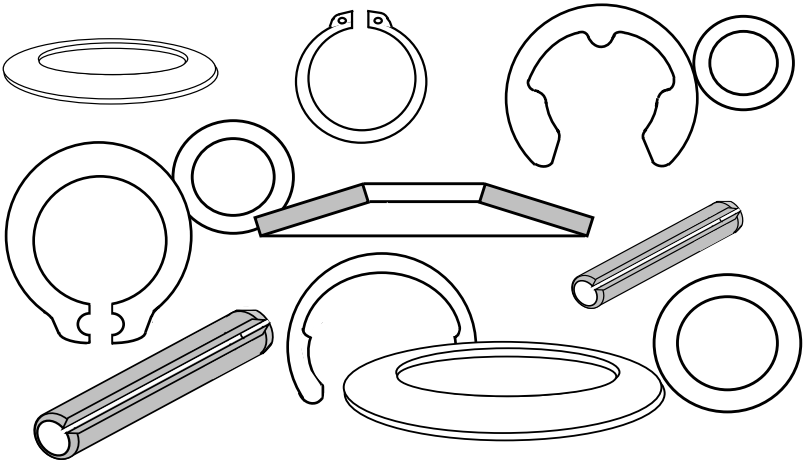


Caleb omponents

Here to fulfill all of your
Spring Steel Fastener requirements



**SPRING
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KITS

**DISC
SPRINGS**

**SHIM &
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WASHERS**

**Caleb Components Limited,
Block 6, Grazebrook Industrial Park,
Peartree Lane, Dudley,
West Midlands, DY2 0XW**

**Tel: 01384 453955
Fax: 01384 257423
sales@calebcomponents.com
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& GRIP RINGS**

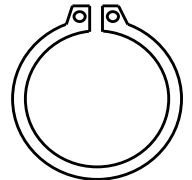
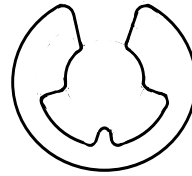
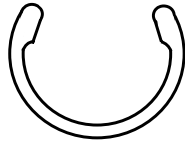
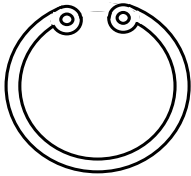
CARBON & STAINLESS PARTS FROM STOCK



**Welcome
to**

**Caleb
Components**

**Suppliers of all types of
Spring type fasteners**



Introduction

CALEB COMPONENTS LTD was established to offer our customers high quality items of spring type fasteners and components,

As well as specialising in the enclosed products we are also able to provide a wide variety of other products including inch sizes, specials types and stainless materials.

We would therefore welcome any enquiry and would do our utmost to fulfil your requirements.

We have full technical information of any product in our range and a technical specification sheet is available for any of our products upon request.

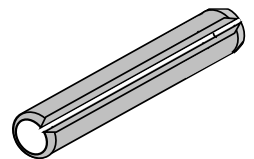
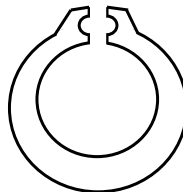
Carriage is free for all orders over £200.00

(For UK deliveries only)

Minimum line charge is £2.50

Please note! Whilst every endeavour has been made to ensure that the contents of this catalogue is accurate; no liability will be accepted for any errors.

Please contact us now for any standard or non-standard item of spring type component



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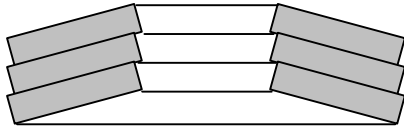
Disc Spring Introduction

A brief history - The humble Disc Spring Washer was introduced to the world by Julien-Francoise Belleville and patented as early as 1861. This early form of Disc Spring in the form of an annular type shell was able to absorb very high axial forces with very small amounts of deflection.

Over the years the Disc Spring has become more finely honed with greater degrees and accuracy for both forces and deflections.

With the introduction of DIN 2092 calculations, it is now possible to either select or design a Disc to meet a customers specific requirement.

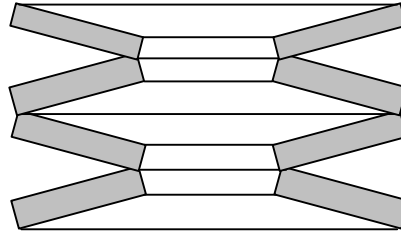
Caleb Components can offer a large choice of standard Discs Springs or even design and provide a special to suit your requirements. With our specialist Disc Data program we can provide a print-out covering all the relevant details.



Stacked in Parallel

Deflection: As a single Disc

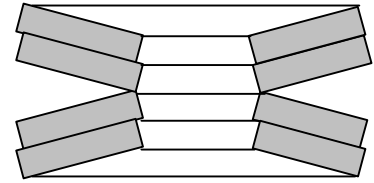
Force: As per single Disc multiplied by the number of Discs in parallel



Stacked in series

Deflection: As per single Disc multiplied by number of Discs in series.

Force: As a single Disc



Stacked in series & parallel

Deflection: As per single Disc multiplied by number of Discs in series.

Force: As per single Disc multiplied by the number of Discs in parallel

Note! Hysteresis increases the load by approximately 3% per mating face per Disc. Eg if 3 Discs are in parallel the load would increase by approximately 6% (2 mating faces x 3%).

To minimise friction and obtain a more accurate force the correct guiding element and clearance should be used.
(see enclosed table)

Recommended O/Dia & I/Dia clearances	
Diameter	Diameter Clearance
up to 16mm	0.2mm
Over 16.0mm to 20.0mm	0.3mm
Over 20.0mm to 26.0mm	0.4mm
Over 26.0mm to 31.5mm	0.5mm
Over 31.5mm to 59.0mm	0.6mm
Over 59.0mm to 80.0mm	0.8mm
Over 80.0mm to 140.0mm	1.0mm
Over 140mm to 250.0mm	1.6mm

Although it is common to guide Disc Springs on a shaft it is acceptable for them to be guided via the outside dia in an enclosed bore.

To prevent excessive wear on the guide element a minimum surface hardness of 55 HRC should apply to both guide and end abutments.

Some common uses for Disc Springs

- Stiffeners for hinges
- Spring return on press tooling
- Excellent shock absorption
- Clutch return Spring pressure
- Helps prevent bolt loosening
- Clearance take-up
- Provides pressure between cutting blades
- Pre-loading of Ball-Bearing units
- Stacked to form a spring stack

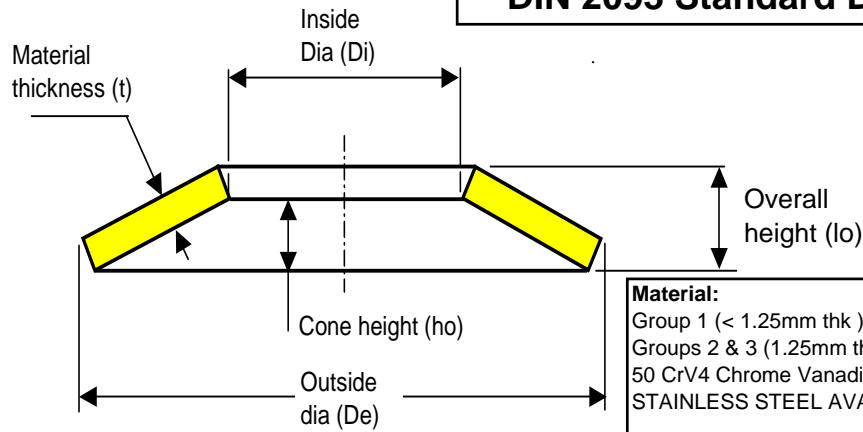
Some advantages of Disc Springs

- High force for short movements
- Even loading throughout circumference
- Various Spring characteristics:
- Linear, regressive and negative rates
- Numerous combinations
- Non-tangle (for automated assembly)
- High shock absorption
- High number of cycles achievable
- Replacement for coil springs

General operating temperatures: 0.2 to under 1.25mm thickness (Carbon Spring Steel) - 10 to +100 Degrees
1.25mm thickness and above (50 CrV4 Chrome Vanadium -40 to + 200 Degrees

Caleb Components can generally offer high volume customer specials in as little as 4 ~ 6 weeks with either minimal or no tooling costs involved and to the highest degree of quality for maximum fatigue life.

DIN 2093 Standard Disc Springs



Material:

Group 1 (< 1.25mm thk):-Carbon Spring Steel
 Groups 2 & 3 (1.25mm thk plus):-
 50 CrV4 Chrome Vanadium Spring Steel
STAINLESS STEEL AVAILABLE ON REQUEST

Standard Finish: Phosphate and oil

F = Force in Newtons at 75% deflection

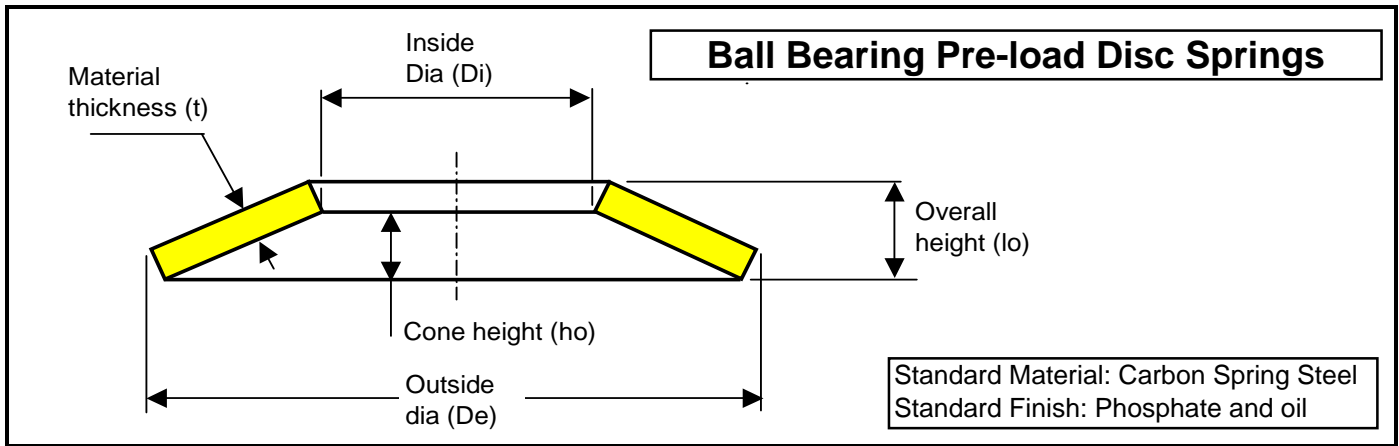
Part no	De	Di	t	lo	ho	F at 75%
CDS63203	6.0	3.2	0.30	0.45	0.15	119
CDS83202	8.0	3.2	0.20	0.40	0.20	26
CDS83203	8.0	3.2	0.30	0.55	0.25	104
CDS83204	8.0	3.2	0.40	0.60	0.20	186
CDS83205	8.0	3.2	0.50	0.70	0.20	357
CDS84204	8.0	4.2	0.20	0.45	0.25	39
CDS84203	8.0	4.2	0.30	0.55	0.25	118
CDS84204	8.0	4.2	0.40	0.60	0.20	210
CDS103203	10.0	3.2	0.30	0.65	0.35	98
CDS103204	10.0	3.2	0.40	0.70	0.30	179
CDS103205	10.0	3.2	0.50	0.75	0.25	279
CDS104205	10.0	4.2	0.40	0.70	0.30	189
CDS104205	10.0	4.2	0.50	0.75	0.25	294
CDS104206	10.0	4.2	0.60	0.85	0.25	502
CDS1052025	10.0	5.2	0.25	0.55	0.30	58
CDS105204	10.0	5.2	0.40	0.70	0.30	209
CDS105205	10.0	5.2	0.50	0.75	0.25	325
CDS124204	12.0	4.2	0.40	0.80	0.40	178
CDS124205	12.0	4.2	0.50	0.85	0.35	284
CDS124206	12.0	4.2	0.60	1.00	0.40	557
CDS125205	12.0	5.2	0.50	0.90	0.40	350
CDS125206	12.0	5.2	0.60	0.95	0.35	506
CDS126205	12.0	6.2	0.50	0.85	0.35	326
CDS126206	12.0	6.2	0.60	0.95	0.35	552
CDS1255205	12.5	5.2	0.50	0.85	0.35	272
CDS12562035	12.5	6.2	0.35	0.80	0.45	151
CDS1256205	12.5	6.2	0.50	0.85	0.35	293
CDS1256206	12.5	6.2	0.60	0.95	0.35	496
CDS1256207	12.5	6.2	0.70	1.00	0.30	660
CDS125621	12.5	6.2	1.00	1.20	0.20	1,254
CDS1472035	14.0	7.2	0.35	0.80	0.45	123
CDS147205	14.0	7.2	0.50	0.90	0.40	279
CDS147208	14.0	7.2	0.80	1.10	0.30	797
CDS155204	15.0	5.2	0.40	0.95	0.55	176
CDS155205	15.0	5.2	0.50	1.00	0.50	278
CDS155206	15.0	5.2	0.60	1.05	0.45	407
CDS155207	15.0	5.2	0.70	1.10	0.40	555
CDS156205	15.0	6.2	0.50	1.00	0.50	289
CDS156206	15.0	6.2	0.60	1.05	0.45	424
CDS156207	15.0	6.2	0.70	1.10	0.40	578
CDS158205	15.0	8.2	0.50	1.00	0.50	334
CDS158207	15.0	8.2	0.70	1.10	0.40	666
CDS158208	15.0	8.2	0.80	1.20	0.40	982

CDS168204	16.0	8.2	0.40	0.90	0.50	154
CDS168206	16.0	8.2	0.60	1.05	0.45	410
CDS168207	16.0	8.2	0.70	1.15	0.45	637
CDS168208	16.0	8.2	0.80	1.20	0.40	825
CDS168209	16.0	8.2	0.90	1.25	0.35	1,013
CDS186204	18.0	6.2	0.40	1.00	0.60	139
CDS186205	18.0	6.2	0.50	1.10	0.60	245
CDS186206	18.0	6.2	0.60	1.20	0.60	400
CDS186207	18.0	6.2	0.70	1.25	0.55	553
CDS186208	18.0	6.2	0.80	1.30	0.50	726
CDS188205	18.0	8.2	0.50	1.10	0.60	265
CDS188207	18.0	8.2	0.70	1.25	0.55	596
CDS188208	18.0	8.2	0.80	1.30	0.50	783
CDS18821	18.0	8.2	1.00	1.40	0.40	1,181
CDS1892045	18.0	9.2	0.45	1.05	0.60	214
CDS189207	18.0	9.2	0.70	1.20	0.50	566
CDS18921	18.0	9.2	1.00	1.40	0.40	1,254
CDS208206	20.0	8.2	0.60	1.30	0.70	412
CDS208207	20.0	8.2	0.70	1.35	0.65	569
CDS208208	20.0	8.2	0.80	1.40	0.60	751
CDS208209	20.0	8.2	0.90	1.45	0.55	954
CDS20821	20.0	8.2	1.00	1.55	0.55	1,294
CDS2010204	20.0	10.2	0.40	0.90	0.50	99
CDS2010205	20.0	10.2	0.50	1.15	0.65	254
CDS2010208	20.0	10.2	0.80	1.35	0.55	748
CDS2010209	20.0	10.2	0.90	1.45	0.55	1,050
CDS201021	20.0	10.2	1.00	1.55	0.55	1,425
CDS2010211	20.0	10.2	1.10	1.55	0.45	1,521
CDS20102125	20.0	10.2	1.25	1.75	0.50	2,477
CDS2010215	20.0	10.2	1.50	1.80	0.30	2,521
CDS22511206	22.5	11.2	0.60	1.40	0.80	425
CDS22511208	22.5	11.2	0.80	1.45	0.65	707
CDS2251121	22.5	11.2	1.00	1.65	0.65	1,335
CDS225112125	22.5	11.2	1.25	1.75	0.50	1,929
CDS238207	23.0	8.2	0.70	1.50	0.80	544
CDS238208	23.0	8.2	0.80	1.55	0.75	719
CDS238209	23.0	8.2	0.90	1.60	0.70	919
CDS23821	23.0	8.2	1.00	1.70	0.70	1,240
CDS2310209	23.0	10.2	0.90	1.65	0.75	1,058
CDS231021	23.0	10.2	1.00	1.70	0.70	1,315
CDS23102125	23.0	10.2	1.25	1.90	0.65	2,310
CDS231221	23.0	12.2	1.00	1.60	0.60	1,217
CDS23122125	23.0	12.2	1.25	1.85	0.60	2,331
CDS2312215	23.0	12.2	1.50	2.00	0.50	3,297
CDS251021	25.0	10.2	1.00	1.75	0.75	1,172
CDS2512207	25.0	12.2	0.70	1.60	0.90	600
CDS2512209	25.0	12.2	0.90	1.60	0.70	862
CDS251221	25.0	12.2	1.00	1.80	0.80	1,359
CDS25122125	25.0	12.2	1.25	1.95	0.70	2,214
CDS2512215	25.0	12.2	1.50	2.05	0.55	2,926
CDS2810208	28.0	10.2	0.80	1.75	0.95	662
CDS281021	28.0	10.2	1.00	1.90	0.90	1,130
CDS28102125	28.0	10.2	1.25	2.05	0.80	1,853
CDS2810215	28.0	10.2	1.50	2.20	0.70	2,723
CDS281221	28.0	12.2	1.00	1.95	0.95	1,268
CDS28122125	28.0	12.2	1.25	2.10	0.85	2,083
CDS2812215	28.0	12.2	1.50	2.25	0.75	3,077
CDS2814208	28.0	14.2	0.80	1.80	1.00	801
CDS281421	28.0	14.2	1.00	1.80	0.80	1,107
CDS28142125	28.0	14.2	1.25	2.10	0.85	2,240
CDS2814215	28.0	14.2	1.50	2.15	0.65	2,841

CDS3151221	31.5	12.2	1.00	2.10	1.10	1,167
CDS315122125	31.5	12.2	1.25	2.20	0.95	1,805
CDS31512215	31.5	12.2	1.50	2.35	0.85	2,688
CDS31516308	31.5	16.3	0.80	1.85	1.05	687
CDS315163125	31.5	16.3	1.25	2.15	0.90	1,913
CDS31516315	31.5	16.3	1.50	2.40	0.90	3,230
CDS315163175	31.5	16.3	1.75	2.45	0.70	3,871
CDS3151632	31.5	16.3	2.00	2.75	0.75	6,173
CDS341221	34.0	12.2	1.00	2.25	1.25	1,172
CDS34122125	34.0	12.2	1.25	2.35	1.10	1,815
CDS3412215	34.0	12.2	1.50	2.50	1.00	2,721
CDS34142125	34.0	14.2	1.25	2.40	1.15	1,989
CDS3414215	34.0	14.2	1.50	2.55	1.05	2,984
CDS3416315	34.0	16.3	1.50	2.55	1.05	3,155
CDS341632	34.0	16.3	2.00	2.85	0.85	5,783
CDS35518309	35.5	18.3	0.90	2.05	1.15	832
CDS355183125	35.5	18.3	1.25	2.25	1.00	1,699
CDS3551832	35.5	18.3	2.00	2.80	0.80	5,187
CDS40142125	40.0	14.2	1.25	2.65	1.40	1,778
CDS4014215	40.0	14.2	1.50	2.75	1.25	2,542
CDS40142175	40.0	14.2	1.75	3.05	1.30	4,114
CDS401422	40.0	14.2	2.00	3.05	1.05	4,763
CDS4016315	40.0	16.3	1.50	2.55	1.05	2,140
CDS40163175	40.0	16.3	1.75	3.10	1.35	4,435
CDS401632	40.0	16.3	2.00	3.10	1.10	5,169
CDS401832	40.0	18.3	2.00	3.15	1.15	5,656
CDS402041	40.0	20.4	1.00	2.30	1.30	1,017
CDS4020415	40.0	20.4	1.50	2.65	1.15	2,621
CDS402042	40.0	20.4	2.00	3.10	1.10	5,701
CDS40204225	40.0	20.4	2.25	3.15	0.90	6,500
CDS4020425	40.0	20.4	2.50	3.45	0.95	9,390
CDS45224125	45.0	22.4	1.25	2.85	1.60	1,891
CDS45224175	45.0	22.4	1.75	3.05	1.30	3,646
CDS4522425	45.0	22.4	2.50	3.50	1.00	7,716
CDS50183125	50.0	18.3	1.25	2.85	1.60	1,373
CDS5018315	50.0	18.3	1.50	3.30	1.80	2,603
CDS501832	50.0	18.3	2.00	3.50	1.50	4,567
CDS5018325	50.0	18.3	2.50	4.10	1.60	9,305
CDS501833	50.0	18.3	3.00	4.40	1.40	13,673
CDS502042	50.0	20.4	2.00	3.50	1.50	4,687
CDS5020425	50.0	20.4	2.50	3.85	1.35	7,919
CDS502242	50.0	22.4	2.00	3.60	1.60	5,222
CDS5022425	50.0	22.4	2.50	3.90	1.40	8,510
CDS50254125	50.0	25.4	1.25	2.85	1.60	1,550
CDS5025415	50.0	25.4	1.50	3.10	1.60	2,512
CDS502542	50.0	25.4	2.00	3.40	1.40	4,762
CDS50254225	50.0	25.4	2.25	3.75	1.50	7,217
CDS5025425	50.0	25.4	2.50	3.90	1.40	9,063
CDS502543	50.0	25.4	3.00	4.10	1.10	11,976
CDS5628515	56.0	28.5	1.50	3.45	1.95	2,622
CDS562852	56.0	28.5	2.00	3.60	1.60	4,438
CDS5628525	56.0	28.5	2.50	4.20	1.70	8,978
CDS562853	56.0	28.5	3.00	4.30	1.30	11,388
CDS602042	60.0	20.4	2.00	4.10	2.10	4,727
CDS6020425	60.0	20.4	2.50	4.30	1.80	7,297
CDS602043	60.0	20.4	3.00	4.70	1.70	11,569
CDS6025425	60.0	25.4	2.50	4.40	1.90	8,164
CDS602543	60.0	25.4	3.00	4.65	1.65	11,768
CDS6030525	60.0	30.5	2.50	4.30	1.80	8,342
CDS60305275	60.0	30.5	2.75	4.75	2.00	12,356
CDS603053	60.0	30.5	3.00	4.70	1.70	13,226

CDS6030535	60.0	30.5	3.50	5.00	1.50	18,153
CDS633118	63.0	31.0	1.80	4.15	2.35	4,238
CDS633125	63.0	31.0	2.50	4.25	1.75	7,189
CDS63313	63.0	31.0	3.00	4.80	1.80	12,536
CDS633135	63.0	31.0	3.50	4.90	1.40	15,025
CDS702552	70.0	25.5	2.00	4.50	2.50	4,437
CDS7030525	70.0	30.5	2.50	4.90	2.40	8,031
CDS703053	70.0	30.5	3.00	5.10	2.10	11,426
CDS703553	70.0	35.5	3.00	5.10	2.10	12,287
CDS703554	70.0	35.5	4.00	5.80	1.80	23,923
CDS704054	70.0	40.5	4.00	5.60	1.60	23,351
CDS704055	70.0	40.5	5.00	6.20	1.20	33,672
CDS71362	71.0	36.0	2.00	4.60	2.60	5,144
CDS713625	71.0	36.0	2.50	4.50	2.00	6,725
CDS71364	71.0	36.0	4.00	5.60	1.60	20,535
CDS803125	80.0	31.0	2.50	5.30	2.80	7,239
CDS80313	80.0	31.0	3.00	5.50	2.50	10,352
CDS80314	80.0	31.0	4.00	6.10	2.10	19,394
CDS80363	80.0	36.0	3.00	5.70	2.70	11,919
CDS80364	80.0	36.0	4.00	6.20	2.20	21,400
CDS8041225	80.0	41.0	2.25	5.20	2.95	6,613
CDS80413	80.0	41.0	3.00	5.30	2.30	10,518
CDS80414	80.0	41.0	4.00	6.20	2.20	22,874
CDS80415	80.0	41.0	5.00	6.70	1.70	33,559
CDS904625	90.0	46.0	2.50	5.70	3.20	7,684
CDS904635	90.0	46.0	3.50	6.00	2.50	14,161
CDS90465	90.0	46.0	5.00	7.00	2.00	31,354
CDS100414	100.0	41.0	4.00	7.20	3.20	20,251
CDS100415	100.0	41.0	5.00	7.75	2.75	32,361
CDS1005127	100.0	51.0	2.70	6.20	3.50	8,609
CDS1005135	100.0	51.0	3.50	6.30	2.80	13,070
CDS100514	100.0	51.0	4.00	7.00	3.00	20,674
CDS100515	100.0	51.0	5.00	7.80	2.80	36,339
CDS100516	100.0	51.0	6.00	8.20	2.20	48,022
CDS100517	100.0	51.0	7.00	9.20	2.20	75,840
CDS112573	112.0	57.0	3.00	6.90	3.90	10,489
CDS112574	112.0	57.0	4.00	7.20	3.20	17,752
CDS112576	112.0	57.0	6.00	8.50	2.50	43,707
CDS125414	125.0	41.0	4.00	8.20	4.20	17,346
CDS125514	125.0	51.0	4.00	8.50	4.50	19,817
CDS125515	125.0	51.0	5.00	8.90	3.90	30,669
CDS125516	125.0	51.0	6.00	9.40	3.40	44,307
CDS125615	125.0	61.0	5.00	9.00	4.00	33,965
CDS125616	125.0	61.0	6.00	9.60	3.60	50,722
CDS125618	125.0	61.0	8.00	10.90	2.90	93,577
CDS1256435	125.0	64.0	3.50	8.00	4.50	15,416
CDS125645	125.0	64.0	5.00	8.50	3.50	29,908
CDS125646	125.0	64.0	6.00	9.60	3.60	52,155
CDS125647	125.0	64.0	7.00	10.00	3.00	67,216
CDS125648	125.0	64.0	8.00	10.60	2.60	85,926
CDS125716	125.0	71.0	6.00	9.30	3.30	51,217
CDS125718	125.0	71.0	8.00	10.40	2.40	85,494
CDS1257110	125.0	71.0	10.00	11.80	1.80	124,124
CDS1407238	140.0	72.0	3.80	8.70	4.90	17,195
CDS140725	140.0	72.0	5.00	9.00	4.00	27,920
CDS140728	140.0	72.0	8.00	11.20	3.20	85,251
CDS150615	150.0	61.0	5.00	10.30	5.30	31,041
CDS150616	150.0	61.0	6.00	10.80	4.80	45,456
CDS150716	150.0	71.0	6.00	10.80	4.80	48,155
CDS150718	150.0	71.0	8.00	12.00	4.00	89,851
CDS150818	150.0	81.0	8.00	11.70	3.70	89,532

CDS1508110	150.0	81.0	10.00	13.00	3.00	139,128
CDS1608243	160.0	82.0	4.30	9.90	5.60	21,843
CDS160826	160.0	82.0	6.00	10.50	4.50	41,008
CDS1608210	160.0	82.0	10.00	13.50	3.50	138,331
CDS1809248	180.0	92.0	4.80	11.00	6.20	26,442
CDS180926	180.0	92.0	6.00	11.10	5.10	37,502
CDS1809210	180.0	92.0	10.00	14.00	4.00	125,417
CDS1809213	180.0	92.0	13.00	16.50	3.50	237,883
CDS200828	200.0	82.0	8.00	14.20	6.20	78,034
CDS2008210	200.0	82.0	10.00	15.50	5.50	129,445
CDS2008212	200.0	82.0	12.00	16.60	4.60	182,737
CDS2009210	200.0	92.0	10.00	15.60	5.60	137,688
CDS2009212	200.0	92.0	12.00	16.80	4.80	199,269
CDS2009214	200.0	92.0	14.00	18.10	4.10	267,227
CDS20010255	200.0	102.0	5.50	12.50	7.00	36,111
CDS2001028	200.0	102.0	8.00	13.60	5.60	76,378
CDS20010210	200.0	102.0	10.00	15.60	5.60	145,357
CDS20010212	200.0	102.0	12.00	16.20	4.20	183,020
CDS20010214	200.0	102.0	14.00	18.20	4.20	289,181
CDS20011212	200.0	112.0	12.00	16.20	4.20	195,830
CDS20011214	200.0	112.0	14.00	17.50	3.50	256,758
CDS20011216	200.0	112.0	16.00	18.80	2.80	305,100
CDS22511265	225.0	112.0	6.50	13.00	6.50	39,775
CDS2251128	225.0	112.0	8.00	14.50	6.50	70,749
CDS22511212	225.0	112.0	12.00	17.00	5.00	171,016
CDS25010210	250.0	102.0	10.00	18.00	8.00	126,387
CDS25010212	250.0	102.0	12.00	19.00	7.00	182,962
CDS2501277	250.0	127.0	7.00	14.80	7.80	50,466
CDS25012710	250.0	127.0	10.00	17.00	7.00	119,053
CDS25012712	250.0	127.0	12.00	19.30	7.30	210,806
CDS25012714	250.0	127.0	14.00	19.60	5.60	248,828
CDS25012716	250.0	127.0	16.00	21.80	5.80	383,017



F = Force in Newtons at 75% deflection

Part no	Bearing code	De	Di	t	lo	ho	F at 75% ho
BB986202	623	9.8	6.2	0.20	0.40	0.20	23
BB12872025	624	12.8	7.2	0.25	0.50	0.25	29
BB15882025	625 634	15.8	8.2	0.25	0.55	0.30	23
BB1889203	626 635	18.8	9.2	0.30	0.65	0.35	23
BB188102035	607	18.8	10.2	0.35	0.70	0.35	31
BB218123035	608 627	21.8	12.3	0.35	0.75	0.40	46
BB23714304	609	23.7	14.3	0.40	0.90	0.50	81
BB25714304	6000 629	25.7	14.3	0.40	0.90	0.50	63
BB27717304	6001	27.7	17.3	0.40	1.00	0.60	80
BB29717404	6200	29.7	17.4	0.40	1.10	0.70	83
BBP31720404	6002 6201	31.7	20.4	0.40	1.10	0.70	81
BBP34620404	6300	34.6	20.4	0.40	1.10	0.70	61
BB34622405	6003 6202	34.6	22.4	0.50	1.20	0.70	118
BB36620405	6301	36.6	20.4	0.50	1.30	0.80	110
BB39625505	6203	39.6	25.5	0.50	1.30	0.80	110
BB41625505	6004 6302	41.6	25.5	0.50	1.40	0.90	113
BB46530506	6005 6204 6303	46.5	30.5	0.60	1.50	0.90	153
BB51535506	6205 6304	51.5	35.5	0.60	1.50	0.90	135
BB54540506	6006	54.5	40.5	0.60	1.50	0.90	141
BB61540507	6007 6206 6305	61.5	40.5	0.70	1.80	1.10	176
BB67550507	6008	67.5	50.5	0.70	1.70	1.00	161
BB71545507	6306	71.5	45.5	0.70	2.10	1.40	185
BB71550507	6207	71.5	50.5	0.70	2.10	1.40	218
BB74555508	6009	74.5	55.5	0.80	1.90	1.10	211
BB79550508	6307	79.5	50.5	0.80	2.30	1.50	228
BB79555508	6010 6208	79.5	55.5	0.80	2.30	1.50	263
BB84560509	6209	84.5	60.5	0.90	2.50	1.60	359
BB89560509	6308	89.5	60.5	0.90	2.50	1.60	288
BB89565509	6011 6210	89.5	65.5	0.90	2.50	1.60	335
BB945755010	6012	94.5	75.5	1.00	2.20	1.20	325
BB99655010	6309	99.0	65.5	1.00	2.60	1.60	292
BB99705010	6013 6211	99.0	70.5	1.00	2.60	1.60	332
BB109705125	6310	109.0	70.5	1.25	2.70	1.45	357
BB109755125	6014 6212	109.0	75.5	1.25	2.70	1.45	398
BB114905125	6015	114.0	90.5	1.25	2.45	1.20	398
BB119755125	6311	119.0	75.5	1.25	2.80	1.55	320
BB119855125	6213	119.0	85.5	1.25	2.80	1.55	393
BB124905125	6016 6214	124.0	90.5	1.25	3.00	1.75	445
BB129855125	6312	129.0	85.5	1.25	3.20	1.95	405
BB129955125	6017 6215	129.0	95.5	1.25	3.20	1.95	500
BB139905125	6313	139.0	90.5	1.25	3.25	2.00	354
BB139101125	6018 6216	139.0	101.0	1.25	3.25	2.00	429
BB14995515	6314	149.0	95.5	1.50	3.20	0.00	379
BB14910615	6020 6217	149.0	106.0	1.50	3.20	0.00	450
BB15910115	6315	159.0	101.0	1.50	3.50	2.00	412
BB15911115	6021 6218	159.0	111.0	1.50	3.50	2.00	477
BB16911115	6316	169.0	111.0	1.50	3.80	2.30	470
BB16912115	6022 6219	169.0	121.0	1.50	3.80	2.30	546
BB1791212	6317	179.0	121.0	2.00	4.20	2.20	864
BB1791262	6024 6220	179.0	126.0	2.00	4.20	2.20	928

BB1891212	6318		189.0	121.0	2.00	4.30	2.30	759	
BB1891312	6221		189.0	131.0	2.00	4.30	2.30	858	
BB1981312	6319		198.0	131.0	2.00	4.50	2.50	812	
BB1981412	6026	6222	198.0	141.0	2.00	4.50	2.50	922	
BB213151225	6224	6320	213.0	151.0	2.25	4.50	2.25	942	
BB223161225	6030	6321	223.0	161.0	2.25	4.60	2.35	942	
BB228161225	6226		228.0	161.0	2.25	4.95	2.70	1036	
BB238161225	6032	6322	238.0	161.0	2.25	5.25	3.00	1021	
BB24817125	6228		248.0	171.0	2.50	5.00	2.50	1005	
BB25817125	6034	6324	258.0	171.0	2.50	5.50	3.00	1106	
BB26818125	6230		268.0	181.0	2.50	5.70	3.20	1155	
BB27818125	6036	6326	278.0	181.0	2.50	6.00	3.50	1155	
BB288191275	6038	6232	288.0	191.0	2.75	5.75	3.00	1145	
BB298191275	6328		298.0	191.0	2.75	6.35	3.60	1307	
BB3082023	6040	6234	308.0	202.0	3.00	6.10	3.10	1300	
BB3182123	6236	6330	318.0	212.0	3.00	6.20	3.20	1302	
BB3382323	6044	6238	6332	338.0	232.0	3.00	6.60	3.60	1415
BB3582423	6048	6240	6334	358.0	242.0	3.00	7.00	4.00	1424

Ball - Bearing Pre-Load Disc Springs are manufactured from high carbon steel, heat treated for ultimate ductility and hardness and carry a phosphate and oil finish as standard.

If a more arduous corrosive application is required, then please contact us, where we will be happy to discuss various options.

Ball Bearing Pre-Load Disc Springs are especially designed for use with radial ball bearings and maintain positioning accuracy of the bearing with no end play. These Springs minimise vibration and shaft deflection. Proper pre-loading will increase bearing rigidity and help eliminate excessive running noise.

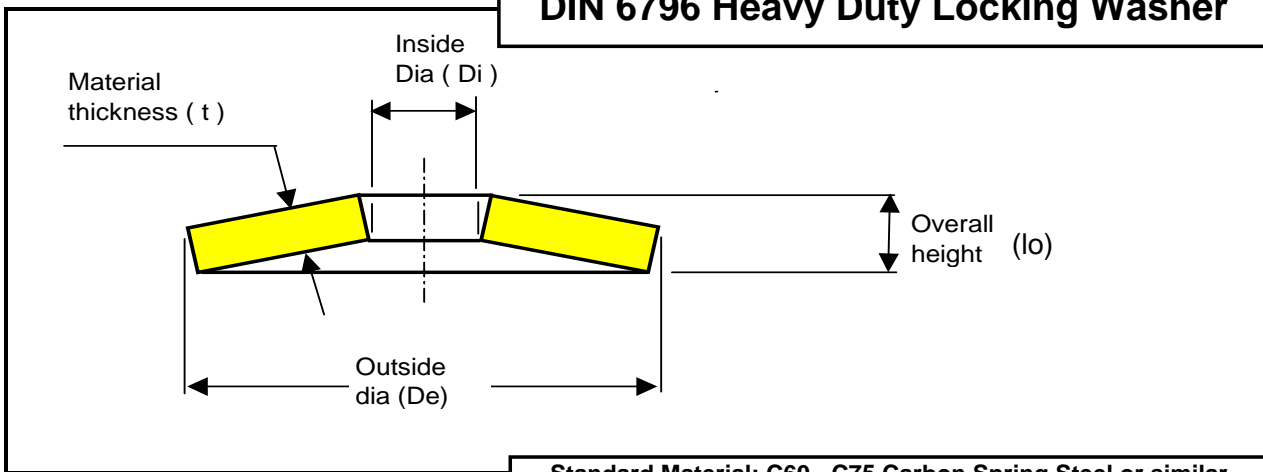
Advantages of Ball-Bearing Pre-Loaded Disc Springs:-

- ✳ Take up manufacturing tolerances
- ✳ Quietens bearings
- ✳ Reduces numbers of components and simplifies fitting
- ✳ Load evenly applied around bearing outer ring
- ✳ Automatic bearing alignment with a light pre-load
- ✳ Minimises axle space
- ✳ Small load change with axial deflection

Caution should be exercised if this type of Disc is used in a series stack arrangement (back to back).

If the cone height / thickness ratio is 1.5 and above, the stack could be prone to collapse.

DIN 6796 Heavy Duty Locking Washer



Standard Material: C60 - C75 Carbon Spring Steel or similar

Part number	Outside Dia (De)	Inside Dia (Di)	Thickness (t)	Overall Height (lo)	Approximate Force to flat	Weight per 1,000 pcs	Bolt Size
HD52204	5.0	2.2	0.40	0.60	628	0.05	2.0
HD62705	6.0	2.7	0.50	0.72	946	0.09	2.5
HD73206	7.0	3.2	0.60	0.85	1,320	0.14	3.0
HD83708	8.0	3.7	0.80	1.06	2,410	0.25	3.5
HD9431	9.0	4.3	1.00	1.30	3,770	0.38	4.0
HD115312	11.0	5.3	1.20	1.55	5,480	0.69	5.0
HD146415	14.0	6.4	1.50	2.00	8,590	1.43	6.0
HD1774175	17.0	7.4	1.75	2.30	11,300	2.53	7.0
HD18842	18.0	8.4	2.00	2.60	14,900	3.13	8.0
HD2310525	23.0	10.5	2.50	3.20	22,100	6.45	10.0
HD29133	29.0	13.0	3.0	3.95	34,100	12.4	12.0
HD351535	35.0	15.0	3.5	4.65	46,000	21.6	14.0
HD39174	39.0	17.0	4.0	5.25	59,700	30.4	16.0
HD421945	42.0	19.0	4.5	5.8	74,400	38.9	18.0
HD45215	45.0	21.0	5.0	6.4	93,200	48.8	20.0
HD492355	49.0	23.0	5.5	7.05	113,700	63.5	22.0
HD56256	56.0	25.0	6.0	7.75	131,000	92.9	24.0
HD602865	60.0	28.0	6.5	8.35	154,000	113	27.0
HD70317	70.0	31.0	7.0	9.2	172,000	170	30.0

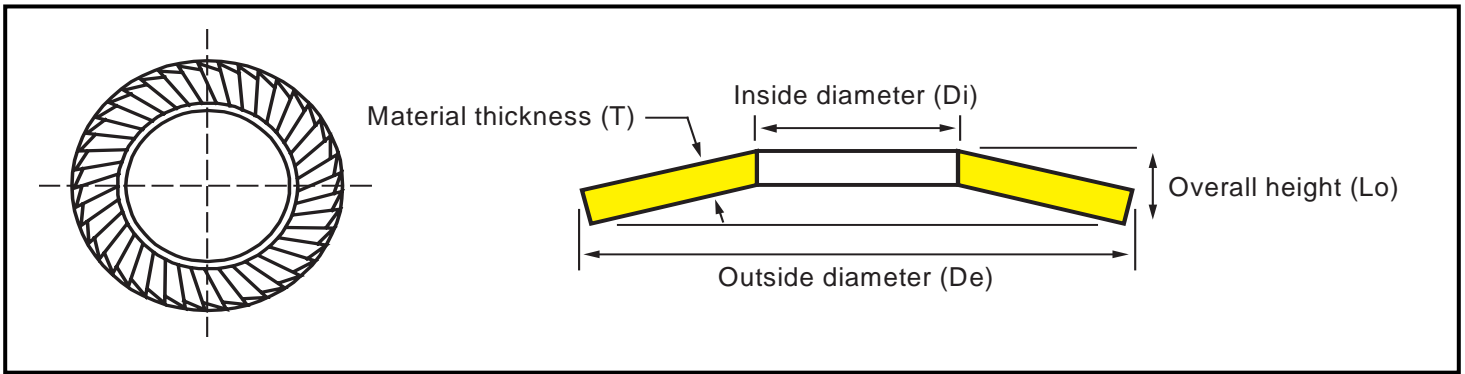
Standard finish is self finish

Alternatives: Phosphate and oil,

Mechanical zinc plate

Deltatone

SERRATED SAFETY WASHERS



Using the same concept of the Disc Spring, the Serrated Safety Washer has the special feature of radial serrations on both surfaces.

When tightened to near capacity these serrations bite into the mating surfaces, thus preventing the loosening of the screw due to vibration and other similar circumstances.

Serrated Safety Washers offer a reduction in the outside dia thus corresponding with most screw head sizes, particularly hexagonal socket type screws.

"S" TYPE - LIGHT DUTY							
Code no:	Screw size mm	O/Dia De	I/Dia Di	Thk T	Overall height Lo	Screw size inch	
SSW3217035	1.6	3.2	1.7	0.35	0.6		
SSW422035	2	4	2.2	0.35	0.6		
SSW4527045	2.5	4.8	2.7	0.45	0.9		
SSW5532045	3	5.5	3.2	0.45	0.9	1/8"	
SSW637045	3.5	6	3.7	0.45	0.9		
SSW74305	4	7	4.3	0.5	1	5/32"	
SSW95306	5	9	5.3	0.6	1.1	3/16"	
SSW106407	6	10	6.4	0.7	1.2		
SSW956707	6.35	9.5	6.7	0.7	1.2	1/4"	
SSW127407	7	12	7.4	0.7	1.3		
SSW138408	8	13	8.4	0.8	1.4	5/16"	
SSW161051	10	16	10.5	1	1.6	3/8"	
SSW1591161	11.1	15.9	11.6	1	1.6	7/16"	
SSW181311	12	18	13	1.1	1.7		
SSW1913711	12.7	19	13.7	1.1	1.8	1/2"	
SSW2215123	14	22	15	1.2	2		
SSW241713	16	24	17	1.3	2.1	5/8"	
SSW271915	18	27	19	1.5	2.3		
SSW302015	19	30	20	1.5	2.4	3/4"	
SSW302115	20	30	21	1.5	2.4		
SSW332315	22	33	23	1.5	2.5	7/8"	
SSW3625618	24	36	25.6	1.8	2.7		
SSW38272	25.4	38	27	2	2.8	1"	
SSW392862	27	39	28.6	2	2.9		
SSW453162	30	45	31.6	2	3.2	1.1/8"	
SSW543825	36	54	38	2.5	4		

"VS" TYPE - MEDIUM DUTY							
Code no:	Screw size mm	O/Dia De	I/Dia Di	Thk T	Overall height Lo	Screw size inch	
SSW9531M	5	9	5.3	1	1.3	3/16"	
SSW10641M	6	10	6.4	1	1.4		
SSW138412M	8	13	8.4	1.2	1.7	5/16"	
SSW1610515M	10	16	10.5	1.5	2	3/8"	
SSW181315	12	18	13	1.5	2.1		
SSW221515M	14	22	15	1.5	2.2		
SSW24172	16	24	17	2	2.6	5/8"	
SSW27192	18	27	19	2	2.7		
SSW30212	20	30	21	2	2.8		
SSW33232M	22	33	23	2	2.9	7/8"	
SSW3625625	24	36	25.6	2.5	3.3		
SSW3925625	27	39	28.6	2.5	3.4		
SSW4531625	30	45	31.6	2.5	3.6	1.1/8"	

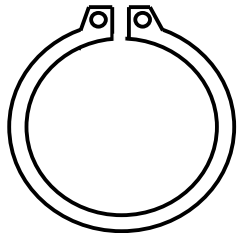
Material: Carbon Spring Steel
 Finish: Black & Oil
 Zinc plated parts available on request

Note! Overall height dimension "Lo" is height in delivered condition before use. Upon compression setting may take place and therefore reduce the height.

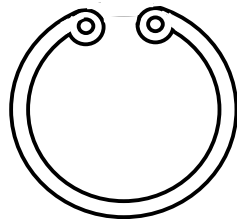
Circlips

Circlips are now widely used in many forms and offer a favourable and inexpensive securing device. They vary from the simple wire ring to the more robust circlip which offers substantial axial thrust.

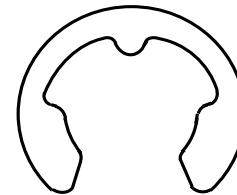
Caleb offers from its stock range what is generally considered the more common types of Circlips. Manufactured to a high degree of quality we offer a very cost effective method of securing device.



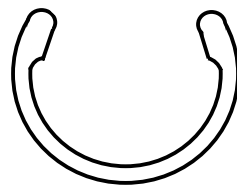
Caleb's 471 range - These are probably the most common form of external axially fitted circlip. They offer continuous radial force and are ideal for applications requiring a strong centrifugal force as well as being secure against high rotational speeds. Fitting or removal is simplified by the use of Circlip Pliers.



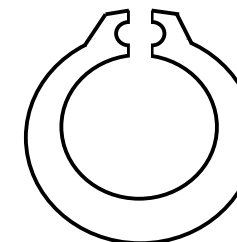
Caleb's 472 range - These are probably the most common form of internal axially fitted circlip. They offer continuous radial force and are ideal for applications requiring a strong centrifugal force as well as being secure against high rotational speeds. Fitting or removal is simplified by the use of Circlip Pliers.



Caleb's ETC range ('E' Type Circlip) are probably the most common radially fitted circlip gripping the groove of the component at 3 points. They have a great deal of flexibility in that once the groove is established to suit that of the circlip the shaft has flexibility to several mm on larger sizes.



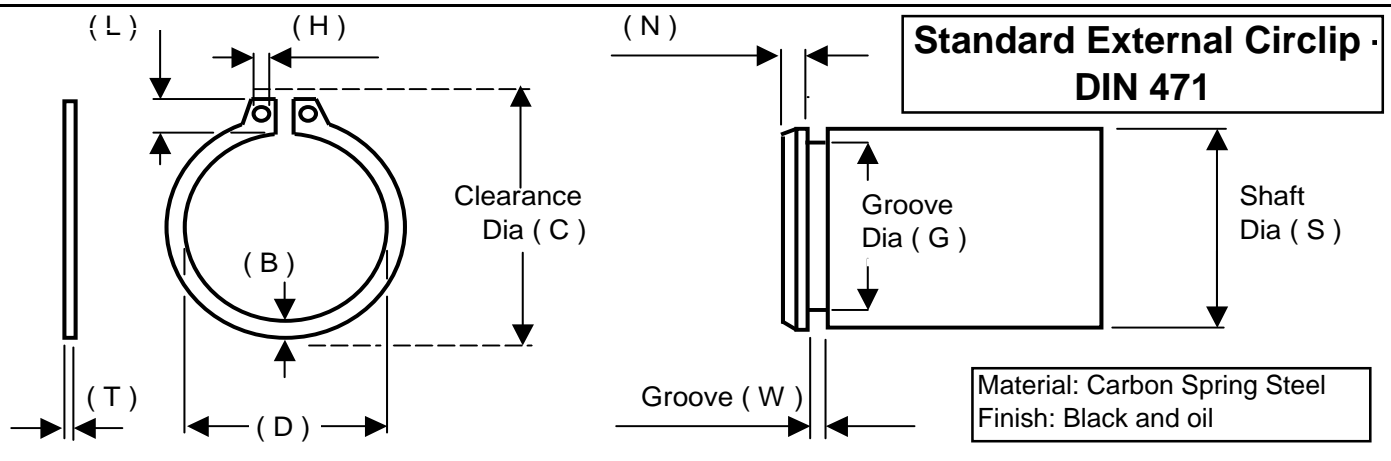
Crescent Rings are radially fitted circlips designed for shafts with grooves. They have a slightly higher thrust load than Circlips and are designed for smaller shafts. Neat appearance and suitable for applications where small clearance dimensions are important.



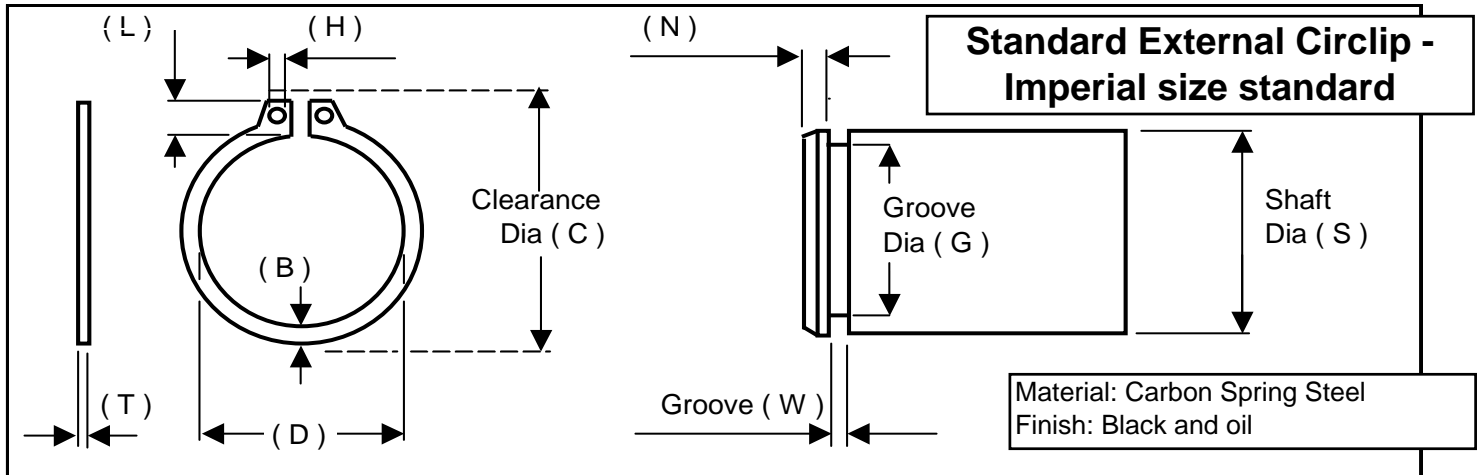
Grip Rings are designed for shafts that have no grooves and therefore offer greater flexibility in that they can be quickly inserted and removed. They are therefore designed to be located anywhere along a shaft body and butt up against the components that requires holding.

The standard material for Circlips is carbon Spring steel with standard black and oil finish. Alternative finishes are also available such as Mechanical, Electro Zinc as well as Deltatone. We would be pleased to discuss your requirements.

Caleb Components also offers a comprehensive range of Stainless Steel part from stock



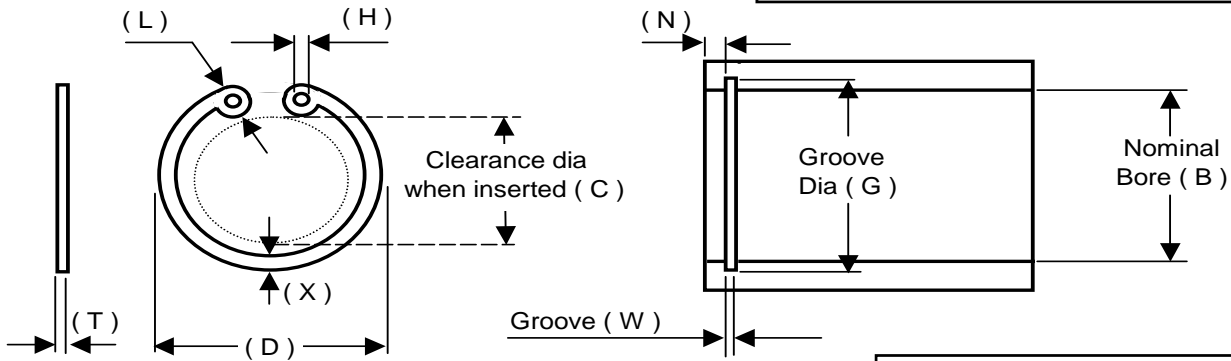
Part no	Shaft	Circlip Dimensions										Groove Dimensions						
		(T)	Tolerance		(D)	Tolerance		(C)	(B)	(L)	(H)	Fr kN	(G)	Tolerance		(W)	(N)	Fn kN
471003	3	0.40	+0.00	-0.05	2.7	+0.04	-0.15	7.0	0.8	1.9	1.0	0.5	2.8	+0.00	-0.040	0.5	0.3	0.2
471004	4	0.40	+0.00	-0.05	3.7	+0.04	-0.15	8.6	0.9	2.2	1.0	0.5	3.8	+0.00	-0.048	0.5	0.3	0.2
471005	5	0.60	+0.00	-0.05	4.7	+0.04	-0.15	10.3	1.1	2.5	1.0	1.0	4.8	+0.00	-0.048	0.7	0.3	0.3
471006	6	0.70	+0.00	-0.05	5.6	+0.04	-0.15	11.7	1.3	2.7	1.2	1.5	5.7	+0.00	-0.048	0.8	0.5	0.5
471007	7	0.80	+0.00	-0.05	6.5	+0.06	-0.18	13.5	1.4	3.1	1.2	2.6	6.7	+0.00	-0.06	0.9	0.5	0.5
471008	8	0.80	+0.00	-0.05	7.4	+0.06	-0.18	14.7	1.5	3.2	1.2	3.0	7.6	+0.00	-0.06	1.1	0.6	0.8
471009	9	1.00	+0.00	-0.06	8.4	+0.06	-0.18	16.0	1.7	3.3	1.2	3.5	8.6	+0.00	-0.06	1.1	0.6	0.9
471010	10	1.00	+0.00	-0.06	9.3	+0.10	-0.36	17.0	1.8	3.3	1.5	4.0	9.6	+0.00	-0.06	1.1	0.6	1.0
471011	11	1.00	+0.00	-0.06	10.2	+0.10	-0.36	18.0	1.8	3.3	1.5	4.5	10.5	+0.00	-0.11	1.1	0.8	1.4
471012	12	1.00	+0.00	-0.06	11.0	+0.10	-0.36	19.0	1.8	3.3	1.7	5.0	11.5	+0.00	-0.11	1.1	0.8	1.5
471013	13	1.00	+0.00	-0.06	11.9	+0.10	-0.36	20.2	2.0	3.4	1.7	5.8	12.4	+0.00	-0.11	1.1	0.9	2.0
471014	14	1.00	+0.00	-0.06	12.9	+0.10	-0.36	21.4	2.1	3.5	1.7	6.4	13.4	+0.00	-0.11	1.1	0.9	2.2
471015	15	1.00	+0.00	-0.06	13.8	+0.10	-0.36	22.6	2.2	3.6	1.7	6.9	14.3	+0.00	-0.11	1.1	1.1	2.7
471016	16	1.00	+0.00	-0.06	14.7	+0.10	-0.36	23.8	2.2	3.7	1.7	7.4	15.2	+0.00	-0.11	1.1	1.2	3.3
471017	17	1.00	+0.00	-0.06	15.7	+0.10	-0.36	25.0	2.3	3.8	1.7	8.0	16.2	+0.00	-0.11	1.1	1.2	3.5
471018	18	1.20	+0.00	-0.06	16.5	+0.10	-0.36	26.2	2.4	3.9	2.0	17.0	17.0	+0.00	-0.11	1.3	1.5	4.6
471019	19	1.20	+0.00	-0.06	17.5	+0.10	-0.36	27.2	2.5	3.9	2.0	17.0	18.0	+0.00	-0.11	1.3	1.5	4.8
471020	20	1.20	+0.00	-0.06	18.5	+0.13	-0.42	28.4	2.6	4.0	2.0	17.1	19.0	+0.00	-0.21	1.3	1.5	5.1
471021	21	1.20	+0.00	-0.06	19.5	+0.13	-0.42	29.6	2.7	4.1	2.0	16.8	20.0	+0.00	-0.21	1.3	1.5	5.4
471022	22	1.20	+0.00	-0.06	20.5	+0.13	-0.42	30.8	2.8	4.2	2.0	16.9	21.0	+0.00	-0.21	1.3	1.5	5.7
471023	23	1.20	+0.00	-0.06	21.5	+0.13	-0.42	32.0	2.9	4.3	2.0	16.6	22.0	+0.00	-0.21	1.3	1.5	5.9
471024	24	1.20	+0.00	-0.06	22.2	+0.21	-0.42	33.2	3.0	4.4	2.0	16.1	22.9	+0.00	-0.21	1.3	1.7	6.8
471025	25	1.20	+0.00	-0.06	23.2	+0.21	-0.42	34.2	3.0	4.4	2.0	16.2	23.9	+0.00	-0.21	1.3	1.7	7.1
471026	26	1.20	+0.00	-0.06	24.2	+0.21	-0.42	35.5	3.1	4.5	2.0	16.1	24.9	+0.00	-0.21	1.3	1.7	7.3
471027	27	1.20	+0.00	-0.06	24.9	+0.21	-0.42	36.7	3.1	4.6	2.0	16.4	25.6	+0.00	-0.21	1.3	2.1	9.6
471028	28	1.50	+0.00	-0.06	25.9	+0.21	-0.42	37.9	3.2	4.7	2.0	32.1	26.6	+0.00	-0.21	1.6	2.1	10.0
471029	29	1.50	+0.00	-0.06	26.9	+0.21	-0.42	39.1	3.4	4.8	2.0	31.8	27.6	+0.00	-0.21	1.6	2.1	10.4
471030	30	1.50	+0.00	-0.06	27.9	+0.21	-0.42	40.5	3.5	5.0	2.0	32.1	28.6	+0.00	-0.21	1.6	2.1	10.7
471031	31	1.50	+0.00	-0.06	28.6	+0.21	-0.42	41.5	3.5	5.0	2.5	31.5	29.3	+0.00	-0.21	1.6	2.6	13.9
471032	32	1.50	+0.00	-0.06	29.6	+0.21	-0.42	43.0	3.6	5.2	2.5	31.2	30.3	+0.00	-0.25	1.6	2.6	13.9
471033	33	1.50	+0.00	-0.06	30.5	+0.25	-0.50	44.0	3.7	5.2	2.5	31.6	31.3	+0.00	-0.25	1.6	2.6	14.3
471034	34	1.50	+0.00	-0.06	31.5	+0.25	-0.50	45.4	3.8	5.4	2.5	31.3	32.3	+0.00	-0.25	1.6	2.6	14.7
471035	35	1.50	+0.00	-0.06	32.2	+0.25	-0.50	46.8	3.9	5.6	2.5	33.0	33.0	+0.00	-0.25	1.6	3.0	17.8
471036	36	1.75	+0.00	-0.06	33.2	+0.25	-0.50	47.8	4.0	5.6	2.5	34.0	34.0	+0.00	-0.25	1.85	3.0	18.3
471037	37	1.75	+0.00	-0.06	34.2	+0.25	-0.50	49.0	4.1	5.7	2.5	35.0	35.0	+0.00	-0.25	1.85	3.0	18.8
471038	38	1.75	+0.00	-0.06	35.2	+0.25	-0.50	50.2	4.2	5.8	2.5	36.0	36.0	+0.00	-0.25	1.85	3.0	19.3
471039	39	1.75	+0.00	-0.06	36.0	+0.25	-0.50	51.4	4.3	5.9	2.5	37.0	37.0	+0.00	-0.25	1.85	3.8	19.9
471040	40	1.75	+0.00	-0.06	36.5	+0.25	-0.50	52.6	4.4	6.0	2.5	37.5	37.5	+0.00	-0.25	1.85	3.8	25.3
471041	41	1.75	+0.00	-0.06	37.5	+0.25	-0.50	54.1	4.5	6.2	2.5	38.5	38.5	+0.00	-0.25	1.85	3.8	26.0
471042	42	1.75	+0.00	-0.06	38.5	+0.39	-0.90	55.7	4.5	6.5	2.5	39.5	39.5	+0.00	-0.25	1.85	3.8	26.7
471043	43	1.75	+0.00	-0.06	39.5	+0.39	-0.90	56.7	4.6	6.5	2.5	40.5	40.5	+0.00	-0.25	1.85	3.8	27.3
471044	44	1.75	+0.00	-0.06	40.5	+0.39	-0.90	57.9	4.6	6.6	2.5	41.5	41.5	+0.00	-0.25	1.85	3.8	28.0
471045	45	1.75	+0.00	-0.06	41.5	+0.39	-0.90	59.1	4.7	6.7	2.5	42.5	42.5	+0.00	-0.25	1.85	3.8	28.1
471046	46	1.75	+0.00	-0.06	42.5	+0.39	-0.90	60.1	4.8	6.7	2.5	43.5	43.5	+0.00	-0.25	1.85	3.8	29.0
471047	47	1.75	+0.00	-0.06	43.5	+0.39	-0.90	61.3	4.9	6.8	2.5	44.5	44.5	+0.00	-0.25	1.85	3.8	30.0
471048	48	1.75	+0.00	-0.06	44.5	+0.39	-0.90	62.5	5.0	6.9	2.5	45.5	45.5	+0.00	-0.25	1.85	3.8	30.1
471050	50	2.00	+0.00	-0.07	45.8	+0.39	-0.90	64.5	5.1	6.9	2.5	47.0	47.0	+0.00	-0.25	2.15	4.5	38.0
471051	51	2.00	+0.00	-0.07	46.8	+0.39	-0.90	65.7	5.2	7.0	2.5	48.0	48.0	+0.00	-0.25	2.15	4.5	38.8
471052	52	2.00	+0.00	-0.07	47.8	+0.39	-0.90	66.7	5.2	7.0	2.5	49.0	49.0	+0.00	-0.25	2.15	4.5	39.7
471053	53	2.00	+0.00	-0.07	48.8	+0.39	-0.90	68.0	5.3	7.1	2.5	50.0	50.0	+0.00	-0.25	2.15	4.5	40.4
471054	54	2.00	+0.00	-0.07	49.8	+0.46	-1.10	69.0	5.3	7.1	2.5	51.0	51.0	+0.00	-0.30	2.15	4.5	41.2
471055	55	2.00	+0.00	-0.07	50.8	+0.46	-1.10	70.2	5.4	7.2	2.5	52.0	52.0	+0.00	-0.30	2.15	4.5	42.0
471056	56	2.00	+0.00	-0.07	51.8	+0.46	-1.10	71.6	5.5	7.3	2.5	53.0	53.0	+0.00	-0.30	2.15	4.5	42.8
471057	57	2.00	+0.00	-0.07	52.8	+0.46	-1.10	72.4	5.5	7.3	2.5	54.0	54.0	+0.00	-0.30	2.15	4.5	43.7
471058	58	2.00	+0.00	-0.07	53.8	+0.46	-1.10	73.6	5.6	7.3	2.5	55.0	55.0	+0.00	-0.30	2.15	4.5	44.3
471060	60	2.00	+0.00	-0.07	55.8	+0.46	-1.10	75.6	5.8	7.4	2.5	69.2	57.0	+0.00	-0.30	2.15	4.5	46.0
471062	62	2.00	+0.00	-0.07	57.8	+0.46	-1.10	77.8	6.0	7.5	2.5	69.3	59.0	+0.00	-0.30	2.15	4.5	47.5
471063	63	2.00	+0.00	-0.07	58.8	+0.46	-1.10	79.0	6.2	7.6	2.5	70.2	60.0	+0.00	-0.30	2.15	4.5	48.3
471065	65	2.50	+0.00	-0.07	60.8	+0.46	-1.10	81.4	6.3	7.8	3.0	135.6	62.0	+0.00	-0.30	2.65	4.5	49.8



Part no	Circlip Dimensions										Force (lb f)
	Shaft		(T)		(D)		(C)	(B)	(L)	(H)	
	(Frac)	(Dec)	Inch	Tol	Inch	Tol	Inch	Inch	Inch	Inch	
N140012	1/8	0.125	0.010	+0.001	0.112		0.22	0.018	0.048	0.024	110
N140015	5/32	0.156	0.010	-0.001	0.142		0.27	0.026	0.056	0.024	130
N140018	3/16	0.188	0.015		0.168	+0.002	0.30	0.025	0.520	0.023	240
N140021	7/32	0.219	0.015		0.196	-0.004	0.34	0.028	0.058	0.024	280
N140023	15/64	0.236	0.015		0.215		0.36	0.300	0.058	0.024	310
N140025	1/4	0.250	0.025		0.225		0.45	0.035	0.083	0.039	880
N140028	9/32	0.281	0.025		0.256		0.49	0.038	0.083	0.039	990
N140031	5/16	0.312	0.025		0.281		0.54	0.040	0.090	0.039	1100
N140034	11/32	0.344	0.025		0.309		0.57	0.042	0.090	0.039	1210
N140037	3/8	0.375	0.025		0.338	+0.002	0.61	0.050	0.091	0.039	1320
N140040	13/32	0.406	0.025		0.366	-0.005	0.63	0.054	0.090	0.039	4130
N140043	7/16	0.438	0.025		0.395		0.66	0.055	0.091	0.039	1550
N140046	15/32	0.469	0.025		0.428		0.68	0.060	0.091	0.039	1660
N140050	1/2	0.500	0.035		0.461		0.77	0.065	0.111	0.045	2470
N140056	9/16	0.562	0.035		0.521		0.82	0.072	0.111	0.045	2780
N140059	19/32	0.594	0.035		0.550		0.86	0.076	0.112	0.045	2940
N140062	5/8	0.625	0.035		0.579		0.90	0.080	0.113	0.045	3090
N140066	43/64	0.672	0.035	+0.002	0.621		0.93	0.082	0.113	0.045	3320
N140068	11/16	0.688	0.042	-0.002	0.635		1.01	0.084	0.140	0.050	4080
N140075	3/4	0.750	0.042		0.693	+0.005	1.09	0.092	0.140	0.050	4450
N140078	25/32	0.781	0.042		0.722	-0.010	1.12	0.094	0.140	0.050	4600
N140081	13/16	0.812	0.042		0.751		1.15	0.096	0.140	0.050	4800
N140087	7/8	0.875	0.042		0.810		1.21	0.104	0.141	0.050	5200
N140093	15/16	0.938	0.042		0.867		1.34	0.110	0.170	0.076	5600
N140098	63/64	0.984	0.042		0.910		1.39	0.114	0.171	0.076	5800
N140100	1	1.000	0.042		0.925		1.41	0.116	0.171	0.076	5900
N140106	1.1/16	1.062	0.050		0.982		1.50	0.122	0.185	0.076	7500
N140112	1.1/8	1.125	0.050		1.041		1.55	0.128	0.186	0.076	7900
N140118	1.3/16	1.188	0.050		1.098		1.61	0.132	0.186	0.076	8400
N140125	1.1/4	1.250	0.050		1.156	+0.010	1.69	0.140	0.187	0.076	8800
N140131	1.5/16	1.312	0.050		1.214	-0.015	1.75	0.146	0.187	0.076	9300
N140137	1.3/8	1.375	0.050		1.272		1.80	0.152	0.188	0.076	9700
N140143	1.7/16	1.438	0.050		1.333		1.87	0.160	0.188	0.076	10200
N140150	1.1/2	1.500	0.050		1.387		1.99	0.168	0.218	0.118	10600
N140156	1.9/16	1.562	0.062		1.446		1.95	0.180	0.189	0.100	10700
N140162	1.5/8	1.625	0.062		1.503		2.17	0.180	0.189	0.100	11100
N140168	1.11/16	1.688	0.062		1.560	+0.013	2.04	0.197	0.205	0.100	11500
N140175	1.3/4	1.750	0.062		1.618	-0.020	2.11	0.197	0.205	0.100	11900
N140181	1.13/16	1.812	0.062		1.675		2.23	0.197	0.205	0.100	12400
N140187	1.7/8	1.875	0.062		1.735		2.29	0.197	0.205	0.100	12800
N140200	2	2.000	0.062		1.850		2.48	0.224	0.232	0.123	13600
N140212	2.1/8	2.125	0.078		1.964		2.61	0.228	0.236	0.123	18200
N140225	2.1/4	2.250	0.078		2.081	+0.015	2.87	0.217	0.225	0.123	19300
N140237	2.3/8	2.375	0.078		2.197	-0.025	2.86	0.228	0.236	0.123	20400
N140250	2.1/2	2.500	0.078	+0.003	2.313		2.98	0.228	0.236	0.123	21400
N140262	2.5/8	2.625	0.078	-0.003	2.428		3.11	0.228	0.236	0.123	22500
N140275	2.3/4	2.750	0.093		2.543		3.33	0.276	0.284	0.123	28100
N140287	2.7/8	2.875	0.093		2.659		3.42	0.260	0.268	0.123	29400
N140300	3	3.000	0.093		2.775		3.55	0.260	0.268	0.123	30700
N140312	3.1/8	3.125	0.093		2.892	+0.020	3.75	0.272	0.305	0.123	32000
N140325	3.1/4	3.250	0.093		3.006	-0.030	3.83	0.276	0.284	0.123	33200
N140350	3.1/2	3.500	0.109		3.237		4.15	0.285	0.320	0.123	42000
N140362	3.5/8	3.625	0.109		3.352		4.28	0.315	0.323	0.123	434000
N140375	3.3/4	3.750	0.109		3.468		4.44	0.337	0.337	0.123	44900
N140387	3.7/8	3.875	0.109		3.584		4.56	0.335	0.335	0.123	46400
N140400	4	4.000	0.109		3.700		4.72	0.352	0.352	0.123	47900

Part no	Groove Dimensions						Force (lb f)
	(G)		(W)		(N)		
	inch	Tol	Inch	Tol	Inch		
N140012	0.117		0.012		0.014	28	
N140015	0.146		0.012		0.017	44	
N140018	0.175	+0.0015	0.018	+0.002	0.022	69	
N140021	0.205	-0.0015	0.018	-0.000	0.023	87	
N140023	0.222		0.018		0.023	93	
N140025	0.230		0.029		0.032	141	
N140028	0.261		0.029		0.035	160	
N140031	0.290		0.029		0.036	194	
N140034	0.321		0.029		0.038	224	
N140037	0.352	+0.002	0.029		0.038	244	
N140040	0.382	-0.002	0.029		0.039	275	
N140043	0.412		0.029		0.042	322	
N140046	0.443		0.029		0.042	345	
N140050	0.468		0.039		0.051	452	
N140056	0.530		0.039		0.051	508	
N140059	0.559		0.039	+0.003	0.057	588	
N140062	0.588		0.039	-0.000	0.060	654	
N140066	0.631		0.039		0.066	780	
N140068	0.646		0.046		0.068	817	
N140075	0.704		0.046		0.074	975	
N140078	0.733	+0.003	0.046		0.076	1060	
N140081	0.762	-0.003	0.046		0.080	1150	
N140087	0.821		0.046		0.085	1340	
N140093	0.882		0.046		0.088	1480	
N140098	0.984		0.046		0.091	1610	
N140100	0.940		0.046		0.094	1700	
N140106	0.998		0.056		0.102	1920	
N140112	1.059		0.056		0.105	2100	
N140118	1.118		0.056		0.111	2350	
N140125	1.176	+0.004	0.056		0.117	2610	
N140131	1.232	-0.004	0.056		0.126	2970	
N140137	1.291		0.056		0.132	3270	
N140143	1.350		0.056	+0.004	0.138	3580	
N140150	1.406		0.056	-0.000	0.147	3990	
N140156	1.468		0.068		0.148	4150	
N140162	1.529		0.068		0.151	4410	
N140168	1.589		0.068		0.156	4720	
N140175	1.650	+0.005	0.068		0.157	4950	
N140181	1.708	-0.005	0.068		0.163	5330	
N140187	1.769		0.068		0.166	5620	
N140200	1.886		0.068		0.178	6450	
N140212	2.003		0.086		0.192	7330	
N140225	2.120		0.086		0.204	8270	
N140237	2.239		0.086		0.213	9130	
N140250	2.360		0.086		0.219	9900	
N140262	2.481		0.086		0.225	10700	
N140275	2.602		0.103		0.231	11500	
N140287	2.721	+0.006	0.103	+0.005	0.240	12500	
N140300	2.838	-0.006	0.103	-0.000	0.252	13700	
N140312	2.957		0.103		0.261	14800	
N140325	3.076		0.103		0.270	16000	
N140350	3.316		0.120		0.285	18200	
N140362	3.435		0.120		0.294	19500	
N140375	3.552		0.120		0.306	21000	
N140387	3.673		0.120		0.312	22100	
N140400	3.792		0.120		0.321	23500	

Standard Internal Circlip - DIN 472



Standard Material: Carbon Spring Steel
Standard Finish: Black and oil

Circlip Dimensions

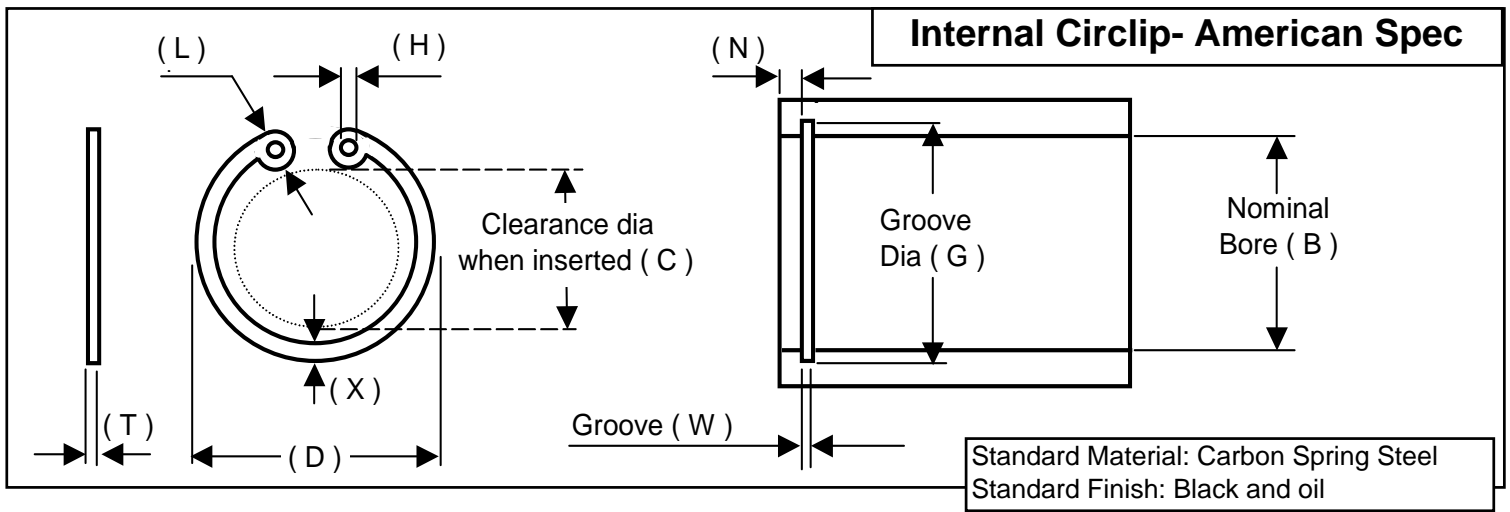
Part no	Bore	(T)	Tolerance	(D)	Tolerance	(C)	(X)	(L)	(H)	Fr KN
472008	8	0.80	+0.00 -0.05	8.7	+0.36 -0.10	3.0	1.1	2.4	1.0	2.0
472009	9	0.80	+0.00 -0.05	9.8	+0.36 -0.10	3.7	1.3	2.5	1.0	2.0
472010	10	1.00	+0.00 -0.06	10.8	+0.36 -0.10	3.3	1.4	3.2	1.2	4.0
472011	11	1.00	+0.00 -0.06	11.8	+0.36 -0.10	4.1	1.5	3.3	1.2	4.0
472012	12	1.00	+0.00 -0.06	13.0	+0.36 -0.10	4.9	1.7	3.4	1.5	4.0
472013	13	1.00	+0.00 -0.06	14.1	+0.36 -0.10	5.4	1.8	3.6	1.5	4.2
472014	14	1.00	+0.00 -0.06	15.1	+0.36 -0.10	6.2	1.9	3.7	1.7	4.5
472015	15	1.00	+0.00 -0.06	16.2	+0.36 -0.10	7.2	2.0	3.7	1.7	5.0
472016	16	1.00	+0.00 -0.06	17.3	+0.36 -0.10	8.0	2.0	3.8	1.7	5.5
472017	17	1.00	+0.00 -0.06	18.3	+0.42 -0.13	8.8	2.1	3.9	1.7	6.0
472018	18	1.00	+0.00 -0.06	19.5	+0.42 -0.13	9.4	2.2	4.1	2.0	6.5
472019	19	1.00	+0.00 -0.06	20.5	+0.42 -0.13	10.4	2.2	4.1	2.0	6.8
472020	20	1.00	+0.00 -0.06	21.5	+0.42 -0.13	11.2	2.3	4.2	2.0	7.2
472021	21	1.00	+0.00 -0.06	22.5	+0.42 -0.13	12.2	2.4	4.2	2.0	7.6
472022	22	1.00	+0.00 -0.06	23.5	+0.42 -0.13	13.2	2.5	4.2	2.0	8.0
472023	23	1.20	+0.00 -0.06	24.6	+0.42 -0.21	14.2	2.5	4.2	2.0	13.8
472024	24	1.20	+0.00 -0.06	25.9	+0.42 -0.21	14.8	2.6	4.4	2.0	13.9
472025	25	1.20	+0.00 -0.06	26.9	+0.42 -0.21	15.5	2.7	4.5	2.0	14.6
472026	26	1.20	+0.00 -0.06	27.9	+0.42 -0.21	16.1	2.8	4.7	2.0	13.9
472027	27	1.20	+0.00 -0.06	29.1	+0.42 -0.21	17.1	2.9	4.7	2.0	13.3
472028	28	1.20	+0.00 -0.06	30.1	+0.50 -0.25	17.9	2.9	4.8	2.0	13.3
472029	29	1.20	+0.00 -0.06	31.1	+0.50 -0.25	18.9	3.0	4.8	2.0	13.6
472030	30	1.20	+0.00 -0.06	32.1	+0.50 -0.25	19.9	3.0	4.8	2.0	13.7
472031	31	1.20	+0.00 -0.06	33.4	+0.50 -0.25	20.0	3.2	5.2	2.5	13.8
472032	32	1.20	+0.00 -0.06	34.4	+0.50 -0.25	20.6	3.2	5.4	2.5	13.8
472033	33	1.20	+0.00 -0.06	35.5	+0.50 -0.25	21.6	3.3	5.4	2.5	14.3
472034	34	1.50	+0.00 -0.06	36.5	+0.50 -0.25	22.6	3.3	5.4	2.5	26.2
472035	35	1.50	+0.00 -0.06	37.8	+0.50 -0.25	23.6	3.4	5.4	2.5	26.9
472036	36	1.50	+0.00 -0.06	38.8	+0.50 -0.25	24.6	3.5	5.4	2.5	26.4
472037	37	1.50	+0.00 -0.06	39.8	+0.50 -0.25	25.4	3.6	5.5	2.5	27.1
472038	38	1.50	+0.00 -0.06	40.8	+0.50 -0.25	26.4	3.7	5.5	2.5	28.2
472039	39	1.50	+0.00 -0.06	42.0	+0.90 -0.39	27.2	3.8	5.6	2.5	28.8
472040	40	1.75	+0.00 -0.06	43.5	+0.90 -0.39	27.8	3.9	5.8	2.5	44.6
472041	41	1.75	+0.00 -0.06	44.5	+0.90 -0.39	28.6	4.0	5.9	2.5	45.0
472042	42	1.75	+0.00 -0.06	45.5	+0.90 -0.39	29.6	4.1	5.9	2.5	44.7
472043	43	1.75	+0.00 -0.06	46.5	+0.90 -0.39	30.6	4.2	5.9	2.5	44.5
472044	44	1.75	+0.00 -0.06	47.5	+0.90 -0.39	31.4	4.2	6.0	2.5	43.3
472045	45	1.75	+0.00 -0.06	48.5	+0.90 -0.39	32.0	4.3	6.2	2.5	43.1
472046	46	1.75	+0.00 -0.06	49.5	+0.90 -0.39	32.7	4.4	6.3	2.5	42.9
472047	47	1.75	+0.00 -0.06	50.5	+1.10 -0.46	33.5	4.4	6.4	2.5	43.5

Groove Dimensions

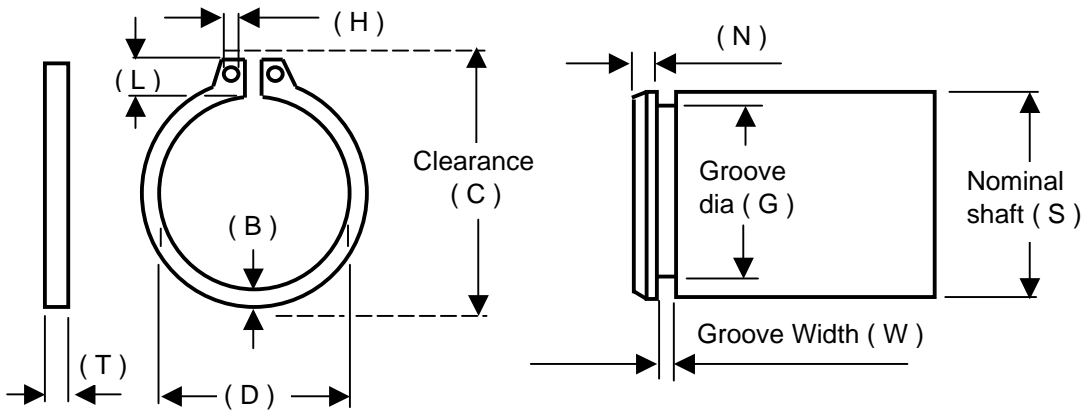
(G)	Tolerance	(W)	(N)	Fn KN
8.4	+0.09 -0.00	0.9	0.6	0.9
9.4	+0.09 -0.00	0.9	0.6	1.0
10.4	+0.11 -0.00	1.1	0.6	1.1
11.4	+0.11 -0.00	1.1	0.6	1.2
12.5	+0.11 -0.00	1.1	0.8	1.6
13.6	+0.11 -0.00	1.1	0.9	2.1
14.6	+0.11 -0.00	1.1	0.9	2.3
15.7	+0.11 -0.00	1.1	1.1	2.8
16.8	+0.11 -0.00	1.1	1.2	3.4
17.8	+0.11 -0.00	1.1	1.2	3.6
19.0	+0.13 -0.00	1.1	1.5	4.8
20.0	+0.13 -0.00	1.1	1.5	5.1
21.0	+0.13 -0.00	1.1	1.5	5.4
22.0	+0.13 -0.00	1.1	1.5	5.7
23.0	+0.13 -0.00	1.1	1.5	5.9
24.1	+0.21 -0.00	1.3	1.5	6.8
25.2	+0.21 -0.00	1.3	1.8	7.7
26.2	+0.21 -0.00	1.3	1.8	8.0
27.2	+0.21 -0.00	1.3	1.8	8.4
28.4	+0.21 -0.00	1.3	2.1	10.1
29.4	+0.21 -0.00	1.3	2.1	10.5
30.4	+0.25 -0.00	1.3	2.1	10.9
31.4	+0.25 -0.00	1.3	2.1	11.3
32.7	+0.25 -0.00	1.3	2.6	14.1
33.7	+0.25 -0.00	1.3	2.6	14.6
34.7	+0.25 -0.00	1.3	2.6	15.0
35.7	+0.25 -0.00	1.6	2.6	15.4
37.0	+0.25 -0.00	1.6	3.0	18.8
38.0	+0.25 -0.00	1.6	3.0	19.4
39.0	+0.25 -0.00	1.6	3.0	19.8
40.0	+0.25 -0.00	1.6	3.0	22.5
41.0	+0.25 -0.00	1.6	3.0	26.0
42.5	+0.25 -0.00	1.9	3.8	27.0
43.5	+0.25 -0.00	1.9	3.8	27.6
44.5	+0.25 -0.00	1.9	3.8	28.4
45.5	+0.25 -0.00	1.9	3.8	28.8
46.5	+0.25 -0.00	1.9	3.8	29.5
47.5	+0.25 -0.00	1.9	3.8	30.2
48.5	+0.25 -0.00	1.9	3.8	30.8
49.5	+0.25 -0.00	1.9	3.8	31.4

472048	48	1.75	+0.00	-0.06	51.5	+1.10	-0.46	34.5	4.5	6.4	2.5	43.2	50.5	+0.30	-0.00	1.9	3.8	32.0
472050	50	2.00	+0.00	-0.07	54.2	+1.10	-0.46	36.3	4.6	6.5	2.5	60.8	53.0	+0.30	-0.00	2.2	4.5	40.5
472051	51	2.00	+0.00	-0.07	55.2	+1.10	-0.46	37.3	4.7	6.5	2.5	60.2	54.0	+0.30	-0.00	2.2	4.5	41.2
472052	52	2.00	+0.00	-0.07	56.2	+1.10	-0.46	37.9	4.7	6.7	2.5	60.3	55.0	+0.30	-0.00	2.2	4.5	42.0
472053	53	2.00	+0.00	-0.07	57.2	+1.10	-0.46	38.9	4.9	6.7	2.5	60.7	56.0	+0.30	-0.00	2.2	4.5	42.9
472054	54	2.00	+0.00	-0.07	58.2	+1.10	-0.46	39.9	5.0	6.7	2.5	60.4	57.0	+0.30	-0.00	2.2	4.5	43.6
472055	55	2.00	+0.00	-0.07	59.2	+1.10	-0.46	40.7	5.0	6.8	2.5	60.3	58.0	+0.30	-0.00	2.2	4.5	44.4
472058	58	2.00	+0.00	-0.07	62.2	+1.10	-0.46	43.5	5.2	6.9	2.5	60.8	61.0	+0.30	-0.00	2.2	4.5	46.7
472060	60	2.00	+0.00	-0.07	64.2	+1.10	-0.46	44.7	5.4	7.3	2.5	61.0	63.0	+0.30	-0.00	2.2	4.5	48.3
472062	62	2.00	+0.00	-0.07	66.2	+1.10	-0.46	46.7	5.5	7.3	2.5	60.9	65.0	+0.30	-0.00	2.2	4.5	49.8
472063	63	2.00	+0.00	-0.07	67.2	+1.10	-0.46	47.7	5.6	7.3	2.5	60.8	66.0	+0.30	-0.00	2.2	4.5	50.6
472064	64	2.00	+0.00	-0.07	68.2	+1.10	-0.46	48.7	5.7	7.5	2.5	60.6	67.0	+0.30	-0.00	2.2	4.5	51.4
472065	65	2.50	+0.00	-0.07	69.2	+1.10	-0.46	49.0	5.8	7.6	3.0	121.0	68.0	+0.30	-0.00	2.7	4.5	51.8
472067	67	2.50	+0.00	-0.07	71.5	+1.10	-0.46	50.8	6.0	7.7	3.0	121.0	70.0	+0.30	-0.00	2.7	4.5	53.8
472068	68	2.50	+0.00	-0.07	72.5	+1.10	-0.46	51.6	6.1	7.8	3.0	121.5	71.0	+0.30	-0.00	2.7	4.5	54.5
472070	70	2.50	+0.00	-0.07	74.5	+1.10	-0.46	53.6	6.2	7.8	3.0	119.0	73.0	+0.30	-0.00	2.7	4.5	56.2
472072	72	2.50	+0.00	-0.07	76.5	+1.10	-0.46	55.6	6.4	7.8	3.0	119.2	75.0	+0.30	-0.00	2.7	4.5	58.0
472075	75	2.50	+0.00	-0.07	79.5	+1.10	-0.46	58.6	6.6	7.8	3.0	118.0	78.0	+0.30	-0.00	2.7	4.5	60.0
472077	77	2.50	+0.00	-0.07	81.5	+1.10	-0.46	60.4	6.7	7.9	3.0	121.1	80.0	+0.30	-0.00	2.7	4.5	61.6
472078	78	2.50	+0.00	-0.07	82.5	+1.30	-0.54	60.1	6.8	8.5	3.0	122.5	81.0	+0.35	-0.00	2.7	4.5	62.3
472080	80	2.50	+0.00	-0.07	85.5	+1.30	-0.54	62.1	7.0	8.5	3.0	120.9	83.5	+0.35	-0.00	2.7	5.3	74.6
472082	82	2.50	+0.00	-0.07	87.5	+1.30	-0.54	64.1	7.0	8.5	3.0	119.0	85.5	+0.35	-0.00	2.7	5.3	76.6
472085	85	3.00	+0.00	-0.08	90.5	+1.30	-0.54	66.9	7.2	8.6	3.5	201.4	88.5	+0.35	-0.00	3.2	5.3	79.5
472087	87	3.00	+0.00	-0.08	92.5	+1.30	-0.54	68.9	7.3	8.6	3.5	204.5	90.5	+0.35	-0.00	3.2	5.3	81.3
472088	88	3.00	+0.00	-0.08	93.5	+1.30	-0.54	69.9	7.4	8.6	3.5	209.4	91.5	+0.35	-0.00	3.2	5.3	82.1
472090	90	3.00	+0.00	-0.08	95.5	+1.30	-0.54	71.9	7.6	8.6	3.5	199.0	93.5	+0.35	-0.00	3.2	5.3	84.0
472092	92	3.00	+0.00	-0.08	97.5	+1.30	-0.54	73.7	7.8	8.7	3.5	201.0	95.5	+0.35	-0.00	3.2	5.3	85.8
472095	95	3.00	+0.00	-0.08	100.5	+1.30	-0.54	76.5	8.1	8.8	3.5	195.0	98.5	+0.35	-0.00	3.2	5.3	88.6
472097	97	3.00	+0.00	-0.08	102.5	+1.30	-0.54	78.5	8.2	8.8	3.5	193.0	100.5	+0.35	-0.00	3.2	5.3	90.5
472098	98	3.00	+0.00	-0.08	103.5	+1.30	-0.54	79.0	8.3	9.0	3.5	191.0	101.5	+0.35	-0.00	3.2	5.3	91.3
472100	100	3.00	+0.00	-0.08	105.5	+1.30	-0.54	80.6	8.4	9.2	3.5	188.0	103.5	+0.35	-0.00	3.2	5.3	93.1
472102	102	4.00	+0.00	-0.10	108.0	+1.30	-0.54	82.0	8.5	9.5	3.5	439.0	106.0	+0.54	-0.00	4.2	6.0	108.8
472105	105	4.00	+0.00	-0.10	112.0	+1.30	-0.54	85.0	8.7	9.5	3.5	436.0	109.0	+0.54	-0.00	4.2	6.0	112.0
472108	108	4.00	+0.00	-0.10	115.0	+1.30	-0.54	89.0	8.9	9.5	3.5	419.0	112.0	+0.54	-0.00	4.2	6.0	115.0
472110	110	4.00	+0.00	-0.10	117.0	+1.30	-0.54	88.2	9.0	10.4	3.5	415.0	114.0	+0.54	-0.00	4.2	6.0	117.0
472112	112	4.00	+0.00	-0.10	119.0	+1.30	-0.54	90.0	9.1	10.5	3.5	418.0	116.0	+0.54	-0.00	4.2	6.0	119.0
472115	115	4.00	+0.00	-0.10	122.0	+1.50	-0.63	93.0	9.3	10.5	3.5	409.0	119.0	+0.54	-0.00	4.2	6.0	122.0
472120	120	4.00	+0.00	-0.10	127.0	+1.50	-0.63	96.9	9.7	11.0	3.5	396.0	124.0	+0.63	-0.00	4.2	6.0	127.0
472125	125	4.00	+0.00	-0.10	132.0	+1.50	-0.63	101.9	10.0	11.0	4.0	385.0	129.0	+0.63	-0.00	4.2	6.0	132.0
472130	130	4.00	+0.00	-0.10	137.0	+1.50	-0.63	106.9	10.2	11.0	4.0	374.0	134.0	+0.63	-0.00	4.2	6.0	138.0
472135	135	4.00	+0.00	-0.10	142.0	+1.50	-0.63	111.5	10.5	11.2	4.0	358.0	139.0	+0.63	-0.00	4.2	6.0	143.0
472140	140	4.00	+0.00	-0.10	147.0	+1.50	-0.63	116.5	10.7	11.2	4.0	350.0	144.0	+0.63	-0.00	4.2	6.0	148.0
472145	145	4.00	+0.00	-0.10	152.0	+1.50	-0.63	121.0	10.9	11.4	4.0	336.0	149.0	+0.63	-0.00	4.2	6.0	153.0
472150	150	4.00	+0.00	-0.10	158.0	+1.50	-0.63	124.8	11.2	12.0	4.0	326.0	155.0	+0.63	-0.00	4.2	7.5	191.0
472155	155	4.00	+0.00	-0.10	164.0	+1.50	-0.63	129.8	11.4	12.0	4.0	324.0	160.0	+0.63	-0.00	4.2	7.5	206.0
472160	160	4.00	+0.00	-0.10	169.0	+1.50	-0.63	132.7	11.6	13.0	4.0	321.0	165.0	+0.63	-0.00	4.2	7.5	212.0
472165	165	4.00	+0.00	-0.10	174.5	+1.50	-0.63	137.7	11.8	13.0	4.0	319.0	170.0	+0.63	-0.00	4.2	7.5	219.0
472170	170	4.00	+0.00	-0.10	179.5	+1.50	-0.63	141.6	12.2	13.5	4.0	349.0	175.0	+0.63	-0.00	4.2	7.5	225.0
472175	175	4.00	+0.00	-0.10	184.5	+1.70	-0.72	146.6	12.7	13.5	4.0	351.0	180.0	+0.63	-0.00	4.2	7.5	232.0
472180	180	4.00	+0.00	-0.10	189.5	+1.70	-0.72	150.2	13.2	14.2	4.0	347.0	185.0	+0.72	-0.00	4.2	7.5	238.0
472185	185	4.00	+0.00	-0.10	194.5	+1.70	-0.72	155.2	13.7	14.2	4.0	349.0	190.0	+0.72	-0.00	4.2	7.5	245.0
472190	190	4.00	+0.00	-0.10	199.5	+1.70	-0.72	160.2	13.8	14.2	4.0	340.0	195.0	+0.72	-0.00	4.2	7.5	251.0
472195	195	4.00	+0.00	-0.10	204.5	+1.70	-0.72	165.2	13.8	14.2	4.0	330.0	200.0	+0.72	-0.00	4.2	7.5	258.0
472200	200	4.00	+0.00	-0.10	209.5	+1.70	-0.72	170.2	14.0	14.2	4.0	325.0	205.0	+0.72	-0.00	4.2	7.5	265.0
472205	205	5.00	+0.00	-0.12	217.0	+1.70	-0.72	175.2	14.0	14.2	4.0	616.0	211.0	+0.72	-0.00	5.2	9.0	326.0
472210	210	5.00	+0.00	-0.12	222.0	+1.70	-0.72	180.2	14.0	14.2	4.0	601.0	216.0	+0.72	-0.00	5.2	9.0	333.0
472215	215	5.00	+0.00	-0.12	227.0	+1.70	-0.72	185.2	14.0	14.2	4.0	586.0	221.0	+0.72	-0.00	5.2	9.0	341.0
472220	220	5.00	+0.00	-0.12	232.0	+1.70	-0.72	190.2	14.0	14.2	4.0	574.0	226.0	+0.72	-0.00	5.2	9.0	349.0
472225	225	5.00	+0.00	-0.12	237.0	+1.70	-0.72	195.2	14.0	14.2	4.0	560.0	231.0	+0.72	-0.00	5.2	9.0	357.0
472230	230	5.00	+0.00	-0.12	242.0	+1.70	-0.72	200.2	14.0	14.2	4.0	549.0	236.0	+0.72	-0.00	5.2	9.0	365.0

472235	235	5.00	+0.00	-0.12	247.0	+1.70	-0.72	205.2	14.0	14.2	4.0	536.0	241.0	+0.72	-0.00	5.2	9.0	373.0
472240	240	5.00	+0.00	-0.12	252.0	+2.00	-0.81	210.2	14.0	14.2	4.0	525.0	246.0	+0.72	-0.00	5.2	9.0	380.0
472245	245	5.00	+0.00	-0.12	257.0	+2.00	-0.81	215.2	14.0	14.2	4.0	514.0	251.0	+0.81	-0.00	5.2	9.0	389.0
472250	250	5.00	+0.00	-0.12	262.0	+2.00	-0.81	220.2	14.0	14.2	4.0	504.0	256.0	+0.81	-0.00	5.2	9.0	396.0
472255	255	5.00	+0.00	-0.12	270.0	+2.00	-0.81	221.0	16.0	16.2	5.0	549.0	263.0	+0.81	-0.00	5.2	12.0	541.0
472260	260	5.00	+0.00	-0.12	275.0	+2.00	-0.81	226.0	16.0	16.2	5.0	538.0	268.0	+0.81	-0.00	5.2	12.0	553.0
472265	265	5.00	+0.00	-0.12	280.0	+2.00	-0.81	231.0	16.0	16.2	5.0	528.0	273.0	+0.81	-0.00	5.2	12.0	563.0
472270	270	5.00	+0.00	-0.12	285.0	+2.00	-0.81	236.0	16.0	16.2	5.0	518.0	278.0	+0.81	-0.00	5.2	12.0	573.0
472275	275	5.00	+0.00	-0.12	290.0	+2.00	-0.81	241.0	16.0	16.2	5.0	509.0	283.0	+0.81	-0.00	5.2	12.0	585.0
472280	280	5.00	+0.00	-0.12	295.0	+2.00	-0.81	246.0	16.0	16.2	5.0	499.0	288.0	+0.81	-0.00	5.2	12.0	593.0
472285	285	5.00	+0.00	-0.12	300.0	+2.00	-0.81	251.0	16.0	16.2	5.0	491.0	293.0	+0.81	-0.00	5.2	12.0	605.0
472290	290	5.00	+0.00	-0.12	305.0	+2.00	-0.81	256.0	16.0	16.2	5.0	482.0	298.0	+0.81	-0.00	5.2	12.0	615.0
472295	295	5.00	+0.00	-0.12	310.0	+2.00	-0.81	261.0	16.0	16.2	5.0	474.0	303.0	+0.81	-0.00	5.2	12.0	625.0
472300	300	5.00	+0.00	-0.12	315.0	+2.00	-0.81	266.0	16.0	16.2	5.0	466.0	308.0	+0.81	-0.00	5.2	12.0	636.0
472310	310	5.00	+0.00	-0.18	327.0	+2.50	-1.00	268.0	20.0	20.2	6.0	947.0	320.0	+0.89	-0.00	6.2	15.0	823.0
472320	320	5.00	+0.00	-0.18	337.0	+2.50	-1.00	278.0	20.0	20.2	6.0	919.0	330.0	+0.89	-0.00	6.2	15.0	850.0
472330	330	5.00	+0.00	-0.18	347.0	+2.50	-1.00	288.0	20.0	20.2	6.0	894.0	340.0	+0.89	-0.00	6.2	15.0	876.0
472340	340	5.00	+0.00	-0.18	357.0	+2.50	-1.00	298.0	20.0	20.2	6.0	869.0	350.0	+0.89	-0.00	6.2	15.0	903.0
472350	350	5.00	+0.00	-0.18	367.0	+2.50	-1.00	308.0	20.0	20.2	6.0	846.0	360.0	+0.89	-0.00	6.2	15.0	929.0
472360	360	5.00	+0.00	-0.18	377.0	+2.50	-1.00	318.0	20.0	20.2	6.0	823.0	370.0	+0.89	-0.00	6.2	15.0	955.0
472370	370	5.00	+0.00	-0.18	387.0	+2.50	-1.00	328.0	20.0	20.2	6.0	803.0	380.0	+0.89	-0.00	6.2	15.0	981.0
472380	380	5.00	+0.00	-0.18	397.0	+2.50	-1.00	338.0	20.0	20.2	6.0	784.0	390.0	+0.89	-0.00	6.2	15.0	1008.0
472390	390	5.00	+0.00	-0.18	407.0	+2.50	-1.00	348.0	20.0	20.2	6.0	764.0	400.0	+0.89	-0.00	6.2	15.0	1033.0
472400	400	5.00	+0.00	-0.18	417.0	+2.50	-1.00	358.0	20.0	20.2	6.0	746.0	410.0	+1.00	-0.00	6.2	15.0	1060.0
472400	400	5.00	+0.00	-0.18	417.0	+2.50	-1.00	358.0	20.0	20.2	6.0	746.0	410.0	+1.00	-0.00	6.2	15.0	1060.0



Part no	Circlip Dimensions										Groove Dimensions						
	Bore		(T)		(D)		(C)	(X)	(L)	(H)	Force (lb f)	(G)		(W)		(N)	Force (lb f)
	(Frac)	(Dec)	Inch	Tol	Inch	Tol	inch	inch	inch	inch		Inch	Tol	Inch	Tol	Inch	
N130025	1/4"	0.250	.015		0.280		0.11	0.025	0.068	0.029	530	0.268	+0.001	0.018	0.002	0.027	130
N130031	5/16	0.312	.015		0.346		0.17	0.033	0.069	0.029	660	0.330	-0.001	0.018	0.000	0.027	160
N130037	3/8	0.375	.025		0.415		0.20	0.040	0.085	0.039	1320	0.397		0.029		0.033	235
N130043	7/16	0.438	.025		0.482		0.23	0.049	0.101	0.039	1550	0.461		0.029		0.036	285
N130045	29/64	0.453	.025		0.498	+0.010	0.25	0.050	0.101	0.045	1600	0.477		0.029		0.036	310
N130050	1/2	0.500	.035		0.548	-0.005	0.26	0.053	0.117	0.045	2470	0.530	+0.002	0.039		0.045	425
N130056	9/16	0.562	.035		0.620		0.28	0.053	0.137	0.045	2780	0.596	-0.002	0.039		0.051	540
N130062	5/8	0.625	.035		0.694		0.35	0.060	0.138	0.060	3090	0.665		0.039	0.003	0.060	705
N130068	11/16	0.688	.035		0.763		0.41	0.063	0.137	0.060	3400	0.732		0.039	-0.003	0.066	855
N130075	3/4	0.750	.035		0.831		0.45	0.070	0.147	0.060	3710	0.796		0.039		0.069	975
N130081	13/16	0.812	.042	+0.002	0.901		0.49	0.077	0.160	0.060	4820	0.862		0.046		0.075	1150
N130087	7/8	0.875	.042	-0.002	0.971	+0.015	0.55	0.084	0.160	0.060	5190	0.920	+0.003	0.046		0.084	1390
N130093	15/16	0.938	.042		1.041	-0.010	0.61	0.091	0.160	0.060	5570	1.000	-0.003	0.046		0.093	1640
N130100	1	1.000	.042		1.111		0.68	0.104	0.160	0.060	5940	1.066		0.046		0.099	1870
N130106	1.1/16	1.062	.050		1.180		0.69	0.110	0.185	0.076	7500	1.130		0.056		0.102	2040
N130112	1.1/8	1.125	.050		1.249		0.75	0.116	0.185	0.076	7950	1.197		0.056		0.108	2290
N130118	1.3/16	1.188	.050		1.319		0.81	0.120	0.185	0.076	8400	1.262		0.056		0.111	2490
N130125	1.1/4	1.250	.050		1.388	+0.025	0.88	0.124	0.185	0.076	8850	1.330	+0.004	0.056		0.120	2830
N130131	1.5/16	1.312	.050		1.456	-0.020	0.94	0.130	0.185	0.076	9300	1.396	-0.004	0.056		0.126	3120
N130137	1.3/8	1.375	.050		1.526		1.00	0.130	0.185	0.076	9700	1.461		0.056		0.129	3340
N130143	1.7/16	1.438	.050		1.593		1.06	0.133	0.185	0.076	10200	1.528		0.056		0.135	3660
N130150	1.1/2	1.500	.050		1.660		1.13	0.133	0.185	0.076	10600	1.594		0.056	0.004	0.141	3990
N130156	1.9/16	1.562	.062		1.734		1.15	0.160	0.205	0.076	11400	1.658		0.068	0.000	0.144	4240
N130162	1.5/8	1.625	.062		1.804		1.21	0.160	0.205	0.076	11800	1.725		0.068		0.150	4590
N130168	1.11/16	1.688	.062		1.874		1.27	0.170	0.205	0.076	12300	1.792		0.068		0.156	4960
N130175	1.3/4	1.750	.062		1.942	+0.035	1.34	0.175	0.205	0.076	12800	1.858	+0.005	0.068		0.162	5340
N130181	1.13/16	1.812	.062		2.012	-0.025	1.40	0.170	0.205	0.091	13200	1.922	-0.005	0.068		0.165	5630
N130187	1.7/8	1.875	.062		2.072		1.48	0.170	0.205	0.091	13700	1.989		0.068		0.171	6040
N130193	1.15/16	1.938	.062		2.141		1.52	0.165	0.205	0.091	14100	2.056		0.068		0.177	6470
N130200	2.00	2.000	.062		2.210		1.59	0.170	0.205	0.091	14600	2.122		0.068		0.183	6900
N130206	2.1/16	2.062	.078		2.280		1.61	0.186	0.225	0.091	18900	2.186		0.086		0.186	7230
N130212	2.1/8	2.125	.078		2.350		1.65	0.195	0.236	0.091	19500	2.251		0.086		0.189	7570
N130218	2.3/16	2.188	.078		2.415		1.71	0.199	0.236	0.091	20000	2.318		0.086		0.195	8040
N130225	2.1/4	2.250	.078		2.490		1.77	0.203	0.236	0.091	20600	2.382		0.086		0.198	8400
N130231	2.5/16	2.312	.078		2.560		1.84	0.205	0.236	0.091	21200	2.450		0.086		0.207	9020
N130237	2.3/8	2.375	.078		2.630		1.90	0.207	0.236	0.091	21700	2.517		0.086		0.213	9540
N130244	2.7/16	2.440	.078		2.702	+0.035	1.96	0.205	0.236	0.108	22300	2.584		0.086		0.216	10100
N130250	2.1/2	2.500	.078		2.775	-0.025	2.02	0.210	0.236	0.108	22900	2.648		0.086		0.222	1300
N130256	2.9/16	2.562	.093	+0.003	2.844		2.02	0.222	0.268	0.108	28000	2.714		0.103		0.228	11000
N130262	2.5/8	2.625	.093	-0.003	2.910		2.08	0.226	0.268	0.108	28600	2.781		0.103		0.234	11600
N130268	2.11/16	2.688	.093		2.980		2.15	0.236	0.268	0.108	29300	2.848		0.103		0.240	12200
N130275	2.3/4	2.750	.093		3.050		2.18	0.234	0.284	0.108	30000	2.914		0.103	0.005	0.246	12800
N130281	2.13/16	2.812	.093		3.121		2.24	0.230	0.284	0.108	30800	2.980	+0.006	0.103	0.000	0.252	13400
N130287	2.7/8	2.875	.093		3.191		2.30	0.240	0.284	0.108	31500	3.051	-0.006	0.103		0.264	14300
N130300	3.00	3.000	.093		3.325		2.43	0.250	0.284	0.108	32900	3.182		0.103		0.273	15400
N130306	3.1/16	3.062	.109		3.418		2.46	0.254	0.299	0.123	39300	3.248		0.120		0.279	16100
N130312	3.1/8	3.125	.109		3.488		2.52	0.260	0.299	0.123	40100	3.315		0.120		0.285	16800
N130325	3.1/4	3.250	.109		3.623	+0.055	2.65	0.269	0.299	0.123	41700	3.446		0.120		0.294	18000
N130334	3.11/32	3.346	.109		3.734	-0.055	2.69	0.276	0.323	0.123	43000	3.546		0.120		0.300	18900
N130347	3.15/32	3.469	.109		3.857		2.77	0.294	0.350	0.123	44500	3.675		0.120		0.309	20200
N130350	3.1/2	3.500	.109		3.890		2.80	0.294	0.350	0.123	44900	3.710		0.120		0.315	20800
N130362	3.5/8	3.625	.109		4.024		2.92	0.298	0.350	0.123	46500	3.841		0.120		0.324	22100
N130375	3.3/4	3.750	.109		4.157		3.04	0.309	0.350	0.123	48200	3.974		0.120		0.336	23700
N130387	3.7/8	3.875	.109		4.291	+0.065	3.17	0.312	0.350	0.123	49800	4.107		0.120		0.348	25400
N130393	3.15/16	3.938	.109		4.358	-0.065	3.23	0.319	0.350	0.123	50600	4.174		0.120		0.354	26300
N130400	4.00	4.000	.109		4.424		3.24	0.330	0.378	0.123	51400	4.240		0.120		0.360	27100



**Heavy Duty
External Circlip
DIN 1460**

Standard Material:
Carbon Spring Steel

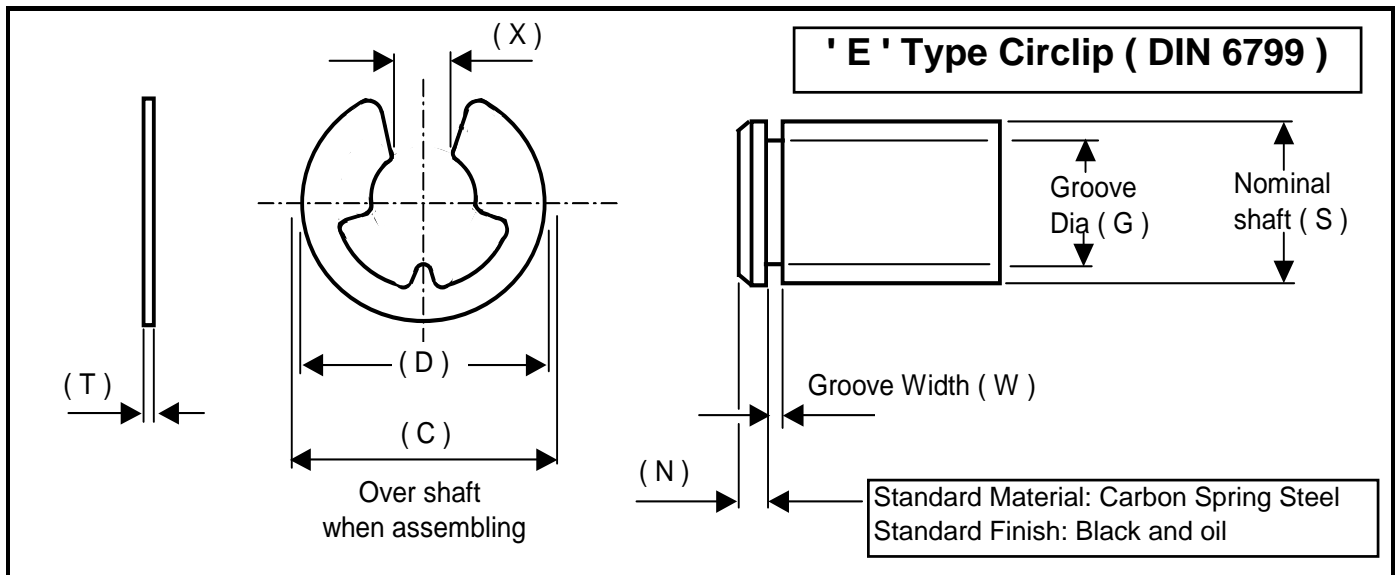
Stainless Steel
available on request

Circlip Dimensions

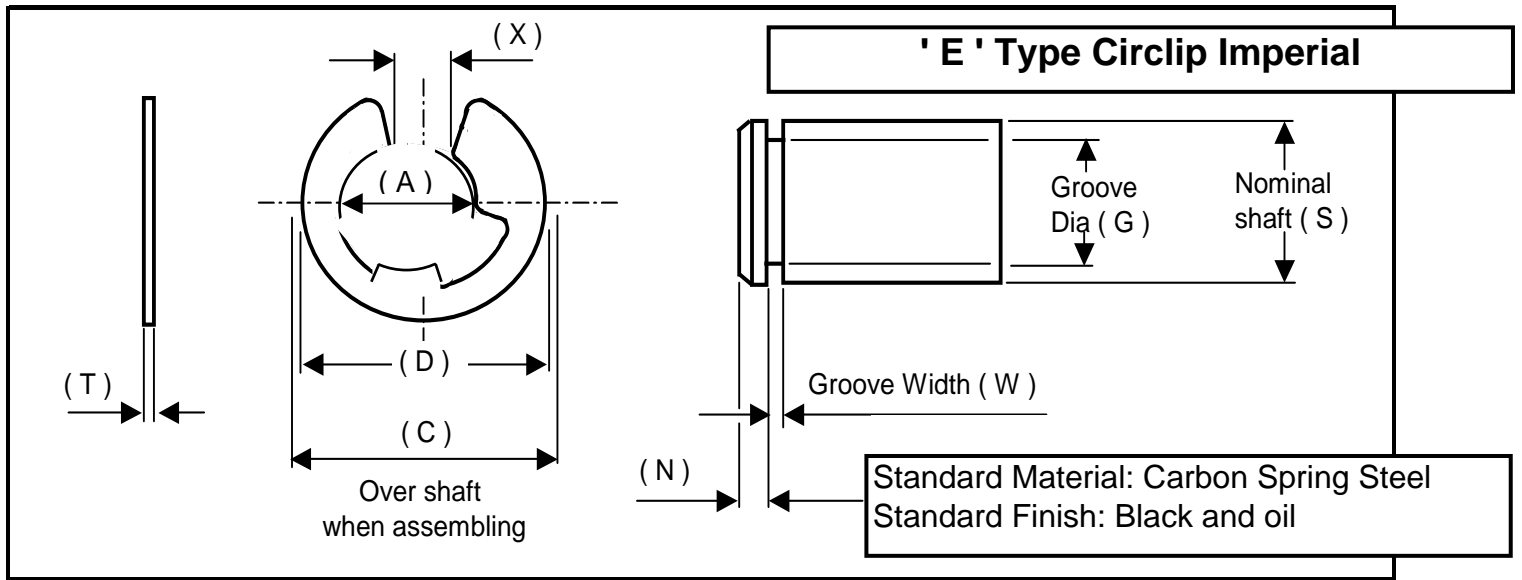
Part no	Shaft	(T)	Tolerance	(D)	Tolerance	(C)	(B)	(L)	(H)	Fr KN
1460012	12	1.50	+0.00 -0.06	11.0	+0.10 -0.36	19.0	1.8	3.3	1.7	11.3
1460013	13	1.50	+0.00 -0.06	11.9	+0.10 -0.36	20.2	2.0	3.4	1.7	5.8
1460014	14	1.50	+0.00 -0.06	12.9	+0.10 -0.36	21.4	2.1	3.5	1.7	6.4
1460015	15	1.50	+0.00 -0.06	13.8	+0.10 -0.36	22.6	2.4	3.6	2.0	15.5
1460016	16	1.50	+0.00 -0.06	14.7	+0.10 -0.36	23.8	2.5	3.7	2.0	16.6
1460017	17	1.50	+0.00 -0.06	15.7	+0.10 -0.36	25.0	2.6	3.8	1.7	18.0
1460018	18	1.50	+0.00 -0.06	16.5	+0.10 -0.36	26.2	2.7	3.9	2.0	26.6
1460019	19	1.50	+0.00 -0.06	17.5	+0.13 -0.42	27.2	2.7	3.9	2.0	26.6
1460020	20	1.75	+0.00 -0.06	18.5	+0.13 -0.42	28.4	3.0	4.0	2.0	36.3
1460022	22	1.75	+0.00 -0.06	20.5	+0.13 -0.42	30.8	3.1	4.2	2.0	36.0
1460023	23	1.75	+0.00 -0.06	21.5	+0.13 -0.42	32.0	3.2	4.3	2.0	35.7
1460024	24	1.75	+0.00 -0.06	22.2	+0.21 -0.42	33.2	3.2	4.4	2.0	34.2
1460025	25	2.00	+0.00 -0.07	23.2	+0.21 -0.42	34.2	3.4	4.4	2.0	45.0
1460026	26	2.00	+0.00 -0.07	24.2	+0.21 -0.42	35.5	3.3	4.5	2.0	44.0
1460027	27	2.00	+0.00 -0.07	24.9	+0.21 -0.42	36.7	3.4	4.6	2.0	45.5
1460028	28	2.00	+0.00 -0.07	25.9	+0.21 -0.42	37.9	3.5	4.7	2.0	57.0
1460029	29	2.00	+0.00 -0.07	26.9	+0.21 -0.42	39.1	3.8	4.8	2.0	56.5
1460030	30	2.00	+0.00 -0.07	27.9	+0.21 -0.42	40.5	4.1	5.0	2.0	57.0
1460032	32	2.00	+0.00 -0.07	29.6	+0.25 -0.50	43.0	4.1	5.2	2.5	57.0
1460033	33	2.00	+0.00 -0.07	30.5	+0.25 -0.50	44.0	4.0	5.2	2.5	56.0
1460034	34	2.50	+0.00 -0.07	31.5	+0.25 -0.50	45.4	4.2	5.4	2.5	87.0
1460035	35	2.50	+0.00 -0.07	32.2	+0.25 -0.50	46.8	4.2	5.6	2.5	86.0
1460036	36	2.50	+0.00 -0.07	33.2	+0.25 -0.50	47.8	4.2	5.6	2.5	101.5
1460038	38	2.50	+0.00 -0.07	35.2	+0.25 -0.50	50.2	4.3	5.8	2.5	101.0
1460040	40	2.50	+0.00 -0.07	36.5	+0.39 -0.90	52.6	4.4	6.0	2.5	104.0
1460042	42	2.50	+0.00 -0.07	38.5	+0.39 -0.90	55.7	4.5	6.5	2.5	102.0
1460045	45	2.50	+0.00 -0.07	41.5	+0.39 -0.90	59.1	4.7	6.7	2.5	100.0
1460048	48	2.50	+0.00 -0.07	44.5	+0.39 -0.90	62.5	5.0	6.9	2.5	101.0
1460050	50	3.00	+0.00 -0.08	45.8	+0.39 -0.90	64.5	5.1	6.9	2.5	165.0
1460052	52	3.00	+0.00 -0.08	47.8	+0.39 -0.90	66.7	5.2	7.0	2.5	165.0
1460055	55	3.00	+0.00 -0.08	50.8	+0.46 -1.10	70.2	5.4	7.2	2.5	161.0
1460056	56	3.00	+0.00 -0.08	51.8	+0.46 -1.10	71.6	5.5	7.3	2.5	53.0
1460058	58	3.00	+0.00 -0.08	53.8	+0.46 -1.10	73.6	5.6	7.3	2.5	160.0
1460060	60	3.00	+0.00 -0.08	55.8	+0.46 -1.10	75.6	5.8	7.4	2.5	156.0
1460062	62	3.00	+0.00 -0.08	57.8	+0.46 -1.10	77.8	6.0	7.5	2.5	69.3
1460063	63	3.00	+0.00 -0.08	58.8	+0.46 -1.10	79.0	6.2	7.6	2.5	70.2
1460035	65	4.00	+0.00 -0.08	60.8	+0.46 -1.10	81.4	6.3	7.8	3.0	346.0
1460068	68	2.50	+0.00 -0.08	63.5	+0.46 -1.10	84.4	6.5	8.0	3.0	135.9
1460070	70	4.00	+0.00 -0.08	65.5	+0.46 -1.10	87.0	6.6	8.1	3.0	343.0
1460072	72	4.00	+0.00 -0.08	67.5	+0.46 -1.10	89.2	6.8	8.2	3.0	131.8
1460075	75	4.00	+0.00 -0.08	70.5	+0.46 -1.10	92.7	7.0	8.4	3.0	333.0
1460078	78	4.00	+0.00 -0.08	73.5	+0.46 -1.10	96.1	7.3	8.6	3.0	131.3
1460080	80	4.00	+0.00 -0.10	74.5	+0.46 -1.10	98.1	7.4	8.6	3.0	328.0
1460082	82	4.00	+0.00 -0.10	76.5	+0.46 -1.10	100.3	7.6	8.7	3.0	
1460085	85	4.00	+0.00 -0.10	79.5	+0.46 -1.10	103.3	7.8	8.7	3.5	383.0
1460087	87	3.25	+0.00 -0.10	81.5	+0.54 -1.30	105.5	7.9	8.8	3.5	
1460090	90	4.00	+0.00 -0.10	84.5	+0.54 -1.30	108.5	8.2	8.8	3.5	386.0
1460092	92	4.00	+0.00 -0.10	86.5	+0.54 -1.30	111.0	8.4	9.0	3.5	
1460095	95	4.00	+0.00 -0.10	89.5	+0.54 -1.30	114.8	8.6	9.4	3.5	378.0
1460098	98	4.00	+0.00 -0.10	92.5	+0.54 -1.30	118.0	9.0	9.5	3.5	
1460100	100	4.00	+0.00 -0.10	94.5	+0.54 -1.30	120.2	9.0	9.6	3.5	368.0

Groove Dimensions

(G)	Tolerance	(W)	(N)	Fn KN
11.5	+0.00 -0.11	1.6	0.7	1.5
12.4	+0.00 -0.11	1.6	0.9	
13.4	+0.00 -0.11	1.6	0.9	
14.3	+0.00 -0.11	1.6	0.7	3.2
15.2	+0.00 -0.11	1.6	1.2	3.3
16.2	+0.00 -0.11	1.6	1.5	4.3
17.0	+0.00 -0.11	1.6	1.8	5.5
18.0	+0.00 -0.11	1.6	1.8	5.8
19.0	+0.00 -0.15	1.85	1.6	5.6
21.0	+0.00 -0.15	1.85	1.5	5.6
22.0	+0.00 0.15	1.85	1.8	7.0
22.9	+0.00 -0.21	1.85	1.9	8.0
23.9	+0.00 -0.21	2.15	1.9	8.3
24.9	+0.00 -0.21	2.15	2.4	10.7
25.6	+0.00 -0.21	2.15	2.3	10.3
26.6	+0.00 -0.21	2.15	2.1	10.0
27.6	+0.00 -0.21	2.15	2.1	10.4
28.6	+0.00 -0.21	2.15	2.1	10.7
30.3	+0.00 -0.21	2.15	2.5	12.9
31.3	+0.00 -0.25	2.15	2.5	14.3
32.3	+0.00 -0.25	2.65	2.8	16.4
33.0	+0.00 -0.25	2.65	3.0	17.8
34.0	+0.00 -0.25	2.65	3.3	20.1
36.0	+0.00 -0.25	2.65	3.3	21.2
37.5	+0.00 -0.25	2.65	3.8	25.3
39.5	+0.00 -0.25	2.65	3.8	26.7
42.5	+0.00 -0.25	2.65	3.8	28.6
45.5	+0.00 -0.25	2.65	3.8	30.7
47.0	+0.00 -0.25	3.15	4.5	38.2
49.0	+0.00 -0.25	3.15	4.5	39.7
52.0	+0.00 -0.30	3.15	4.5	42.0
53.0	+0.00 -0.30	3.15	4.5	42.8
55.0	+0.00 -0.30	3.15	4.5	44.3
57.0	+0.00 -0.30	3.15	4.5	46.0
59.0	+0.00 -0.30	3.15	4.5	47.5
60.0	+0.00 -0.30	3.15	4.5	48.3
62.0	+0.00 -0.30	4.15	4.5	49.8
65.0	+0.00 -0.30	4.15	4.5	52.2
67.0	+0.00 -0.30	4.15	4.5	53.8
69.0	+0.00 -0.30	4.15	4.5	55.3
72.0	+0.00 -0.30	4.15	4.5	57.6
75.0	+0.00 -0.30	4.15	5.3	60.0
76.5	+0.00 -0.30	4.15	5.3	71.6
78.5	+0.00 -0.30	4.15	5.3	73.5
81.5	+0.00 -0.35	4.15	5.3	76.3
83.5	+0.00 -0.35	4.15	5.3	78.2
86.5	+0.00 -0.35	4.15	5.3	80.8
88.5	+0.00 -0.35	4.15	5.3	82.7
91.5	+0.00 -0.35	4.15	5.3	85.5
94.5	+0.00 -0.35	4.15	5.3	88.2
96.5	+0.00 -0.35	4.15	5.3	90.0

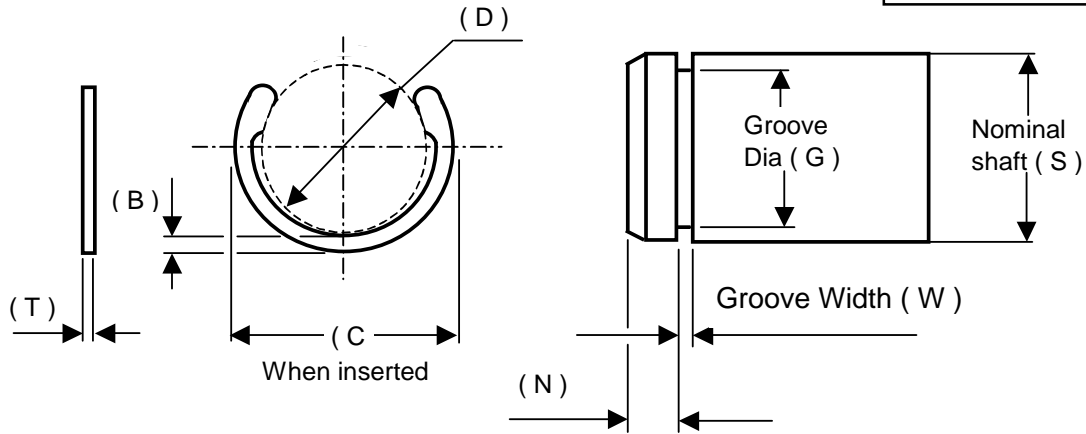


Part no	Shaft			Circlip Dimensions								Groove Dimensions						
	Nom	Min	Max	Thk	Tolerance		(D)	(C)	(X)	Tolerance		Fr KN	Dia G	Tolerance		(W)	(N)	Fn KN
ETC0008	1.2	1.0	1.4	0.20	+0.02	-0.02	1.95	2.25	0.58	+0.04	-0.04	0.1	0.8	+0.00	0.04	0.24	0.4	0.03
ETC0012	1.7	1.4	2.0	0.30	+0.02	-0.02	2.9	3.25	1.01	+0.04	-0.04	0.1	1.2	+0.00	0.06	0.34	0.6	0.04
ETC0015	2.3	2.0	2.5	0.40	+0.02	-0.02	3.85	4.25	1.28	+0.04	-0.04	0.2	1.5	+0.00	0.06	0.44	0.8	0.07
ETC0019	2.8	2.5	3.0	0.50	+0.02	-0.02	4.4	4.8	1.61	+0.04	-0.04	0.4	1.9	+0.00	0.06	0.54	1.0	0.10
ETC0023	3.5	3.0	4.0	0.60	+0.02	-0.02	5.9	6.3	1.94	+0.04	-0.04	0.5	2.3	+0.00	0.06	0.64	1.0	0.15
ETC0032	4.5	4.0	5.0	0.60	+0.02	-0.02	6.8	7.3	2.7	+0.04	-0.04	0.7	3.2	+0.00	0.075	0.64	1.0	0.22
ETC0040	6.0	5.0	7.0	0.70	+0.02	-0.02	8.8	9.3	3.34	+0.05	-0.05	1.0	4.0	+0.00	0.075	0.74	1.2	0.25
ETC0050	7.0	6.0	8.0	0.70	+0.02	-0.02	10.75	11.3	4.11	+0.05	-0.05	1.2	5.0	+0.00	0.075	0.74	1.2	0.90
ETC0060	8.0	7.0	9.0	0.70	+0.02	-0.02	11.75	12.3	5.26	+0.05	-0.05	1.4	6.0	+0.00	0.075	0.74	1.2	1.10
ETC0070	9.5	8.0	11.0	0.90	+0.02	-0.02	13.8	14.3	5.84	+0.05	-0.05	1.8	7.0	+0.00	0.09	0.94	1.5	1.25
ETC0080	10.5	9.0	12.0	1.00	+0.03	-0.03	15.6	16.3	6.52	+0.06	-0.06	2.5	8.0	+0.00	0.09	1.05	1.8	1.42
ETC0090	12.0	10.0	14.0	1.10	+0.03	-0.03	18.2	18.8	7.63	+0.06	-0.06	3.0	9.0	+0.00	0.09	1.15	2.0	1.60
ETC0100	13.0	11.0	15.0	1.20	+0.03	-0.03	19.65	20.4	8.32	+0.06	-0.06	3.5	10.0	+0.00	0.09	1.25	2.0	1.70
ETC0120	15.5	13.0	18.0	1.30	+0.03	-0.03	22.65	23.4	10.45	+0.07	-0.07	4.7	12.0	+0.00	0.11	1.35	2.5	3.10
ETC0150	20.0	16.0	24.0	1.50	+0.03	-0.03	28.6	29.4	12.61	+0.07	-0.07	7.8	15.0	+0.00	0.11	1.55	3.0	7.00
ETC0190	25.5	20.0	31.0	1.75	+0.03	-0.03	36.7	37.6	15.92	+0.07	-0.07	11.0	19.0	+0.00	0.13	1.8	3.5	10.00
ETC0240	31.5	25.0	38.0	2.00	+0.03	-0.03	43.65	44.6	21.88	+0.08	-0.08	15.0	24.0	+0.00	0.13	2.05	4.0	13.00



Part no	Shaft		T Inch	Tol Inch	D Inch	C inch	A inch	Tol Inch	Groove Dimensions				
	s Inch	Tol Inch							Dia G	Tol Inch	W Inch	N Inch	Fn KN
1500/X004	0.040	+0.010/-0.00	0.010	+0.001	0.079	0.090	0.025		0.026		0.012	0.014	5
1500/X006	0.062		0.010	-0.001	0.140	0.150	0.051	+0.001	0.052		0.012	0.010	6
1500/0006	0.062		0.010		0.156	0.165	0.051	-0.003	0.052		0.012	0.010	6
1500/Y006	0.062	+0.030	0.020		0.187	0.200	0.051		0.052		0.023	0.010	6
1500/X009	0.094	-0.000	0.015		0.230	0.245	0.069	+0.002/-0.002	0.074		0.018	0.020	17
1500/0009	0.094		0.015		0.187	0.200	0.073		0.074		0.018	0.020	17
1500/X011	0.110		0.015		0.375	0.390	0.076		0.079		0.018	0.030	32
1500/0012	0.125		0.015		0.230	0.240	0.094		0.095	+0.002	0.018	0.030	35
1500/X014	0.140	+0.040	0.015		0.203	0.214	0.100		0.102	-0.000	0.018	0.038	50
1500/Y014	0.140	-0.000	0.015		0.250	0.265	0.108		0.110		0.018	0.030	39
1500/0014	0.140		0.025		0.270	0.285	0.102	+0.001	0.105		0.029	0.034	46
1500/0015	0.156	+0.050	0.025		0.282	0.295	0.114	-0.003	0.116		0.029	0.040	58
1500/X017	0.172	-0.000	0.025		0.312	0.325	0.125		0.127		0.029	0.044	72
1500/X018	0.188	+0.0600	0.025		0.375	0.390	0.122		0.125		0.029	0.062	110
1500/0018	0.188	-0.000	0.025	+0.002	0.335	0.350	0.145		0.147		0.029	0.040	72
1500/X021	0.219		0.025	-0.002	0.437	0.450	0.185		0.188		0.029	0.030	63
1500/0025	0.250		0.025		0.527	0.540	0.207		0.210		0.029	0.040	93
1500/X031	0.312	+0.100	0.025		0.500	0.520	0.243		0.250		0.029	0.062	180
1500/0037	0.375	-0.000	0.035		0.660	0.680	0.300	+0.002	0.303		0.039	0.072	252
1500/0043	0.438		0.035		0.687	0.710	0.337	-0.004	0.343		0.039	0.094	388
1500/X043	0.438		0.035		0.600	0.620	0.375		0.380	+0.003	0.039	0.058	237
1500/0050	0.500		0.042		0.800	0.820	0.392		0.396	-0.000	0.046	0.104	485
1500/0062	0.625		0.042		0.940	0.960	0.480		0.485		0.046	0.140	816
1500/X074	0.744	+0.120	0.050		1.000	1.020	0.616	+0.003	0.625		0.056	0.118	1190
1500/0075	0.750	-0.000	0.050		1.120	1.140	0.574	-0.004	0.580		0.056	0.170	1630
1500/0087	0.875		0.050		1.300	1.320	0.668		0.675		0.056	0.200	1370
1500/X098	0.984		0.050		1.500	1.530	0.822		0.835		0.056	0.148	1210
1500/X118	1.188	+0.200	0.062	+0.003	1.626	1.670	1.066	+0.006	1.079	+0.005	0.068	0.108	1860
1500/X137	1.375	-0.000	0.062	-0.003	1.875	1.920	1.213	-0.010	1.230	-0.000	0.068	0.144	1860

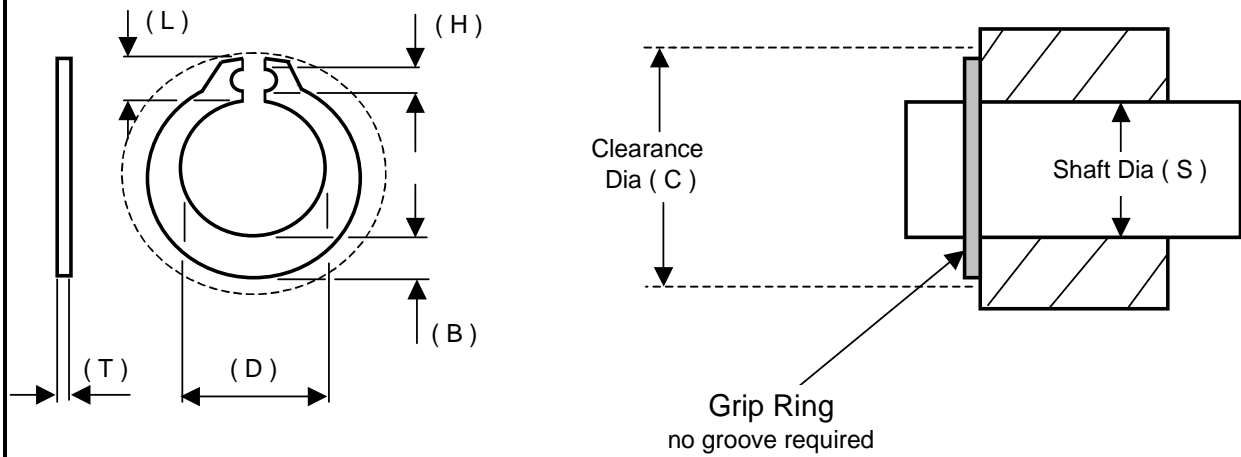
Crescent Rings



Standard Material: Carbon Spring Steel
Standard Finish: Black and oil

Part no	Shaft		Circlip Dimensions						Groove Dimensions						
	Shaft	Tolerance	(T)	Tolerance	(D)	Tolerance	(C)	(B)	Fr KN	(G)	Tolerance	(W)	Tolerance	(N)	Fn KN
CR003	3	+0.08 -0.00	0.4	+0.00 -0.05	2.2	+0.06 -0.06	4.1	0.9	0.50	2.3	+0.00 -0.07	0.44	+0.05 -0.00	1.0	0.24
CR004	4	+0.08 -0.00	0.4	+0.00 -0.05	3.0	+0.06 -0.06	5.2	1.0	0.50	3.2	+0.00 -0.07	0.44	+0.05 -0.00	1.2	0.37
CR005	5	+0.10 -0.00	0.6	+0.00 -0.05	3.8	+0.08 -0.08	6.4	1.2	1.10	4.0	+0.00 -0.07	0.64	+0.08 -0.00	1.5	0.58
CR006	6	+0.10 -0.00	0.7	+0.00 -0.05	4.8	+0.08 -0.08	7.6	1.3	1.65	5.0	+0.00 -0.07	0.74	+0.08 -0.00	1.5	0.72
CR007	7	+0.10 -0.00	0.8	+0.00 -0.05	5.8	+0.08 -0.08	8.8	1.4	2.20	6.0	+0.00 -0.09	0.85	+0.08 -0.00	1.5	0.85
CR008	8	+0.10 -0.00	0.8	+0.00 -0.05	6.8	+0.09 -0.09	10.2	1.6	2.20	7.0	+0.00 -0.09	0.85	+0.08 -0.00	1.5	0.98
CR009	9	+0.10 -0.00	1.0	+0.00 -0.06	7.8	+0.09 -0.09	11.4	1.7	3.50	8.0	+0.00 -0.09	1.10	+0.08 -0.00	1.5	1.10
CR010	10	+0.10 -0.00	1.0	+0.00 -0.06	8.8	+0.09 -0.09	12.4	1.7	3.70	9.0	+0.00 -0.09	1.10	+0.08 -0.00	1.5	1.24
CR011	11	+0.10 -0.00	1.0	+0.00 -0.06	9.7	+0.18 -0.18	13.6	1.8	4.00	10.0	+0.00 -0.11	1.10	+0.08 -0.00	1.5	1.35
CR012	12	+0.15 -0.00	1.0	+0.00 -0.06	10.6	+0.18 -0.18	14.7	1.9	4.20	10.9	+0.00 -0.11	1.10	+0.08 -0.00	1.7	1.65
CR013	13	+0.15 -0.00	1.0	+0.00 -0.06	11.4	+0.18 -0.18	15.8	2.0	4.50	11.8	+0.00 -0.11	1.10	+0.08 -0.00	1.8	1.90
CR014	14	+0.15 -0.00	1.0	+0.00 -0.06	12.3	+0.18 -0.18	16.7	2.0	5.00	12.7	+0.00 -0.11	1.10	+0.08 -0.00	2.0	2.20
CR015	15	+0.15 -0.00	1.0	+0.00 -0.06	13.2	+0.18 -0.18	17.8	2.1	5.50	13.6	+0.00 -0.11	1.10	+0.08 -0.00	2.1	2.60
CR016	16	+0.15 -0.00	1.0	+0.00 -0.06	14.1	+0.18 -0.18	18.9	2.2	5.80	14.5	+0.00 -0.11	1.10	+0.08 -0.00	2.3	3.00
CR017	17	+0.15 -0.00	1.0	+0.00 -0.06	14.9	+0.18 -0.18	19.9	2.3	6.00	15.4	+0.00 -0.11	1.10	+0.08 -0.00	2.4	3.40
CR018	18	+0.15 -0.00	1.2	+0.00 -0.06	15.8	+0.18 -0.18	20.9	2.3	8.50	16.3	+0.00 -0.11	1.30	+0.15 -0.00	2.6	3.70
CR019	19	+0.15 -0.00	1.2	+0.00 -0.06	16.7	+0.18 -0.18	22.0	2.4	9.00	17.2	+0.00 -0.11	1.30	+0.15 -0.00	2.7	4.30
CR020	20	+0.15 -0.00	1.2	+0.00 -0.06	17.6	+0.18 -0.18	23.2	2.6	9.40	18.1	+0.00 -0.21	1.30	+0.15 -0.00	2.9	4.70
CR022	22	+0.15 -0.00	1.2	+0.00 -0.06	19.4	+0.21 -0.21	25.5	2.8	10.00	19.9	+0.00 -0.21	1.30	+0.15 -0.00	3.2	5.70
CR023	23	+0.15 -0.00	1.2	+0.00 -0.06	20.2	+0.21 -0.21	26.6	2.9	10.50	20.8	+0.00 -0.21	1.30	+0.15 -0.00	3.3	6.20
CR024	24	+0.15 -0.00	1.2	+0.00 -0.06	21.1	+0.21 -0.21	27.7	3.0	11.00	21.7	+0.00 -0.21	1.30	+0.15 -0.00	3.5	6.80
CR025	25	+0.15 -0.00	1.2	+0.00 -0.06	22.0	+0.21 -0.21	28.9	3.2	11.50	22.6	+0.00 -0.21	1.30	+0.15 -0.00	3.6	7.50
CR026	26	+0.20 -0.00	1.2	+0.00 -0.06	22.9	+0.21 -0.21	30.0	3.3	12.00	23.5	+0.00 -0.21	1.30	+0.15 -0.00	3.8	8.00
CR028	28	+0.20 -0.00	1.5	+0.00 -0.06	24.6	+0.21 -0.21	32.2	3.5	16.50	25.2	+0.00 -0.21	1.60	+0.15 -0.00	4.2	9.70
CR030	30	+0.20 -0.00	1.5	+0.00 -0.06	26.3	+0.21 -0.21	34.4	3.7	17.00	27.0	+0.00 -0.21	1.60	+0.15 -0.00	4.5	11.00

Metric Grip Rings



Standard Material: Carbon Spring Steel
Standard Finish: Phosphate and oil

Part No	Shaft		Circlip Dimensions										
	(S)	Tolerance	(T)	Tolerance	(D)	Tolerance	(C)	(B)	(L)	(H)	AI N		
GR0015	1.5	+0.05 -0.05	0.40	+0.06 -0.06	1.40	+0.05 -0.05	5.1	0.7	1.7	0.9	40		
GR0020	2.0	+0.05 -0.05	0.60	+0.06 -0.06	1.90	+0.05 -0.05	6.0	1.0	1.9	0.9	50		
GR0025	2.5	+0.05 -0.05	0.60	+0.06 -0.06	2.35	+0.05 -0.05	6.5	1.2	1.9	0.9	60		
GR003	3.0	+0.05 -0.05	0.60	+0.06 -0.06	2.85	+0.05 -0.05	7.4	1.4	2.1	0.9	75		
GR0035	3.5	+0.05 -0.05	0.60	+0.06 -0.06	3.30	+0.05 -0.05	8.3	1.6	2.3	1.2	90		
GR004	4.0	+0.05 -0.05	0.80	+0.06 -0.06	3.80	+0.06 -0.06	9.6	1.8	2.7	1.2	100		
GR0045	4.5	+0.05 -0.05	0.80	+0.06 -0.06	4.25	+0.06 -0.06	10.5	2.0	2.9	1.3	120		
GR005	5.0	+0.08 -0.08	0.80	+0.06 -0.06	4.75	+0.08 -0.08	11.0	2.2	2.9	1.3	130		
GR006	6.0	+0.08 -0.08	1.00	+0.08 -0.08	5.70	+0.08 -0.08	12.6	2.4	3.2	1.4	170		
GR007	7.0	+0.08 -0.08	1.00	+0.08 -0.08	6.70	+0.09 -0.09	14.0	2.7	3.4	1.4	180		
GR008	8.0	+0.08 -0.08	1.00	+0.08 -0.08	7.70	+0.09 -0.09	15.2	3.0	3.5	1.4	200		
GR009	9.0	+0.08 -0.08	1.20	+0.08 -0.08	8.65	+0.09 -0.09	18.3	3.3	4.7	2.0	230		
GR010	10.0	+0.08 -0.08	1.20	+0.08 -0.08	9.65	+0.09 -0.09	19.6	3.5	4.7	2.0	250		
GR011	11.0	+0.12 -0.12	1.20	+0.08 -0.08	10.60	+0.11 -0.11	20.8	4.2	4.8	2.0	280		
GR012	12.0	+0.12 -0.12	1.20	+0.08 -0.08	11.60	+0.11 -0.11	21.8	4.6	4.8	2.0	300		
GR015	15.0	+0.12 -0.12	1.50	+0.10 -0.10	14.50	+0.11 -0.11	26.4	5.6	5.1	2.2	400		
GR016	16.0	+0.12 -0.12	1.50	+0.10 -0.10	15.40	+0.11 -0.11	27.8	5.8	5.6	2.5	500		
GR017	17.0	+0.12 -0.12	1.75	+0.10 -0.10	16.35	+0.11 -0.11	29.5	6.2	6.0	2.5	600		
GR020	20.0	+0.12 -0.12	1.75	+0.10 -0.10	19.30	+0.13 -0.13	34.4	7.1	6.1	2.5	700		
GR025	25.0	+0.12 -0.12	1.75	+0.10 -0.10	24.15	+0.13 -0.13	41.6	8.2	6.6	2.5	750		

Spring Tension pins

The humble Spring tension pin also known as a Roll Pin has many attributes making it a functional securing, locating and hinge pin device.

The Spring Pin has many advantages as a fastener some of which are listed below:-

Replacement for Solid Pins, Taper Pins, Cotter Pins, Split Pins, threaded items and many other methods of fastening previously used.

Excellent shear strength properties - Tests show that Spring Tension pins to be approximately 10% stronger as well as 10% lighter than that of mild steel solid pins.

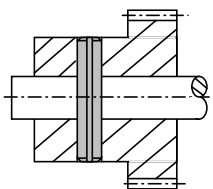
With diameters slightly larger than that of the hole size they provide a tight spring fit into the hole providing a tight grip along the pins length.

By virtue of their design they offer constant on-going pressure making them resistant to vibration.

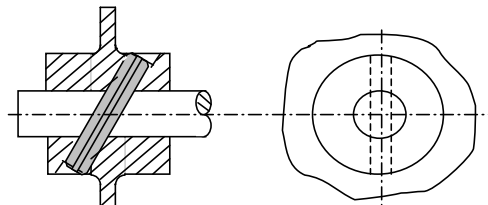
Costs are reduced by the elimination of reaming and threading. Simply drill and insert.

Pin shear strength can be increased further by inserting one pin inside another.

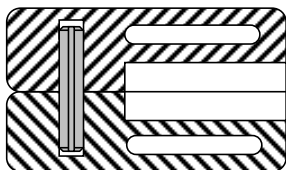
Typical examples of Spring Tension Pin applications



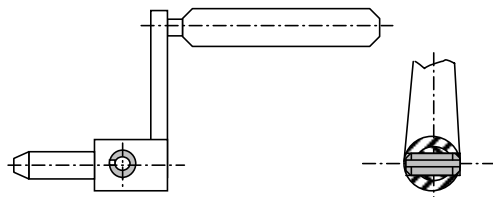
Gear secured to shaft



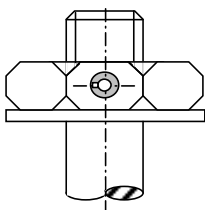
Hub secured to shaft diagonally



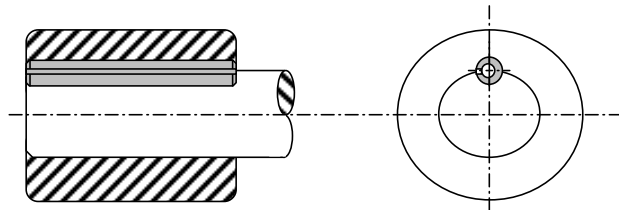
Securing of 2 castings



Handle securing device



Securing nut to thread

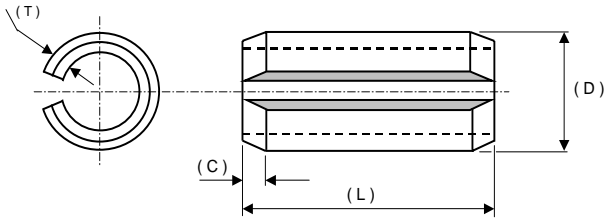


Securing Castor or wheel to shaft

Other information:- Pins are generally manufactured from carbon spring steel and supplied with a self / plain finish. However Caleb is able to offer stainless steel parts on request and also offer plated finishes such as electro zinc and passivate or Deltatone.

Note! Parts that are electroplated may be subject to hydrogen de-embrittlement and in extreme cases fracture may occur. Caleb can take no responsibility for this and is carried out at customers own risk.

Please note! If parts are supplied plated this will increase the diameter of the pin and some interlocking may take place either in the plating or packing process.



Spring Tension Pin ISO 8752 (DIN 1481)

Std Material: Carbon Spring Steel
Standard Finish: Self / Plain
Stainless parts as metric dimensions

Chamfer angle: 15~30 Degrees
Hardness: 44~53 Rockwell C

Nominal Dia mm	Diameter (D)		Wall Thickness (T)	Recommended Hole Size		Minimum Double shear		Chamfer Length (C)	
	Min	Max		Min	Max	KN	KG	Min	Max
1	1.2	1.3	0.2	1.00	1.10	7	71	0.15	0.35
1.5	1.7	1.8	0.3	1.50	1.60	16	161	0.25	0.45
2	2.3	2.4	0.4	2.00	2.10	29	288	0.35	0.55
2.5	2.8	2.9	0.5	2.50	2.60	46	447	0.40	0.60
3	3.3	3.5	0.6	3.00	3.10	66	644	0.50	0.70
3.5	3.8	4.0	0.7	3.50	3.62	94	924	0.50	0.80
4	4.4	4.6	0.8	4.00	4.12	117	1146	0.65	0.85
4.5	4.9	5.1	1.0	4.50	4.62	160	1567	0.80	1.00
5	5.4	5.6	1.0	5.00	5.12	182	1789	0.90	1.10
6	6.4	6.7	1.2	6.00	6.12	271	2655	1.20	1.40
8	8.5	8.8	1.5	8.00	8.15	445	4360	1.40	1.80
10	10.5	10.8	2.0	10.00	10.15	729	7154	2.00	2.40
12	12.5	12.8	2.5	12.00	12.17	1082	10615	2.00	2.40
13	13.5	13.8	2.5	13.00	13.17	1196	11732	2.00	2.40
14	14.5	14.8	3.0	14.00	14.17	1505	14755	2.00	2.40
16	16.5	16.8	3.0	16.00	16.17	1779	17447	2.00	2.40

Part Numbers

N o m i n a l D i a m e t e r m m

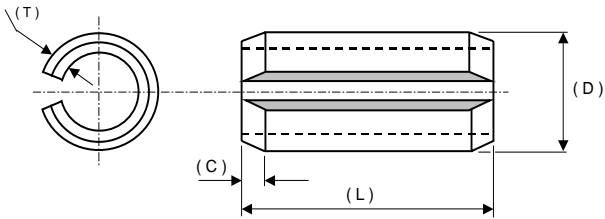
Pin Length	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	8.0	10.0	12.0	13.0	14.0	16.0
4.0	STP-4	STP15-4	STP2-4	STP25-4	STP3-4											
5.0	STP-5	STP15-5	STP2-5	STP25-5	STP3-5											
6.0	STP-6	STP15-6	STP2-6	STP25-6	STP3-6	STP35-6	STP4-6									
8.0	STP-8	STP15-8	STP2-8	STP25-8	STP3-8	STP35-8	STP4-8	STP5-8	STP5-8							
10.0	STP-10	STP15-10	STP2-10	STP25-10	STP3-10	STP35-10	STP4-10	STP4.5-10	STP5-10	STP6-10	STP8-10					
12.0	STP-12	STP15-12	STP2-12	STP25-12	STP3-12	STP35-12	STP4-12	STP4.5-12	STP5-12	STP6-12	STP8-12					
14.0	STP-14	STP15-14	STP2-14	STP25-14	STP3-14	STP35-14	STP4-14	STP4.5-14	STP5-14	STP6-14	STP8-14					
16.0	STP-16	STP15-16	STP2-16	STP25-16	STP3-16	STP35-16	STP4-16	STP4.5-16	STP5-16	STP6-16	STP8-16	STP10-16	STP12-16			
18.0	STP-18	STP15-18	STP2-18	STP25-18	STP3-18	STP35-18	STP4-18	STP4.5-18	STP5-18	STP6-18	STP8-18	STP10-18	STP12-18			
20.0	STP-20	STP15-20	STP2-20	STP25-20	STP3-20	STP35-20	STP4-20	STP4.5-20	STP5-20	STP6-20	STP8-20	STP10-20	STP12-20			
22.0			STP2-22	STP25-22	STP3-22	STP35-22	STP4-22	STP4.5-22	STP5-22	STP6-22	STP8-22	STP10-22	STP12-22			
24.0		STP15-24	STP2-24	STP25-24	STP3-24	STP35-24	STP4-24	STP4.5-24	STP5-24	STP6-24	STP8-24	STP10-24	STP12-24			
26.0			STP2-26	STP25-26	STP3-26	STP35-26	STP4-26	STP4.5-26	STP5-26	STP6-26	STP8-26	STP10-26	STP12-26			
28.0			STP2-28	STP25-28	STP3-28	STP35-28	STP4-28	STP4.5-28	STP5-28	STP6-28	STP8-28	STP10-28	STP12-28			
30.0			STP2-30	STP25-30	STP3-30	STP35-30	STP4-30	STP4.5-30	STP5-30	STP6-30	STP8-30	STP10-30	STP12-30	STP13-30	STP14-30	STP16-30
32.0					STP3-32	STP35-32	STP4-32	STP4.5-32	STP5-32	STP6-32	STP8-32	STP10-32	STP12-32			
35.0					STP3-35	STP35-35	STP4-35	STP4.5-35	STP5-35	STP6-35	STP8-35	STP10-35	STP12-35			
36.0					STP3-36	STP35-36	STP4-36	STP4.5-36	STP5-36	STP6-36	STP8-36	STP10-36	STP12-36			
40.0			STP2-40	STP25-40	STP3-40	STP35-40	STP4-40	STP4.5-40	STP5-40	STP6-40	STP8-40	STP10-40	STP12-40	STP13-40	STP14-40	STP16-40
45.0							STP4-45	STP4.5-45	STP5-45	STP6-45	STP8-45	STP10-45	STP12-45		STP14-45	STP16-45
50.0					STP3-50	STP35-50	STP4-50	STP4.5-50	STP5-50	STP6-50	STP8-50	STP10-50	STP12-50	STP13-50	STP14-50	STP16-50
55.0									STP5-55	STP6-55	STP8-55	STP10-55	STP12-55		STP14-55	STP16-55
60.0							STP4-60	STP4.5-60	STP5-60	STP6-60	STP8-60	STP10-60	STP12-60	STP13-60	STP14-60	STP16-60
65.0									STP5-65	STP6-65	STP8-65	STP10-65	STP12-65		STP14-65	STP16-65
70.0									STP5-70	STP6-70	STP8-70	STP10-70	STP12-70	STP13-70	STP14-70	STP16-70
75.0									STP5-75	STP6-75	STP8-75	STP10-75	STP12-75		STP14-75	STP16-75
80.0									STP5-80	STP6-80	STP8-80	STP10-80	STP12-80	STP13-80	STP14-80	STP16-80
85.0										STP6-85	STP8-85	STP10-85	STP12-85		STP14-85	STP16-85
90.0										STP6-90	STP8-90	STP10-90	STP12-90	STP13-90	STP14-90	STP16-90
95.0										STP6-95	STP8-95	STP10-95	STP12-95		STP14-95	STP16-95
100.0										STP6-100	STP8-100	STP10-100	STP12-100	STP13-100	STP14-100	STP16-100
120.0															STP14-120	STP16-120
140.0															STP14-140	STP16-140

Length Tolerance:	Up to 10mm	+/-	0.25	} ISO 8752	Up to 10mm	+	0.5	} DIN 1481
	12 to 50mm	+/-	0.5		12 to 50mm	+	1	
	Over 50mm	+/-	0.75		Over 50mm	+	1.5	

Spring Tension Pin Imperial Sizes

Std Material: Carbon Spring Steel
Standard Finish: Self / Plain
Stainless parts as imperial dimensions

Chamfer angle: 15~30 Degrees
Hardness: 44~53 Rockwell C



Nominal Dia IN	Diameter (D)		Wall Thickness (T)	Recommended Hole Size		Minimum Double shear		Chamfer Length (C)		
	Min	Max		Min	Max	LBS	KG	Min	Max	
1/16	0.062	0.066	0.069	0.012	0.062	0.065	425	193	0.15	0.35
5/64	0.078	0.083	0.086	0.016	0.078	0.081	650	295	0.25	0.45
3/32	0.094	0.099	0.103	0.020	0.094	0.097	1000	454	0.35	0.55
1/8	0.125	0.131	0.135	0.028	0.125	0.129	2100	953	0.40	0.60
5/32	0.156	0.162	0.167	0.032	0.156	0.160	3000	1361	0.50	0.70
3/16	0.187	0.194	0.199	0.040	0.187	0.192	4400	1996	0.50	0.80
7/32	0.219	0.226	0.232	0.048	0.219	0.224	5700	2586	0.65	0.85
1/4	0.250	0.258	0.264	0.048	0.250	0.256	7700	3493	0.80	1.00
5/16	0.312	0.321	0.328	0.064	0.312	0.318	11500	5216	0.90	1.10
3/8	0.375	0.385	0.392	0.078	0.375	0.382	17600	7983	1.20	1.40
7/16	0.437	0.448	0.456	0.078	0.437	0.445	20000	9072	1.40	1.80
1/2	0.500	0.513	0.521	0.098	0.500	0.510	25800	11703	2.00	2.40

WGT IN KG PER 1,000

N o m i n a l D i a m e t e r I n c h e s

Pin Length	1/16	5/64	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
3/16	0.049	0.070	0.106	0.194												
1/4	0.066	0.095	0.143	0.258	0.371	0.55										
5/16	0.082	0.121	0.179	0.323	0.462											
3/8	0.098	0.145	0.215	0.388	0.553	0.82	1.14	1.37								
7/16	0.114	0.171	0.251	0.452	0.644	0.95	1.32	1.60								
1/2	0.130	0.196	0.287	0.517	0.735	1.09	1.51	1.83								
9/16	0.146	0.221	0.323	0.581	0.827	1.24	1.69	2.06								
5/8	0.162	0.246	0.359	0.646	0.918	1.37	1.88	2.29	3.69	5.38			A	A	A	A
11/16	0.179	0.272	0.395	0.711	1.009	1.51	2.07	2.52					V	V	V	V
3/4	0.195	0.296	0.431	0.775	1.100	1.64	2.26	2.75	4.43	6.46	8.19	10.88	A	A	A	A
13/16	0.211	0.322	0.467	0.840	1.191	1.79	2.45	2.98	4.79				I	I	I	I
7/8	0.227	0.347	0.504	0.904	1.283	1.93	2.64	3.21	5.16	7.54			L	L	L	L
15/16	0.243	0.372	0.540	0.969	1.373	2.06	2.83	3.44	5.53				A	A	A	A
1	0.259	0.397	0.576	1.034	1.463	2.20	3.02	3.67	5.90	8.62	10.93	14.51	B	B	B	B
1.1/8		0.447	0.648	1.163	1.645	2.46	3.40	4.12	6.63	9.69			L	L	L	L
1.1/4	0.323	0.499	0.720	1.292	1.828	2.74	3.78	4.58	7.26	10.89	13.66	18.13	E	E	E	E
1.3/8		0.549	0.792	1.421	2.010	3.00	4.16	5.04	8.11	12.02						
1.1/2	0.387	0.600	0.865	1.551	2.193	3.28	4.54	5.49	8.62	13.15	16.39	21.77	O	O	O	O
1.5/8				1.682	2.375	3.54	4.92	5.95	9.59	14.30			N	N	N	N
1.3/4				1.812	2.557	3.81	5.30	6.40	9.98	15.42	19.13	25.40				
1.7/8				1.941	2.740	4.08	5.68	6.86	11.06	16.33			R	R	R	R
2				2.071	2.922	4.34	6.06	7.32	11.34	17.24	21.86	29.03	E	E	E	E
2.1/4					3.287	4.87	6.82	8.24	13.15	19.50	24.59	32.66	Q	Q	Q	Q
2.1/2					3.653	5.41	7.58	9.15	14.51	21.77	27.32	36.74	U	U	U	U
2.3/4						5.95	8.33	10.06	15.88	20.04	30.05	40.37	E	E	E	E
3						6.49	9.08	10.97	17.24	26.31	32.79	44.00	S	S	S	S
3.1/4								11.88	18.60	28.12	35.52	45.36	T	T	T	T
3.1/2								12.80	19.96	30.39	38.25	49.90				
3.3/4								13.71	21.77	32.66	40.92	54.43				
4								14.63	23.13	34.93	43.71	58.97				

LONGER LENGTHS AVAILABLE ON REQUEST

Length Tolerance:	Up to 1"	+/-	0.015
	1.1/8" to 2.00"	+/-	0.020
	2.1/4" to 3.00"	+/-	0.025
	Over 3.00"	+/-	0.030

Caleb's Kits

CARBON STEEL CIRCLIP KITS

Internal DIN 472		External DIN 471	
Size	Qty	Size	Qty
8	50	8	50
9	50	9	50
10	50	10	50
11	50	11	50
12	50	12	50
13	50	13	50
14	25	14	25
15	25	15	25
16	25	16	25
18	25	18	25
19	25	19	25
20	20	20	20
21	20	21	20
22	20	22	20
24	20	24	20
25	20	25	20
28	15	26	20
30	15	30	15
Total:	555	Total:	560

STAINLESS STEEL CIRCLIP KITS

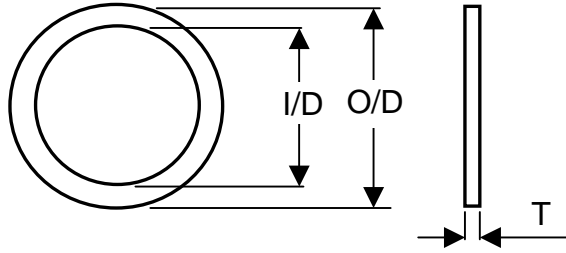
Internal DIN 472		External DIN 471	
Size	Qty	Size	Qty
8	50	8	50
9	50	9	50
10	50	10	50
11	50	11	50
12	50	12	50
13	50	13	50
14	25	14	25
15	25	15	25
16	25	16	25
18	25	18	25
19	25	19	25
20	20	20	20
21	20	21	20
22	20	22	20
24	20	24	20
25	20	25	20
28	15	26	20
30	15	30	15
Total:	555	Total:	560

DIN 2093 DISC SPRING KITS

Size	Qty
8mm x 4.2mm x 0.3mm	50
8mm x 4.2mm x 0.4mm	50
10mm x 5.2mm x 0.25mm	50
10mm x 5.2mm x 0.5mm	50
12.5mm x 6.2mm x 0.35mm	50
12.5mm x 6.2mm x 0.7mm	50
14mm x 7.2mm x 0.35mm	25
14mm x 7.2mm x 0.5mm	25
16mm x 8.2mm x 0.4mm	25
16mm x 8.2mm x 0.6mm	25
18mm x 9.2mm x 0.45mm	25
18mm x 9.2mm x 0.7mm	20
20mm x 10.2mm x 0.5mm	20
20mm x 10.2mm x 0.8mm	20
22.5mm x 11.2mm x 0.6mm	20
22.5mm x 11.2mm x 0.8mm	20
25mm x 12.2mm x 0.7mm	20
25mm x 12.2mm x 0.9mm	20
Total:	565

DIN 1481 / ISO 8752 SPRING TENSION PINS

Size	Qty
2mm x 10mm	50
2mm x 16mm	50
2mm x 20mm	50
3mm x 10mm	50
3mm x 16mm	50
3mm x 20mm	50
4mm x 16mm	25
4mm x 20mm	25
4mm x 26mm	25
5mm x 10mm	25
5mm x 26mm	25
5mm x 30mm	20
6mm x 12mm	20
6mm x 20mm	20
6mm x 30mm	20
8mm x 12mm	20
8mm x 20mm	20
8mm x 30mm	15
Total:	560



SHIMS AND SUPPORT WASHERS

INCORPORATING DIN 988

CARBON STEEL
PLAIN FINISH
DENOTES STOCK RANGE

I/D	O/D	SHIM WASHERS - THICKNESS (T)					SUPPORT WASHERS
		0.10	0.20	0.30	0.50	1.00	
3	6	***	***	***	***	***	1.00
4	8	***	***	***	***	***	1.00
5	10	***	***	***	***	***	1.00
6	12	***	***	***	***	***	1.20
7	13	***	***	***	***		
8	14	***	***	***	***	***	1.20
9	15	***	***		***	***	1.20
10	16	***	***	***	***	***	1.20
12	18	***		***	***	***	1.20
13	19	***	***	***	***	***	1.50
14	20	***	***	***	***	***	1.50
15	21	***	***	***	***	***	1.50
15	22	***	***		***	***	1.50
16	22	***	***	***	***	***	1.50
17	24	***	***	***	***	***	1.50
18	25	***	***	***	***	***	1.50
20	28	***	***	***	***	***	2.00
22	30	***	***	***	***	***	
22	32	***	***	***	***	***	
25	35	***	***		***	***	2.00
26	37	***	***		***	***	2.00
28	40	***	***	***	***	***	2.00
30	42	***	***	***	***	***	2.50
32	45	***		***	***	***	2.50
35	45	***	***	***	***	***	2.50
37	47	***			***	***	2.50
40	50	***	***	***	***	***	2.50
42	52	***		***	***	***	2.50
45	55	***	***	***	***	***	3.00
48	60	***		***	***	***	3.00
50	62	***	***	***	***		3.00
55	68	***		***	***	***	3.00
56	72	***	***	***	***	***	3.00
60	75	***	***	***	***	***	3.00
63	80	***	***	***	***	***	3.00
65	85	***			***	***	3.50
70	90	***	***		***	***	3.50
80	100	***	***		***	***	3.50
85	105	***			***	***	3.50
90	110	***		***		***	3.50
95	115	***				***	3.50
100	120	***				***	
105	130	***			***	***	