

Axial preloading of bearings with **SPIROL** bearing Disc Springs extends the bearing life and eliminates excessive running noise.

One or more Disc Springs can be used. In most cases the outer race of the ball bearing is preloaded with the Disc Spring. In some cases it is desirable to preload the inner race. Accordingly, Disc Springs designed for the outer race of one bearing will also fit the inner race of another bearing.

The recommended preload is achieved when the disc is deflected to 75% of the free cone heights (h_o). The h_o/t ratio is designed so that the spring load remains nearly constant for a large deflection range. Tolerance build up and variations resulting from expansion can be accommodated without a significant change in preload.

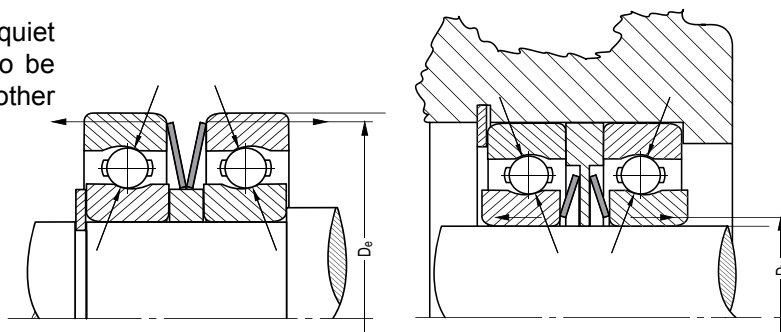
| Ball Bearing Size | Dimensions | | | | | $s = 0.75 h_o$ | | | |
|-------------------|------------|-------|------|-------|-------|----------------|-------|-------|-------|
| | D_e | D_i | t | l_o | h_o | s, mm | F (N) | | |
| 623 | EL3 | 9.8 | 6.2 | 0.2 | 0.4 | 0.2 | 0.15 | 23.2 | |
| 624 | EL4 | 12.8 | 7.2 | 0.25 | 0.5 | 0.25 | 0.188 | 29.3 | |
| 625 | 634 | EL5 | 15.8 | 8.2 | 0.25 | 0.55 | 0.3 | 0.225 | 23 |
| 626 | 635 | EL6 | 18.8 | 9.2 | 0.3 | 0.65 | 0.35 | 0.263 | 31.3 |
| 607 | EL7 | 18.8 | 10.2 | 0.35 | 0.7 | 0.35 | 0.263 | 50.7 | |
| 608 | 627 | EL8 | 21.8 | 12.3 | 0.35 | 0.75 | 0.4 | 0.3 | 46.3 |
| 609 | EL9 | 23.7 | 14.3 | 0.4 | 0.9 | 0.5 | 0.375 | 80.6 | |
| 600 | 629 | 25.7 | 14.3 | 0.4 | 0.9 | 0.5 | 0.375 | 63.5 | |
| 6001 | | 27.7 | 17.3 | 0.4 | 1 | 0.6 | 0.45 | 80 | |
| | 6200 | 29.7 | 17.4 | 0.4 | 1.1 | 0.7 | 0.525 | 82.8 | |
| 6002 | 6201 | 31.7 | 20.4 | 0.4 | 1.1 | 0.7 | 0.525 | 81 | |
| | 6300 | 34.6 | 20.4 | 0.4 | 1.1 | 0.7 | 0.525 | 61.4 | |
| 6003 | 6202 | 34.6 | 22.4 | 0.5 | 1.2 | 0.7 | 0.525 | 118.4 | |
| | 6301 | 36.6 | 20.4 | 0.5 | 1.3 | 0.8 | 0.6 | 110.2 | |
| | 6203 | 39.6 | 25.5 | 0.5 | 1.3 | 0.8 | 0.6 | 109.9 | |
| 6004 | 6302 | 41.6 | 25.5 | 0.5 | 1.4 | 0.9 | 0.675 | 113.3 | |
| 6005 | 6204 | 46.5 | 30.5 | 0.6 | 1.5 | 0.9 | 0.675 | 153.5 | |
| | 6205 | 6304 | 51.5 | 35.5 | 0.6 | 1.5 | 0.9 | 0.675 | 135.5 |
| 6006 | | 54.5 | 40.5 | 0.6 | 1.5 | 0.9 | 0.675 | 141.3 | |
| 6007 | 6206 | 6305 | 61.5 | 40.5 | 0.7 | 1.8 | 1.1 | 0.825 | 175.6 |
| 6008 | | 67.5 | 50.5 | 0.7 | 1.7 | 1 | 0.75 | 161.3 | |
| | 6306 | 71.5 | 45.5 | 0.7 | 2.1 | 1.4 | 1.05 | 184.9 | |
| | 6207 | 71.5 | 50.5 | 0.7 | 2.1 | 1.4 | 1.05 | 218.3 | |
| 6009 | | 74.5 | 55.5 | 0.8 | 1.9 | 1.1 | 0.825 | 211.3 | |
| | 6307 | 79.5 | 50.5 | 0.8 | 2.3 | 1.5 | 1.125 | 227.5 | |
| 6010 | 6208 | 79.5 | 55.5 | 0.8 | 2.3 | 1.5 | 1.125 | 263.4 | |
| | 6209 | 84.5 | 60.5 | 0.9 | 2.5 | 1.6 | 1.2 | 358.7 | |
| | 6308 | 89.5 | 60.5 | 0.9 | 2.5 | 1.6 | 1.2 | 287.8 | |
| 6011 | 6210 | 89.5 | 65.5 | 0.9 | 2.5 | 1.6 | 1.2 | 335.3 | |
| 6012 | | 94.5 | 75.5 | 1 | 2.2 | 1.2 | 0.9 | 324.7 | |
| | 6309 | 99 | 65.5 | 1 | 2.6 | 1.6 | 1.2 | 292.3 | |
| 6013 | 6211 | 99 | 70.5 | 1 | 2.6 | 1.6 | 1.2 | 332.3 | |
| | 6310 | 109 | 70.5 | 1.25 | 2.7 | 1.45 | 1.088 | 357.1 | |
| 6014 | 6212 | 109 | 75.5 | 1.25 | 2.7 | 1.45 | 1.088 | 397.9 | |
| 6015 | | 114 | 90.5 | 1.25 | 2.45 | 1.2 | 0.9 | 398.2 | |
| | 6311 | 119 | 75.5 | 1.25 | 2.8 | 1.55 | 1.163 | 319.9 | |
| | 6213 | 119 | 85.5 | 1.25 | 2.8 | 1.55 | 1.163 | 392.6 | |
| 6016 | 6214 | 124 | 90.5 | 1.25 | 3 | 1.75 | 1.313 | 444.8 | |

| STANDARD MATERIALS | |
|---|--|
| B | "t" less than 1.25 mm High Carbon Steel |
| W | "t" 1.25 mm and thicker Alloy Steel |
| Austempered to HRC 42 - 52 / HV 412 - 544 | |
| STANDARD FINISH | |
| R | Phosphate coated, oiled |

TO ORDER: Product / D_e x D_i x t / material code / finish code
 EXAMPLE: BRG 41.6 x 25.5 x 0.5 B R

Note: All Ball Bearing Disc Springs are made to order.

Predictable preloading of bearings results in quiet running and long life. Disc Springs may also be used to preload seals, packings, clutches and other machine elements.

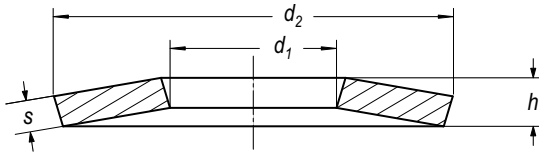




CONICAL SPRING WASHERS

Designed in accordance with DIN 6796 for use with high tensile bolts in Classes 8.8 and higher.

Since the spring force exerted is predictable, Spring Washers provide a simple effective means of determining bolt tension required to achieve a properly torqued assembly. In addition, tension, which would otherwise be lost to expansion, wear, or compression set, is maintained.



| Nominal Size | d_1 H14 | d_2 h14 | s | h max ¹⁾ | h min ²⁾ | Force N Test ³⁾ | Force N ⁴⁾ |
|--------------|--------------|--------------|------|--------------------------|--------------------------|-------------------------------|--------------------------|
| 2 | 2.2 | 5 | 0.4 | 0.6 | 0.5 | 920 | 628 |
| 2.5 | 2.7 | 6 | 0.5 | 0.72 | 0.61 | 1540 | 946 |
| 3 | 3.2 | 7 | 0.6 | 0.85 | 0.72 | 2350 | 1320 |
| 3.5 | 3.7 | 8 | 0.8 | 1.06 | 0.92 | 3160 | 2410 |
| 4 | 4.3 | 9 | 1 | 1.3 | 1.12 | 4050 | 3770 |
| 5 | 5.3 | 11 | 1.2 | 1.55 | 1.35 | 6700 | 5480 |
| 6 | 6.4 | 14 | 1.5 | 2 | 1.7 | 9400 | 8590 |
| 7 | 7.4 | 17 | 1.75 | 2.3 | 2 | 13700 | 11300 |
| 8 | 8.4 | 18 | 2 | 2.6 | 2.24 | 17200 | 14900 |
| 10 | 10.5 | 23 | 2.5 | 3.2 | 2.8 | 27500 | 22100 |
| 12 | 13 | 29 | 3 | 3.95 | 3.43 | 40000 | 34100 |
| 14 | 15 | 35 | 3.5 | 4.65 | 4.04 | 55000 | 46000 |
| 16 | 17 | 39 | 4 | 5.25 | 4.58 | 75000 | 59700 |
| 18 | 19 | 42 | 4.5 | 5.8 | 5.08 | 95000 | 74400 |
| 20 | 21 | 45 | 5 | 6.4 | 5.6 | 122000 | 93200 |
| 22 | 23 | 49 | 5.5 | 7.05 | 6.15 | 152000 | 113700 |
| 24 | 25 | 56 | 6 | 7.75 | 6.77 | 175000 | 131000 |
| 27 | 28 | 60 | 6.5 | 8.35 | 7.3 | 230000 | 154000 |
| 30 | 31 | 70 | 7 | 9.2 | 8 | 280000 | 172000 |

- 1) Maximum height at delivery
- 2) Minimum height after test for permanent set as specified in DIN 267 Part 26
- 3) Compression test load
- 4) Calculated spring force at deflection equals $h_{min} - s$

| | | |
|-----------------|----------|---|
| MATERIAL | B | Spring steel heat treated to HV 420-510 (HRC 43-50) |
| FINISH | K | Plain (natural), oiled |

TO ORDER: Product / $d_2 \times d_1 \times t$ / material code / finish code
 EXAMPLE: LWR 9 x 4.3 x 1 B K

Produced to order only.

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ISO/TS 16949:2009 Certified
 ISO 9001:2008 Certified