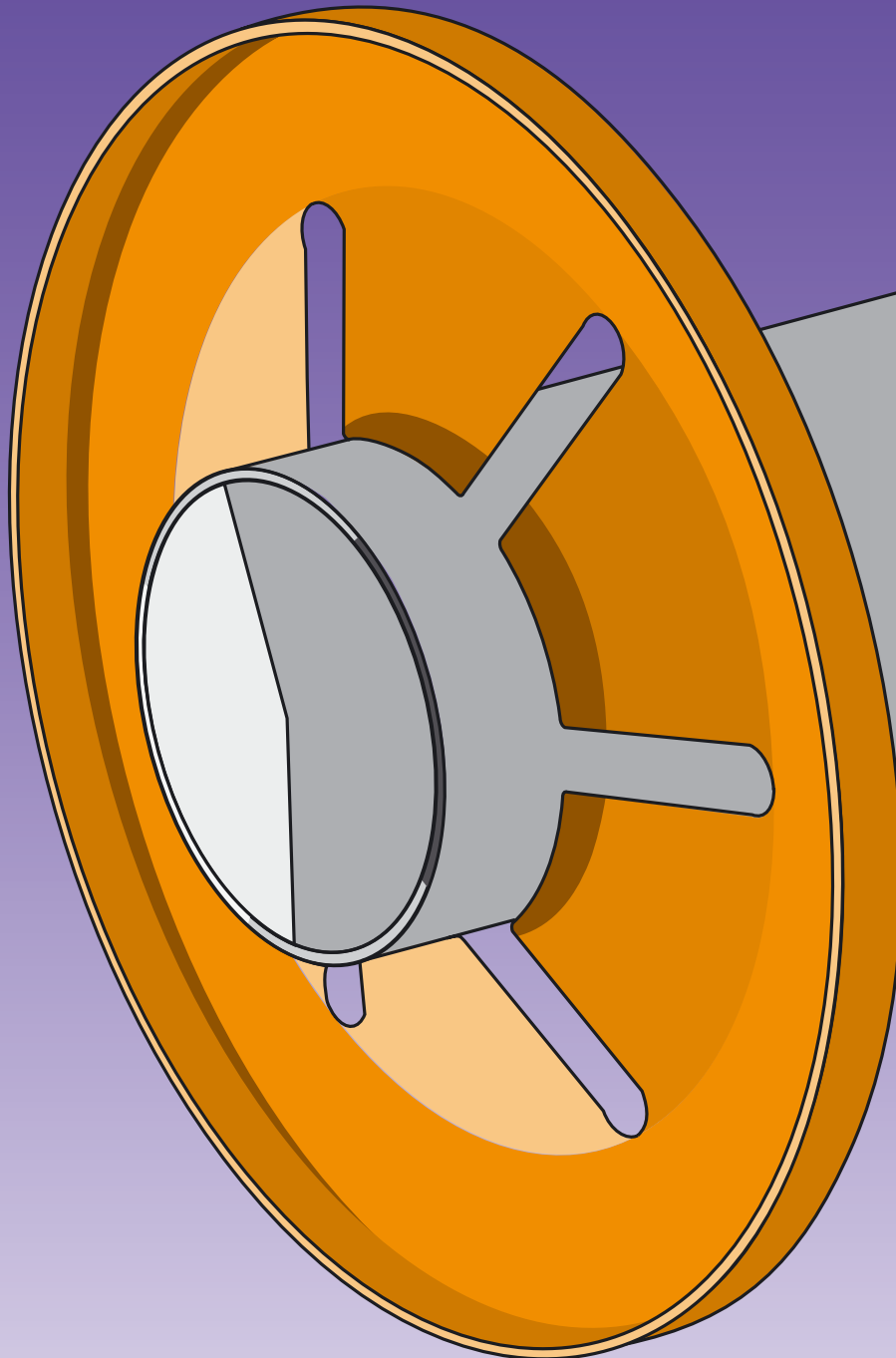



## ■ STARLOCK<sup>®</sup> retaining washers




# STARLOCK® retaining washers

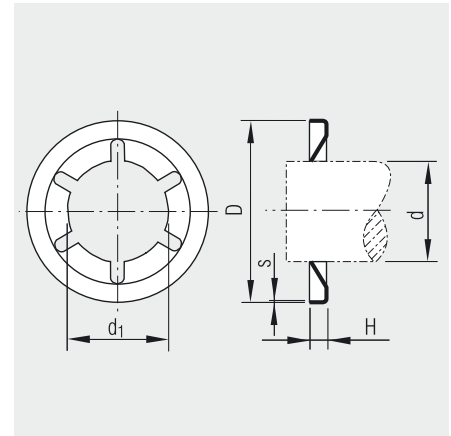
without cap




## Material

 **Spring steel**, brownish or bluish finish

 **Spring steel**, mechanical zinc

 **Stainless steel**



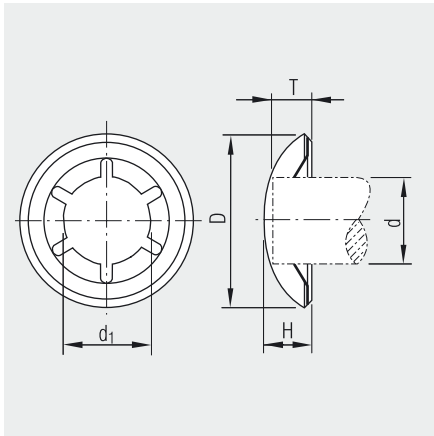
Spindle-ø d [mm]	Internal-ø d <sub>1</sub> [mm]	External-ø D ±0.3 [mm]	Height H ±0.2 [mm]	Material thickness S [mm]	Number of slits	Pull off force <sup>2</sup> [N]	Part No.		
							 Steel painted	 Steel zinc	 Stainless
1.6	1.23 – 1.46	9.7	1.3	0.20	4	200	<b>399 201</b>	<b>399 401<sup>1</sup></b>	<b>399 801<sup>1</sup></b>
2.0	1.61 – 1.84	9.7	1.3	0.20	4	200	<b>399 202</b>	<b>399 402<sup>1</sup></b>	<b>399 802</b>
2.4	2.02 – 2.25	9.7	1.3	0.20	4	200	<b>399 203</b>	<b>399 403<sup>1</sup></b>	<b>399 803<sup>1</sup></b>
3.0	2.58 – 2.81	9.7	1.3	0.20	4	200	<b>399 204</b>	<b>399 404</b>	<b>399 804</b>
3.2	2.78 – 3.01	9.7	1.3	0.20	4	200	<b>399 205</b>	<b>399 405</b>	<b>399 805<sup>1</sup></b>
4.0	3.57 – 3.80	11.5	1.3	0.20	5	400	<b>399 206</b>	<b>399 406</b>	<b>399 806</b>
4.8	4.31 – 4.53	11.5	1.3	0.20	6	400	<b>399 207</b>	<b>399 407</b>	<b>399 807</b>
5.0	4.51 – 4.74	11.5	1.3	0.20	6	400	<b>399 208</b>	<b>399 408</b>	<b>399 808</b>
6.0	5.45 – 5.70	15.3	1.3	0.25	6	800	<b>399 209</b>	<b>399 409</b>	<b>399 809</b>
6.4	5.83 – 6.08	15.3	1.3	0.25	6	800	<b>399 210</b>	<b>399 410</b>	<b>399 810<sup>1</sup></b>
7.0	6.46 – 6.72	15.3	1.3	0.25	6	800	<b>399 211</b>	<b>399 411</b>	<b>399 811</b>
8.0	7.40 – 7.66	15.3	1.3	0.25	6	800	<b>399 212</b>	<b>399 412</b>	<b>399 812</b>
9.0	8.50 – 8.75	18.4	1.9	0.30	6	1000	<b>399 213</b>	<b>399 413</b>	<b>399 813</b>
9.5	9.00 – 9.26	18.4	1.9	0.30	6	1000	<b>399 214</b>	<b>399 414<sup>1</sup></b>	<b>399 814</b>
10.0	9.49 – 9.74	18.4	1.9	0.30	6	1000	<b>399 215</b>	<b>399 415</b>	<b>399 815</b>
11.0	10.50 – 10.76	18.4	1.9	0.30	6	1000	<b>399 216</b>	<b>399 416</b>	<b>399 816</b>
12.0	11.37 – 11.62	25.0	2.3	0.40	6	2500	<b>399 217</b>	<b>399 417</b>	<b>399 817</b>
12.7	12.10 – 12.36	25.0	2.3	0.40	6	2500	<b>399 218</b>	<b>399 418<sup>1</sup></b>	<b>399 818<sup>1</sup></b>
13.0	12.38 – 12.64	25.0	2.3	0.40	6	2500	<b>399 219</b>	<b>399 419</b>	<b>399 819<sup>1</sup></b>
14.0	13.40 – 13.66	28.2	2.3	0.40	6	2500	<b>399 220</b>	<b>399 420</b>	<b>399 820</b>
15.0	14.43 – 14.68	28.2	2.3	0.40	6	2500	<b>399 221</b>	<b>399 421</b>	<b>399 821<sup>1</sup></b>
16.0	15.28 – 15.53	28.2	2.3	0.40	6	2500	<b>399 222</b>	<b>399 422</b>	<b>399 822</b>
17.0	16.42 – 16.68	28.2	2.3	0.40	6	2500	<b>399 223</b>	<b>399 423</b>	<b>399 823<sup>1</sup></b>
18.0	17.34 – 17.62	36.5	3.0	0.40	9	3500	<b>399 224</b>	<b>399 424</b>	<b>399 824<sup>1</sup></b>
19.0	18.40 – 18.69	36.5	3.0	0.40	9	3500	<b>399 225</b>	<b>399 425</b>	<b>399 825<sup>1</sup></b>
20.0	19.30 – 19.63	36.5	3.0	0.40	9	3500	<b>399 226</b>	<b>399 426</b>	<b>399 826</b>
21.0	20.33 – 20.61	36.5	3.0	0.40	9	3500	<b>399 227</b>	<b>399 427<sup>1</sup></b>	<b>399 827<sup>1</sup></b>
22.0	21.37 – 21.65	36.5	3.0	0.40	9	3500	<b>399 228</b>	<b>399 428</b>	<b>399 828<sup>1</sup></b>
23.0	22.34 – 22.62	38.1	2.9	0.45	9	3500	<b>399 229</b>	<b>399 429<sup>1</sup></b>	<b>399 829<sup>1</sup></b>
24.0	23.33 – 23.66	38.1	3.2	0.50	9	3850	–	<b>399 430</b>	–
24.0	23.33 – 23.66	41.3	3.2	0.50	9	3850	<b>399 230</b>	–	–
25.0	24.30 – 24.63	41.3	3.2	0.50	9	3850	<b>399 231</b>	<b>399 431</b>	–

<sup>1</sup> Not standard stock. These items will be manufactured to customer requirements.

<sup>2</sup> The pull off forces apply for steel parts and are based on tests using an untreated ST 37 h 11 steel spindle.

On request: • Other surface finishes are available e.g. DELTA Tone + Seal (for spindle diameters from 12.0 mm) depending on quantity

We reserve the right to amend specifications at any time.



with stainless steel cap

## Material

- **Spring steel**, brownish or bluish finish
- **Spring steel**, mechanical zinc
- **Stainless steel**



Spindle- $\varnothing$ d [mm]	Internal- $\varnothing$ d <sub>1</sub> [mm]	External- $\varnothing$ D $\pm 0.3$ [mm]	Height H $\pm 0.2$ [mm]	Insertion depth T max [mm]	Number of slits	Pull off force <sup>2</sup> [N]	Part No.		
							<span style="color: blue;">■</span> Steel painted	<span style="color: blue;">■</span> Steel zinc	<span style="color: gray;">■</span> Stainless
1.6	1.23 – 1.46	10.6	3.0	2.5	4	200	399 351	399 451 <sup>1</sup>	399 951 <sup>1</sup>
2.0	1.61 – 1.84	10.6	3.0	2.5	4	200	399 352	399 452 <sup>1</sup>	399 952 <sup>1</sup>
2.4	2.02 – 2.25	10.6	3.0	2.5	4	200	399 353	399 453	399 953 <sup>1</sup>
3.0	2.58 – 2.81	10.6	3.0	2.5	4	200	399 354	399 454 <sup>1</sup>	399 954
3.2	2.78 – 3.01	10.6	3.0	2.5	4	200	399 355	399 455	399 955 <sup>1</sup>
4.0	3.57 – 3.80	12.4	3.8	3.0	5	400	399 356	399 456	399 956
4.8	4.31 – 4.53	12.4	3.8	3.0	6	400	399 357	399 457	399 957
5.0	4.51 – 4.74	12.4	3.8	3.0	6	400	399 358	399 458	399 958
6.0	5.45 – 5.70	16.2	5.0	4.0	6	800	399 359	399 459	399 959
6.4	5.83 – 6.08	16.2	5.0	4.0	6	800	399 360 <sup>1</sup>	399 460 <sup>1</sup>	399 960 <sup>1</sup>
7.0	6.46 – 6.72	16.2	5.0	4.0	6	800	399 361	399 461 <sup>1</sup>	399 961
8.0	7.40 – 7.66	16.2	5.0	4.0	6	800	399 362	399 462	399 962
9.0	8.50 – 8.75	19.7	5.9	4.5	6	1000	399 363	399 463	399 963
9.5	9.00 – 9.26	19.7	5.9	4.5	6	1000	399 364 <sup>1</sup>	399 464 <sup>1</sup>	399 964 <sup>1</sup>
10.0	9.49 – 9.74	19.7	5.9	4.5	6	1000	399 365	399 465	399 965
11.0	10.50 – 10.76	19.7	5.9	4.5	6	1000	399 366	399 466	399 966
12.0	11.37 – 11.62	26.0	7.5	6.0	6	2500	399 367	399 467	399 967
12.7	12.10 – 12.36	26.0	7.5	6.0	6	2500	399 368 <sup>1</sup>	399 468 <sup>1</sup>	399 968 <sup>1</sup>
13.0	12.38 – 12.64	26.0	7.5	6.0	6	2500	399 369 <sup>1</sup>	399 469 <sup>1</sup>	399 969 <sup>1</sup>
14.0	13.40 – 13.66	29.4	9.0	7.0	6	2500	399 370	399 470	399 970 <sup>1</sup>
15.0	14.43 – 14.68	29.4	9.0	7.0	6	2500	399 371	399 471	399 971 <sup>1</sup>
16.0	15.28 – 15.53	29.4	9.0	7.0	6	2500	399 372	399 472	399 972 <sup>1</sup>
17.0	16.42 – 16.68	29.4	9.0	7.0	6	2500	399 373	399 473	399 973 <sup>1</sup>
18.0	17.34 – 17.62	38.2	11.7	8.7	9	3500	399 374	399 474	399 974 <sup>1</sup>
19.0	18.40 – 18.69	38.2	11.7	8.7	9	3500	399 375 <sup>1</sup>	399 475 <sup>1</sup>	399 975 <sup>1</sup>
20.0	19.30 – 19.63	38.2	11.7	8.7	9	3500	399 376	399 476	399 976 <sup>1</sup>
21.0	20.33 – 20.61	38.2	11.7	8.7	9	3500	399 377 <sup>1</sup>	399 477 <sup>1</sup>	399 977 <sup>1</sup>
22.0	21.37 – 21.65	38.2	11.7	8.7	9	3500	399 378 <sup>1</sup>	399 478 <sup>1</sup>	399 978 <sup>1</sup>
23.0	22.34 – 22.62	39.8	13.0	9.5	9	3500	399 379 <sup>1</sup>	399 479 <sup>1</sup>	399 979 <sup>1</sup>
24.0	23.33 – 23.66	43.0	12.5	9.5	9	3850	399 380 <sup>1</sup>	399 480 <sup>1</sup>	–
25.0	24.30 – 24.63	43.0	12.5	9.5	9	3850	399 381	399 481	–

<sup>1</sup> Not standard stock. These items will be manufactured to customer requirements.

<sup>2</sup> The pull off forces apply for steel parts and are based on tests using an untreated ST 37 h 11 steel spindle.

Material thicknesses for STARLOCK® are the same as uncapped version

On request: • Other surface finishes are available e.g. DELTA Tone + Seal (for spindle diameters from 12.0 mm) depending on quantity

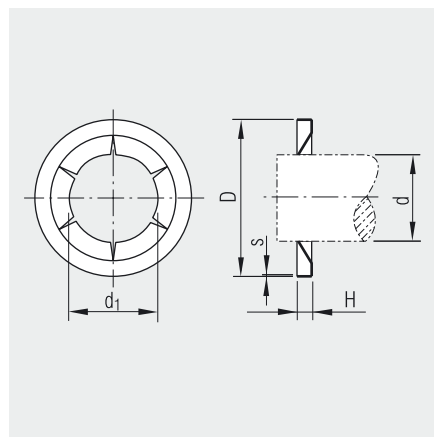
We reserve the right to amend specifications at any time.

# STARLOCK® retaining washers

reinforced, without cap

## Material

**Spring steel**, brownish or bluish finish



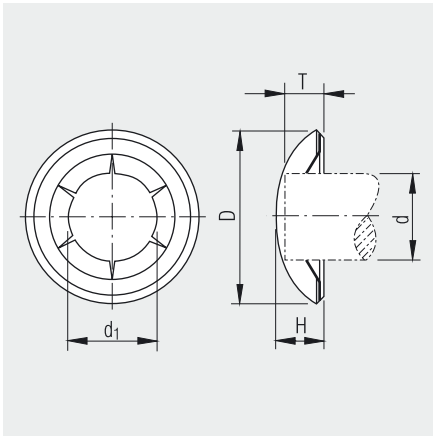
Spindle-ø d [mm]	Internal-ø d <sub>1</sub> [mm]	External-ø D ±0.3 [mm]	Height H ±0.3 [mm]	Material thickness S ±0.03 [mm]	Number of slits	Pull off force <sup>1</sup> [N]	Part No. <b>Steel</b>
<b>4.0</b>	3.57 – 3.80	11.5	1.3	0.4	6	1250	<b>399 106<sup>2</sup></b>
<b>5.0</b>	4.51 – 4.74	11.5	1.3	0.4	6	1250	<b>399 108<sup>2</sup></b>
<b>6.0</b>	5.33 – 5.59	15.3	1.3	0.4	6	1800	<b>399 109</b>
<b>8.0</b>	7.25 – 7.42	15.3	1.3	0.4	6	1800	<b>399 112</b>

<sup>1</sup> The pull off forces are based on our tests using an untreated ST 37 h 11 steel spindle.

<sup>2</sup> Not standard stock. These items will be manufactured to customer requirements.

We reserve the right to amend specifications at any time.


## STARLOCK® retaining washers



reinforced,  
with stainless steel cap

### Material

 **Spring steel**, brownish or bluish finish

Spindle-ø d [mm]	Internal-ø d <sub>1</sub> [mm]	External-ø D ±0.3 [mm]	Height H ±0.3 [mm]	Material thickness <sup>2</sup> S ±0.03 [mm]	Insertion depth T max [mm]	Number of slits	Pull off force <sup>1</sup> [N]	Part No.  <b>Steel</b>
<b>4.0</b>	3.57 – 3.80	12.3	3.5	0.4	3.0	6	1250	<b>399 156'</b>
<b>5.0</b>	4.51 – 4.74	12.3	3.5	0.4	3.0	6	1250	<b>399 158'</b>
<b>6.0</b>	5.33 – 5.59	16.2	5.0	0.4	4.0	6	1800	<b>399 159'</b>
<b>8.0</b>	7.25 – 7.42	16.2	5.0	0.4	4.0	6	1800	<b>399 162</b>

<sup>1</sup> The pull off forces are based on our tests using an untreated ST 37 h 11 steel spindle.


<sup>2</sup> of the Starlock®

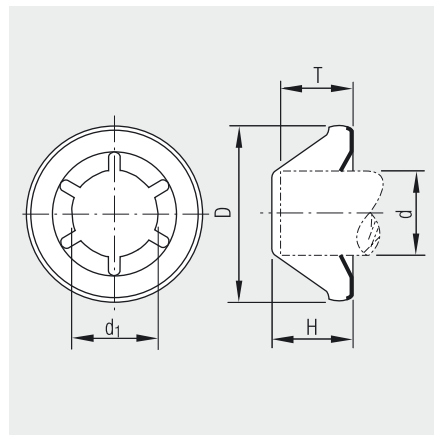
We reserve the right to amend specifications at any time.


# STARLOCK® retaining washers

with steel deep cap, zinc plated

## Material

 **Spring steel**, brownish or bluish finish

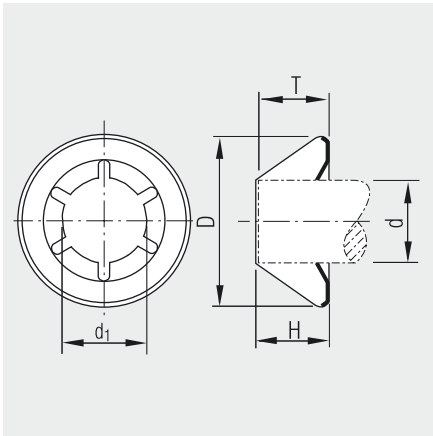


Spindle- $\varnothing$ d [mm]	Internal- $\varnothing$ d <sub>1</sub> [mm]	External- $\varnothing$ D $\pm 0.3$ [mm]	Height H $\pm 0.3$ [mm]	Material thickness <sup>2</sup> S $\pm 0.03$ [mm]	Insertion depth T max [mm]	Number of slits	Pull off force <sup>1</sup> [N]	Part No.  <b>Steel</b>
<b>4.0</b>	3.57 – 3.80	12.3	5.7	0.20	5.3	5	400	<b>399 636</b>
<b>5.0</b>	4.51 – 4.74	12.3	5.7	0.20	5.3	6	400	<b>399 638</b>
<b>6.0</b>	5.45 – 5.70	16.2	7.2	0.25	6.7	6	800	<b>399 639</b>
<b>7.0</b>	6.46 – 6.72	16.2	7.2	0.25	6.7	6	800	<b>399 641</b>
<b>8.0</b>	7.40 – 7.66	16.2	7.2	0.25	6.7	6	800	<b>399 642</b>
<b>9.0</b>	8.50 – 8.75	19.7	8.1	0.30	7.8	6	1000	<b>399 643</b>
<b>10.0</b>	9.49 – 9.74	19.7	8.1	0.30	7.8	6	1000	<b>399 645</b>
<b>11.0</b>	10.50 – 10.76	19.7	8.1	0.30	7.8	6	1000	<b>399 646</b>

<sup>1</sup> The pull off forces are based on our tests using an untreated ST 37 h 11 steel spindle.

<sup>2</sup> of the Starlock®

We reserve the right to amend specifications at any time.



with stainless steel trapezium cap

**Material**

**Spring steel**, brownish or bluish finish

Spindle-ø d [mm]	Internal-ø d <sub>1</sub> [mm]	External-ø D ±0.3 [mm]	Height H ±0.3 [mm]	Material thickness <sup>2</sup> S ±0.03 [mm]	Insertion depth T max [mm]	Number of slits	Pull off force <sup>1</sup> [N]	Part No.  ■ Steel
<b>5.0</b>	4.51 – 4.74	12.3	4.3	0.20	4.0	6	400	<b>399 688</b>
<b>6.0</b>	5.45 – 5.70	16.2	4.8	0.25	5.0	6	800	<b>399 689</b>
<b>8.0</b>	7.40 – 7.66	16.2	4.8	0.25	5.0	6	800	<b>399 692</b>
<b>10.0</b>	9.49 – 9.74	19.7	5.6	0.30	5.7	6	1000	<b>399 695</b>

<sup>1</sup> The pull off forces are based on our tests using an untreated ST 37 h 11 steel spindle.

<sup>2</sup> of the Starlock®

We reserve the right to amend specifications at any time.

On request: • Starlock retaining washer, special design

For example:



# STARLOCK® retaining washers

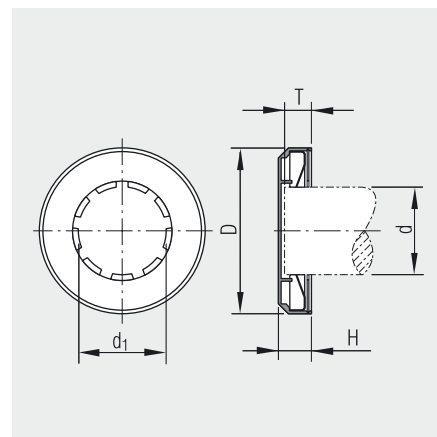
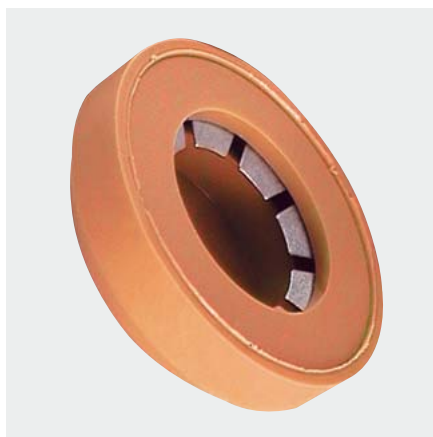
with coloured plastic cap




## Material

 **Spring steel**, brownish or bluish finish

 **Spring steel**, mechanical zinc

 **Stainless steel**



Spindle- $\varnothing$ d [mm]	Internal- $\varnothing$ d <sub>1</sub> [mm]	External- $\varnothing$ D $\pm 0.3$ [mm]	Height H $\pm 0.3$ [mm]	Insertion depth T max [mm]	Number of slits	Pull off force <sup>1</sup> [N]	Part No.		
							 Steel painted	 Steel zinc	 Stainless
6.0	5.45 – 5.70	19.0	6.5	5.5	6	800			
6.4	5.83 – 6.08	19.0	6.5	5.5	6	800			
7.0	6.46 – 6.72	19.0	6.5	5.5	6	800			
8.0	7.40 – 7.66	19.0	6.5	5.5	6	800			
9.0	8.50 – 8.75	23.0	7.5	6.5	6	1000			
9.5	9.00 – 9.26	23.0	7.5	6.5	6	1000			
10.0	9.49 – 9.74	23.0	7.5	6.5	6	1000			
11.0	10.50 – 10.76	23.0	7.5	6.5	6	1000			
12.0	11.37 – 11.62	30.0	9.0	8.0	6	2500			
12.7	12.10 – 12.36	30.0	9.0	8.0	6	2500			
13.0	12.38 – 12.64	30.0	9.0	8.0	6	2500			
14.0	13.40 – 13.66	33.0	11.0	10.0	6	2500			
15.0	14.43 – 14.68	33.0	11.0	10.0	6	2500			
16.0	15.28 – 15.53	33.0	11.0	10.0	6	2500			
17.0	16.42 – 16.68	33.0	11.0	10.0	6	2500			
18.0	17.34 – 17.62	41.0	12.0	11.0	9	3500			
19.0	18.40 – 18.69	41.0	12.0	11.0	9	3500			
20.0	19.30 – 19.63	41.0	12.0	11.0	9	3500			
21.0	20.33 – 20.61	41.0	12.0	11.0	9	3500			
22.0	21.37 – 21.65	41.0	12.0	11.0	9	3500			
24.0 <sup>2</sup>	23.33 – 23.66	46.0	14.0	13.0	9	3850			
25.0 <sup>2</sup>	24.30 – 24.63	46.0	14.0	13.0	9	3850			

**Part No.<sup>3</sup>**  
according to RAL colour  
or colour sample

<sup>1</sup> The pull off forces apply for steel parts and are based on tests using an untreated ST 37 h 11 steel spindle.

<sup>2</sup> Not available in stainless steel

<sup>3</sup> Please state the following on all inquiries/orders:

1. Axle/spindle diameter
2. STARLOCK® retaining washer (insert) in spring steel, painted, mechanical zinc or stainless steel
3. Colour of plastic cap according to RAL or colour sample

Material thicknesses for STARLOCK® are the same as uncapped version

STARLOCK® retaining washer with plastic PA6 caps according to RAL or colour sample can be made to customer specification.

Minimum order volume: 5000. Delivery time: approx. 3–4 weeks.

Standard black and white available from stock.

On request: • Special requests e.g. with company logo, symbols or lettering

We reserve the right to amend specifications at any time.



### Hand tools and magnetic fittings

for STARLOCK® retaining washers in spring steel, without cap



Spindle Ø [mm]	Part No. Tool	Part No. Magnetic fitting
1.6 – 3.2	390 303	390 310
4.0 – 5.0	390 303	390 311
6.0 – 8.0	390 303	390 312
9.0 – 11.0	390 303	390 313
12.0 – 13.0	390 303	390 317
14.0 – 17.0	390 303	390 318
18.0 – 23.0	390 303	390 315
24.0 – 25.0	390 303	390 316

### Hand tools and magnetic fittings

for STARLOCK® retaining washers with standard stainless steel caps



Axle-/spindle- Ø [mm]	Part No. Tool	Part No. Magnetic fitting
1.6 – 3.2	390 303	390 320
4.0 – 5.0	390 303	390 321
6.0 – 8.0	390 303	390 322
9.0 – 11.0	390 303	390 323
12.0 – 13.0	390 303	390 327
14.0 – 17.0	390 303	390 328
18.0 – 22.0	390 303	390 325
23.0	390 303	390 329
24.0 – 25.0	390 303	390 326

### Hand tools and magnetic fittings

for STARLOCK® retaining washers with steel deep caps and stainless steel trapezium caps



Spindle Ø [mm]	Part No. Tool	Part No. Magnetic fitting
4.0 – 5.0	390 303	390 312
6.0 – 9.0	390 303	390 313
10.0 – 11.0	390 303	390 317

