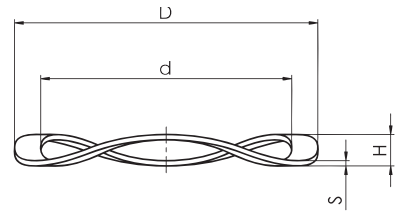
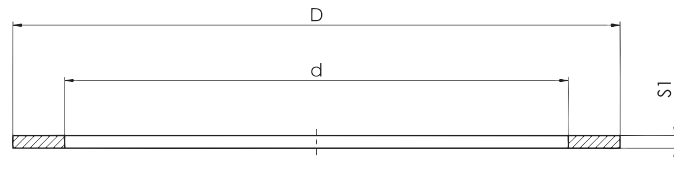


Accessories



Shims AS

For production engineering purposes, shims are often used to balance the accumulation of tolerances (tolerance chains) and axial tolerances.

GRW spring washers are made of corrosion-proof 1.4310 (AISI 301) spring wire. They are heat-treated, burr-free, and have an extremely fine surface finish

Spring washers WF

Spring washers are used for defined axial preloading of bearings, particularly for miniature and small ball bearings. The manufacture of these spring washers includes cutting and punching processes. Through a subsequent finishing process, they can be calibrated to provide highly accurate preload tolerances for special applications.

GRW spring washers are made of corrosion-proof 1.4310 (AISI 301) spring wire. They are heat-treated, burr-free, and have an extremely fine surface finish. Our spring washers are designed with 3 waves ensuring even support of the bearing during axial preloading.

Shims d x D	s	Dimensions [mm]		Compatible sizes	
		Spring washers (d x D x H x s)	Spring constant [N/mm]	on shafts	in housings
AS 1.55 x 2.50	0.15	–	–	68/1,5, 69/1,5	–
–	–	WF 1.60 x 2.90 x 0.40 x 0.06	50.0	–	–
–	–	WF 1.90 x 2.80 x 0.50 x 0.08	60.0	–	–
AS 2.00 x 4.30	0.10 0.16 0.20	–	–	–	–
AS 2.25 x 3.20	0.08 0.10	WF 2.15 x 3.10 x 0.50 x 0.08	54.9	682, 692, 5/64	–
AS 2.80 x 3.90	0.08 0.10	WF 2.70 x 3.80 x 0.50 x 0.08	52.0	60/2,5, 68/2,5, 69/2,5, 3/32	68/1,5, 691, 1191
AS 3.05 x 4.50	0.10 0.16 0.20	–	–	–	–
AS 3.30 x 4.40	0.08 0.10 0.12	WF 3.20 x 4.30 x 0.50 x 0.10	32.5	623, 683, 693, 1/8A, 1/8B, 3175, 1/8A/6, 1/8B/083	–
AS 3.50 x 5.00	0.08	–	–	–	–
AS 3.80 x 4.90	0.08 0.10 0.12	WF 3.70 x 4.80 x 0.55 x 0.10	32.0	–	682, 69/1,5
AS 4.05 x 5.50	0.10 0.20	–	–	–	–
AS 4.30 x 5.85	0.10 0.12 0.15	WF 4.20 x 5.75 x 0.65 x 0.12	40.0	604, 624, 634, 684, 694, 3967	68/2,5, 692
AS 4.90 x 6.20	0.10 0.12 0.15	WF 4.80 x 6.10 x 0.60 x 0.12	37.0	3/16, 4763A, 4763B	5/64, 3175
AS 5.20 x 6.75	0.15	–	–	–	–
AS 5.30 x 6.85	0.10 0.12 0.15	WF 5.20 x 6.75 x 0.65 x 0.12	22.0	625, 635, 685, 695	683, 69/2,5
AS 5.50 x 8.50	0.40	–	–	–	–
AS 6.30 x 7.85	0.12 0.15 0.18	WF 6.20 x 7.75 x 0.70 x 0.15	38.0	626, 686, 696	60/2,5, 693, 3/32, 1/8A, 3967, 4763A
AS 6.70 x 9.40	0.10	–	–	–	–
AS 7.30 x 8.80	0.12 0.15 0.18	WF 7.20 x 8.70 x 0.90 x 0.15	28.5	607, 627, 687, 697	684
–	–	WF 7.20 x 12.00 x 1.55 x 0.13	41.8	607, 627	6350B, 7938, 1/8B/083
AS 8.30 x 9.80	0.10 0.15 0.18 0.20	WF 8.20 x 9.70 x 0.85 x 0.18	26.0	608, 688, 698, 7938	623
AS 9.30 x 10.80	0.15 0.18 0.20	WF 9.20 x 10.70 x 1.15 x 0.18	22.0	609, 629, 689, 699	685, 694
AS 10.30 x 11.80	0.18 0.20 0.22	WF 10.20 x 11.70 x 1.05 x 0.20	18.5	6000, 6800, 6900, 3/8	604
–	–	WF 10.50 x 15.80 x 1.85 x 0.25	77.0	6000	625, 634
AS 11.30 x 12.80	0.18 0.20 0.22	WF 11.20 x 12.70 x 1.30 x 0.20	16.0	–	624, 686, 695
AS 12.30 x 13.80	0.20 0.22 0.25	WF 12.20 x 13.70 x 1.30 x 0.22	20.0	–	687
AS 13.30 x 14.80	0.20 0.22 0.25	WF 13.20 x 14.70 x 1.30 x 0.22	13.0	–	696
AS 14.35 x 15.80	0.22 0.25 0.30	WF 14.20 x 15.65 x 1.55 x 0.25	17.0	–	625, 634, 688, 1/4A
AS 15.35 x 16.80	0.22 0.25 0.30	WF 15.20 x 16.65 x 1.55 x 0.25	14.5	–	689, 697
AS 16.00 x 22.00	0.10	WF 15.80 x 21.80 x 1.60 x 0.20	10.0	–	3/8
AS 16.40 x 18.80	0.25 0.30 0.35	WF 16.20 x 18.55 x 2.15 x 0.30	28.5	–	607, 626, 635, 6800, 698, 1/4

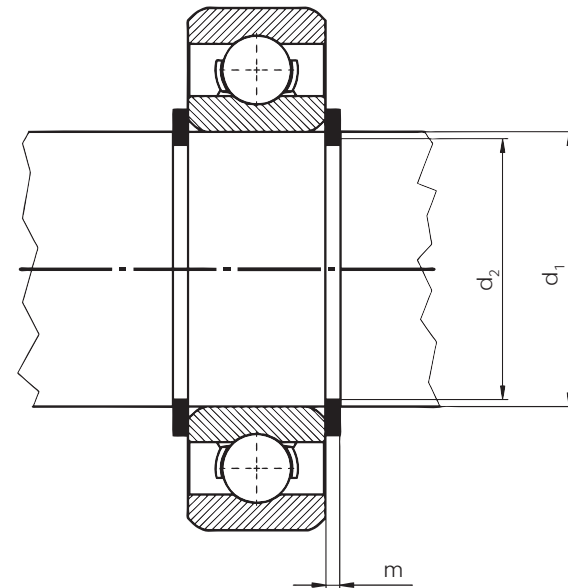
Material 1.4310 (AISI 301). Before planning to use shims and spring washers, please check on availability. Other sizes on request. Subject to change. Minimum quantity 100 pieces.

Accessories

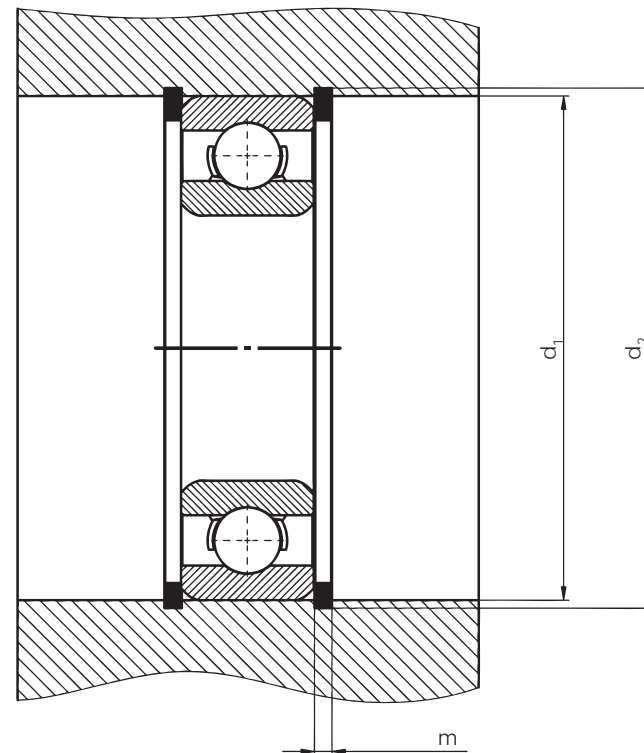
Retaining rings – (shaft circlips WSR, bore retaining rings BSR)

Retaining rings are precision engineered components designed to be applied on shafts or in bores providing a shoulder that accurately positions, locates and retains parts of an assembly. They are especially useful with small and evenly distributed axial and radial loads. It is important to ensure that the face of the retaining ring does not touch the edge radius of the bearing. If the face does touch the radial edge, we recommend that you use our shims in conjunction with our retaining rings.

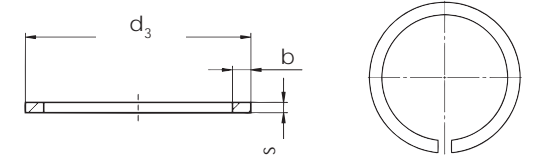
GRW retaining rings are constructed from cold-drawn spring wire 1.4310 (AISI 301), which exhibits a constant cross section. They are corrosion-proof and free of any scale or burrs.



Assembly using shaft circlips



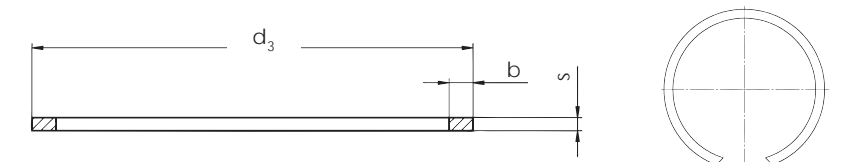
Assembly using bore circlips



Shaft circlips

Type	Shaft d_1	Dimensions [mm]				Gro	
		d_3 max.	Split lock b ± 0.10	s ± 0.02	d_2 -0.05	m $+0.03$	
WSR 3	3	2.60	0.50	0.30	2.70	0.33	
WSR 4	4	3.60	0.50	0.30	3.70	0.33	
WSR 5	5	4.50	0.70	0.40	4.60	0.44	
WSR 6	6	5.45	0.70	0.40	5.60	0.44	
WSR 7	7	6.45	0.70	0.40	6.60	0.44	
WSR 8	8	7.35	0.90	0.50	7.50	0.55	
WSR 9	9	8.30	0.90	0.50	8.50	0.55	
WSR 10	10	9.25	0.90	0.50	9.50	0.55	

Material 1.4310 (AISI 301). Subject to change. 1000 pieces per pack.



Bore circlips

Type	Shaft d_1	Dimensions [mm]				Gro	
		d_3 min.	Split lock b ± 0.10	s ± 0.02	d_2 -0.05	m $+0.03$	
BSR 4	4	4.40	0.50	0.30	4.30	0.33	
BSR 5	5	5.45	0.50	0.30	5.30	0.33	
BSR 6	6	6.45	0.50	0.30	6.30	0.33	
BSR 7	7	7.50	0.50	0.30	7.30	0.33	
BSR 8	8	8.60	0.70	0.40	8.40	0.44	
BSR 9	9	9.60	0.70	0.40	9.40	0.44	
BSR 10	10	10.65	0.70	0.40	10.40	0.44	
BSR 11	11	11.65	0.70	0.40	11.40	0.44	
BSR 12	12	12.75	0.90	0.50	12.50	0.55	
BSR 13	13	13.75	0.90	0.50	13.50	0.55	
BSR 14	14	14.80	0.90	0.50	14.50	0.55	
BSR 15	15	15.80	0.90	0.50	15.50	0.55	
BSR 16	16	16.85	0.90	0.50	16.50	0.55	
BSR 17	17	17.85	0.90	0.50	17.50	0.55	
BSR 19	19	20.00	1.10	0.60	19.60	0.66	

Material 1.4310 (AISI 301). Subject to change. 1000 pieces per pack.