

wave springs & spiral rings

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(see page 3 for further details)

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THE PERFECT ANSWER TO ALL YOUR DESIGN PROBLEMS

With over 30 years of experience, TFC is the leading European supplier of Smalley Retaining Rings and Flat Wire Wave Springs, and we have the capability to solve most retention and pre-load problems, no matter how unusual the application, dimensions or materials.



This catalogue contains details of our extensive standard ranges, most of which are available off-the-shelf for immediate delivery. However the unique 'No-Tooling' method of production enables us to easily provide special designs. Our qualified internal and external sales teams are available to assist in all aspects of design from prototypes through to final production.

TFC is ISO 9001:2000 approved incorporating design status and operates from purpose built headquarters in Sussex, UK and from regional offices in Germany.

Visit www.tfc.eu.com to find more information on our Smalley products including application stories and design data.



Wave springs are precise flat wire load bearing devices. They take up play and compensate for dimensional variations within assemblies. 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% still offering the same load and deflection. All springs are not equal!

Wave springs



Unlike die-stamped circlips, Spiral Retaining Rings and Snap Rings are coiled on edge to the exact diameter required. They have a uniform cross-section, no lugs, and are free of burrs. Our metric and imperial sized Spiral Retaining Rings are interchangeable with standard circlip grooves and are found in thousands of mechanical products around the world.

Retaining rings

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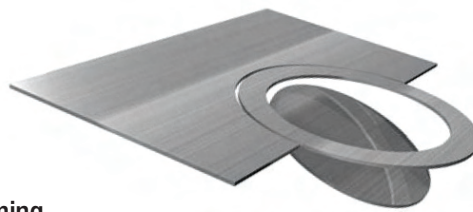
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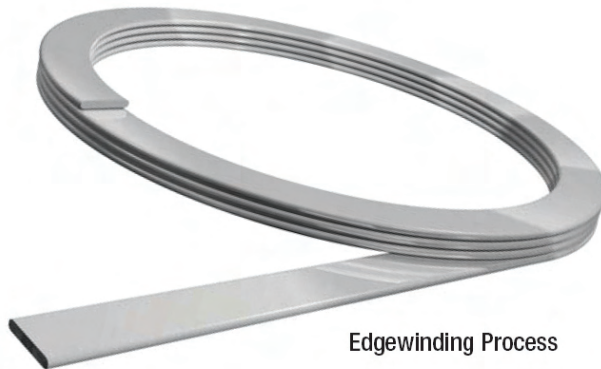
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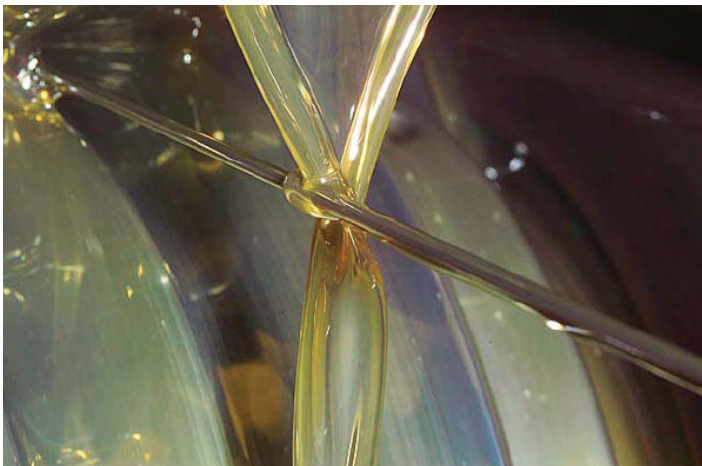
Edge-winding, also known as “The No-Tooling-Cost Process”, is our precision forming operation that coils pre-tempered flat wire on edge to create a near-perfect circle. Circular-Grain® metallurgy gives our products strength and stability far superior to that of conventional retaining rings and wave washers which are simply stamped through the metal grain. Edge-wound products can be coiled to your exact specification in any diameter between 5mm-2300mm, and with any number of turns (layers or coils), effectively eliminating material waste.



Conventional Stamping Process



Edgewise Winding Process



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. Then, we quickly resume production of your order, whether it consists of one part or one million.

The factory is vertically integrated with onsite material manufacturing and large warehouse. We are able to produce custom rings or springs using a wide variety of readily available materials or can produce custom raw material sizes to meet delivery requirements. Available materials include; Carbon Spring Steel, 302, 316 and 17/7PH Stainless Steels, plus exotic alloys such as Inconel, Elgiloy, A286, Phosphor Bronze and Beryllium copper. Please see our Material Selection Guide on pages 72-74.



Whether you are looking for prototypes, short runs or high volumes, the unique No-Tooling- Cost™ manufacturing process allows our products to be manufactured in a timely fashion. Our substantial stocked range is available for immediate shipment and specials can be designed and produced in days, not weeks. For customers who use just-in-time inventory control, TFC will offer to stock parts for immediate shipment, ready for the next purchase order or blanket order release.



While TFC have thousands of standard stock retaining rings and wave springs available in carbon steel and stainless steel, the uniqueness of applications often demands a ring or spring conform to specific requirements. A common misconception of special designs is the cost. Our “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.

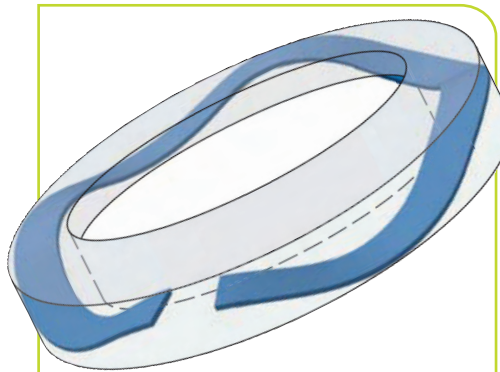
Should you need any help with your part selection or you can't find a standard part to meet your requirements, please do not hesitate to contact our engineering department for immediate assistance. Tel: +44 (0)1435 866011 or Email: Design@tfc.eu.com

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.

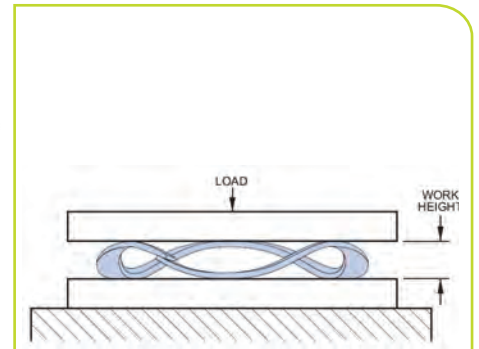
OPERATING ENVIRONMENT

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.



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.

Working cavity



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.

Load requirement

RETAINING RING DESIGN

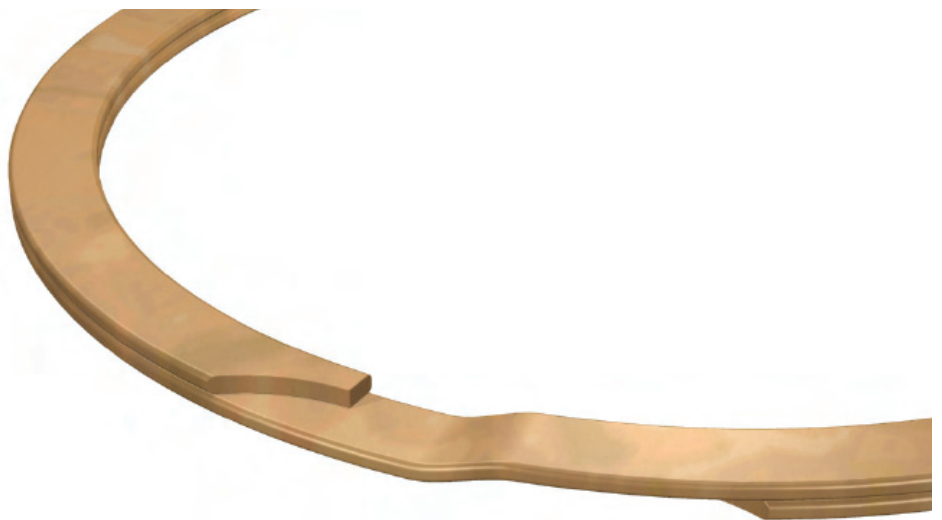
Spiral Retaining Ring and Snap Ring applications can be analysed with a straight forward set of design calculations. There are four main areas that should be considered in most applications prior to selecting a standard part or designing a custom ring.

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 72-74.

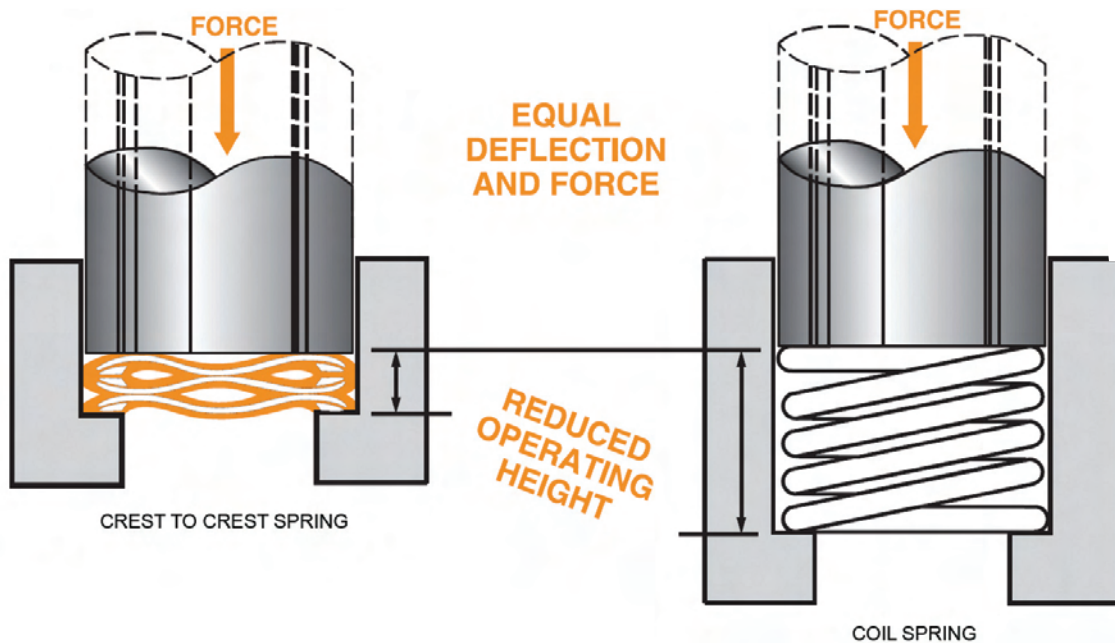
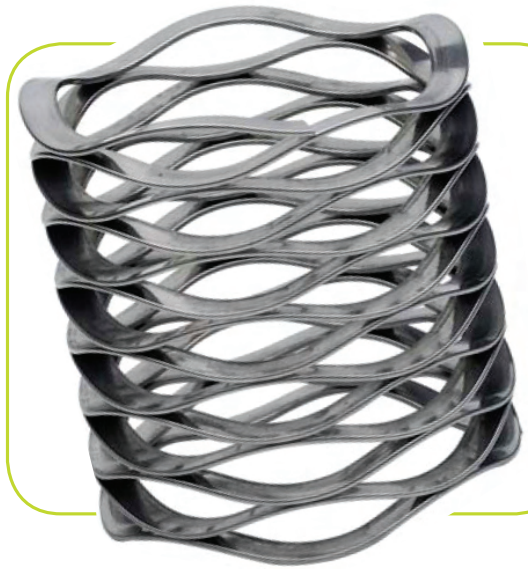
LOAD CAPACITY. Understanding the load capacity of a retaining ring assembly is essential to determining the risk of failure due to thrust loading. The capacity of the assembly requires calculations for both ring shear and groove deformation. Values for these are provided within this catalogue's tables 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 71.



CREST-TO-CREST WAVE SPRINGS

Crest-to-Crest 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 formed from a single piece of wire and therefore the wave peaks hold their configuration.



Crest-to-Crest Wave Springs offer the unique advantage of assembly space savings when used to replace coil springs. They can maintain the same force and load specifications of a conventional round wire spring, yet occupy 50% or less of the axial space, resulting in lowered operating heights, free heights, and solid heights.



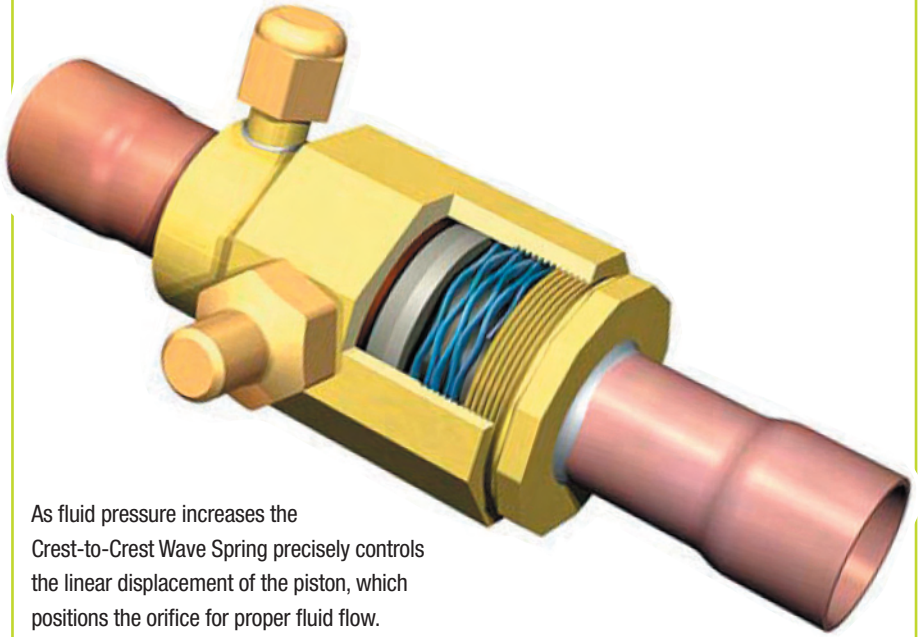
CREST-TO-CREST SPRINGS WITH SHIM ENDS

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 provide an even distribution of the spring force upon adjacent components. This feature is similar to the concept of double-disc grinding springs for a flat surface.



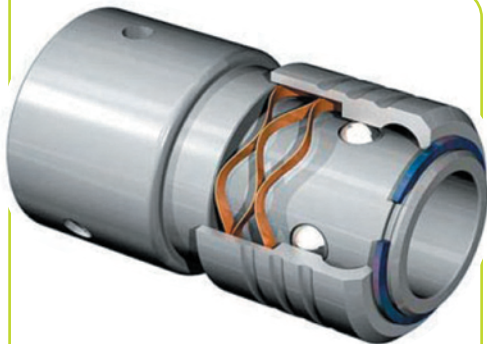
A Crest-to-Crest Spring applies pressure, to precisely load the carbon face against a mating surface, to properly seal fluids. The spring operates over a fixed working range and provides an exact force, unlike the stamped wavy washer it replaced which could not maintain the necessary spring rate. Exact pressure of the carbon face against the sealing surface is essential to avoid excessive wear, yet maintain a good seal.

Mechanical seal



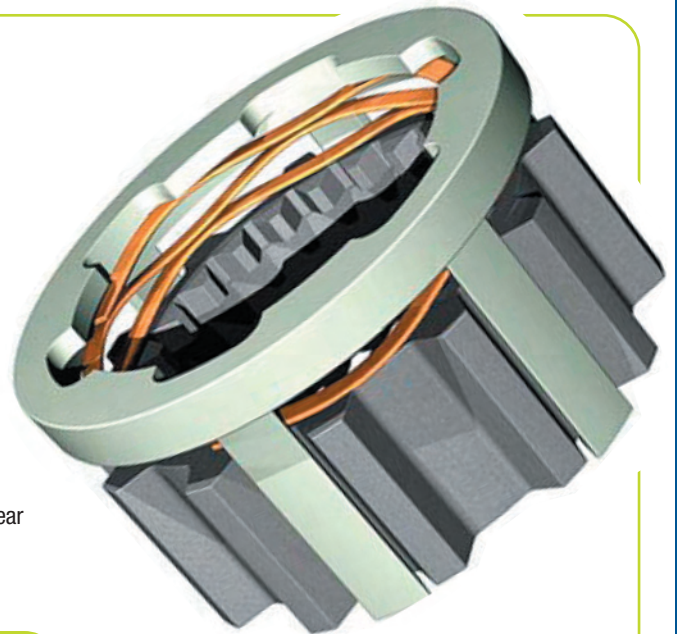
As fluid pressure increases the Crest-to-Crest Wave Spring precisely controls the linear displacement of the piston, which positions the orifice for proper fluid flow.

Flow valve



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.

Quick disconnect

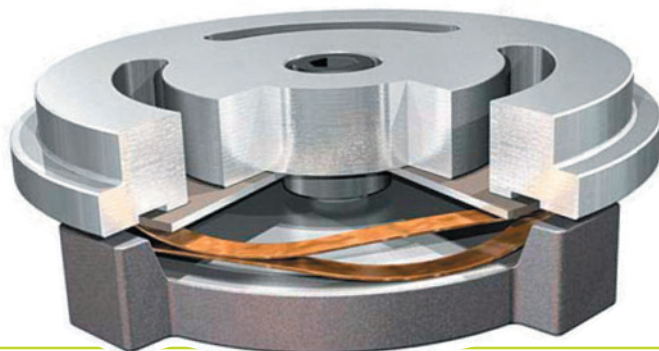


Functioning in a contained bracket, a Crest-to-Crest Wave Spring loads a gear with light force allowing axial movement. The gear shown self-aligns with its mating gear during operation.

Floating gear

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

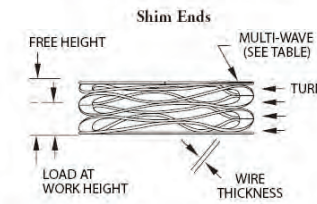
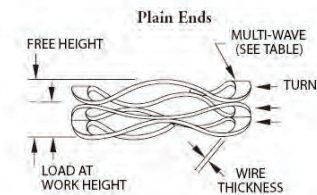
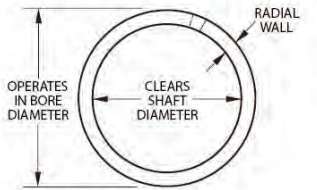
Pressure relief valve





YCM-Series

YCMS-Series



ORDER OPTIONS

YCM 06-L1

End Options:

- Plain Ends
- Shim Ends

YCM
YCMS

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

Please contact us for other materials.

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Stock items in Carbon Steel and 177PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
YCM06-L1**	6	4	6	0.61	1.52	2.5	3	0.13	0.51	6.56
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	3.94
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	2.81
YCM06-L6**	6	4	6	1.63	4.06	2.5	8	0.13	0.51	2.46
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	1.51
YCM06-M1**	6	4	12	0.74	1.52	2.5	3	0.15	0.61	15.24
YCM06-M2**	6	4	12	0.97	2.03	2.5	4	0.15	0.61	11.25
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	7.62
YCM06-M5**	6	4	12	1.70	3.56	2.5	7	0.15	0.61	6.47
YCM06-M6**	6	4	12	1.96	4.06	2.5	8	0.15	0.61	5.69
YCM06-M7**	6	4	12	2.18	4.57	2.5	9	0.15	0.61	5.03
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	3.50
YCM08-L1	8	5	15	1.70	2.82	2.5	3	0.20	0.81	13.42
YCM08-L2	8	5	15	2.39	3.76	2.5	4	0.20	0.81	10.94
YCM08-L3	8	5	15	2.74	4.70	2.5	5	0.20	0.81	7.67
YCM08-L4	8	5	15	3.56	5.64	2.5	6	0.20	0.81	7.20
YCM08-L5	8	5	15	4.01	6.58	2.5	7	0.20	0.81	5.85
YCM08-L6	8	5	15	4.57	7.52	2.5	8	0.20	0.81	5.09
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	28.81
YCM08-M2	8	5	30	2.54	3.76	2.5	4	0.25	0.81	24.61
YCM08-M3	8	5	30	3.05	4.70	2.5	5	0.25	0.81	18.17
YCM08-M4	8	5	30	3.81	5.64	2.5	6	0.25	0.81	16.40
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	11.69
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	6.91
YCM10-L1	10	7	18	1.91	3.96	2.5	3	0.20	0.81	8.75
YCM10-L2	10	7	18	2.54	5.28	2.5	4	0.20	0.81	6.56
YCM10-L3	10	7	18	3.15	6.60	2.5	5	0.20	0.81	5.21
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	3.27
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	11.48
YCM10-M4	10	7	35	4.32	7.92	2.5	6	0.28	0.81	9.70
YCM10-M5	10	7	35	5.08	9.25	2.5	7	0.28	0.81	8.40
YCM10-M6	10	7	35	5.84	10.57	2.5	8	0.28	0.81	7.41
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

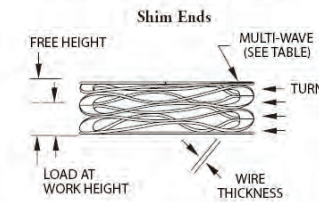
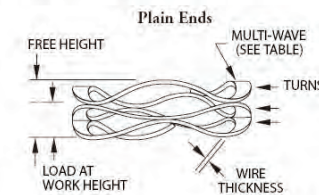
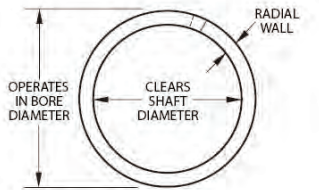
Dimensions in millimeters

** Not available with shim ends * Theoretical

CREST-TO-CREST SPRINGS METRIC



YCM-Series YCMS-Series



ORDER OPTIONS

YCM 12-L3

End Options:

- Plain Ends
- Shim Ends

YCM
YCMS

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

Please contact us for other materials.

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Stock items in Carbon Steel and 17/7PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
YCM12-L3	12	9	20	2.46	7.24	2.5	5	0.20	1.02	4.19
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
YCM12-M1	12	8.5	40	2.36	4.34	2.5	3	0.28	1.17	20.19
YCM12-M2	12	8.5	40	3.18	5.79	2.5	4	0.28	1.17	15.29
YCM12-M3	12	8.5	40	3.96	7.24	2.5	5	0.28	1.17	12.21
YCM12-M4	12	8.5	40	4.75	8.69	2.5	6	0.28	1.17	10.16
YCM12-M5	12	8.5	40	5.54	10.13	2.5	7	0.28	1.17	8.70
YCM12-M6	12	8.5	40	6.32	11.58	2.5	8	0.28	1.17	7.61
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	5.55
YCM12-H1	12	8.5	60	1.98	4.34	2.5	3	0.30	1.14	25.40
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	15.24
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	10.94
YCM12-H6	12	8.5	60	5.31	11.58	2.5	8	0.30	1.14	9.56
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	6.95
YCM14-L1	14	10	22	2.18	4.95	2.5	3	0.23	1.47	7.95
YCM14-L2	14	10	22	2.95	6.60	2.5	4	0.23	1.47	6.01
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	4.09
YCM14-L5	14	10	22	5.33	11.56	2.5	7	0.23	1.47	3.54
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	18.06
YCM14-M2	14	10	50	2.95	6.60	2.5	4	0.30	1.52	13.67
YCM14-M3	14	10	50	3.71	8.26	2.5	5	0.30	1.52	11.00
YCM14-M4	14	10	50	4.52	9.91	2.5	6	0.30	1.52	9.29
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	7.11
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	44.36
YCM14-H2	14	9	80	4.19	6.60	2.5	4	0.38	1.52	33.15
YCM14-H3	14	9	80	5.26	8.26	2.5	5	0.38	1.52	26.69
YCM14-H4	14	9	80	6.30	9.91	2.5	6	0.38	1.52	22.18
YCM14-H5	14	9	80	7.34	11.56	2.5	7	0.38	1.52	18.97
YCM14-H6	14	9	80	8.41	13.21	2.5	8	0.38	1.52	16.66
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	12.11
YCM15-L1	15	11	25	2.57	5.18	2.5	3	0.25	1.47	9.56
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

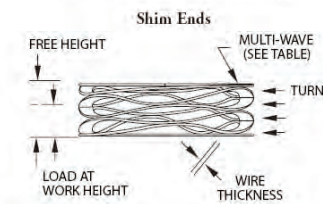
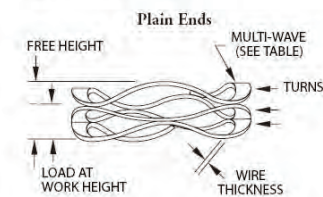
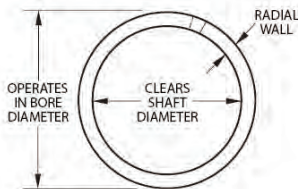
Dimensions in millimeters

*Theoretical



YCM-Series

YCMS-Series



ORDER OPTIONS

YCM 15-L5

End Options:

- Plain Ends
- Shim Ends

YCM
YCMS

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

Please contact us for other materials.

CAN'T FIND A PART ?

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Stock items in Carbon Steel and 177PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
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	28.53
YCM15-M2	15	10	50	4.57	6.91	3.5	4	0.23	1.47	21.40
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	14.26
YCM15-M5	15	10	50	8.00	12.09	3.5	7	0.23	1.47	12.23
YCM15-M6	15	10	50	9.14	13.82	3.5	8	0.23	1.47	10.70
YCM15-M7	15	10	50	10.29	15.54	3.5	9	0.23	1.47	9.51
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
YCM15-H1	15	10	80	3.20	5.18	3.5	3	0.25	1.47	40.38
YCM15-H2	15	10	80	4.19	6.91	3.5	4	0.25	1.47	29.44
YCM15-H3	15	10	80	5.23	8.64	3.5	5	0.25	1.47	23.50
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	16.75
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	13.01
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	7.57
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	30.93
YCM16-M2	16	11	55	4.83	7.21	3.5	4	0.25	1.47	23.04
YCM16-M3	16	11	55	6.05	9.02	3.5	5	0.25	1.47	18.51
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	13.20
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	8.39
YCM16-M8	16	11	55	15.70	23.44	3.5	13	0.25	1.47	7.10
YCM16-H1	16	11	90	3.30	5.41	3.5	3	0.30	1.52	42.69
YCM16-H2	16	11	90	4.57	7.21	3.5	4	0.30	1.52	34.07
YCM16-H3	16	11	90	5.59	9.02	3.5	5	0.30	1.52	26.25
YCM16-H4	16	11	90	6.86	10.82	3.5	6	0.30	1.52	22.71
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	14.40
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	8.38
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	5.97
YCM18-L6	18	13	30	10.69	17.15	3.5	9	0.20	1.80	4.65
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	27.07
YCM18-M2	18	13	55	4.98	7.62	3.5	4	0.25	1.83	20.82

Dimensions in millimeters

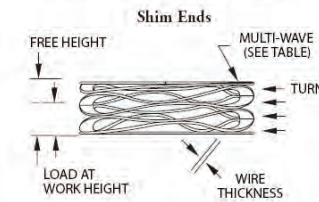
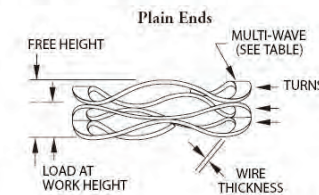
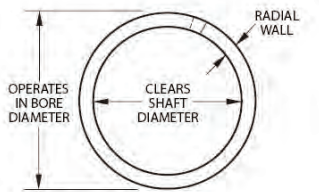
* Theoretical

CREST-TO-CREST SPRINGS METRIC



YCM-Series

YCMS-Series



ORDER OPTIONS

YCM 18-M3

End Options:

Plain Ends

Shim Ends

YCM

YCMS

Material Options:

Carbon Steel (blank)

Stainless Steel S17

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Stock items in Carbon Steel and 17/7PH Stainless Steel

Part Number	Operates in Bore Diameter	Cleares Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
YCM18-M3	18	13	55	6.22	9.53	3.5	5	0.25	1.83	16.66
YCM18-M4	18	13	55	7.47	11.43	3.5	6	0.25	1.83	13.88
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	47.88
YCM18-H2	18	13	90	5.13	7.62	3.5	4	0.30	1.83	36.16
YCM18-H3	18	13	90	6.40	9.53	3.5	5	0.30	1.83	28.81
YCM18-H4	18	13	90	7.70	11.43	3.5	6	0.30	1.83	24.10
YCM18-H5	18	13	90	8.97	13.34	3.5	7	0.30	1.83	20.60
YCM18-H6	18	13	90	11.53	17.15	3.5	9	0.30	1.83	16.03
YCM18-H7	18	13	90	15.37	22.86	3.5	12	0.30	1.83	12.01
YCM20-L1	20	15	35	2.72	6.32	3.5	3	0.20	1.80	9.70
YCM20-L2	20	15	35	3.61	8.43	3.5	4	0.20	1.80	7.25
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	21.36
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
YCM20-M4	20	14	70	6.27	12.65	3.5	6	0.25	1.98	10.98
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	48.01
YCM20-H2	20	14	100	5.66	8.43	3.5	4	0.33	2.01	36.12
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	24.01
YCM20-H5	20	14	100	9.91	14.76	3.5	7	0.33	2.01	20.61
YCM20-H6	20	14	100	12.73	18.97	3.5	9	0.33	2.01	16.00
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	5.47
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	21.72
YCM25-M2	25	19	80	3.94	8.84	3.5	4	0.30	2.39	16.32
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	10.86
YCM25-M5	25	19	80	6.88	15.47	3.5	7	0.30	2.39	9.32
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	42.46
YCM25-H2	25	19	110	5.38	8.84	3.5	4	0.38	2.39	31.84
YCM25-H3	25	19	110	6.73	11.05	3.5	5	0.38	2.39	25.47
YCM25-H4	25	19	110	8.08	13.26	3.5	6	0.38	2.39	21.23
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	14.15
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	10.76

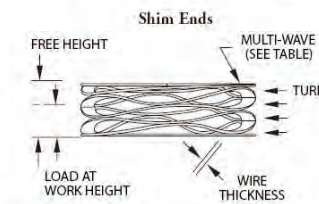
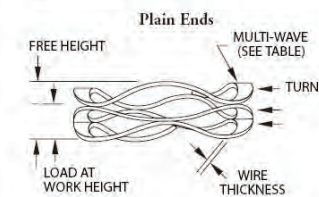
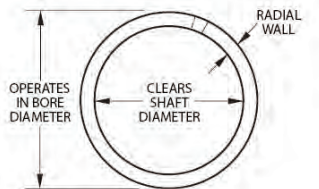
Dimensions in millimeters

*Theoretical



YCM-Series

YCMS-Series



ORDER OPTIONS

YCM 28-L3

End Options:

- Plain Ends
- Shim Ends

YCM
YCMS

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

Please contact us for other materials.

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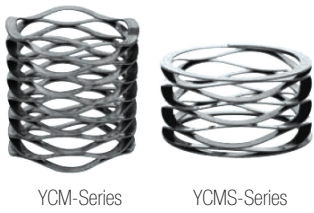
Stock items in Carbon Steel and 177PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
YCM28-L3	28	22	50	6.27	12.07	3.5	5	0.30	2.39	8.63
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	28.12
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	12.02
YCM28-M6	28	22	80	11.71	19.30	3.5	8	0.38	2.39	10.53
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	48.74
YCM28-H2	28	22	130	6.07	9.65	3.5	4	0.46	2.39	36.30
YCM28-H3	28	22	130	7.59	12.07	3.5	5	0.46	2.39	29.08
YCM28-H4	28	22	130	9.12	14.48	3.5	6	0.46	2.39	24.26
YCM28-H5	28	22	130	10.64	16.89	3.5	7	0.46	2.39	20.81
YCM28-H6	28	22	130	12.17	19.30	3.5	8	0.46	2.39	18.21
YCM28-H7	28	22	130	13.69	21.72	3.5	9	0.46	2.39	16.20
YCM28-H8	28	22	130	16.71	26.54	3.5	11	0.46	2.39	13.23
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	11.25
YCM30-L2	30	24	50	4.22	10.16	3.5	4	0.30	2.39	8.41
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
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	21.87
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	13.17
YCM30-M4	30	24	90	7.04	15.24	3.5	6	0.38	2.39	10.97
YCM30-M5	30	24	90	8.20	17.78	3.5	7	0.38	2.39	9.40
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	5.99
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	37.91
YCM30-H2	30	24	130	5.59	10.16	3.5	4	0.46	2.39	28.43
YCM30-H3	30	24	130	6.99	12.70	3.5	5	0.46	2.39	22.75
YCM30-H4	30	24	130	8.38	15.24	3.5	6	0.46	2.39	18.96
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	12.64
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	15.75
YCM35-L2	35	27	70	5.23	11.18	3.5	4	0.36	3.18	11.78
YCM35-L3	35	27	70	6.55	13.97	3.5	5	0.36	3.18	9.44
YCM35-L4	35	27	70	7.87	16.76	3.5	6	0.36	3.18	7.87

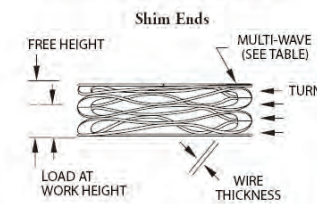
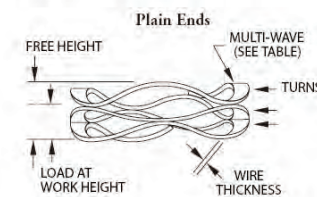
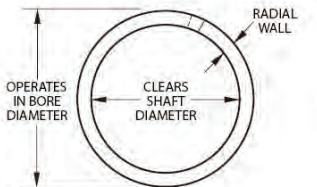
Dimensions in millimeters

* Theoretical

CREST-TO-CREST SPRINGS METRIC



Stock items in Carbon Steel and 17/7PH Stainless Steel



ORDER OPTIONS

YCM 35-L5

End Options:

- Plain Ends
- Shim Ends

YCM
YCMS

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

Please contact us for other materials.

NEED A SAMPLE ?

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Part Number	Operates in Bore Diameter	Cleares Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
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	25.93
YCM35-M2	35	27	110	5.51	11.18	3.5	4	0.41	3.38	19.42
YCM35-M3	35	27	110	6.88	13.97	3.5	5	0.41	3.38	15.52
YCM35-M4	35	27	110	8.26	16.76	3.5	6	0.41	3.38	12.93
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	7.05
YCM35-M9	35	27	110	17.91	36.32	3.5	13	0.41	3.38	5.97
YCM35-H1	35	27	160	4.04	8.38	3.5	3	0.46	3.38	36.84
YCM35-H2	35	27	160	5.38	11.18	3.5	4	0.46	3.38	27.63
YCM35-H3	35	27	160	6.73	13.97	3.5	5	0.46	3.38	22.10
YCM35-H4	35	27	160	8.08	16.76	3.5	6	0.46	3.38	18.42
YCM35-H5	35	27	160	9.42	19.56	3.5	7	0.46	3.38	15.79
YCM35-H6	35	27	160	10.77	22.35	3.5	8	0.46	3.38	13.81
YCM35-H7	35	27	160	12.12	25.15	3.5	9	0.46	3.38	12.28
YCM35-H8	35	27	160	14.81	30.73	3.5	11	0.46	3.38	10.05
YCM35-H9	35	27	160	17.50	36.32	3.5	13	0.46	3.38	8.50
YCM40-L1	40	30	100	2.90	9.14	3.5	3	0.41	3.38	16.00
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	6.85
YCM40-L6	40	30	100	7.70	24.38	3.5	8	0.41	3.38	5.99
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	40.45
YCM40-M2	40	30	150	7.24	12.19	3.5	4	0.53	3.63	30.28
YCM40-M3	40	30	150	9.04	15.24	3.5	5	0.53	3.63	24.20
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	17.27
YCM40-M6	40	30	150	14.48	24.38	3.5	8	0.53	3.63	15.14
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	9.30
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	64.54
YCM40-H3	40	30	300	9.42	15.24	4.5	5	0.46	3.38	51.58
YCM40-H4	40	30	300	11.33	18.29	4.5	6	0.46	3.38	43.11
YCM40-H5	40	30	300	13.21	21.34	4.5	7	0.46	3.38	36.91
YCM40-H6	40	30	300	15.09	24.38	4.5	8	0.46	3.38	32.27
YCM40-H7	40	30	300	16.97	27.43	4.5	9	0.46	3.38	28.67
YCM40-H8	40	30	300	20.75	33.53	4.5	11	0.46	3.38	23.48
YCM40-H9	40	30	300	24.54	39.62	4.5	13	0.46	3.38	19.88
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

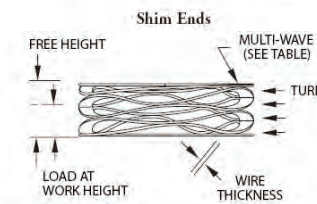
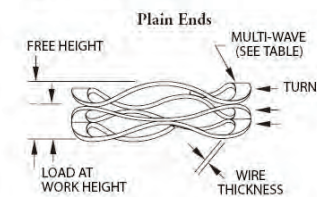
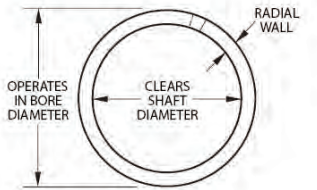
Dimensions in millimeters

* Theoretical



YCM-Series

YCMS-Series



ORDER OPTIONS

YCM 45-L7

End Options:

- Plain Ends **YCM**
- Shim Ends **YCMS**

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

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e Design@tfc.eu.com

Stock items in Carbon Steel and 17/7PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
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	49.21
YCM45-M2	45	35	225	6.99	13.21	4.5	4	0.46	3.63	36.16
YCM45-M3	45	35	225	9.14	16.51	4.5	5	0.46	3.63	30.55
YCM45-M4	45	35	225	10.80	19.81	4.5	6	0.46	3.63	24.95
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	18.85
YCM45-M7	45	35	225	16.26	29.72	4.5	9	0.46	3.63	16.71
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	114.95
YCM45-H2	45	35	400	8.38	13.21	4.5	4	0.61	3.76	82.88
YCM45-H3	45	35	400	11.20	16.51	4.5	5	0.61	3.76	75.35
YCM45-H4	45	35	400	12.95	19.81	4.5	6	0.61	3.76	58.33
YCM45-H5	45	35	400	15.37	23.11	4.5	7	0.61	3.76	51.63
YCM45-H6	45	35	400	17.27	26.42	4.5	8	0.61	3.76	43.74
YCM45-H7	45	35	400	19.69	29.72	4.5	9	0.61	3.76	39.87
YCM45-H8	45	35	400	24.26	36.32	4.5	11	0.61	3.76	33.15
YCM45-H9	45	35	400	28.45	42.93	4.5	13	0.61	3.76	27.63
YCM50-L1	50	40	110	4.83	10.29	3.5	3	0.53	3.63	20.14
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	11.86
YCM50-L4	50	40	110	9.40	20.57	3.5	6	0.53	3.63	9.84
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	39.72
YCM50-M2	50	40	225	6.35	13.72	4.5	4	0.46	3.63	30.55
YCM50-M3	50	40	225	7.49	17.15	4.5	5	0.46	3.63	23.31
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	16.71
YCM50-M6	50	40	225	11.89	27.43	4.5	8	0.46	3.63	14.47
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	91.56
YCM50-H2	50	40	400	7.80	13.72	4.5	4	0.61	3.76	67.59
YCM50-H3	50	40	400	10.16	17.15	4.5	5	0.61	3.76	57.27
YCM50-H4	50	40	400	11.79	20.57	4.5	6	0.61	3.76	45.51
YCM50-H5	50	40	400	14.15	24.00	4.5	7	0.61	3.76	40.59
YCM50-H6	50	40	400	15.62	27.43	4.5	8	0.61	3.76	33.87
YCM50-H7	50	40	400	17.91	30.86	4.5	9	0.61	3.76	30.88
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	21.14
YCM50-H10	50	40	400	29.21	51.44	4.5	15	0.61	3.76	18.00
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	18.42	3.5	5	0.61	3.76	14.31
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

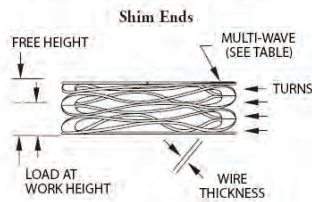
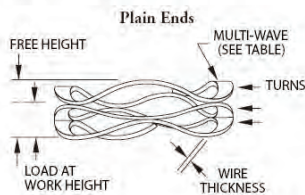
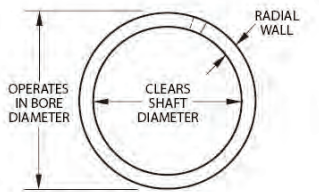
Dimensions in millimeters

* Theoretical

CREST-TO-CREST SPRINGS METRIC



YCM-Series YCMS-Series



ORDER OPTIONS

YCM 55-L6

End Options:

- Plain Ends
- Shim Ends

YCM
YCMS

Material Options:

- Carbon Steel (blank)
- Stainless Steel S17

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Stock items in Carbon Steel and 17/7PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height*	Number of Waves	Number of Turns	Thickness	Radial Wall	Spring Rate* (N/mm)
YCM55-L6	55	45	125	15.52	29.46	3.5	8	0.61	3.76	8.96
YCM55-L7	55	45	125	18.42	33.15	3.5	9	0.61	3.76	8.48
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	23.55
YCM55-M3	55	45	250	5.16	18.42	4.5	5	0.46	3.63	18.86
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	6.29
YCM55-H1	55	45	400	5.31	11.05	4.5	3	0.61	3.76	69.68
YCM55-H2	55	45	400	7.24	14.73	4.5	4	0.61	3.76	53.38
YCM55-H3	55	45	400	9.09	18.42	4.5	5	0.61	3.76	42.91
YCM55-H4	55	45	400	10.64	22.10	4.5	6	0.61	3.76	34.92
YCM55-H5	55	45	400	12.24	25.78	4.5	7	0.61	3.76	29.55
YCM55-H6	55	45	400	14.10	29.46	4.5	8	0.61	3.76	26.03
YCM55-H7	55	45	400	15.82	33.15	4.5	9	0.61	3.76	23.09
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	13.94
YCM60-L1	60	50	135	5.59	11.43	4.5	3	0.46	3.63	23.11
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	13.88
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	8.68
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	57.59
YCM60-M2	60	50	275	8.86	15.24	4.5	4	0.61	3.76	43.13
YCM60-M3	60	50	275	11.07	19.05	4.5	5	0.61	3.76	34.48
YCM60-M4	60	50	275	13.28	22.86	4.5	6	0.61	3.76	28.72
YCM60-M5	60	50	275	15.49	26.67	4.5	7	0.61	3.76	24.61
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	122.18
YCM60-H2	60	50	450	10.31	15.24	4.5	4	0.76	4.01	91.32
YCM60-H3	60	50	450	12.90	19.05	4.5	5	0.76	4.01	73.21
YCM60-H4	60	50	450	15.47	22.86	4.5	6	0.76	4.01	60.88
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	45.66
YCM60-H7	60	50	450	23.22	34.29	4.5	9	0.76	4.01	40.63
YCM60-H8	60	50	450	28.37	41.91	4.5	11	0.76	4.01	33.24
YCM60-H9	60	50	450	33.53	49.53	4.5	13	0.76	4.01	28.12
YCM60-H10	60	50	450	38.68	57.15	4.5	15	0.76	4.01	24.37

Dimensions in millimeters

*Theoretical

GAP & OVERLAP TYPE WAVE SPRINGS

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

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

- Loads and spring rates are more accurate, more predictable, and may be toleranced better than stampings.
- Gap & Overlap spring ends are free to move circumferentially as the spring outside diameter grows during compression. This permits radial expansion or diameter growth within a cavity, without the binding or hang-up normally associated with die stamped wave washers.
- Edge-winding pre-tempered round edge flat wire produces wave springs with uniform circular-grain microstructure and material surface free of pits, scratches, cracks and other minute imperfections. By contrast, the stamping process forms a wavy washer with cross-cut grains, and subsequent manufacturing procedures can lead to problems such as distortion and fatigue cracking.

All told, the metallurgy, the mechanical properties and the uniform dimensional stability of the edge-wound wave spring provides a component for precision quality applications.

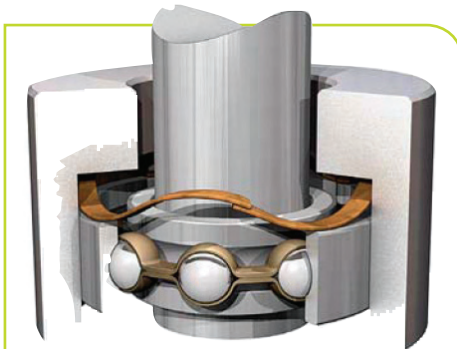


Gap Type Wave Springs



Overlap Type Wave Springs

GAP & OVERLAP WAVE SPRING APPLICATIONS



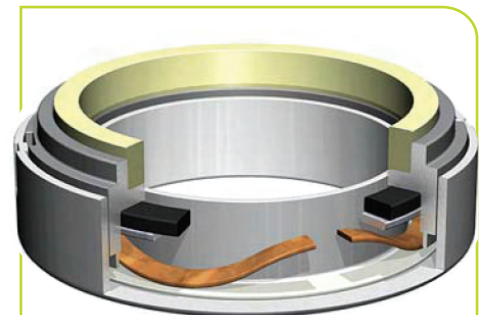
One of the most common wave spring applications world-wide is a bearing preload arrangement as illustrated. Having the proper load will often extend bearing life by lowering operating temperatures, reducing vibration, minimizing wear and providing for quieter & smoother performance.

Bearing Preload



Overlap Type Wave Spring installed in an electronic connector assembly. As male and female components are rotated together into final assembly, the wave spring is compressed to its working height. In this position it exerts a constant force that locks both components together.

Bayonet Connector



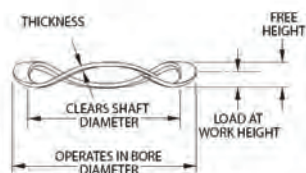
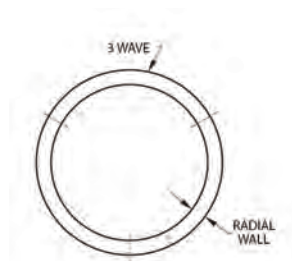
Wave spring applies pressure, to precisely load the carbon face against a mating surface, to properly seal fluids. The spring operates over a fixed working range and provides an exact force, unlike the stamped wavy washer it replaced which could not maintain the necessary spring rate.

Mechanical Seal

SINGLE TURN WAVE SPRINGS IMPERIAL

OVERLAP TYPE

Stock items in Carbon Steel and 1777PH Stainless Steel



Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height *	Number of Waves	Thickness	Radial Wall	Spring Rate * (lb/Inch)
YSSR-0050	0.500	0.400	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

Dimensions in inches

* Theoretical

CAN'T FIND A PART ?

Contact our specialist team for assistance

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e Design@tfc.eu.com

ORDER OPTIONS

YSSR-0050

Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

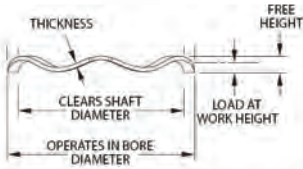
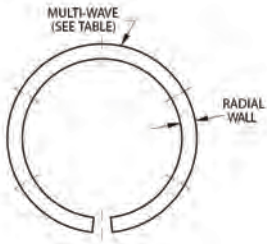
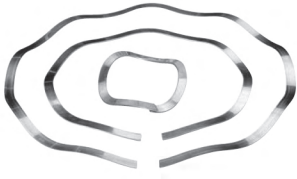


GEAR BOX DRIVE

Designed in a plastic housing, this Smalley Wave Spring keeps constant pressure on a pinion gear, which is driven by a worm gear. The presence of vibration is greatly reduced by the spring. Also, the spring takes up tolerances that accumulate in the plastic non-critical components used in the box.

GAP TYPE

Stock items in Carbon Steel and 177PH Stainless Steel



ORDER OPTIONS

YSSR-0175

Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

NEED A SAMPLE ?

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e Sales@tfc.eu.com

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height *	Number of Waves	Thickness	Radial Wall	Spring Rate * (lb/inch)
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

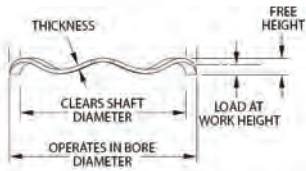
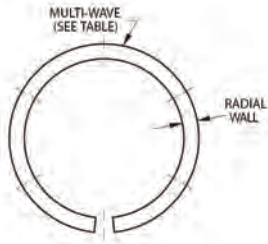
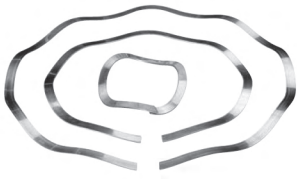
Dimensions in inches

* Theoretical

NARROW SECTION WAVE SPRINGS IMPERIAL

GAP TYPE

Stock items in Carbon Steel and 17/7PH Stainless Steel



Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height *	Number of Waves	Thickness	Radial Wall	Spring Rate * (lb/Inch)
YSSR-0325N	3.250	2.820	54	0.109	0.200	4	0.030	0.188	593
YSSR-0337N	3.375	2.940	56	0.109	0.220	4	0.030	0.188	505
YSSR-0350N	3.500	3.070	58	0.109	0.260	4	0.030	0.188	384
YSSR-0362N	3.625	3.190	60	0.109	0.270	4	0.030	0.188	373
YSSR-0375N	3.750	3.320	62	0.109	0.280	4	0.030	0.188	363
YSSR-0387N	3.875	3.440	64	0.109	0.310	4	0.030	0.188	318
YSSR-0400N	4.000	3.570	66	0.109	0.200	5	0.030	0.188	725
YSSR-0412N	4.125	3.690	67	0.109	0.200	5	0.030	0.188	736
YSSR-0425N	4.250	3.820	69	0.109	0.240	5	0.030	0.188	527
YSSR-0437N	4.375	3.940	70	0.109	0.210	5	0.030	0.188	693
YSSR-0450N	4.500	4.070	72	0.109	0.280	5	0.030	0.188	421
YSSR-0462N	4.625	4.190	73	0.125	0.270	5	0.030	0.188	503
YSSR-0475N	4.750	4.320	75	0.125	0.320	5	0.030	0.188	385
YSSR-0487N	4.875	4.440	76	0.125	0.320	5	0.030	0.188	390
YSSR-0500N	5.000	4.570	78	0.125	0.350	5	0.030	0.188	347
YSSR-0512N	5.125	4.690	80	0.125	0.350	5	0.030	0.188	356
YSSR-0525N	5.250	4.820	82	0.125	0.360	5	0.030	0.188	349
YSSR-0537N	5.375	4.940	84	0.125	0.440	5	0.030	0.188	267
YSSR-0550N	5.500	5.070	86	0.125	0.280	6	0.030	0.188	555
YSSR-0562N	5.625	5.190	88	0.125	0.290	6	0.030	0.188	533
YSSR-0575N	5.750	5.320	90	0.125	0.340	6	0.030	0.188	419
YSSR-0587N	5.875	5.440	92	0.125	0.340	6	0.030	0.188	428
YSSR-0600N	6.000	5.570	94	0.125	0.340	6	0.030	0.188	437
YSSR-0612N	6.125	5.690	96	0.125	0.280	7	0.030	0.188	619
YSSR-0625N	6.250	5.820	98	0.125	0.280	7	0.030	0.188	632
YSSR-0637N	6.375	5.940	100	0.125	0.300	7	0.030	0.188	571
YSSR-0650N	6.500	6.070	102	0.125	0.300	7	0.030	0.188	583
YSSR-0675N	6.750	6.320	104	0.125	0.300	7	0.030	0.188	594
YSSR-0700N	7.000	6.480	106	0.156	0.320	7	0.030	0.233	646
YSSR-0725N	7.250	6.730	108	0.156	0.330	7	0.030	0.233	621
YSSR-0750N	7.500	6.980	110	0.156	0.360	7	0.030	0.233	539
YSSR-0775N	7.750	7.230	114	0.156	0.380	7	0.030	0.233	509

Dimensions in inches

** Theoretical*

ORDER OPTIONS

YSSR-0325N

Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

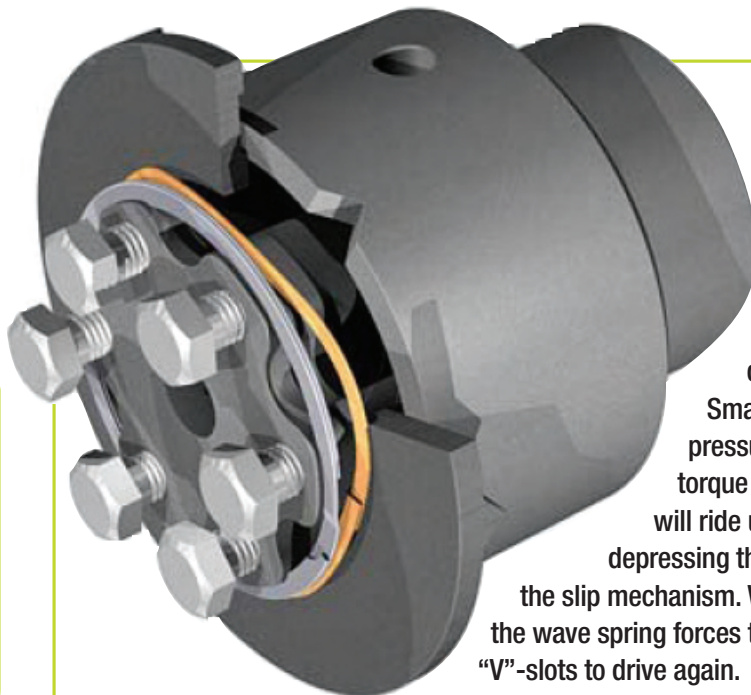
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(see page 3 for further details)

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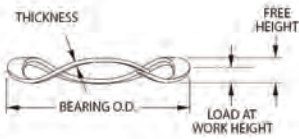
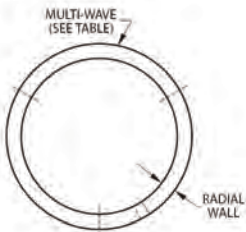
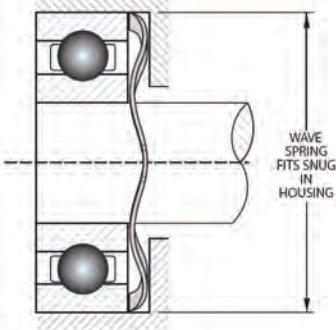
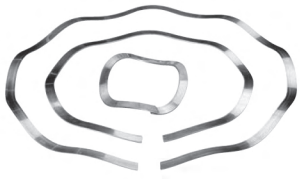


SLIP CLUTCH

Clutch drives when the “V”-detents are in the “V”-slots. A Smalley Wave Spring maintains pressure to hold this position. As torque is increased, the “V”-detents will ride up and out the “V”-slots, depressing the wave spring and developing the slip mechanism. When torque is decreased, the wave spring forces the “V”-detents firmly into the “V”-slots to drive again.

OVERLAP TYPE

Stock items in Carbon Steel and 177PH Stainless Steel



Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height *	Number of Waves	Thickness	Radial Wall	Spring Rate * (N/mm)
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	3.81	121
YSSB-0217	55.00	46.11	151.3	2.36	3.81	4	0.61	3.81	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

Dimensions in millimeters

* Theoretical

ORDER OPTIONS

YSSB-0063

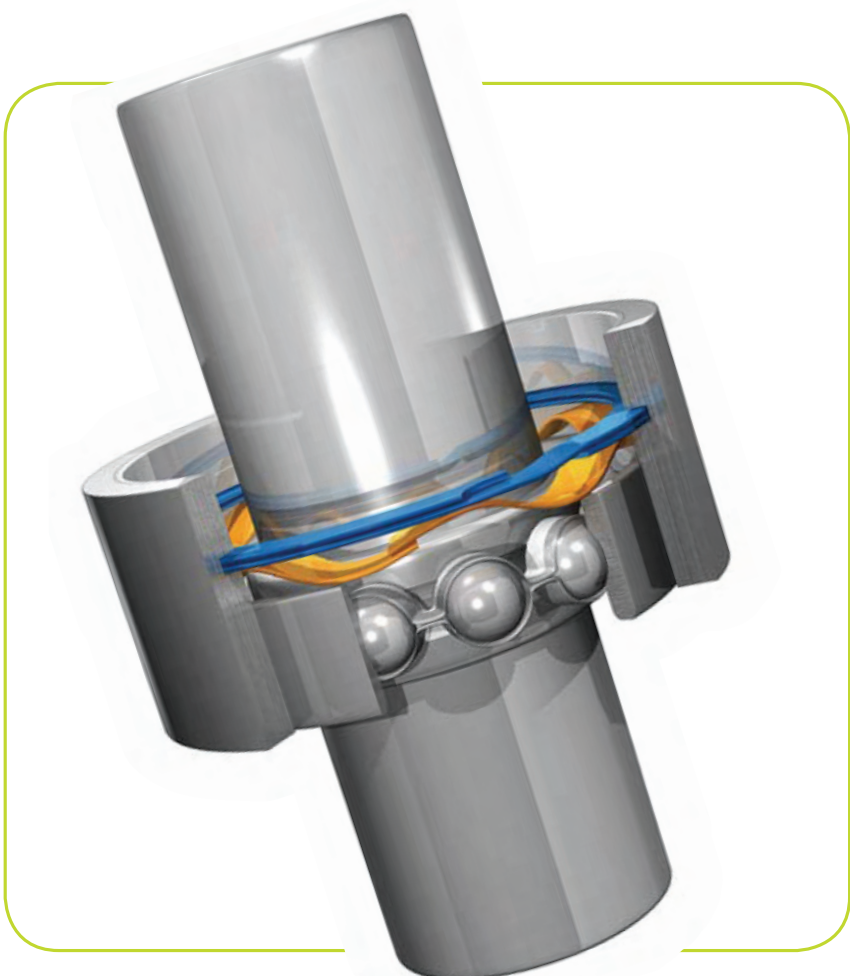
Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

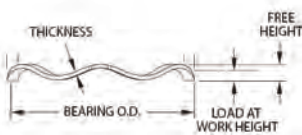
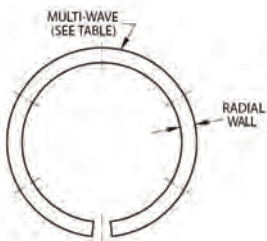
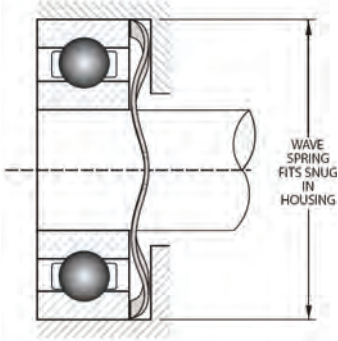
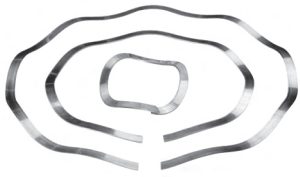
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BEARING PRELOAD SPRINGS METRIC

GAP TYPE

Stock items in Carbon Steel and 177PH Stainless Steel



ORDER OPTIONS

YSSB-0394

Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

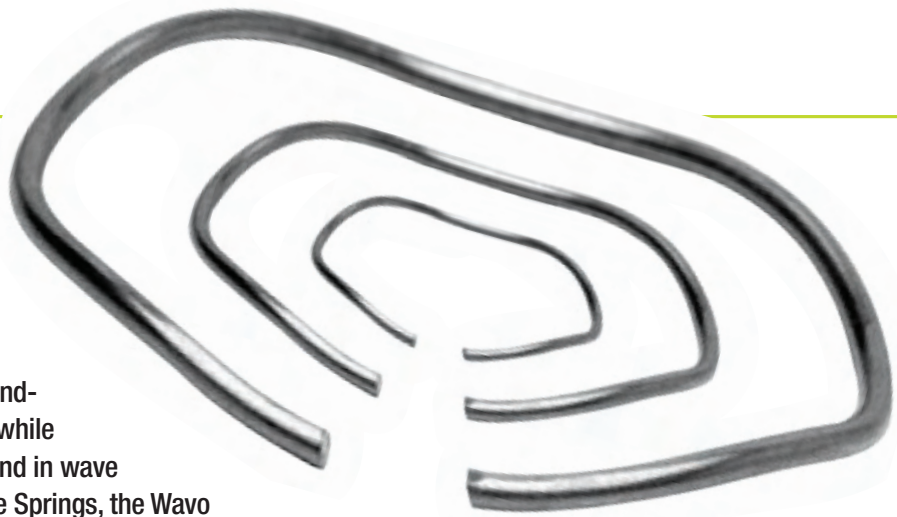
t +44 (0)1435 866011

e Sales@tfc.eu.com

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (N)	Work Height	Free Height *	Number of Waves	Thickness	Radial Wall	Spring Rate * (N/mm)
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

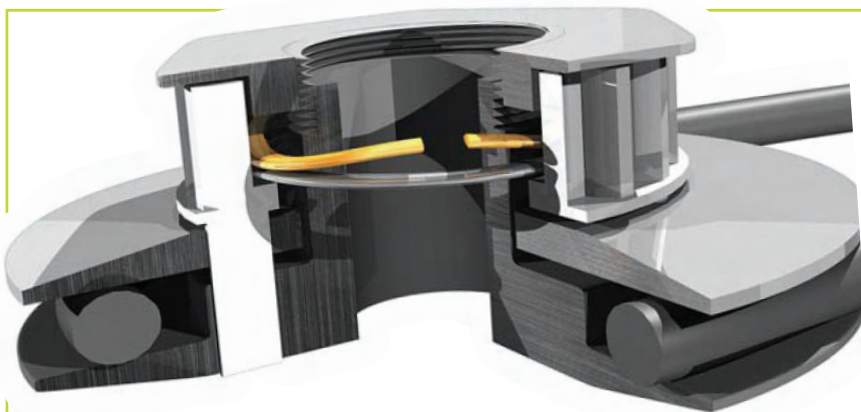
Dimensions in millimeters

** Theoretical*



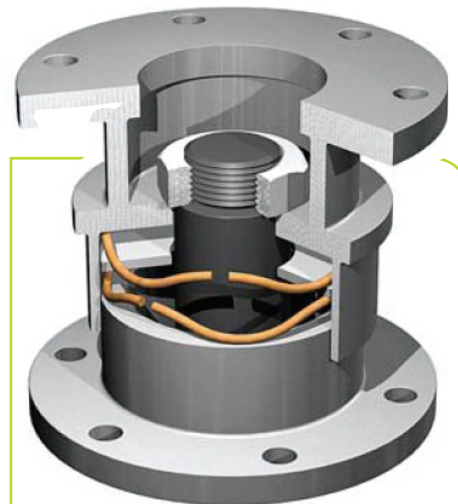
Wavo Springs are produced from round-section wire to provide higher loads while maintaining the accurate loading found in wave springs. As an alternative to Belleville Springs, the Wavo provides similar loads but in a fraction of the radial space.

WAVO® SPRING APPLICATIONS



Pressure on the round belt is produced by compressing the Wavo spring through the sheave halves. The top threaded cap rotates to adjust the Wavo compression.

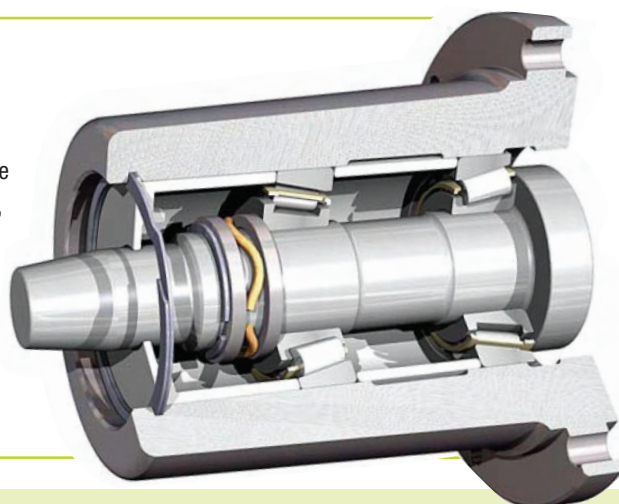
Clutch Drive



Wavo Springs provide high force and a relatively large axial displacement, in limited space. The springs are arranged in series for additional travel.

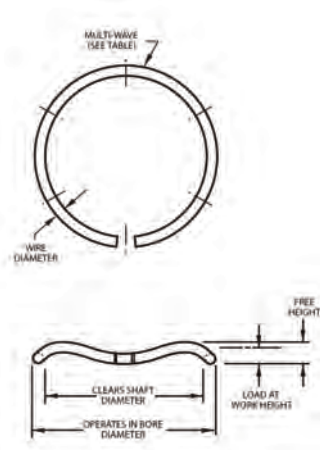
Vibration Isolator

A Smalley Wavo spring was specified to provide a higher preload (the force needed was greater than offered with a stock Wave Spring) to the tapered roller bearings. Also, the entire bearing/spindle arrangement is held in its housing by a spiral retaining ring.



High Speed Pump

ROUND WIRE GAP TYPE WAVE SPRINGS IMPERIAL



Stock items in Carbon Steel and 17/7PH Stainless Steel

Part Number	Operates in Bore Diameter	Clears Shaft Diameter	Load (lb)	Work Height	Free Height *	Number of Waves	Thickness	Spring Rate * (lb/Inch)
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	0.103	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

ORDER OPTIONS

YRW-0050

Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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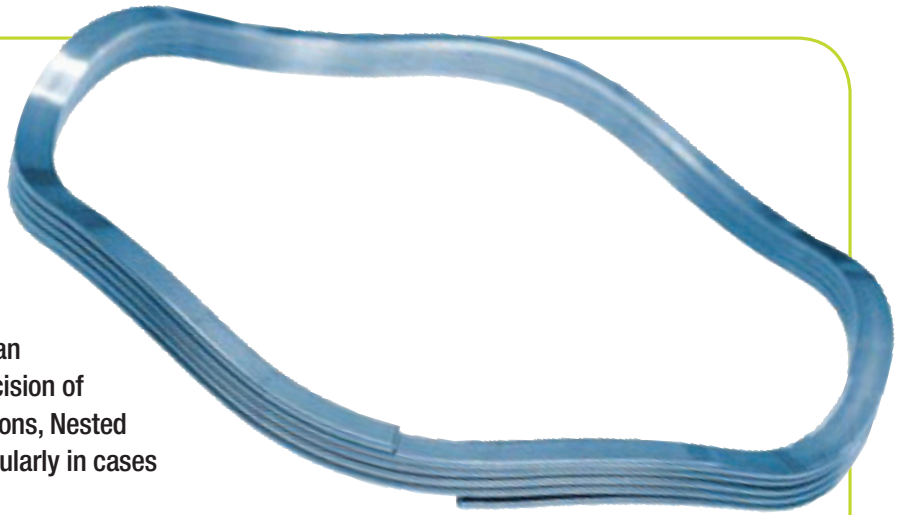
e Design@tfc.eu.com

Dimensions in inches

* Theoretical

NESTED WAVE SPRINGS

Nested Wave Springs are manufactured 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 proportionately 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.



INTERLACED CREST-TO-CREST WAVE SPRINGS

An interlaced spring is ideal for applications where extremely high forces and long deflections are required. This unique spring comprises two or three Smalley crest-to-crest springs, wound together to form a single heavy-duty spring. Interlacing like this effectively increases the thickness of the spring turns, thereby providing substantially higher forces, greater fatigue resistance, but still maintaining excellent deflection characteristics.

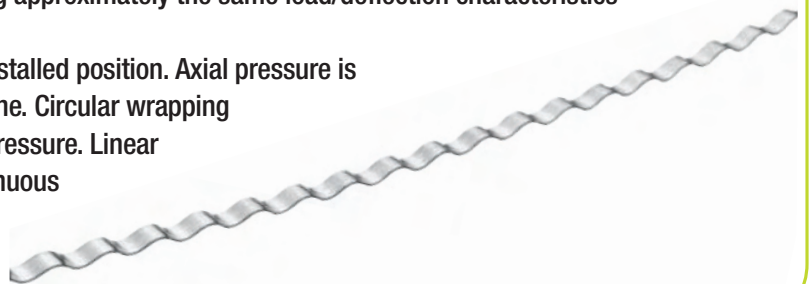
The interlaced spring is an ideal replacement for situations where disc-spring stacks or pocketed coil springs are used. As a single component, it avoids the assembly difficulties associated with stacking and orientating disc springs and eliminates costly machining operations to house multiple coil springs.



LINEAR EXPANDERS

Linear expanders 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.

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

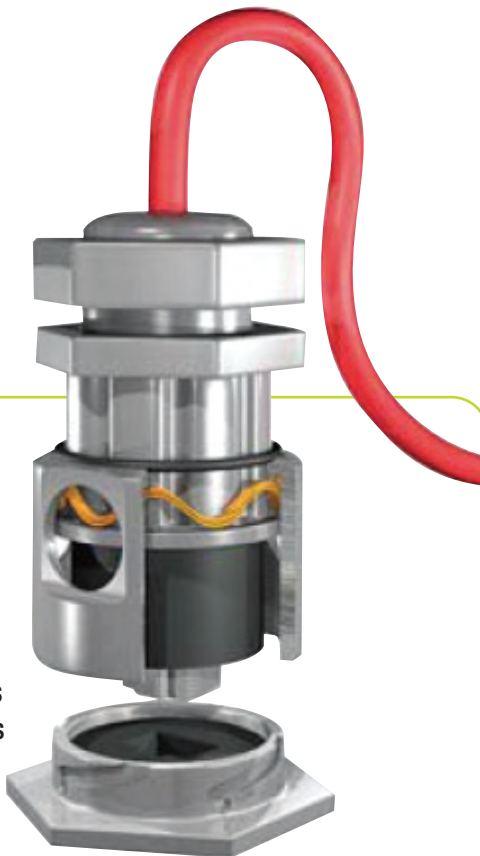


2-turn Nested wave springs are used to disengage clutch plates. Pneumatic pressure overcomes the wave springs force allowing plates to contact. With pressure released, springs separate the plates allowing a zero contact-idle position.



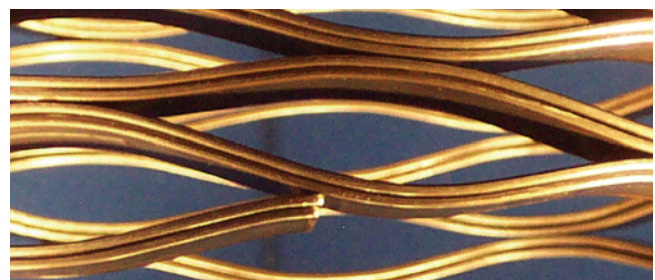
Clutch

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 was necessary to develop a higher load in very tight radial and axial space.



Low Voltage Connector

Interlaced wave springs are used to preload the valve of a petrochemical downhole tool. With large load and deflection requirements, plus a highly corrosive environment, the interlaced spring manufactured from an exotic alloy such as Inconel X-750 or Elgiloy was a perfect solution.



Subsea Ball Release Valve

SPIRAL RETAINING RINGS

Spirals are manufactured by coiling the ring from flat wire. This unique process produces a retaining ring that has no protruding lugs or burrs that would interfere in your assembly. The Smalley Ring can be economically produced in carbon steel, stainless steel, coppers, and many other alloys.

TFC offers over 5000 standard spiral rings, which are readily available in both carbon and stainless steel. If you require special designs, take advantage of TFC's engineers and no-tooling manufacture; a process perfect for large runs, prototypes and midstream design changes. Whatever your application, TFC/Smalley have the cost-effective and innovative design solution.

ADVANTAGES OF SPIRAL RETAINING RINGS

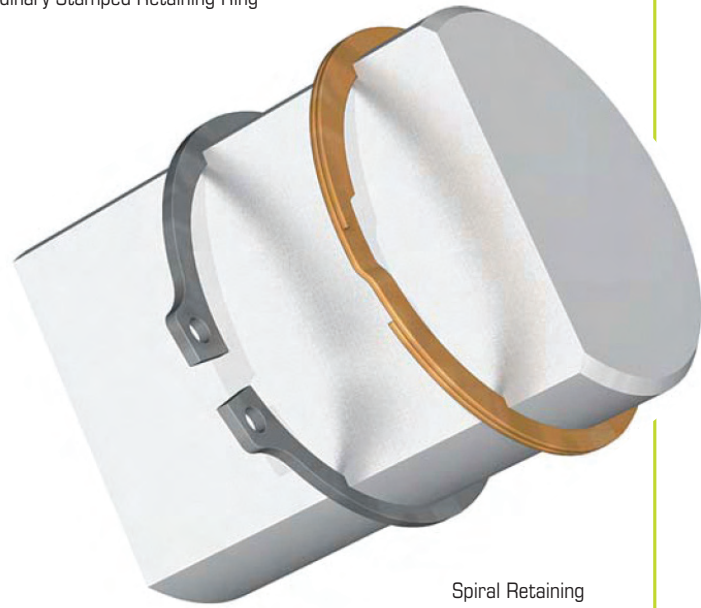
- No gap – full 360° retaining surface.
- No protruding lugs to interfere with mating components (uniform cross section).
- Economically produced in stainless steel.
- Easy installation and removal. See pages 68-69.
- No tooling charges on custom designs.
- Available in a wide range of exotic materials and finishes. See pages 72 to 74.
- Special end configurations to suit your application. See page 69.

INTERCHANGE LISTING

Smalley Retaining Rings are interchangeable with both imperial and metric retaining ring grooves. We offer **free samples** of stock retaining rings to test in your application.

Cross reference a standard circlip, stamped ring or snap ring to find the appropriate spiral retaining ring to fit your application.

Ordinary Stamped Retaining Ring



Spiral Retaining Ring

NEED A SPECIAL



Our engineers are available to discuss your application

(see page 3 for further details)

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TFC	SPIRAL EQUIVALENT	MILITARY MIL-DTL-27426 *	AEROSPACE AS 3219 *	METRIC AEROSPACE MA 4035 *	EUROPEAN SPECIFICATION DIN	WALDES TRUARC	EATON	IRR	ANDERTON
XDNH					DIN 472				D1300
XDNS					DIN 471				D1400
XEH				MA 4017					
XES				MA 4016					
XVH	UR								
XVS	US								
XWH	RR	/3	AS 4299 AS 3217						
XWS	RS	/1	AS 4299 AS 3218						
XWHT	RRT						NAN		
XWST	RST						XAN		
XWHM	RRN	/4	AS 4299 AS 3215			5000 5008	IN	3000 4000	N1300
XWSM	RSN	/2	AS 4299 AS 3216			5100 5108	EN	3100 4100	N1400

GROOVE INTERCHANGE ONLY
Use a spiral retaining ring to fit into the same groove of these stamped retaining rings.

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



A 2-Turn Spiral Retaining Ring creates an O/D I/D lock, permitting the 360° rotation of the nut. This permanent assembly is commonly used to hold two components together.

Pneumatic Fitting



A special 1½ turn External Retaining Ring retains the internal mechanical components of the ratchet wrench. The additional half turn provides that little extra strength needed to prevent the ring from dislodging when the wrench is dropped.

Ratchet Wrench



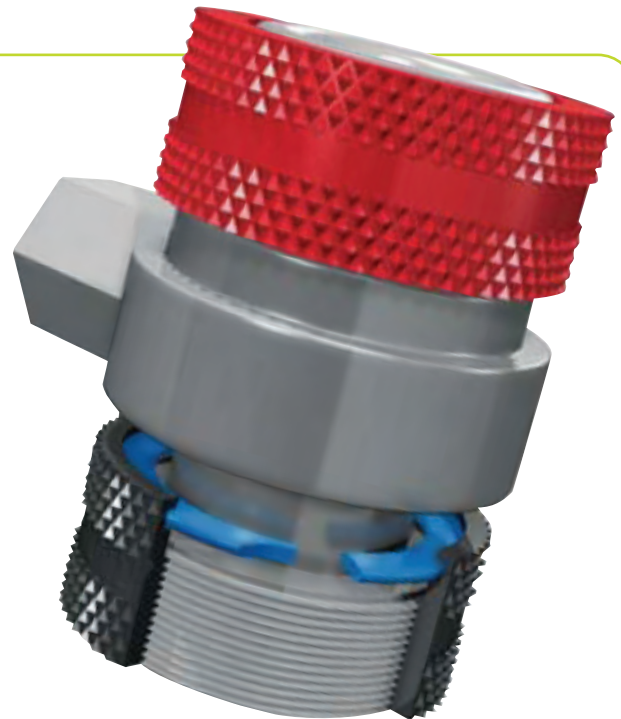
A retaining ring designed in a shallow groove exerts very light pressure on the glass lens in this pressure gauge. This single-turn retaining ring design provides the optimum load without breaking the glass.

Pressure Gauge



External 2-turn retaining ring prevents the pinion shafts from spinning when the gears are rotating. The Smalley ring snaps securely on the groove and the rings radial wall is designed to extend radially outward, clearing the four flat pinion shaft pins by .020".

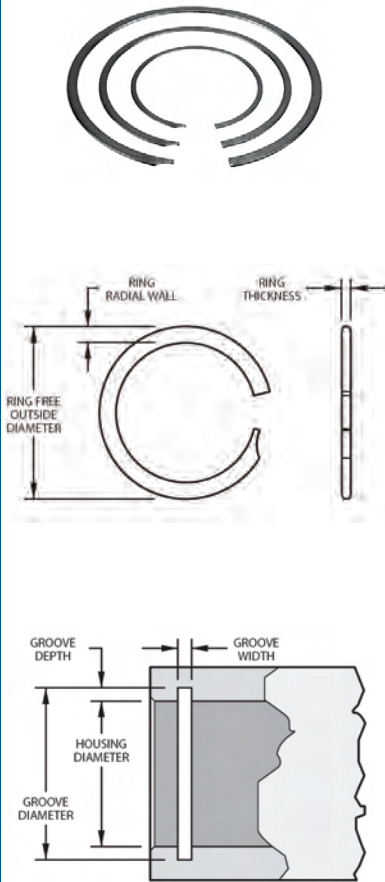
Gear Assembly



To keep the cap on the fitting, a single-turn retaining ring is located in a shallow internal groove. The wall thickness of the cap is small so the ring was designed with square corners to operate in a very shallow groove.

Hose Fitting

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XVHM 6

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

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e Design@tfc.eu.com

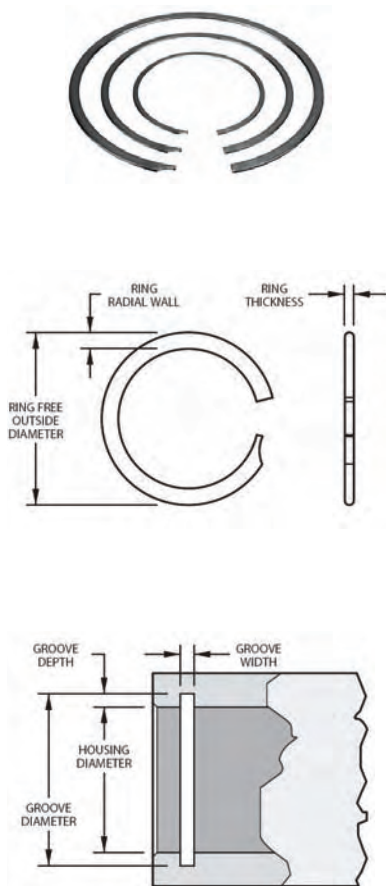
Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XVHM 6*	6.00	6.35	0.51	0.30	6.30	0.38	440	1990
XVHM 7*	7.00	7.38	0.51	0.30	7.32	0.38	550	2320
XVHM 8*	8.00	8.44	0.64	0.38	8.36	0.46	700	3180
XVHM 9*	9.00	9.54	0.76	0.38	9.46	0.46	1000	3580
XVHM 10*	10.00	10.58	0.76	0.38	10.50	0.46	1240	3980
XVHM 11	11.00	11.68	0.89	0.38	11.60	0.46	1630	4390
XVHM 12	12.00	12.74	0.89	0.38	12.66	0.46	1930	4770
XVHM 13	13.00	13.80	1.14	0.46	13.72	0.56	2280	6260
XVHM 14	14.00	14.80	1.14	0.46	14.72	0.56	2460	6740
XVHM 15	15.00	15.80	1.14	0.46	15.72	0.56	2630	7220
XVHM 16	16.00	16.80	1.14	0.46	16.72	0.56	2810	7710
XVHM 17	17.00	17.82	1.14	0.46	17.72	0.56	2980	8190
XVHM 18	18.00	18.82	1.14	0.46	18.72	0.56	3160	8670
XVHM 19	19.00	19.86	1.14	0.46	19.76	0.56	3520	9150
XVHM 20	20.00	21.26	1.65	0.53	21.06	0.66	5170	11100
XVHM 21	21.00	22.27	1.65	0.53	22.06	0.66	5420	11650
XVHM 22	22.00	23.28	1.65	0.53	23.06	0.66	5680	12210
XVHM 24	24.00	25.29	1.65	0.53	25.06	0.66	6200	13320
XVHM 25	25.00	26.30	1.65	0.53	26.06	0.66	6460	13870
XVHM 26	26.00	27.31	1.65	0.53	27.06	0.66	6720	14430
XVHM 28	28.00	29.40	2.24	0.64	29.12	0.79	7640	16300
XVHM 29	29.00	30.41	2.24	0.64	30.12	0.79	7910	16880
XVHM 30	30.00	31.42	2.24	0.64	31.12	0.79	8190	17470
XVHM 31	31.00	32.43	2.24	0.64	32.12	0.79	8460	18050
XVHM 32	32.00	33.44	2.24	0.64	33.12	0.79	8730	18630
XVHM 34	34.00	35.45	2.24	0.64	35.12	0.79	9280	19800
XVHM 35	35.00	36.47	2.24	0.64	36.12	0.79	9550	20380
XVHM 36	36.00	37.48	2.24	0.64	37.12	0.79	9830	20960
XVHM 37	37.00	38.49	2.24	0.64	38.12	0.79	10100	21540
XVHM 38	38.00	39.50	2.24	0.64	39.12	0.79	10370	22120
XVHM 40	40.00	41.94	3.00	0.79	41.48	0.99	14430	28750
XVHM 42	42.00	43.96	3.00	0.79	43.48	0.99	15150	30190
XVHM 45	45.00	46.99	3.00	0.79	46.48	0.99	16230	32340
XVHM 47	47.00	49.00	3.00	0.79	48.48	0.99	16950	33780
XVHM 48	48.00	50.01	3.00	0.79	49.48	0.99	17310	34500
XVHM 50	50.00	52.04	3.00	0.79	51.48	0.99	18030	35930
XVHM 52	52.00	54.55	4.01	0.79	53.94	0.99	24580	37370
XVHM 55	55.00	57.57	4.01	0.79	56.94	0.99	26000	39530
XVHM 56	56.00	58.58	4.01	0.79	57.94	0.99	26470	40250
XVHM 58	58.00	60.60	4.01	0.79	59.94	0.99	27420	41680
XVHM 60	60.00	62.64	4.01	0.79	61.94	0.99	28360	43120
XVHM 62	62.00	64.67	4.01	0.79	63.94	0.99	29310	44560
XVHM 63	63.00	65.69	4.01	0.79	64.94	0.99	29780	45280
XVHM 65	65.00	67.70	4.01	0.79	66.94	0.99	30730	46720
XVHM 68	68.00	70.72	4.01	0.79	69.94	0.99	32150	48870
XVHM 70	70.00	72.74	4.01	0.79	71.94	0.99	33090	50310
XVHM 72	72.00	74.77	4.01	0.79	73.94	0.99	34040	51750
XVHM 75	75.00	77.80	4.01	0.79	76.94	0.99	35460	53900

Dimensions in millimeters

¹No removal notch. ²Based on groove material yield strength of 310 N/mm² and safety factor of 2. ³Based on a safety factor of 3

INTERNAL LIGHT DUTY SERIES METRIC

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XVHM 78

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

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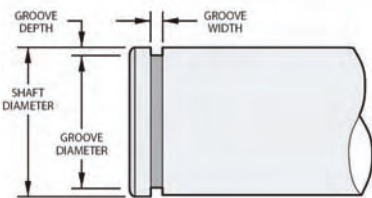
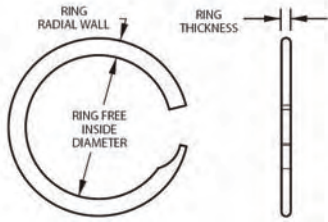
Part Number	Housing Diameter	Outside Diameter	RING			GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness		Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XVHM 78	78.00	81.20	4.78	0.99		80.34	1.12	44480	70250
XVHM 80	80.00	83.23	4.78	0.99		82.34	1.12	45620	72050
XVHM 82	82.00	85.25	4.78	0.99		84.34	1.12	46760	73850
XVHM 85	85.00	88.29	4.78	0.99		87.34	1.12	48470	76550
XVHM 88	88.00	91.32	4.78	0.99		90.34	1.12	50180	79260
XVHM 90	90.00	93.36	4.78	0.99		92.34	1.12	51320	81060
XVHM 92	92.00	95.37	4.78	0.99		94.34	1.12	52460	82860
XVHM 95	95.00	98.39	4.78	0.99		97.34	1.12	54170	85560
XVHM 98	98.00	101.41	4.78	0.99		100.34	1.12	55880	88260
XVHM 100	100.00	103.43	4.78	0.99		102.34	1.12	57020	90060
XVHM 102	102.00	105.44	4.78	0.99		104.34	1.12	58160	91870
XVHM 105	105.00	108.92	5.72	1.17		107.80	1.32	71640	106440
XVHM 110	110.00	113.98	5.72	1.17		112.80	1.32	75050	111510
XVHM 112	112.00	116.01	5.72	1.17		114.80	1.32	76420	113540
XVHM 115	115.00	119.12	5.72	1.17		117.88	1.32	80710	116580
XVHM 120	120.00	124.30	5.72	1.17		123.00	1.32	87730	121650
XVHM 125	125.00	129.47	5.72	1.17		128.12	1.32	95040	126710
XVHM 130	130.00	134.66	5.72	1.17		133.26	1.32	103270	131780
XVHM 135	135.00	139.83	5.72	1.55		138.38	1.70	111190	181300
XVHM 140	140.00	145.00	5.72	1.55		143.50	1.70	119400	188010
XVHM 150	150.00	155.30	6.73	1.55		153.76	1.70	137440	201440
XVHM 155	155.00	160.46	6.73	1.55		158.88	1.70	146360	208160
XVHM 160	160.00	165.64	6.73	1.55		164.00	1.70	155960	214870
XVHM 165	165.00	170.82	6.73	1.55		169.13	1.70	165860	221590
XVHM 170	170.00	175.99	6.73	1.55		174.25	1.70	176060	228300
XVHM 175	175.00	181.17	6.73	1.55		179.38	1.70	186570	235020
XVHM 180	180.00	186.35	6.73	1.55		184.50	1.70	197380	241730
XVHM 185	185.00	191.52	6.73	1.55		189.63	1.70	208500	248450
XVHM 190	190.00	196.70	6.73	1.55		194.75	1.70	219920	255160
XVHM 195	195.00	201.87	7.62	1.55		199.88	1.70	231650	261880
XVHM 200	200.00	207.05	7.62	1.55		205.00	1.70	243680	268590
XVHM 210	210.00	217.40	7.62	1.55		215.25	1.70	268660	282020
XVHM 220	220.00	227.76	8.76	1.93		225.50	2.08	294850	367880
XVHM 230	230.00	238.11	8.76	1.93		235.75	2.08	322270	384600
XVHM 240	240.00	248.46	8.76	1.93		246.00	2.08	350900	401330
XVHM 250	250.00	258.81	8.76	1.93		256.25	2.08	380750	418050
XVHM 260	260.00	269.17	9.65	1.93		266.50	2.08	411820	434770
XVHM 270	270.00	279.52	9.65	1.93		276.75	2.08	444110	451490
XVHM 280	280.00	289.87	9.65	1.93		287.00	2.08	477610	468210
XVHM 290	290.00	300.22	9.65	1.93		297.25	2.08	512340	484940
XVHM 300	300.00	310.58	9.65	1.93		307.50	2.08	548280	501660

Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel

Part Number	Shaft Diameter	Inside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY						
			Radial Wall			Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²					
XVSM 6*	6.00	5.65	+0/-0.25	0.51	0.30	5.70	0.38	440	1990					
XVSM 7*	7.00	6.58		0.51						0.30	6.64	0.38	610	2230
XVSM 8*	8.00	7.52		0.64						0.38	7.60	0.46	780	3180
XVSM 9*	9.00	8.42	+0/-0.30	0.76	0.38	8.50	0.46	1110	3580					
XVSM 10*	10.00	9.32		0.89						0.38	9.40	0.46	1460	3980
XVSM 11	11.00	10.32		0.89						0.38	10.40	0.46	1610	4380
XVSM 12	12.00	11.22	+0/-0.33	1.14	0.46	11.34	±0.05	1930	5780					
XVSM 13	13.00	12.15		1.14						0.46	12.28	0.56	2280	6260
XVSM 14	14.00	13.15		1.14						0.46	13.28	0.56	2460	6740
XVSM 15	15.00	14.14	+0/-0.38	1.14	0.46	14.28	±0.05/±0	2630	7220					
XVSM 16	16.00	15.13		1.14						0.46	15.28	0.56	2810	7710
XVSM 17	17.00	16.13		1.14						0.46	16.28	0.56	2980	8190
XVSM 18	18.00	17.12	±0.04	1.14	0.46	17.28	±0.08	3160	8670					
XVSM 19	19.00	18.11		1.14						0.46	18.28	0.56	3330	9150
XVSM 20	20.00	19.10		1.14						0.46	19.28	0.56	3510	9630
XVSM 21	21.00	19.74	±0.10	1.65	0.53	19.94	±0.10	5420	11650					
XVSM 22	22.00	20.73		1.65						0.53	20.94	0.66	5680	12210
XVSM 24	24.00	22.72		1.65						0.53	22.94	0.66	6200	13320
XVSM 25	25.00	23.71	+0/-0.38	1.65	0.53	23.94	±0.10	6460	13870					
XVSM 26	26.00	24.63		2.24						0.64	24.88	0.79	7100	15140
XVSM 28	28.00	26.62		2.24						0.64	26.88	0.79	7640	16300
XVSM 29	29.00	27.61	±0.10	2.24	0.64	27.88	±0.10	7910	16880					
XVSM 30	30.00	28.59		2.24						0.64	28.88	0.79	8190	17470
XVSM 32	32.00	30.57		2.24						0.64	30.88	0.79	8730	18630
XVSM 34	34.00	32.56	+0/-0.51	2.24	0.64	32.88	±0.13	9280	19800					
XVSM 35	35.00	33.55		2.24						0.64	33.88	0.79	9550	20380
XVSM 36	36.00	34.54		2.24						0.64	34.88	0.79	9830	20960
XVSM 38	38.00	36.52	±0.05	2.24	0.64	36.88	±0.13	10370	22120					
XVSM 40	40.00	38.09		3.00						0.79	38.52	0.99	14430	28750
XVSM 42	42.00	40.07		3.00						0.79	40.52	0.99	15150	30190
XVSM 45	45.00	43.04	+0/-0.64	3.00	0.79	43.52	±0.15	16230	32340					
XVSM 48	48.00	46.01		3.00						0.79	46.52	0.99	17310	34500
XVSM 50	50.00	47.99		3.00						0.79	48.52	0.99	18030	35930
XVSM 52	52.00	49.48	±0.05	4.01	0.79	50.06	±0.08/±0	24580	37370					
XVSM 55	55.00	52.46		4.01						0.79	53.06	0.99	26000	39530
XVSM 56	56.00	53.44		4.01						0.79	54.06	0.99	26470	40250
XVSM 58	58.00	55.42	±0.05	4.01	0.79	56.06	±0.15	27420	41680					
XVSM 60	60.00	57.40		4.01						0.79	58.06	0.99	28360	43120
XVSM 62	62.00	59.37		4.01						0.79	60.06	0.99	29310	44560
XVSM 63	63.00	60.35	+0/-0.64	4.01	0.79	61.06	±0.15	29780	45280					
XVSM 65	65.00	62.33		4.01						0.79	63.06	0.99	30730	46720
XVSM 68	68.00	65.31		4.01						0.79	66.06	0.99	32150	48870
XVSM 70	70.00	67.29	±0.05	4.01	0.79	68.06	±0.15	33090	50310					
XVSM 72	72.00	69.27		4.01						0.79	70.06	0.99	34040	51750
XVSM 75	75.00	72.25		4.01						0.79	73.06	0.99	35450	53900



ORDER OPTIONS

XVSM 6

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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(see page 3 for further details)

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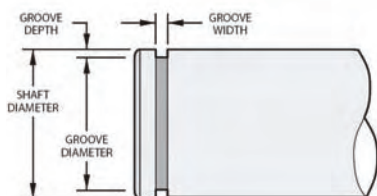
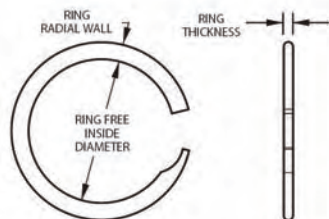
Dimensions in millimeters

¹No removal notch. ²Based on groove material yield strength of 310 N/mm² and safety factor of 2. ³Based on a safety factor of 3

EXTERNAL LIGHT DUTY SERIES METRIC

Stock items in Carbon Steel and Stainless Steel

Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XVSM 78	78.00	74..85	4.78	0.99	75.66	1.12	44480	70250
XVSM 80	80.00	76.82	4.78	0.99	77.66	1.12	45620	72050
XVSM 82	82.00	78.79	4.78	0.99	79.66	1.12	46760	73850
XVSM 85	85.00	81.76	4.78	0.99	82.66	1.12	48470	76550
XVSM 88	88.00	84.73	4.78	0.99	85.66	1.12	50180	79260
XVSM 90	90.00	86.69	4.78	0.99	87.66	1.12	51320	81060
XVSM 95	95.00	91.66	4.78	0.99	92.66	1.12	54170	85560
XVSM 100	100.00	96.62	4.78	0.99	97.66	1.12	57020	90060
XVSM 105	105.00	101.13	5.72	1.17	102.20	1.32	71640	106440
XVSM 110	110.00	106.08	5.72	1.17	107.20	1.32	75050	111510
XVSM 115	115.00	111.03	5.72	1.17	112.20	1.32	78470	116580
XVSM 120	120.00	115.98	5.72	1.17	117.20	1.32	81880	121650
XVSM 125	125.00	120.93	5.72	1.17	122.20	1.32	85290	126710
XVSM 130	130.00	125.88	5.72	1.17	127.20	1.32	88700	131780
XVSM 135	135.00	130.31	5.72	1.55	131.63	1.70	111030	181300
XVSM 140	140.00	135.13	5.72	1.55	136.50	1.70	119400	188010
XVSM 150	150.00	144.83	5.72	1.55	146.25	1.70	137070	201440
XVSM 155	155.00	149.66	5.72	1.55	151.13	1.70	146360	208160
XVSM 160	160.00	154.44	6.73	1.55	156.00	1.70	155960	214870
XVSM 165	165.00	159.27	6.73	1.55	160.88	1.70	165860	221590
XVSM 170	170.00	164.09	6.73	1.55	165.75	1.70	176060	228300
XVSM 175	175.00	168.92	6.73	1.55	170.63	1.70	186570	235020
XVSM 180	180.00	173.75	6.73	1.55	175.50	1.70	197380	241730
XVSM 185	185.00	178.57	7.62	1.55	180.38	1.70	208500	248450
XVSM 190	190.00	183.40	7.62	1.55	185.25	1.70	219920	255160
XVSM 195	195.00	188.22	7.62	1.55	190.13	1.70	231650	261880
XVSM 200	200.00	193.05	7.62	1.55	195.00	1.70	243680	268590
XVSM 210	210.00	202.70	8.76	1.93	204.75	2.08	268660	351160
XVSM 220	220.00	212.36	8.76	1.93	214.50	2.08	294850	367880
XVSM 230	230.00	222.01	8.76	1.93	224.25	2.08	322270	384600
XVSM 240	240.00	231.66	8.76	1.93	234.00	2.08	350900	401330
XVSM 250	250.00	241.31	8.76	1.93	243.75	2.08	380750	418050
XVSM 260	260.00	250.97	9.65	1.93	253.50	2.08	411820	434770
XVSM 270	270.00	260.62	9.65	1.93	263.25	2.08	444110	451490
XVSM 280	280.00	270.27	9.65	1.93	273.00	2.08	477610	468210
XVSM 290	290.00	279.92	9.65	1.93	282.75	2.08	512340	484940
XVSM 300	300.00	289.58	9.65	1.93	292.50	2.08	548280	501660



ORDER OPTIONS

XVSM 78

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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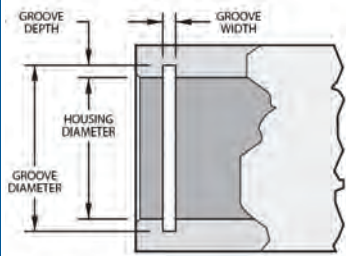
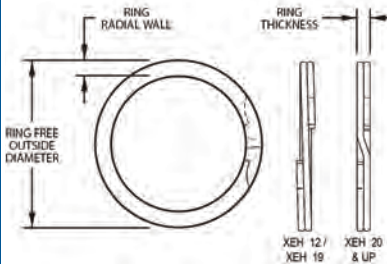
Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



MA 4017 Specification.
Please see page 24.



ORDER OPTIONS

XEH 12

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XEH 12	12.00	12.89	1.14	0.60	12.70	0.70	2050	7950
XEH 13	13.00	13.95	1.14	0.89	13.75	1.00	2410	12110
XEH 14	14.00	15.07	1.40	0.89	14.85	1.00	2930	13040
XEH 15	15.00	16.14	1.40	0.89	15.90	1.00	3290	13970
XEH 16	16.00	17.15	1.40	0.89	16.95	1.00	3740	14900
XEH 17	17.00	18.32	1.65	0.89	18.05	1.00	4390	15830
XEH 18	18.00	19.39	1.65	0.89	19.10	1.00	4820	16760
XEH 19	19.00	20.48	1.65	0.89	20.17	1.00	5460	17690
XEH 20	20.00	21.51	1.91	0.89	21.22	1.00	5940	18620
XEH 21	21.00	22.56	1.91	0.89	22.27	1.00	6550	19550
XEH 22	22.00	23.65	1.91	1.07	23.37	1.20	7390	24630
XEH 23	23.00	24.69	2.16	1.07	24.42	1.20	7950	25750
XEH 24	24.00	25.73	2.16	1.07	25.47	1.20	8650	26870
XEH 25	25.00	27.03	2.16	1.07	26.67	1.20	10230	27990
XEH 26	26.00	28.07	2.16	1.07	27.77	1.20	11270	29110
XEH 27	27.00	29.11	2.64	1.27	28.87	1.40	12360	31170
XEH 28	28.00	30.10	2.64	1.27	29.87	1.40	12820	32330
XEH 29	29.00	31.21	2.64	1.27	30.95	1.40	13840	33480
XEH 30	30.00	32.28	2.64	1.27	32.00	1.40	14610	34640
XEH 31	31.00	33.32	2.64	1.27	33.05	1.40	15550	35790
XEH 32	32.00	34.23	2.64	1.27	34.00	1.40	15880	36950
XEH 34	34.00	36.46	3.00	1.27	36.20	1.40	18210	39260
XEH 35	35.00	37.55	3.00	1.27	37.30	1.40	19600	40410
XEH 36	36.00	38.68	3.00	1.27	38.40	1.40	21040	41560
XEH 37	37.00	39.60	3.00	1.27	39.40	1.40	21620	42720
XEH 38	38.00	40.77	3.00	1.27	40.50	1.40	23130	43870
XEH 40	40.00	42.91	3.25	1.57	42.50	1.75	24350	57090
XEH 42	42.00	45.01	3.25	1.57	44.60	1.75	26590	59950
XEH 45	45.00	48.13	3.25	1.57	47.70	1.75	29590	64230
XEH 46	46.00	49.28	3.25	1.57	48.80	1.75	31370	65660
XEH 47	47.00	50.32	4.01	1.57	49.90	1.75	33190	67080
XEH 48	48.00	51.46	4.01	1.57	51.00	1.75	35070	68510
XEH 50	50.00	53.66	4.01	1.57	53.20	1.75	38960	71370
XEH 52	52.00	54.30	3.25	1.25	53.79	1.42	22790	59090
XEH 53	53.00	55.32	3.25	1.25	54.79	1.42	23230	60230
XEH 55	55.00	57.38	3.51	1.25	56.85	1.42	24910	62500
XEH 56	56.00	58.40	3.51	1.25	57.85	1.42	25360	63640
XEH 58	58.00	60.43	3.51	1.25	59.85	1.42	26270	65910
XEH 59	59.00	61.54	3.51	1.25	60.93	1.42	27870	67050
XEH 60	60.00	62.57	3.51	1.25	61.99	1.42	29220	68180
XEH 61	61.00	63.65	3.81	1.25	63.09	1.42	31190	69320
XEH 62	62.00	64.70	3.81	1.25	64.09	1.42	31700	70460
XEH 63	63.00	65.70	3.81	1.25	65.09	1.42	32220	71590
XEH 64	64.00	66.77	3.81	1.25	66.19	1.42	34290	72730
XEH 65	65.00	67.82	3.81	1.25	67.19	1.42	34820	73870
XEH 66	66.00	68.80	3.81	1.25	68.19	1.42	35360	75000
XEH 67	67.00	69.90	3.81	1.25	69.25	1.42	36870	76140

Dimensions in millimeters

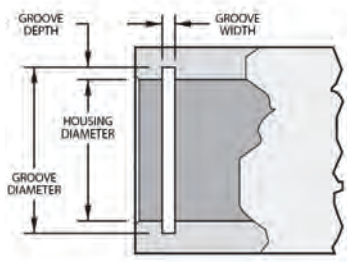
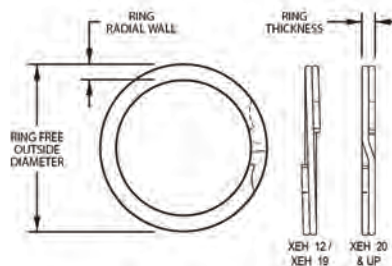
¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

INTERNAL SERIES METRIC

Stock items in Carbon Steel and Stainless Steel



MA 4017 Specification.
Please see page 24.



ORDER OPTIONS

XEH 68

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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Part Number	Housing Diameter	Outside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY	
			Radial Wall			Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²
XEH 68	68.00	70.94	4.01		1.25	70.29	1.42	38090	77270
XEH 69	69.00	71.94	4.01	±.10	1.25	71.29	1.42	38650	78410
XEH 70	70.00	72.94	4.01		1.25	72.29	1.42	39210	79550
XEH 71	71.00	73.99	4.01		1.25	73.29	1.42	39770	80680
XEH 72	72.00	75.04	4.27		1.25	74.39	1.42	40910	81510
XEH 75	75.00	78.07	4.27		1.25	77.39	1.42	43830	85230
XEH 78	78.00	81.21	4.27		1.55	80.45	1.73	46730	109910
XEH 80	80.00	83.22	4.52		1.55	82.49	1.73	48700	112730
XEH 82	82.00	85.28	4.52		1.55	84.55	1.73	51120	115550
XEH 85	85.00	88.38	4.78		1.55	87.65	1.73	55060	119780
XEH 88	88.00	91.45	4.78		1.55	90.69	1.73	57860	124000
XEH 90	90.00	93.58	5.03		1.55	92.79	1.73	61370	126820
XEH 92	92.00	95.66	5.03		1.55	94.85	1.73	64070	129640
XEH 95	95.00	98.69	5.03		1.55	97.85	1.73	66160	133870
XEH 98	98.00	101.83	5.28		1.55	100.99	1.73	71590	138090
XEH 100	100.00	103.83	5.28		1.55	102.99	1.73	73050	140910
XEH 102	102.00	106.00	5.54	±.13	1.55	105.15	1.73	78490	143730
XEH 105	105.00	109.00	5.54		1.55	108.15	1.73	80800	147960
XEH 108	108.00	112.22	5.79		1.55	111.31	1.73	87310	152190
XEH 110	110.00	114.25	5.79		1.55	113.31	1.73	62140	155000
XEH 112	112.00	116.44	6.05		1.55	115.45	1.73	94370	157820
XEH 115	115.00	119.44	6.05		1.55	118.45	1.73	96890	162050
XEH 120	120.00	124.54	6.35		1.83	123.55	2.00	104030	199640
XEH 125	125.00	129.59	6.35		1.83	128.55	2.00	108360	207960
XEH 130	130.00	134.71	6.35		1.83	133.65	2.00	115860	216280
XEH 135	135.00	139.74	6.35		1.83	138.62	2.00	119000	224600
XEH 140	140.00	144.87	6.35		1.83	143.72	2.00	126820	232920
XEH 145	145.00	150.04	6.35		1.83	148.82	2.00	134880	241230
XEH 150	150.00	155.07	6.35		1.83	153.82	2.00	139530	249550
XEH 155	155.00	160.72	7.92		2.18	159.40	2.40	166080	307190
XEH 160	160.00	165.74	7.92		2.18	164.40	2.40	171433	317100
XEH 165	165.00	170.77	7.92		2.18	169.40	2.40	176790	327010
XEH 170	170.00	176.05	7.92		2.18	174.60	2.40	190430	336920
XEH 175	175.00	181.05	7.92		2.18	179.60	2.40	196030	346830
XEH 180	180.00	186.38	7.92		2.18	184.88	2.40	213900	356740
XEH 185	185.00	191.10	7.92		2.18	189.88	2.40	219840	366650
XEH 190	190.00	196.45	7.92		2.18	194.88	2.40	225790	376560
XEH 195	195.00	201.74	7.92		2.18	200.14	2.40	244070	386460
XEH 200	200.00	206.76	7.92	±.15	2.18	205.14	2.40	250330	396370
XEH 210	210.00	217.10	9.53		2.18	215.40	2.40	276140	416490
XEH 220	220.00	227.40	9.53		2.18	225.64	2.40	257150	436010
XEH 230	230.00	237.73	9.53		2.18	235.90	2.40	330450	455830
XEH 240	240.00	247.80	9.53		2.18	245.90	2.40	344810	475650
XEH 250	250.00	258.10	9.53		2.18	256.16	2.40	375010	495470
XEH 260	260.00	268.43	9.53		2.18	266.40	2.40	405210	515290
XEH 270	270.00	278.50	9.53		2.18	276.40	2.40	420790	535100
XEH 280	280.00	288.82	9.53		2.18	286.66	2.40	454100	554920

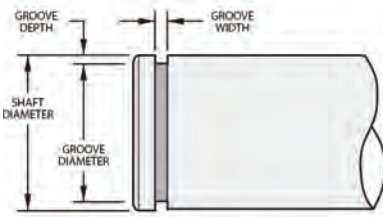
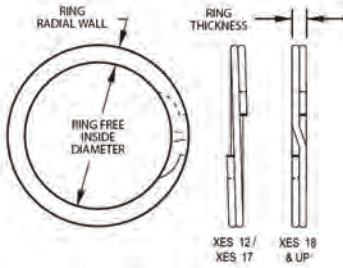
Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



MA 4016 Specification.
Please see page 24.



ORDER OPTIONS

XES 12

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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Part Number	Shaft Diameter	Inside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY	
			Radial Wall			Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XES 12	12.00	11.18	1.14		0.60	11.29	0.70	2100	7950
XES 13	13.00	12.13	1.27		0.89	12.24	1.00	2410	12100
XES 14	14.00	13.06	1.27		0.89	13.19	1.00	2800	13040
XES 15	15.00	13.98	1.27		0.89	14.09	1.00	3360	13970
XES 16	16.00	14.90	1.40		0.89	15.02	1.00	3820	14900
XES 17	17.00	15.82	1.40		0.89	16.02	1.00	4060	15830
XES 18	18.00	16.80	1.65		1.07	16.92	1.20	4730	20150
XES 19	19.00	17.73	1.65		1.07	17.87	1.20	5270	21270
XES 20	20.00	18.62	1.65		1.07	18.77	1.20	6040	22390
XES 21	21.00	19.57	1.65		1.07	19.72	1.20	6550	23510
XES 22	22.00	20.45	1.91		1.07	20.62	1.20	7390	24630
XES 23	23.00	21.39	1.91		1.07	21.57	1.20	8070	25750
XES 24	24.00	22.35	1.91	+0/-0.33	1.07	22.52	1.20	8650	26870
XES 25	25.00	23.25	2.16		1.07	23.42	1.20	9620	27990
XES 26	26.00	24.21	2.16		1.07	24.42	1.20	10000	29110
XES 27	27.00	25.04	2.64		1.27	25.35	1.40	10910	31170
XES 28	28.00	26.00	2.64		1.27	26.30	1.40	11590	32330
XES 29	29.00	26.95	2.64		1.27	27.27	1.40	12290	33480
XES 30	30.00	27.92	2.64		1.27	28.25	1.40	12860	34640
XES 31	31.00	28.84	2.64		1.27	29.17	1.40	13890	35790
XES 32	32.00	29.77	2.64		1.27	30.09	1.40	14960	36950
XES 34	34.00	31.54	3.00		1.27	31.90	1.40	17390	39260
XES 35	35.00	32.44	3.00		1.27	32.80	1.40	18750	40410
XES 36	36.00	33.40	3.00	±0.10	1.27	33.75	1.40	19810	41560
XES 37	37.00	34.24	3.00		1.27	34.67	1.40	21080	42720
XES 38	38.00	35.18	3.00		1.27	35.66	1.40	21650	43870
XES 40	40.00	37.15	3.25		1.57	37.55	1.75	23960	57090
XES 42	42.00	39.02	3.25		1.57	39.45	1.75	26180	59990
XES 45	45.00	41.77	3.25		1.57	42.25	1.75	30240	64230
XES 46	46.00	42.67	3.25	+0/-0.51	1.57	43.15	1.75	32040	65660
XES 47	47.00	43.81	4.01		1.57	44.31	1.75	30900	67080
XES 48	48.00	44.48	4.01		1.57	45.05	1.75	34600	68510
XES 50	50.00	46.69	4.01		1.57	47.05	1.75	36040	71370
XES 52	52.00	49.62	3.25		1.25	50.15	1.42	23550	59090
XES 53	53.00	50.62	3.25		1.25	51.15	1.42	24000	60230
XES 54	54.00	51.62	3.25		1.25	52.15	1.42	24460	61370
XES 55	55.00	52.62	3.51		1.25	53.15	1.42	24910	62500
XES 56	56.00	53.62	3.51		1.25	54.15	1.42	25370	63640
XES 58	58.00	55.43	3.51		1.25	56.01	1.42	28250	65910
XES 59	59.00	56.43	3.51		1.25	57.01	1.42	28730	67050
XES 60	60.00	57.43	3.51	+0/-0.63	1.25	58.01	1.42	29220	68180
XES 61	61.00	58.36	3.51		1.25	58.91	1.42	31190	69320
XES 62	62.00	59.30	3.76		1.25	59.91	1.42	31710	70460
XES 63	63.00	60.30	3.76		1.25	60.91	1.42	32220	71590
XES 64	64.00	61.25	3.76		1.25	61.91	1.42	32730	72730
XES 65	65.00	62.20	3.76		1.25	62.81	1.42	34820	73870
XES 66	66.00	63.16	3.76		1.25	63.79	1.42	35680	75000

Dimensions in millimeters

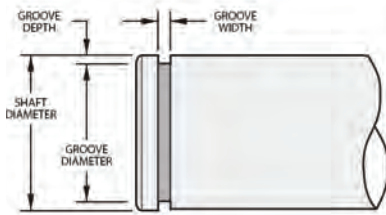
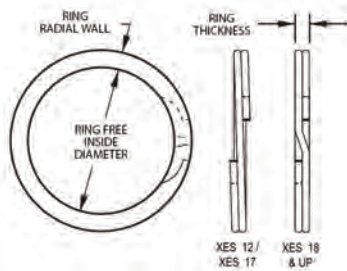
¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

EXTERNAL SERIES METRIC

Stock items in Carbon Steel and Stainless Steel



MA 4016 Specification.
Please see page 24.



ORDER OPTIONS

XES 67

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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(see page 3 for further details)

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Part Number	Shaft Diameter	Inside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY	
			Radial Wall			Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²
XES 67	67.00	64.16	+0/-0.63	3.76	1.25	64.71	1.42	37530	76140
XES 68	68.00	65.08	+0/-0.63	4.01	1.25	65.71	1.42	38090	77270
XES 69	69.00	66.06	+0/-0.63	4.01	±.10	66.71	1.42	38650	78410
XES 70	70.00	67.08	+0/-0.63	4.01	1.25	67.71	1.42	39210	79550
XES 71	71.00	68.04	+0/-0.63	4.01	1.25	68.71	1.42	39770	80680
XES 72	72.00	69.00	+0/-0.63	4.27	1.25	69.65	1.42	41380	81820
XES 75	75.00	71.93	+0/-0.76	4.27	1.25	72.61	1.42	43830	85230
XES 78	78.00	74.84	+0/-0.76	4.27	1.55	75.55	1.73	46730	109910
XES 80	80.00	76.80	+0/-0.76	4.52	1.55	77.51	1.73	48700	112730
XES 82	82.00	78.72	+0/-0.76	4.52	±.08	79.45	1.73	51120	115550
XES 85	85.00	81.62	+0/-0.76	4.78	1.55	82.35	±.15	55060	119780
XES 88	88.00	84.53	+0/-0.76	4.78	1.55	85.31	1.73	57860	124000
XES 90	90.00	86.43	+0/-0.76	5.03	1.55	87.21	1.73	61370	126820
XES 95	95.00	91.37	+0/-1.0	5.03	1.55	92.15	1.73	66160	133870
XES 100	100.00	96.10	+0/-1.0	5.28	±.13	97.01	1.73	73050	140910
XES 105	105.00	100.94	+0/-1.0	5.54	1.55	101.85	1.73	80780	147960
XES 110	110.00	105.75	+0/-1.0	5.79	1.55	106.69	1.73	88930	155000
XES 115	115.00	110.59	+0/-1.0	6.05	1.55	111.55	1.73	96890	162050
XES 120	120.00	115.49	+0/-1.0	6.35	1.83	116.45	2.00	104030	199640
XES 125	125.00	120.44	+0/-1.0	6.35	1.83	121.45	2.00	108360	207960
XES 130	130.00	125.34	+0/-1.0	6.35	1.83	126.35	2.00	115860	216280
XES 135	135.00	130.20	+0/-1.0	6.35	1.83	131.27	2.00	122950	224600
XES 140	140.00	135.14	+0/-1.0	6.35	1.83	136.25	2.00	128190	232920
XES 145	145.00	140.00	+0/-1.0	6.35	1.83	141.17	2.00	135590	241230
XES 150	150.00	145.00	+0/-1.0	6.35	1.83	146.17	2.00	140260	249550
XES 155	155.00	149.33	+0/-1.52	7.92	2.18	150.60	2.40	166080	307190
XES 160	160.00	154.31	+0/-1.52	7.92	2.18	155.60	2.40	171430	317100
XES 165	165.00	159.23	+0/-1.52	7.92	2.18	160.60	2.40	176790	327010
XES 170	170.00	164.00	+0/-1.52	7.92	2.18	165.40	2.40	190430	336920
XES 175	175.00	169.00	+0/-1.52	7.92	2.18	170.40	2.40	196030	346830
XES 180	180.00	173.78	+0/-1.52	7.92	2.18	±.10	175.20	210400	356740
XES 185	185.00	178.70	+0/-1.52	7.92	2.18	180.20	±.175	216240	366650
XES 190	190.00	183.70	+0/-1.52	7.92	2.18	185.20	2.40	220080	376560
XES 195	195.00	188.43	+0/-1.52	7.92	2.18	190.00	2.40	237420	386460
XES 200	200.00	193.43	+0/-1.52	7.92	±.15	195.00	2.40	243510	396370
XES 210	210.00	202.93	+0/-1.78	9.53	2.18	204.60	2.40	276140	416190
XES 220	220.00	212.65	+0/-1.78	9.53	2.18	214.40	2.40	300010	436010
XES 230	230.00	222.60	+0/-1.78	9.53	2.18	224.40	2.40	313640	455830
XES 240	240.00	232.32	+0/-1.78	9.53	2.18	234.20	2.40	328970	475650
XES 250	250.00	241.83	+0/-1.78	9.53	2.18	243.80	2.40	377440	495470
XES 260	260.00	251.57	+0/-1.78	9.53	2.18	253.60	2.40	405210	515290
XES 270	270.00	261.30	+0/-1.78	9.53	2.18	263.40	2.40	433940	535100
XES 280	280.00	271.04	+0/-1.78	9.53	2.18	273.20	2.40	463650	554920

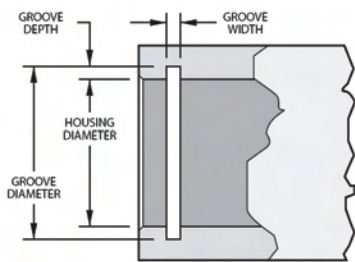
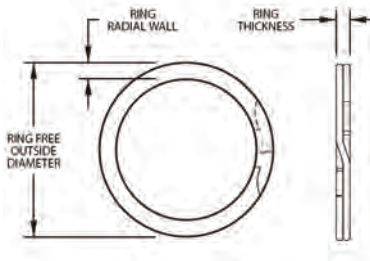
Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 472



ORDER OPTIONS

XDNH 13

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

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Contact our specialist team for assistance

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Part Number	Housing Diameter	Outside Diameter	RING			GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²	
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	±.10	29.40	1.30	9552	29039	
XDNH 29	29.00	30.71	2.41	±.10	30.40	1.30	9893	30076	
XDNH 30	30.00	31.71	2.41	±.10	31.40	1.30	10235	31113	
XDNH 31	31.00	33.02	2.41	±.10	32.70	1.30	12842	32150	
XDNH 32	32.00	34.04	2.41	±.10	33.70	1.30	13256	33187	
XDNH 33	33.00	35.05	2.41	±.10	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	±.12	65.00	2.15	45325	108860	
XDNH 63	63.00	66.67	5.08	±.12	66.00	2.15	46056	110615	
XDNH 64	64.00	67.67	5.08	±.12	67.00	2.15	46787	112371	
XDNH 65	65.00	68.67	5.08	±.12	68.00	2.15	47518	114126	
XDNH 67	67.00	70.67	5.08	±.12	70.00	2.15	48980	119901	
XDNH 68	68.00	71.67	5.08	±.12	71.00	2.15	49711	121656	
XDNH 70	70.00	73.67	5.08	±.12	73.00	2.15	51173	126165	
XDNH 72	72.00	75.67	5.08	±.12	75.00	2.15	52635	130674	
XDNH 75	75.00	78.68	5.08	±.12	78.00	2.15	54828	138605	
XDNH 76	76.00	79.68	5.08	±.12	79.00	2.15	55559	139934	

Dimensions in millimeters

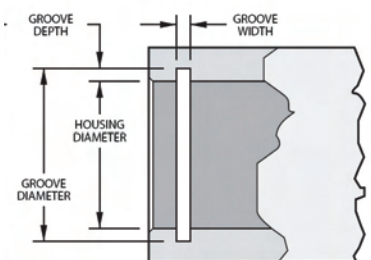
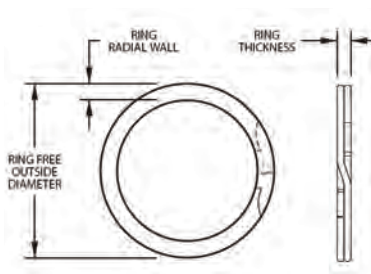
¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

INTERNAL DIN SERIES METRIC

Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 472



ORDER OPTIONS

XDNH 78

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

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e Sales@tfc.eu.com

Part Number	Housing Diameter	Outside Diameter	RING				GROOVE			THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²			
XDNH 78	78.00	81.69	5.08	±.12	2.41	81.00	2.65	57021	162870		
XDNH 80	80.00	84.19	6.05	±.13	2.41	83.50	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	6.05		2.91	103.50	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	6.73	3.89	129.00	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	7.92	3.89	160.00	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	7.92	3.89	200.00	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	11.18	4.86	268.00	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	12.70	5.87	340.00	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			

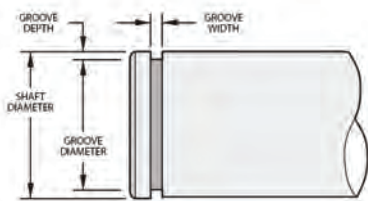
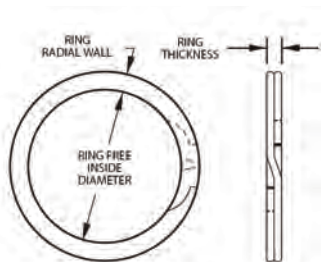
Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 471



ORDER OPTIONS

XDNS 13

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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Part Number	Shaft Diameter	Inside Diameter	RING			GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²	
XDNS 13	13.00	12.27	1.40	0.99	12.40	1.10	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	5.08	1.93	47.00	2.15	36552	87790	
XDNS 52	52.00	48.51	5.08	1.93	49.00	2.15	38014	91302	
XDNS 54	54.00	50.50	5.08	1.93	51.00	2.15	39476	94813	
XDNS 55	55.00	51.49	5.08	1.93	52.00	2.15	40207	96569	
XDNS 56	56.00	52.48	5.08	1.93	53.00	2.15	40938	98325	
XDNS 58	58.00	54.43	5.08	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	
XDNS 77	77.00	73.33	5.08	2.41	74.00	2.65	56290	160782	
XDNS 78	78.00	74.33	5.08	2.41	75.00	2.65	57021	162870	

Dimensions in millimeters

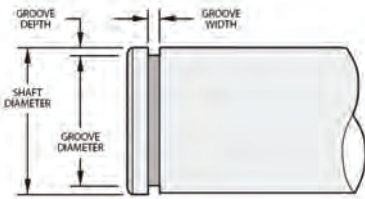
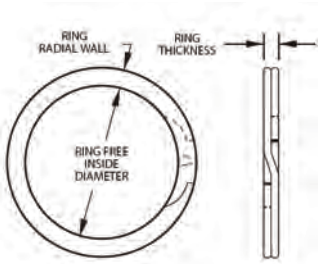
¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

EXTERNAL DIN SERIES METRIC

Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 471



ORDER OPTIONS

XDNS 80

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

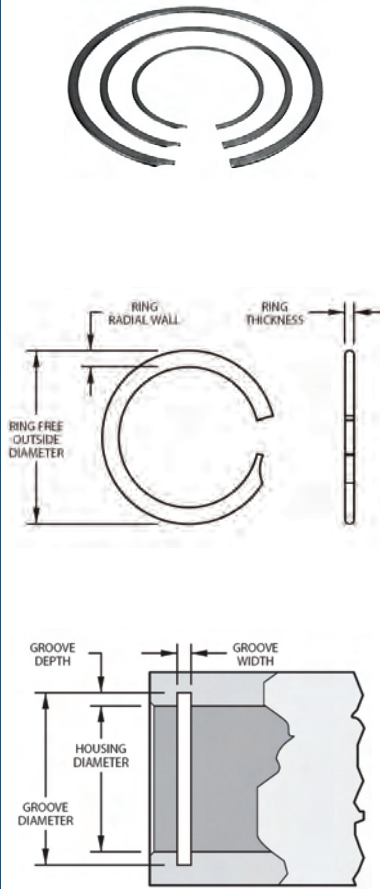
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Part Number	Shaft Diameter	Inside Diameter	RING			GROOVE		THRUST CAPACITY				
			Radial Wall	Thickness		Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²			
XDNS 80	80.00	75.81	+0/-0.76	6.05	±.08	2.41	76.50	+0/-0.30	2.65	+0.14/-0	68231	167046
XDNS 82	82.00	77.81		6.05			2.41	78.50	2.65		69936	171222
XDNS 85	85.00	80.80	+0/-0.89	6.35	±.13	2.91	81.50	+0/-0.35	3.15	+0.14/-0	72500	214310
XDNS 88	88.00	83.80		6.35			2.91		84.50		3.15	75054
XDNS 90	90.00	85.80	+0/-1.30	6.35	±.10	2.91	86.50	+0/-0.63	3.15	+0.18/-0	76759	226915
XDNS 95	95.00	90.80		6.35			2.91		91.50		3.15	81024
XDNS 98	98.00	93.79	+0/-1.52	6.35	±.15	2.91	94.50	+0/-0.72	3.15	+0.18/-0	83583	247086
XDNS 100	100.00	95.79		6.35			2.91		96.50		3.15	85288
XDNS 102	102.00	97.29	+0/-1.78	6.73	±.19	3.89	98.00	+0/-0.81	4.15	+0.22/-0	99422	343778
XDNS 105	105.00	100.28		6.73			3.89		101.00		4.15	102346
XDNS 108	108.00	103.25	+0/-2.30	6.73	±.13	3.89	104.00	+0/-0.89	4.15	+0.22/-0	105270	364000
XDNS 110	110.00	105.23		6.73			3.89		106.00		4.15	107220
XDNS 115	115.00	110.19	+0/-2.80	6.73	±.15	3.89	111.00	+0/-0.89	4.15	+0.22/-0	112093	387593
XDNS 120	120.00	115.16		6.73			3.89		116.00		4.15	116967
XDNS 125	125.00	120.12	+0/-2.80	6.73	±.10	3.89	121.00	+0/-0.89	4.15	+0.22/-0	121840	421297
XDNS 130	130.00	125.07		6.73			3.89		126.00		4.15	126714
XDNS 135	135.00	130.02	+0/-2.80	6.73	±.10	3.89	131.00	+0/-0.89	4.15	+0.22/-0	131588	455001
XDNS 140	140.00	134.98		6.73			3.89		136.00		4.15	136461
XDNS 145	145.00	139.93	+0/-2.80	6.73	±.10	3.89	141.00	+0/-0.89	4.15	+0.22/-0	141335	488704
XDNS 150	150.00	143.91		7.92			3.89		145.00		4.15	182761
XDNS 155	155.00	148.89	+0/-2.80	7.92	±.10	3.89	150.00	+0/-0.89	4.15	+0.22/-0	188853	522408
XDNS 160	160.00	153.85		7.92			3.89		155.00		4.15	194945
XDNS 165	165.00	158.80	+0/-2.80	7.92	±.10	3.89	160.00	+0/-0.89	4.15	+0.22/-0	201037	556112
XDNS 170	170.00	163.75		7.92			3.89		165.00		4.15	207129
XDNS 175	175.00	168.73	+0/-2.80	7.92	±.15	3.89	170.00	+0/-0.89	4.15	+0.22/-0	213221	589815
XDNS 180	180.00	173.69		7.92			3.89		175.00		4.15	219313
XDNS 185	185.00	178.66	+0/-2.80	7.92	±.15	3.89	180.00	+0/-0.89	4.15	+0.22/-0	225405	623519
XDNS 190	190.00	183.59		7.92			3.89		185.00		4.15	231497
XDNS 195	195.00	188.54	+0/-2.80	7.92	±.15	3.89	190.00	+0/-0.89	4.15	+0.22/-0	237589	657223
XDNS 200	200.00	193.54		7.92			3.89		195.00		4.15	243681
XDNS 205	205.00	197.54	+0/-2.80	11.18	±.15	4.86	199.00	+0/-0.89	5.15	+0.22/-0	299727	863214
XDNS 210	210.00	202.54		11.18			4.86		204.00		5.15	307038
XDNS 220	220.00	212.47	+0/-2.80	11.18	±.15	4.86	214.00	+0/-0.89	5.15	+0.22/-0	321659	926376
XDNS 230	230.00	222.40		11.18			4.86		224.00		5.15	336280
XDNS 240	240.00	232.33	+0/-2.80	11.18	±.15	4.86	234.00	+0/-0.89	5.15	+0.22/-0	350900	1010592
XDNS 250	250.00	242.24		11.18			4.86		244.00		5.15	365521
XDNS 260	260.00	250.19	+0/-2.80	12.70	±.15	4.86	252.00	+0/-0.89	5.15	+0.22/-0	506856	1094808
XDNS 270	270.00	260.15		12.70			4.86		262.00		5.15	526351
XDNS 280	280.00	270.08	+0/-2.80	12.70	±.15	4.86	272.00	+0/-0.89	5.15	+0.22/-0	545845	1179024
XDNS 290	290.00	279.98		12.70			4.86		282.00		5.15	565340
XDNS 300	300.00	289.92	+0/-2.80	12.70	±.13	4.86	292.00	+0/-0.89	5.15	+0.22/-0	584834	1263241
XDNS 310	310.00	297.84		15.88			5.87		300.00		6.20	755411
XDNS 320	320.00	307.84	+0/-2.80	15.88	±.19	5.87	310.00	+0/-0.89	6.20	+0.22/-0	779779	1627484
XDNS 330	330.00	317.75		15.88			5.87		320.00		6.20	804147
XDNS 340	340.00	327.69	+0/-2.80	15.88	±.19	5.87	330.00	+0/-0.89	6.20	+0.22/-0	828515	1729201
XDNS 350	350.00	337.64		15.88			5.87		340.00		6.20	852883
XDNS 360	360.00	347.57	+0/-2.80	15.88	±.19	5.87	350.00	+0/-0.89	6.20	+0.22/-0	877251	1830919
XDNS 370	370.00	357.48		15.88			5.87		360.00		6.20	901619
XDNS 380	380.00	367.41	+0/-2.80	15.88	±.19	5.87	370.00	+0/-0.89	6.20	+0.22/-0	925987	1932637
XDNS 390	390.00	377.34		15.88			5.87		380.00		6.20	950355
XDNS 400	400.00	387.25	+0/-2.80	15.88	±.19	5.87	390.00	+0/-0.89	6.20	+0.22/-0	974723	2034354

Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XVH 25

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

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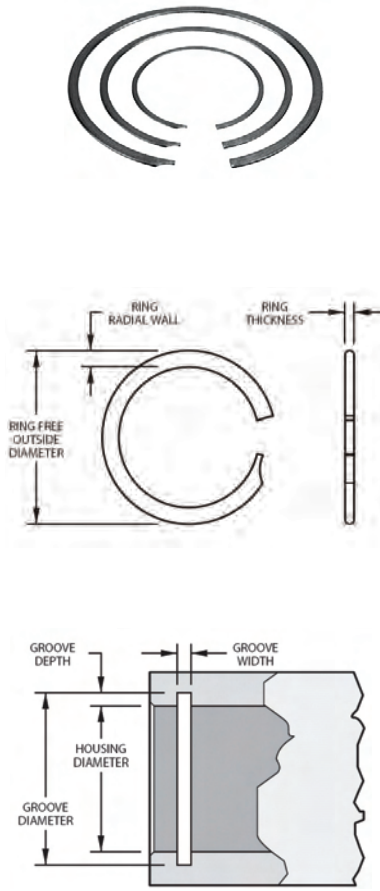
Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY					
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²				
XVH 25*	0.250	0.264	+0.010/-0	0.020	±.0015	±.002	±.002/-0	106	481			
XVH 31*	0.312	0.329		0.025				0.015	0.326	0.018	154	750
XVH 37*	0.375	0.398		0.030				0.015	0.395	0.018	265	901
XVH 43	0.437	0.466	+0.012/-0	0.030	0.015	0.463	0.018	402	1050			
XVH 50	0.500	0.531	+0.013/-0	0.045	±.0015	±.002	±.002/-0	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	+0.013/-0	0.045	±.0015	±.003	±.002/-0	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	0.026	1210	2460
XVH 87	0.875	0.926	+0.015/-0	0.065	±.0015	±.003	±.002/-0	1300	2660			
XVH 93	0.937	0.989		0.065				0.021	0.979	0.026	1390	2840
XVH 100	1.000	1.052		0.065				0.021	1.042	0.026	1480	3040
XVH 106	1.062	1.117	+0.015/-0	0.088	±.004	±.004	±.002/-0	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	+0.020/-0	0.088	±.004	±.005	±.002/-0	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	+0.020/-0	0.088	±.004	±.005	±.002/-0	2240	4740			
XVH 150	1.500	1.559		0.088				0.025	1.544	0.031	2330	4950
XVH 156	1.562	1.637		0.118				0.031	1.619	0.039	3200	6390
XVH 162	1.625	1.701	+0.020/-0	0.118	±.004	±.005	±.002/-0	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	+0.025/-0	0.118	±.002	±.006	±.003/-0	3710	7410			
XVH 187	1.875	1.953		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	+0.025/-0	0.118	±.002	±.006	±.003/-0	4100	8180			
XVH 206	2.062	2.162		0.158				0.031	2.138	0.039	5540	8430
XVH 212	2.125	2.226		0.158				0.031	2.201	0.039	5710	8690
XVH 218	2.187	2.289	+0.025/-0	0.158	±.002	±.006	±.003/-0	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	+0.025/-0	0.158	±.002	±.006	±.003/-0	6380	9720			
XVH 243	2.437	2.541		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	+0.025/-0	0.158	±.002	±.006	±.003/-0	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	+0.030/-0	0.158	±.005	±.006	±.003/-0	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	+0.030/-0	0.158	±.005	±.006	±.003/-0	7890	12010			
XVH 300	3.000	3.110		0.158				0.031	3.076	0.039	8060	12270
XVH 306	3.062	3.188		0.188				0.039	3.154	0.044	9960	15760
XVH 312	3.125	3.251	-0	0.188	0.039	3.217	0.044	10160	16080			

Dimensions in inches

¹No removal notch. ²Based on groove material yield strength of 45000 psi and safety factor of 2. ³Based on a safety factor of 3

INTERNAL LIGHT DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XVH 318

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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(see page 3 for further details)

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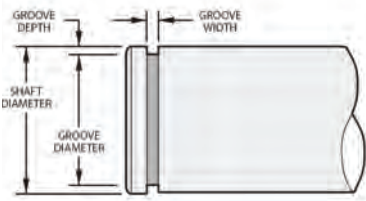
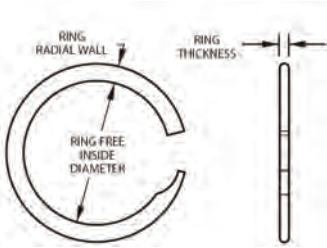
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Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
XVH 318	3.187	3.314	0.188	0.039	3.279	0.044	10360	16400
XVH 325	3.250	3.377	0.188	0.039	3.342	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	0.225	0.046	4.235	0.052	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	0.052	19440	28900
XVH 525	5.250	5.435	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	0.265	0.061	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	0.345	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
XVH1000	10.000	10.353	0.345	0.076	10.250	0.082	88360	95500

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XVS 25

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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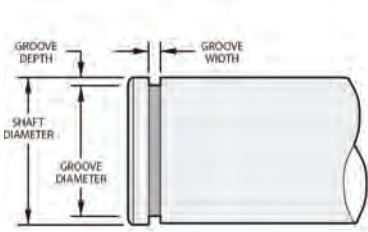
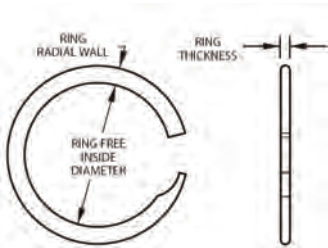
Part Number	Shaft Diameter	Inside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY						
			Radial Wall			Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²					
XVS 25*	0.250	0.236	+0/-0.010	0.020	0.012	0.238	0.015	±.002	+0.002/-0	106	481			
XVS 31*	0.312	0.294		0.025						0.015	0.297	0.018	165	750
XVS 37*	0.375	0.348		0.025						0.015	0.351	0.018	318	901
XVS 43	0.437	0.410	+0/-0.012	0.035	0.015	0.413	0.018	371	1050					
XVS 50	0.500	0.467	+0/-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	±.0015	0.770	0.026	1210	2460				
XVS 87	0.875	0.825		0.065	0.021	±.003	0.833	0.026	1300	2660				
XVS 93	0.937	0.886		0.065	0.021	±.003	0.895	0.026	1390	2840				
XVS 100	1.000	0.949		0.065	0.021	±.004	0.958	0.026	1480	3040				
XVS 106	1.062	1.008		0.088	0.025	±.004	1.018	0.031	1650	3500				
XVS 112	1.125	1.071	+0/-0.015	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		0.118	0.031	1.505	0.039	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/-0.020	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		0.158	0.031	1.986	0.039	5540	8430					
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	±.002	2.236	0.039	6210	9460				
XVS 237	2.375	2.273	0.158	0.031	±.002	2.299	0.039	6380	9720					
XVS 243	2.437	2.335	0.158	0.031	±.002	2.361	0.039	6550	9970					
XVS 250	2.500	2.397	+0/-0.025	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					
XVS 306	3.062	2.938		+0/-0.030	0.188	±.005	2.970	0.044	9960	15760				
XVS 312	3.125	3.001	0.188	0.039	±.005	3.033	0.044	10160	16080					

Dimensions in inches

¹No removal notch. ²Based on groove material yield strength of 45000 psi and safety factor of 2. ³Based on a safety factor of 3

EXTERNAL LIGHT DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XVS 318

Material Options:
 Carbon Steel (blank)
 302 Stainless Steel S02
 316 Stainless Steel S16

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Part Number	Shaft Diameter	Inside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY	
			Radial Wall			Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²
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/-0.030	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	0.225		0.046	4.015	0.052	16040	23850
XVS 425	4.250	4.097	0.225	±.005	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/-0.035	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	0.225		0.061	5.119	0.067	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/-0.045	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		0.061	7.069	0.067	46640	55580
XVS 750	7.500	7.240	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/-0.060	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	0.345		0.076	8.288	0.082	63690	81180
XVS 875	8.750	8.446	0.345	+0.004/-0.008	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/-0.070	0.076	9.263	0.082	79910	90730
XVS 975	9.750	9.411	0.345		0.076	9.506	0.082	84080	93120
XVS1000	10.000	9.653	0.345		0.076	9.750	0.082	88360	95500

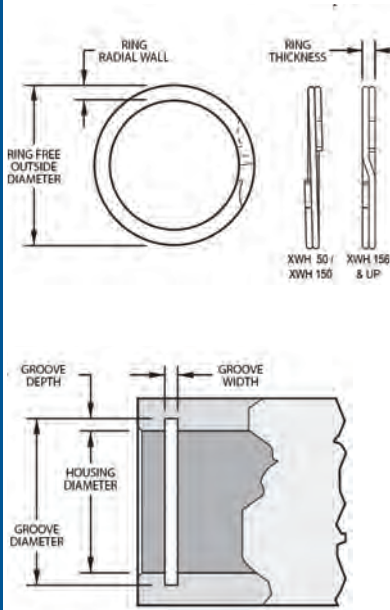
Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



AS 3217, AS 4299 or MIL-DTL-27426/3 Specifications. Please see page 24.



ORDER OPTIONS

XWH 50

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²
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	±.002	550	2380
XWH 62	0.625	0.658	0.045	0.025	0.651	±.002	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	0.953	0.065	0.031	0.943	±.003	1220	4060
XWH 93	0.938	0.986	0.065	0.031	0.975	0.036	1260	4200
XWH 96	0.968	1.022	0.075	0.037	1.011	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	±.004	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	±.004	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	±.005	3840	11310
XWH 181	1.813	1.894	0.118	0.049	1.875	±.005	3970	11720
XWH 185	1.850	1.937	0.118	0.049	1.917	0.056	4450	11960
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

Dimensions in inches

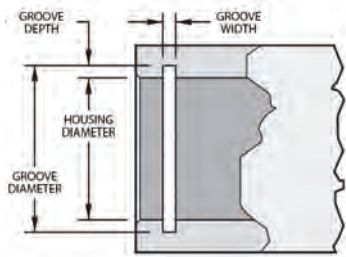
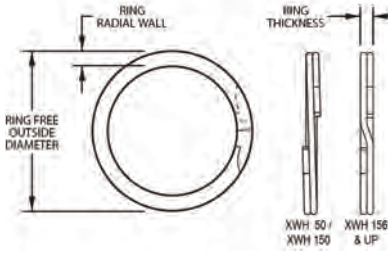
¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

INTERNAL MEDIUM DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



AS 3217, AS 4299 or MIL-DTL-27426/3 Specifications. Please see page 24.



ORDER OPTIONS

XWH 206

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

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Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
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
XWH 437	4.375	4.543	0.228	0.061	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	4.698	0.068	21930	36720

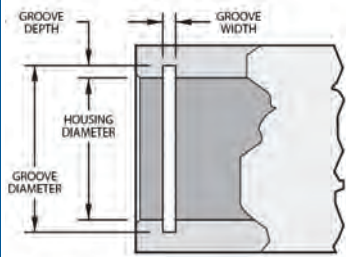
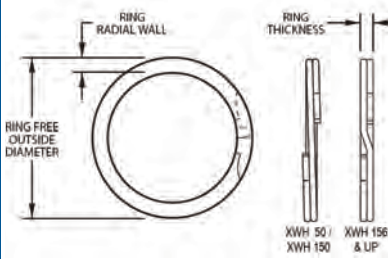
Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



AS 3217, AS 4299 or MIL-DTL-27426/3 Specifications. Please see page 24.



ORDER OPTIONS

XWH 462

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²
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	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	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	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	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	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	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	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	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	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	8.141	0.312	0.086	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	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	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	9.732	0.094	77900	107800
XWH 975	9.750	10.068	0.375	0.086	9.992	0.094	83390	110640
XWH1000	10.000	10.320	0.375	0.086	10.242	0.094	85530	113470
XWH1025	10.250	10.582	0.375	0.086	10.502	0.094	91290	116310
XWH1050	10.500	10.834	0.375	0.086	10.752	0.094	93520	119150
XWH1075	10.750	11.095	0.375	0.086	11.012	0.094	99540	121990
XWH1100	11.000	11.347	0.375	0.086	11.262	0.094	101860	124820

Dimensions in inches

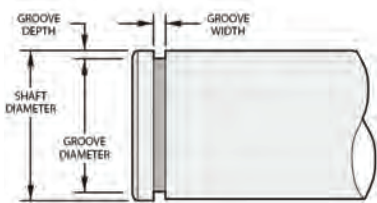
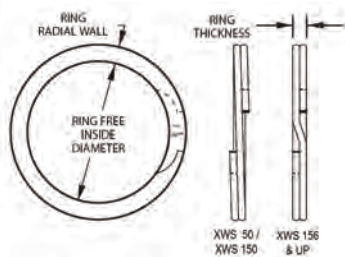
¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

EXTERNAL MEDIUM DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



AS 3218, AS 4299 or MIL-DTL-27426/1 Specifications. Please see page 24.



ORDER OPTIONS

XWS 50

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

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Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
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
XWS 187	1.875	1.789	0.128	0.049	1.808	0.056	4510	12120
XWS 193	1.938	1.851	0.128	0.049	1.871	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

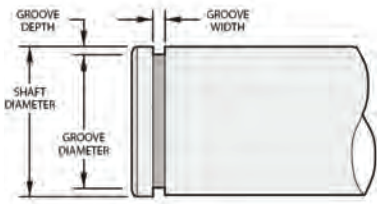
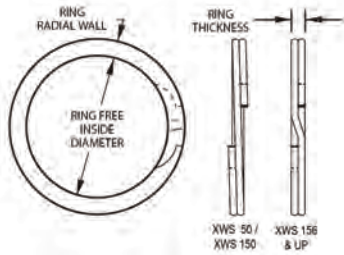
Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



AS 3218, AS 4299 or MIL-DTL-27426/1 Specifications. Please see page 24.



ORDER OPTIONS

XWS 218

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

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Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²
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	4.022	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
XWS 437	4.375	4.208	0.228	0.061	4.245	0.068	20100	35210
XWS 443	4.437	4.271	0.228	0.061	4.307	0.068	20390	35710
XWS 450	4.500	4.326	0.238	0.061	4.364	0.068	21630	36220
XWS 456	4.562	4.384	0.250	0.072	4.422	0.079	22570	43340
XWS 462	4.625	4.447	0.250	0.072	4.485	0.079	22890	43940
XWS 468	4.687	4.508	0.250	0.072	4.547	0.079	23190	44530

Dimensions in inches

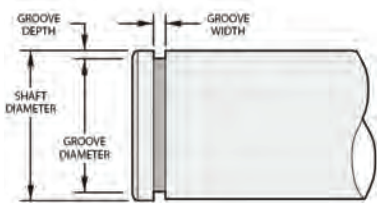
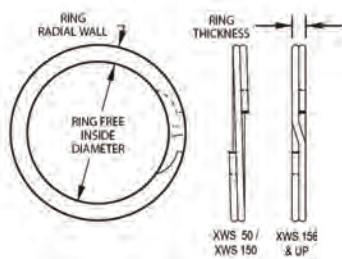
¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

EXTERNAL MEDIUM DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



AS 3218, AS 4299 or MIL-DTL-27426/1 Specifications. Please see page 24.



ORDER OPTIONS

XWS 472

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

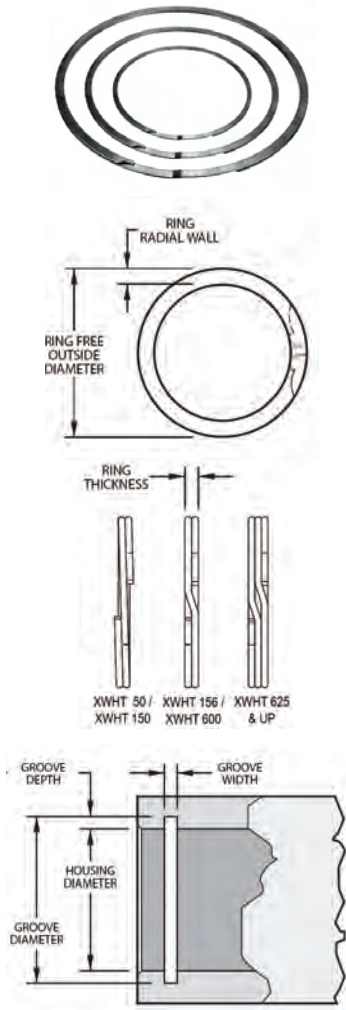
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Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY									
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²								
XWS 472	4.724	4.546	+0/-0.040	0.250	0.072	±.006	0.079	23370	44880							
XWS 475	4.750	4.571		0.250				0.072	4.610	0.079	23500	45130				
XWS 481	4.812	4.633		0.250				0.072	4.672	0.079	23810	45720				
XWS 487	4.875	4.695		0.250				0.072	4.735	0.079	24120	46310				
XWS 493	4.937	4.757		0.250				0.072	4.797	0.079	24430	46900				
XWS 500	5.000	4.816		0.250				0.072	4.856	0.079	25450	47500				
XWS 511	5.118	4.934		0.250				0.072	4.974	0.079	26050	48620				
XWS 512	5.125	4.939		0.250				0.072	4.981	0.079	26080	48690				
XWS 525	5.250	5.064		±.005				0.250	0.072	±.007	0.079	26720	49880			
XWS 537	5.375	5.187						0.250				0.072	5.228	0.079	28120	51060
XWS 550	5.500	5.308	0.250		0.072	5.353	0.079	28770				52250				
XWS 551	5.511	5.320	0.250		0.072	5.364	0.079	28830				52360				
XWS 562	5.625	5.433	+0/-0.050		0.250	0.072	±.007	0.079				29420	53440			
XWS 575	5.750	5.550			0.250							0.072	5.597	0.079	31300	54630
XWS 587	5.875	5.674			0.250							0.072	5.722	0.079	31980	55810
XWS 590	5.905	5.705			0.250							0.072	5.752	0.079	32140	56100
XWS 600	6.000	5.798			0.250							0.072	5.847	0.079	32660	57000
XWS 612	6.125	5.903			0.312							0.086	5.953	0.094	37230	69500
XWS 625	6.250	6.026		0.312	0.086				6.078	0.094	37990	70920				
XWS 629	6.299	6.076		0.312	0.086				6.127	0.094	38290	71480				
XWS 637	6.375	6.152		0.312	0.086				6.203	0.094	38750	72340				
XWS 650	6.500	6.274		0.312	0.086				6.328	0.094	39510	73760				
XWS 662	6.625	6.390	+0/-0.060	0.312	0.086	±.004	0.094	42620	75180							
XWS 675	6.750	6.513		0.312				0.086	6.568	0.094	43420	76600				
XWS 687	6.875	6.638		0.312				0.086	6.693	0.094	44220	78010				
XWS 700	7.000	6.761		0.312				0.086	6.818	0.094	45030	79430				
XWS 712	7.125	6.877		0.312				0.086	6.933	0.094	48350	80850				
XWS 725	7.250	6.999		0.312				0.086	7.058	0.094	49200	82270				
XWS 737	7.375	7.125		0.312				0.086	7.183	0.094	50050	83690				
XWS 750	7.500	7.250		0.312				0.086	7.308	0.094	50890	85110				
XWS 762	7.625	7.363		0.312				0.086	7.423	0.094	54440	86520				
XWS 775	7.750	7.486		±.006				0.312	0.086	±.008	0.094	55330	87940			
XWS 787	7.875	7.611	0.312		0.086	7.673	0.094	56220				89360				
XWS 800	8.000	7.734	0.312		0.086	7.798	0.094	57110				90780				
XWS 825	8.250	7.972	0.375		0.086	8.038	0.094	61820				93620				
XWS 850	8.500	8.220	0.375		0.086	8.288	0.094	63690				96450				
XWS 875	8.750	8.459	0.375		0.086	8.528	0.094	68650				99290				
XWS 900	9.000	8.707	+0/-0.070		0.375	0.086	0.094	0.094				70620	102130			
XWS 925	9.250	8.945			0.375							0.086	9.018	0.094	75850	104960
XWS 950	9.500	9.194			0.375							0.086	9.268	0.094	77900	107800
XWS 975	9.750	9.432			0.375							0.086	9.508	0.094	83390	110640
XWS1000	10.000	9.680		0.375	0.086				9.758	0.094	85530	113470				
XWS1025	10.250	9.918		0.375	0.086				9.998	0.094	91290	116310				
XWS1050	10.500	10.166		0.375	0.086				10.248	0.094	93520	119150				
XWS1075	10.750	10.405		0.375	0.086				10.488	0.094	99540	121990				
XWS1100	11.000	10.653		0.375	0.086				10.738	0.094	101860	124820				

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XWHT 50

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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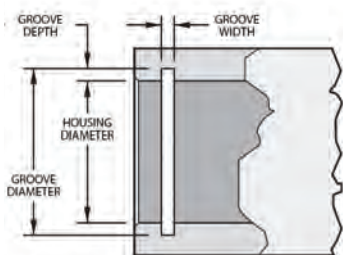
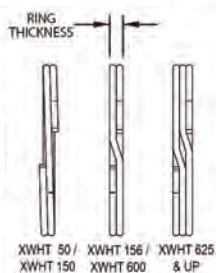
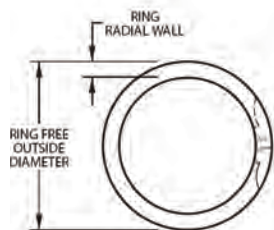
Part Number	Housing Diameter	Outside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY		
			Radial Wall			Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²	
XWHT 50	0.500	0.529	0.045		0.035	0.524	±.002	0.039	420	2530
XWHT 51	0.512	0.541	0.045		0.035	0.536		0.039	430	2590
XWHT 56	0.562	0.597	0.045		0.035	0.592		0.039	600	2840
XWHT 62	0.625	0.665	0.045		0.035	0.659		0.039	750	3160
XWHT 68	0.688	0.730	0.055		0.035	0.724		0.039	880	3480
XWHT 75	0.750	0.796	0.055		0.035	0.790		0.039	1060	3790
XWHT 77	0.777	0.825	0.065	+0.013/-0	0.042	0.819	±.003	0.046	1150	4720
XWHT 81	0.812	0.864	0.065		0.042	0.857		0.046	1320	4930
XWHT 86	0.866	0.919	0.065		0.042	0.912		0.046	1410	5260
XWHT 87	0.875	0.929	0.065		0.042	0.922		0.046	1480	5310
XWHT 90	0.901	0.957	0.065		0.042	0.950		0.046	1590	5470
XWHT 93	0.938	0.997	0.075		0.042	0.989		0.046	1720	5690
XWHT 100	1.000	1.063	0.075		0.042	1.055		0.046	1980	6070
XWHT 102	1.023	1.087	0.075		0.042	1.079		0.046	2030	6210
XWHT 106	1.062	1.129	0.078		0.050	1.120		0.056	2180	7010
XWHT 112	1.125	1.195	0.078		0.050	1.185		0.056	2390	7420
XWHT 118	1.188	1.260	0.088		0.050	1.250		0.056	2600	7840
XWHT 125	1.250	1.330	0.093	+0.015/-0	0.050	1.320	±.004	0.056	3090	8250
XWHT 131	1.312	1.395	0.093		0.050	1.385		0.056	3430	8660
XWHT 137	1.375	1.461	0.098		0.050	1.450		0.056	3690	9070
XWHT 143	1.438	1.526	0.103		0.050	1.515		0.056	3960	9490
XWHT 145	1.456	1.546	0.108		0.050	1.535		0.056	4120	9610
XWHT 150	1.500	1.591	0.108		0.050	1.580		0.056	4240	9900
XWHT 156	1.562	1.659	0.113		0.062	1.647		0.068	4750	12780
XWHT 162	1.625	1.727	0.113		0.062	1.715		0.068	5170	13290
XWHT 165	1.653	1.757	0.118		0.062	1.745		0.068	5380	13520
XWHT 168	1.688	1.793	0.118		0.062	1.780		0.068	5490	13810
XWHT 175	1.750	1.858	0.118	+0.020/-0	0.062	1.845	±.005	0.068	5940	14320
XWHT 181	1.812	1.923	0.123		0.062	1.910		0.068	6280	14820
XWHT 185	1.850	1.963	0.123		0.062	1.949		0.068	6540	15130
XWHT 187	1.875	1.989	0.128		0.062	1.975		0.068	6630	15340
XWHT 193	1.938	2.054	0.128		0.062	2.040		0.068	6990	15850
XWHT 200	2.000	2.125	0.138		0.062	2.110		0.068	7780	16360
XWHT 206	2.062	2.190	0.141		0.078	2.175		0.086	8310	21220
XWHT 212	2.125	2.255	0.141		0.078	2.240		0.086	8710	21870
XWHT 218	2.188	2.321	0.141		0.078	2.305		0.086	9130	22520
XWHT 225	2.250	2.386	0.141		0.078	2.370		0.086	9540	23160
XWHT 231	2.312	2.457	0.188		0.078	2.440		0.086	10460	23800
XWHT 237	2.375	2.522	0.188		0.078	2.505		0.086	10910	24440
XWHT 244	2.440	2.588	0.188		0.078	2.570		0.086	11210	25110
XWHT 250	2.500	2.653	0.188	+0.025/-0	0.078	2.635	±.006	0.086	12020	25730
XWHT 253	2.531	2.687	0.188		0.078	2.668		0.086	12350	26050
XWHT 256	2.562	2.720	0.188		0.093	2.700		0.103	12500	29940
XWHT 262	2.625	2.785	0.188		0.093	2.765		0.103	12990	30680
XWHT 268	2.688	2.855	0.188		0.093	2.834		0.103	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

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

INTERNAL MEDIUM/HEAVY DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XWHT 283

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

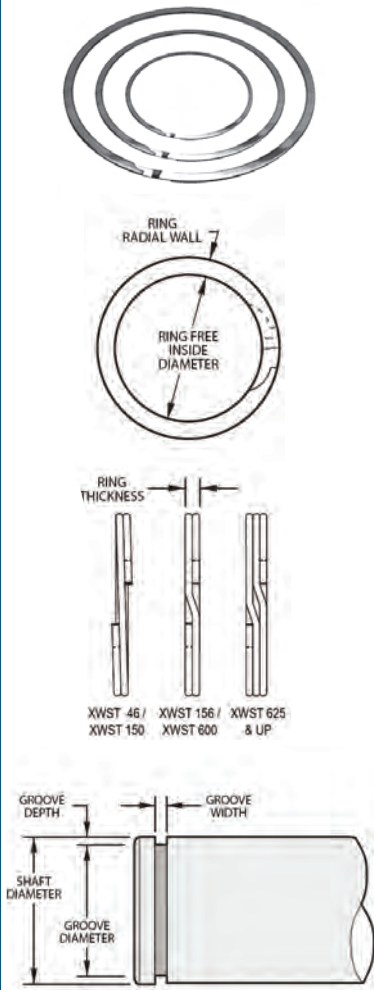
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Part Number	Housing Diameter	RING			GROOVE		THRUST CAPACITY	
		Outside Diameter	Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²
XWHT 283	2.834	3.009	0.188	0.093	2.987	0.103	15430	33120
XWHT 287	2.875	3.053	0.188	0.093	3.030	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	0.250	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	0.312	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	0.375	0.127	5.520	0.139	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
XWHT 625	6.250	6.576	0.312	0.165	6.530	0.174	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
XWHT1000	10.000	10.552	0.375	0.189	10.450	0.209	159040	237500
XWHT1050	10.500	11.072	0.375	0.189	10.970	0.209	174420	249380

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XWST 46

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SAMPLE ?

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Part Number	Shaft Diameter	Inside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY		
			Radial Wall			Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²	
XWST 46	0.469	0.436	0.045		0.025	0.443	±.002	0.029	430	1800
XWST 50	0.500	0.469	0.045		0.035	0.474		0.039	460	2530
XWST 55	0.551	0.518	0.045		0.035	0.524		0.039	550	2790
XWST 56	0.562	0.529	0.045		0.035	0.535		0.039	560	2840
XWST 59	0.594	0.559	0.045		0.035	0.565		0.039	630	3000
XWST 62	0.625	0.590	0.055		0.035	0.596		0.039	660	3160
XWST 66	0.669	0.630	0.055		0.035	0.638		0.039	760	3380
XWST 68	0.688	0.648	0.065		0.042	0.655	±.003	0.046	830	4180
XWST 75	0.750	0.708	0.065	+0/-0.013	0.042	0.715		0.046	950	4550
XWST 78	0.781	0.738	0.065		0.042	0.745		0.046	990	4740
XWST 81	0.812	0.768	0.065		0.042	0.776		0.046	1030	4930
XWST 87	0.875	0.827	0.075		0.042	0.835	±.002	0.046	1240	5310
XWST 93	0.938	0.886	0.075		0.042	0.894		0.046	1460	5690
XWST 98	0.984	0.934	0.075		0.042	0.940		0.046	1530	5970
XWST 100	1.000	0.947	0.075		0.042	0.955		0.046	1630	6070
XWST 102	1.023	0.969	0.075		0.042	0.977		0.046	1660	6210
XWST 106	1.062	1.005	0.088		0.050	1.015		0.056	1800	7010
XWST 112	1.125	1.064	0.088		0.050	1.075		0.056	1990	7420
XWST 118	1.188	1.126	0.088		0.050	1.135	±.004	0.056	2270	7370
XWST 125	1.250	1.184	0.093	+0/-0.015	0.050	1.195		0.056	2470	8250
XWST 131	1.312	1.240	0.098		0.050	1.250	±.004	0.056	2880	8660
XWST 137	1.375	1.298	0.103		0.050	1.310		0.056	3210	9070
XWST 143	1.438	1.359	0.103		0.050	1.370		0.056	3460	9490
XWST 150	1.500	1.419	0.103		0.050	1.430		0.056	3710	9900
XWST 156	1.562	1.476	0.108		0.062	1.490		0.068	3980	12780
XWST 162	1.625	1.537	0.118		0.062	1.550		0.068	4370	13290
XWST 168	1.687	1.598	0.118		0.062	1.610		0.068	4650	13800
XWST 175	1.750	1.657	0.118		0.062	1.670	±.005	0.068	4950	14320
XWST 177	1.771	1.676	0.123	+0/-0.020	0.062	1.689		0.068	5130	14490
XWST 181	1.812	1.714	0.123		0.062	1.730		0.068	5250	14820
XWST 187	1.875	1.774	0.123		0.062	1.790		0.068	5700	15340
XWST 196	1.969	1.864	0.123		0.062	1.879		0.068	6260	16110
XWST 200	2.000	1.894	0.128		0.062	1.910		0.068	6360	16360
XWST 206	2.062	1.955	0.141		0.078	1.970		0.086	6710	21220
XWST 212	2.125	2.012	0.141		0.078	2.027	±.003	0.086	7360	21870
XWST 215	2.156	2.041	0.141		0.078	2.057		0.086	7620	22190
XWST 225	2.250	2.129	0.141		0.078	2.145		0.086	8430	23160
XWST 231	2.312	2.188	0.141	+0/-0.025	0.078	2.205		0.086	8830	23800
XWST 237	2.375	2.248	0.141		0.078	2.265		0.086	9230	24440
XWST 243	2.437	2.307	0.141		0.078	2.325	±.006	0.086	9650	25080
XWST 250	2.500	2.366	0.188		0.078	2.385		0.086	10250	25730
XWST 255	2.559	2.424	0.188		0.078	2.443		0.086	10490	26340
XWST 262	2.625	2.485	0.188		0.078	2.505		0.086	11130	27020
XWST 268	2.687	2.545	0.188		0.078	2.565		0.086	11590	27660
XWST 275	2.750	2.604	0.188		0.093	2.625		0.103	12250	32140
XWST 287	2.875	2.722	0.188	+0/-0.030	0.093	2.742		0.103	13620	33600
XWST 293	2.937	2.780	0.188		0.093	2.801		0.103	14120	34320

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

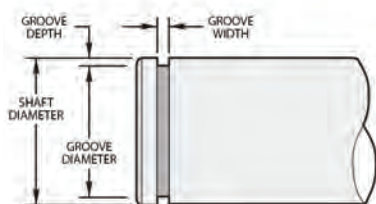
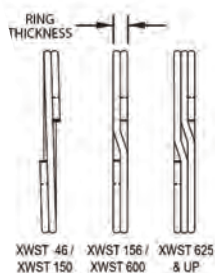
EXTERNAL MEDIUM/HEAVY DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel

Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY						
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²					
XWST 300	3.000	2.838	+0/- .030	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/- .040	0.188	0.093	3.280	0.103	19190	40170				
XWST 350	3.500	3.153		0.250	0.111	3.340	0.120	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	±.005	0.111	±.003	3.458	±.006	0.120	±.005	21520	50560
XWST 368	3.687	3.490		0.250	±.005	0.111	±.003	3.517	±.006	0.120	±.005	22150	51430
XWST 375	3.750	3.550		0.250	±.005	0.111	±.003	3.577	±.006	0.120	±.005	23060	52310
XWST 387	3.875	3.670	+0/- .040	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/- .050	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		0.375	0.127	5.030	0.139	40820	83790				
XWST 550	5.500	5.229		0.375	0.127	±.004	±.007	5.265	0.139	±.006	45880	87780	
XWST 575	5.750	5.466		0.375	0.127	±.004	±.007	5.505	0.139	±.006	49990	91770	
XWST 600	6.000	5.705		0.375	0.127	±.004	±.007	5.745	0.139	±.006	54290	95760	
XWST 625	6.250	5.942	+0/- .060	0.312	0.165	5.985	0.174	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		0.312	0.165	6.942	0.174	78290	172190				
XWST 750	7.500	7.130		0.375	±.006	0.189	7.180	0.209	84820	178130			
XWST 775	7.750	7.368	+0/- .070	0.375	0.189	±.005	±.008	7.420	0.209	±.008/- .0	90390	184070	
XWST 800	8.000	7.607		0.375	0.189	±.005	±.008	7.660	0.209	±.008/- .0	96130	190000	
XWST 825	8.250	7.845		0.375	0.189	±.005	±.008	7.900	0.209	±.008/- .0	102050	195940	
XWST 850	8.500	8.083		0.375	0.189	±.005	±.008	8.140	0.209	±.008/- .0	108150	201880	
XWST 875	8.750	8.321		0.375	0.189	±.005	±.008	8.383	0.209	±.008/- .0	113800	207820	
XWST 900	9.000	8.560		0.375	0.189	±.005	±.008	8.620	0.209	±.008/- .0	120870	213750	
XWST 925	9.250	8.798	+0/- .070	0.375	0.189	±.005	±.008	8.860	0.209	±.008/- .0	127500	219690	
XWST 950	9.500	9.036		0.375	0.189	±.005	±.008	9.100	0.209	±.008/- .0	134300	225630	
XWST 975	9.750	9.273		0.375	0.189	±.005	±.008	9.338	0.209	±.008/- .0	141970	231570	
XWST 1000	10.000	9.508		0.375	0.189	±.005	±.008	9.575	0.209	±.008/- .0	150560	237500	

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3



ORDER OPTIONS

XWST 300

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

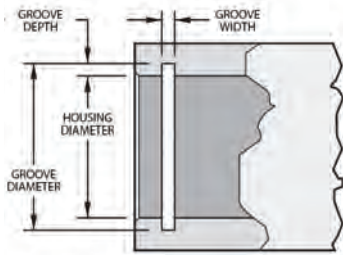
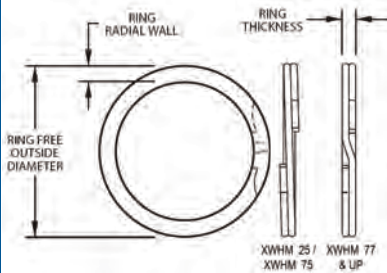
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Stock items in Carbon Steel and Stainless Steel



AS 3215, AS 4299 or MIL-DTL-27426/4 Specifications. Please see page 24.



ORDER OPTIONS

XWHM 25

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

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Part Number	Housing Diameter	Outside Diameter	RING			GROOVE		THRUST CAPACITY							
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²							
XWHM 25*	0.250	0.270	+0.010/-0	0.020	0.015	0.268	0.020	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	0.035	0.025	0.461	0.029	371	1680						
XWHM 50	0.500	0.538	+0.013/-0	0.045	0.035	0.530	±.002	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	0.046	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	+0.013/-0	0.085	0.042	0.959	±.003	1850	5470						
XWHM 93	0.938	1.013		0.085						0.042	1.000	0.046	2060	5690	
XWHM 100	1.000	1.080		0.085						0.042	1.066	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						±.004	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	0.128	1.658	0.068	±.004/-0	5300	12780						
XWHM 162	1.625	1.742		0.128				0.062	1.725	0.068	5740	13290			
XWHM 165	1.653	1.772		0.128				0.062	1.755	0.068	5960	13520			
XWHM 168	1.688	1.810		0.128				0.062	1.792	0.068	6210	13810			
XWHM 175	1.750	1.876		0.128				0.062	1.858	0.068	6680	14320			
XWHM 181	1.812	1.940		0.128				0.062	1.922	0.068	7050	14820			
XWHM 185	1.850	1.981		0.158				0.062	1.962	0.068	7320	15130			
XWHM 187	1.875	2.008		0.158				0.062	1.989	0.068	7560	15340			
XWHM 193	1.938	2.075		0.158				0.062	2.056	0.068	8080	15850			
XWHM 200	2.000	2.142		0.158				0.062	2.122	0.068	8620	16360			
XWHM 206	2.062	2.201	+0.025/-0	0.168	2.186	0.086	±.005	9040	21220						
XWHM 212	2.125	2.267		0.168				0.078	2.251	0.086	9460	21870			
XWHM 218	2.188	2.334		0.168				0.078	2.318	0.086	10050	22520			
XWHM 225	2.250	2.399		0.168				0.078	2.382	0.086	10500	23160			
XWHM 231	2.312	2.467		0.200				0.078	2.450	0.086	11280	23800			
XWHM 237	2.375	2.535		0.200				0.078	2.517	0.086	11920	24440			
XWHM 244	2.440	2.602		0.200				0.078	2.584	0.086	12420	25110			
XWHM 250	2.500	2.667		0.200				±.005	2.648	0.086	13080	25730			
XWHM 253	2.531	2.700		0.200					0.078	2.681	0.086	13420	26050		
XWHM 256	2.562	2.733		0.225					0.093	2.714	0.103	13760	29940		
XWHM 262	2.625	2.801	0.225	0.093	2.781	0.103	14470		30680						
XWHM 268	2.688	2.868	0.225	0.093	2.848	0.103	15200		31410						
XWHM 275	2.750	2.934	0.225	0.093	2.914	0.103	15940		32140						
XWHM 281	2.813	3.001	0.225	0.093	2.980	0.103	16700		32880						
XWHM 283	2.834	3.027	0.225	0.093	3.006	0.103	17230		33120						
XWHM 287	2.875	3.072	0.225	0.093	3.051	0.103	17880		33600						
XWHM 300	3.000	3.204	0.225	0.093	3.182	0.103	18300		35060						

Dimensions in inches

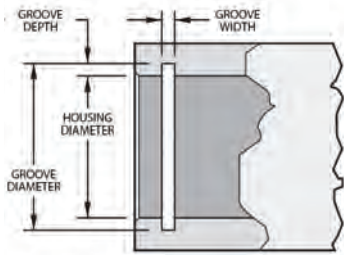
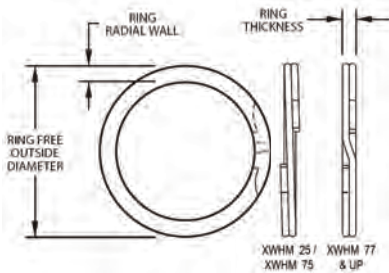
¹No removal notch. ²Based on groove material yield strength of 45000 psi and safety factor of 2. ³Based on a safety factor of 3

INTERNAL HEAVY DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



AS 3215, AS 4299 or MIL-DTL-27426/4 Specifications. Please see page 24.



ORDER OPTIONS

XWHM 306

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

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Part Number	Housing Diameter	Outside Diameter	RING			GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness		Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²
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	±.005	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	0.281	0.111		3.755	0.120	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	±.003	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	4.395	0.312	0.111		4.365	0.120	34990	57540
XWHM 425	4.250	4.520	0.312	0.111		4.490	0.120	36050	59280
XWHM 433	4.330	4.600	0.312	0.111		4.570	0.120	36730	60400
XWHM 450	4.500	4.770	0.312	0.111		4.740	0.120	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	±.006	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	5.685	0.350	0.127		5.645	0.139	51290	85780
XWHM 550	5.500	5.810	0.350	0.127	±.004	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	0.380	0.156		6.530	0.174	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	0.437	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
XWHM1000	10.000	10.523	0.500	0.187		10.450	0.209	159040	234990
XWHM1025	10.250	10.786	0.500	0.187		10.711	0.209	167370	240870
XWHM1050	10.500	11.047	0.500	0.187	±.005	10.970	0.209	174420	246740
XWHM1075	10.750	11.313	0.500	0.187		11.234	0.209	183890	252620
XWHM1100	11.000	11.575	0.500	0.187		11.495	0.209	192830	258490
XWHM1125	11.250	11.838	0.500	0.187		11.756	0.209	201190	264370
XWHM1150	11.500	12.102	0.562	0.187		12.018	0.209	210540	270240
XWHM1175	11.750	12.365	0.562	0.187		12.279	0.209	220100	276120
XWHM1200	12.000	12.628	0.562	0.187	±.120/-0	12.540	0.209	229020	281990
XWHM1225	12.250	12.891	0.562	0.187		12.801	0.209	238990	287860
XWHM1250	12.500	13.154	0.562	0.187		13.063	0.209	249170	293740
XWHM1275	12.750	13.417	0.562	0.187		13.324	0.209	258660	299610
XWHM1300	13.000	13.680	0.662	0.187		13.585	0.209	269240	305490
XWHM1325	13.250	13.943	0.662	0.187	±.015	13.846	0.209	279100	311360
XWHM1350	13.500	14.207	0.662	0.187		14.108	0.209	290100	317240
XWHM1375	13.750	14.470	0.662	0.187		14.369	0.209	301300	323110
XWHM1400	14.000	14.732	0.662	0.187		14.630	0.209	311730	328990
XWHM1425	14.250	14.995	0.662	0.187		14.891	0.209	323340	334860
XWHM1450	14.500	15.259	0.750	0.187	±.140/-0	15.153	0.209	335160	340740
XWHM1475	14.750	15.522	0.750	0.187		15.414	0.209	346150	346610
XWHM1500	15.000	15.785	0.750	0.187		15.675	0.209	358380	352490

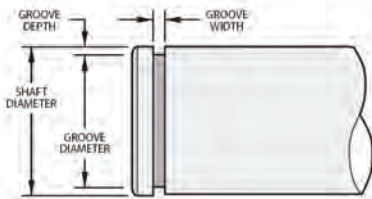
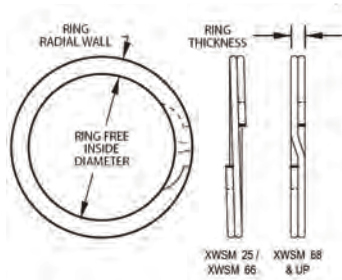
Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



AS 3216, AS 4299 or MIL-DTL-27426/2 Specifications. Please see page 24.



ORDER OPTIONS

XWSM 25

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02
- 316 Stainless Steel S16

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
XWSM 25*	0.250	0.228	0.020	0.025	0.230	0.029	177	961
XWSM 31*	0.312	0.287	0.025	0.025	0.290	0.029	243	1200
XWSM 37*	0.375	0.349	0.030	0.025	0.352	0.029	305	1442
XWSM 43	0.437	0.409	0.035	0.025	0.412	0.029	386	1680
XWSM 46	0.469	0.439	0.045	0.025	0.443	0.029	430	1880
XWSM 50	0.500	0.464	0.050	0.035	0.468	0.039	570	2530
XWSM 55	0.551	0.514	0.050	0.035	0.519	0.039	620	2790
XWSM 56	0.562	0.525	0.050	0.035	0.530	0.039	640	2840
XWSM 59	0.594	0.554	0.050	0.035	0.559	0.039	760	3000
XWSM 62	0.625	0.583	0.055	0.035	0.588	0.039	840	3160
XWSM 66	0.669	0.623	0.055	0.035	0.629	0.039	950	3380
XWSM 68	0.688	0.641	0.065	0.042	0.646	0.046	1020	4180
XWSM 75	0.750	0.698	0.065	0.042	0.704	0.046	1220	4550
XWSM 78	0.781	0.727	0.065	0.042	0.733	0.046	1330	4740
XWSM 81	0.812	0.756	0.065	0.042	0.762	0.046	1440	4930
XWSM 87	0.875	0.814	0.075	0.042	0.821	0.046	1670	5310
XWSM 93	0.938	0.875	0.075	0.042	0.882	0.046	1860	5690
XWSM 98	0.984	0.919	0.085	0.042	0.926	0.046	2020	5970
XWSM 100	1.000	0.932	0.085	0.042	0.940	0.046	2120	6070
XWSM 102	1.023	0.953	0.085	0.042	0.961	0.046	2240	6210
XWSM 106	1.062	0.986	0.103	0.050	0.998	0.056	2400	7010
XWSM 112	1.125	1.047	0.103	0.050	1.059	0.056	2620	7420
XWSM 118	1.188	1.105	0.103	0.050	1.118	0.056	2940	7840
XWSM 125	1.250	1.163	0.103	0.050	1.176	0.056	3270	8250
XWSM 131	1.312	1.218	0.118	0.050	1.232	0.056	3710	8660
XWSM 137	1.375	1.277	0.118	0.050	1.291	0.056	4080	9070
XWSM 143	1.438	1.336	0.118	0.050	1.350	0.056	4470	9490
XWSM 150	1.500	1.390	0.118	0.050	1.406	0.056	4980	9900
XWSM 156	1.562	1.453	0.128	0.062	1.468	0.068	5190	12780
XWSM 162	1.625	1.513	0.128	0.062	1.529	0.068	5510	13290
XWSM 168	1.687	1.573	0.128	0.062	1.589	0.068	5840	13800
XWSM 175	1.750	1.633	0.128	0.062	1.650	0.068	6190	14320
XWSM 177	1.771	1.651	0.128	0.062	1.669	0.068	6380	14490
XWSM 181	1.812	1.690	0.128	0.062	1.708	0.068	6660	14820
XWSM 187	1.875	1.751	0.158	0.062	1.769	0.068	7020	15340
XWSM 196	1.969	1.838	0.158	0.062	1.857	0.068	7790	16110
XWSM 200	2.000	1.867	0.158	0.062	1.886	0.068	8060	16360
XWSM 206	2.062	1.932	0.168	0.078	1.946	0.086	8450	21220
XWSM 212	2.125	1.989	0.168	0.078	2.003	0.086	9160	21870
XWSM 215	2.156	2.018	0.168	0.078	2.032	0.086	9450	22190
XWSM 225	2.250	2.105	0.168	0.078	2.120	0.086	10340	23160
XWSM 231	2.312	2.163	0.168	0.078	2.178	0.086	10950	23800
XWSM 237	2.375	2.223	0.200	0.078	2.239	0.086	11420	24440
XWSM 243	2.437	2.283	0.200	0.078	2.299	0.086	11890	25080
XWSM 250	2.500	2.343	0.200	0.078	2.360	0.086	12370	25730
XWSM 255	2.559	2.402	0.200	0.078	2.419	0.086	12660	26340
XWSM 262	2.625	2.464	0.200	0.078	2.481	0.086	13360	27020
XWSM 268	2.687	2.523	0.200	0.078	2.541	0.086	13870	27660
XWSM 275	2.750	2.584	0.225	0.093	2.602	0.103	14390	32140
XWSM 287	2.875	2.702	0.225	0.093	2.721	0.103	15650	33600
XWSM 293	2.937	2.760	0.225	0.093	2.779	0.103	16400	34320
XWSM 300	3.000	2.818	0.225	0.093	2.838	0.103	17180	35060
XWSM 306	3.062	2.878	0.225	0.093	2.898	0.103	17750	35790
XWSM 312	3.125	2.936	0.225	0.093	2.957	0.103	18560	36520
XWSM 315	3.156	2.965	0.225	0.093	2.986	0.103	18960	36880

Dimensions in inches

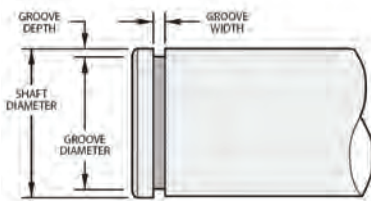
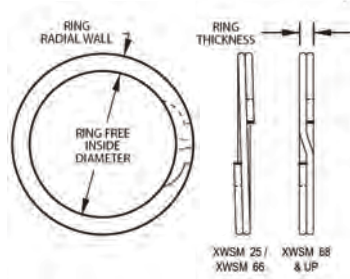
¹No removal notch. ²Based on groove material yield strength of 45000 psi and safety factor of 2. ³Based on a safety factor of 3

EXTERNAL HEAVY DUTY SERIES IMPERIAL

Stock items in Carbon Steel and Stainless Steel



AS 3216, AS 4299 or MIL-DTL-27426/2 Specifications. Please see page 24.



ORDER OPTIONS

XWSM 325

Material Options:
 Carbon Steel (blank)
 302 Stainless Steel S02
 316 Stainless Steel S16

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

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Part Number	Shaft Diameter	Inside Diameter	RING			GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness		Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
XWSM 325	3.250	3.054		0.225	0.093	3.076	0.103	19990	37980
XWSM 334	3.344	3.144		0.225	0.093	3.166	0.103	21040	39080
XWSM 343	3.437	3.234	+0/-0.030	0.225	0.093	3.257	0.103	21870	40170
XWSM 350	3.500	3.293		0.270	0.111	3.316	0.120	22760	48820
XWSM 354	3.543	3.333		0.270	0.111	3.357	0.120	23290	49420
XWSM 362	3.625	3.411		0.270	0.111	3.435	0.120	24340	50560
XWSM 368	3.687	3.469		0.270	0.111	3.493	0.120	25280	51430
XWSM 375	3.750	3.527		0.270	±0.005	3.552	±0.006	26240	52310
XWSM 387	3.875	3.647	+0/-0.035	0.270	0.111	3.673	0.120	27670	54050
XWSM 393	3.938	3.708		0.270	0.111	3.734	0.120	28390	54930
XWSM 400	4.000	3.765		0.270	0.111	3.792	0.120	29410	55800
XWSM 425	4.250	4.037		0.270	0.111	4.065	0.120	27940	59280
XWSM 437	4.375	4.161		0.270	0.111	4.190	0.120	28760	61030
XWSM 450	4.500	4.280		0.270	0.111	4.310	0.120	30220	62770
XWSM 475	4.750	4.518		0.270	0.111	4.550	0.120	36930	66260
XWSM 500	5.000	4.756		0.270	0.111	4.790	0.120	37110	69740
XWSM 525	5.250	4.995	+0/-0.050	0.350	0.127	5.030	0.139	40820	83790
XWSM 550	5.500	5.228		0.350	±0.006	5.265	±0.007	45880	87780
XWSM 575	5.750	5.466		0.350	0.127	5.505	0.139	49990	91770
XWSM 600	6.000	5.705		0.350	0.127	5.745	0.139	54290	95760
XWSM 625	6.250	5.938	+0/-0.060	0.418	0.156	5.985	0.174	58760	122520
XWSM 650	6.500	6.181		0.418	0.156	6.225	0.174	63410	127420
XWSM 675	6.750	6.410		0.418	0.156	6.465	0.174	68230	132330
XWSM 700	7.000	6.648		0.418	0.156	6.705	0.174	73230	137230
XWSM 725	7.250	6.891		0.418	0.156	6.942	0.174	78920	142130
XWSM 750	7.500	7.130		0.437	0.187	7.180	0.209	84820	176240
XWSM 775	7.750	7.368		0.437	0.187	7.420	0.209	90390	182120
XWSM 800	8.000	7.606		0.437	0.187	7.660	0.209	96130	187990
XWSM 825	8.250	7.845	+0/-0.070	0.437	0.187	7.900	±0.008	102050	193870
XWSM 850	8.500	8.083		0.437	0.187	8.140	0.209	108150	199740
XWSM 875	8.750	8.324		0.437	±0.007	8.383	0.209	113800	205620
XWSM 900	9.000	8.560		0.500	0.187	8.620	0.209	120870	211490
XWSM 925	9.250	8.798		0.500	0.187	8.860	0.209	127500	217370
XWSM 950	9.500	9.036		0.500	0.187	9.100	0.209	134300	223240
XWSM 975	9.750	9.275		0.500	0.187	9.338	0.209	141970	229120
XWSM1000	10.000	9.508		0.500	0.187	9.575	0.209	150560	234990
XWSM1025	10.250	9.745		0.500	0.187	9.814	0.209	157950	240870
XWSM1050	10.500	9.984		0.500	0.187	10.054	0.209	165510	246740
XWSM1075	10.750	10.221		0.500	0.187	10.293	0.209	174010	252620
XWSM1100	11.000	10.459	+0/-0.090	0.500	0.187	10.533	0.209	181950	258490
XWSM1125	11.250	10.692		0.500	0.187	10.772	0.209	190060	264360
XWSM1150	11.500	10.934		0.562	0.187	11.011	±0.010	199160	270240
XWSM1175	11.750	11.171		0.562	0.187	11.250	0.209	207640	276120
XWSM1200	12.000	11.410		0.562	0.187	11.490	0.209	216300	281990
XWSM1225	12.250	11.647		0.562	0.187	11.729	0.209	226000	287860
XWSM1250	12.500	11.885		0.562	0.187	11.969	0.209	235030	293740
XWSM1275	12.750	12.124		0.562	0.187	12.208	0.209	244240	299610
XWSM1300	13.000	12.361		0.662	0.187	12.448	0.209	253620	305490
XWSM1325	13.250	12.598		0.662	0.187	12.687	0.209	264120	311360
XWSM1350	13.500	12.837		0.662	0.187	12.927	0.209	273870	317240
XWSM1375	13.750	13.074	+0/-0.110	0.662	±0.015/-0.010	13.166	±0.012	283800	323110
XWSM1400	14.000	13.311		0.662	0.187	13.405	0.209	294900	328990
XWSM1425	14.250	13.548		0.662	0.187	13.644	0.209	305200	334860
XWSM1450	14.500	13.787		0.750	0.187	13.884	0.209	315680	340740
XWSM1475	14.750	14.024		0.750	0.187	14.123	0.209	327380	346610
XWSM1500	15.000	14.262		0.750	0.187	14.363	0.209	338230	352490

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

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.

Similar to a bowed circlip, with the added advantages of being able to offer precise loads, no lugs to interfere with other components, and a full 360° contact surface.

Once assembled the WaveRing can reduce end-play, vibration and eliminate tolerance stack up in an assembly.

Designed to fit into a groove, the WaveRing applies pressure in two directions; against the groove wall and against the mating components. Single, double or multiple turns in the WaveRing are possible, as well as a choice of materials. The following standard stocked parts are available in carbon steel or 17/7PH stainless steel.



WAVERINGS APPLICATIONS



GEAR BRACKET

The worm gear shaft is held in place and pre-loaded using a WaveRing. The WaveRing fits an internal groove and the waveform in the ring allows the gear/shaft to float axially as the gear rotates.

NEED A SPECIAL



Our engineers are available to discuss your application

(see page 3 for further details)

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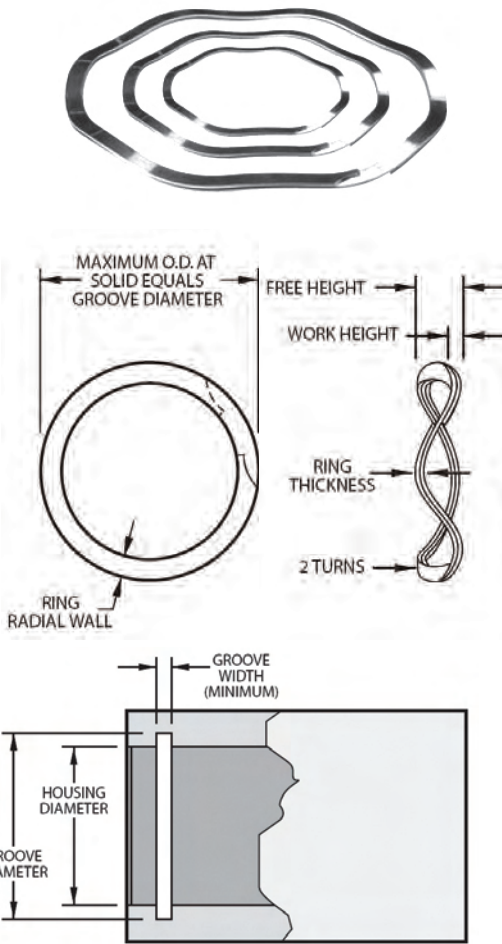
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INTERNAL WAWERINGS IMPERIAL

Stock items in Carbon Steel and 177PH Stainless Steel

Part Number	Housing Diameter	Load (lb) @ Work Height	Max. Free Height	Number of Waves	RING			GROOVE	
					Thickness	Radial Wall	Crimp	Diameter	Width Min.
YVHW-075	0.750	25 @ .080	0.114	3	0.035	0.065	N	0.796	0.119
YVHW-087	0.875	30 @ .085	0.110	3	0.042	0.085	N	0.931	0.115
YVHW-100	1.000	34 @ .085	0.120	3	0.042	0.085	N	1.066	0.125
YVHW-112	1.125	38 @ .100	0.125	3	0.050	0.128	N	1.197	0.130
YVHW-125	1.250	40 @ .100	0.135	3	0.050	0.128	N	1.330	0.140
YVHW-137	1.375	45 @ .100	0.125	4	0.050	0.128	N	1.461	0.130
YVHW-150	1.500	50 @ .100	0.135	4	0.050	0.128	N	1.594	0.140
YVHW-162	1.625	55 @ .110	0.135	4	0.062	0.158	N	1.725	0.140
YVHW-175	1.750	60 @ .110	0.140	4	0.062	0.158	N	1.858	0.145
YVHW-187	1.875	63 @ .110	0.141	4	0.062	0.158	N	1.989	0.146
YVHW-200	2.000	65 @ .110	0.150	4	0.062	0.158	N	2.122	0.155
YVHW-212	2.125	70 @ .130	0.170	4	0.078	0.188	N	2.251	0.175
YVHW-225	2.250	75 @ .130	0.175	4	0.078	0.188	N	2.382	0.180
YVHW-237	2.375	80 @ .130	0.180	4	0.078	0.188	N	2.517	0.185
YVHW-250	2.500	84 @ .130	0.183	4	0.078	0.188	N	2.648	0.188
YVHW-262	2.625	88 @ .170	0.220	4	0.093	0.225	N	2.781	0.225
YVHW-275	2.750	94 @ .170	0.229	4	0.093	0.225	N	2.914	0.234
YVHW-287	2.875	97 @ .170	0.225	4	0.093	0.225	N	3.051	0.230
YVHW-300	3.000	100 @ .170	0.230	4	0.093	0.225	N	3.182	0.235
YVHW-312	3.125	103 @ .185	0.250	4	0.111	0.281	Y	3.315	0.255
YVHW-325	3.250	106 @ .185	0.250	4	0.111	0.281	Y	3.446	0.255
YVHW-358	3.500	115 @ .185	0.245	4	0.111	0.281	Y	3.710	0.250
YVHW-362	3.625	117 @ .185	0.250	4	0.111	0.281	Y	3.841	0.250
YVHW-375	3.750	121 @ .185	0.255	4	0.111	0.312	Y	3.974	0.260
YVHW-387	3.875	126 @ .185	0.260	4	0.111	0.312	Y	4.107	0.265
YVHW-400	4.000	130 @ .185	0.255	4	0.111	0.312	Y	4.240	0.260
YVHW-412	4.125	134 @ .185	0.258	4	0.111	0.312	Y	4.365	0.263
YVHW-425	4.250	140 @ .185	0.264	4	0.111	0.312	Y	4.490	0.269
YVHW-450	4.500	150 @ .185	0.250	5	0.111	0.312	Y	4.740	0.255
YVHW-475	4.750	160 @ .185	0.252	5	0.111	0.312	Y	4.995	0.257
YVHW-500	5.000	170 @ .185	0.247	5	0.111	0.312	Y	5.260	0.252

Dimensions in inches



ORDER OPTIONS

YVHW-075

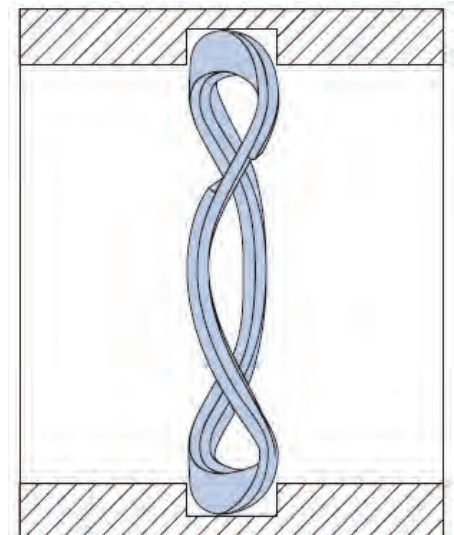
Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

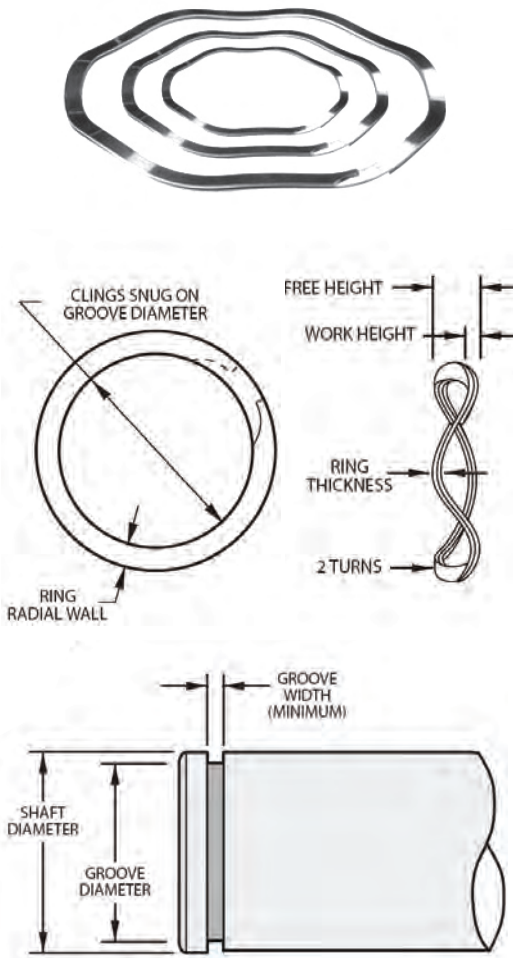
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e Sales@tfc.eu.com



Stock items in Carbon Steel and 17/7PH Stainless Steel

Part Number	Shaft Diameter	Load (lb) @ Work Height	Max. Free Height	Number of Waves	RING			GROOVE	
					Thickness	Radial Wall	Crimp	Diameter	Width Min.
YWSW-075	0.750	25 @ .085	0.115	3	0.042	0.065	N	0.704	0.120
YWSW-087	0.875	30 @ .085	0.131	3	0.042	0.075	N	0.821	0.136
YWSW-100	1.000	34 @ .085	0.129	3	0.042	0.085	N	0.940	0.134
YWSW-112	1.125	38 @ .100	0.137	3	0.050	0.128	N	1.059	0.142
YWSW-125	1.250	40 @ .100	0.145	3	0.050	0.128	N	1.176	0.150
YWSW-137	1.375	45 @ .100	0.130	4	0.050	0.128	N	1.291	0.135
YWSW-150	1.500	50 @ .100	0.126	4	0.050	0.128	N	1.406	0.131
YWSW-162	1.625	55 @ .110	0.138	4	0.062	0.158	N	1.529	0.143
YWSW-175	1.750	60 @ .110	0.137	4	0.062	0.158	N	1.650	0.142
YWSW-187	1.875	63 @ .110	0.140	4	0.062	0.158	N	1.769	0.145
YWSW-200	2.000	65 @ .110	0.145	4	0.062	0.158	N	1.886	0.150
YWSW-212	2.125	70 @ .130	0.170	4	0.078	0.188	N	2.003	0.175
YWSW-225	2.250	75 @ .130	0.175	4	0.078	0.188	N	2.120	0.180
YWSW-237	2.375	80 @ .130	0.175	4	0.078	0.188	N	2.239	0.180
YWSW-250	2.500	84 @ .130	0.171	4	0.078	0.188	N	2.360	0.176
YWSW-262	2.625	88 @ .130	0.181	4	0.078	0.188	N	2.481	0.190
YWSW-275	2.750	94 @ .170	0.217	4	0.093	0.225	Y	2.602	0.222
YWSW-287	2.875	97 @ .170	0.217	4	0.093	0.225	Y	2.721	0.222
YWSW-300	3.000	100 @ .170	0.225	4	0.093	0.225	Y	2.838	0.230
YWSW-312	3.125	103 @ .170	0.230	4	0.093	0.225	Y	2.957	0.235
YWSW-325	3.250	106 @ .170	0.225	4	0.093	0.225	Y	3.076	0.230
YWSW-350	3.500	115 @ .185	0.245	4	0.111	0.281	Y	3.316	0.250
YWSW-362	3.625	117 @ .185	0.250	4	0.111	0.281	Y	3.435	0.255
YWSW-375	3.750	121 @ .185	0.258	4	0.111	0.281	Y	3.552	0.263
YWSW-387	3.875	126 @ .185	0.255	4	0.111	0.281	Y	3.673	0.260
YWSW-400	4.000	130 @ .185	0.268	4	0.111	0.281	Y	3.792	0.273
YWSW-412	4.125	134 @ .185	0.263	4	0.111	0.281	Y	3.919	0.268
YWSW-425	4.250	140 @ .185	0.248	5	0.111	0.281	Y	4.065	0.253
YWSW-450	4.500	150 @ .185	0.256	5	0.111	0.281	Y	4.310	0.261
YWSW-475	4.750	160 @ .185	0.253	5	0.111	0.281	Y	4.550	0.258
YWSW-500	5.000	170 @ .185	0.259	5	0.111	0.281	Y	4.790	0.264

Dimensions in inches



ORDER OPTIONS

YWSW-075

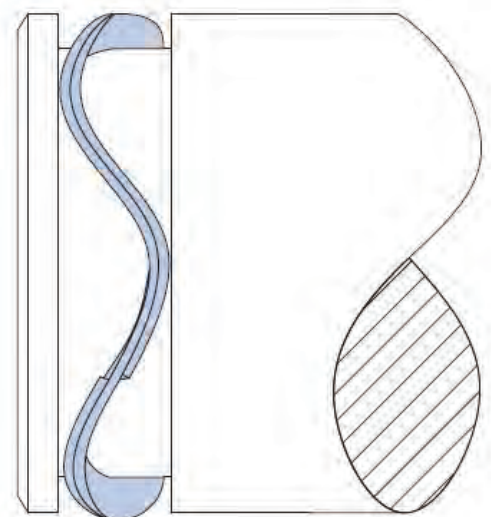
Material Options:
Carbon Steel (blank)
Stainless Steel S17

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

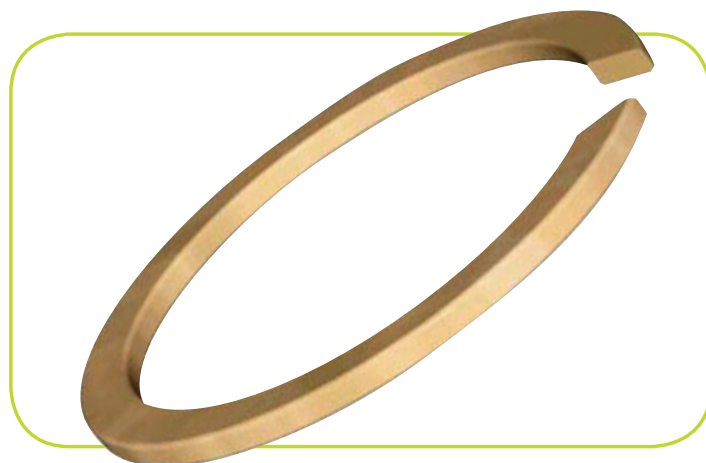
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Another popular type of retaining ring configuration is the well known snap ring. Also produced by edge-winding with no special tooling charges, snap rings have been specified for many years in the automotive and heavy equipment industries as a standard choice for engineers.

TFC have hundreds of standard snap rings in stock, in carbon steel and stainless steel and in both imperial 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 grooves for field servicing.

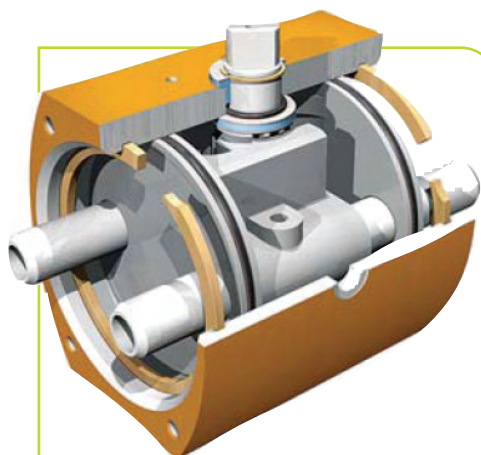


INTERCHANGE LISTING

GROOVE INTERCHANGE ONLY – Our snap rings fit into the same groove as these stamped circlips.

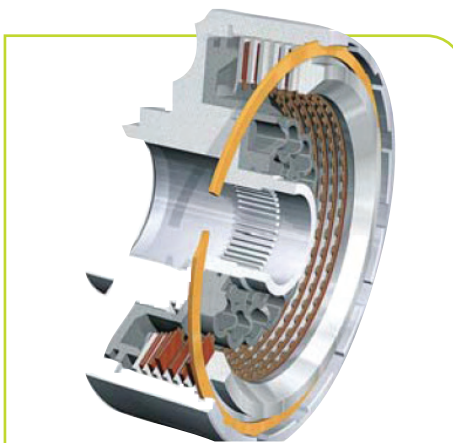
TFC	SPIRAL EQUIVALENT	MILITARY MIL-DTL-27426*	AEROSPACE AS 3219*	METRIC AEROSPACE MA 4035*	EUROPEAN SPECIFICATION DIN	WALDES TRUARC	EATON	IRR	ANDERTON
XFH					DIN 472				D1300
XFS					DIN 471				D1400

SNAP RING APPLICATIONS



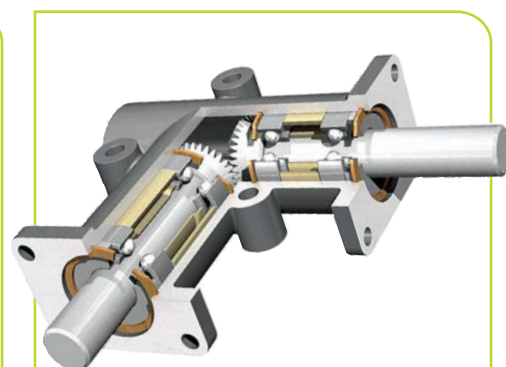
High thrust capacity was needed and a snap ring was selected to absorb the occasional shock loading of the pistons.

Actuator Valve



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

Pneumatic Clutch



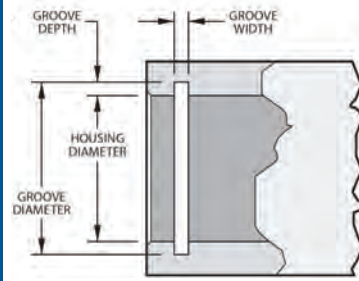
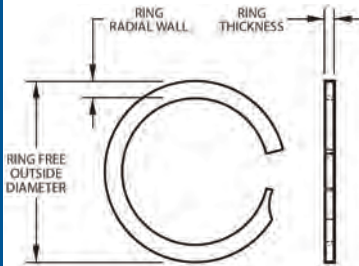
Snap rings secure the bearing assembly by providing removable shoulders in the bore. This simplifies the design of the gear box and replaces costly flanged end-plates.

Right Angle Drive

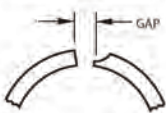
Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 472



END CONFIGURATION



ORDER OPTIONS

XFH 13

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

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Part Number	Housing Diameter	Outside Diameter	RING			GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness		Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XFH 13	13.00	13.73	1.40	0.94		13.60	1.10	1931	10591
XFH 14	14.00	14.74	1.40	0.94		14.60	1.10	2077	11396
XFH 15	15.00	15.85	1.40	0.94		15.70	1.10	2602	12224
XFH 16	16.00	16.90	1.65	0.94		16.80	1.10	3172	13029
XFH 17	17.00	17.97	1.65	0.94		17.80	1.10	3367	13838
XFH 18	18.00	19.18	1.90	0.94		19.00	1.10	4457	14666
XFH 19	19.00	20.25	1.90	0.94		20.00	1.10	4702	15471
XFH 20	20.00	21.20	1.90	0.94		21.00	1.10	4951	16276
XFH 21	21.00	22.21	1.90	0.94		22.00	1.10	5200	17103
XFH 22	22.00	23.22	1.90	0.94		23.00	1.10	5445	17913
XFH 23	23.00	24.23	1.90	0.94		24.00	1.10	5698	18736
XFH 24	24.00	25.40	2.15	1.15		25.20	1.30	6539	23927
XFH 25	25.00	26.45	2.15	1.15		26.20	1.30	6806	24914
XFH 26	26.00	27.46	2.15	1.15		27.20	1.30	7082	25929
XFH 27	27.00	28.47	2.38	1.15		28.20	1.30	7353	26916
XFH 28	28.00	29.68	2.38	1.15	±.10	29.40	1.30	9702	27904
XFH 29	29.00	30.69	2.38	1.15	±.05	30.40	1.30	10053	28918
XFH 30	30.00	31.79	2.38	1.15		31.40	1.30	10395	29905
XFH 31	31.00	33.01	2.38	1.15		32.70	1.30	12660	30893
XFH 32	32.00	33.93	2.38	1.15		33.70	1.30	13073	31907
XFH 33	33.00	35.03	2.38	1.15		34.70	1.30	13478	32895
XFH 34	34.00	36.04	3.25	1.44		35.70	1.60	13892	40319
XFH 35	35.00	37.35	3.25	1.44		37.00	1.60	16899	41493
XFH 36	36.00	38.36	3.25	1.44		38.00	1.60	17375	42663
XFH 37	37.00	39.37	3.25	1.44		39.00	1.60	17869	43868
XFH 38	38.00	40.44	3.25	1.44		40.00	1.60	18344	45043
XFH 40	40.00	42.86	4.01	1.69		42.50	1.85	24265	55621
XFH 41	41.00	43.91	4.01	1.69		43.50	1.85	24866	56995
XFH 42	42.00	44.92	4.01	1.69		44.50	1.85	25484	58410
XFH 45	45.00	47.88	4.01	1.69		47.50	1.85	27303	62578
XFH 47	47.00	49.97	4.01	1.69		49.50	1.85	28504	65331
XFH 48	48.00	50.98	4.01	1.69		50.50	1.85	29118	66741
XFH 50	50.00	53.50	5.08	1.93		53.00	2.15	36529	75282
XFH 51	51.00	54.43	5.08	1.93		54.00	2.15	37249	76776
XFH 52	52.00	55.52	5.08	1.93		55.00	2.15	37974	78266
XFH 55	55.00	58.55	5.08	1.93		58.00	2.15	40163	82777
XFH 56	56.00	59.56	5.08	1.93		59.00	2.15	40906	84307
XFH 57	57.00	60.68	5.08	1.93		60.00	2.15	41631	85797
XFH 58	58.00	61.58	5.08	1.93		61.00	2.15	42352	87287
XFH 60	60.00	63.60	5.08	1.93	±.13	63.00	2.15	43819	90308
XFH 62	62.00	65.58	5.08	1.93	±.08	65.00	2.15	45283	93328
XFH 63	63.00	66.63	5.08	1.93		66.00	2.15	46008	94823
XFH 64	64.00	67.64	5.08	2.41		67.00	2.65	46751	114742
XFH 65	65.00	68.70	5.08	2.41		68.00	2.65	47471	116517
XFH 67	67.00	70.54	5.08	2.41		70.00	2.65	48939	120115
XFH 68	68.00	71.84	5.08	2.41		71.00	2.65	49660	121890
XFH 70	70.00	73.64	5.08	2.41		73.00	2.65	51128	125489

Dimensions in millimeters

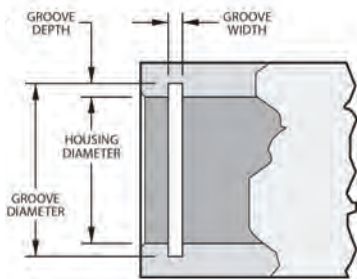
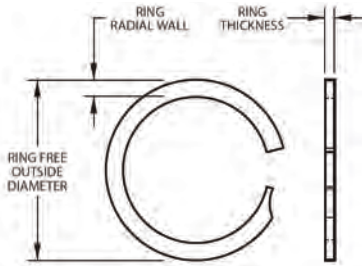
¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

INTERNAL SNAP RINGS METRIC

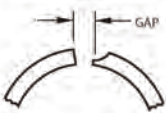
Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 472



END CONFIGURATION



ORDER OPTIONS

XFH 72

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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Part Number	Housing Diameter	Outside Diameter	RING		Thickness	GROOVE		THRUST CAPACITY						
			Radial Wall	Thickness		Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²					
XFH 72	72.00	75.72	+0.76/-0	5.08	±0.08	75.00	+0.30/-0	2.65	+1.14/-0	52591	129083			
XFH 75	75.00	78.75		5.08						2.41	78.00	2.65	54780	134456
XFH 76	76.00	79.88		5.08						2.41	79.00	2.65	55505	136231
XFH 78	78.00	81.73		5.08						2.41	81.00	2.65	56968	139830
XFH 80	80.00	84.30	+0.89/-0	6.02	±0.13	83.50	+0.35/-0	2.65	+1.14/-0	68342	143428			
XFH 82	82.00	86.32		6.02						2.41	85.50	2.65	70033	146978
XFH 85	85.00	89.35		6.30						2.91	88.50	3.15	72595	175046
XFH 88	88.00	92.38		6.30						2.91	91.50	3.15	75175	181269
XFH 90	90.00	94.70	+1.30/-0	6.30	±0.10	93.50	+0.54/-0	3.15	+1.18/-0	76865	185353			
XFH 92	92.00	96.50		6.30						2.91	95.50	3.15	78582	189485
XFH 95	95.00	99.62		6.30						2.91	98.50	3.15	81140	195659
XFH 98	98.00	102.71		6.30						2.91	101.50	3.15	83702	201829
XFH 100	100.00	104.50	+1.40/-0	6.30	±0.15	103.50	+0.72/-0	3.15	+1.18/-0	85415	205962			
XFH 102	102.00	107.27		6.73						3.89	106.00	4.15	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	+1.78/-0	6.73	±0.13	114.00	+0.81/-0	4.15	+1.18/-0	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	+3.05 /-0	6.73	±0.18	129.00	+0.81/-0	4.15	+1.18/-0	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	134.00	4.15	127130	343096
XFH 135	135.00	140.35		6.73						3.89	139.00	4.15	132023	356303
XFH 140	140.00	145.26	+1.78/-0	6.73	±0.10	144.00	+0.63/-0	4.15	+1.18/-0	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	+1.40/-0	8.03	±0.15	165.00	+0.63/-0	4.15	+1.18/-0	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	+1.78/-0	8.03	±0.15	185.00	+0.72/-0	4.15	+1.18/-0	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	+1.78/-0	8.03	±0.13	205.00	+0.72/-0	4.15	+1.18/-0	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	+1.78/-0	9.48	±0.13	246.00	+0.72/-0	5.15	+1.18/-0	350578	750953			
XFH 250	250.00	258.50		9.48						4.87	256.00	5.15	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	+3.05 /-0	11.05	±0.18	288.00	+0.81/-0	5.15	+1.18/-0	544200	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

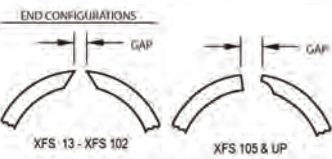
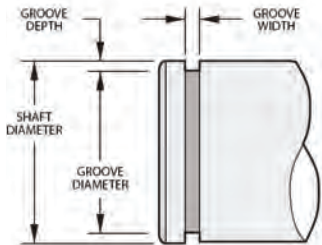
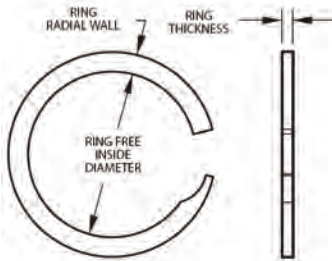
Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 471



ORDER OPTIONS

XFS 13

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

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Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (N) ¹	Ring Shear (N) ²
XFS 13	13.00	12.27	1.40	0.94	12.40	1.10	1931	10591
XFS 14	14.00	13.31	1.40	0.94	13.40	1.10	2077	11396
XFS 15	15.00	14.15	1.40	0.94	14.30	1.10	2602	12224
XFS 16	16.00	14.98	1.65	0.94	15.20	1.10	3172	13029
XFS 17	17.00	16.06	1.65	0.94	16.20	1.10	3367	13838
XFS 18	18.00	16.82	1.90	1.15	17.00	1.30	4457	17953
XFS 19	19.00	17.81	1.90	1.15	18.00	1.30	4702	18941
XFS 20	20.00	18.80	1.90	1.15	19.00	1.30	4951	19928
XFS 21	21.00	19.79	1.90	1.15	20.00	1.30	5200	20942
XFS 22	22.00	20.83	1.90	1.15	21.00	1.30	5445	21930
XFS 23	23.00	21.77	1.90	1.15	22.00	1.30	5698	22939
XFS 24	24.00	22.50	2.15	1.15	22.90	1.30	6539	23927
XFS 25	25.00	23.70	2.15	1.15	23.90	1.30	6806	24914
XFS 26	26.00	24.64	2.15	1.15	24.90	1.30	7082	25929
XFS 27	27.00	25.50	2.15	1.15	25.90	1.30	7353	26916
XFS 28	28.00	26.32	3.25	1.44	26.60	1.60	9702	33179
XFS 29	29.00	27.15	3.25	1.44	27.60	1.60	10053	34385
XFS 30	30.00	28.35	3.25	1.44	28.60	1.60	10395	35559
XFS 32	32.00	29.87	3.25	1.44	30.30	1.60	13073	37939
XFS 33	33.00	31.07	3.25	1.44	31.30	1.60	13478	39113
XFS 34	34.00	31.96	3.25	1.44	32.30	1.60	13892	40319
XFS 35	35.00	32.57	3.25	1.44	33.00	1.60	16899	41493
XFS 36	36.00	33.64	4.01	1.69	34.00	1.85	17375	50038
XFS 38	38.00	35.62	4.01	1.69	36.00	1.85	18344	52827
XFS 40	40.00	37.02	4.01	1.69	37.50	1.85	24265	55621
XFS 42	42.00	39.08	4.01	1.69	39.50	1.85	25484	58410
XFS 45	45.00	42.05	4.01	1.69	42.50	1.85	27303	62578
XFS 46	46.00	43.10	4.01	1.69	43.50	1.85	27904	63952
XFS 47	47.00	44.03	4.01	1.69	44.50	1.85	28504	65331
XFS 48	48.00	44.89	4.01	1.69	45.50	1.85	29118	66741
XFS 50	50.00	46.50	5.08	1.93	47.00	2.15	36529	75282
XFS 52	52.00	48.48	5.08	1.93	49.00	2.15	37974	78266
XFS 54	54.00	50.46	5.08	1.93	51.00	2.15	39438	81287
XFS 55	55.00	51.45	5.08	1.93	52.00	2.15	40163	82777
XFS 56	56.00	52.44	5.08	1.93	53.00	2.15	40906	84307
XFS 58	58.00	54.42	5.08	1.93	55.00	2.15	42352	87287
XFS 60	60.00	56.55	5.08	1.93	57.00	2.15	43819	90308
XFS 62	62.00	58.32	5.08	1.93	59.00	2.15	45283	93328
XFS 63	63.00	59.37	5.08	2.41	60.00	2.15	46008	94823
XFS 65	65.00	61.35	5.08	2.41	62.00	2.65	47471	116641
XFS 67	67.00	63.35	5.08	2.41	64.00	2.65	48939	120240
XFS 68	68.00	64.45	5.08	2.41	65.00	2.65	49660	122019
XFS 70	70.00	66.22	5.08	2.41	67.00	2.65	51128	125618
XFS 72	72.00	68.28	5.08	2.41	69.00	2.65	52591	129221
XFS 75	75.00	71.25	5.08	2.41	72.00	2.65	54780	134599
XFS 77	77.00	73.23	5.08	2.41	74.00	2.65	56230	138153
XFS 78	78.00	74.06	5.08	2.41	75.00	2.65	56968	139977

Dimensions in millimeters

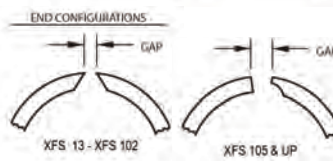
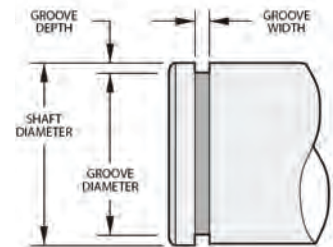
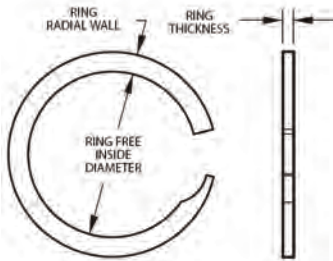
¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

EXTERNAL SNAP RINGS METRIC

Stock items in Carbon Steel and Stainless Steel



To suit European groove specification DIN 471



ORDER OPTIONS

XFS 80

Material Options:
Carbon Steel (blank)
302 Stainless Steel S02

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

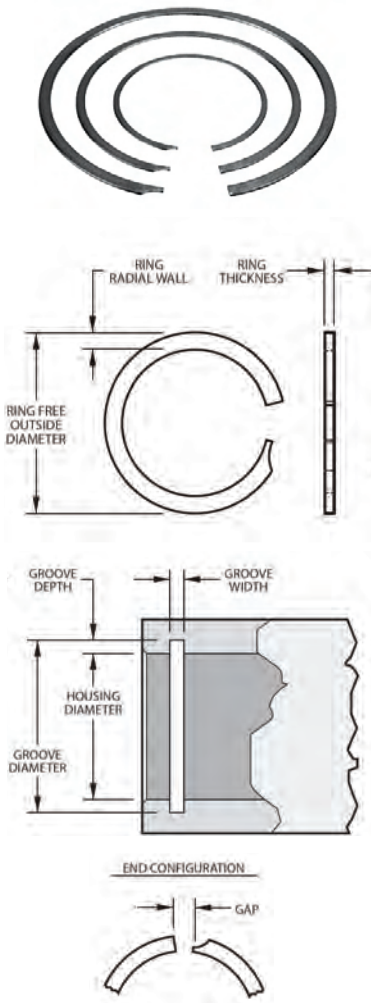
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Part Number	Shaft Diameter	Inside Diameter	RING			GROOVE			THRUST CAPACITY					
			Radial Wall	Thickness		Diameter	Width	Groove Yield (N) ¹	Ring Sheer (N) ²					
XFS 80	80.00	75.70	+0/-0.76	6.02	±0.08	2.41	76.50	+0/-0.30	2.65	+0.14/-0.0	68342	143575		
XFS 82	82.00	77.68		6.02		2.41					78.50	2.65	70033	147134
XFS 85	85.00	80.65		6.30		2.91					81.50	3.15	72595	175656
XFS 88	88.00	83.60	+0/-0.89	6.30	±0.08	2.91	84.50	+0/-0.35	3.15		75175	181906		
XFS 90	90.00	85.80		6.30		2.91					86.50	3.15	76865	185998
XFS 95	95.00	90.68		6.30		2.91					91.50	3.15	81140	196340
XFS 98	98.00	93.70	+0/-1.30	6.30	±0.13	2.91	94.50	+0/-0.54	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		6.30		2.91					98.50	3.15	87127	210828
XFS 105	105.00	99.83	+0/-1.52	6.73	±0.15	3.89	101.00	+0/-0.63	4.15	+0.18/-0.0	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	+0/-1.78	6.73	±0.10	3.89	111.00	+0/-0.72	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	4.15	122237	329676
XFS 130	130.00	124.70	+0/-2.30	6.73	±0.13	3.89	126.00	+0/-0.81	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	+0/-1.78	6.73	±0.10	3.89	141.00	+0/-0.63	4.15	+0.18/-0.0	141809	382467		
XFS 150	150.00	143.50		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	+0/-1.52	8.03	±0.15	3.89	155.00	+0/-0.63	4.15	+0.18/-0.0	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	+0/-1.78	8.03	±0.15	3.89	170.00	+0/-0.72	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		8.03		3.89					180.00	4.15	224417	488232
XFS 190	190.00	183.35	+0/-2.30	8.03	±0.13	3.89	185.00	+0/-0.81	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/-1.78	11.05	±0.18	4.87	199.00	+0/-0.72	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	+0/-2.30	11.05	±0.13	4.87	224.00	+0/-0.81	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	+0/-1.78	12.70	±0.18	4.87	252.00	+0/-0.72	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	+0/-1.78	12.70	±0.18	4.87	282.00	+0/-0.72	5.15		563599	907357		
XFS 300	300.00	289.00		12.70		4.87					292.00	5.15	583051	938673

Dimensions in millimeters

¹Based on groove material yield strength of 310 N/mm² and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XFHE 50

Material Options:

- Carbon Steel (blank)
- 302 Stainless Steel S02

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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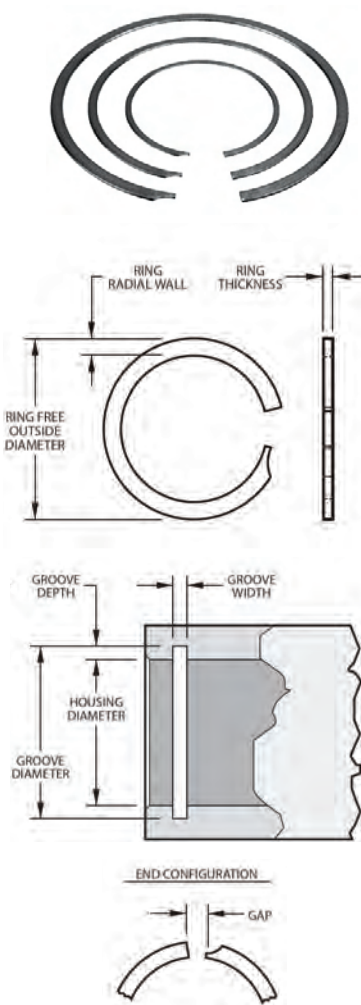
Part Number	Housing Diameter	Outside Diameter	RING			GROOVE		THRUST CAPACITY				
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²				
XFHE 50	0.500	0.529	+0.013/-0	0.055	±0.004	±0.002	+0.004/-0	424	2325			
XFHE 56	0.562	0.591		0.055				0.037	0.586	0.043	477	2613
XFHE 62	0.625	0.665		0.065				0.037	0.657	0.043	707	2906
XFHE 68	0.687	0.726		0.065				0.037	0.719	0.043	777	3194
XFHE 75	0.750	0.797	0.075	0.037	0.790	+0.005/-0	0.043	1060	3487			
XFHE 81	0.812	0.860	0.075	0.037	0.852		0.043	1148	3775			
XFHE 87	0.875	0.924	0.075	0.037	0.915	+0.008/-0	0.043	1237	4068			
XFHE 93	0.937	1.000	0.085	0.045	0.985		0.051	1590	5334			
XFHE 100	1.000	1.058	0.085	0.045	1.048		0.051	1696	5693			
XFHE 106	1.062	1.121	0.094	0.045	1.110		0.051	1802	6045			
XFHE 112	1.125	1.192	+0.015/-0	0.094	±0.004	±0.002	+0.008/-0	2227	6404			
XFHE 118	1.187	1.252		0.094				0.045	1.181	0.051	2349	6757
XFHE 125	1.250	1.336		0.094				0.045	1.243	0.051	2916	7116
XFHE 131	1.312	1.391		0.094				0.045	1.316	0.051	3060	7469
XFHE 137	1.375	1.470	0.094	0.045	1.378	+0.010/-0	0.063	3791	9307			
XFHE 143	1.437	1.529	0.128	0.057	1.453		0.063	3961	9727			
XFHE 150	1.500	1.592	0.128	0.057	1.515		0.063	4135	10153			
XFHE 156	1.562	1.687	0.158	0.067	1.578		0.073	5741	12400			
XFHE 162	1.625	1.746	+0.020/-0	0.158	±0.005	±0.003	+0.010/-0	5973	12901			
XFHE 168	1.687	1.808		0.158				0.067	1.729	0.073	6201	13393
XFHE 175	1.750	1.885		0.158				0.067	1.791	0.073	6927	13893
XFHE 181	1.812	1.942		0.158				0.067	1.862	0.073	7173	14385
XFHE 187	1.875	2.007	0.158	0.067	1.924	+0.012/-0	0.073	7422	14885			
XFHE 193	1.937	2.074	0.200	0.076	1.987		0.085	8078	16649			
XFHE 200	2.000	2.143	0.200	0.076	2.055		0.085	8341	17191			
XFHE 206	2.062	2.200	0.200	0.076	2.118		0.085	8599	17724			
XFHE 212	2.125	2.264	+0.025/-0	0.200	±0.005	±0.003	+0.012/-0	8862	18265			
XFHE 218	2.187	2.327		0.200				0.076	2.180	0.085	9121	18798
XFHE 225	2.250	2.389		0.200				0.076	2.243	0.085	9384	19340
XFHE 231	2.312	2.453		0.200				0.076	2.305	0.085	9642	19873
XFHE 237	2.375	2.517	0.200	0.076	2.368	+0.013/-0	0.085	9905	20414			
XFHE 243	2.437	2.582	0.200	0.076	2.430		0.085	10163	20947			
XFHE 250	2.500	2.643	0.200	0.076	2.493		0.085	10426	21488			
XFHE 256	2.562	2.705	0.200	0.076	2.555		0.085	10685	22025			
XFHE 262	2.625	2.777	+0.030/-0	0.200	±0.005	±0.003	+0.012/-0	10947	22670			
XFHE 268	2.687	2.828		0.200				0.095	2.618	0.104	11206	23250
XFHE 275	2.750	2.899		0.200				0.095	2.680	0.104	11469	23849
XFHE 281	2.812	2.958		0.200				0.095	2.743	0.104	11727	24458
XFHE 287	2.875	3.022	+0.035/-0	0.200	±0.005	±0.003	+0.013/-0	11990	25077			
XFHE 293	2.937	3.084		0.200				0.095	2.805	0.104	12249	25706
XFHE 300	3.000	3.145		0.200				0.095	2.868	0.104	12511	26345
XFHE 306	3.062	3.218		0.200				0.095	2.930	0.104	12777	26994
XFHE 312	3.125	3.294	+0.035/-0	0.237	±0.005	±0.003	+0.013/-0	13047	27653			
XFHE 318	3.187	3.357		0.237				0.095	2.993	0.104	13320	28322
XFHE 325	3.250	3.420		0.237				0.095	3.055	0.104	13597	29001
XFHE 331	3.312	3.483		0.237				0.095	3.118	0.104	13879	29690
XFHE 337	3.375	3.547	0.248	0.115	3.184	+0.007/-0	0.124	14165	30389			
XFHE 337	3.375	3.547	0.248	0.115	3.263		0.124	14456	31098			
XFHE 337	3.375	3.547	0.248	0.115	3.325	0.124	14751	31817				
XFHE 337	3.375	3.547	0.248	0.115	3.388	0.124	15050	32546				
XFHE 337	3.375	3.547	0.248	0.115	3.450	0.124	15353	33285				
XFHE 337	3.375	3.547	0.248	0.115	3.513	0.124	15660	34034				

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

INTERNAL SNAP RINGS IMPERIAL

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XFHE 343

Material Options:
Carbon Steel (blank)
302 Stainless Steel S02

Please contact us for other materials.

CAN'T FIND A PART ?

Contact our specialist team for assistance

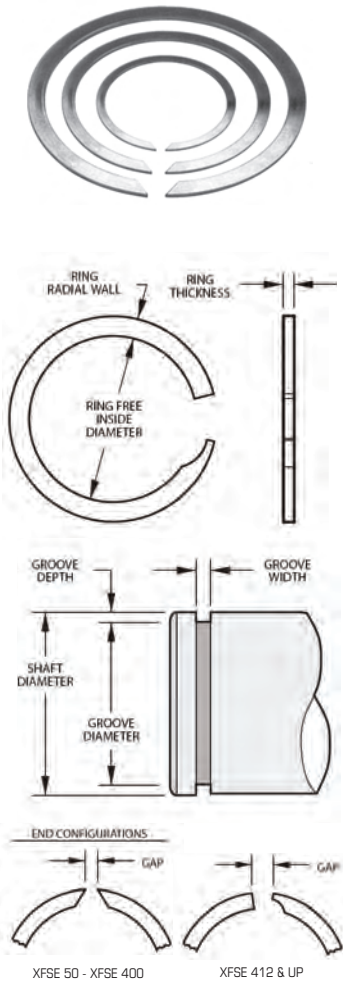
t +44 (0)1435 866011
e Design@tfc.eu.com

Part Number	Housing Diameter	Outside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
XFHE 343	3.437	3.609	0.248	0.115	3.575	0.124	16763	40422
XFHE 350	3.500	3.673	0.248	0.115	3.638	0.124	17071	41163
XFHE 356	3.562	3.728	0.248	0.115	3.700	0.124	17373	41892
XFHE 362	3.625	3.799	0.248	0.115	3.763	0.124	17680	42633
XFHE 368	3.687	3.862	0.248	0.115	3.825	0.124	17983	43362
XFHE 375	3.750	3.922	0.248	0.115	3.888	0.124	18290	44103
XFHE 381	3.812	3.988	0.248	0.115	3.950	0.124	18592	44832
XFHE 387	3.875	4.044	0.248	0.115	4.013	0.124	18900	45573
XFHE 393	3.937	4.114	0.248	0.115	4.075	0.124	19202	46302
XFHE 400	4.000	4.223	0.265	0.153	4.158	0.163	22337	60283
XFHE 412	4.125	4.329	0.265	0.153	4.283	0.163	23035	62166
XFHE 425	4.250	4.452	0.265	0.153	4.408	0.163	23733	64050
XFHE 437	4.375	4.576	0.265	0.153	4.533	0.163	24431	65934
XFHE 450	4.500	4.703	0.265	0.153	4.658	0.163	25129	67818
XFHE 462	4.625	4.829	0.265	0.153	4.783	0.163	25827	69702
XFHE 475	4.750	4.945	0.265	0.153	4.908	0.163	26525	71585
XFHE 487	4.875	5.082	0.265	0.153	5.033	0.163	27223	73469
XFHE 500	5.000	5.207	0.265	0.153	5.158	0.163	27921	75353
XFHE 525	5.250	5.460	0.265	0.153	5.408	0.163	29317	79121
XFHE 550	5.500	5.719	0.265	0.153	5.658	0.163	30713	82888
XFHE 575	5.750	5.965	0.265	0.153	5.908	0.163	32109	86656
XFHE 600	6.000	6.256	0.316	0.153	6.196	0.163	41563	90424
XFHE 625	6.250	6.508	0.316	0.153	6.446	0.163	43295	94191
XFHE 650	6.500	6.760	0.316	0.153	6.696	0.163	45027	97959
XFHE 675	6.750	7.013	0.316	0.153	6.946	0.163	46759	101727
XFHE 700	7.000	7.266	0.316	0.153	7.196	0.163	48490	105494
XFHE 725	7.250	7.541	0.316	0.153	7.446	0.163	50222	109262
XFHE 750	7.500	7.762	0.316	0.153	7.696	0.163	51954	113030
XFHE 775	7.750	8.023	0.316	0.153	7.946	0.163	53686	116797
XFHE 800	8.000	8.276	0.316	0.153	8.196	0.163	55418	120565
XFHE 825	8.250	8.580	0.373	0.192	8.486	0.203	68813	147399
XFHE 850	8.500	8.821	0.373	0.192	8.736	0.203	70898	151866
XFHE 875	8.750	9.073	0.373	0.192	8.986	0.203	72983	156332
XFHE 900	9.000	9.326	0.373	0.192	9.236	0.203	75068	160799
XFHE 925	9.250	9.580	0.373	0.192	9.486	0.203	77154	165265
XFHE 950	9.500	9.831	0.373	0.192	9.736	0.203	79239	169732
XFHE 975	9.750	10.083	0.373	0.192	9.986	0.203	81324	174199
XFHE1000	10.000	10.414	0.435	0.192	10.314	0.203	110977	178665
XFHE1025	10.250	10.660	0.435	0.192	10.564	0.203	113751	183132
XFHE1050	10.500	10.919	0.435	0.192	10.814	0.203	116526	187599
XFHE1075	10.750	11.171	0.435	0.192	11.064	0.203	119300	192065
XFHE1100	11.000	11.440	0.435	0.192	11.314	0.203	122074	196532

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XFSE 50

Material Options:

Carbon Steel (blank)
302 Stainless Steel S02

Please contact us for other materials.

NEED A SAMPLE ?

Call our sales team to discuss your requirements

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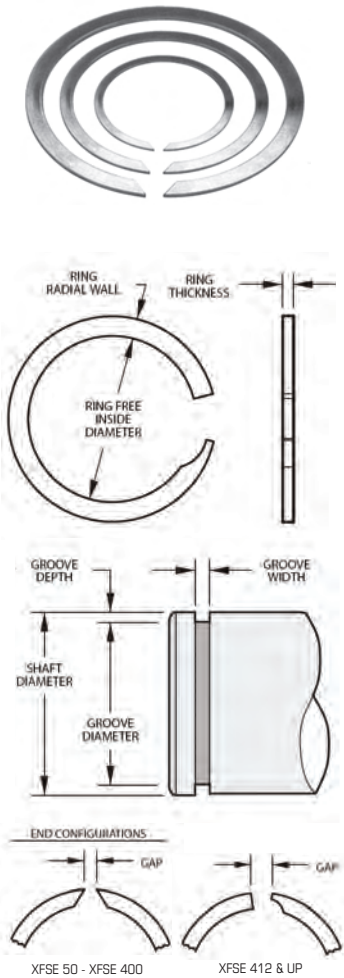
Part Number	Shaft Diameter	Inside Diameter	RING			GROOVE			THRUST CAPACITY	
			Radial Wall	Thickness		Diameter	Width	Groove Yield (lb) ¹	Ring Shear (lb) ²	
XFSE 50	0.500	0.471	0.055	0.037	0.476	0.043	424	2325		
XFSE 56	0.562	0.524	0.055	0.037	0.532	0.043	596	2613		
XFSE 62	0.625	0.590	0.065	0.037	0.595	0.043	663	2906		
XFSE 68	0.687	0.649	0.065	0.037	0.655	0.043	777	3194		
XFSE 75	0.750	0.701	0.075	0.045	0.710	0.051	1060	4241		
XFSE 81	0.812	0.764	0.075	0.045	0.772	0.051	1148	4592		
XFSE 87	0.875	0.820	0.075	0.045	0.831	0.051	1361	4948		
XFSE 93	0.937	0.886	0.085	0.045	0.893	0.051	1457	5334		
XFSE 100	1.000	0.933	0.085	0.045	0.952	0.051	1696	5693		
XFSE 106	1.062	1.004	0.085	0.045	1.014	0.051	1802	6045		
XFSE 112	1.125	1.069	0.128	0.057	1.077	0.063	1909	7615		
XFSE 118	1.187	1.116	0.128	0.057	1.131	0.063	2349	8035		
XFSE 125	1.250	1.176	0.128	0.057	1.188	0.063	2739	8461		
XFSE 131	1.312	1.223	0.128	0.057	1.242	0.063	3246	8881		
XFSE 137	1.375	1.282	0.128	0.057	1.297	0.063	3791	9307		
XFSE 143	1.437	1.344	0.158	0.067	1.359	0.073	3961	11408		
XFSE 150	1.500	1.402	0.158	0.067	1.422	0.073	4135	11908		
XFSE 156	1.562	1.457	0.158	0.067	1.470	0.073	5079	12400		
XFSE 162	1.625	1.517	0.158	0.067	1.533	0.073	5284	12901		
XFSE 168	1.687	1.578	0.158	0.067	1.595	0.073	5485	13393		
XFSE 175	1.750	1.640	0.158	0.067	1.658	0.073	5690	13893		
XFSE 181	1.812	1.697	0.158	0.067	1.720	0.073	5892	14385		
XFSE 187	1.875	1.767	0.158	0.067	1.783	0.073	6097	14885		
XFSE 193	1.937	1.800	0.200	0.076	1.819	0.085	8078	16649		
XFSE 200	2.000	1.862	0.200	0.076	1.882	0.085	8341	17191		
XFSE 206	2.062	1.924	0.200	0.076	1.944	0.085	8599	17724		
XFSE 212	2.125	1.987	0.200	0.076	2.007	0.085	8862	18265		
XFSE 218	2.187	2.048	0.200	0.076	2.069	0.085	9121	18798		
XFSE 225	2.250	2.110	0.200	0.076	2.132	0.085	9384	19340		
XFSE 231	2.312	2.171	0.200	0.076	2.194	0.085	9642	19873		
XFSE 237	2.375	2.226	0.200	0.076	2.257	0.085	9905	20414		
XFSE 243	2.437	2.296	0.200	0.076	2.319	0.085	10163	20947		
XFSE 250	2.500	2.357	0.200	0.076	2.382	0.085	10426	21488		
XFSE 256	2.562	2.415	0.200	0.095	2.444	0.104	10685	26252		
XFSE 262	2.625	2.486	0.200	0.095	2.507	0.104	10947	26898		
XFSE 268	2.687	2.537	0.200	0.095	2.569	0.104	11206	27533		
XFSE 275	2.750	2.607	0.200	0.095	2.632	0.104	11469	28179		
XFSE 281	2.812	2.665	0.200	0.095	2.694	0.104	11727	28814		
XFSE 287	2.875	2.727	0.200	0.095	2.757	0.104	11990	29460		
XFSE 293	2.937	2.789	0.200	0.095	2.819	0.104	12249	30095		
XFSE 300	3.000	2.852	0.200	0.095	2.882	0.104	12511	30740		
XFSE 306	3.062	2.916	0.200	0.095	2.944	0.104	12770	31376		
XFSE 312	3.125	2.955	0.237	0.095	2.987	0.104	15242	32021		
XFSE 318	3.187	3.016	0.237	0.095	3.049	0.104	15544	32657		
XFSE 325	3.250	3.079	0.237	0.095	3.112	0.104	15851	33302		
XFSE 331	3.312	3.140	0.248	0.115	3.174	0.124	16154	39088		

Dimensions in inches

¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

EXTERNAL SNAP RINGS IMPERIAL

Stock items in Carbon Steel and Stainless Steel



ORDER OPTIONS

XFSE 337

Material Options:
Carbon Steel (blank)
302 Stainless Steel S02

Please contact us for other materials.

NEED A SPECIAL ?

Our engineers are available to discuss your application
(see page 3 for further details)

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Part Number	Shaft Diameter	Inside Diameter	RING		GROOVE		THRUST CAPACITY	
			Radial Wall	Thickness	Diameter	Width	Groove Yield (lb) ¹	Ring Sheer (lb) ²
XFSE 337	3.375	3.203	0.248	0.115	3.237	0.124	16461	39831
XFSE 343	3.437	3.264	0.248	0.115	3.299	0.124	16763	40563
XFSE 350	3.500	3.326	0.248	0.115	3.362	0.124	17071	41307
XFSE 356	3.562	3.378	0.248	0.115	3.424	0.124	17373	42038
XFSE 362	3.625	3.451	0.248	0.115	3.487	0.124	17680	42782
XFSE 368	3.687	3.512	0.248	0.115	3.549	0.124	17983	43514
XFSE 375	3.750	3.570	0.248	0.115	3.612	0.124	18290	44257
XFSE 381	3.812	3.636	0.248	0.115	3.674	0.124	18592	44989
XFSE 387	3.875	3.689	0.248	0.115	3.737	0.124	18900	45732
XFSE 393	3.937	3.760	0.248	0.115	3.799	0.124	19202	46464
XFSE 400	4.000	3.828	0.248	0.115	3.862	0.124	19509	47208
XFSE 412	4.125	3.930	0.265	0.153	3.967	0.163	23035	62126
XFSE 425	4.250	4.050	0.265	0.153	4.092	0.163	23733	64008
XFSE 437	4.375	4.174	0.265	0.153	4.217	0.163	24431	65891
XFSE 450	4.500	4.297	0.265	0.153	4.342	0.163	25129	67774
XFSE 462	4.625	4.421	0.265	0.153	4.467	0.163	25827	69656
XFSE 475	4.750	4.530	0.265	0.153	4.592	0.163	26525	71539
XFSE 487	4.875	4.668	0.265	0.153	4.717	0.163	27223	73421
XFSE 500	5.000	4.792	0.265	0.153	4.842	0.163	27921	75304
XFSE 525	5.250	5.039	0.265	0.153	5.092	0.163	29317	79069
XFSE 550	5.500	5.292	0.265	0.153	5.342	0.163	30713	82834
XFSE 575	5.750	5.535	0.265	0.153	5.592	0.163	32109	86599
XFSE 600	6.000	5.744	0.316	0.153	5.804	0.163	41563	90365
XFSE 625	6.250	5.992	0.316	0.153	6.054	0.163	43295	94130
XFSE 650	6.500	6.236	0.316	0.153	6.304	0.163	45027	97895
XFSE 675	6.750	6.486	0.316	0.153	6.554	0.163	46759	101727
XFSE 700	7.000	6.734	0.316	0.153	6.804	0.163	48490	105494
XFSE 725	7.250	6.993	0.316	0.153	7.054	0.163	50222	109262
XFSE 750	7.500	7.219	0.316	0.153	7.304	0.163	51954	113030
XFSE 775	7.750	7.477	0.316	0.153	7.554	0.163	53686	116797
XFSE 800	8.000	7.683	0.435	0.192	7.764	0.203	66727	142932
XFSE 825	8.250	7.940	0.435	0.192	8.014	0.203	68813	147399
XFSE 850	8.500	8.179	0.435	0.192	8.264	0.203	70898	151866
XFSE 875	8.750	8.427	0.435	0.192	8.514	0.203	72983	156332
XFSE 900	9.000	8.673	0.435	0.192	8.764	0.203	75068	160799
XFSE 925	9.250	8.922	0.435	0.192	9.014	0.203	77154	165265
XFSE 950	9.500	9.130	0.435	0.192	9.240	0.203	87297	169732
XFSE 975	9.750	9.393	0.435	0.192	9.490	0.203	89594	174199
XFSE1000	10.000	9.586	0.500	0.192	9.686	0.203	110977	178665
XFSE1025	10.250	9.826	0.500	0.192	9.936	0.203	113751	183132
XFSE1050	10.500	10.081	0.500	0.192	10.186	0.203	116526	187599
XFSE1075	10.750	10.329	0.500	0.192	10.436	0.203	119300	192065
XFSE1100	11.000	10.584	0.500	0.192	10.686	0.203	122074	196532

Dimensions in inches

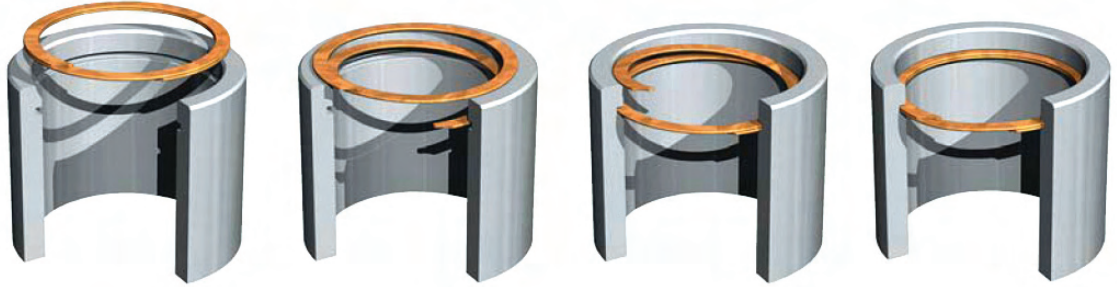
¹Based on groove material yield strength of 45000 psi and safety factor of 2. ²Based on a safety factor of 3

MANUAL INSTALLATION

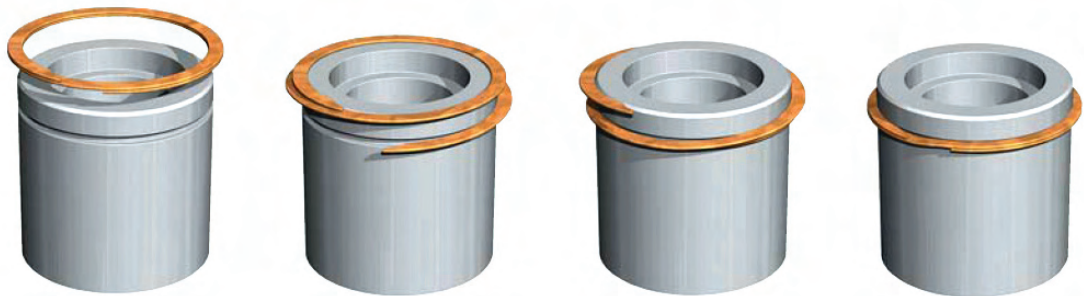
Manual installation on an individual or low production basis is accomplished as follows:

- 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:



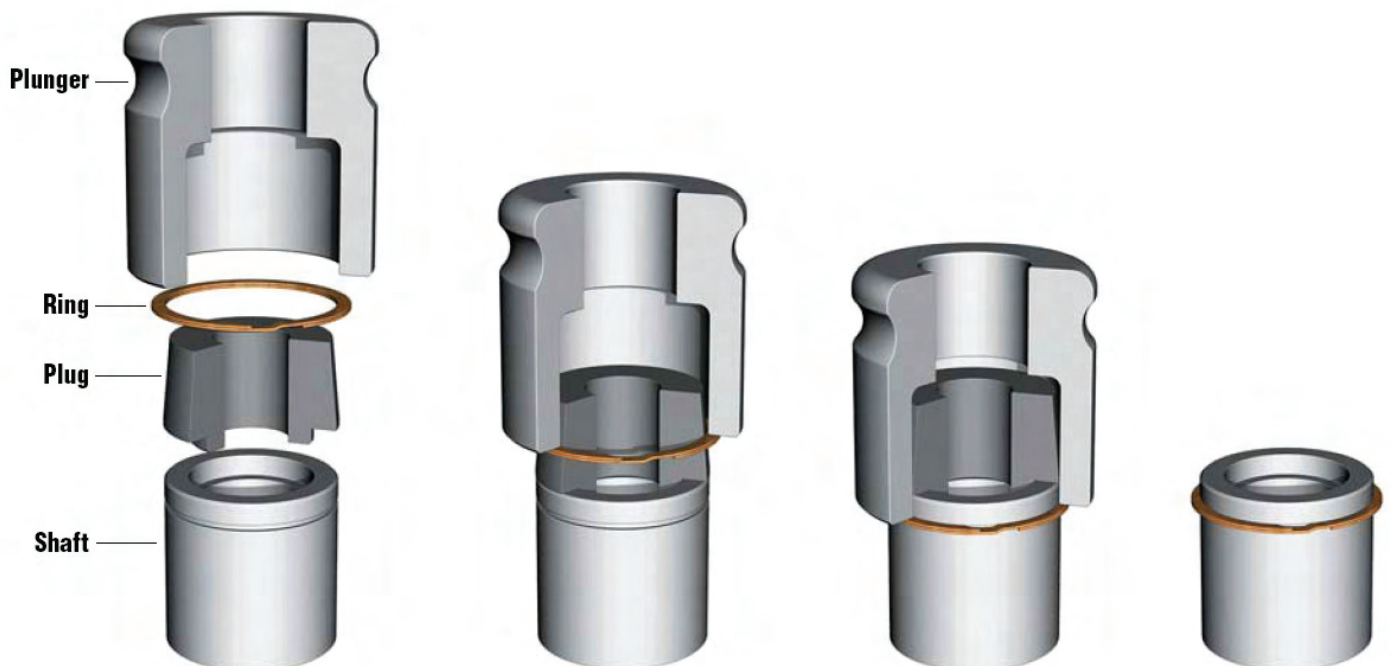
SHAFT:



SEMI-AUTOMATED & AUTOMATED INSTALLATION

EXTERNAL RINGS

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.



SEMI-AUTOMATED & AUTOMATED INSTALLATION cont.

INTERNAL RINGS

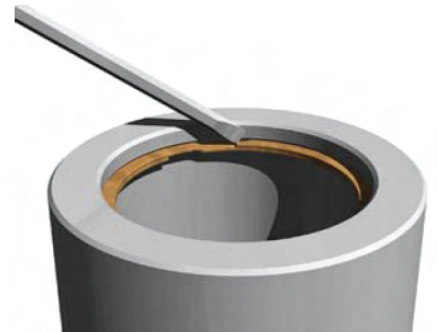
Internal retaining ring installation is accomplished in a similar manner. A tapered bore which acts as a ring contracting guide, and a plunger pushes the retaining ring into position. Tooling for ring installation should have hardened working surfaces to minimize wear.



REMOVAL

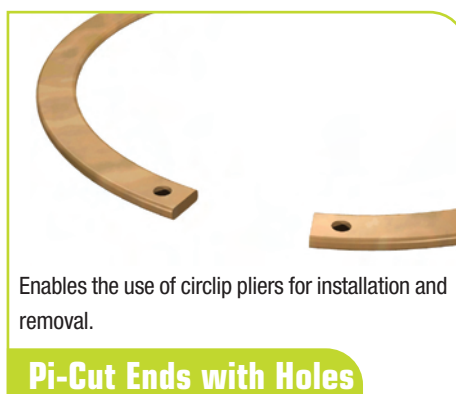
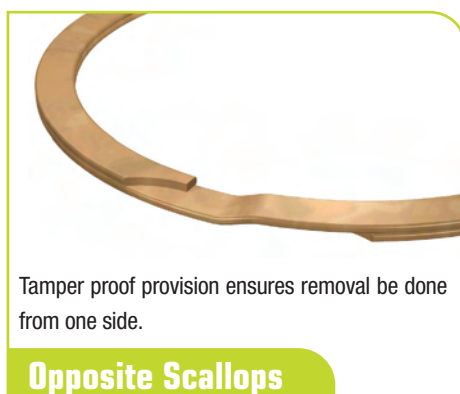
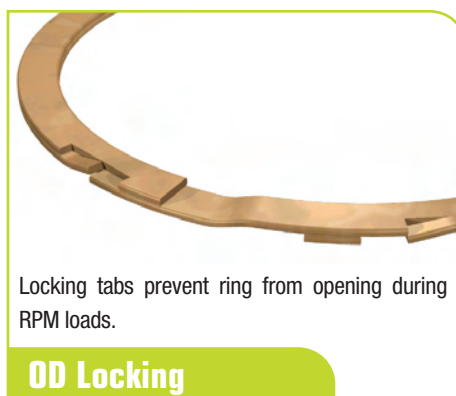
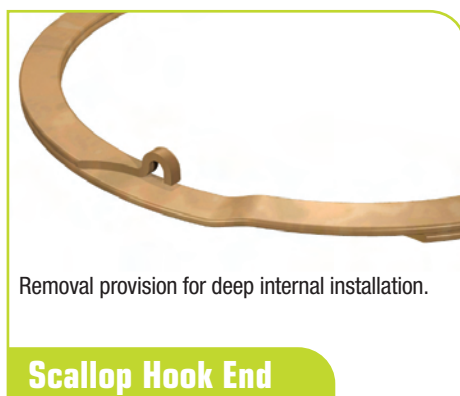
Retaining Rings are supplied standard with removal notches to enable easy extraction from a groove. The notch is provided to form a small gap between the ring end and the shaft or housing, permitting a blunt object to be inserted at the end of the ring to pry the free end out radially and up.

- 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.



SPECIAL END CONFIGURATIONS

To facilitate easier removal, or hamper removal, TFC can design a ring with special end configurations. Here are a few examples:



A Spiral 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 are listed in the tables on the following page.

Rapid acceleration of the assembly or rotational speeds in excess of the values stated may cause failure of the retaining ring. If this is a potential problem please contact TFC's engineers to determine whether one of the following solutions would be suitable.



SELF-LOCKING FEATURE

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.

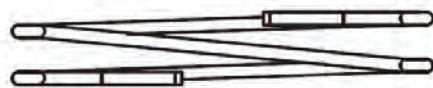


BALANCED RING

The 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.



Right Hand (Standard Wound)



Left Hand (Reverse Wound)

LEFT HAND WOUND

Spiral retaining rings are wound standard in a clockwise direction. In special applications, especially those that rotate in an anti-clockwise direction, it is sometimes favourable to have the retaining ring coiled in the opposite direction.

NEED A SPECIAL ?

Our engineers are available to discuss your application

(see page 3 for further details)

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e Design@tfc.eu.com

Selecting the proper material for an application requires a general knowledge of what is available for use in our flat wire products and depends on the environment in which the spring/retaining ring is to be used.

Specifying the correct material can prevent additional cost and failure in operation. Carbon steel is the most commonly specified material. Stainless steels, although more costly than carbon steel, provide far superior corrosion resistance and have higher temperature operating limits. Please find below a range of available materials and their characteristics. If you have any questions or require some guidance, please don't hesitate to contact our engineers on +44 (0)1435 866011 or Design@tfc.eu.com.

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 maximized 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.

- Max. recommended operating temp.: 121°C / 250°F
- Colour: various, including blue, black and grey.



STAINLESS STEEL

302 STAINLESS STEEL

AMS-5866

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 categorised as being a non-magnetic stainless, 302 becomes slightly magnetic as a result of cold working. It is not hardenable by heat treatment.

- Max. recommended operating temp.: 204°C / 400°F
- Colour: silver-grey.

316 STAINLESS STEEL

ASTM A313 (referenced for chemical composition only).

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 exhibits 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.

- Max. recommended operating temp.: 204°C / 400°F
- Colour: silver-grey.

17-7 PH/C STAINLESS STEEL, CONDITION CH900

AMS-5529

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 CH-900. 17-7 PH C/CH-900 exhibits magnetism similar to high carbon steel.

- Max. recommended operating temp.: 343°C / 650°F
- Colour: After precipitation hardening, 17-7 has a blue, brown or silver colour as a result of open-air heat treatment, although passivation provides a bright finish.

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.

SPRING TEMPER

AMS-5699 – conforming to NACE standard MR-01-75

Most commonly, Inconel X-750 is precipitation heat treated to a spring temper condition. The National Association of Corrosion Engineers (NACE) approves this hard temper to specification MR-0175 (Rc50 maximum) for spiral retaining rings and wave springs.

■ Max. recommended operating temp.: 371°C / 700°F

NO.1 TEMPER, “Rc35 MAX”

AMS-5699¹ – conforming to NACE standard MR-01-75

Requires a longer heat treatment than spring temper and has a lower tensile strength.

■ Max. recommended operating temp.: 371°C / 700°F

NO.1 TEMPER, AMS-5698

This material is typically used for retaining rings requiring corrosion and heat resistance.

■ Max. recommended operating temp.: 538°C / 1000°F

Both spring temper and #1 temper exhibit no magnetism and 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.

■ Colour: blue/silver-grey

A286 ALLOY

AMS-5810

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.

■ Max. recommended operating temp.: 538°C / 1000°F

■ Colour: blue/silver-grey.

ELGILOY*

AMS-5876¹ – conforming to NACE standard MR-01-75.

Known for its excellent resistance to corrosive environments, no magnetism, and use at elevated temperatures, this relatively new spring material is now readily available from TFC. 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.”

■ Max. recommended operating temp.: 427°C / 800°F

■ Colour: Blue-brown in color as a result of heat treatment.



COPPERS

BERYLLIUM COPPER ALLOY #25

TEMPER TH02 – ASTM b197¹

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 non-magnetic. Its electrical conductivity is about 2-4 times as great as phosphor bronze.

■ Max. recommended operating temp.: 204°C / 400°F

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 maximize spring characteristics. Phosphor bronze is hardenable only by cold working. This material is also non-magnetic.



The finish of a part can also play an important role in its resistance to corrosive environments. Finishes are also very popular in creating an aesthetically pleasing product. Please find a selection of our standard finishes below, should one of these not fit your requirements then please contact us on +44 (0)1435 866011 or Design@tfc.eu.com.

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, Class 2, Type I

Cadmium Plate with Chromate Dip,

AMS-QQ-P-416, Class 2, Type II

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. TFC offers stainless steel as the preferable option to cadmium.

OIL DIP

This is the standard finish for all 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.

PASSIVATION

AMS 2700, Method 1, Type 2, Class 3

+AMS-QQ-P-35 Type II

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 contaminates 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 gray-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.

VAPOUR 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 retaining 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.

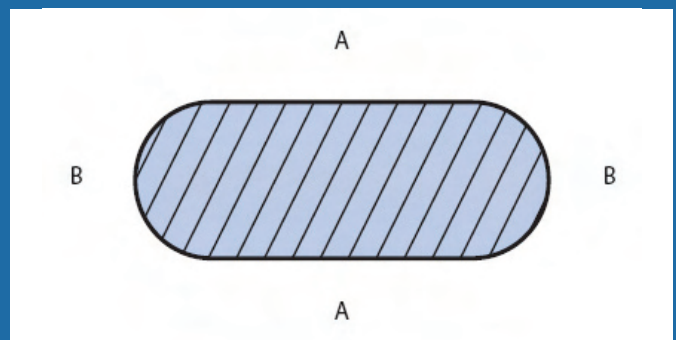
MANUFACTURING SPECIFICATIONS

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.

MATERIAL TESTING – 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 hardness 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 cross-section, not a single point as in a hardness test.





LOST for a solution?

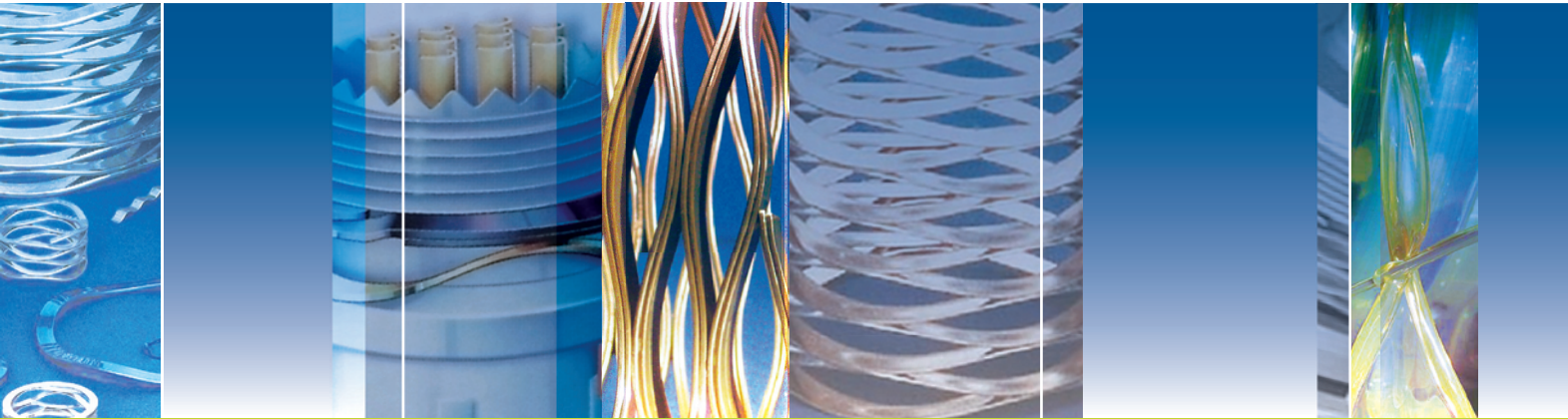
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