36050	59280
	XWHM-433	4,330	4,588		0,312		0,111	4,556		0,120		36730	60400
	XWHM-450	4,500	4,768	+0,050/-0,000	0,312		0,111	4,735	±0,004	0,120	+0,006/-0,000	38170	62770
	XWHM-462	4,625	4,899		0,312		0,111	4,865		0,120		39230	64510
	XWHM-475	4,750	5,030		0,312		0,111	4,995		0,120		41300	66260
	XWHM-500	5,000	5,297		0,312		0,111	5,260		0,120		45950	69740
	XWHM-525	5,250	5,559		0,350		0,127	5,520		0,139		50100	83790
	XWHM-537	5,375	5,690		0,350		0,127	5,650		0,139		51290	85780
	XWHM-550	5,500	5,810		0,350		0,127	5,770		0,139		52480	87780
	XWHM-575	5,750	6,062		0,350		0,127	6,020		0,139		54870	91770
	XWHM-600	6,000	6,314		0,350		0,127	6,270		0,139		57260	95760
	XWHM-625	6,250	6,576	+0,055/-0,000	0,380	+0,005/-0,010	0,156	6,530	±0,008	0,174	+0,008/-0,000	61850	122520
	XWHM-650	6,500	6,838		0,380		0,156	6,790		0,174		66620	127420
	XWHM-662	6,625	6,974		0,380		0,156	6,925		0,174		70240	129870
	XWHM-675	6,750	7,105		0,380		0,156	7,055		0,174		73000	132320
	XWHM-700	7,000	7,366		0,380		0,156	7,315		0,174		78180	137230
	XWHM-725	7,250	7,628		0,418		0,187	7,575		0,209		83530	170370
	XWHM-750	7,500	7,895		0,418		0,187	7,840		0,209		90120	176240
	XWHM-775	7,750	8,157		0,418		0,187	8,100		0,209		95870	182120
	XWHM-800	8,000	8,419		0,418		0,187	8,360		0,209		101790	187990
	XWHM-825	8,250	8,680	+0,070/-0,000	0,437		0,187	8,620		0,209		107880	193870
	XWHM-850	8,500	8,942		0,437		0,187	8,880		0,209		114160	199740
	XWHM-875	8,750	9,209		0,437		0,187	9,145		0,209		122460	205620
	XWHM-900	9,000	9,471		0,437		0,187	9,405		0,209		129140	211490
	XWHM-925	9,250	9,737		0,437		0,187	9,669		0,209		137310	217370
	XWHM-950	9,500	10,000		0,500		0,187	9,930		0,209		144380	223240
	XWHM-975	9,750	10,260		0,500		0,187	10,189		0,209		150620	229120
	XWHM-1000	10,000	10,523		0,500		0,187	10,450		0,209		159040	234990
	XWHM-1025	10,250	10,786	+0,120/-0,000	0,500		0,187	10,711	±0,010	0,209	+0,008/-0,000	167370	240870
	XWHM-1050	10,500	11,047		0,500		0,187	10,970		0,209		174420	246740
	XWHM-1075	10,750	11,313		0,500		0,187	11,234		0,209		183890	252620
	XWHM-1100	11,000	11,575		0,500		0,187	11,495		0,209		192830	258490
	XWHM-1125	11,250	11,838		0,500		0,187	11,756		0,209		201190	264370
	XWHM-1150	11,500	12,102		0,562		0,187	12,018		0,209		210540	270240
	XWHM-1175	11,750	12,365		0,562		0,187	12,279		0,209		220100	276120
	XWHM-1200	12,000	12,628		0,562		0,187	12,540		0,209		229020	281990
	XWHM-1225	12,250	12,891	+0,140/-0,000	0,562		0,187	12,801	±0,012	0,209		238990	287860
	XWHM-1250	12,500	13,154		0,562		0,187	13,063		0,209		249170	293740
	XWHM-1275	12,750	13,417		0,562		0,187	13,324		0,209		258660	299610
	XWHM-1300	13,000	13,680		0,662		0,187	13,585		0,209		269240	305490
	XWHM-1325	13,250	13,943		0,662		0,187	13,846		0,209		279100	311360
	XWHM-1350	13,500	14,207		0,662		0,187	14,108		0,209		290100	317240
	XWHM-1375	13,750	14,470		0,662		0,187	14,369		0,209		301300	323110
	XWHM-1400	14,000	14,732		0,662		0,187	14,630		0,209		311730	328990
	XWHM-1425	14,250	14,995		0,662		0,187	14,891		0,209		323340	334860
	XWHM-1450	14,500	15,259		0,750		0,187	15,153		0,209		335160	340740
	XWHM-1475	14,750	15,522		0,750		0,187	15,414		0,209		346150	346610
	XWHM-1500	15,000	15,785		0,750		0,187	15,675		0,209		358380	352490

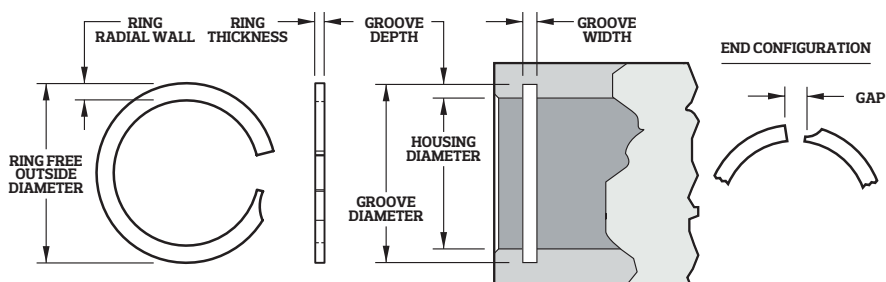
¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XFHE Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Housing Diameter	Ring				Groove			Thrust Capacity	
			Outside Diameter	Radial Wall	Thickness		Diameter	Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XFHE-0050	0,500	0,529	0,055	0,037		0,524	0,043		424	2325
	XFHE-0056	0,562	0,591	0,055	0,037		0,586	0,043		477	2613
	XFHE-0062	0,625	0,665	0,065	0,037		0,657	0,043	+0,004/-0,000	707	2906
	XFHE-0068	0,687	0,726	0,065	0,037		0,719	0,043		777	3194
	XFHE-0075	0,750	0,797	0,075	0,037		0,790	0,043		1060	3487
	XFHE-0081	0,812	0,860	0,075	0,037		0,852	0,043	+0,005/-0,000	1148	3775
	XFHE-0087	0,875	0,924	0,075	0,037		0,915	0,043		1237	4068
	XFHE-0093	0,937	1,000	0,085	0,045		0,985	0,051		1590	5334
	XFHE-0100	1,000	1,058	0,085	0,045		1,048	0,051	+0,008/-0,000	1696	5693
	XFHE-0106	1,062	1,121	0,094	0,045		1,110	0,051		1802	6045
	XFHE-0112	1,125	1,192	0,094	0,045		1,181	0,051		2227	6404
	XFHE-0118	1,187	1,252	0,094	0,045		1,243	0,051		2349	6757
	XFHE-0125	1,250	1,336	0,094	0,045		1,316	0,051		2916	7116
	XFHE-0131	1,312	1,391	0,094	0,045		1,378	0,051		3060	7469
	XFHE-0137	1,375	1,470	0,128	0,057		1,453	0,063		3791	9307
	XFHE-0143	1,437	1,529	0,128	0,057		1,515	0,063	+0,010/-0,000	3961	9727
	XFHE-0150	1,500	1,592	0,128	0,057		1,578	0,063		4135	10153
	XFHE-0156	1,562	1,687	0,158	0,067		1,666	0,073	+0,010/-0,000	5741	12400
	XFHE-0162	1,625	1,746	0,158	0,067		1,729	0,073		5973	12901
	XFHE-0168	1,687	1,808	0,158	0,067		1,791	0,073		6201	13393
	XFHE-0175	1,750	1,885	0,158	0,067		1,862	0,073		6927	13893
	XFHE-0181	1,812	1,942	0,158	0,067		1,924	0,073		7173	14385
	XFHE-0187	1,875	2,007	0,158	0,067		1,987	0,073		7422	14885
	XFHE-0193	1,937	2,074	0,200	0,076		2,055	0,085		8078	16649
	XFHE-0200	2,000	2,143	0,200	0,076		2,118	0,085	+0,006/-0,000	8341	17191
	XFHE-0206	2,062	2,200	0,200	0,076		2,180	0,085		8599	17724
	XFHE-0212	2,125	2,264	0,200	0,076		2,243	0,085		8862	18265
	XFHE-0218	2,187	2,327	0,200	0,076		2,305	0,085		9121	18798
	XFHE-0225	2,250	2,389	0,200	0,076		2,368	0,085		9384	19340
	XFHE-0231	2,312	2,453	0,200	0,076		2,430	0,085		9642	19873
	XFHE-0237	2,375	2,517	0,200	0,076		2,493	0,085	+0,012/-0,000	9905	20414
	XFHE-0243	2,437	2,582	0,200	0,076		2,555	0,085		10163	20947
	XFHE-0250	2,500	2,643	0,200	0,076		2,618	0,085		10426	21488
	XFHE-0256	2,562	2,705	0,200	0,095		2,680	0,104		10685	26225
	XFHE-0262	2,625	2,777	0,200	0,095		2,743	0,104		10947	26870
	XFHE-0268	2,687	2,828	0,200	0,095		2,805	0,104		11206	27504
	XFHE-0275	2,750	2,899	0,200	0,095		2,868	0,104		11469	28149
	XFHE-0281	2,812	2,958	0,200	0,095		2,930	0,104		11727	28784
	XFHE-0287	2,875	3,022	0,200	0,095		2,993	0,104		11990	29429
	XFHE-0293	2,937	3,084	0,200	0,095		3,055	0,104		12249	30063
	XFHE-0300	3,000	3,145	0,200	0,095		3,118	0,104		12511	30708
	XFHE-0306	3,062	3,218	0,200	0,095		3,184	0,104		13203	31343
	XFHE-0312	3,125	3,294	0,237	0,095		3,263	0,104	+0,013/-0,000	15242	31988
	XFHE-0318	3,187	3,357	0,237	0,095		3,325	0,104		15544	32622
	XFHE-0325	3,250	3,420	0,237	0,095		3,388	0,104		15851	33267

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XFHE Series

	Part No. ¹	Housing Diameter	Ring						Groove				Thrust Capacity				
			Outside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³			
Imperial (in.)	XFHE-0331	3,312	3,483	+0,035/-0,000	0,248	±0,005	0,115	±0,003	3,450	+0,013/-0,000	0,124	+0,007/-0,000	16154	38952			
	XFHE-0337	3,375	3,547		0,248		0,115		3,513		0,124		16461	39693			
	XFHE-0343	3,437	3,609		0,248		0,115		3,575		0,124		16763	40422			
	XFHE-0350	3,500	3,673		0,248		0,115		3,638		0,124		17071	41163			
	XFHE-0356	3,562	3,728		0,248		0,115		3,700		0,124		17373	41892			
	XFHE-0362	3,625	3,799		0,248		0,115		3,763		0,124		17680	42633			
	XFHE-0368	3,687	3,862		0,248		0,115		3,825		0,124		17983	43362			
	XFHE-0375	3,750	3,922		0,248		0,115		3,888		0,124		18290	44103			
	XFHE-0381	3,812	3,988		0,248		0,115		3,950		0,124		18592	44832			
	XFHE-0387	3,875	4,044		0,248		0,115		4,013		0,124		18900	45573			
	XFHE-0393	3,937	4,114		0,248		0,115		4,075		0,124		19202	46302			
	XFHE-0400	4,000	4,223	+0,050/-0,000	0,265	±0,004	0,153	+0,024/-0,000	4,158	+0,021/-0,000	0,163		22337	60283			
	XFHE-0412	4,125	4,329		0,265		0,153		4,283		0,163		23035	62166			
	XFHE-0425	4,250	4,452		0,265		0,153		4,408		0,163		23733	64050			
	XFHE-0437	4,375	4,576		0,265		0,153		4,533		0,163		24431	65934			
	XFHE-0450	4,500	4,703		0,265		0,153		4,658		0,163		25129	67818			
	XFHE-0462	4,625	4,829		0,265		0,153		4,783		0,163		25827	69702			
	XFHE-0475	4,750	4,945		0,265		0,153		4,908		0,163		26525	71585			
	XFHE-0487	4,875	5,082		0,265		0,153		5,033		0,163		27223	73469			
	XFHE-0500	5,000	5,207		0,265		0,153		5,158		0,163		27921	75353			
	XFHE-0525	5,250	5,460		0,265		0,153		5,408		0,163		29317	79121			
	XFHE-0550	5,500	5,719		0,265		0,153		5,658		0,163		30713	82888			
	XFHE-0575	5,750	5,965		0,265		0,153		5,908		0,163		32109	86656			
	XFHE-0600	6,000	6,256	+0,055/-0,000	0,316	±0,006	0,153	+0,028/-0,000	6,196	+0,031/-0,000	0,163		41563	90,424			
	XFHE-0625	6,250	6,508		0,316		0,153		6,446		0,163		43295	94191			
	XFHE-0650	6,500	6,760		0,316		0,153		6,696		0,163		45027	97959			
	XFHE-0675	6,750	7,013		0,316		0,153		6,946		0,163		46759	101727			
	XFHE-0700	7,000	7,266	+0,070/-0,000	0,316		±0,005		0,153		+0,028/-0,000		7,196	+0,031/-0,000	0,163	48490	105494
	XFHE-0725	7,250	7,541		0,316				0,153				7,446		0,163	50222	109262
	XFHE-0750	7,500	7,762		0,316				0,153				7,696		0,163	51954	113030
	XFHE-0775	7,750	8,023		0,316				0,153				7,946		0,163	53686	116797
	XFHE-0800	8,000	8,276		0,316				0,153				8,196		0,163	55418	120565
	XFHE-0825	8,250	8,580		0,373				0,192				8,486		0,203	68813	147399
	XFHE-0850	8,500	8,821		0,373				0,192				8,736		0,203	70898	151866
	XFHE-0875	8,750	9,073		0,373				0,192				8,986		0,203	72983	156332
	XFHE-0900	9,000	9,326		0,373	0,192		9,236	0,203	75068			160799				
	XFHE-0925	9,250	9,580		0,373	0,192		9,486	0,203	77154			165265				
	XFHE-0950	9,500	9,831		0,373	0,192		9,736	0,203	79239			169732				
	XFHE-0975	9,750	10,083	0,373	0,192	9,986	0,203	81324	174199								
	XFHE-1000	10,000	10,414	+0,120/-0,000	0,435	±0,007	0,192	+0,031/-0,000	10,314	+0,031/-0,000	0,203		110977	178665			
	XFHE-1025	10,250	10,660		0,435		0,192		10,564		0,203		113751	183132			
	XFHE-1050	10,500	10,919		0,435		0,192		10,814		0,203		116526	187599			
	XFHE-1075	10,750	11,171		0,435		0,192		11,064		0,203		119300	192065			
	XFHE-1100	11,000	11,440		0,435		0,192		11,314		0,203	122074	196532				

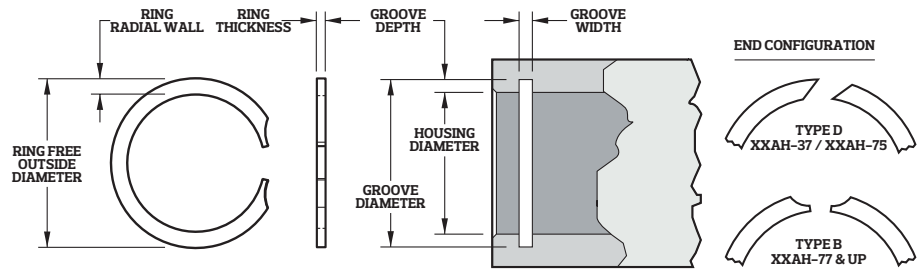
¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XXAH Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity		
			Outside Diameter		Radial Wall	Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³	
Imperial (in.)	XXAH-37	0,375	0,400	+0,020/-0,000	0,035	±0,003	0,025	±0,002	0,395	±0,003	0,028	+0,003/-0,000	265	1174
	XXAH-43	0,438	0,467		0,035		0,025		0,462		0,028		372	1371
	XXAH-50	0,500	0,530		0,040		0,035		0,524		0,039		424	2073
	XXAH-51	0,512	0,542		0,040		0,035		0,536		0,039		434	2123
	XXAH-56	0,562	0,600		0,048		0,035		0,590		0,039		556	2331
	XXAH-62	0,625	0,670		0,048		0,035		0,657		0,039		707	2592
	XXAH-68	0,688	0,733		0,048		0,035		0,720		0,039		778	2853
	XXAH-75	0,750	0,799		0,048		0,035		0,786		0,039		954	3110
	XXAH-77	0,777	0,827		0,062		0,042		0,813		0,046		989	3906
	XXAH-81	0,812	0,867		0,062		0,042		0,852		0,046		1148	4082
	XXAH-87	0,875	0,934		0,062		0,042		0,919		0,046		1361	4398
	XXAH-90	0,901	0,961		0,078		0,042		0,945		0,046		1401	4529
	XXAH-93	0,938	1,003	0,078	0,042	0,986	0,046	1591	4715					
	XXAH-100	1,000	1,070	0,078	0,042	1,052	0,046	1696	5027					
	XXAH-102	1,023	1,094	0,093	0,042	1,075	0,046	1880	5142					
	XXAH-106	1,062	1,134	0,093	0,050	1,114	0,056	1952	6272					
	XXAH-112	1,125	1,202	0,093	0,050	1,181	0,056	2227	6644					
	XXAH-118	1,188	1,270	0,093	0,050	1,248	0,056	2519	7017					
	XXAH-125	1,250	1,337	0,109	0,050	1,314	0,056	2827	7383					
	XXAH-131	1,312	1,404	0,109	0,050	1,380	0,056	3153	7749					
	XXAH-137	1,375	1,472	0,109	0,050	1,447	0,056	3499	8121					
	XXAH-143	1,438	1,535	0,125	0,050	1,510	0,056	3659	8493					
	XXAH-145	1,456	1,557	0,125	0,050	1,532	0,056	3911	8599					
	XXAH-150	1,500	1,607	0,125	0,050	1,576	0,056	4029	8859					
	XXAH-156	1,562	1,668	0,125	0,062	1,642	0,068	4416	11002					
	XXAH-162	1,625	1,736	0,141	0,062	1,709	0,068	4824	11446					
	XXAH-165	1,653	1,765	0,141	0,062	1,737	0,068	4907	11643					
	XXAH-168	1,688	1,804	0,156	0,062	1,776	0,068	5250	11889					
	XXAH-175	1,750	1,870	0,156	0,062	1,842	0,068	5690	12326					
	XXAH-181	1,812	1,933	0,156	0,062	1,904	0,068	5892	12763					
	XXAH-185	1,850	1,975	0,156	0,062	1,946	0,068	6277	13030					
	XXAH-187	1,875	2,000	0,156	0,062	1,971	0,068	6362	13206					
	XXAH-193	1,938	2,068	0,156	0,062	2,038	0,068	6849	13650					
	XXAH-196	1,968	2,098	0,156	0,062	2,068	0,068	6955	13862					
	XXAH-200	2,000	2,131	0,156	0,062	2,100	0,068	7069	14087					
	XXAH-206	2,062	2,197	0,156	0,078	2,166	0,086	7579	17491					
	XXAH-212	2,125	2,260	0,156	0,078	2,229	0,086	7811	18025					
	XXAH-218	2,188	2,331	0,171	0,078	2,296	0,086	8352	18559					
	XXAH-225	2,250	2,393	0,171	0,078	2,358	0,086	8588	19085					
	XXAH-231	2,312	2,459	0,171	0,078	2,424	0,086	9152	19611					
	XXAH-237	2,375	2,523	0,171	0,078	2,487	0,086	9401	20145					
	XXAH-244	2,440	2,592	0,187	0,078	2,556	0,086	10003	20697					
	XXAH-250	2,500	2,653	0,187	0,078	2,616	0,086	10249	21206					
	XXAH-253	2,531	2,688	0,187	0,078	2,651	0,086	10734	21469					
	XXAH-256	2,562	2,726	0,187	0,093	2,686	0,103	11228	26078					
	XXAH-262	2,625	2,790	0,187	0,093	2,750	0,103	11504	26719					
	XXAH-268	2,688	2,856	0,187	0,093	2,816	0,103	11780	27361					
	XXAH-271	2,717	2,882	0,187	0,093	2,842	0,103	12291	27656					

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XXAH Series

	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity		
			Outside Diameter	Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³	
Imperial (in.)	XXAH-275	2,750	2,918	+0,062/-0,000	0,187	±0,005	0,093	±0,002	2,878	±0,006	0,103	+0,005/-0,000	12441	27992
	XXAH-281	2,813	2,985		0,187		0,093		2,945		0,103		13123	28633
	XXAH-283	2,834	3,006		0,187		0,093		2,966		0,103		13221	28847
	XXAH-287	2,875	3,056		0,187		0,093		3,011		0,103		13819	29264
	XXAH-300	3,000	3,181		0,187		0,093		3,136		0,103		14420	30536
	XXAH-306	3,062	3,247		0,218		0,109		3,202		0,120		15151	35009
	XXAH-312	3,125	3,311		0,218		0,109		3,265		0,120		15463	35729
	XXAH-315	3,156	3,342		0,218		0,109		3,296		0,120		15616	36084
	XXAH-325	3,250	3,442		0,218		0,109		3,394		0,120		16540	37158
	XXAH-334	3,346	3,539		0,218		0,109		3,490		0,120		17029	38256
	XXAH-346	3,469	3,663	0,218	0,109	3,613	0,120	17655	39662					
	XXAH-350	3,500	3,700	+0,078/-0,000	0,250	0,109	3,648	0,120	18308	40017				
	XXAH-354	3,543	3,745		0,250	0,109	3,691	0,120	18533	40508				
	XXAH-356	3,562	3,766		0,250	0,109	3,710	0,120	18632	40725				
	XXAH-362	3,625	3,831		0,250	0,109	3,773	0,120	18961	41446				
	XXAH-375	3,750	3,962		0,250	0,109	3,902	0,120	20145	42875				
	XXAH-387	3,875	4,089		0,250	0,109	4,027	0,120	20817	44304				
	XXAH-393	3,938	4,156		0,250	0,109	4,094	0,120	21712	45024				
	XXAH-400	4,000	4,221		0,250	0,109	4,156	0,120	22054	45733				
	XXAH-412	4,125	4,355		0,250	0,109	4,285	0,120	23326	47162				
	XXAH-425	4,250	4,485		+0,093/-0,000	0,250	0,109	4,410	0,120	24033	48592			
	XXAH-433	4,330	4,565	0,250		0,109	4,490	0,120	24486	49506				
	XXAH-443	4,436	4,670	0,250		0,109	4,596	0,120	25085	50718				
	XXAH-450	4,500	4,744	0,250		0,109	4,664	0,120	26083	51450				
	XXAH-462	4,625	4,875	0,250		0,109	4,795	0,120	27788	52879				
	XXAH-475	4,750	5,011	0,281		0,109	4,926	0,120	29547	54308				
	XXAH-500	5,000	5,265	0,281		0,109	5,180	0,120	31809	57167				
	XXAH-525	5,250	5,530	+0,125/-0,000		0,312	0,125	5,435	±0,007	0,139	34141	65732		
	XXAH-537	5,375	5,660		0,312	0,125	5,565	0,139		36094	67297			
	XXAH-550	5,500	5,796		0,312	0,125	5,696	0,139		38100	68862			
	XXAH-575	5,750	6,050		0,312	0,125	5,950	0,139		40644	71992			
	XXAH-600	6,000	6,309		0,312	0,125	6,204	0,139	43260	75122				
	XXAH-625	6,250	6,568		0,343	0,156	6,458	±0,008	0,174	45946	94130			
	XXAH-650	6,500	6,832	+0,156/-0,000	0,343	0,156	6,712		0,174	48703	97895			
	XXAH-662	6,625	6,975		0,343	0,156	6,845		0,174	51512	99778			
	XXAH-675	6,750	7,100		0,343	0,156	6,970		0,174	52484	101660			
	XXAH-700	7,000	7,350		0,343	0,156	7,220		0,174	54428	105426			
	XXAH-725	7,250	7,630		0,375	0,187	7,500		0,209	64059	123654			
	XXAH-750	7,500	7,890		0,375	0,187	7,750		0,209	66268	127918			
	XXAH-800	8,000	8,400	+0,187/-0,000	0,375	0,187	8,250		0,209	70686	136446			
	XXAH-825	8,250	8,665		0,437	0,187	8,540		0,209	84558	141478			
	XXAH-850	8,500	8,915		0,437	0,187	8,790		0,209	87120	145766			
	XXAH-875	8,750	9,205		0,500	0,187	9,080	0,209	102053	150053				
	XXAH-900	9,000	9,455		0,500	0,187	9,330	0,209	104968	154340				
	XXAH-905	9,055	9,509		0,500	0,187	9,384	0,209	105610	155283				
	XXAH-950	9,500	9,955		0,500	0,187	9,830	0,209	110800	162915				
	XXAH-984	9,840	10,295		0,500	0,187	10,170	0,209	114766	168745				
	XXAH-1000	10,000	10,455		0,500	0,187	10,330	0,209	116632	171489				

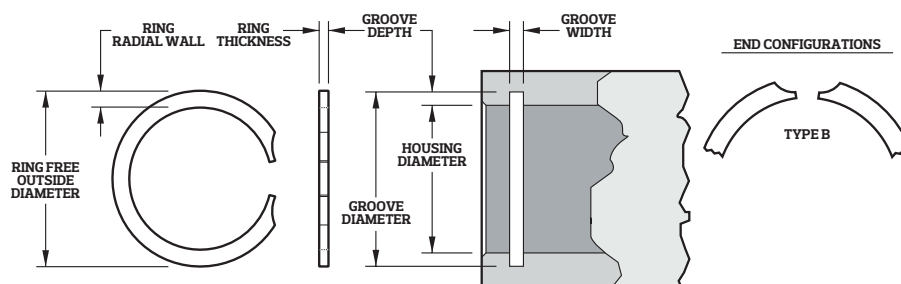
¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XXDH Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Housing Diameter	Ring					Groove				Thrust Capacity		
			Outside Diameter		Radial Wall		Thickness	Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³	
Imperial (in.)	XXDH-112	1,125	1,196	+0.031/-0.000	0,093	±0.003	0,042	±0.002	1,181	±0.005	0,046	+0.003/-0.000	2227	5655
	XXDH-125	1,250	1,330		0,093		0,042		1,310		0,046		2651	6283
	XXDH-137	1,375	1,460		0,093		0,042		1,435		0,046		2916	6912
	XXDH-150	1,500	1,600		0,125		0,042		1,580		0,046		4241	7540
	XXDH-162	1,625	1,725	+0.062/-0.000	0,125	±0.005	0,042		1,705	0,046	4595	8168		
	XXDH-175	1,750	1,855		0,125		0,042		1,830	0,046	4948	8796		
	XXDH-187	1,875	1,990		0,156		0,042		1,965	0,046	5964	9425		
	XXDH-200	2,000	2,115		0,156		0,042		2,090	0,046	6362	10053		
	XXDH-206	2,062	2,177		0,156		0,042		2,152	0,046	6559	10365		
	XXDH-218	2,187	2,302		0,156		0,042		2,277	0,046	6957	10993		
	XXDH-231	2,312	2,432		0,156		0,042		2,402	0,046	7354	11621		
	XXDH-243	2,437	2,557		0,156		0,042		2,527	0,046	7752	12250		
	XXDH-256	2,562	2,682	0,156	0,042	2,652	0,046		8149	12878				
	XXDH-300	3,000	3,154	+0.078/-0.000	0,187	±0.005	0,062		3,124	±0.006	0,068	+0.004/-0.000	13148	21130
	XXDH-325	3,250	3,404		0,187		0,062		3,374		0,068		14243	22891
	XXDH-350	3,500	3,654		0,187		0,062		3,624		0,068		15339	24652
	XXDH-375	3,750	3,904		0,187		0,062		3,874		0,068		16434	26413
	XXDH-400	4,000	4,155	0,187	0,062	4,125	0,068		17671	28174				
	XXDH-425	4,250	4,429	0,218	0,078	4,394	0,086		21630	36050				
	XXDH-450	4,500	4,679	0,218	0,078	4,644	0,086		22902	38170				
	XXDH-475	4,750	4,929	0,218	0,078	4,894	0,086		24175	40291				
	XXDH-500	5,000	5,184	+0.093/-0.000	0,218	±0.007	0,078		5,144	±0.008	0,086	+0.005/-0.000	25447	42412
	XXDH-525	5,250	5,434		0,218		0,078		5,394		0,086		26719	44532
	XXDH-575	5,750	5,934		0,218		0,078		5,894		0,086		29264	48773
	XXDH-600	6,000	6,220		0,250		0,093		6,160		0,103		33929	61073
	XXDH-650	6,500	6,730	+0.125/-0.000	0,250	0,093	6,660		0,103	36757	66162			
	XXDH-700	7,000	7,240	0,250	0,093	7,160	0,103		39584	71251				
	XXDH-725	7,250	7,500	+0.187/-0.000	0,250	±0.008	7,410		0,103	40998	73796			
	XXDH-750	7,500	7,760		0,250		7,660		0,103	42412	76341			
	XXDH-800	8,000	8,285		0,250		8,160		0,103	45239	81430			

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

ID/OD Lock

ID/OD Retaining Ring Lock

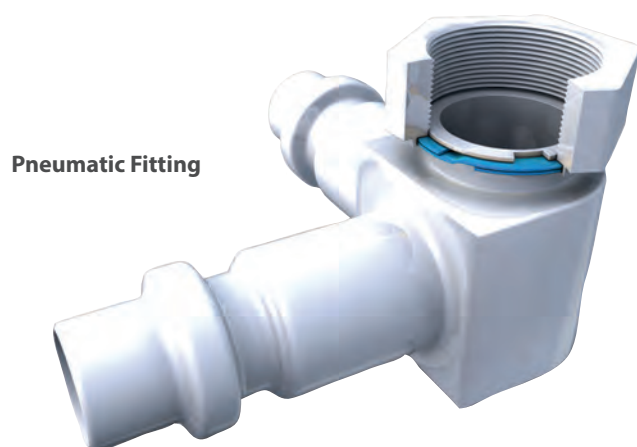
Spirolox Retaining Rings can operate in an internal and an external groove simultaneously.

Spiral type retaining rings have many benefits for the ID/OD Lock, these benefits include concealed fastening, no required assembly tooling and a 360° rotational capacity. With a Spirolox Retaining Ring, the application is tamper-proof and aesthetically pleasing.

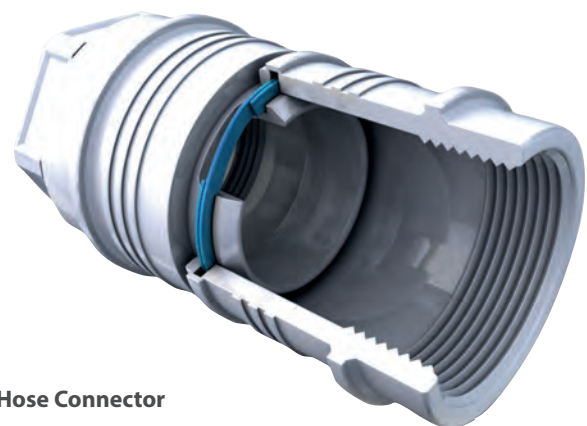
In this featured application, the retaining ring is initially installed in the housing groove. When the mating component in the assembly is added, the retaining ring compresses into the groove. The groove is deep enough for the rings radial wall to fit into as the component slides into position. Finally, when the grooves meet, the retaining ring snaps into the shaft groove (groove depth equals 1/2 the retaining rings radial wall) while still in the housing groove.



In the pneumatic fitting and hose connector applications depicted below, a 2-Turn retaining ring without removal notches or an offset, creates an ID/OD lock, permitting the 360° rotation of the nut.



Pneumatic Fitting



Hose Connector

Light Duty Rings (Metric)

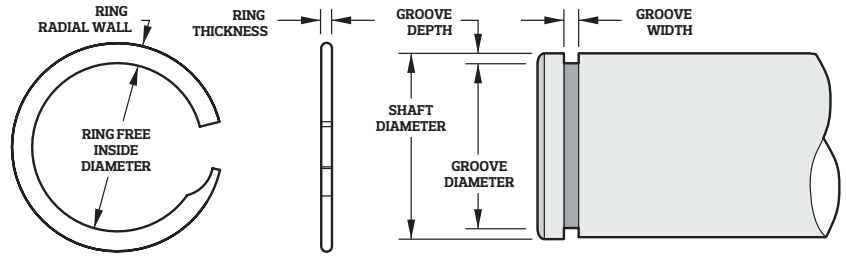
XVSM Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel



* No Removal Notch



Metric (mm)	Part No. ¹	Shaft Diameter	Ring					Groove				Thrust Capacity							
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²	Ring Shear (N) ³					
	XVSM-6*	6,00	5,65	+0,00/-0,25	0,51	±0,10	0,30	±0,04	5,70	±0,05	0,38	+0,05/-0,00	439	1988					
	XVSM-7*	7,00	6,58		0,51		0,30		6,64		0,38		614	2234					
	XVSM-8*	8,00	7,52		0,64		0,38		7,60		0,46		780	3183					
	XVSM-9*	9,00	8,42		0,76		0,38		8,50		0,46		1114	3580					
	XVSM-10*	10,00	9,32	+0,00/-0,30	0,89	±0,10	0,38	±0,04	9,40	±0,05	0,46	+0,05/-0,00	1462	3978					
	XVSM-11	11,00	10,32		0,89		0,38		10,40		0,46		1608	4376					
	XVSM-12	12,00	11,22		+0,00/-0,33		1,14		±0,10		0,46		±0,05	11,34	±0,05	0,56	+0,05/-0,00	1930	5779
	XVSM-13	13,00	12,15				1,14				0,46			12,28		0,56		2281	6261
	XVSM-14	14,00	13,15	1,14		0,46	13,28	0,56		2456	6742								
	XVSM-15	15,00	14,14	1,14		0,46	14,28	0,56		2632	7224								
	XVSM-16	16,00	15,13	1,14		0,46	15,28	0,56		2807	7705								
	XVSM-17	17,00	16,13	1,14		0,46	16,28	0,56		2983	8187								
	XVSM-18	18,00	17,12	1,14		0,46	17,28	0,56		3158	8669								
	XVSM-19	19,00	18,11	1,14		0,46	18,28	0,56		3334	9150								
	XVSM-20	20,00	19,10	+0,00/-0,33	1,14	±0,10	0,46	±0,05	19,28	±0,08	0,56	+0,05/-0,00	3509	9632					
	XVSM-21	21,00	19,74		1,65		0,53		19,94		0,66		5424	11652					
	XVSM-22	22,00	20,73		1,65		0,53		20,94		0,66		5683	12207					
	XVSM-24	24,00	22,72		1,65		0,53		22,94		0,66		6199	13317					
	XVSM-25	25,00	23,71	+0,00/-0,38	1,65	±0,10	0,53	±0,05	23,94	±0,10	0,66	+0,08/-0,00	6458	13872					
	XVSM-26	26,00	24,63		2,24		0,64		24,88		0,79		7096	15138					
	XVSM-28	28,00	26,62		2,24		0,64		26,88		0,79		7642	16303					
	XVSM-29	29,00	27,61		2,24		0,64		27,88		0,79		7915	16885					
	XVSM-30	30,00	28,59		2,24		0,64		28,88		0,79		8188	17467					
	XVSM-32	32,00	30,57		2,24		0,64		30,88		0,79		8734	18632					
	XVSM-34	34,00	32,56		2,24		0,64		32,88		0,79		9279	19796					
	XVSM-35	35,00	33,55		2,24		0,64		33,88		0,79		9552	20378					
	XVSM-36	36,00	34,54	2,24	0,64	34,88	0,79	9825	20960										
	XVSM-38	38,00	36,52	+0,00/-0,51	2,24	±0,10	0,64	±0,13	36,88	±0,15	0,79	+0,08/-0,00	10371	22125					
	XVSM-40	40,00	38,09		3,00		0,79		38,52		0,99		14426	28748					
	XVSM-42	42,00	40,07		3,00		0,79		40,52		0,99		15147	30185					
	XVSM-45	45,00	43,04		3,00		0,79		43,52		0,99		16229	32341					
	XVSM-48	48,00	46,01	+0,00/-0,64	3,00	±0,05	0,79	±0,13	46,52	±0,15	0,99	+0,08/-0,00	17311	34497					
	XVSM-50	50,00	47,99		3,00		0,79		48,52		0,99		18032	35935					
	XVSM-52	52,00	49,48		4,01		0,79		50,06		0,99		24583	37372					
	XVSM-55	55,00	52,46		4,01		0,79		53,06		0,99		26001	39528					
	XVSM-56	56,00	53,44		4,01		0,79		54,06		0,99		26473	40247					
	XVSM-58	58,00	55,42		4,01		0,79		56,06		0,99		27419	41684					
	XVSM-60	60,00	57,40		4,01		0,79		58,06		0,99		28364	43122					
	XVSM-62	62,00	59,37		4,01		0,79		60,06		0,99		29310	44559					
	XVSM-63	63,00	60,35	+0,00/-0,64	4,01	±0,05	0,79	±0,15	61,06	±0,15	0,99	+0,08/-0,00	29783	45278					
	XVSM-65	65,00	62,33		4,01		0,79		63,06		0,99		30728	46715					
	XVSM-68	68,00	65,31		4,01		0,79		66,06		0,99		32146	48871					
	XVSM-70	70,00	67,29		4,01		0,79		68,06		0,99		33092	50309					
	XVSM-72	72,00	69,27		4,01		0,79		70,06		0,99		34037	51746					
	XVSM-75	75,00	72,25		4,01		0,79		73,06		0,99		35456	53902					

¹ Add suffix "-S02" for 302 stainless steel. Add suffix "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2.

³ Based on a safety factor of 3.

Light Duty Rings (Metric)

XVSM Series

Metric (mm)	Part No. ¹	Shaft Diameter	Ring				Groove				Thrust Capacity		
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²
	XVSM-78	78,00	74,85	+0,00/-0,76	0,99	±0,13	0,99	±0,05	75,66	±0,15	1,12	+0,08/-0,00	44477
XVSM-80	80,00	76,82	4,78		0,99		77,66		1,12		45617		72052
XVSM-82	82,00	78,79	4,78		0,99		79,66		1,12		46757		73853
XVSM-85	85,00	81,76	4,78		0,99		82,66		1,12		48468		76555
XVSM-88	88,00	84,73	4,78		0,99		85,66		1,12		50179		79257
XVSM-90	90,00	86,69	4,78		0,99		87,66		1,12		51319		81058
XVSM-95	95,00	91,66	4,78		0,99		92,66		1,12		54170		85561
XVSM-100	100,00	96,62	4,78	0,99	97,66	1,12	57021	90064					
XVSM-105	105,00	101,13	+0,00/-0,89	5,72	1,17	102,20	±0,18	1,32	+0,10/-0,00	71642	106440		
XVSM-110	110,00	106,08		5,72	1,17	107,20		1,32		75054	111508		
XVSM-115	115,00	111,03		5,72	1,17	112,20		1,32		78465	116577		
XVSM-120	120,00	115,98		5,72	1,17	117,20		1,32		81877	121645		
XVSM-125	125,00	120,93		5,72	1,17	122,20		1,32		85288	126714		
XVSM-130	130,00	125,88		5,72	1,17	127,20		1,32		88700	131783		
XVSM-135	135,00	130,31		5,72	1,55	131,63		1,70		111027	181299		
XVSM-140	140,00	135,13	+0,00/-1,14	5,72	1,55	136,50	±0,20	1,70	+0,13/-0,00	119404	188013		
XVSM-145	145,00	139,95		5,72	1,55	141,37		1,70		127974	197907		
XVSM-150	150,00	144,83		5,72	1,55	146,25		1,70		137070	201443		
XVSM-155	155,00	149,66		5,72	1,55	151,13		1,70		146361	208158		
XVSM-160	160,00	154,44		6,73	1,55	156,00		1,70		155956	214872		
XVSM-165	165,00	159,27		6,73	1,55	160,88		1,70		165855	221587		
XVSM-170	170,00	164,09		6,73	1,55	165,75		1,70		176059	228302		
XVSM-175	175,00	168,92	+0,00/-1,52	6,73	1,55	170,63	±0,15	1,70	+0,13/-0,00	186568	235017		
XVSM-180	180,00	173,75		6,73	1,55	175,50		1,70		197381	241731		
XVSM-185	185,00	178,57		7,62	1,55	180,38		1,70		208499	248446		
XVSM-190	190,00	183,40		7,62	1,55	185,25		1,70		219922	255161		
XVSM-195	195,00	188,22		7,62	1,55	190,13		1,70		231649	261876		
XVSM-200	200,00	193,05		7,62	1,55	195,00		1,70		243681	268590		
XVSM-210	210,00	202,70		8,76	1,93	204,75		2,08		268658	351160		
XVSM-220	220,00	212,36	+0,00/-1,78	8,76	1,93	214,50	±0,15	2,08	+0,13/-0,00	294854	367882		
XVSM-230	230,00	222,01		8,76	1,93	224,25		2,08		322268	384604		
XVSM-240	240,00	231,66		8,76	1,93	234,00		2,08		350900	401326		
XVSM-250	250,00	241,31		8,76	1,93	243,75		2,08		380751	418048		
XVSM-260	260,00	250,97		9,65	1,93	253,50		2,08		411821	434770		
XVSM-270	270,00	260,62		9,65	1,93	263,25		2,08		444108	451492		
XVSM-280	280,00	270,27		9,65	1,93	273,00		2,08		477614	468214		
XVSM-290	290,00	279,92	+0,00/-1,78	9,65	1,93	282,75	±0,15	2,08	+0,13/-0,00	512339	484936		
XVSM-300	300,00	289,58		9,65	1,93	292,50		2,08		548282	501658		

¹ Add suffix "-S02" for 302 stainless steel. Add suffix "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2.

³ Based on a safety factor of 3.

Aerospace Rings (Metric)

XES Series

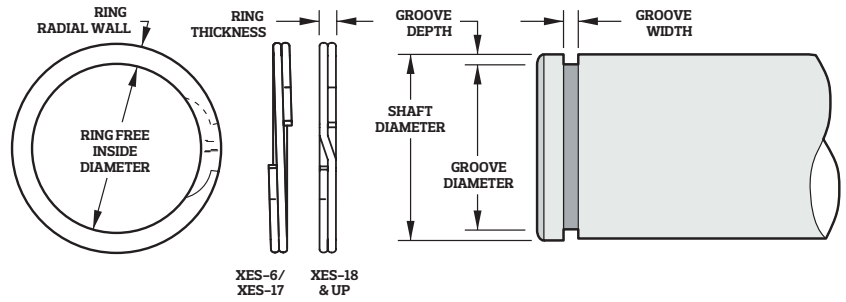
Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

MA 4016⁴



* No Removal Notch



	Part No. ¹	Shaft Diameter	Ring			Groove		Thrust Capacity	
			Inside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XES-6*	6,00	5,61	0,38 - 0,58	0,64	5,66	0,74	500	3160
	XES-7*	7,00	6,53	0,51 - 0,71	0,64	6,58	0,74	720	3690
	XES-8*	8,00	7,49	0,51 - 0,71	0,64	7,57	0,74	840	4210
	XES-9*	9,00	8,41	0,64 - 0,84	0,64	8,48	0,74	1140	4740
	XES-10*	10,00	9,40	0,64 - 0,84	0,64	9,50	0,74	1220	5270
	XES-11	11,00	10,39	0,76 - 0,96	0,64	10,46	0,74	1450	5790
	XES-12	12,00	11,18	1,02 - 1,22	0,60	11,29	0,70	2100	7950
	XES-13	13,00	12,13	1,14 - 1,35	0,89	12,24	1,00	2410	12100
	XES-14	14,00	13,06	1,14 - 1,35	0,89	13,19	1,00	2800	13040
	XES-15	15,00	13,98	1,14 - 1,35	0,89	14,09	1,00	3360	13970
	XES-16	16,00	14,90	1,27 - 1,48	0,89	15,02	1,00	3820	14900
	XES-17	17,00	15,82	1,27 - 1,48	0,89	16,02	1,00	4060	15830
	XES-18	18,00	16,80	1,52 - 1,73	1,07	16,92	1,20	4730	20150
	XES-19	19,00	17,73	1,52 - 1,73	1,07	17,87	1,20	5270	21270
	XES-20	20,00	18,62	1,52 - 1,73	1,07	18,77	1,20	6040	22390
	XES-21	21,00	19,57	1,52 - 1,73	1,07	19,72	1,20	6550	23510
	XES-22	22,00	20,45	1,78 - 1,98	1,07	20,62	1,20	7390	24630
	XES-23	23,00	21,39	1,78 - 1,98	1,07	21,57	1,20	8070	25750
	XES-24	24,00	22,35	1,78 - 1,98	1,07	22,52	1,20	8650	26870
	XES-25	25,00	23,25	2,03 - 2,24	1,07	23,42	1,20	9620	27990
	XES-26	26,00	24,21	2,03 - 2,24	1,07	24,42	1,20	10000	29110
	XES-27	27,00	25,04	2,49 - 2,69	1,27	25,35	1,40	10910	31170
	XES-28	28,00	26,00	2,49 - 2,69	1,27	26,30	1,40	11590	32330
	XES-29	29,00	26,95	2,49 - 2,69	1,27	27,27	1,40	12290	33480
	XES-30	30,00	27,92	2,49 - 2,69	1,27	28,25	1,40	12860	34640
	XES-31	31,00	28,84	2,49 - 2,69	1,27	29,17	1,40	13890	35790
	XES-32	32,00	29,77	2,49 - 2,69	1,27	30,09	1,40	14960	36950
	XES-34	34,00	31,54	2,87 - 3,07	1,27	31,90	1,40	17390	39260
	XES-35	35,00	32,44	2,87 - 3,07	1,27	32,80	1,40	18750	40410
	XES-36	36,00	33,40	2,87 - 3,07	1,27	33,75	1,40	19810	41560
	XES-37	37,00	34,24	2,87 - 3,07	1,27	34,67	1,40	21080	42720
	XES-38	38,00	35,18	2,87 - 3,07	1,27	35,66	1,40	21650	43870
	XES-40	40,00	37,15	3,12 - 3,33	1,57	37,55	1,75	23960	57090
	XES-42	42,00	39,02	3,12 - 3,33	1,57	39,45	1,75	26180	59990
	XES-45	45,00	41,77	3,12 - 3,33	1,57	42,25	1,75	30240	64230
	XES-46	46,00	42,67	3,12 - 3,33	1,57	43,15	1,75	32040	65660
	XES-47	47,00	43,81	3,89 - 4,09	1,57	44,31	1,75	30900	67080
	XES-48	48,00	44,48	3,89 - 4,09	1,57	45,05	1,75	34600	68510
	XES-50	50,00	46,69	3,89 - 4,09	1,57	47,05	1,75	36040	71370
	XES-52	52,00	49,62	3,12 - 3,33	1,25	50,15	1,42	23550	59090
	XES-53	53,00	50,62	3,12 - 3,33	1,25	51,15	1,42	24000	60230
	XES-54	54,00	51,62	3,12 - 3,33	1,25	52,15	1,42	24460	61370
	XES-55	55,00	52,62	3,38 - 3,58	1,25	53,15	1,42	24910	62500
	XES-56	56,00	53,62	3,38 - 3,58	1,25	54,15	1,42	25370	63640
	XES-58	58,00	55,43	3,38 - 3,58	1,25	56,01	1,42	28250	65910
	XES-59	59,00	56,43	3,38 - 3,58	1,25	57,01	1,42	28730	67050

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

⁴ Contact TFC for details/information on how to order parts to be in compliance with this specification.

Aerospace Rings (Metric)

XES Series

	Part No. ¹	Shaft Diameter	Ring				Groove				Thrust Capacity		
			Inside Diameter		Radial Wall	Thickness	Diameter		Width	Groove Yield (N) ²	Ring Shear (N) ³		
Metric (mm)	XES-60	60,00	57,43	+0,00/-0,63	3,38 - 3,58	1,25	±0,08	58,01	±0,15	1,42	+0,10/-0,00	29220	68180
	XES-61	61,00	58,36		3,38 - 3,58	1,25		58,91		1,42		31190	69320
	XES-62	62,00	59,30		3,63 - 3,84	1,25		59,91		1,42		31710	70460
	XES-63	63,00	60,30		3,63 - 3,84	1,25		60,91		1,42		32220	71590
	XES-64	64,00	61,25		3,63 - 3,84	1,25		61,91		1,42		32730	72730
	XES-65	65,00	62,20		3,63 - 3,84	1,25		62,81		1,42		34820	73870
	XES-66	66,00	63,16		3,63 - 3,84	1,25		63,79		1,42		35680	75000
	XES-67	67,00	64,16		3,63 - 3,84	1,25		64,71		1,42		37530	76140
	XES-68	68,00	65,08	+0,00/-0,76	3,89 - 4,09	1,25		65,71		1,42	38090	77270	
	XES-69	69,00	66,06		3,89 - 4,09	1,25		66,71		1,42	38650	78410	
	XES-70	70,00	67,08		3,89 - 4,09	1,25		67,71		1,42	39210	79550	
	XES-71	71,00	68,04		3,89 - 4,09	1,25		68,71		1,42	39770	80680	
	XES-72	72,00	69,00		4,11 - 4,37	1,25		69,65		1,42	41380	81820	
	XES-75	75,00	71,93		4,11 - 4,37	1,25		72,61		1,42	43830	85230	
	XES-78	78,00	74,84		4,11 - 4,37	1,55		75,55		1,73	46730	109910	
	XES-80	80,00	76,80		4,37 - 4,62	1,55		77,51		1,73	48700	112730	
	XES-82	82,00	78,72	+0,00/-1,00	4,37 - 4,62	1,55		79,45		1,73	51120	115550	
	XES-85	85,00	81,62		4,62 - 4,88	1,55		82,35		1,73	55060	119780	
	XES-88	88,00	84,53		4,62 - 4,88	1,55		85,31		1,73	57860	124000	
	XES-90	90,00	86,43		4,88 - 5,13	1,55		87,21		1,73	61370	126820	
	XES-95	95,00	91,37		4,88 - 5,13	1,55		92,15		1,73	66160	133870	
	XES-100	100,00	96,10		5,13 - 5,38	1,55		97,01		1,73	73050	140910	
	XES-105	105,00	100,94		5,38 - 5,64	1,55		101,85		1,73	80780	147960	
	XES-110	110,00	105,75		5,64 - 5,89	1,55		106,69		1,73	88930	155000	
	XES-115	115,00	110,59	+0,00/-1,30	5,89 - 6,15	1,55		111,55		1,73	96890	162050	
	XES-120	120,00	115,49		6,20 - 6,45	1,83		116,45		2,00	104030	199640	
	XES-125	125,00	120,44		6,20 - 6,45	1,83		121,45		2,00	108360	207960	
	XES-130	130,00	125,34		6,20 - 6,45	1,83		126,35		2,00	115860	216280	
	XES-135	135,00	130,20		6,20 - 6,45	1,83		131,27		2,00	122950	224600	
	XES-140	140,00	135,14		6,20 - 6,45	1,83		136,25		2,00	128190	232920	
	XES-145	145,00	140,00		6,20 - 6,45	1,83		141,17		2,00	135590	241230	
	XES-150	150,00	145,00	+0,00/-1,52	6,20 - 6,45	1,83		146,17		2,00	140260	249550	
	XES-155	155,00	149,33		7,72 - 8,03	2,18		150,60		2,40	166080	307190	
	XES-160	160,00	154,31		7,72 - 8,03	2,18		155,60		2,40	171430	317100	
	XES-165	165,00	159,23		7,72 - 8,03	2,18		160,60		2,40	176790	327010	
	XES-170	170,00	164,00		7,72 - 8,03	2,18		165,40		2,40	190430	336920	
	XES-175	175,00	169,00		7,72 - 8,03	2,18		170,40		2,40	196030	346830	
	XES-180	180,00	173,78		7,72 - 8,03	2,18		175,20		2,40	210400	356740	
	XES-185	185,00	178,70		7,72 - 8,03	2,18		180,20		2,40	216240	366650	
	XES-190	190,00	183,70	+0,00/-1,78	7,72 - 8,03	2,18		185,20		2,40	220080	376560	
XES-195	195,00	188,43	7,72 - 8,03		2,18	190,00	2,40	237420	386460				
XES-200	200,00	193,43	7,72 - 8,03		2,18	195,00	2,40	243510	396370				
XES-210	210,00	202,93	9,32 - 9,63		2,18	204,60	2,40	276140	416190				
XES-220	220,00	212,65	9,32 - 9,63		2,18	214,40	2,40	300010	436010				
XES-230	230,00	222,60	9,32 - 9,63		2,18	224,40	2,40	313640	455830				
XES-240	240,00	232,32	9,32 - 9,63		2,18	234,20	2,40	328970	475650				
XES-250	250,00	241,83	9,32 - 9,63		2,18	243,80	2,40	377440	495470				
XES-260	260,00	251,57	+0,00/-1,78	9,32 - 9,63	2,18	253,60	2,40	405210	515290				
XES-270	270,00	261,30		9,32 - 9,63	2,18	263,40	2,40	433940	535100				
XES-280	280,00	271,04		9,32 - 9,63	2,18	273,20	2,40	463650	554920				

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.
⁴ Contact TFC for details/information on how to order parts to be in compliance with this specification.

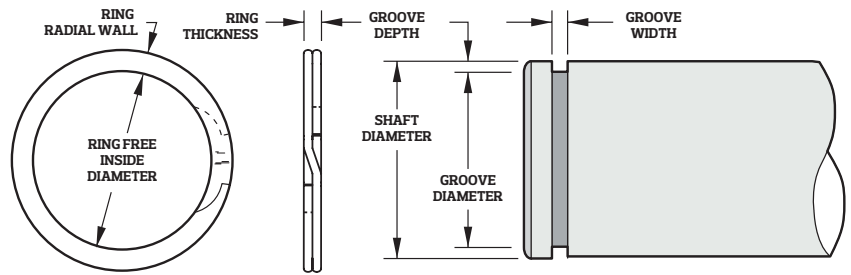
DIN Rings (Metric)

XDNS Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

Groove Compatible
with DIN 471



	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XDNS-13	13,00	12,27	+0,00/-0,33	1,40	±0,10	0,99	±0,05	12,40	+0,00/-0,11	1,10	+0,14/-0,00	1901	13474
	XDNS-14	14,00	13,26		1,40		0,99		13,40		1,10		2047	14510
	XDNS-15	15,00	14,15		1,40		0,99		14,30		1,10		2559	15547
	XDNS-16	16,00	15,04		1,65		0,99		15,20		1,10		3119	16583
	XDNS-17	17,00	16,04		1,65		0,99		16,20		1,10		3314	17620
	XDNS-18	18,00	16,83		1,91		1,14		17,00		1,30		4386	18668
	XDNS-19	19,00	17,83		1,91		1,14		18,00	1,30	4630		19705	
	XDNS-20	20,00	18,82		1,91		1,14		19,00	1,30	4874		20742	
	XDNS-21	21,00	19,79		1,91		1,14		20,00	1,30	5117		21779	
	XDNS-22	22,00	20,78		1,91		1,14		21,00	1,30	5361		22816	
	XDNS-23	23,00	21,77		1,91		1,14		22,00	1,30	5605		23853	
	XDNS-24	24,00	22,66		2,18		1,14		22,90	1,30	6433		24891	
	XDNS-25	25,00	23,65	2,18	1,14	23,90	1,30	6701	25928					
	XDNS-26	26,00	24,64	2,18	1,14	24,90	1,30	6969	26965					
	XDNS-27	27,00	25,34	2,18	1,14	25,60	1,30	9211	28002					
	XDNS-28	28,00	26,34	2,39	1,44	26,60	1,60	9552	36681					
	XDNS-29	29,00	27,33	2,39	1,44	27,60	1,60	9893	37991					
	XDNS-30	30,00	28,32	2,39	1,44	28,60	1,60	10235	39301					
	XDNS-32	32,00	30,00	3,25	1,44	30,30	1,60	13256	41921					
	XDNS-33	33,00	30,99	3,25	1,44	31,30	1,60	13670	43231					
	XDNS-34	34,00	31,98	3,25	1,44	32,30	1,60	14085	44541					
	XDNS-35	35,00	32,66	3,25	1,44	33,00	1,60	17058	45851					
	XDNS-36	36,00	33,65	4,01	1,69	34,00	1,85	17545	55349					
	XDNS-38	38,00	35,64	4,01	1,69	36,00	1,85	18520	58424					
	XDNS-40	40,00	37,11	4,01	1,69	37,50	1,85	24368	61498					
	XDNS-42	42,00	39,09	4,01	1,69	39,50	1,85	25586	64573					
	XDNS-45	45,00	42,06	4,01	1,69	42,50	1,85	27414	69186					
	XDNS-46	46,00	43,05	4,01	1,69	43,50	1,85	28023	70723					
	XDNS-47	47,00	44,04	4,01	1,69	44,50	1,85	28633	72261					
	XDNS-48	48,00	45,03	4,01	1,69	45,50	1,85	29242	73798					
	XDNS-50	50,00	46,53	+0,00/-0,63	5,08	±0,12	1,93	±0,08	47,00	+0,00/-0,25	2,15		36552	87790
	XDNS-52	52,00	48,51		1,93		49,00		2,15		38014		91302	
	XDNS-54	54,00	50,50		1,93		51,00		2,15		39476		94813	
	XDNS-55	55,00	51,49		1,93		52,00		2,15		40207		96569	
	XDNS-56	56,00	52,48		1,93		53,00		2,15		40938		98325	
XDNS-58	58,00	54,43	1,93		55,00		2,15		42400		101836			
XDNS-60	60,00	56,42	5,08		1,93		57,00		2,15	43863	105348			
XDNS-62	62,00	58,42	5,08		1,93		59,00		2,15	45325	108860			
XDNS-63	63,00	59,39	5,08		1,93		60,00		2,15	46056	110615			
XDNS-65	65,00	61,39	5,08		2,41		62,00		2,65	47518	135725			
XDNS-67	67,00	63,37	5,08		2,41		64,00		2,65	48980	139901			
XDNS-68	68,00	64,34	5,08		2,41		65,00		2,65	49711	141989			
XDNS-70	70,00	66,34	5,08	2,41	67,00	2,65	51173	146165						
XDNS-72	72,00	68,33	5,08	2,41	69,00	2,65	52635	150341						
XDNS-75	75,00	71,33	5,08	2,41	72,00	2,65	54828	156605						

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

DIN Rings (Metric)

XDNS Series

	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XDNS-77	77,00	73,33	+0,00/-0,76	5,08	±0,12	2,41	±0,08	74,00	+0,00/-0,30	2,65	+0,14/-0,00	56290	160782
	XDNS-78	78,00	74,33		5,08		2,41		75,00		2,65		57021	162870
	XDNS-80	80,00	75,81		6,05		2,41		76,50		2,65		68231	167046
	XDNS-82	82,00	77,81		6,05		2,41		78,50		2,65		69936	171222
	XDNS-85	85,00	80,80	+0,00/-0,89	6,35	±0,13	2,91	±0,10	81,50	+0,00/-0,35	3,15	+0,18/-0,00	72495	214309
	XDNS-88	88,00	83,80		6,35		2,91		84,50		3,15		75054	221873
	XDNS-90	90,00	85,80		6,35		2,91		86,50		3,15		76759	226915
	XDNS-95	95,00	90,80		6,35		2,91		91,50		3,15		81024	239522
	XDNS-98	98,00	93,79	+0,00/-1,30	6,35	±0,15	2,91	±0,13	94,50	+0,00/-0,63	3,15	+0,22/-0,00	83583	247086
	XDNS-100	100,00	95,79		6,35		2,91		96,50		3,15		85288	252128
	XDNS-102	102,00	97,29		6,73		3,89		98,00		4,15		99422	343778
	XDNS-105	105,00	100,28		6,73		3,89		101,00	+0,00/-0,72	4,15		102346	353889
	XDNS-108	108,00	103,25	+0,00/-1,52	6,73	±0,19	3,89	±0,13	104,00		4,15		105270	364000
	XDNS-110	110,00	105,23		6,73		3,89		106,00		4,15		107220	370741
	XDNS-115	115,00	110,19		6,73		3,89		111,00		4,15		112093	387593
	XDNS-120	120,00	115,16		6,73		3,89		116,00	+0,00/-0,81	4,15		116967	404445
	XDNS-125	125,00	120,12	+0,00/-2,30	6,73	±0,19	3,89	±0,13	121,00		4,15		121840	421297
	XDNS-130	130,00	125,07		6,73		3,89		126,00		4,15		126714	438149
	XDNS-135	135,00	130,02		6,73		3,89		131,00		4,15		131588	455001
	XDNS-140	140,00	134,98		6,73		3,89		136,00	+0,00/-0,89	4,15		136461	471852
	XDNS-145	145,00	139,93	+0,00/-2,80	6,73	±0,19	3,89	±0,13	141,00		4,15		141335	488704
	XDNS-150	150,00	143,91		7,92		3,89		145,00		4,15		182761	505556
	XDNS-155	155,00	148,89		7,92		3,89		150,00		4,15		188853	522408
	XDNS-160	160,00	153,85	+0,00/-0,89	7,92	±0,19	3,89	±0,13	155,00	+0,00/-0,89	4,15	+0,22/-0,00	194945	539260
	XDNS-165	165,00	158,80		7,92		3,89		160,00		4,15		201037	556112
	XDNS-170	170,00	163,75		7,92		3,89		165,00		4,15		207129	572964
	XDNS-175	175,00	168,73		7,92		3,89		170,00		4,15		213221	589815
	XDNS-180	180,00	173,69	+0,00/-1,78	7,92	±0,19	3,89	±0,13	175,00	+0,00/-0,81	4,15		219313	606667
	XDNS-185	185,00	178,66		7,92		3,89		180,00		4,15		225405	623519
	XDNS-190	190,00	183,59		7,92		3,89		185,00		4,15		231497	640371
	XDNS-195	195,00	188,54		7,92		3,89		190,00		4,15		237589	657223
	XDNS-200	200,00	193,54	+0,00/-2,80	7,92	±0,19	3,89	±0,13	195,00	+0,00/-0,81	4,15		243681	674075
	XDNS-205	205,00	197,54		11,18		4,86		199,00		5,15		299727	863214
	XDNS-210	210,00	202,54		11,18		4,86		204,00		5,15		307038	884268
	XDNS-220	220,00	212,47		11,18		4,86		214,00		5,15		321659	926376
	XDNS-230	230,00	222,40	+0,00/-2,80	11,18	±0,19	4,86	±0,13	224,00	+0,00/-0,81	5,15	+0,22/-0,00	336280	968484
	XDNS-240	240,00	232,33		11,18		4,86		234,00		5,15		350900	1010592
	XDNS-250	250,00	242,24		11,18		4,86		244,00		5,15		365521	1052700
	XDNS-260	260,00	250,19		12,70		4,86		252,00	+0,00/-0,81	5,15		506856	1094808
	XDNS-270	270,00	260,15	+0,00/-2,80	12,70	±0,19	4,86	±0,13	262,00		5,15		526351	1136916
	XDNS-280	280,00	270,08		12,70		4,86		272,00		5,15		545845	1179024
	XDNS-290	290,00	279,98		12,70		4,86		282,00		5,15		565340	1221132
	XDNS-300	300,00	289,92		12,70		4,86		292,00	+0,00/-0,89	5,15		584834	1263241
	XDNS-310	310,00	297,84	+0,00/-2,80	15,88	±0,19	5,87	±0,13	300,00		6,20	+0,22/-0,00	755411	1576625
	XDNS-320	320,00	307,84		15,88		5,87		310,00		6,20		779779	1627484
	XDNS-330	330,00	317,75		15,88		5,87		320,00		6,20		804147	1678342
	XDNS-340	340,00	327,69		15,88		5,87		330,00		6,20		828515	1729201
	XDNS-350	350,00	337,64	+0,00/-2,80	15,88	±0,19	5,87	±0,13	340,00	+0,00/-0,89	6,20	+0,22/-0,00	852883	1780060
	XDNS-360	360,00	347,57		15,88		5,87		350,00		6,20		877251	1830919
	XDNS-370	370,00	357,48		15,88		5,87		360,00		6,20		901619	1881778
	XDNS-380	380,00	367,41		15,88		5,87		370,00		6,20		925987	1932637
	XDNS-390	390,00	377,34	+0,00/-2,80	15,88	±0,19	5,87	±0,13	380,00	+0,00/-0,89	6,20	+0,22/-0,00	950355	1983496
	XDNS-400	400,00	387,25		15,88		5,87		390,00		6,20		974723	2034354

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

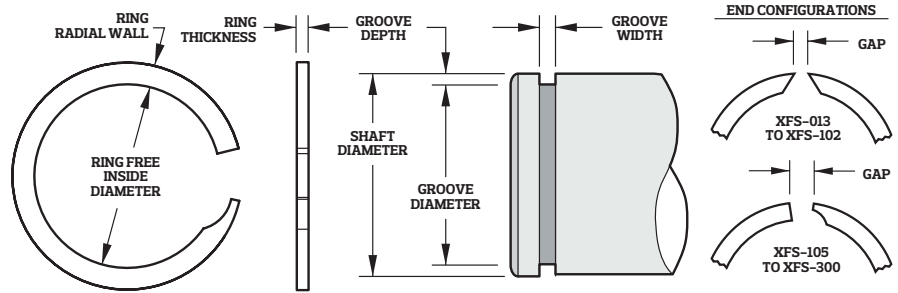
Snap Rings (Metric)

XFS Series

Stock items available in:

- Carbon steel
- 302 stainless steel

Groove Compatible
with DIN 471



	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XFS-013	13,00	12,27	+0,00/-0,33	1,40	±0,10	0,94	±0,05	12,40	+0,00/-0,11	1,10	+0,14/-0,00	1931	10591
	XFS-014	14,00	13,31		1,40		0,94		13,40		1,10		2077	11396
	XFS-015	15,00	14,15		1,40		0,94		14,30		1,10		2602	12224
	XFS-016	16,00	14,98		1,65		0,94		15,20		1,10		3172	13029
	XFS-017	17,00	16,06		1,65		0,94		16,20		1,10		3367	13838
	XFS-018	18,00	16,82		1,90		1,15		17,00	1,30	4457		17953	
	XFS-019	19,00	17,81		1,90		1,15		18,00	1,30	4702		18941	
	XFS-020	20,00	18,80		1,90		1,15		19,00	1,30	4951		19928	
	XFS-021	21,00	19,79		1,90		1,15		20,00	1,30	5200		20942	
	XFS-022	22,00	20,83		1,90		1,15		21,00	1,30	5445		21930	
	XFS-023	23,00	21,77		1,90		1,15		22,00	1,30	5698		22939	
	XFS-024	24,00	22,50		2,15		1,15		22,90	1,30	6539		23927	
	XFS-025	25,00	23,70		2,15		1,15		23,90	1,30	6806		24914	
	XFS-026	26,00	24,64		2,15		1,15		24,90	1,30	7082		25929	
	XFS-027	27,00	25,50		2,15		1,15		25,90	1,30	7353		26916	
	XFS-028	28,00	26,32	3,25	1,44	26,60	1,60	9702	33179					
	XFS-029	29,00	27,15	3,25	1,44	27,60	1,60	10053	34385					
	XFS-030	30,00	28,35	3,25	1,44	28,60	1,60	10395	35559					
	XFS-032	32,00	29,87	3,25	1,44	30,30	1,60	13073	37939					
	XFS-033	33,00	31,07	3,25	1,44	31,30	1,60	13478	39113					
	XFS-034	34,00	31,96	3,25	1,44	32,30	1,60	13892	40319					
	XFS-035	35,00	32,57	3,25	1,44	33,00	1,60	16899	41493					
	XFS-036	36,00	33,64	4,01	1,69	34,00	1,85	17375	50038					
	XFS-038	38,00	35,62	4,01	1,69	36,00	1,85	18344	52827					
	XFS-040	40,00	37,02	4,01	1,69	37,50	1,85	24265	55621					
	XFS-042	42,00	39,08	4,01	1,69	39,50	1,85	25484	58410					
	XFS-045	45,00	42,05	4,01	1,69	42,50	1,85	27303	62578					
	XFS-046	46,00	43,10	4,01	1,69	43,50	1,85	27904	63952					
	XFS-047	47,00	44,03	4,01	1,69	44,50	1,85	28504	65331					
	XFS-048	48,00	44,89	4,01	1,69	45,50	1,85	29118	66741					
	XFS-050	50,00	46,50	5,08	±0,13	1,93	±0,08	47,00	2,15	36529	75282			
	XFS-052	52,00	48,48	5,08		1,93		49,00	2,15	37974	78266			
	XFS-054	54,00	50,46	5,08		1,93		51,00	2,15	39438	81287			
	XFS-055	55,00	51,45	5,08		1,93		52,00	2,15	40163	82777			
	XFS-056	56,00	52,44	5,08		1,93		53,00	2,15	40906	84307			
XFS-058	58,00	54,42	5,08	1,93		55,00		2,15	42352	87287				
XFS-060	60,00	56,55	5,08	1,93		57,00		2,15	43819	90308				
XFS-062	62,00	58,32	5,08	1,93		59,00		2,15	45283	93328				
XFS-063	63,00	59,37	5,08	1,93		60,00		2,15	46008	94823				
XFS-065	65,00	61,35	5,08	2,41		62,00		2,65	47471	116641				
XFS-067	67,00	63,35	5,08	2,41		64,00		2,65	48939	120240				
XFS-068	68,00	64,45	5,08	2,41		65,00		2,65	49660	122019				
XFS-070	70,00	66,22	5,08	2,41		67,00		2,65	51128	125618				
XFS-072	72,00	68,28	5,08	2,41		69,00		2,65	52591	129221				
XFS-075	75,00	71,25	5,08	2,41		72,00		2,65	54780	134599				

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Metric)

XFS Series

	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (N) ²	Ring Shear (N) ³
Metric (mm)	XFS-077	77,00	73,23	+0,00/-0,76	5,08	±0,13	2,41	±0,08	74,00	+0,00/-0,30	2,65	+0,14/-0,00	56230	138153
	XFS-078	78,00	74,06		5,08		2,41		75,00		2,65		56968	139977
	XFS-080	80,00	75,70		6,02		2,41		76,50		2,65		68342	143575
	XFS-082	82,00	77,68		6,02		2,41		78,50		2,65		70033	147134
	XFS-085	85,00	80,65		6,30		2,91		81,50	+0,00/-0,35	3,15	72595	175656	
	XFS-088	88,00	83,60	6,30	2,91		84,50		3,15		75175	181906		
	XFS-090	90,00	85,80	6,30	2,91		86,50		3,15		76865	185998		
	XFS-095	95,00	90,68	6,30	2,91		91,50		3,15		81140	196340		
	XFS-098	98,00	93,70	6,30	2,91		94,50	3,15	83702	202536				
	XFS-100	100,00	95,50	6,30	2,91		96,50	3,15	85415	206682				
	XFS-102	102,00	97,23	+0,00/-1,30	6,30		2,91	98,50	+0,00/-0,54	3,15	87127	210828		
	XFS-105	105,00	99,83		6,73		3,89	101,00		4,15	102687	276951		
	XFS-108	108,00	102,87		6,73		3,89	104,00		4,15	105619	284855		
	XFS-110	110,00	104,90		6,73		3,89	106,00		4,15	107580	290149		
	XFS-115	115,00	109,85		6,73		3,89	111,00	4,15	112473	303346			
	XFS-120	120,00	115,06		6,73		3,89	116,00	4,15	117344	316478			
	XFS-125	125,00	119,75		6,73		3,89	121,00	+0,00/-0,63	4,15	122237	329676		
	XFS-130	130,00	124,70		6,73		3,89	126,00		4,15	127130	342873		
	XFS-135	135,00	129,65		6,73	3,89	131,00	4,15		132023	356071			
	XFS-140	140,00	134,42		6,73	3,89	136,00	4,15		136916	369269			
	XFS-145	145,00	139,55	6,73	3,89	141,00	+0,00/-0,72	4,15	141809	382467				
	XFS-150	150,00	143,50	+0,00/-1,52	8,03	3,89		145,00	4,15	181986	395665			
	XFS-155	155,00	148,45		8,03	3,89		150,00	4,15	188026	408796			
	XFS-160	160,00	153,40		8,03	3,89		155,00	4,15	194094	421994			
	XFS-165	165,00	158,40		8,03	3,89		160,00	4,15	200166	435192			
	XFS-170	170,00	163,30		8,03	3,89		165,00	4,15	206237	448683			
	XFS-175	175,00	168,25	8,03	3,89	170,00		4,15	212305	461890				
	XFS-180	180,00	173,20	8,03	3,89	175,00		4,15	218377	475097				
	XFS-185	185,00	177,62	+0,00/-1,78	8,03	3,89		180,00	4,15	224417	488232			
	XFS-190	190,00	183,35		8,03	3,89		185,00	4,15	230489	501439			
XFS-195	195,00	188,05	8,03		3,89	190,00	4,15	236556	514646					
XFS-200	200,00	193,00	8,03		3,89	195,00	4,15	242628	527853					
XFS-205	205,00	196,95	+0,00/-2,30		11,05	±0,18	4,87	+0,00/-0,72	199,00	5,15	299454	641438		
XFS-210	210,00	201,67		11,05	4,87		204,00		5,15	306763	657096			
XFS-220	220,00	211,80		11,05	4,87		214,00		5,15	321344	688327			
XFS-230	230,00	221,70		11,05	4,87		224,00		5,15	335961	719638			
XFS-240	240,00	231,89		11,05	4,87		234,00	5,15	350578	750953				
XFS-250	250,00	241,50		11,05	4,87		244,00	5,15	365199	782264				
XFS-260	260,00	249,59		12,70	4,87		252,00	+0,00/-0,81	5,15	505300	813500			
XFS-270	270,00	259,30		12,70	4,87		262,00		5,15	524748	844811			
XFS-280	280,00	268,83		12,70	4,87		272,00		5,15	544200	876126			
XFS-290	290,00	279,10		12,70	4,87		282,00		5,15	563599	907357			
XFS-300	300,00	289,00		12,70	4,87			292,00		5,15	583051	938673		

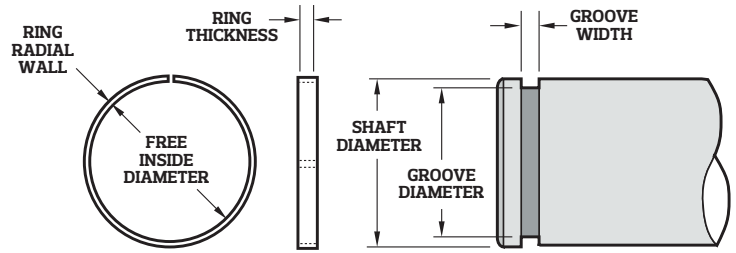
¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Based on a safety factor of 3.

Hoopster® Rings (Metric)

XHSM Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Shaft Diameter	Ring			Groove		Groove Yield (N) ²
			Inside Diameter	Radial Wall	Thickness	Diameter ³	Width	
Metric (mm)	XHSM-10	10	9,37	0,43	1,14	9,57	1,27	1051
	XHSM-11	11	10,35	0,43	1,14	10,57	1,27	1156
	XHSM-12	12	11,33	0,43	1,14	11,57	1,27	1262
	XHSM-13	13	12,21	0,53	1,65	12,47	1,78	1688
	XHSM-14	14	13,19	0,53	1,65	13,47	1,78	1818
	XHSM-15	15	14,17	0,53	1,65	14,47	1,78	1948
	XHSM-16	16	15,15	0,53	1,65	15,47	1,78	2078
	XHSM-17	17	16,13	0,53	1,65	16,47	1,78	2208
	XHSM-18	18	17,03	0,61	2,24	17,39	2,36	2672
	XHSM-19	19	18,01	0,61	2,24	18,39	2,36	2820
	XHSM-20	20	18,99	0,61	2,24	19,39	2,36	2968
	XHSM-21	21	19,97	0,61	2,24	20,39	2,36	3117
	XHSM-22	22	20,95	0,61	2,24	21,39	2,36	3265
	XHSM-23	23	21,93	0,61	2,24	22,39	2,36	3414
	XHSM-24	24	22,91	0,61	2,24	23,39	2,36	3562
	XHSM-25	25	23,89	0,61	2,24	24,39	2,36	3711
	XHSM-26	26	24,72	0,76	3,00	25,24	3,12	4824
	XHSM-27	27	25,70	0,76	3,00	26,24	3,12	5009
	XHSM-28	28	26,68	0,76	3,00	27,24	3,12	5195
	XHSM-29	29	27,66	0,76	3,00	28,24	3,12	5380
	XHSM-30	30	28,64	0,76	3,00	29,24	3,12	5566
	XHSM-31	31	29,62	0,76	3,00	30,24	3,12	5751
	XHSM-32	32	30,60	0,76	3,00	31,24	3,12	5937
	XHSM-33	33	31,48	0,86	3,81	32,14	3,94	6939
	XHSM-34	34	32,46	0,86	3,81	33,14	3,94	7149
	XHSM-35	35	33,44	0,86	3,81	34,14	3,94	7359
	XHSM-36	36	34,42	0,86	3,81	35,14	3,94	7569
	XHSM-37	37	35,40	0,86	3,81	36,14	3,94	7780
	XHSM-38	38	36,38	0,86	3,81	37,14	3,94	7990
	XHSM-40	40	38,34	0,86	3,81	39,14	3,94	8411
	XHSM-41	41	39,32	0,86	3,81	40,14	3,94	8621
	XHSM-42	42	40,30	0,86	3,81	41,14	3,94	8831
	XHSM-45	45	43,13	0,97	4,75	44,03	4,88	10575
	XHSM-47	47	45,09	0,97	4,75	46,03	4,88	11045
	XHSM-48	48	46,07	0,97	4,75	47,03	4,88	11280
	XHSM-50	50	48,03	0,97	4,75	49,03	4,88	11750
	XHSM-51	51	49,01	0,97	4,75	50,03	4,88	11985
	XHSM-52	52	49,99	0,97	4,75	51,03	4,88	12220
	XHSM-55	55	52,93	0,97	4,75	54,03	4,90	12925
	XHSM-56	56	53,91	0,97	4,75	55,03	4,90	13160
	XHSM-57	57	54,89	0,97	4,75	56,03	4,90	13395
	XHSM-58	58	55,87	0,97	4,75	57,03	4,90	13630
	XHSM-60	60	57,83	0,97	4,75	59,03	4,90	14100
	XHSM-62	62	59,62	1,14	5,72	60,86	5,87	17254
	XHSM-63	63	60,60	1,14	5,72	61,86	5,87	17532
	XHSM-64	64	61,58	1,14	5,72	62,86	5,87	17811
	XHSM-65	65	62,56	1,14	5,72	63,86	5,87	18089
	XHSM-67	67	64,52	1,14	5,72	65,86	5,87	18645
	XHSM-68	68	65,50	1,14	5,72	66,86	5,87	18924
	XHSM-70	70	67,46	1,14	5,72	68,86	5,87	19480
	XHSM-72	72	69,42	1,14	5,72	70,86	5,87	20037
	XHSM-75	75	72,36	1,14	5,72	73,86	5,87	20872
	XHSM-76	76	73,34	1,14	5,72	74,86	5,87	21150

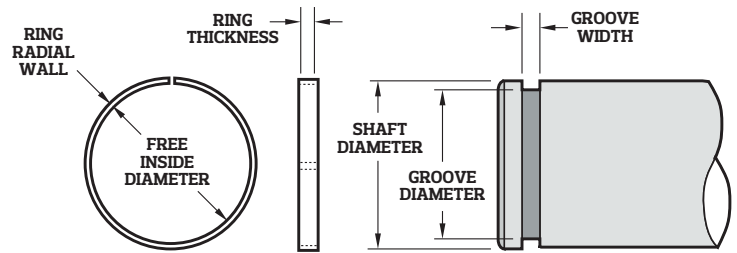
¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 310 N/mm² and a safety factor of 2. ³ Sharp corners on the groove required

Hoopster® Rings (Imperial)

XHS Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Shaft Diameter	Ring				Groove			Groove Yield (lb) ²
			Inside Diameter		Radial Wall	Thickness	Diameter ³		Width	
Imperial (in.)	XHS-37	0,375	0,351	±0,000/-0,012	0,017	0,045	0,358	±0,002	0,050	225
	XHS-43	0,437	0,411	±0,000/-0,012	0,017	0,045	0,420	±0,002	0,050	263
	XHS-46	0,469	0,443	±0,000/-0,012	0,017	0,045	0,452	±0,002	0,050	282
	XHS-50	0,500	0,469	±0,000/-0,012	0,021	0,065	0,479	±0,002	0,070	371
	XHS-53	0,531	0,499	±0,000/-0,015	0,021	0,065	0,510	±0,002	0,070	394
	XHS-56	0,562	0,530	±0,000/-0,015	0,021	0,065	0,541	±0,002	0,070	417
	XHS-59	0,594	0,561	±0,000/-0,015	0,021	0,065	0,573	±0,002	0,070	441
	XHS-62	0,625	0,592	±0,000/-0,015	0,021	0,065	0,604	±0,002	0,070	464
	XHS-65	0,656	0,622	±0,000/-0,015	0,021	0,065	0,635	±0,002	0,070	487
	XHS-68	0,688	0,653	±0,000/-0,015	0,021	0,065	0,667	±0,002	0,070	511
	XHS-71	0,718	0,680	±0,000/-0,018	0,024	0,088	0,694	±0,003	0,093	609
	XHS-75	0,750	0,711	±0,000/-0,018	0,024	0,088	0,726	±0,003	0,093	636
	XHS-78	0,781	0,741	±0,000/-0,018	0,024	0,088	0,757	±0,003	0,093	662
	XHS-81	0,812	0,772	±0,000/-0,018	0,024	0,088	0,788	±0,003	0,093	689
	XHS-84	0,843	0,802	±0,000/-0,018	0,024	0,088	0,819	±0,003	0,093	715
	XHS-87	0,875	0,834	±0,000/-0,018	0,024	0,088	0,851	±0,003	0,093	742
	XHS-90	0,906	0,864	±0,000/-0,018	0,024	0,088	0,882	±0,003	0,093	768
	XHS-93	0,938	0,895	±0,000/-0,018	0,024	0,088	0,914	±0,003	0,093	796
	XHS-96	0,968	0,925	±0,000/-0,020	0,024	0,088	0,944	±0,004	0,093	821
	XHS-100	1,000	0,956	±0,000/-0,020	0,024	0,088	0,976	±0,004	0,093	848
	XHS-103	1,031	0,980	±0,000/-0,020	0,030	0,118	1,001	±0,004	0,123	1093
	XHS-106	1,062	1,011	±0,000/-0,020	0,030	0,118	1,032	±0,004	0,123	1126
	XHS-109	1,093	1,041	±0,000/-0,020	0,030	0,118	1,063	±0,004	0,123	1159
	XHS-112	1,125	1,073	±0,000/-0,020	0,030	0,118	1,095	±0,004	0,123	1193
	XHS-115	1,156	1,103	±0,000/-0,020	0,030	0,118	1,126	±0,004	0,123	1226
	XHS-118	1,188	1,134	±0,000/-0,020	0,030	0,118	1,158	±0,004	0,123	1260
	XHS-121	1,218	1,164	±0,000/-0,020	0,030	0,118	1,188	±0,004	0,123	1291
	XHS-125	1,250	1,195	±0,000/-0,020	0,030	0,118	1,220	±0,004	0,123	1325
	XHS-128	1,281	1,225	±0,000/-0,024	0,030	0,118	1,251	±0,005	0,123	1358
	XHS-131	1,312	1,252	±0,000/-0,024	0,034	0,150	1,278	±0,005	0,155	1577
	XHS-134	1,343	1,282	±0,000/-0,024	0,034	0,150	1,309	±0,005	0,155	1614
	XHS-137	1,375	1,314	±0,000/-0,024	0,034	0,150	1,341	±0,005	0,155	1652
	XHS-140	1,406	1,344	±0,000/-0,024	0,034	0,150	1,372	±0,005	0,155	1690
	XHS-143	1,437	1,374	±0,000/-0,024	0,034	0,150	1,403	±0,005	0,155	1727
	XHS-146	1,468	1,405	±0,000/-0,024	0,034	0,150	1,434	±0,005	0,155	1765
	XHS-150	1,500	1,436	±0,000/-0,024	0,034	0,150	1,466	±0,005	0,155	1802
	XHS-156	1,562	1,497	±0,000/-0,030	0,034	0,150	1,528	±0,006	0,155	1877
	XHS-162	1,625	1,559	±0,000/-0,030	0,034	0,150	1,591	±0,006	0,155	1953
	XHS-168	1,688	1,619	±0,000/-0,030	0,034	0,150	1,653	±0,006	0,155	2028
	XHS-175	1,750	1,677	±0,000/-0,024	0,038	0,187	1,712	±0,005	0,193	2350
	XHS-181	1,812	1,739	±0,000/-0,024	0,038	0,187	1,775	±0,005	0,193	2434
	XHS-187	1,875	1,800	±0,000/-0,024	0,038	0,187	1,837	±0,005	0,193	2518
	XHS-193	1,938	1,861	±0,000/-0,024	0,038	0,187	1,900	±0,005	0,193	2603
	XHS-200	2,000	1,922	±0,000/-0,024	0,038	0,187	1,962	±0,005	0,193	2686
	XHS-206	2,062	1,983	±0,000/-0,024	0,038	0,187	2,024	±0,005	0,193	2769
	XHS-212	2,125	2,045	±0,000/-0,024	0,038	0,187	2,087	±0,005	0,193	2854
	XHS-218	2,188	2,106	±0,000/-0,024	0,038	0,187	2,150	±0,005	0,193	2939
	XHS-225	2,250	2,167	±0,000/-0,024	0,038	0,187	2,212	±0,005	0,193	3022
	XHS-231	2,312	2,228	±0,000/-0,024	0,038	0,187	2,274	±0,005	0,193	3105
	XHS-237	2,375	2,290	±0,000/-0,024	0,038	0,187	2,337	±0,005	0,193	3190
	XHS-243	2,437	2,343	±0,000/-0,030	0,045	0,225	2,392	±0,006	0,232	3876
	XHS-250	2,500	2,405	±0,000/-0,030	0,045	0,225	2,455	±0,006	0,232	3976
	XHS-256	2,562	2,466	±0,000/-0,030	0,045	0,225	2,517	±0,006	0,232	4075
	XHS-262	2,625	2,528	±0,000/-0,030	0,045	0,225	2,580	±0,006	0,232	4175
	XHS-268	2,688	2,589	±0,000/-0,030	0,045	0,225	2,643	±0,006	0,232	4275
	XHS-275	2,750	2,650	±0,000/-0,030	0,045	0,225	2,705	±0,006	0,232	4374
	XHS-281	2,812	2,712	±0,000/-0,030	0,045	0,225	2,768	±0,006	0,232	4472
	XHS-287	2,875	2,773	±0,000/-0,030	0,045	0,225	2,830	±0,006	0,232	4572
	XHS-293	2,938	2,833	±0,000/-0,030	0,045	0,225	2,892	±0,006	0,232	4673
	XHS-300	3,000	2,895	±0,000/-0,030	0,045	0,225	2,955	±0,006	0,232	4771

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Sharp corners on the groove required

Light Duty Rings (Imperial)

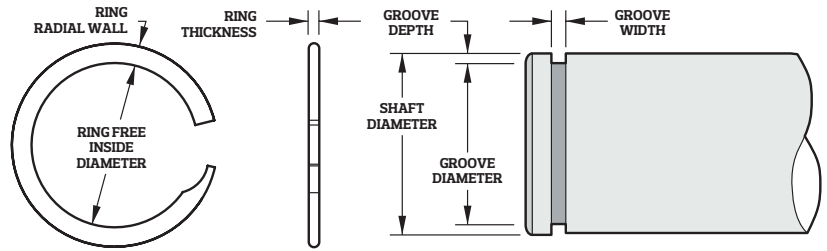
XVS Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel



* No Removal Notch



	Part No. ¹	Shaft Diameter	Ring					Groove				Thrust Capacity		
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XVS-25*	0,250	0,236	+0,000/-0,010	0,020		0,012		0,238	±0,002	0,015		106	481
	XVS-31*	0,312	0,294		0,025		0,015		0,297		0,018		165	750
	XVS-37*	0,375	0,348		0,025		0,015		0,351		0,018		318	901
	XVS-43	0,437	0,410	+0,000/-0,012	0,035	0,015	0,413	0,018	371	1050				
	XVS-50	0,500	0,467	+0,000/-0,013	0,045	0,018	0,472	0,022	500	1300				
	XVS-56	0,562	0,529		0,045	0,018	0,534	0,022	560	1460				
	XVS-62	0,625	0,591		0,045	0,018	0,597	0,022	620	1630				
	XVS-68	0,687	0,652		0,045	0,018	0,659	0,022	680	1790				
	XVS-75	0,750	0,715		0,045	0,018	0,722	0,022	740	1950				
	XVS-81	0,812	0,762		0,065	0,021	0,770	±0,003	0,026	1210	2460			
	XVS-87	0,875	0,825		0,065	0,021	0,833		0,026	1300	2660			
	XVS-93	0,937	0,886		0,065	0,021	0,895		0,026	1390	2840			
	XVS-100	1,000	0,949		0,065	0,021	0,958	0,026	1480	3040				
	XVS-106	1,062	1,008	+0,000/-0,015	0,088	0,025	1,018	±0,004	0,031	1650	3500			
	XVS-112	1,125	1,071		0,088	0,025	1,081		0,031	1750	3710			
	XVS-118	1,187	1,132		0,088	0,025	1,143		0,031	1850	3920			
	XVS-125	1,250	1,194		0,088	0,025	1,206		0,031	1940	4120			
	XVS-131	1,312	1,255		0,088	0,025	1,268		0,031	2040	4330			
	XVS-137	1,375	1,318		0,088	0,025	1,331		0,031	2140	4540			
	XVS-143	1,437	1,379		0,088	0,025	1,393		0,031	2240	4740			
	XVS-150	1,500	1,442		0,088	0,025	1,456		0,031	2330	4950			
	XVS-156	1,562	1,488		+0,000/-0,020	0,118	±0,004		0,031	±0,005	0,039	+0,003/-0,000	3200	6390
	XVS-162	1,625	1,550	0,118		0,031		1,568	0,039		3330		6650	
	XVS-168	1,687	1,612	0,118		0,031		1,630	0,039		3460		6900	
	XVS-175	1,750	1,674	0,118		0,031		1,693	0,039		3590		7160	
	XVS-181	1,812	1,736	0,118		0,031		1,755	0,039		3710		7410	
	XVS-187	1,875	1,798	0,118		0,031		1,818	0,039		3840		7670	
	XVS-193	1,937	1,859	0,118		0,031		1,880	0,039		3970		7920	
	XVS-200	2,000	1,922	0,118		0,031		1,943	0,039		4100		8180	
	XVS-206	2,062	1,963	+0,000/-0,025		0,158		±0,002	0,031		±0,006		0,039	+0,003/-0,000
	XVS-212	2,125	2,026		0,158	0,031	2,049		0,039	5710		8690		
	XVS-218	2,187	2,087		0,158	0,031	2,111		0,039	5870		8950		
	XVS-225	2,250	2,149		0,158	0,031	2,174		0,039	6040		9200		
	XVS-231	2,312	2,211		0,158	0,031	2,236		0,039	6210		9460		
	XVS-237	2,375	2,273		0,158	0,031	2,299		0,039	6380		9720		
	XVS-243	2,437	2,335		0,158	0,031	2,361		0,039	6550		9970		
XVS-250	2,500	2,397	0,158		0,031	2,424	0,039		6720	10230				
XVS-256	2,562	2,458	0,158		0,031	2,486	0,039		6880	10480				
XVS-262	2,625	2,521	0,158		0,031	2,549	0,039		7050	10740				
XVS-268	2,687	2,582	0,158		0,031	2,611	0,039		7220	10990				
XVS-275	2,750	2,644	0,158		0,031	2,674	0,039		7390	11250				
XVS-281	2,812	2,706	0,158		0,031	2,736	0,039		7550	11500				
XVS-287	2,875	2,768	0,158		0,031	2,799	0,039		7720	11760				
XVS-293	2,937	2,830	0,158		0,031	2,861	0,039		7890	12010				
XVS-300	3,000	2,892	0,158	0,031	2,924	0,039	8060	12270						

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Light Duty Rings (Imperial)

XVS Series

	Part No. ¹	Shaft Diameter	Ring					Groove				Thrust Capacity								
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³						
Imperial (in.)	XVS-306	3,062	2,938	+0,000/-0,030	0,188	±0,005	0,039	±0,002	2,970	±0,006	0,044	+0,003/-0,000	9960	15760						
	XVS-312	3,125	3,001		0,188		0,039		3,033		0,044		10160	16080						
	XVS-318	3,187	3,062		0,188		0,039		3,095		0,044		10360	16400						
	XVS-325	3,250	3,125		0,188		0,039		3,158		0,044		10570	16720						
	XVS-331	3,312	3,186		0,188		0,039		3,220		0,044		10770	17040						
	XVS-337	3,375	3,248		0,188		0,039		3,283		0,044		10970	17370						
	XVS-343	3,437	3,310		0,188		0,039		3,345		0,044		11180	17690						
	XVS-350	3,500	3,372		0,188		0,039		3,408		0,044		11380	18010						
	XVS-356	3,562	3,433		0,188		0,039		3,470		0,044		11580	18330						
	XVS-362	3,625	3,496		0,188		0,039		3,533		0,044		11790	18650						
	XVS-368	3,687	3,557		0,188		0,039		3,595		0,044		11990	18970						
	XVS-375	3,750	3,620		0,188		0,039		3,658		0,044		12190	19300						
	XVS-381	3,812	3,681		0,188		0,039		3,720		0,044		12400	19620						
	XVS-387	3,875	3,743		0,188		0,039		3,783		0,044		12600	19940						
	XVS-393	3,937	3,805		0,188		0,039		3,845		0,044		12800	20260						
	XVS-400	4,000	3,867		0,188		0,039		3,908		0,044		13010	20580						
	XVS-412	4,125	3,973	+0,000/-0,035	0,225	±0,002	0,046	±0,007	4,015	±0,007	0,052	+0,004/-0,000	16040	23850						
	XVS-425	4,250	4,097		0,225		0,046		4,140		0,052		16520	24570						
	XVS-437	4,375	4,221		0,225		0,046		4,265		0,052		17010	25290						
	XVS-450	4,500	4,345		0,225		0,046		4,390		0,052		17500	26010						
	XVS-462	4,625	4,468		0,225		0,046		4,515		0,052		17980	26740						
	XVS-475	4,750	4,592		0,225		0,046		4,640		0,052		18470	27460						
	XVS-487	4,875	4,715		0,225		0,046		4,765		0,052		18950	28180						
	XVS-500	5,000	4,839		0,225		0,046		4,890		0,052		19440	28900						
	XVS-525	5,250	5,067	+0,000/-0,045	0,225		±0,002	0,061	±0,008	5,119	±0,008		0,067	+0,005/-0,000	24490	40240				
	XVS-550	5,500	5,309		0,225			0,061		5,363			0,067		26830	42160				
	XVS-575	5,750	5,550		0,225			0,061		5,606			0,067		29260	44080				
	XVS-600	6,000	5,792		0,225			0,061		5,850			0,067		31810	45990				
	XVS-625	6,250	6,033		0,265			0,061		6,094			0,067		34460	47910				
	XVS-650	6,500	6,275		0,265			0,061		6,338			0,067		37220	49830				
	XVS-675	6,750	6,515		0,265			0,061		6,581			0,067		40560	51740				
	XVS-700	7,000	6,757		0,265			0,061		6,825			0,067		43540	53660				
	XVS-725	7,250	6,998	0,300	+0,004/-0,008	0,061		±0,008	7,069	±0,008	0,067	+0,005/-0,000	46640		55580					
	XVS-750	7,500	7,240	+0,000/-0,060		0,300			0,061		7,313		0,067		49830	57490				
	XVS-775	7,750	7,480			0,300			0,061		7,556		0,067		53140	59410				
	XVS-800	8,000	7,722			0,300			0,061		7,800		0,067		56550	61320				
	XVS-825	8,250	7,964			0,345			0,076		8,044		0,082		60070	78790				
	XVS-850	8,500	8,205	+0,000/-0,070		0,345			+0,004/-0,008		0,076		±0,008		8,288	±0,008	0,082	+0,005/-0,000	63690	81180
	XVS-875	8,750	8,446			0,345					0,076				8,531		0,082		68040	83570
	XVS-900	9,000	8,687			0,345					0,076				8,775		0,082		71890	85950
	XVS-925	9,250	8,929		0,345	0,076	9,019	0,082		75850	88340									
	XVS-950	9,500	9,170	0,345	0,076	9,263	0,082	79910		90730										
	XVS-975	9,750	9,411	+0,000/-0,070	0,345	0,076	9,506	0,082		84080	93120									
	XVS-1000	10,000	9,653		0,345	0,076	9,750	0,082		88360	95500									

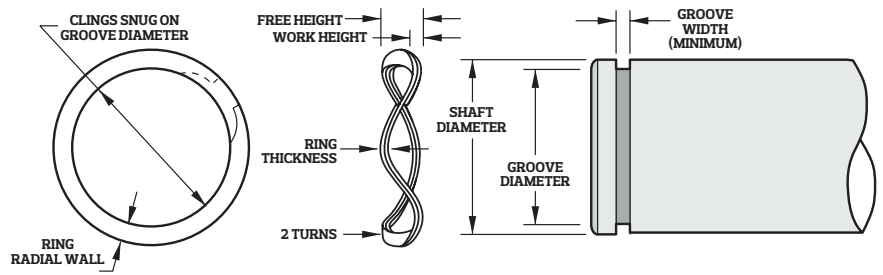
¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

WaveRing Series (Imperial)

YWSW Series

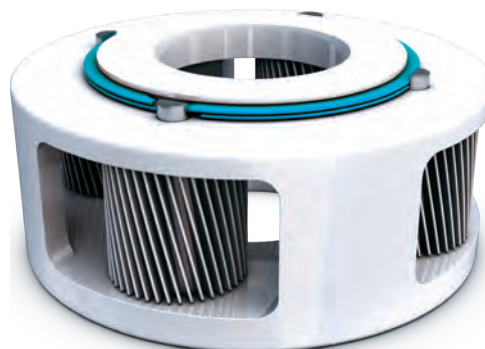
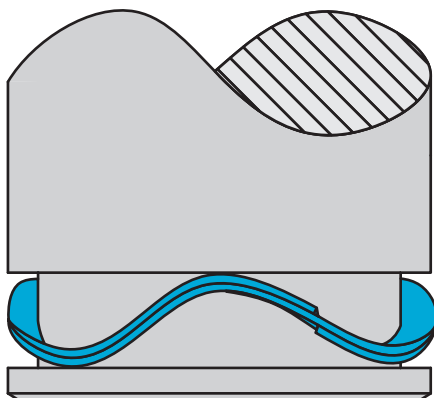
Stock items available in:

- Carbon steel
- 17-7PH stainless steel



	Part No. ¹	Shaft Diameter	Load (lb) @ Work Height	Max. Free Height	Number of Waves	Ring		Crimp	Groove	
						Thickness	Radial Wall		Diameter	Width Min.
Imperial (in.)	YWSW-75	0,750	25 @ 0,085	0,115	3	0,042	0,065	N	0,704	0,120
	YWSW-87	0,875	30 @ 0,085	0,131	3	0,042	0,075	N	0,821	0,136
	YWSW-100	1,000	34 @ 0,085	0,129	3	0,042	0,085	N	0,940	0,134
	YWSW-112	1,125	38 @ 0,100	0,137	3	0,050	0,128	N	1,059	0,142
	YWSW-125	1,250	40 @ 0,100	0,145	3	0,050	0,128	N	1,176	0,150
	YWSW-137	1,375	45 @ 0,100	0,130	4	0,050	0,128	N	1,291	0,135
	YWSW-150	1,500	50 @ 0,100	0,126	4	0,050	0,128	N	1,406	0,131
	YWSW-162	1,625	55 @ 0,110	0,138	4	0,062	0,158	N	1,529	0,143
	YWSW-175	1,750	60 @ 0,110	0,137	4	0,062	0,158	N	1,650	0,142
	YWSW-187	1,875	63 @ 0,110	0,140	4	0,062	0,158	N	1,769	0,145
	YWSW-200	2,000	65 @ 0,110	0,145	4	0,062	0,158	N	1,886	0,150
	YWSW-212	2,125	70 @ 0,130	0,170	4	0,078	0,188	N	2,003	0,175
	YWSW-225	2,250	75 @ 0,130	0,175	4	0,078	0,188	N	2,120	0,180
	YWSW-237	2,375	80 @ 0,130	0,175	4	0,078	0,188	N	2,239	0,180
	YWSW-250	2,500	84 @ 0,130	0,171	4	0,078	0,188	N	2,360	0,176
	YWSW-262	2,625	88 @ 0,130	0,181	4	0,078	0,188	N	2,481	0,190
	YWSW-275	2,750	94 @ 0,170	0,217	4	0,093	0,225	Y	2,602	0,222
	YWSW-287	2,875	97 @ 0,170	0,217	4	0,093	0,225	Y	2,721	0,222
	YWSW-300	3,000	100 @ 0,170	0,225	4	0,093	0,225	Y	2,838	0,230
	YWSW-312	3,125	103 @ 0,170	0,230	4	0,093	0,225	Y	2,957	0,235
	YWSW-325	3,250	106 @ 0,170	0,225	4	0,093	0,225	Y	3,076	0,230
	YWSW-350	3,500	115 @ 0,185	0,245	4	0,111	0,281	Y	3,316	0,250
	YWSW-362	3,625	117 @ 0,185	0,250	4	0,111	0,281	Y	3,435	0,255
	YWSW-375	3,750	121 @ 0,185	0,258	4	0,111	0,281	Y	3,552	0,263
	YWSW-387	3,875	126 @ 0,185	0,255	4	0,111	0,281	Y	3,673	0,260
	YWSW-400	4,000	130 @ 0,185	0,268	4	0,111	0,281	Y	3,792	0,273
	YWSW-412	4,125	134 @ 0,185	0,263	4	0,111	0,281	Y	3,919	0,268
	YWSW-425	4,250	140 @ 0,185	0,248	5	0,111	0,281	Y	4,065	0,253
	YWSW-450	4,500	150 @ 0,185	0,256	5	0,111	0,281	Y	4,310	0,261
	YWSW-475	4,750	160 @ 0,185	0,253	5	0,111	0,281	Y	4,550	0,258
	YWSW-500	5,000	170 @ 0,185	0,259	5	0,111	0,281	Y	4,790	0,264

Add suffix "-S17" for stainless steel.



Gear Assembly Application

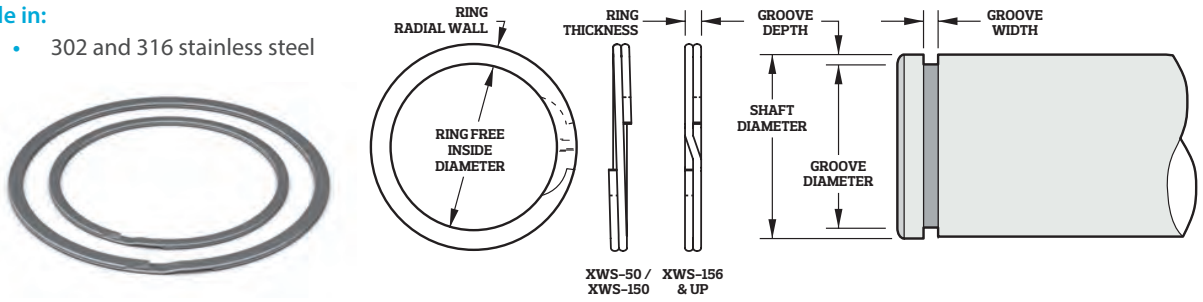
Medium Duty Rings (Imperial)

XWS Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

AS3218, AS4299,
MIL-DTL-27426/1



	Part No. ¹	Shaft Diameter	Ring			Groove		Thrust Capacity	
			Inside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWS-50	0,500	0,467	0,045	0,025	0,474	0,030	460	2000
	XWS-53	0,531	0,498	0,045	0,025	0,505	0,030	490	2130
	XWS-55	0,551	0,518	0,045	0,025	0,525	0,030	510	2210
	XWS-56	0,562	0,529	0,045	0,025	0,536	0,030	520	2250
	XWS-59	0,594	0,561	0,045	0,025	0,569	0,030	550	2380
	XWS-62	0,625	0,585	0,055	0,025	0,594	0,030	710	2500
	XWS-65	0,656	0,617	0,055	0,025	0,625	0,030	740	2630
	XWS-66	0,669	0,629	0,055	0,025	0,638	0,030	760	2680
	XWS-68	0,687	0,647	0,055	0,025	0,656	0,030	780	2750
	XWS-71	0,718	0,679	0,055	0,025	0,687	0,030	810	2880
	XWS-75	0,750	0,710	0,065	0,031	0,719	0,036	850	3360
	XWS-78	0,781	0,741	0,065	0,031	0,750	0,036	880	3500
	XWS-81	0,812	0,771	0,065	0,031	0,781	0,036	920	3640
	XWS-84	0,843	0,803	0,065	0,031	0,812	0,036	950	3780
	XWS-87	0,875	0,828	0,065	0,031	0,838	0,036	1180	3920
	XWS-90	0,906	0,860	0,065	0,031	0,869	0,036	1220	4060
	XWS-93	0,937	0,889	0,065	0,031	0,900	0,036	1260	4200
	XWS-96	0,968	0,916	0,075	0,037	0,925	0,042	1440	5180
	XWS-98	0,984	0,930	0,075	0,037	0,941	0,042	1460	5260
	XWS-100	1,000	0,946	0,075	0,037	0,957	0,042	1480	5350
	XWS-102	1,023	0,968	0,075	0,037	0,980	0,042	1520	5470
	XWS-103	1,031	0,978	0,075	0,037	0,988	0,042	1530	5510
	XWS-106	1,062	1,007	0,075	0,037	1,020	0,042	1580	5680
	XWS-109	1,093	1,040	0,075	0,037	1,051	0,042	1620	5840
	XWS-112	1,125	1,070	0,075	0,037	1,083	0,042	1670	6020
	XWS-115	1,156	1,102	0,075	0,037	1,114	0,042	1720	6180
	XWS-118	1,188	1,127	0,085	0,043	1,140	0,048	2020	7380
	XWS-121	1,218	1,159	0,085	0,043	1,170	0,048	2070	7570
	XWS-125	1,250	1,188	0,085	0,043	1,202	0,048	2120	7770
	XWS-128	1,281	1,221	0,085	0,043	1,233	0,048	2170	7960
	XWS-131	1,312	1,251	0,095	0,043	1,264	0,048	2230	8150
	XWS-134	1,343	1,282	0,095	0,043	1,295	0,048	2280	8350
	XWS-137	1,375	1,308	0,095	0,043	1,323	0,048	2530	8540
	XWS-140	1,406	1,340	0,095	0,043	1,354	0,048	2580	8740
	XWS-143	1,437	1,370	0,095	0,043	1,385	0,048	2640	8930
	XWS-146	1,468	1,402	0,095	0,043	1,416	0,048	2700	9120
	XWS-150	1,500	1,433	0,095	0,043	1,448	0,048	2760	9320
	XWS-156	1,562	1,490	0,108	0,049	1,507	0,056	3090	10100
	XWS-157	1,575	1,503	0,108	0,049	1,520	0,056	3120	10190
	XWS-162	1,625	1,549	0,108	0,049	1,566	0,056	3450	10510
	XWS-168	1,687	1,610	0,118	0,049	1,628	0,056	3580	10910
	XWS-175	1,750	1,673	0,118	0,049	1,691	0,056	3710	11310
	XWS-177	1,771	1,690	0,118	0,049	1,708	0,056	4010	11450
	XWS-181	1,813	1,730	0,118	0,049	1,749	0,056	4100	11720

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

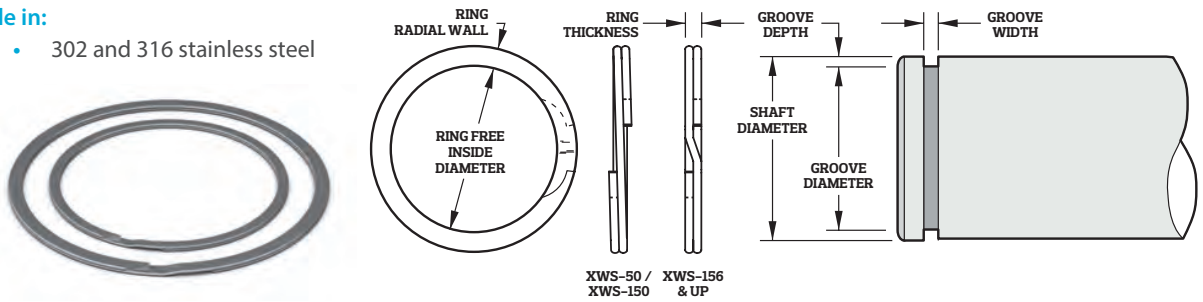
Medium Duty Rings (Imperial)

XWS Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

AS3218, AS4299,
MIL-DTL-27426/1



	Part No. ¹	Shaft Diameter	Ring			Groove		Thrust Capacity	
			Inside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWS-187	1,875	1,789	0,128	0,049	1,808	0,056	4510	12120
	XWS-193	1,938	1,844	0,128	0,049	1,861	0,056	4660	12530
	XWS-196	1,969	1,882	0,128	0,049	1,902	0,056	4730	12730
	XWS-200	2,000	1,909	0,128	0,049	1,929	0,056	4950	12930
	XWS-206	2,062	1,971	0,128	0,049	1,992	0,056	5100	13330
	XWS-212	2,125	2,029	0,128	0,049	2,051	0,056	5560	13740
	XWS-215	2,156	2,060	0,138	0,049	2,082	0,056	5640	13940
	XWS-216	2,165	2,070	0,138	0,049	2,091	0,056	5660	14000
	XWS-218	2,188	2,092	0,138	0,049	2,113	0,056	5720	14150
	XWS-225	2,250	2,153	0,138	0,049	2,176	0,056	5890	14550
	XWS-231	2,312	2,211	0,138	0,049	2,234	0,056	6370	14950
	XWS-236	2,362	2,261	0,138	0,049	2,284	0,056	6510	15270
	XWS-237	2,375	2,273	0,138	0,049	2,297	0,056	6550	15360
	XWS-243	2,437	2,331	0,148	0,049	2,355	0,056	7060	15760
	XWS-250	2,500	2,394	0,148	0,049	2,418	0,056	7250	16160
	XWS-255	2,559	2,449	0,148	0,049	2,473	0,056	7780	16550
	XWS-256	2,562	2,452	0,148	0,049	2,476	0,056	7790	16560
	XWS-262	2,625	2,514	0,148	0,049	2,539	0,056	7980	16970
	XWS-268	2,688	2,572	0,158	0,049	2,597	0,056	8550	17380
	XWS-275	2,750	2,635	0,158	0,049	2,660	0,056	8750	17780
	XWS-281	2,813	2,696	0,168	0,049	2,722	0,056	8950	18190
	XWS-287	2,875	2,755	0,168	0,049	2,781	0,056	9550	18590
	XWS-293	2,937	2,817	0,168	0,049	2,843	0,056	9760	18990
	XWS-295	2,952	2,831	0,168	0,049	2,858	0,056	9810	19090
	XWS-300	3,000	2,877	0,168	0,061	2,904	0,068	10180	24150
	XWS-306	3,062	2,938	0,168	0,061	2,966	0,068	10390	24650
	XWS-312	3,125	3,000	0,178	0,061	3,027	0,068	10820	25150
	XWS-314	3,149	3,023	0,178	0,061	3,051	0,068	10910	25350
	XWS-318	3,187	3,061	0,178	0,061	3,089	0,068	11040	25650
	XWS-325	3,250	3,121	0,178	0,061	3,150	0,068	11490	26160
	XWS-331	3,312	3,180	0,188	0,061	3,208	0,068	12170	26660
	XWS-334	3,343	3,210	0,188	0,061	3,239	0,068	12290	26910
	XWS-337	3,375	3,242	0,188	0,061	3,271	0,068	12410	27170
	XWS-343	3,437	3,301	0,188	0,061	3,331	0,068	12880	27660
	XWS-350	3,500	3,363	0,188	0,061	3,394	0,068	13110	28170
	XWS-354	3,543	3,402	0,198	0,061	3,433	0,068	13770	28520
	XWS-356	3,562	3,422	0,198	0,061	3,452	0,068	13850	28670
	XWS-362	3,625	3,483	0,198	0,061	3,515	0,068	14090	29180
	XWS-368	3,687	3,543	0,198	0,061	3,575	0,068	14600	29680
	XWS-374	3,740	3,597	0,198	0,061	3,628	0,068	14800	30100
	XWS-375	3,750	3,606	0,198	0,061	3,638	0,068	14840	30180
	XWS-381	3,812	3,668	0,198	0,061	3,700	0,068	15090	30680
	XWS-387	3,875	3,724	0,208	0,061	3,757	0,068	16160	31190
	XWS-393	3,938	3,784	0,208	0,061	3,820	0,068	16420	31700
	XWS-400	4,000	3,842	0,218	0,061	3,876	0,068	17530	32200
	XWS-406	4,063	3,906	0,218	0,061	3,939	0,068	17810	32700
	XWS-412	4,125	3,967	0,218	0,061	4,000	0,068	18080	33200
	XWS-413	4,134	3,975	0,218	0,061	4,010	0,068	18120	33270
	XWS-418	4,188	4,030	0,218	0,061	4,058	0,068	19240	33710
	XWS-425	4,250	4,084	0,228	0,061	4,120	0,068	19530	34210
	XWS-431	4,312	4,147	0,228	0,061	4,182	0,068	19810	34710
	XWS-433	4,331	4,164	0,228	0,061	4,200	0,068	19900	34860

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Medium Duty Rings (Imperial)

XWS Series

	Part No. ¹	Shaft Diameter	Ring						Groove						Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³		
Imperial (in.)	XWS-437	4,375	4,208	+0,000/-0,040	0,228	0,061	±0,003	4,245	±0,006	0,068	+0,005/-0,000	20100	35210			
	XWS-443	4,437	4,271					4,307				20390	35710			
	XWS-450	4,500	4,326					4,364				21630	36220			
	XWS-456	4,562	4,384					4,422				22570	43340			
	XWS-462	4,625	4,447					4,485				22890	43940			
	XWS-468	4,687	4,508					4,547				23190	44530			
	XWS-472	4,724	4,546					4,584				23370	44880			
	XWS-475	4,750	4,571					4,610				23500	45130			
	XWS-481	4,812	4,633					4,672				23810	45720			
	XWS-487	4,875	4,695					4,735				24120	46310			
	XWS-493	4,937	4,757	4,797	24430	46900										
	XWS-500	5,000	4,820	4,856	25450	47500										
	XWS-511	5,118	4,934	4,974	26050	48620										
	XWS-512	5,125	4,939	4,981	26080	48690										
	XWS-525	5,250	5,064	5,107	26720	49880										
	XWS-537	5,375	5,187	5,228	28120	51060										
	XWS-550	5,500	5,308	5,353	28770	52250										
	XWS-551	5,511	5,320	5,364	28830	52360										
	XWS-562	5,625	5,433	5,478	29420	53440										
	XWS-575	5,750	5,550	5,597	31300	54630										
	XWS-587	5,875	5,674	5,722	31980	55810										
	XWS-590	5,905	5,705	5,752	32140	56100										
	XWS-600	6,000	5,798	5,847	32660	57000										
	XWS-612	6,125	5,903	5,953	37230	69500										
	XWS-625	6,250	6,026	6,078	37990	70920										
	XWS-629	6,299	6,076	6,127	38290	71480										
	XWS-637	6,375	6,152	6,203	38750	72340										
	XWS-650	6,500	6,274	6,328	39510	73760										
	XWS-662	6,625	6,390	6,443	42620	75180										
	XWS-675	6,750	6,513	6,568	43420	76600										
	XWS-687	6,875	6,638	6,693	44220	78010										
	XWS-700	7,000	6,761	6,818	45030	79430										
	XWS-712	7,125	6,877	6,933	48350	80850										
	XWS-725	7,250	6,999	7,058	49200	82270										
	XWS-737	7,375	7,125	7,183	50050	83690										
	XWS-750	7,500	7,250	7,308	50890	85110										
	XWS-762	7,625	7,363	7,423	54440	86520										
	XWS-775	7,750	7,486	7,548	55330	87940										
	XWS-787	7,875	7,611	7,673	56220	89360										
	XWS-800	8,000	7,734	7,798	57110	90780										
	XWS-825	8,250	7,972	8,038	61820	93620										
	XWS-850	8,500	8,220	8,288	63690	96450										
	XWS-875	8,750	8,459	8,528	68650	99290										
	XWS-900	9,000	8,707	8,778	70620	102130										
	XWS-925	9,250	8,945	9,018	75850	104960										
	XWS-950	9,500	9,194	9,268	77900	107800										
	XWS-975	9,750	9,432	9,508	83390	110640										
	XWS-1000	10,000	9,680	9,758	85530	113470										
	XWS-1025	10,250	9,918	9,998	91290	116310										
	XWS-1050	10,500	10,166	10,248	93520	119150										
	XWS-1075	10,750	10,405	10,488	99540	121990										
	XWS-1100	11,000	10,653	10,738	101860	124820										

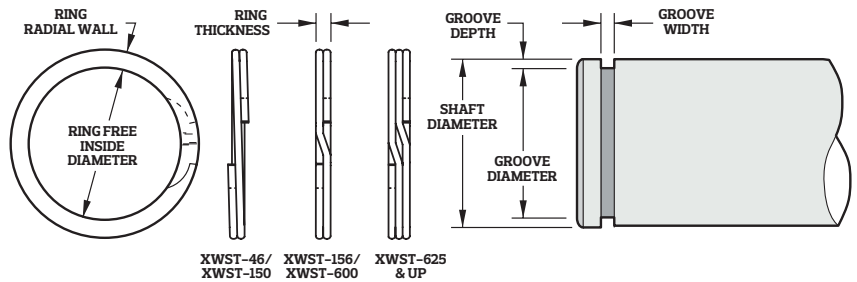
¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Medium Heavy Duty Rings (Imperial)

XWST Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel



	Part No. ¹	Shaft Diameter	Ring				Groove			Thrust Capacity	
			Inside Diameter	Radial Wall	Thickness		Diameter	Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWST-46	0,469	0,436	0,045	0,025		0,443	±0,002	0,029	430	1800
	XWST-50	0,500	0,469	0,045	0,035		0,474	±0,002	0,039	460	2530
	XWST-55	0,551	0,518	0,045	0,035		0,524	±0,002	0,039	550	2790
	XWST-56	0,562	0,529	0,045	0,035		0,535	±0,002	0,039	560	2840
	XWST-59	0,594	0,559	0,045	0,035		0,565	±0,002	0,039	630	3000
	XWST-62	0,625	0,590	0,055	0,035		0,596	±0,002	0,039	660	3160
	XWST-66	0,669	0,630	0,055	0,035		0,638	±0,002	0,039	760	3380
	XWST-68	0,688	0,648	0,065	0,042		0,655	±0,003	0,046	830	4180
	XWST-75	0,750	0,708	0,065	0,042		0,715	±0,003	0,046	950	4550
	XWST-78	0,781	0,738	0,065	0,042		0,745	±0,003	0,046	990	4740
	XWST-81	0,812	0,768	0,065	0,042		0,776	±0,003	0,046	1030	4930
	XWST-87	0,875	0,827	0,075	0,042	±0,002	0,835	±0,003	0,046	1240	5310
	XWST-93	0,938	0,886	0,075	0,042	±0,002	0,894	±0,003	0,046	1460	5690
	XWST-98	0,984	0,934	0,075	0,042	±0,002	0,940	±0,003	0,046	1530	5970
	XWST-100	1,000	0,947	0,075	0,042	±0,002	0,955	±0,003	0,046	1630	6070
	XWST-102	1,023	0,969	0,075	0,042	±0,002	0,977	±0,003	0,046	1660	6210
	XWST-106	1,062	1,005	0,088	0,050		1,015	±0,004	0,056	1800	7010
	XWST-112	1,125	1,064	0,088	0,050		1,075	±0,004	0,056	1990	7420
	XWST-118	1,188	1,126	0,088	0,050		1,135	±0,004	0,056	2270	7370
	XWST-125	1,250	1,184	0,093	0,050		1,195	±0,004	0,056	2470	8250
	XWST-131	1,312	1,240	0,098	0,050		1,250	±0,004	0,056	2880	8660
	XWST-137	1,375	1,298	0,103	0,050		1,310	±0,004	0,056	3210	9070
	XWST-143	1,438	1,359	0,103	0,050		1,370	±0,004	0,056	3460	9490
	XWST-150	1,500	1,419	0,103	0,050		1,430	±0,004	0,056	3710	9900
	XWST-156	1,562	1,476	0,113	0,062		1,490	±0,005	0,068	3980	12780
	XWST-162	1,625	1,537	0,118	0,062		1,550	±0,005	0,068	4370	13290
	XWST-168	1,687	1,598	0,118	0,062		1,610	±0,005	0,068	4650	13800
	XWST-175	1,750	1,657	0,118	0,062		1,670	±0,005	0,068	4950	14320
	XWST-177	1,771	1,676	0,123	0,062		1,689	±0,005	0,068	5130	14490
	XWST-181	1,812	1,714	0,123	0,062		1,730	±0,005	0,068	5250	14820
	XWST-187	1,875	1,774	0,123	0,062		1,790	±0,005	0,068	5700	15340
	XWST-196	1,969	1,864	0,123	0,062		1,879	±0,005	0,068	6260	16110
	XWST-200	2,000	1,894	0,128	0,062		1,910	±0,005	0,068	6360	16360
	XWST-206	2,062	1,955	0,141	0,078	±0,003	1,970	±0,006	0,086	6710	21220
	XWST-212	2,125	2,012	0,141	0,078	±0,003	2,027	±0,006	0,086	7360	21870
	XWST-215	2,156	2,041	0,141	0,078	±0,003	2,057	±0,006	0,086	7620	22190
	XWST-225	2,250	2,129	0,141	0,078	±0,003	2,145	±0,006	0,086	8430	23160
	XWST-231	2,312	2,188	0,141	0,078	±0,003	2,205	±0,006	0,086	8830	23800
	XWST-237	2,375	2,248	0,141	0,078	±0,003	2,265	±0,006	0,086	9230	24440
	XWST-243	2,437	2,307	0,141	0,078	±0,003	2,325	±0,006	0,086	9650	25080
	XWST-250	2,500	2,366	0,188	0,078	±0,005	2,385	±0,006	0,086	10250	25730
	XWST-255	2,559	2,424	0,188	0,078	±0,005	2,443	±0,006	0,086	10490	26340
	XWST-262	2,625	2,485	0,188	0,078	±0,005	2,505	±0,006	0,086	11130	27020
	XWST-268	2,687	2,545	0,188	0,078	±0,005	2,565	±0,006	0,086	11590	27660

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Medium Heavy Duty Rings (Imperial)

XWST Series

	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWST-275	2,750	2,604	+0,000/-0,030	0,188	±0,005	0,093	±0,003	2,625	±0,006	0,103	+0,005/-0,000	12250	32140
	XWST-287	2,875	2,722		0,188		0,093		2,742		0,103		13620	33600
	XWST-293	2,937	2,780		0,188		0,093		2,801		0,103		14120	34320
	XWST-300	3,000	2,838		0,188		0,093		2,860		0,103		14840	35060
	XWST-306	3,062	2,897		0,188		0,093		2,920		0,103		15370	35790
	XWST-312	3,125	2,957		0,188		0,093		2,980		0,103		16130	36520
	XWST-315	3,156	2,986		0,188		0,093		3,010		0,103		16290	36880
	XWST-325	3,250	3,075		0,188		0,093		3,100		0,103		17230	37980
	XWST-334	3,344	3,164		0,188		0,093		3,190		0,103		18200	39080
	XWST-343	3,437	3,254		0,188		0,093		3,280		0,103		19190	40170
	XWST-350	3,500	3,315	+0,000/-0,040	0,250	±0,005	0,111	±0,003	3,340	±0,006	0,120	+0,005/-0,000	19790	48820
	XWST-354	3,543	3,356		0,250		0,111		3,381		0,120		20290	49420
	XWST-362	3,625	3,433		0,250		0,111		3,458		0,120		21520	50560
	XWST-368	3,687	3,490		0,250		0,111		3,517		0,120		22150	51430
	XWST-375	3,750	3,550		0,250		0,111		3,577		0,120		23060	52310
	XWST-387	3,875	3,670		0,250		0,111		3,696		0,120		24650	54050
	XWST-393	3,938	3,730		0,250		0,111		3,756		0,120		25330	54930
	XWST-400	4,000	3,787		0,250		0,111		3,815		0,120		26300	55800
	XWST-425	4,250	4,032		0,250		0,111		4,065		0,120		27940	59280
	XWST-437	4,375	4,162		0,250		0,111		4,190		0,120		28760	61030
	XWST-450	4,500	4,280		0,250		0,111		4,310		0,120		30220	62770
	XWST-475	4,750	4,515		0,250		0,111		4,550		0,120		33580	66260
	XWST-500	5,000	4,755		0,250		0,111		4,790		0,120		37110	69740
	XWST-525	5,250	4,995	+0,000/-0,050	0,375	±0,006	0,127	±0,004	5,030	±0,007	0,139	+0,006/-0,000	40820	83790
	XWST-550	5,500	5,229		0,375		0,127		5,265		0,139		45880	87780
	XWST-575	5,750	5,466		0,375		0,127		5,505		0,139		49990	91770
	XWST-600	6,000	5,705		0,375		0,127		5,745		0,139		54290	95760

Rings listed below are three-turn construction.

	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XWST-625	6,250	5,942	+0,000/-0,060	0,312	±0,006	0,165	±0,005	5,985	±0,008	0,174	+0,008/-0,000	58760	129590
	XWST-650	6,500	6,182		0,312		0,165		6,225		0,174		63410	134780
	XWST-675	6,750	6,420		0,312		0,165		6,465		0,174		68230	139960
	XWST-700	7,000	6,658		0,312		0,165		6,705		0,174		73230	145140
	XWST-725	7,250	6,894	+0,000/-0,070	0,312		0,165		6,942		0,174		78290	172190
	XWST-750	7,500	7,130		0,375		0,189		7,180		0,209		84820	178130
	XWST-775	7,750	7,368		0,375		0,189		7,420		0,209		90390	184070
	XWST-800	8,000	7,607		0,375		0,189		7,660		0,209		96130	190000
	XWST-825	8,250	7,845		0,375		0,189		7,900		0,209		102050	195940
	XWST-850	8,500	8,083		0,375		0,189		8,140		0,209		108150	201880
	XWST-875	8,750	8,321		0,375		0,189		8,383		0,209		113800	207820
	XWST-900	9,000	8,560		0,375		0,189		8,620		0,209		120870	213750
	XWST-925	9,250	8,798		0,375		0,189		8,860		0,209		127500	219690
	XWST-950	9,500	9,036		0,375		0,189		9,100		0,209		134300	225630
	XWST-975	9,750	9,273		0,375		0,189		9,338		0,209		141970	231570
	XWST-1000	10,000	9,508		0,375		0,189		9,575		0,209		150560	237500

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

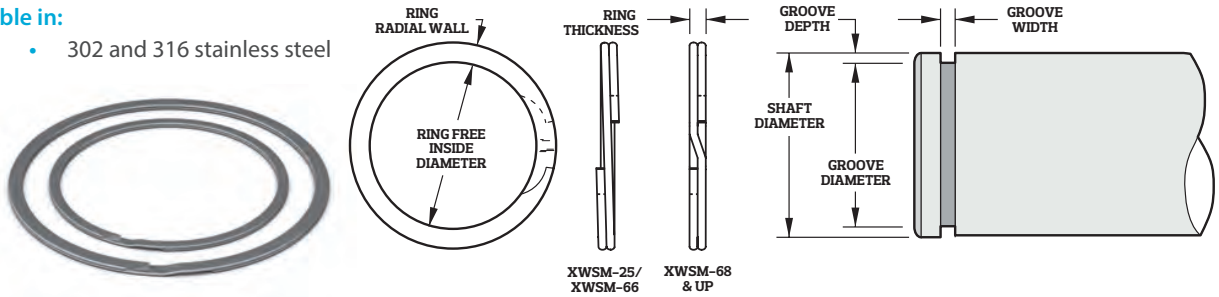
Heavy Duty Rings (Imperial)

XWSM Series

Stock items available in:

- Carbon steel
- 302 and 316 stainless steel

AS3216, AS4299,
MIL-DTL-27426/2



* No Removal Notch

	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity				
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³			
Imperial (in.)	WSM-25*	0,250	0,228	+0,000/-0,010	0,020		0,025		0,230	±0,002	0,029		177	961			
	WSM-31*	0,312	0,287		0,025		0,025		0,290		0,029		243	1200			
	WSM-37*	0,375	0,349		0,030		0,025		0,352		0,029		305	1442			
	WSM-43	0,437	0,409	+0,000/-0,012	0,035	0,025	0,412	0,029	386	1680							
	WSM-46	0,469	0,439		0,045	0,025	0,443	0,029	430	1880							
	WSM-50	0,500	0,464		0,050	0,035	0,468	0,039	570	2530							
	WSM-55	0,551	0,514	+0,000/-0,013	0,050	0,035	0,519	0,039	620	2790							
	WSM-56	0,562	0,525		0,050	0,035	0,530	0,039	640	2840							
	WSM-59	0,594	0,554		0,050	0,035	0,559	0,039	760	3000							
	WSM-62	0,625	0,583		0,055	0,035	0,588	0,039	840	3160							
	WSM-66	0,669	0,623		0,055	0,035	0,629	0,039	950	3380							
	WSM-68	0,688	0,641		0,065	0,042	0,646	0,046	1020	4180							
	WSM-75	0,750	0,698		0,065	0,042	0,704	0,046	1220	4550							
	WSM-78	0,781	0,727		0,065	0,042	0,733	0,046	1330	4740							
	WSM-81	0,812	0,756		0,065	0,042	0,762	0,046	1440	4930							
	WSM-87	0,875	0,814		0,075	0,042	0,821	0,046	1670	5310							
	WSM-93	0,938	0,875		0,075	0,042	0,882	0,046	1860	5690							
	WSM-98	0,984	0,919		0,085	0,042	0,926	0,046	2020	5970							
	WSM-100	1,000	0,932	0,085	0,042	0,940	0,046	2120	6070								
	WSM-102	1,023	0,953	0,085	0,042	0,961	0,046	2240	6210								
	WSM-106	1,062	0,986	0,103	+0,003/-0,005	0,050	±0,002	0,998	0,056	+0,003/-0,000	2400	7010					
	WSM-112	1,125	1,047	0,103		0,050		1,059	0,056		2620	7420					
	WSM-118	1,188	1,105	0,103		0,050		1,118	0,056		2940	7840					
	WSM-125	1,250	1,163	0,103		0,050		1,176	0,056		3270	8250					
	WSM-131	1,312	1,218	0,118		0,050		1,232	0,056		3710	8660					
	WSM-137	1,375	1,277	0,118		0,050		1,291	0,056		4080	9070					
	WSM-143	1,438	1,336	0,118		0,050		1,350	0,056		4470	9490					
	WSM-150	1,500	1,385	0,118		0,050		1,406	0,056		4980	9900					
	WSM-156	1,562	1,453	0,128		+0,000/-0,020		0,062	±0,003		1,468	0,068	+0,004/-0,000	5190	12780		
	WSM-162	1,625	1,513	0,128				0,062			1,529	0,068		5510	13290		
	WSM-168	1,687	1,573	0,128				0,062			1,589	0,068		5840	13800		
	WSM-175	1,750	1,633	0,128				0,062			1,650	0,068		6190	14320		
	WSM-177	1,771	1,651	0,128	0,062		1,669	0,068		6380	14490						
	WSM-181	1,812	1,690	0,128	0,062		1,708	0,068		6660	14820						
	WSM-187	1,875	1,751	0,158	0,062		1,769	0,068		7020	15340						
	WSM-196	1,969	1,838	0,158	0,062		1,857	0,068		7790	16110						
	WSM-200	2,000	1,867	0,158	0,062		1,886	0,068		8060	16360						
	WSM-206	2,062	1,932	+0,000/-0,025	0,168		+0,004/-0,006	0,078		±0,003	1,946	±0,006		+0,005/-0,000	8450	21220	
	WSM-212	2,125	1,989		0,168			0,078			2,003				0,086	9160	21870
	WSM-215	2,156	2,018		0,168			0,078			2,032				0,086	9450	22190
	WSM-225	2,250	2,105		0,168	0,078		2,120	0,086		10340		23160				
	WSM-231	2,312	2,163		0,168	0,078		2,178	0,086		10950		23800				
	WSM-237	2,375	2,223		0,200	0,078		2,239	0,086		11420		24440				
	WSM-243	2,437	2,283		0,200	0,078		2,299	0,086		11890		25080				
	WSM-250	2,500	2,343		0,200	0,078		2,360	0,086		12370		25730				
	WSM-255	2,559	2,402		0,200	0,078		2,419	0,086		12660		26340				
	WSM-262	2,625	2,464		0,200	0,078		2,481	0,086		13360		27020				
	WSM-268	2,687	2,523		0,200	0,078		2,541	0,086		13870		27660				

¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3

Heavy Duty Rings (Imperial)

XWSM Series

	Part No. ¹	Shaft Diameter	Ring					Groove				Thrust Capacity		
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	WSM-275	2,750	2,584	+0,000/-0,030	0,225		0,093		2,602		0,103		14390	32140
	WSM-287	2,875	2,702						2,721		0,103		15650	33600
	WSM-293	2,937	2,760						2,779		0,103		16400	34320
	WSM-300	3,000	2,818						2,838		0,103		17180	35060
	WSM-306	3,062	2,878						2,898		0,103		17750	35790
	WSM-312	3,125	2,936						2,957		0,103		18560	36520
	WSM-315	3,156	2,965						2,986		0,103		18960	36880
	WSM-325	3,250	3,054						3,076		0,103		19990	37980
	WSM-334	3,344	3,144						3,166		0,103		21040	39080
	WSM-343	3,437	3,234						3,257		0,103		21870	40170
	WSM-350	3,500	3,293	0,270	0,111	3,316	0,120	22760	48820					
	WSM-354	3,543	3,333	0,270	0,111	3,357	0,120	23290	49420					
	WSM-362	3,625	3,411	0,270	0,111	3,435	0,120	24340	50560					
	WSM-368	3,687	3,469	0,270	0,111	3,493	0,120	25280	51430					
	WSM-375	3,750	3,527	0,270	0,111	3,552	0,120	26240	52310					
	WSM-387	3,875	3,647	0,270	0,111	3,673	0,120	27670	54050					
	WSM-393	3,938	3,708	0,270	0,111	3,734	0,120	28390	54930					
	WSM-400	4,000	3,765	0,270	0,111	3,792	0,120	29410	55800					
	WSM-425	4,250	4,037	0,270	0,111	4,065	0,120	27940	59280					
	WSM-437	4,375	4,161	0,270	0,111	4,190	0,120	28760	61030					
	WSM-450	4,500	4,280	0,270	0,111	4,310	0,120	30220	62770					
	WSM-475	4,750	4,518	0,270	0,111	4,550	0,120	36930	66260					
	WSM-500	5,000	4,756	0,270	0,111	4,790	0,120	37110	69740					
	WSM-525	5,250	4,995	+0,000/-0,050	0,350	0,127	±0,004	±0,007	5,030	0,139	40820	83790		
	WSM-550	5,500	5,228						5,265	0,139	45880	87780		
	WSM-575	5,750	5,466						5,505	0,139	49990	91770		
	WSM-600	6,000	5,705						5,745	0,139	54290	95760		
	WSM-625	6,250	5,938	+0,000/-0,060	0,418	0,156	±0,005	±0,008	5,985	0,174	58760	122520		
	WSM-650	6,500	6,181						6,225	0,174	63410	127420		
	WSM-675	6,750	6,410						6,465	0,174	68230	132330		
	WSM-700	7,000	6,648						6,705	0,174	73230	137230		
	WSM-725	7,250	6,891	+0,000/-0,070	0,418	0,156	±0,005	±0,008	6,942	0,174	78920	142130		
	WSM-750	7,500	7,130						7,180	0,209	84820	176240		
	WSM-775	7,750	7,368						7,420	0,209	90390	182120		
	WSM-800	8,000	7,606						7,660	0,209	96130	187990		
	WSM-825	8,250	7,845						7,900	0,209	102050	193870		
	WSM-850	8,500	8,083						8,140	0,209	108150	199740		
	WSM-875	8,750	8,324						8,383	0,209	113800	205620		
	WSM-900	9,000	8,560						8,620	0,209	120870	211490		
	WSM-925	9,250	8,798						8,860	0,209	127500	217370		
	WSM-950	9,500	9,036						9,100	0,209	134300	223240		
	WSM-975	9,750	9,275	+0,000/-0,090	0,500	0,187	±0,005	±0,010	9,338	0,209	141970	229120		
	WSM-1000	10,000	9,508						9,575	0,209	150560	234990		
	WSM-1025	10,250	9,745						9,814	0,209	157950	240870		
	WSM-1050	10,500	9,984						10,054	0,209	165510	246740		
	WSM-1075	10,750	10,221						10,293	0,209	174010	252620		
	WSM-1100	11,000	10,459						10,533	0,209	181950	258490		
	WSM-1125	11,250	10,692						10,772	0,209	190060	264360		
	WSM-1150	11,500	10,934						11,011	0,209	199160	270240		
	WSM-1175	11,750	11,171						11,250	0,209	207640	276120		
	WSM-1200	12,000	11,410						11,490	0,209	216300	281990		
	WSM-1225	12,250	11,647	+0,005/-0,100	0,562	0,187	±0,005	±0,012	11,729	0,209	226000	287860		
	WSM-1250	12,500	11,885						11,969	0,209	235030	293740		
	WSM-1275	12,750	12,124						12,208	0,209	244240	299610		
	WSM-1300	13,000	12,361						12,448	0,209	253620	305490		
	WSM-1325	13,250	12,598						12,687	0,209	264120	311360		
	WSM-1350	13,500	12,837						12,927	0,209	273870	317240		
	WSM-1375	13,750	13,074						13,166	0,209	283800	323110		
	WSM-1400	14,000	13,311						13,405	0,209	294900	328990		
	WSM-1425	14,250	13,548						13,644	0,209	305200	334860		
	WSM-1450	14,500	13,787						13,884	0,209	315680	340740		
	WSM-1475	14,750	14,024	14,123	0,209	327380	346610							
	WSM-1500	15,000	14,262	14,363	0,209	338230	352490							

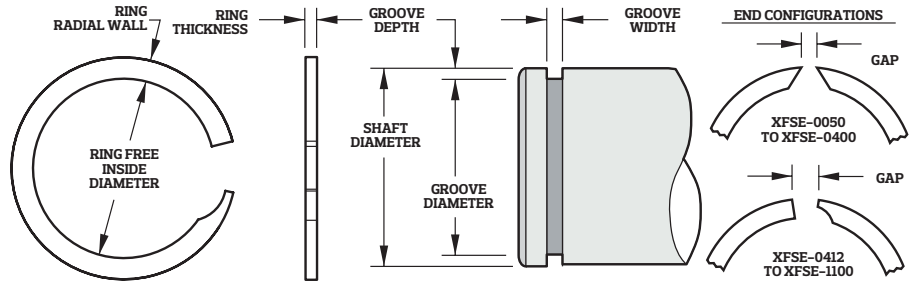
¹ Add suffix "-S02" for 302 stainless steel, "-S16" for 316 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3

Snap Rings (Imperial)

XFSE Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Shaft Diameter	Ring				Groove				Thrust Capacity			
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XFSE-0050	0,500	0,471	+0,000/-0,013	0,055	±0,004	0,037	±0,002	0,476	+0,000/-0,004	0,043	0,006/-0,000	424	2325
	XFSE-0056	0,562	0,524		0,055		0,037		0,532		0,043		596	2613
	XFSE-0062	0,625	0,590		0,065		0,037		0,595		0,043		663	2906
	XFSE-0068	0,687	0,649		0,065		0,037		0,655		0,043		777	3194
	XFSE-0075	0,750	0,701		0,075		0,045		0,710		0,051		1060	4241
	XFSE-0081	0,812	0,764		0,075		0,045		0,772	+0,000/-0,004	0,051		1148	4592
	XFSE-0087	0,875	0,820		0,075		0,045		0,831		0,051		1361	4948
	XFSE-0093	0,937	0,886		0,085		0,045		0,893		0,051		1457	5334
	XFSE-0100	1,000	0,933		0,085		0,045		0,952		0,051		1696	5693
	XFSE-0106	1,062	1,004		0,085		0,045		1,014		0,051		1802	6045
	XFSE-0112	1,125	1,069	+0,000/-0,015	0,128	±0,005	0,057	±0,003	1,077	+0,000/-0,010	0,063		1909	7615
	XFSE-0118	1,187	1,116		0,128		0,057		1,131		0,063		2349	8035
	XFSE-0125	1,250	1,176		0,128		0,057		1,188		0,063		2739	8461
	XFSE-0131	1,312	1,223		0,128		0,057		1,242		0,063		3246	8881
	XFSE-0137	1,375	1,282		0,128		0,057		1,297		0,063		3791	9307
	XFSE-0143	1,437	1,344		0,158		0,067		1,359		0,073		3961	11408
	XFSE-0150	1,500	1,402		0,158		0,067		1,422		0,073		4135	11908
	XFSE-0156	1,562	1,457		0,158		0,067		1,470		0,073		5079	12400
	XFSE-0162	1,625	1,517		0,158		0,067		1,533		0,073		5284	12901
	XFSE-0168	1,687	1,578		0,158		0,067		1,595		0,073		5485	13393
	XFSE-0175	1,750	1,640	0,158	0,067	1,658	0,073	5690	13893					
	XFSE-0181	1,812	1,697	0,158	0,067	1,720	0,073	5892	14385					
	XFSE-0187	1,875	1,767	0,158	0,067	1,783	0,073	6097	14885					
	XFSE-0193	1,937	1,800	+0,000/-0,025	0,200	±0,005	0,076	±0,003	1,819	+0,000/-0,012	0,085		8078	16649
	XFSE-0200	2,000	1,862		0,200		0,076		1,882		0,085		8341	17191
	XFSE-0206	2,062	1,924		0,200		0,076		1,944		0,085		8599	17724
	XFSE-0212	2,125	1,987		0,200		0,076		2,007		0,085		8862	18265
	XFSE-0218	2,187	2,048		0,200		0,076		2,069		0,085		9121	18798
	XFSE-0225	2,250	2,110		0,200		0,076		2,132		0,085		9384	19340
	XFSE-0231	2,312	2,171		0,200		0,076		2,194		0,085		9642	19873
	XFSE-0237	2,375	2,226		0,200		0,076		2,257		0,085		9905	20414
	XFSE-0243	2,437	2,296		0,200		0,076		2,319		0,085		10163	20947
	XFSE-0250	2,500	2,357		0,200		0,076		2,382		0,085		10426	21488
	XFSE-0256	2,562	2,415	0,200	0,095	2,444	0,104	10685	26252					
	XFSE-0262	2,625	2,486	0,200	0,095	2,507	0,104	10947	26898					
	XFSE-0268	2,687	2,537	+0,000/-0,030	0,200	0,095	2,569	0,104	11206	27533				
	XFSE-0275	2,750	2,607		0,200	0,095	2,632	0,104	11469	28179				
	XFSE-0281	2,812	2,665		0,200	0,095	2,694	0,104	11727	28814				
	XFSE-0287	2,875	2,727		0,200	0,095	2,757	0,104	11990	29460				

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XFSE Series

	Part No. ¹	Shaft Diameter	Ring						Groove				Thrust Capacity	
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XFSE-0300	3,000	2,852	+0,000/-0,030	0,200	±0,005	0,095	±0,003	2,882	+0,000/-0,012	0,104	+0,007/-0,000	12511	30740
	XFSE-0306	3,062	2,916		0,200		0,095		2,944		0,104		12770	31376
	XFSE-0312	3,125	2,955		0,237		0,095		2,987		0,104		15242	32021
	XFSE-0318	3,187	3,016		0,237		0,095		3,049		0,104		15544	32657
	XFSE-0325	3,250	3,079		0,237		0,095		3,112		0,104		15851	33302
	XFSE-0331	3,312	3,140	+0,000/-0,035	0,248		0,115		3,174	+0,000/-0,014	0,124		16154	39088
	XFSE-0337	3,375	3,203		0,248		0,115		3,237		0,124		16461	39831
	XFSE-0343	3,437	3,264		0,248		0,115		3,299		0,124		16763	40563
	XFSE-0350	3,500	3,326		0,248		0,115		3,362		0,124		17071	41307
	XFSE-0356	3,562	3,378		0,248		0,115		3,424		0,124		17373	42038
	XFSE-0362	3,625	3,451		0,248		0,115		3,487		0,124		17680	42782
	XFSE-0368	3,687	3,512		0,248		0,115		3,549		0,124		17983	43514
	XFSE-0375	3,750	3,570		0,248		0,115		3,612		0,124		18290	44257
	XFSE-0381	3,812	3,636		0,248		0,115		3,674		0,124		18592	44989
	XFSE-0387	3,875	3,689		0,248		0,115		3,737		0,124		18900	45732
	XFSE-0393	3,937	3,760		0,248		0,115		3,799	+0,000/-0,021	0,124		19202	46464
	XFSE-0400	4,000	3,828	+0,000/-0,051	0,248		0,115	3,862	0,124		19509		47208	
	XFSE-0412	4,125	3,930		0,265		0,153	3,967	0,163		23035		62126	
	XFSE-0425	4,250	4,050		0,265		0,153	4,092	0,163		23733		64008	
	XFSE-0437	4,375	4,174		0,265		0,153	4,217	0,163		24431		65891	
	XFSE-0450	4,500	4,297		0,265		0,153	4,342	0,163		25129		67774	
	XFSE-0462	4,625	4,421		0,265		0,153	4,467	0,163		25827		69656	
	XFSE-0475	4,750	4,530		0,265		0,153	4,592	0,163		26525		71539	
	XFSE-0487	4,875	4,668		0,265		0,153	4,717	+0,000/-0,024	0,163	27223		73421	
	XFSE-0500	5,000	4,792		0,265		0,153	4,842		0,163	27921		75304	
	XFSE-0525	5,250	5,039		0,265		0,153	5,092		0,163	29317		79069	
	XFSE-0550	5,500	5,292		0,265		0,153	5,342		0,163	30713		82834	
	XFSE-0575	5,750	5,535		0,265		0,153	5,592		0,163	32109		86599	
	XFSE-0600	6,000	5,744	+0,000/-0,060	0,316	±0,006	0,153	5,804		0,163	41563		90365	
	XFSE-0625	6,250	5,992		0,316		0,153	6,054		0,163	43295		94130	
	XFSE-0650	6,500	6,236		0,316		0,153	6,304		0,163	45027		97895	
	XFSE-0675	6,750	6,486		0,316		0,153	6,554		0,163	46759		101727	
	XFSE-0700	7,000	6,734		0,316		0,153	6,804		0,163	48490		105494	
	XFSE-0725	7,250	6,993	+0,000/-0,070	0,316		0,153	±0,005		7,054	0,163		50222	109262
	XFSE-0750	7,500	7,219		0,316		0,153			7,304	0,163		51954	113030
	XFSE-0775	7,750	7,477		0,316		0,153			7,554	0,163		53686	116797
	XFSE-0800	8,000	7,683		0,435	±0,007	0,192		+0,000/-0,028	0,203	66727		142932	
	XFSE-0825	8,250	7,940		0,435		0,192			8,014	0,203		68813	147399
	XFSE-0850	8,500	8,179		0,435		0,192			8,264	0,203		70898	151866
	XFSE-0875	8,750	8,427		0,435		0,192			8,514	0,203		72983	156332
	XFSE-0900	9,000	8,673		0,435		0,192			8,764	0,203		75068	160799
	XFSE-0925	9,250	8,922		0,435		0,192			9,014	0,203		77154	165265
	XFSE-0950	9,500	9,130		0,435		0,192			9,240	0,203		87297	169732
	XFSE-0975	9,750	9,393	+0,000/-0,091	0,435		0,192			9,490	0,203		89594	174199
	XFSE-1000	10,000	9,586		0,500		0,192		9,686	+0,000/-0,031	0,203		110977	178665
	XFSE-1025	10,250	9,826		0,500		0,192		9,936		0,203		113751	183132
	XFSE-1050	10,500	10,081		0,500		0,192		10,186		0,203		116526	187599
	XFSE-1075	10,750	10,329		0,500		0,192		10,436		0,203		119300	192065
	XFSE-1100	11,000	10,584		0,500		0,192		10,686		0,203		122074	196532

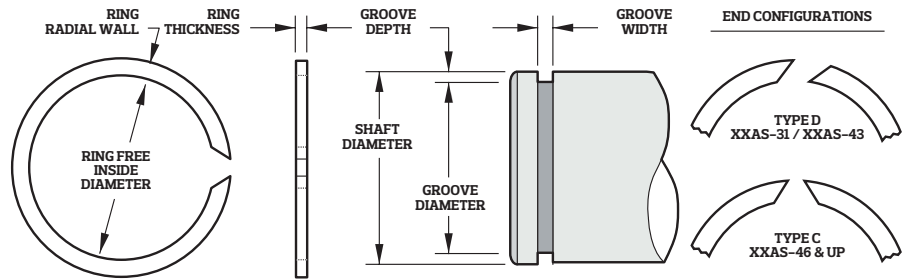
¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XXAS Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Shaft Diameter	Ring				Groove				Thrust Capacity	
			Inside Diameter		Radial Wall	Thickness	Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XXAS-31	0,312	0,281	+0,000/-0,015	0,040	0,025	0,290	±0,002	0,028	+0,003/-0,000	243	977
	XXAS-34	0,344	0,312		0,040	0,025	0,322		0,028		267	1077
	XXAS-35	0,354	0,320		0,040	0,025	0,330		0,028		300	1108
	XXAS-37	0,375	0,341		0,040	0,025	0,351		0,028		318	1174
	XXAS-39	0,393	0,359	+0,000/-0,020	0,040	0,025	0,369		0,028		333	1231
	XXAS-40	0,406	0,372		0,040	0,025	0,382		0,028		344	1271
	XXAS-43	0,438	0,402		0,040	0,025	0,412		0,028		402	1371
	XXAS-46	0,469	0,433		0,040	0,025	0,443		0,028		431	1468
	XXAS-50	0,500	0,464	+0,000/-0,025	0,048	0,035	0,474	±0,002	0,039	+0,003/-0,000	459	2073
	XXAS-55	0,551	0,514		0,048	0,035	0,524		0,039		526	2285
	XXAS-56	0,562	0,524		0,048	0,035	0,534		0,039		556	2331
	XXAS-59	0,594	0,555		0,048	0,035	0,566		0,039		588	2463
	XXAS-62	0,625	0,586		0,062	0,035	0,597		0,039		619	2592
	XXAS-66	0,669	0,630		0,062	0,035	0,640		0,039		686	2774
	XXAS-68	0,688	0,644		0,062	0,042	0,656		0,046		778	3458
	XXAS-75	0,750	0,703		0,062	0,042	0,716		0,046		901	3770
	XXAS-78	0,781	0,733	+0,000/-0,031	0,062	0,042	0,745	±0,003	0,046	+0,004/-0,000	994	3926
	XXAS-81	0,812	0,764		0,062	0,042	0,776		0,046		1033	4082
	XXAS-87	0,875	0,820		0,078	0,042	0,835		0,046		1237	4398
	XXAS-93	0,938	0,881		0,078	0,042	0,896		0,046		1392	4715
	XXAS-98	0,984	0,925		0,078	0,042	0,940		0,046		1530	4946
	XXAS-100	1,000	0,941		0,093	0,042	0,956		0,046		1555	5027
	XXAS-102	1,023	0,962		0,093	0,042	0,977		0,046		1663	5142
	XXAS-106	1,062	1,000		0,093	0,050	1,016	±0,004	0,056		1727	6272
	XXAS-112	1,125	1,060	+0,000/-0,046	0,093	0,050	1,075		0,056		1988	6644
	XXAS-118	1,188	1,121		0,093	0,050	1,136		0,056		2183	7017
	XXAS-125	1,250	1,179		0,093	0,050	1,194		0,056		2474	7383
	XXAS-131	1,312	1,232		0,093	0,050	1,250		0,056		2875	7749
	XXAS-137	1,375	1,291		0,109	0,050	1,309		0,056		3207	8121
	XXAS-143	1,438	1,351		0,109	0,050	1,370		0,056		3456	8493
	XXAS-150	1,500	1,408		0,109	0,050	1,430		0,056		3711	8859
	XXAS-156	1,562	1,467	+0,000/-0,050	0,125	0,062	1,490	±0,006	0,068	+0,005/-0,000	3975	11002
	XXAS-162	1,625	1,527		0,125	0,062	1,551		0,068		4250	11446
	XXAS-168	1,687	1,581		0,125	0,062	1,611		0,068		4531	11882
	XXAS-175	1,750	1,640		0,125	0,062	1,670		0,068		4948	12326
	XXAS-177	1,771	1,657		0,141	0,062	1,687		0,068		5258	12474
	XXAS-181	1,812	1,698		0,141	0,062	1,728		0,068		5379	12763
	XXAS-187	1,875	1,759		0,156	0,062	1,789		0,068		5699	13206
	XXAS-196	1,969	1,849		0,156	0,062	1,879		0,068		6263	13869
	XXAS-200	2,000	1,880	+0,000/-0,050	0,156	0,062	1,910	±0,006	0,068		6362	14087
	XXAS-206	2,062	1,936		0,156	0,078	1,966		0,086		6996	17491
	XXAS-212	2,125	1,997		0,156	0,078	2,027		0,086		7360	18025
	XXAS-215	2,156	2,026		0,156	0,078	2,056		0,086		7620	18288
	XXAS-225	2,250	2,116		0,156	0,078	2,146		0,086		8270	19085
	XXAS-231	2,312	2,174		0,187	0,078	2,204		0,086		8825	19611
	XXAS-237	2,375	2,235		0,187	0,078	2,265		0,086		9233	20145
	XXAS-243	2,437	2,295		0,187	0,078	2,325		0,086		9647	20671
	XXAS-250	2,500	2,356		0,187	0,078	2,386		0,086		10073	21206

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XXAS Series

	Part No. ¹	Shaft Diameter	Ring					Groove				Thrust Capacity		
			Inside Diameter		Radial Wall		Thickness		Diameter		Width		Groove Yield (lb) ²	Ring Shear (lb) ³
Imperial (in.)	XXAS-255	2,559	2,413	+0,000/-0,046	0,187		0,078		2,443		0,086		10491	21706
	XXAS-262	2,625	2,475		0,187		0,078		2,505		0,086		11133	22266
	XXAS-268	2,687	2,535		0,187		0,078		2,565		0,086		11586	22792
	XXAS-275	2,750	2,594	+0,000/-0,062	0,187	0,093	2,624	0,103	12246	27992				
	XXAS-287	2,875	2,713		0,187	0,093	2,743	0,103	13413	29264				
	XXAS-293	2,937	2,771		0,187	0,093	2,801	0,103	14117	29895				
	XXAS-300	3,000	2,830		0,218	0,093	2,860	0,103	14844	30536				
	XXAS-306	3,062	2,890		0,218	0,093	2,920	0,103	15367	31167				
	XXAS-312	3,125	2,951		0,218	0,093	2,981	0,103	15904	31809				
	XXAS-315	3,156	2,980		0,218	0,093	3,010	0,103	16285	32124				
	XXAS-325	3,250	3,070		0,250	0,093	3,100	0,103	17230	33081				
	XXAS-334	3,344	3,160		0,250	0,093	3,190	0,103	18201	34038				
	XXAS-343	3,437	3,251		0,250	0,093	3,281	0,103	18950	34984				
	XXAS-350	3,500	3,305		+0,000/-0,078	0,250	0,109	3,340	0,120	19792	40017			
	XXAS-354	3,543	3,346			0,250	0,109	3,381	0,120	20286	40508			
	XXAS-362	3,625	3,423	0,250		0,109	3,458	0,120	21396	41446				
	XXAS-368	3,687	3,482	0,250		0,109	3,517	0,120	22153	42155				
	XXAS-375	3,750	3,541	0,250		0,109	3,576	0,120	23061	42875				
	XXAS-387	3,875	3,657	0,281		0,109	3,697	0,120	24378	44304				
	XXAS-393	3,938	3,713	0,281		0,109	3,758	0,120	25052	45024				
	XXAS-400	4,000	3,771	+0,000/-0,093		0,281	0,109	3,816	0,120	26012	45733			
	XXAS-425	4,250	4,016		0,281	0,109	4,066	0,120	27638	48592				
	XXAS-437	4,375	4,141		0,281	0,109	4,191	0,120	28451	50021				
	XXAS-450	4,500	4,255		0,312	0,109	4,310	0,120	30218	51450				
	XXAS-475	4,750	4,495		0,312	0,109	4,550	0,120	33576	54308				
	XXAS-500	5,000	4,730	+0,000/-0,125	0,312	0,109	4,790	0,120	37110	57167				
	XXAS-525	5,250	4,970		0,375	0,125	5,030	0,139	40821	65732				
	XXAS-550	5,500	5,206		0,375	0,125	5,266	0,139	45486	68862				
	XXAS-575	5,750	5,446		0,375	0,125	5,506	0,139	49586	71992				
	XXAS-590	5,900	5,600		0,375	0,125	5,656	0,139	50880	73870				
	XXAS-600	6,000	5,687		0,375	0,125	5,746	0,139	53863	75122				
	XXAS-625	6,250	5,916		0,437	0,156	5,986	0,174	58316	94130				
	XXAS-650	6,500	6,151		0,437	0,156	6,226	0,174	62946	97895				
	XXAS-675	6,750	6,386		0,437	0,156	6,466	0,174	67752	101660				
	XXAS-700	7,000	6,621		0,437	0,156	6,706	0,174	72736	105426				
	XXAS-725	7,250	6,840		+0,000/-0,156	0,500	0,187	6,930	0,209	81996	124330			
	XXAS-750	7,500	7,090			0,500	0,187	7,180	0,209	84823	128617			
	XXAS-800	8,000	7,560	0,500		0,187	7,660	0,209	96133	137191				
	XXAS-850	8,500	8,050	0,500		0,187	8,160	0,209	102141	145766				
	XXAS-900	9,000	8,545	0,500		0,187	8,660	0,209	108149	154340				
	XXAS-925	9,250	8,800	0,500		0,187	8,910	0,209	111153	158627				
	XXAS-950	9,500	9,040	0,500		0,187	9,160	0,209	114158	162915				
	XXAS-1000	10,000	9,535	0,500		0,187	9,660	0,209	120166	171489				

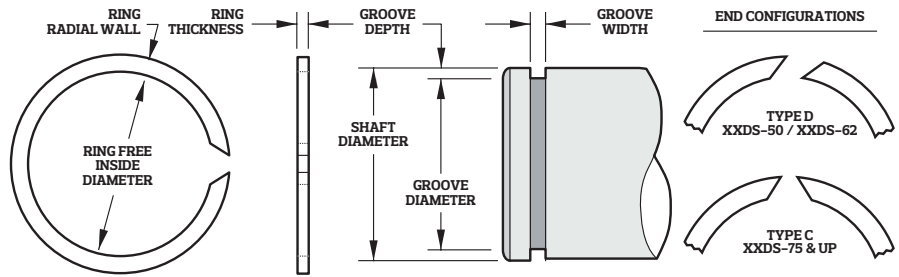
¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Snap Rings (Imperial)

XXDS Series

Stock items available in:

- Carbon steel
- 302 stainless steel



	Part No. ¹	Shaft Diameter	Ring				Groove				Thrust Capacity			
			Inside Diameter		Radial Wall	Thickness	Diameter		Width	Groove Yield (lb) ²	Ring Shear (lb) ³			
Imperial (in.)	XXDS-50	0,500	0,465	+0,000/-0,025	0,048	±0,003	0,035	0,474	±0,002	0,039	+0,003/-0,000	459	2073	
	XXDS-62	0,625	0,587		0,062		0,035			0,597		0,039	619	2592
	XXDS-75	0,750	0,704		0,078		0,042			0,716		0,046	901	3770
	XXDS-87	0,875	0,823	+0,000/-0,031	0,093	0,042	0,833	±0,003	0,046	1299		4398		
	XXDS-100	1,000	0,944		0,093	0,042	0,954	0,046	1626	5027				
	XXDS-112	1,125	1,065		0,125	0,042	1,077	0,046	1909	5655				
	XXDS-118	1,187	1,120	+0,000/-0,031	0,125	0,042	1,135	±0,004	0,046	2182		5967		
	XXDS-125	1,250	1,179		0,125	0,042	1,194		0,046	2474		6283		
	XXDS-131	1,312	1,232		0,125	0,042	1,252		0,046	2782		6595		
	XXDS-137	1,375	1,289	+0,000/-0,031	0,125	0,042	1,309	±0,004	0,046	3207		6912		
	XXDS-143	1,437	1,349		0,125	0,042	1,369		0,046	3454		7223		
	XXDS-150	1,500	1,410		0,125	0,042	1,430		0,046	3711		7540		
	XXDS-162	1,625	1,520	+0,000/-0,062	0,156	0,042	1,545	±0,004	0,046	4595		8168		
	XXDS-168	1,687	1,582		0,156	0,042	1,607		0,046	4770		8480		
	XXDS-175	1,750	1,645		0,156	0,042	1,670		0,046	4948		8796		
	XXDS-193	1,937	1,832	+0,000/-0,062	0,156	0,042	1,857	±0,006	0,046	5477		9736		
	XXDS-200	2,000	1,895		0,156	0,042	1,920		0,046	5655		10053		
	XXDS-218	2,187	2,082		0,156	0,042	2,107		0,046	6184		10993		
	XXDS-225	2,250	2,145	+0,000/-0,062	0,156	0,042	2,170	±0,006	0,046	6362		11310		
	XXDS-237	2,375	2,270		0,156	0,042	2,295		0,046	6715		11938		
	XXDS-250	2,500	2,390		0,156	0,042	2,420		0,046	7069		12566		
	XXDS-275	2,750	2,596	+0,000/-0,078	0,187	±0,005	0,062	2,626	±0,006	0,068		+0,004/-0,000	12052	19369
	XXDS-293	2,937	2,783		0,187		0,062	2,813		0,068			12871	20687
	XXDS-300	3,000	2,846		0,187		0,062	2,876		0,068			13148	21130
	XXDS-312	3,125	2,965	+0,000/-0,093	0,187		0,062	3,000	±0,006	0,068		13806	22011	
	XXDS-325	3,250	3,090		0,187		0,062	3,125		0,068		14358	22891	
	XXDS-337	3,375	3,215		0,187		0,062	3,250		0,068		14910	23772	
	XXDS-350	3,500	3,340	+0,000/-0,093	0,187		0,062	3,375	±0,006	0,068		15463	24652	
	XXDS-375	3,750	3,570		0,218		0,078	3,610		0,086		18555	31809	
	XXDS-400	4,000	3,820		0,218		0,078	3,860		0,086		19792	33929	
	XXDS-425	4,250	4,070	+0,000/-0,093	0,218		0,078	4,110	±0,008	0,086		21029	36050	
	XXDS-450	4,500	4,320		0,218		0,078	4,360		0,086	22266	38170		
	XXDS-475	4,750	4,560		0,218		0,078	4,610		0,086	23503	40291		
	XXDS-500	5,000	4,800	+0,000/-0,125	0,218		0,078	4,860	±0,008	0,086	24740	42412		
	XXDS-550	5,500	5,280		0,250		0,093	5,340		0,103	31102	55983		
	XXDS-600	6,000	5,775		0,250		0,093	5,840		0,103	33929	61073		
	XXDS-650	6,500	6,270	+0,000/-0,156	0,250		0,093	6,340	±0,008	0,103	36757	66162		
	XXDS-700	7,000	6,765		0,250		0,093	6,840		0,103	39584	71251		
	XXDS-750	7,500	7,245		0,281		0,109	7,320		0,120	47713	85750		
	XXDS-800	8,000	7,740	+0,000/-0,156	0,281		0,109	7,820	0,120	50894	91466			

¹ Add suffix "-S02" for 302 stainless steel. ² Based on a groove material yield strength of 45,000 psi and a safety factor of 2. ³ Based on a safety factor of 3.

Laminar Seal Rings

A Smalley Laminar Seal Ring set is a metallic labyrinth seal consisting of multiple rings in a groove. The arrangement and the specific orientation of the rings are dictated by the application and the severity of the environment.

There are sixteen series of standard imperial and metric Laminar Seal Ring configurations from which to select. Eight of these series are sets consisting of single-turn rings. The other eight series are sets consisting of double-turn rings. Within each series are operational ring-set configurations in both imperial and metric sizes. The selection of the appropriate set should be determined by the application. For some applications a complete labyrinth configuration (i.e.; a complete labyrinth configuration is one which has rings staggered within the set) is necessary due to a severe environment where contamination is highly probable. In other applications design engineers can keep the groove dimensions minimal by specifying laminar sets with rings clinging either to the bore or to the shaft.

Standard parts from 15 mm to 1300 mm and 5/8" to 50".

Special seals manufactured with No-Tooling-Charges.

Smalley's Laminar Seal Rings are interchangeable with FEY Rings.

Interchange Listing

TFC	FEY	
WQH	AS	FK3
WQHC	ASK	
WQS	IS	
WQSC	ISK	
WQHD	ASD	FK6
WQHCD	ASKD	
WQSD	ISD	
WQSCD	ISKD	
Consult TFC Engineering		FK5



Advantages of Laminar Seal Rings

- No friction with other rotating components, ideal for high speed applications.
- Prevent dirt and splash water from contaminating components.
- When used in conjunction with other seals, Laminar Seals provide a primary seal against severe contamination, before the contaminants come in contact with the secondary seal.
- Sets of multiple rings provide an efficient labyrinth seal.
- Rings may be produced from a wide variety of alloys to withstand more severe conditions including higher temperatures and corrosive environments.
- As a metallic mechanical seal they can outperform rubber seals in durability and life expectancy.
- The change from rubber to metal reduces the need for frequent seal replacement.

Laminar Seal Rings

Selection Guide

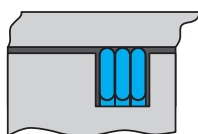
Standard Laminar Ring Sets Available

Single-Turn Laminar Seal Rings

Used in a variety of applications, this series of Seal Rings should be utilized for light to medium duty applications, dependent on the ring configuration specified. The sets are comprised of single-turn rings in either 3 rings per set or 5 rings per set.

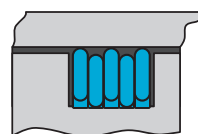
APPLICATIONS: 3 ring sets protect components from low dirt and low splash water contamination. 5 ring sets provide a better labyrinth seal to protect components from medium dirt and medium splash water contamination.

N.B. Laminar sealing ring sets should ideally be packed with grease to optimise performance.



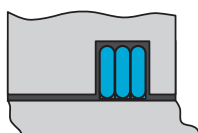
WYH Series WQH Series

Internal - Light Duty
1 set = 3 individual rings
(rings rotate with bore only)



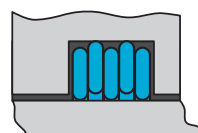
WYHC Series WQHC Series

Internal - Medium Duty
1 set = 5 individual rings
(3 rings rotate with bore & 2 rings rotate with shaft)



WYS Series WQS Series

External - Light Duty
1 set = 3 individual rings
(rings rotate with shaft only)



WYSC Series WQSC Series

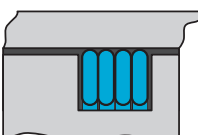
External - Medium Duty
1 set = 5 individual rings
(3 rings rotate with shaft & 2 rings rotate with bore)

Double-Turn Laminar Seal Rings

The sets are comprised of double-turn rings in either 2 rings per set or 3 rings per set. The double-turn rings fit tighter in the bore or on the shaft, provide complete 360° surface contact and resist higher axial/radial forces than single-turn ring sets, for medium to heavy duty applications.

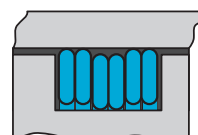
APPLICATIONS: 2 ring sets protect components from medium dirt and medium splash water contamination. 3 ring sets provide a better labyrinth seal to protect components from heavy dirt and heavy splash water contamination.

N.B. Laminar sealing ring sets should ideally be packed with grease to optimise performance.



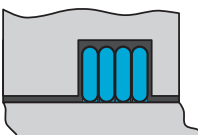
WYHD Series WQHD Series

Internal - Medium/Heavy Duty
1 set = 2 individual rings
(rings rotate with bore only)



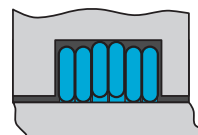
WYHCD Series WQHCD Series

Internal - Heavy Duty
1 set = 3 individual rings
(2 rings rotate with bore & 1 ring rotates with shaft)



WYSD Series WQSD Series

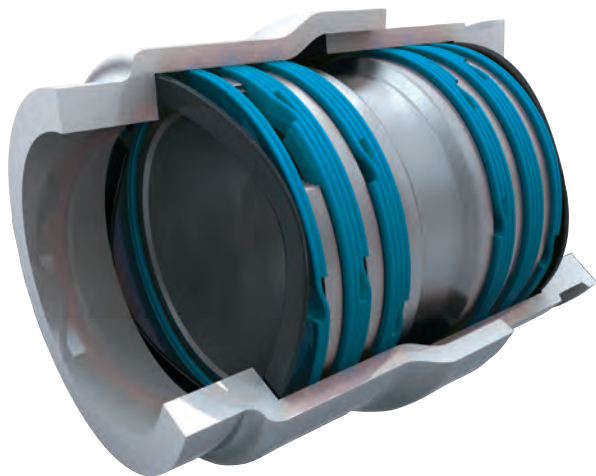
External - Medium/Heavy Duty
1 set = 2 individual rings
(rings rotate with shaft only)



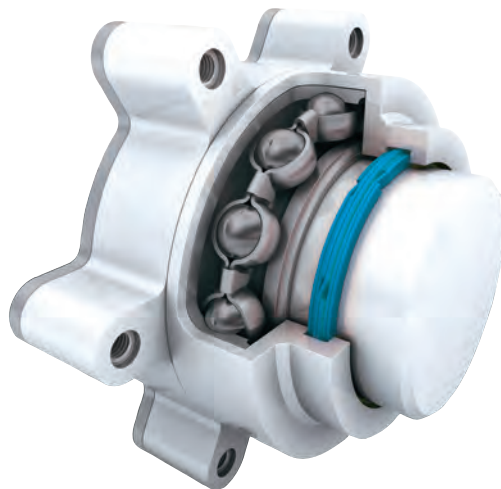
WYSCD Series WQSCD Series

External - Heavy Duty
1 set = 3 individual rings
(2 rings rotate with shaft & 1 ring rotates with bore)

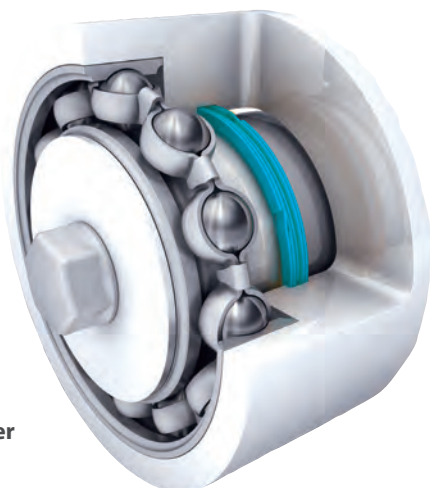
Laminar Seal Rings



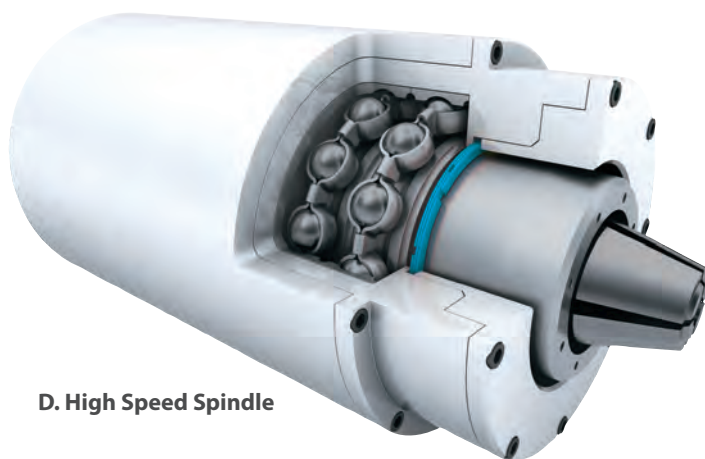
A. Coupling



B. Bearing Protection



C. Pulley Idler



D. High Speed Spindle

A. Coupling

The seal arrangement in this assembly has been custom designed for optimum protection against contamination. Gases build up pressure in a center cavity, protected on both ends from contaminants entering.

C. Pulley Idler

The ring set designed in this application extends the life of the ball bearing by keeping contaminants from penetrating the precision bearing surfaces even though the bearing itself is sealed. When the shaft rotates only the groove ring rotates while the housing rings remain stationary.

B. Bearing Protection

The 3 ring set protects the ball bearing from contaminants like dirt and water. The seal retains grease/lubricant and prevents contaminants from penetrating into the critical components of the assembly.

D. High Speed Spindle

The WQS series has been designed into the spindle assembly to protect the tandem bearings against corrosive elements. Though it is not the primary seal in the assembly, it is designed as the final seal protecting the bearings. All rings in the set will cling to the shaft due to the high rotational speed of the main spindle.

Laminar Seal Rings (Metric)

Single-Turn Rings

Single-Turn Laminar Sealing Rings WQH or WQS are used for a wide variety of applications.

They are commonly used to protect bearing systems by retaining grease/lubricant and preventing water or other contaminating liquids from penetrating into the critical areas of an assembly. The alternating (staggered) series WQHC and WQSC offer (due to an increased labyrinth seal) further improved sealing efficiency. They are often specified where the lubricating grease may liquefy due to higher operating temperatures or where protection against larger amounts of contaminating liquids (such as cooling water) is required.

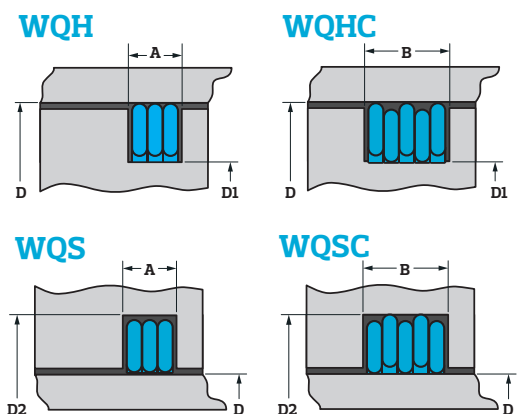
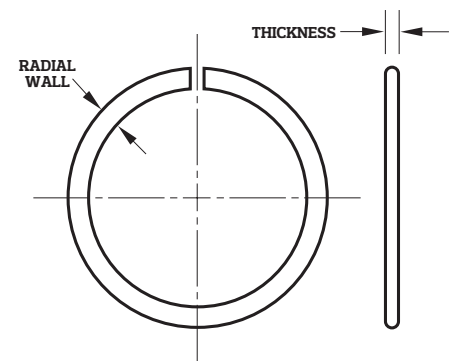
The metric Single-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel

	Bore Shaft D	Groove ² Width		Ring Dimensions		Groove Diameter D2	Groove Diameter D1
		A	B	RW	T		
	15 - 24,9	2,2	3,6	1,0	0,65	(D) +2,6	(D) -2,6
	25 - 29,9	2,2	3,6	1,2	0,65	+3,0	-3,0
	30 - 35,9	2,2	3,6	1,5	0,65	+3,6	-3,6
	36 - 42,9	2,2	3,6	1,8	0,65	+4,2	-4,2
	43 - 48,9	2,4	4,0	2,2	0,72	+5,0	-5,0
	49 - 51,9	2,4	4,0	2,4	0,72	+5,4	-5,4
	52 - 59,9	2,4	4,0	2,6	0,72	+5,8	-5,8
	60 - 69,9	2,7	4,5	2,8	0,82	+6,2	-6,2
	70 - 74,9	2,7	4,5	3,1	0,82	+6,8	-6,8
	75 - 79,9	2,7	4,5	3,3	0,82	+7,2	-7,2
	80 - 89,9	2,7	4,5	3,5	0,82	+7,6	-7,6
	90 - 99,9	2,7	4,5	3,8	0,82	+8,2	-8,2
	100 - 104,9	2,7	4,5	4,1	0,82	+8,8	-8,8
	105 - 109,9	3,3	5,5	4,3	0,98	+9,2	-9,2
	110 - 119,9	3,3	5,5	4,6	0,98	+9,8	-9,8
	120 - 129,9	3,3	5,5	5,0	0,98	+10,8	-10,8
	130 - 149,9	3,3	5,5	5,5	0,98	+11,8	-11,8
	150 - 170,9	3,4	5,6	6,0	1,00	+13,0	-13,0
	150 ¹ - 170,9	5,1	8,2	6,0	1,50	+13,0	-13,0
	171 - 199,9	3,4	5,6	7,0	1,00	+15,0	-15,0
	171 ¹ - 199,9	5,1	8,2	7,0	1,50	+15,0	-15,0
	200 - 259,9	4,1	6,6	8,0	1,20	+18,0	-18,0
	200 ¹ - 259,9	5,1	8,2	8,0	1,50	+18,0	-18,0
	260 - 319,9	5,1	8,2	9,0	1,50	+20,0	-20,0
	320 - 399,9	5,2	8,3	10,0	1,50	+22,0	-22,0
	400 - 439,9	5,2	8,3	11,0	1,50	+24,0	-24,0
	440 - 600,9	5,2	8,3	12,0	1,50	+26,0	-26,0
	440 ¹ - 600,0	8,3	13,5	12,0	2,50	+26,0	-26,0
	601 - 699,9	8,3	13,5	14,0	2,50	+32,0	-32,0
	700 - 799,9	8,3	13,5	16,0	2,50	+36,0	-36,0
	800 - 899,9	8,3	13,5	18,0	2,50	+40,0	-40,0
	900 - 999,9	8,3	13,5	20,0	2,50	+44,0	-44,0
	1000 - 1300,0	8,4	13,6	22,0	2,50	+48,0	-48,0

¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.



Tolerances (mm)				
D	15 - 104,9	105 - 149,9	150 - 439,9	440 - 1300
A-B	+0,10 -0,00	+0,15 -0,00	+0,20 -0,00	+0,25 -0,00
RW	+0,10 -0,10	+0,10 -0,20	+0,15 -0,30	+0,20 -0,40
T	+0,04 -0,02	+0,05 -0,03	+0,06 -0,04	+0,07 -0,05
D2	+0,20 -0,00	+0,25 -0,00	+0,30 -0,00	+0,40 -0,00
D1	+0,00 -0,20	+0,00 -0,25	+0,00 -0,30	+0,00 -0,40



Laminar Seal Rings (Metric)

Double-Turn Rings

Double-Turn Laminar Sealing Rings offer a higher clamping force when installed in the bore or on the shaft.

They are suited for higher operating speeds, have 360° contact (no axial gap) and should be used where application conditions are more severe. One typical application is where high amounts of dirt and dust are present and the ring sets provide the necessary seal against contamination from outside elements.

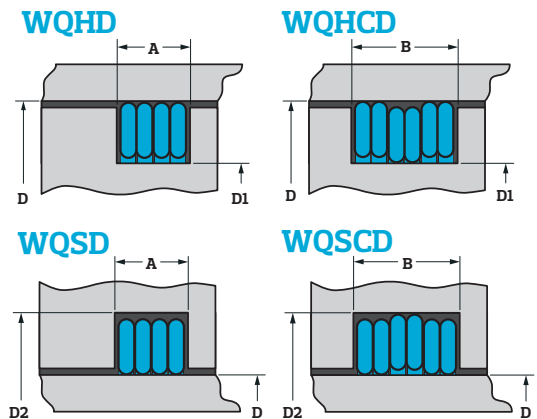
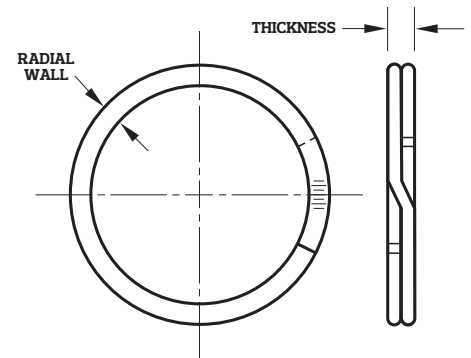
Double-Turn Laminar Ring Sets are also used to protect contacting radial seals, rubber seals, O-rings and other oil seals. For protection in the most severe environments the alternating (staggered) sets WQHCD and WQSCD are the preferred choice by engineers. They provide sealing with 360° contact in both the bore and on the shaft.

The metric Double-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel

	Bore Shaft D	Groove ² Width		Ring Dimensions		Groove Diameter D2	Groove Diameter D1
		A	B	RW	T		
	15 - 24,9	2,9	4,3	1,0	1,30	(D) +2,6	(D) -2,6
	25 - 29,9	2,9	4,3	1,2	1,30	+3,0	-3,0
	30 - 35,9	2,9	4,3	1,5	1,30	+3,6	-3,6
	36 - 42,9	2,9	4,3	1,8	1,30	+4,2	-4,2
	43 - 48,9	3,2	4,8	2,2	1,45	+5,0	-5,0
	49 - 51,9	3,2	4,8	2,4	1,45	+5,4	-5,4
	52 - 59,9	3,2	4,8	2,6	1,45	+5,8	-5,8
	60 - 69,9	3,6	5,4	2,8	1,65	+6,2	-6,2
	70 - 74,9	3,6	5,4	3,1	1,65	+6,8	-6,8
	75 - 79,9	3,6	5,4	3,3	1,65	+7,2	-7,2
	80 - 89,9	3,6	5,4	3,5	1,65	+7,6	-7,6
	90 - 99,9	3,6	5,4	3,8	1,65	+8,2	-8,2
	100 - 104,9	3,6	5,4	4,1	1,65	+8,8	-8,8
	105 - 109,9	4,3	6,4	4,3	1,96	+9,2	-9,2
	110 - 119,9	4,3	6,4	4,6	1,96	+9,8	-9,8
	120 - 129,9	4,3	6,4	5,0	1,96	+10,8	-10,8
	130 - 149,9	4,3	6,4	5,5	1,96	+11,8	-11,8
	150 - 170,9	4,4	6,5	6,0	2,00	+13,0	-13,0
	150 ¹ - 170,9	6,5	9,6	6,0	3,00	+13,0	-13,0
	171 - 199,9	4,4	6,5	7,0	2,00	+15,0	-15,0
	171 ¹ - 199,9	6,5	9,6	7,0	3,00	+15,0	-15,0
	200 - 259,9	5,3	7,8	8,0	2,40	+18,0	-18,0
	200 ¹ - 259,9	6,5	9,6	8,0	3,00	+18,0	-18,0
	260 - 319,9	6,5	9,6	9,0	3,00	+20,0	-20,0
	320 - 399,9	6,6	9,8	10,0	3,00	+22,0	-22,0
	400 - 439,9	6,6	9,8	11,0	3,00	+24,0	-24,0
	440 - 600,9	6,6	9,8	12,0	3,00	+26,0	-26,0
	440 ¹ - 600,9	10,6	15,9	12,0	5,00	+26,0	-26,0
	601 - 699,9	10,8	16,2	14,0	5,00	+32,0	-32,0
	700 - 799,9	10,8	16,2	16,0	5,00	+36,0	-36,0
	800 - 899,9	11,0	16,5	18,0	5,00	+40,0	-40,0
	900 - 999,9	11,0	16,5	20,0	5,00	+44,0	-44,0
	1000 - 1300,0	11,0	16,5	22,0	5,00	+48,0	-48,0



Tolerances (mm)				
D	15 - 104,9	105 - 149,9	150 - 439,9	440 - 1300
A-B	+0,10 -0,00	+0,15 -0,00	+0,20 -0,00	+0,25 -0,00
RW	+0,10 -0,10	+0,10 -0,20	+0,15 -0,30	+0,20 -0,40
T	+0,08 -0,04	+0,10 -0,06	+0,12 -0,08	+0,14 -0,10
D2	+0,20 -0,00	+0,25 -0,00	+0,30 -0,00	+0,40 -0,00
D1	+0,00 -0,20	+0,00 -0,25	+0,00 -0,30	+0,00 -0,40



¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.

Laminar Seal Rings (Imperial)

Single-Turn Rings

Single-Turn Laminar Sealing Rings WYH or WYS are used for a wide variety of applications.

They are commonly used to protect bearing systems by retaining grease/lubricant and preventing water or other contaminating liquids from penetrating into the critical areas of an assembly. The alternating (staggered) series WYHC and WYSC offer (due to an increased labyrinth seal) further improved sealing efficiency. They are often specified where the lubricating grease may liquefy due to higher operating temperatures or where protection against larger amounts of contaminating liquids (such as cooling water) is required.

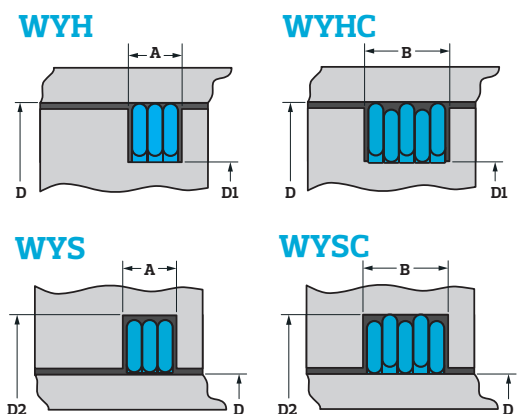
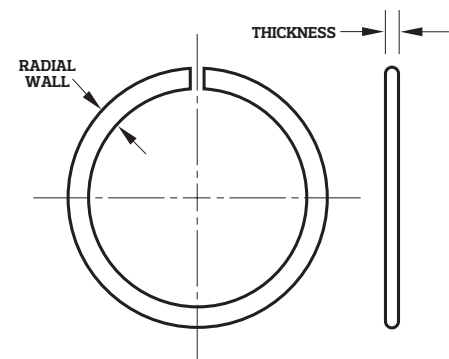
The imperial Single-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel

	Bore Shaft D	Groove ² Width		Ring Dimensions		Groove Diameter D2	Groove Diameter D1
		A	B	RW	T		
Imperial (in.)	0,625 - 1,249	0,072	0,119	0,055	0,021	(D) +0,134	(D) -0,134
	1,250 - 1,499	0,072	0,119	0,065	0,021	+0,154	-0,154
	1,500 - 1,749	0,084	0,139	0,078	0,025	+0,180	-0,180
	1,750 - 2,249	0,102	0,170	0,095	0,031	+0,214	-0,214
	2,250 - 2,749	0,102	0,170	0,113	0,031	+0,250	-0,250
	2,750 - 2,999	0,102	0,170	0,123	0,031	+0,270	-0,270
	3,000 - 3,249	0,102	0,170	0,128	0,031	+0,280	-0,280
	3,250 - 3,499	0,102	0,170	0,138	0,031	+0,300	-0,300
	3,500 - 3,999	0,102	0,170	0,158	0,031	+0,340	-0,340
	4,000 - 4,499	0,102	0,170	0,168	0,031	+0,360	-0,360
	4,500 - 4,999	0,131	0,215	0,188	0,039	+0,408	-0,408
	5,000 - 5,499	0,131	0,215	0,200	0,039	+0,432	-0,432
	5,500 - 6,249	0,158	0,254	0,225	0,046	+0,490	-0,490
	6,250 - 7,749	0,187	0,301	0,250	0,055	+0,540	-0,540
	7,750 - 9,999	0,187	0,301	0,312	0,055	+0,702	-0,702
	10,000 - 12,499	0,217	0,346	0,350	0,063	+0,778	-0,778
	12,500 - 14,999	0,217	0,346	0,375	0,063	+0,828	-0,828
	15,000 - 19,999	0,307	0,496	0,437	0,093	+0,952	-0,952
	20,000 - 24,999	0,310	0,504	0,500	0,093	+1,158	-1,158
	25,000 - 29,999	0,310	0,504	0,567	0,093	+1,292	-1,292
	30,000 - 50,000	0,310	0,504	0,750	0,093	+1,658	-1,658

¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.



Tolerances (in)				
D	0,625 - 4,499	4,500 - 9,999	10,000 - 14,999	15,000 - 50,000
A-B	+0,004 -0,000	+0,008 -0,000	+0,010 -0,000	+0,010 -0,000
RW	+0,004 -0,004	+0,006 -0,006	+0,007 -0,007	+0,015 -0,010
T	+0,002 -0,002	+0,003 -0,003	+0,004 -0,004	+0,005 -0,005
D2	+0,008 -0,000	+0,012 -0,000	+0,012 -0,000	+0,016 -0,000
D1	+0,000 -0,008	+0,000 -0,012	+0,000 -0,012	+0,000 -0,016



Laminar Seal Rings (Imperial)

Double-Turn Rings

Double-Turn Laminar Sealing Rings offer a higher clamping force when installed in the bore or on the shaft.

They are suited for higher operating speeds, have 360° contact (no axial gap) and should be used where application conditions are more severe. One typical application is where high amounts of dirt and dust are present and the ring sets provide the necessary seal against contamination from outside elements.

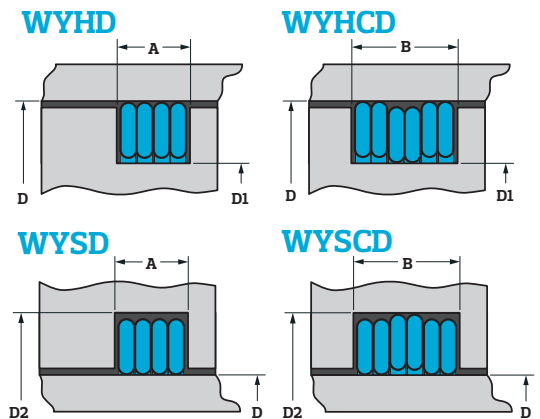
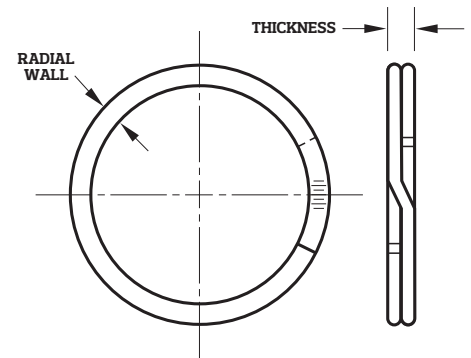
Double-Turn Laminar Ring Sets are also used to protect contacting radial seals, rubber seals, O-rings and other oil seals. For protection in the most severe environment the alternating (staggered) sets WYHCD and WYSCD are the preferred choice by engineers. They provide sealing with 360° contact in both the bore and on the shaft.

The imperial Double-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel

	Bore Shaft D	Groove ² Width		Ring Dimensions		Groove Diameter D2	Groove Diameter D1
		A	B	RW	T		
Imperial (in.)	0,625 - 1,249	0,098	0,145	0,055	0,043	(D) +0,134	(D) -0,134
	1,250 - 1,499	0,098	0,145	0,065	0,043	+0,154	-0,154
	1,500 - 1,749	0,112	0,166	0,078	0,050	+0,180	-0,180
	1,750 - 2,249	0,136	0,204	0,095	0,062	+0,214	-0,214
	2,250 - 2,749	0,136	0,204	0,113	0,062	+0,250	-0,250
	2,750 - 2,999	0,136	0,204	0,123	0,062	+0,270	-0,270
	3,000 - 3,249	0,136	0,204	0,128	0,062	+0,280	-0,280
	3,250 - 3,499	0,136	0,204	0,138	0,062	+0,300	-0,300
	3,500 - 3,999	0,136	0,204	0,158	0,062	+0,340	-0,340
	4,000 - 4,499	0,136	0,206	0,168	0,062	+0,360	-0,360
	4,500 - 4,999	0,172	0,254	0,188	0,078	+0,408	-0,408
	5,000 - 5,499	0,172	0,254	0,200	0,078	+0,432	-0,432
	5,500 - 6,249	0,202	0,299	0,225	0,093	+0,490	-0,490
	6,250 - 7,749	0,238	0,353	0,250	0,111	+0,540	-0,540
	7,750 - 9,999	0,242	0,357	0,312	0,111	+0,702	-0,702
	10,000 - 12,499	0,274	0,405	0,350	0,127	+0,778	-0,778
	12,500 - 14,999	0,278	0,412	0,375	0,127	+0,828	-0,828
	15,000 - 19,999	0,398	0,592	0,437	0,187	+0,952	-0,952
	20,000 - 24,999	0,398	0,596	0,500	0,187	+1,158	-1,158
	25,000 - 29,999	0,405	0,608	0,567	0,187	+1,292	-1,292
	30,000 - 50,000	0,413	0,620	0,750	0,187	+1,658	-1,658



Tolerances (in)				
D	0,625 - 4,499	4,500 - 9,999	10,000 - 14,999	15,000 - 50,000
A-B	+0,004 -0,000	+0,008 -0,000	+0,010 -0,000	+0,010 -0,000
RW	+0,004 -0,004	+0,006 -0,006	+0,007 -0,007	+0,015 -0,010
T	+0,002 -0,002	+0,003 -0,003	+0,004 -0,004	+0,005 -0,005
D2	+0,008 -0,000	+0,012 -0,000	+0,012 -0,000	+0,016 -0,000
D1	+0,000 -0,008	+0,000 -0,012	+0,000 -0,012	+0,000 -0,016

¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.



Supply Chain Assist

flexible solutions to
achieve your goals



TFC Europe Ltd is one of the leading suppliers of technical fastener components to industry, with an unrivalled reputation for delivering innovative products, supply solutions, and exemplary service.

Our logistic expertise provides you with fasteners, components and consumables when and where you want them. Maximise your productivity and leverage resources with TFC's global supply and distribution services.

- Tailored DLF / Kanban / JIT / VMI systems
- Nationwide Service Centres
- Cutting Edge Stock Replenishment Technology



call now to speak to our expert team
+44 (0) 845 643 9023
www.tfcassist.com

Engineering Support

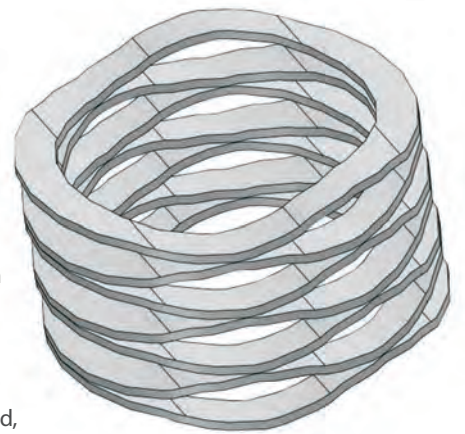
Engineering Support

TFC specialise in the design, development and production of custom retaining rings and wave/compression springs.

TFC & Smalley bring along the combined experience of our engineering staff in designing retaining rings and wave springs for the most demanding of applications. Our capabilities extend well beyond the ordinary manufacturer as we not only design the rings and springs but, Smalley design the machinery they run on.

Our design engineers will tailor a design to meet the exact characteristics necessary for individual function, where certain criteria must be considered and we have designed and solved thousands of tough applications for OEMs in nearly every industry. Whether it's exposure to high temperature or a cryogenic environment, a dynamic / fatigue problem or simply a static load, we've been involved and resolved complex design issues.

As part of our attention to complete customer support, also included in our processes is the development of a packaging solution for our Smalley products. Whether the part is coin-wrapped, bulk packaged, wire tied, on a tube or individually bagged an engineer is involved with all aspects of handling and shipment.



CAD Models

Standard retaining ring and wave spring models are available for download in all major CAD formats. Please contact TFC's engineering team for details.

Optimised Design

Our sophisticated Smalley software has been developed so that all the variables in a given design are optimised to the full. It considers both the dimensions of the product and the cost to produce the ring or spring. The typical analysis provides a product that performs to specification but does not over-design dimensions and/or materials that can raise costs.

Because our No-Tooling-Cost process enables an almost infinite selection of dimensions, the software considers the relationships between maximum stress levels, product configurations and dimensions, and pushes the limits in the choices available for the best design. Based upon the criteria selected, our engineers work with you to determine what design alternatives will work best for a particular application.

By making simple design changes; such as material thickness, radial wall, number of waves or selecting a different alloy, we can quickly determine the design impact. This time saving technology allows for correct parts to be manufactured and ready to test.

Testing

Factory testing is performed on our products to ensure that they satisfy our stringent quality standards prior to shipment. Statistical Process Control, SPC, is performed on a sampling of parts to verify that critical dimensions are in control and we have the ability to test various application-specific performance characteristics.

An example of this would be to ascertain the cycle life of a spring or ring product.

Re-Engineering

If you are currently considering using Spirolox Retaining Rings or Smalley Wave Springs to replace an existing product, our engineering department will work with you to choose the best new design for your application. Send us a sample of an existing ring or spring, drawings of the assembly or your design requirements and we will engineer and provide new solutions for your consideration. Once an alternative design is presented, we will work with you to obtain exact prototypes or samples of similar products for evaluation and testing.

Mid-Stream design changes can also be accomplished with relative ease. It is not uncommon that dimensions need modification right in the middle of production. Once again, Smalley products can usually be changed at any point in the process by making a machine adjustment, without any tooling changes.

You can rely on the flexibility that all our Smalley products offer for all your applications.

Spring Design

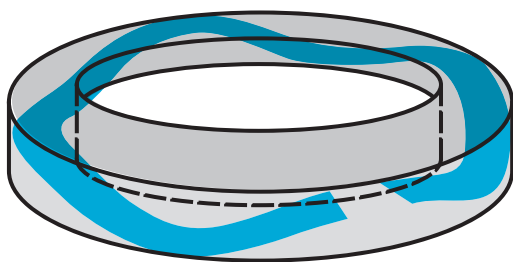
Spring Design

Defining the Spring Requirements

Although wave spring applications are extremely diverse, there is a consistently basic set of rules for defining spring requirements. Those requirements are used to select a stock/standard spring or design a special spring to meet the specifications.

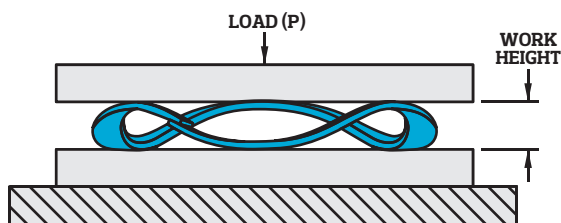
Working Cavity

The working cavity usually consists of a bore the spring operates in and/or a shaft the spring clears. The spring stays positioned by piloting in the bore or on the shaft. The distance between the loading surfaces defines the axial working cavity or work height of the spring.



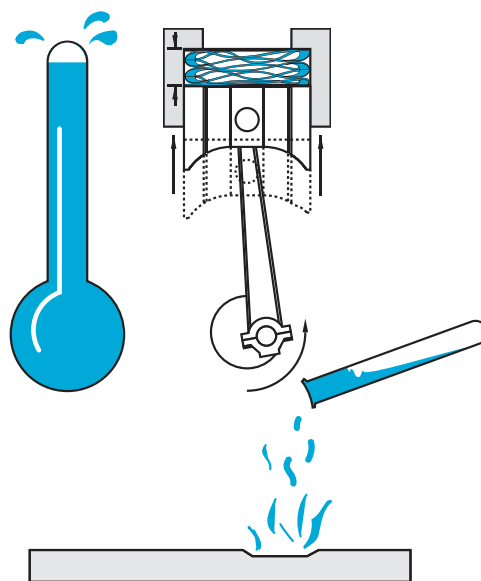
Load Requirement

The load requirement is defined by the amount of axial force the spring must produce when installed at its work height. Some applications require multiple working heights, where loads at 2 or more operating heights are critical and must be considered in the design. Often minimum and/or maximum loads are satisfactory solutions, particularly where tolerance stack-ups are inherent in the application.



Operating Environment

High temperature, dynamic loading (fatigue), a corrosive media or other unusual operating conditions must be considered in spring applications. Solutions to various environmental conditions typically require selection of the optimal raw material and operating stress.



Standard Springs vs. Special Springs

Finding the right spring can be as easy as selecting a standard catalogue item. A TFC engineer can help you choose from over 4000 standard parts available from stock in carbon and stainless steel. Smalley's "no-tooling" method of manufacturing provides the utmost in flexibility and quality.

Whether the requirement is for 1 spring or 1000000 consider TFC for your special spring requirements.

Let TFC Design Your Spring

Over 50% of Smalley's business is in the design and manufacturing of special springs to suit individual applications. Whether it's a technical question, or the most complex spring design, TFC engineers are always available and welcome the opportunity to assist you. Utilise the Application Checklist found in this catalogue. An engineer will recommend a standard catalogue item or provide you with design options for a special spring.

Spring Application Checklist

Application Checklist

TFC Wave Springs.

Email: design@tfc.eu.com | Fax: +44 (0)1435 866620

Quick Delivery on Custom Orders • No-Tooling-Cost • Precise Specifications • Engineering/Design Assistance
Complete this application checklist and challenge TFC's engineering team.

Name	Title	Date
Company		
Address		
Post Code	Country	
Phone	Fax	
Email		

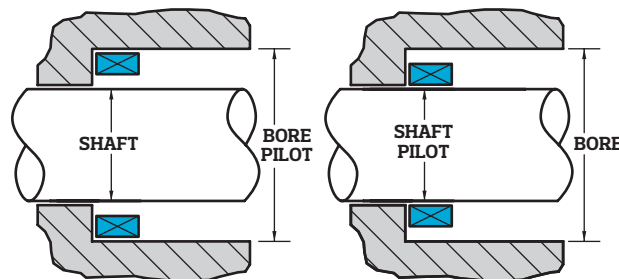
Dimension in: () Metric Units () Imperial Units

Operates in bore diameter

Inside diameter clears shaft

Specify which diameter the spring should pilot closest to:

() Bore () Shaft



Load Deflection (select one)

Group A

Min - Max Load @ Work Height () N @ mm () lb @ in

Free Height Approximate

Group B

Min - Max Load @ Work Height () N @ mm () lb @ in

Min - Max Load @ Work Height () N @ mm () lb @ in

Free Height Approximate

Group C

Free Height (min) - (max)

of Waves Material Thickness

Radial Wall

Sketch

Material

Consider the environment:

Temperature () C () F

Corrosive Media

*Carbon Steel ()

*17-7 PH Stainless ()

302 Stainless Steel ()

316 Stainless Steel ()

Inconel X-750 ()

Other ()

Finish

*Oil dipped (Carbon Steel) ()

*Vapor degreased and ultrasonic cleaned (Stainless Steel) ()

Passivate ()

Black Oxide ()

Phosphate Coat ()

Vibratory Deburr ()

Other ()

Fatigue: Specify estimated cycle life

() Static Application () 10⁶ Cycle Life

() Under 10⁵ Cycle Life () Over 10⁶ Cycle Life

() 10⁵ Cycle Life

Quantity:

Prototype

Production

Application: (Description)

.....

.....

.....

.....

*Denotes standard material or finish.

Ring Design

Ring Design

Spirolox Retaining Ring and Snap Ring applications, although diverse, can be analysed with a straight-forward set of design calculations. There are four main areas that should be considered in most applications.

1. **Material Selection**
2. **Load Capacity**
3. **Rotational Capacity**
4. **Installation Stress**

TFC Application Engineers are available to provide immediate technical assistance.

The following pages of Spirolox Retaining Ring and Constant Section Ring engineering design have been developed from over fifty years of extensive testing and research into the various applications of retaining rings. The formulas are provided for the preliminary analysis of a ring application and the design of a Spirolox Retaining Ring.

Design engineers commonly associate the word “retaining ring” to a basic style or type of retaining device. In reality, retaining rings are nearly as diverse as their applications. Spirolox Retaining Rings offer a distinct alternative, and in many instances an advantage, over the more common retaining rings available on the market today. Some of the major distinctions are:

Spiral Wound in Multiple Turns

Increases load capacity yet allows easy assembly by hand or as an automated process.

Uniform Radial Section

Provides a pleasant appearance on the assembled product. Beneficial when radial clearance is limited.

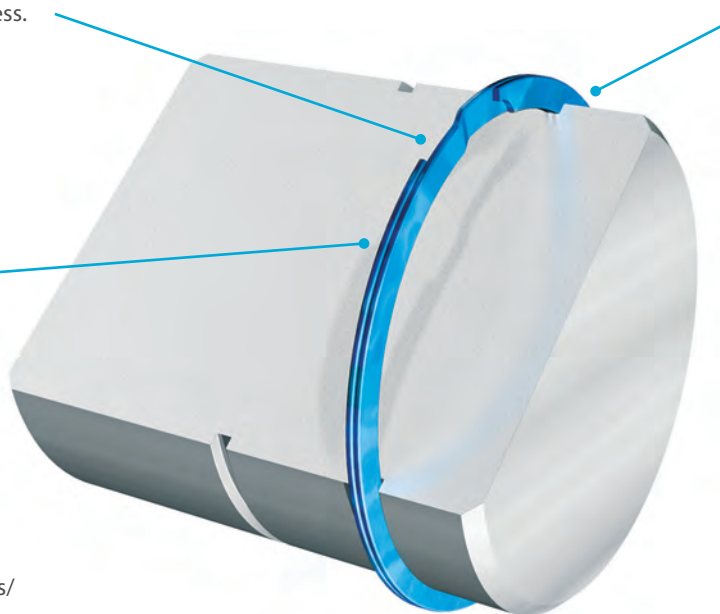
Simplified Assembly

Wind into groove. No special pliers/ tools needed to install or remove. Removal notch provided for easy removal using a screwdriver.

360° Retaining Surface

No gap – no protruding lugs.

Diameters from 5mm to 3000mm



Design Flexibility

Ring thickness can be changed to accommodate most any application by either varying material thickness and/or number of turns. Standard rings meet military and aerospace specifications. Special designs are produced quickly and economically in many alloys.

Special End Configurations

To facilitate easier removal, or hamper removal, TFC can design a ring with special end configuration to suit the application.

Here are some examples:



Axially Bent Scallops



Crimp End



Dimpled Ends



Holes



Locking Ends with Holes



Rounded Ends with Holes



Deep Bore Installation



Straight Ends with Installation



Balanced 2-Turn Spirolox Retaining Ring



Square Wire Retaining Ring with Radial 'Pinch' Installation



Square Wire Retaining Ring with Radial 'Pinch' Installation / Removal Provisions



Multiple Turn Retaining Ring with Rotation Lock



Round Wire Retaining Ring with Axially Bent Locks



Round Wire Retaining Ring

Ring Design

Rotational Capacity

The maximum recommended RPM for all standard external Spirolox Retaining Rings are listed in the ring tables of this manual.

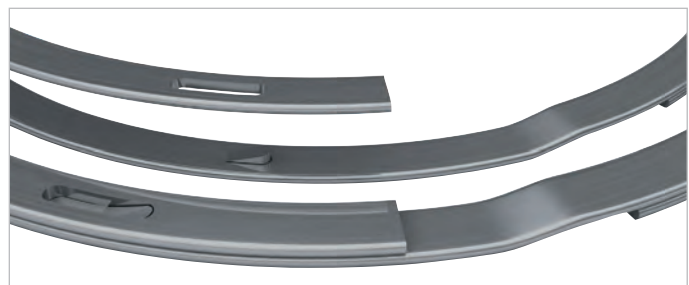
A Spirolox Retaining Ring, operating on a rotating shaft, can be limited by centrifugal forces. Failure may occur when these centrifugal forces are great enough to lift the ring from the groove. The formula below calculates the RPM at which the force holding the ring tight on the groove (cling) becomes zero.

Rapid acceleration of the assembly may cause failure of the retaining ring. If this is a potential problem, contact TFC engineering team for design assistance.

Self-Locking

This feature allows the ring to function properly at speeds that exceed the recommended rotational capacity. The self-locking option can be incorporated for both external and internal rings.

The self-locking feature utilizes a small tab on the inside turn "locking" into a slot on the outside turn. Self-locking allows the ring to operate at high speeds, withstand vibration, function under rapid acceleration and absorb a degree of impact loading.



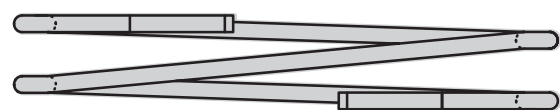
Balanced

Smalley's balanced feature statically balances the retaining ring. A series of slots, opposite the gap end, account for the missing material in the gap. This characteristic is very useful when the balance of the assembly is critical and it is necessary to reduce eccentric loading.



Left Hand Wound

Smalley retaining rings are wound standard in a clockwise direction. In special applications it is sometimes favorable to have the retaining ring reverse, left hand wound.



**RIGHT HAND
(STANDARD WOUND)**

**LEFT HAND
(REVERSE WOUND)**

Ring Design

Maximum Allowable RPM for Spirolox Retaining Rings – Metric

Part No.	XVSM	XES	XDNS	XFS	Part No.	XVSM	XES	XDNS	XFS	Part No.	XVSM	XES	XDNS	XFS	Part No.	XVSM	XES	XDNS	XFS
6	51561	-	-	-	35	7004	7485	7628	11685	71	-	2309	-	-	170	945	749	715	1151
7	39742	-	-	-	36	6641	6903	8474	11640	72	3218	2321	2805	3947	175	894	697	671	1088
8	40518	-	-	-	37	-	7227	-	-	75	2949	2152	2537	3648	180	848	657	636	1030
9	35627	-	-	-	38	5994	7174	7556	10520	77	-	-	2379	3467	185	898	631	601	1115
10	31833	-	-	-	40	7573	6172	7181	10841	78	3158	2007	2304	3731	190	854	591	577	860
11	25202	-	-	-	42	6888	5715	6546	8972	80	3025	1981	2576	3747	195	813	569	551	880
12	30875	22153	-	-	45	6021	5158	5740	7861	82	2900	1895	2425	3574	200	775	534	518	837
13	26805	20094	22915	31185	46	-	4909	5505	7006	85	2703	1825	2333	3476	205	495	1068	22915	31185
14	22359	18471	19967	21602	47	-	5570	5283	7232	88	2526	1737	2143	3252	210	802	579	466	1077
15	19625	14543	17836	24273	48	5309	5744	5075	7881	90	2443	1721	2029	2731	220	734	530	425	932
16	17364	14149	18132	29110	50	4901	4084	5651	7885	92	-	-	-	-	230	674	482	527	854
17	14958	15923	15677	19841	52	6057	3616	5251	7318	95	2174	1509	1777	2598	240	622	444	486	735
18	13439	12233	16195	22605	53	-	3450	-	-	98	-	-	1659	2377	250	575	413	451	726
19	12140	11685	14221	20417	54	-	3295	4842	6811	100	1955	1508	1579	2542	260	582	381	424	743
20	11066	10810	12948	18532	55	5380	3360	4680	6576	102	1530	2746	12948	18532	270	541	354	390	718
21	15326	9641	12475	16896	56	5238	3215	4525	6354	105	2082	1399	1435	2640	280	505	328	363	714
22	13341	10397	11421	13523	58	4890	3111	4359	5942	108	1368	2418	11421	13523	290	472	-	382	624
23	-	9652	10495	14213	59	-	2982	-	-	110	1902	1323	1391	2279	300	443	-	357	584
24	11035	8479	10825	19083	60	4575	2862	4050	4793	115	1745	1248	1280	2090	310	-	-	342	-
25	10214	8524	10020	11982	61	-	2683	-	-	120	1606	1176	1175	1694	320	-	-	316	-
26	12483	8642	9301	12494	62	4323	2884	3738	5490	125	1483	1092	1088	1778	330	-	-	299	-
27	-	11357	8721	14320	63	4220	2773	3691	5071	130	1374	993	1017	1647	340	-	-	343	-
28	10648	10259	8609	15229	64	-	2780	-	-	135	1270	934	952	1530	350	-	-	322	-
29	9973	9765	8060	18016	65	3967	2577	3430	4806	140	1186	870	888	1519	360	-	-	305	-
30	9534	9149	7562	12189	66	-	2526	-	-	145	821	835	1331	12189	370	-	-	291	-
31	-	8495	-	-	67	-	2275	3239	4463	150	1022	755	788	1470	380	-	-	276	-
32	8437	7778	8686	14215	68	3602	2486	3201	3945	155	961	891	733	1379	390	-	-	262	-
33	-	-	8205	9511	69	-	2438	-	9511	160	1060	831	690	1296	400	-	-	251	-
34	7398	7982	7763	10847	70	3402	2315	2982	4411	165	1000	795	753	1201					

Maximum Allowable RPM for Spirolox Retaining Rings – Imperial

Part No.	XVS	XWS	XWST	XWSM	XFSE	Part No.	XVS	XWS	XWST	XWSM	XFSE	Part No.	XVS	XWS	XWST	XWSM	XFSE
25	45227	-	-	36651	-	146	-	5020	-	-	-	334	-	1840	1810	1960	-
31	39946	-	-	31364	-	150	5900	4940	4670	6540	12178	337	2630	1790	-	-	3433
37	31161	-	-	23025	-	156	7720	5343	5160	6110	9004	343	3500	1750	1690	1880	3334
43	24067	-	-	18019	-	157	-	5240	-	-	-	350	2440	1700	2020	2090	3236
46	-	-	28820	21450	-	162	7220	4880	4690	5750	9118	354	-	1730	1960	2080	-
50	28030	24650	20780	20600	32573	168	6590	4930	4110	5260	8595	356	2370	1680	-	1970	3528
56	-	-	-	-	32410	175	6200	4510	3930	4970	8101	362	2270	1660	1860	1890	2970
53	-	21280	-	-	-	177	-	4410	3960	4990	-	368	2210	1600	1860	1890	2890
55	-	19440	18130	18260	-	181	5700	4290	4170	4720	8470	374	-	1520	-	-	-
56	21060	18520	17270	17400	-	187	5380	4240	3850	4540	6440	375	2120	1530	1790	1860	2964
59	-	17290	15200	15390	-	193	5100	4020	-	-	8047	381	2060	1470	-	-	2701
62	17850	19500	15700	14730	22107	196	-	3860	3320	4730	-	387	2010	1500	1620	1750	2934
65	-	16270	-	-	-	200	4720	3740	3410	4560	7650	393	1930	1510	1560	1690	2529
66	-	16510	15600	13860	-	206	5970	3550	3340	3810	7103	400	1880	1470	1560	1660	2264
68	15340	15470	15600	13510	19520	212	5550	3400	3120	3560	6603	406	-	1400	-	-	-
71	-	13050	-	-	-	215	-	3490	3120	3450	-	412	2090	1350	-	-	2367
75	12350	14290	12750	12190	22451	216	-	3370	-	-	-	413	-	1380	-	-	-
78	-	12960	11590	11110	-	218	5290	3290	-	-	6316	418	-	1360	-	-	-
81	15380	12470	11300	10150	17414	225	5050	3220	2820	3240	6040	425	1960	1360	1350	1440	2350
84	-	10770	-	-	-	231	4720	3020	2730	3040	5786	431	-	1300	-	-	-
87	12800	10570	10660	10340	17374	236	-	2870	-	-	-	433	-	1300	-	-	-
90	-	9180	-	-	-	237	4520	2890	2560	3380	6343	437	1850	1290	1250	1360	2215
93	11500	9400	9100	8760	12757	243	4240	2920	2480	3180	5089	443	-	1230	-	-	-
96	-	8920	-	-	-	250	4063	2750	3040	3090	4994	450	1750	1270	1210	1300	2116
98	-	9530	6980	8640	-	255	-	2600	3430	2920	-	456	-	1280	-	-	-
100	9800	9160	7800	8940	18675	256	3900	2600	-	-	5118	462	1670	1240	-	-	2001
102	-	9070	7400	8500	-	262	3680	2500	2780	2750	4073	468	-	1220	-	-	-
103	-	8080	-	-	-	268	3540	2470	2630	2680	4797	472	-	1180	-	-	-
106	11490	8610	8660	11260	11446	275	3400	2340	2560	2790	3981	475	1580	1180	1160	1180	2193
109	-	7350	-	-	-	281	3220	2380	-	-	4074	481	-	1140	-	-	-
112	9990	7470	7960	9820	12107	287	3100	2260	2260	2590	3927	487	1520	1120	-	-	1816
115	-	6700	-	-	-	293	2940	2140	2200	2460	3727	493	-	1090	-	-	-
118	9220	7350	6320	9040	15056	295	-	2160	-	-	-	500	1440	1050	1020	1080	1724
121	-	6340	-	-	-	300	2840	2080	2150	2410	3537	511	-	1000	-	-	-
125	8500	6750	6500	8042	11970	306	3670	2020	2090	2290	3245	512	-	1020	-	-	-
128	-	5860	-	-	-	312	3030	1980	1990	2240	3853	525	1310	970	1280	1210	-
131	7880	6310	5800	8280	13786	314	-	1980	-	-	-	537	-	900	-	-	-
134	-	5960	-	-	-	315	-	-	1990	2190	-	550	1190	890	1170	1120	-
137	7030	6110	6000	7430	11008	318	2930	1930	-	-	3731	551	-	870	-	-	-
140	-	5580	-	-	-	325	2790	1870	1900	2100	3557	562	-	840	-	-	-
143	6560	5490	5160	6700	11594	331	2700	1840	-	-	3595	575	1090	820	1100	1030	-

Ring Application Checklist

Application Checklist

Retaining Rings.

Email: design@tfc.eu.com | Fax: +44 (0)1435 866620

Quick Delivery on Custom Orders • No-Tooling-Cost • Precise Specifications • Engineering/Design Assistance
Complete this application checklist and challenge TFC's engineering team.

Name	Title	Date
Company		
Address		
Post Code	Country	
Phone	Fax	
Email		

Dimension in: () Metric Units () Imperial Units

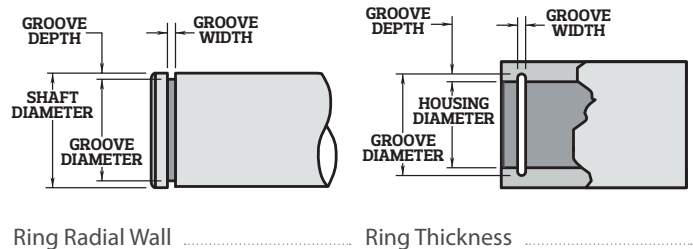
Housing Diameter

Shaft Diameter

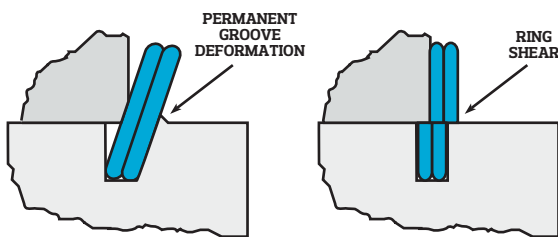
Groove Diameter

Groove Width

RPM



Thrust Capacity



1. Groove Deformation

This occurs when maximum capacity is limited by the groove material (groove material is soft)

2. Ring Shear

This occurs when maximum capacity is limited by the retaining ring (groove material is hardened)

If thrust is a consideration specify:

Groove Material

Load Capacity () N () lb

Sketch

Material

Consider the environment:

Temperature () C () F

Corrosive Media

*Carbon Steel ()
*302 Stainless Steel ()
*316 Stainless Steel ()
Inconel X-750 ()
A-286 ()
Other ()

Finish

*Oil dipped (Carbon Steel) ()
*Vapor degreased and ultrasonic cleaned (Stainless Steel) ()
Passivate ()
Black Oxide ()
Phosphate Coat ()
Vibratory Deburr ()
Other ()

Quantity:

Prototype

Production

Application: (Description)

Material Types

Material Types

Selecting the proper material for an application requires a general knowledge of what is commonly available for use in Smalley flat wire products.

Specifying the correct material can prevent additional cost and failure in operation. Carbon steel is the most commonly specified material. Stainless steel, although more costly than carbon steel, provide far superior corrosion resistance and have higher temperature operating limits.

Carbon Steel

Oil Tempered

SAE 1070-1090 high carbon tempered spring steel is a standard material for spiral retaining rings and wave springs. Tensile strength and yield strength are maximised as a result of the oil tempered martensitic structure.

Hard Drawn

SAE 1060-1075 high carbon cold drawn spring steel is a standard material for snap rings. Hard drawn carbon steel has no scale as it receives its strength from the drawing process.

In either temper, carbon steel is best suited in applications having a protected environment as it corrodes if not lubricated or atmospherically sealed. Additional corrosion protection can be added with special finishes. Rings and springs are normally supplied with an oil dip finish providing protection during shipment and for shelf storage.

- Carbon steel is highly magnetic and can be a variety of different colours including blue, black and grey.

Stainless Steel

302 Stainless Steel

302 is the standard stainless steel for spiral retaining rings. This widely used material is specified because of its combination of corrosion resistance and physical properties. 302 obtains its spring temper condition by cold working. Though it is categorized as being a nonmagnetic stainless, 302 becomes slightly magnetic as a result of cold working. It is not hardenable by heat treatment.

- 302 has a silver-grey colour.

316 Stainless Steel

Nearly identical in physical properties and heat resistance to 302, 316 provides additional corrosion resistance, particularly against pitting, due to its molybdenum chemical content. 316 is generally used in food, chemical and sea water applications.

316 shows less magnetism than 302. However, as with 302, magnetism increases as the wire is cold reduced. This stainless grade is also not hardenable by heat treatment.

- 316 has a silver-grey colour.

17-7 PH Condition CH900 Stainless Steel

Similar in corrosion resistance to type 302, this alloy is used almost exclusively for wave springs, yet offers both high tensile and yield strengths for special ring applications. In fatigue and high stress applications, 17-7 out performs even the finest grade of carbon steel.

Spring properties are achieved by precipitation hardening Condition C to Condition CH900. As a result, the material may be subjected to a temperature of 343°C without a loss of spring properties. 17-7 PH Condition CH900 exhibits magnetism similar to high carbon steel.

- After precipitation hardening, 17-7 has a blue, brown or silver colour as a result of open-air heat treatment, although atmosphere controlled heat treatment provides a bright colour.

Material Types

Super Alloys

Inconel X-750*

This nickel-chromium alloy is used most commonly in high temperature and corrosive environments. Two commonly specified tempers of Inconel are described below.

Most commonly, Inconel X-750 is precipitation heat treated to a spring temper condition. In this state, it has temperature resistance to 371°C. The National Association of Corrosion Engineers (NACE) approves this hard temper to specification MR-01-75 (Rc50 maximum) for spiral retaining rings and wave/compression springs.

#1 temper, which requires a longer heat treatment than spring temper, has a lower tensile strength but provides temperature protection to 538°C.

Both spring temper and #1 temper may be heat treated in either an open air or atmosphere controlled furnace. Open air heat treatment may produce oxidation, which often results in a slight black residue. An atmosphere controlled environment eliminates oxidation and produces a component with no residue.

- Rings and springs manufactured from this grade of Inconel have a blue/silver-grey colour and exhibit no magnetism.

A286 Alloy

In applications up to 538°C, this alloy exhibits similar properties to Inconel X-750. Its spring temper condition is obtained by precipitation hardening. A286 may be heat treated similar to spring temper and #1 temper Inconel.

- This material exhibits no magnetism and has a blue/silver-grey colour.

Elgiloy*

Known for its excellent resistance to corrosive environments and use at elevated temperatures, this relatively new spring material is now readily available from Smalley. Commonly used in oil industry applications, Elgiloy shows improved reliability over other NACE approved materials by resisting sulfide stress cracking.

Additionally, Elgiloy is said to out perform "over 600% better than 17-7 PH in load retention at 343°C and provide over 100% more cycles (in fatigue resistance) than carbon steel, without breakage."

- Elgiloy exhibits no magnetism and is blue-brown in colour as a result of heat treatment.

*INCONEL X-750 is a registered trademark of Special Metals Corporation.
ELGILOY is a registered trademark of Combined Metals of Chicago.

Coppers

Beryllium Copper Alloy #25

Normally specified in a hard temper, this alloy produces excellent spring properties due to a combination of low modulus of elasticity and high ultimate tensile strength. The alloy gains its physical properties by precipitation hardening. In contrast to other copper alloys, beryllium copper has the highest strength and offers remarkable resistance to loss of physical properties at elevated temperatures.

- Beryllium copper is nonmagnetic. Its electrical conductivity is about 2-4 times as great as phosphor bronze

Phosphor Bronze, Grade A

Phosphor bronze offers fair spring properties, fair electrical conductivity and is rated a step below beryllium copper in performance. It is purchased in a spring temper condition to maximise spring characteristics.

- Phosphor bronze is hardenable only by cold working. This material is also nonmagnetic.



Materials Table

The table below presents the more common alloys used by Smalley Steel Ring Company.

Material	Material Thickness (mm)	Minimum Tensile Strength (N/mm²)	Shear Strength (N/mm²)	Maximum Recommended Operating Temp. ⁴ (°C)	Modulus of Elasticity (N/mm²)	Chemical	Afnor	Number-DIN
CARBON STEEL								
Oil Tempered SAE 1070 - 1090	0,152 - 0,356	1855	1055	121	206843	Carbon Steel XC67 to XC75	Not applicable	1,1231 - 1,1248 ¹
	0,357 - 0,533	1758	1000					
	0,534 - 1,092	1524	869					
	≥1,093	1455	827					
Hard Drawn SAE 1060 - 1075	0,152 - 0,762	1586	896					
	0,763 - 2,794	1248	710					
	2,795 - 5,588	1076	614					
AISI 302								
AMS-5866	0,051 - 0,559	1448	820	204	193053	X10 CrNi 18-8	Not applicable	1,4310
	0,560 - 1,194	1379	786					
	1,195 - 1,575	1276	724					
	1,576 - 1,880	1207	689					
	1,881 - 2,261	1138	648					
	2,262 - 2,413	1069	607					
AISI 316								
ASTM A313 ¹	0,051 - 0,584	1344	765	204	193053	X 5 CrNiMo 17-12-2	Z 7 CND 17-12-2	1,4401
	0,585 - 1,219	1310	745					
	1,220 - 1,549	1207	683					
	≥1,550	1172	669					
17-7 PH								
CONDITION CH900 AMS-5529	ALL	1655 ²	945 ²	343	203395	X 7 CrNiAl 17-7	Z 9 CNA 17-07	1,4568
AISI 316								
CONDITION CH900 AMS-5529	ALL	1241 ²	724 ²	538	213737	X 6 NiCrTiMoVB 25-15-2	Z6NCTDV25-15	1,4980
INCONEL ⁵ ALLOY X-750								
SPRING TEMPER AMS-5699 ³	ALL	1517 ²	862 ²	371	213737	NiCr 15 Fe 7 TiAl	NC 15 Fe 7 TA	2,4669
No. 1 TEMPER "Rc 35 MAXIMUM" AMS-5699 ^{1,3}	ALL	938 ² REF	531 ²	371				
SPRING TEMPER AMS-5699 ³	ALL	1069 ²	607 ²	371				
INCONEL ⁵ ALLOY 718								
AMS-5596 ¹	ALL	1241 ²	703 ²	704	204085	NiCr 19 NbMo	NC 19 FeNb	2,4668
ELGILOY ⁵								
AMS-5876 ^{1,3}	≤ 0,102	2068 ²	1179 ²	427	206843	CoCr20 Ni16 Mo7	Not applicable	Not applicable
	0,103 - 0,483	1999 ²	1138 ²					
	0,484 - 0,635	1931 ²	1096 ²					
	0,636 - 2,54	1862 ²	1062 ²					
BERYLLIUM COPPER								
TEMPER TH02 ASTM B197 ¹	ALL	1276 ²	883 ²	204	127553	CuBe2	Not applicable	2,1247

NOTE: Additional materials available include Phosphor Bronze, C-276, 410 Stainless Steel, MONEL5 K-500, MONEL5 400, Waspaloy and others.
Please consult TFC engineering team for further details.

¹ Referenced for chemical composition only. ² Values obtained after precipitation hardening. ³ Conforms to NACE Standard MR-01-75.

⁴ Exceeding these temperatures will cause increased relaxation. Consult TFC engineering team for High Temperature applications.

⁵ ELGILOY is a registered trademark of Combined Metals of Chicago. INCONEL and MONEL are registered trademarks of Special Metals Corporation.
HASTELLOY is a registered trademark of Haynes International.

Material Finishes

Material Finishes

Oil Dip

This is the standard finish for all Smalley products produced from carbon steel. The oil provides resistance to corrosion in transport and normal storage. The oil dip finish should not be considered a permanent finish.

Black Oxide

MIL-DTL-13924, Class 1

This finish provides a flat black finish. Black oxide is intended more for cosmetic appearance than for corrosion resistance.

Cadmium Plating

**Cadmium Plate, AMS-QQ-P-416, Type I, Class 2,
Cadmium Plate w/Chromate Dip, AMS-QQ-P-416, Type II, Class 2**

Cadmium plating is used on carbon steel to increase the corrosion resistance of the product. The process of cadmium plating spiral retaining rings is costly and subjects the ring to the possibility of hydrogen embrittlement. Smalley offers stainless steel as the preferable option to cadmium.

Passivation

AMS 2700, Method 1, Type 2, Class 3

Passivation is an optional cleaning operation for stainless steel. It provides a bright finish and increased corrosion resistance. Passivation dissolves iron particles and other substances, which have become imbedded in the surface of stainless steel during production. If not dissolved, these foreign particles could promote rusting, discolouration or even pitting.

In theory, the corrosion resistance of stainless steel is due to the thin, invisible oxide film that completely covers the surface of the ring and prevents further oxidation. Removing the contaminants prevents breaks in the oxide film for optimum corrosion resistance.

Zinc Phosphate

MIL-DTL-16232, Type Z, Class 2

This finish is sometimes referred to as "Parkerizing" and appears grey-black in colour. The corrosion resistance of phosphate is superior to black oxide but inferior to cadmium plating or stainless steel. Phosphate can not be applied to stainless steel.

Vapor Degrease/Ultrasonic Clean

This is the standard cleaning and finish for all stainless steels. The process removes oil and other organic compounds from the material surface by use of a chlorinated solvent. The solvent effectively removes oil and grease from the exposed surfaces of the ring or spring. Ultrasonics are used in forcing the solvent to act between the turns of the ring.

Vibratory Deburr /Hand Deburr

Though all circumferential surfaces and edges of Spirolox Rings are smooth, sharp corners are always present on the gap ends due to the cut-off operation. To break the sharp corners, achieving a blended/smooth surface finish, rings may either be vibratory or hand deburred to meet your specifications.

Materials

Specifications

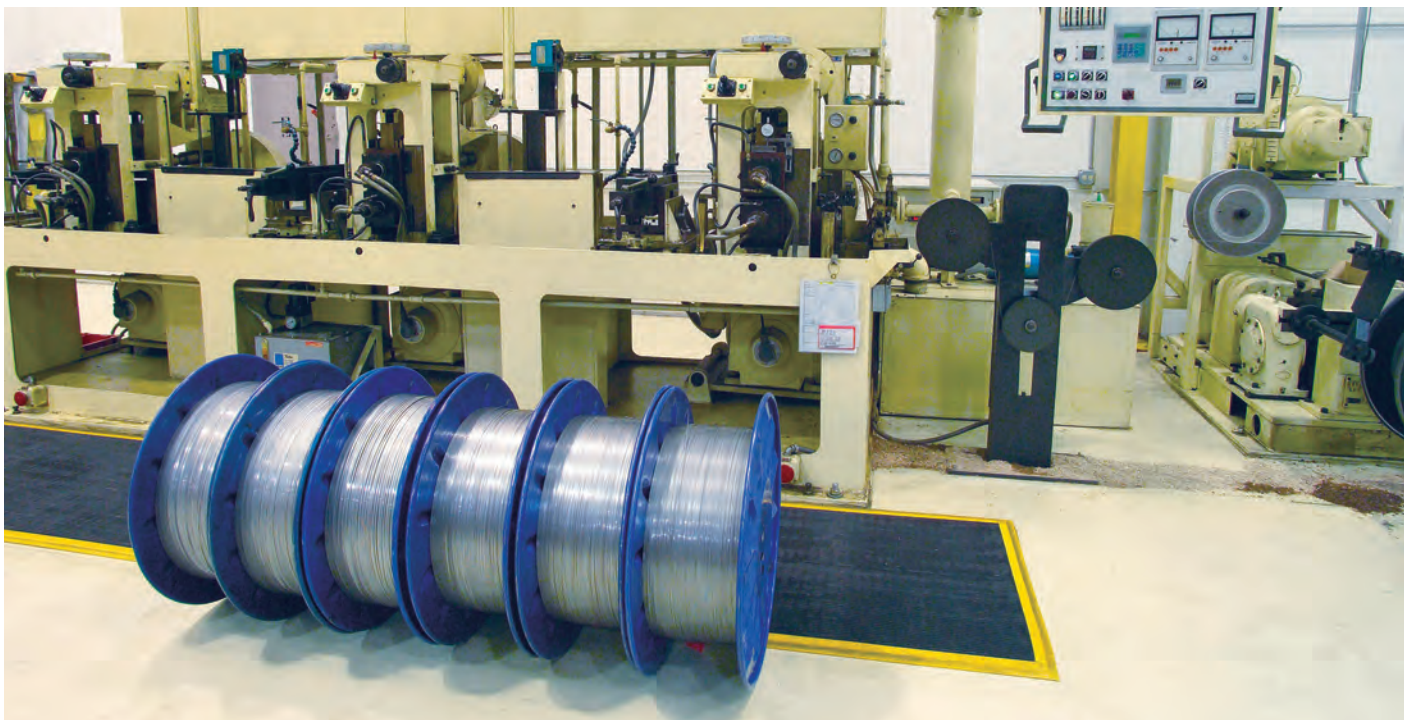
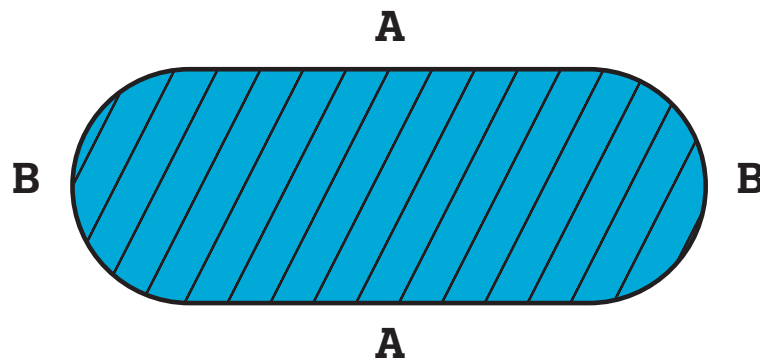
Federal, aerospace and other regulating agencies have prepared several specifications for sheet and strip materials, but few have been published for flat wire.

Smalley procures its material to internally generated specifications. In addition to controlling tensile strength, rigid inspection procedures have been established to check for edge contour, physical imperfections, camber, cross-section and chemical composition.

Ultimate Tensile Strength

To check the spring properties of wire, Ultimate Tensile Strength is the preferred test method over hardness because spring temper flat wire develops different hardnesses at various indentation points.

As a result of cold rolling, the top and bottom surfaces ("A") become harder as they are more severely worked than the round edge areas ("B"). Tensile tests are more consistent as they evaluate the entire crosssection, not a single point as in a hardness test.



Additional Product Ranges

Electronic Hardware

TFC's range includes components for computers, telecoms, medical and military/aerospace applications. Our product line includes; standoffs, spacers, captive screws, PCB supports, pillars, handles and ferrules.

Sheet Metal Fasteners

An extensive stocked range of standard sheet metal fasteners available for immediate delivery. Self-clinch, rivet bushes, clinch nuts, flush head studs, standoffs and self-broaching products.

Threaded Fasteners

A vast range of commodity fasteners are available from TFC; socket products, HT bolts and screws, nuts, washers, studding, machine, self-tapping and thread forming screws. All can be delivered to your short or long-term scheduled requirements, direct to production line or stock room.

Threaded Inserts

A full range of Threaded inserts for plastics, timber and metal are available from TFC stocks. Self-tapping, press-in, screw-in, moulded-in, knock-in and expansion type inserts to name a selection.

Seals & Bearings

TFC work closely with reputable manufacturers to bring together quality sealing solutions and bearings. 'O' rings, shaft seals, roller bearings, whether it's standard or bespoke for the most demanding environments, TFC's expert team can help.

Spring Steel & Moulded Panel Fasteners

Nylon rivets, drive fasteners, plastic clips, cage nuts, 'U'Nuts, Edge clips, pipe staples, all form part of TFC's extensive product portfolio, enabling us to satisfy the component demands of most engineering and industrial companies.

Circlips & Springs

With 1,000's of circlip sizes in stock, both imperial and metric, carbon and stainless, TFC can offer immediate shipment for next day delivery. Our access to the largest selection of round wire coil springs, disc springs, wave springs and wireforms, means TFC can provide a preload solution in a variety of materials including exotic alloys.

Whatever your needs,
we're number one

No.



www.tfc.eu.com

Notes



Wave Springs & Retaining Rings

+44 (0) 1435 866011 | www.tfc.eu.com

