

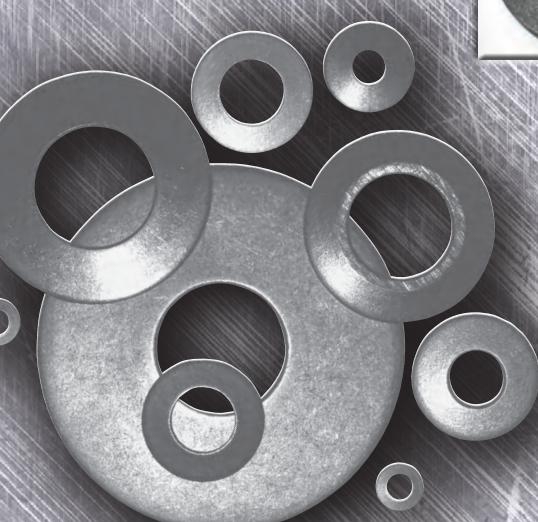
Precision Disc Springs

Custom and Catalog Products.
One Source.



MW Industries, Inc.

BELLEVILLE
CURVED CUSTOM
FINGER WAVE
FLANGE SERRATED
SLOTTED COMPOSITE
CONTACT FLAT DISC
BALL BEARING
SPRINGS

A cluster of various disc spring components, including flange-serrated, contact flat disc, and ball bearing springs, arranged in a pile at the bottom left of the page.

www.CenturyDiscSprings.com
(877)231-6474

About MW Industries, Inc.



MW Industries, Inc. (MWI) is comprised of 15 locations and is headquartered in Rosemont, Illinois. It is the largest, most diversified specialty spring and fastener manufacturer in the United States. Through decades of growth, innovation, and dedication, MWI is a world-class supplier of springs, fasteners, and metal stampings from spring-tempered materials.

Throughout our 70 year tradition, it has been our goal to deliver the highest quality, most technologically innovative, and durable products in the marketplace. MWI is committed to excellence in quality at each phase of the product life cycle – from design and engineering to manufacturing – and in every interaction with our customers. **We empower innovation. We engineer value.**

Century Spring Corporation – Los Angeles, CA

Century Spring Corporation, an MWI location, is North America's leading catalog source of stock and custom springs for both MRO and OEM applications, covering all markets and industries.

Century Spring's 75 year tradition of success is built on exceptional customer service including:

- **Largest Stock Spring Selection in the World**
Century Spring stocks over 35,000 products with 300 million springs in inventory (Metric and standard/English dimensions).
- **Custom Spring Manufacturing**
Century Spring can design and manufacture a custom spring for your application in any quantity from prototype to full production volumes.
- **Superior Customer Service**
Century Spring offers same day shipping on stock items with ordering assistance via phone, fax, or online. Century Spring's website: www.centuryspring.com, features the full catalog of products, technical information, and downloadable CAD drawings of most products.
- **Exacting Quality Standards**
Century Spring is ISO 9001:2008 certified. RoHS compliant product is available on request. All products are manufactured in the USA.

MW Industries, Inc.

MW Industries, Inc. (MWI) is comprised of 15 locations and is headquartered in Rosemont, Illinois. It is the largest, most diversified



Maryland Precision Spring (MPS)/Rolex Spring – Baltimore, MD

Maryland Precision Spring/Rolex Spring is the MWI location lead-manufacturer of disc springs with an extensive inventory and custom manufacturing capabilities. For forty years, Rolex Spring has been serving a range of industries including aerospace, transportation, machining, and construction.

In addition to providing catalog parts that are distributed by Century Spring, MPS/Rolex Spring offers complete design, engineering, and manufacturing support for customers desiring a custom product.

MPS/Rolex Spring services include:

- **Custom Disc Spring Manufacturing**
Complete engineering and manufacturing support for custom Belleville disc springs from concept to finished product.
- **Custom Services**
Product assembly and packaging services including stacking are available to all customers.
- **Large Inventory & Stock**
A large disc spring inventory and stocking programs for “just-in-time” delivery requirements.
- **Quality Standards**
MPS/Rolex Spring is ISO 9001:2008 certified. RoHS compliant product is available on request. All disc spring products are manufactured in the USA.



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Introduction to Disc Springs

Disc Springs, also known as Belleville Washers and Belleville Springs, are discs with a slight cone shape, that deform to a shorter height when subjected to a load along their axis of symmetry. This elastic deformation characterizes the spring action.

MW Industries' disc spring fabrication is subject to exacting manufacturing and quality control standards. Materials used are generally in the annealed condition and hardened to within a range of Rc 44-51 depending on the material thickness. When required, disc springs are preset so that they will not significantly relax under load over time.

Disc springs can be a good design solution where the load required is high and the space available is limited. They can be tailored to provide loading profiles that are not feasible with coiled springs. Disc springs are used singly or in stacks to achieve a desired load and travel. Our disc springs are commonly used in high temperature/extreme pressure applications, pipe flange applications, bolted joint applications, heavy and light bolting applications, dynamic applications and bearing preloaded washer applications.

MWI Disc Springs

MWI offers an extensive listing of catalog parts that have been designed to perform in specific situations. Our catalog disc spring series include:

- **Composite Disc Springs**
alternative to steel elements as they are up to 70% lighter weight, non-corrosive, and non-magnetic
- **CDM Disc Springs**
precision steel Belleville disc springs designed for dynamic loading
- **CDS Disc Springs**
steel Belleville disc springs for light bolted assemblies, sized for standard bolt sizes
- **Serrated Disc Springs**
serrated element ideal for use with most any screw or bolt
- **Contact Disc Springs**
for improved bolt connection applications, compensates for developed looseness, loss of bolt tension due to applied surface deterioration, or movement due to thermal changes

- **Curved Disc Springs**
cylindrical curve is well-suited for applications requiring flexibility, light loads, and repeated cycles through a range of motion
- **Wave Disc Springs**
efficient for obtaining the required load when the load is static, the working range is small, and the allowable amount of axial space is limited
- **SP Series Disc Springs**
for heavy bolted applications with a need to overcome thermal expansion and contraction, and stainless steel options for corrosion resistance
- **FL & MFL Series Flange Disc Springs**
elastic mechanical elements designed primarily for pipe flange applications
- **NDS Series Flange Disc Springs**
maintain tension and pressure around a flange especially under thermal variations or mechanical shock
- **Springs for Ball Bearings**
especially designed for preloading springs used with radial ball bearings
- **Slotted Disc Springs**
slotted elements reduce the spring load and increase deflection
- **Finger Disc Springs**
counteract noise, excess wear, end play, and vibration especially at high speeds
- **Custom Disc Springs**
contact us if you need something and do not see it in the catalog

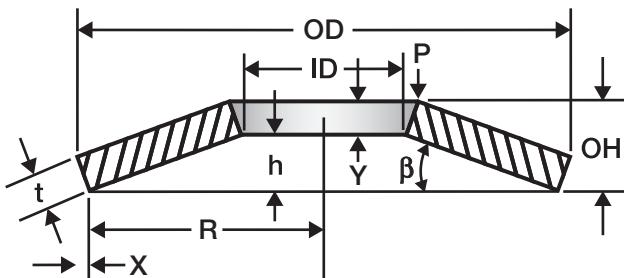
Materials

Century Spring stocks Belleville disc springs made from C1075 high carbon steel or C6150 Alloy steel. These disc springs can be finished with a variety of different platings to provide additional corrosion resistance. Stainless steel springs are also available for environments where corrosion resistance is critical. Inconel™ or H13 alloy springs can be provided for high temperature applications. Other materials are available for special applications.



Engineering & Design Information

Century Spring and MPS/Rolex Spring use a proprietary design software program that enables our team of engineers to quickly design custom disc spring systems based on our customers' specific applications. Contact our disc spring team for additional information, including design assistance.



Disc Spring Load Calculations

When referring to Bellville disc spring design, certain abbreviations are helpful:

- OD = Maximum outside diameter (upper surface)
- ID = Minimum inside diameter (bottom surface)
- h = Conical disc height (cone height)
- OH = Overall height = $t + h$
- t = Actual thickness of disc
- β = Cone angle of disc
- R = Radius from centerline to load bearing circle (bottom surface)
- M = Ratio factor
- μ = Poisson's ratio (.3 for steel)
- E = Young's modulus (30,000,000 for steel)
- f = Deflection of disc
- α = Ratio of diameters (OD/ID)
- P = Load in pounds at a given deflection
- P_f = Load in pounds at flat
- X = $\sin \beta \cdot t$
- Y = $\cos \beta \cdot t$



Engineering & Design Information

Theoretical vs. Measured Characteristic of a Disc Spring

The shape of Belleville disc springs make accurately predicting their performance a challenge. The design information that follows offers good results for most parts that fit within the following parameters:

Ratio of diameters = OD/ID between 1.75 and 2.5
 Ratio of cone height to thickness = h/t between 0.4 and 1.3
 Ratio of diameter to thickness = D/t between 16 and 40

Belleville disc springs should be designed to work within the range of 20% to 80% of their total available deflection to avoid premature fatigue failure. For applications that require springs to operate outside of these parameters, please consult our disc spring design team.

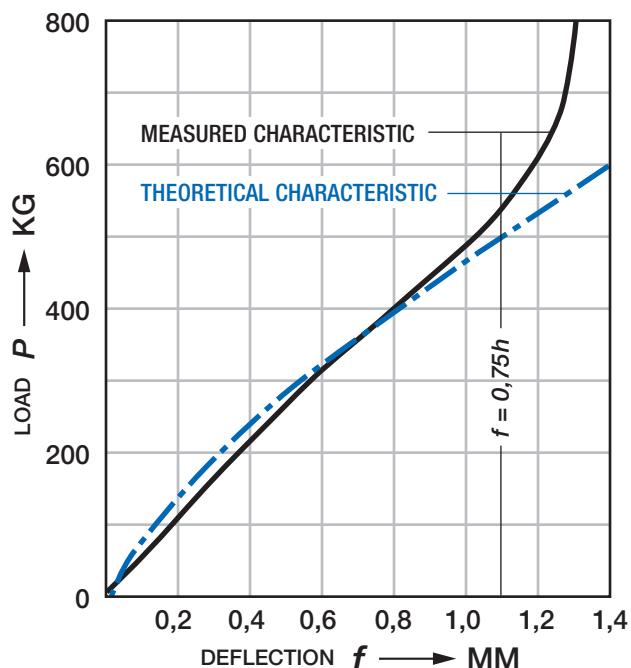
Special Cases of h/t

The shape of the load-deflection diagram for a Belleville disc spring depends on the ratio of the cone height (h) to the material thickness (t). This characteristic of disc springs

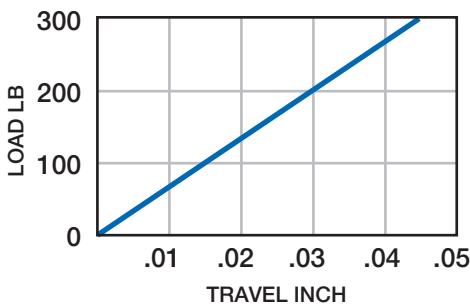
can be used to optimize a spring system for special applications. When this ratio of h/t is small (up to 0.4) then the shape approximates a straight line. Several examples of shapes for specific values of h/t are shown below.

GRAPH FOR CDM-502520

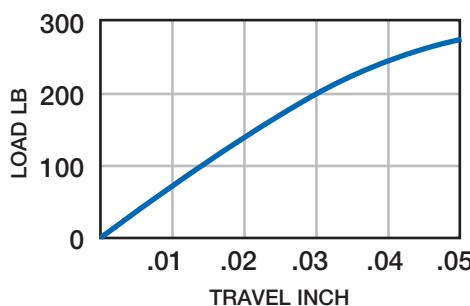
(50 mm x 25.4 x 2.0 x 3.4 OH)



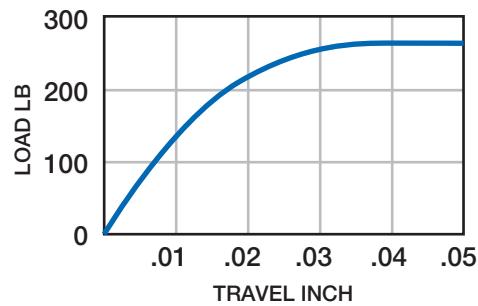
1. Approximate linear $h/t \leq 0.4$



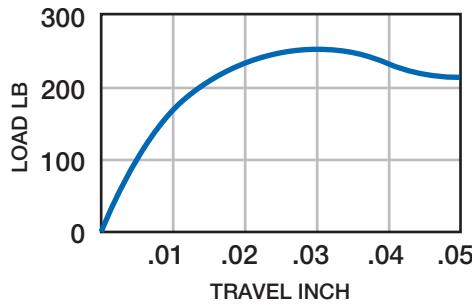
2. Regressive $h/t \sim 1$



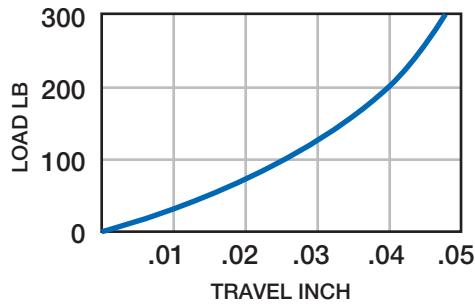
3. Constant load $h/t = 1.4$



4. Negative type $h/t > 1.4$



5. Progressive (see page 9)





Engineering & Design Information

The load deflection formula was developed by J. Almen and A. Laszlo, and published in the Transactions of the American Society of Mechanical Engineers, May 1936, and is rendered as follows:

Load in pounds at a given deflection:

$$P = \frac{E \cdot f}{(1-\mu^2) \cdot M \cdot R^2} \cdot \left[\left(h - \frac{f}{2} \right) \cdot (h-f) \cdot t + t^3 \right]$$

$$\text{WHERE } M = \frac{6}{\pi \cdot \ln \alpha} \cdot \frac{(\alpha-1)^2}{\alpha^2}$$

Disc Spring at Flat

In the flattened condition, the deflection (*f*) is equal to the conical height (*h*) and the equation becomes:

$$P_f = \frac{E \cdot h \cdot t^3}{(1-\mu^2) \cdot M \cdot R^2}$$

To calculate the load accurately, the following important factors must be considered:

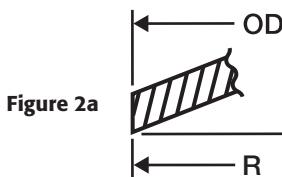


Figure 2a

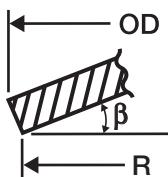


Figure 2b

If the disc spring is made as in Figure 2a, with edges machined to be parallel to the springs central axis, then $R = OD/2$. Most disc springs are made as in Figure 2b.

Therefore, the load-bearing radius is **not equal** to half of the maximum outside diameter. To calculate *R*, the angle β first has to be determined.

A well-designed disc spring has radii at all corners to reduce stress concentrations at the edges. A suitable radius is approximately $= t/6$. This radius further reduces dimension *R* (see Figure 3).

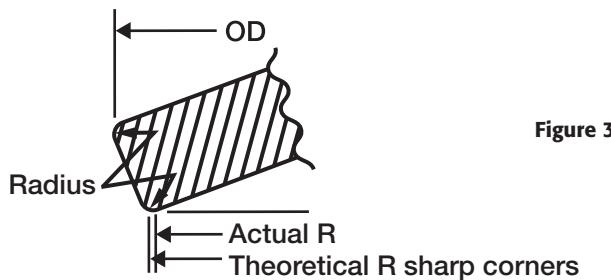


Figure 3

Typically, the overall height of the disc spring is specified because it is easy to measure and control. The cone height (*h*), on the other hand, is difficult to measure (see Figure 4).

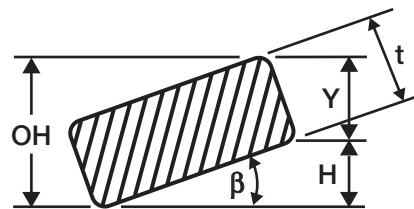


Figure 4

For an approximate calculation, (*h* = overall height – *t*) is acceptable. However, this is not accurate. In fact, *h* = (overall height – *Y*), where *Y* = $\cos \beta \cdot t$. For small thicknesses (under 2 mm), this is not significant. With thicker disc springs, this becomes a major factor for accurate load and stress calculations. This has not been adequately considered in previous technical literature.

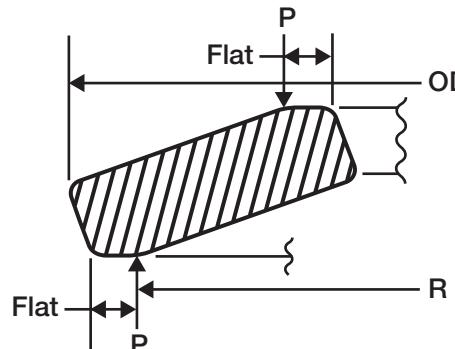


Figure 5

Disc springs that are 8 mm and thicker are made with a bearing flat at upper ID and lower OD as standard (see Figure 5). This bearing flat assures more uniform loading and better alignment of the disc spring stack. The flat is equal to approximately $OD/150$. For load calculations, *R* must be calculated to the inner edge of the flat.

Summary

Precise load and stress calculations require the determination of the disc spring angle (β). Since this is not easily determined by physical measurement, we have developed a computer program that calculates the precise angle and arrives at the exact dimension for conical height (*h*). This exact dimension then determines accurate load and stress calculation. When designing custom disc springs,

continued on next page

Engineering & Design Information

please consult our disc spring team to accurately evaluate the resultant load and stress.

The load and stress formulas are correct only with the assumption that the spring will be worked within the elastic limit of the material.

Dynamic Loading & Fatigue Life

Fatigue life for disc springs is defined by the effective number of stress cycles that can be sustained under certain conditions, prior to failure. This depends on the minimum stress, maximum stress, and stress range.

The fatigue life for a particular Belleville disc spring design can be predicted by making the assumption that its load fluctuates smoothly over time from preload to final load (dynamic loading). This however, is not true in cases of impact loading and therefore, it is difficult to predict life and behavior when springs are impact loaded.

Disc spring fatigue life may be differentiated into two categories:

- 1) Limited life: cycles without failure, between 40,000 and 2,000,000 cycles.
- 2) Unlimited life: cycles in excess of 2,000,000 cycles without failure.

The table below can be used to guide design of Belleville disc springs for "unlimited life".

| Preload in % of h | Max. Deflection in % of h | |
|----------------------|--------------------------------|--------------|
| | Disc Thickness $\leq .039"$ | $\geq .157"$ |
| 15 | 50 | 44 |
| 25 | 56 | 49 |
| 50 | 67 | 64 |

The diagrams presented here are for forecasting fatigue life of single disc springs or series stacks of no more than six disc springs. There are three groups, based on thickness (see legend with each diagram). The horizontal axis represents "preload stress". The vertical axis represents "final stress".

The fatigue life is found at the intersection of these points on the graph. The "zone" in which they fall tells the predicted life. If they fall outside the zones, their life is generally not predictable.

The horizontal borderline enclosing the top portion of the graph zone represents the yield strength of the spring steel material.

Intersection points of minimum/maximum stress limits which fall outside the graph zone boundaries are to be avoided as they indicate spring failure will be likely at an early stage.

The graphs were developed based on empirical test data.
 How to use the graphs:

- 1) For standard catalog disc springs:
 - a) Determine the preload stress
 - b) Determine the final load stress

The intersection of the stress coordinates will indicate the range of fatigue life that may be expected.

- 2) For non-standard or custom disc springs:
 - a) Determine the preload stress from the formula on page 7 for points S2 and S3. Use the HIGHER of the two values for preload and final load.
 - b) Repeat above procedure for the "final stress" again, using the higher value found.

Example using Series CDM Disc Spring:

CDM-188207: .709 x .323 x .0276 (see page 14)

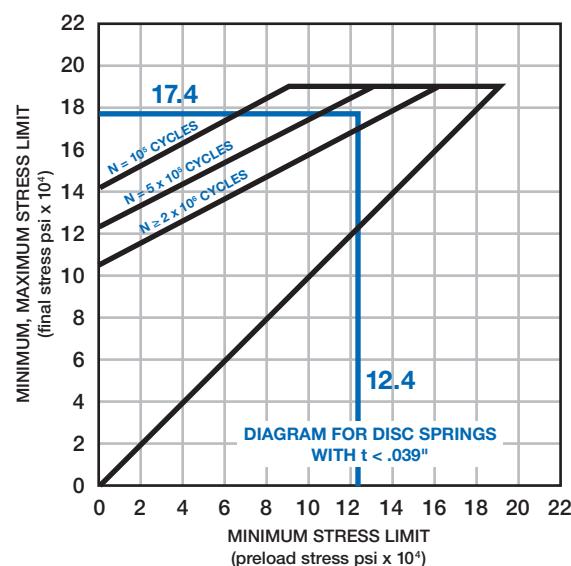
Preload stress at deflection $f = .5h : 124,000 \text{ psi}$

Final load stress at deflection $f = .75h : 174,000 \text{ psi}$

Intersection point between nearby 2 x 10⁴ cycles and

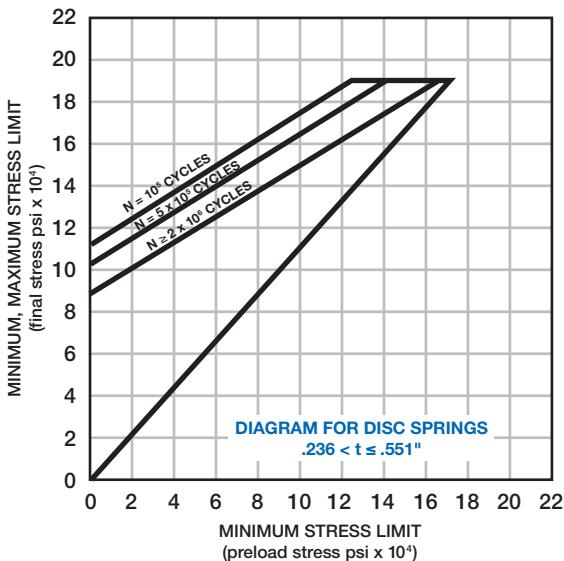
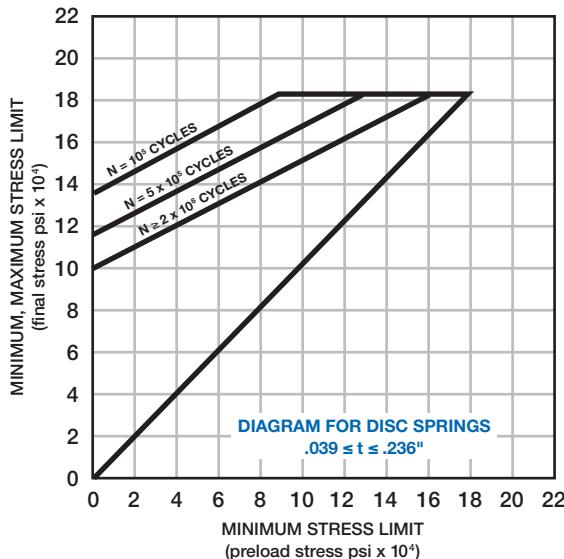
5 x 10⁴ cycles

Predicted cycles: 20,000 cycles





Engineering & Design Information



Disc Spring Stress Calculations

$$S1 = \frac{E \cdot f}{(1-\mu^2) \cdot M \cdot (R)^2} \cdot \left[C_1 \cdot \left(h - \frac{f}{2} \right) + C_2 \cdot t \right]$$

$$S2 = \frac{E \cdot f}{(1-\mu^2) \cdot M \cdot (R)^2} \cdot \left[C_1 \cdot \left(h - \frac{f}{2} \right) - C_2 \cdot t \right]$$

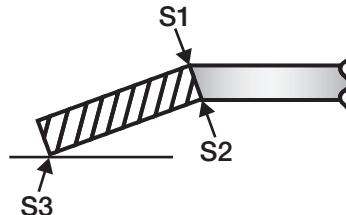
$$S3 = \frac{E \cdot f}{(1-\mu^2) \cdot (R)^2} \cdot \left[T_1 \cdot \left(h - \frac{f}{2} \right) + T_2 \cdot t \right]$$

Where M, C1, C2 are from Table 1. E and μ from material tables.

$$T1 = \frac{(\alpha \cdot L_n(\alpha)) - (\alpha-1)}{L_n(\alpha)} \cdot \frac{\alpha}{(\alpha-1)^2}$$

$$T2 = \frac{(.5) \cdot \alpha}{\alpha-1}$$

$\alpha = D/d$ and $L_n =$ natural logarithm, stress as given is psi

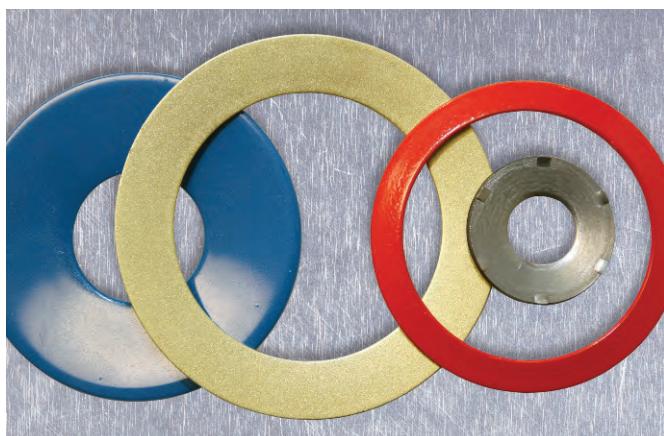


For evaluation of compressive stress, use formula S1. It computes the compressive stress at the upper inner diameter. This compressive stress may be as high as 400,000 psi for certain bolted applications.

For dynamic applications, it is necessary to consider the tensile stresses at the points marked S2 and S3. The stresses at these points depend on the ratio of diameters (α) and the spring characteristic (C) as well as on the deflection (f). This stress should not exceed 200,000 psi at .75h deflection.

OD and ID Guide Clearances

Disc spring diameters change when the springs are loaded. It is necessary to take this into account when specifying clearances between springs and bolts or guide rods operating in the ID of the spring, or between springs and cavity walls when operating in holes. The chart gives recommended minimum guide clearances.



Engineering & Design Information

TABLE 1
Values for M, C₁, C₂

| α OD/ID | M | C ₁ | C ₂ |
|-------------------|------|----------------|----------------|
| 1.10 | .166 | .986 | 1.002 |
| 1.15 | .232 | 1.001 | 1.025 |
| 1.20 | .291 | 1.016 | 1.048 |
| 1.25 | .342 | 1.030 | 1.070 |
| 1.30 | .388 | 1.044 | 1.092 |
| 1.35 | .428 | 1.058 | 1.114 |
| 1.40 | .463 | 1.072 | 1.135 |
| 1.45 | .495 | 1.085 | 1.157 |
| 1.50 | .523 | 1.098 | 1.178 |
| 1.60 | .571 | 1.124 | 1.219 |
| 1.70 | .610 | 1.149 | 1.260 |
| 1.80 | .642 | 1.173 | 1.300 |
| 1.90 | .668 | 1.197 | 1.339 |
| 2.00 | .680 | 1.220 | 1.378 |
| 2.10 | .706 | 1.242 | 1.416 |
| 2.20 | .721 | 1.264 | 1.453 |
| 2.30 | .733 | 1.286 | 1.490 |
| 2.40 | .742 | 1.307 | 1.527 |
| 2.50 | .750 | 1.328 | 1.563 |
| 2.60 | .757 | 1.348 | 1.599 |
| 2.80 | .767 | 1.388 | 1.669 |
| 3.00 | .773 | 1.426 | 1.738 |
| 3.20 | .776 | 1.464 | 1.806 |
| 3.40 | .778 | 1.500 | 1.873 |
| 3.60 | .778 | 1.535 | 1.938 |
| 3.80 | .777 | 1.570 | 2.003 |
| 4.00 | .775 | 1.604 | 2.067 |

| OD OR ID (MM) | OD OR ID (INCH) | CLEARANCE | |
|------------------|--------------------|-----------|-------|
| | | MM | INCH |
| Up to 16 | 0.63 | 0.18 | 0.008 |
| Over 16 | Up to 20 | 0.64 | 0.027 |
| Over 20 | Up to 26 | 0.80 | 0.036 |
| Over 26 | Up to 31.5 | 1.03 | 0.045 |
| Over 31.5 | Up to 50 | 1.25 | 0.054 |
| Over 50 | Up to 80 | 1.98 | 0.069 |
| Over 80 | Up to 140 | 3.15 | 0.087 |
| Over 140 | Up to 250 | 5.53 | 0.141 |

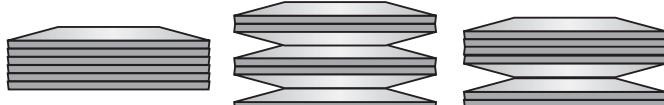




Engineering & Design Information

Disc Spring Stacks

Disc springs may be used singly or in stacks (parallel stack, series stack, or a combination of both parallel and series stacks).



Stacked in Parallel

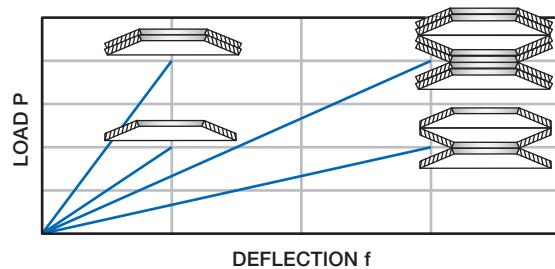
TOTAL DEFLECTION = deflection of 1 disc
TOTAL LOAD = load on 1 disc x quantity of discs in stack

Series

TOTAL DEFLECTION = deflection of 1 disc x quantity of discs in stack
TOTAL LOAD = load on 1 disc

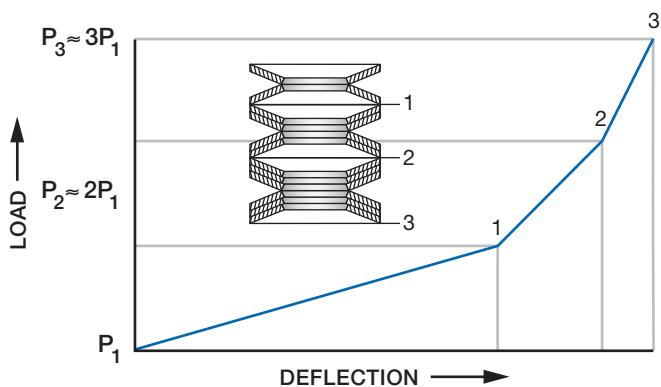
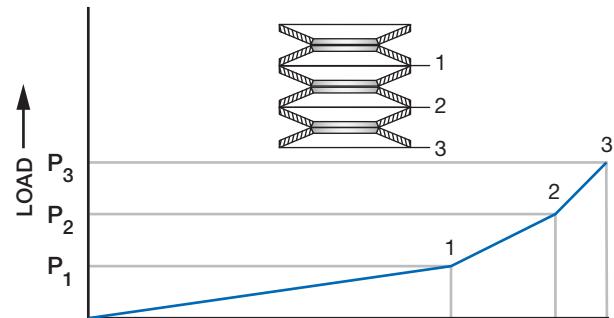
Parallel Series

Combinations of both series stacks and parallel stacks can be designed to accommodate virtually any load or deflection, and to obtain progressive or regressive characteristics.

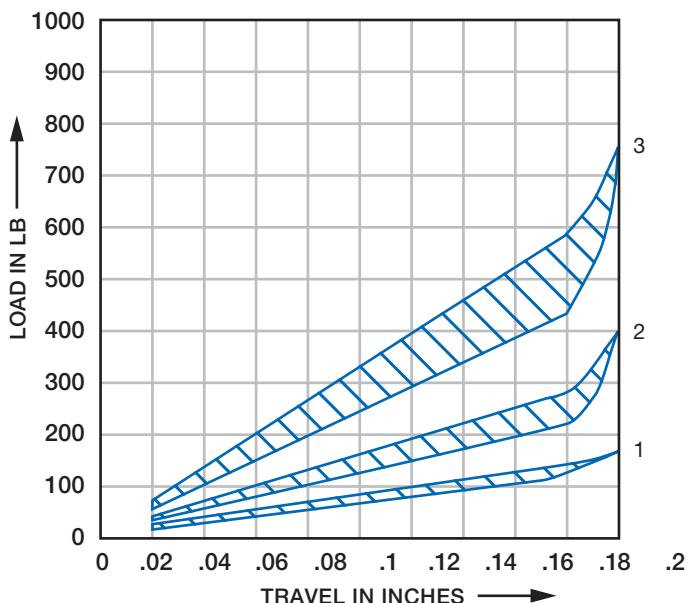


Disc Spring Damping (Hysteresis)

In disc spring stacks, particularly those with parallel units, friction must be considered. Sliding friction occurs at the disc spring's adjoining, moving surfaces (radial walls). As a result, the spring force increases on loading and decreases on unloading, causing a damping effect (hysteresis). This characteristic may be taken advantage of in shock loaded or vibrating systems that need damping. The hysteresis effect is a function of the number of disc springs in parallel.



Disc springs of differing thickness can be stacked in series to obtain a progressively rising load. This effect is also obtained using same thickness springs, but incrementally increasing the units in the stack. Care must be taken not to over-stress the spring in the stack.



(Note: Friction forces between springs must be considered.)



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 www.centurydiscsprings.com

Disc Spring Materials: Chemical/Physical Properties

CHEMICAL CONTENT IN %

| Material | C Carbon | Si Silicon | Mn Manganese | P Phosphorus | S Sulphur | Al Aluminum | Cr Chromium | Ni Nickel | V Vanadium | Fe Iron | Cu Copper | Ti Titanium | Mo Molybdenum | Co Cobalt | Columbium & Tantalum |
|----------------------------|-------------|---------------|-----------------|-----------------|--------------|----------------|----------------|--------------|---------------|------------|--------------|----------------|------------------|--------------|-------------------------|
| C1075 | .7 - .8 | .25 - .5 | .6 - .8 | .045 | .045 | - | - | - | - | - | - | - | - | - | - |
| SAE6150 | .47 - .54 | .15 - .35 | .60 - 1.00 | .035 | .040 | - | .75 - 1.20 | - | .15 min. | - | - | - | - | - | - |
| 17/7 PH (ARMCO RG.T.M.) | ≤ .09 | ≤ 1.0 | ≤ 1.0 | - | - | .75 - 1.5 | 16.0 - 18.0 | 6.5 - 7.75 | - | - | - | - | - | - | - |
| AISI 301 | ≤ .12 | ≤ 1.0 | ≤ 2.0 | - | - | - | 16.0 - 18.0 | 7.0 - 9.0 | - | - | - | - | - | - | - |
| INCONEL X-750 | .08 | .5 | 1.0 | - | .01 | .7 | 15.5 | 70.0 | - | 7.0 | .5 | 2.5 | - | 1.0 | .95 |
| INCONEL 718 | .08 | .35 | .35 | .015 | .015 | .6 | 19.0 | 52.5 | - | 17.0 | .3 | .9 | 3.05 | 1.0 | 5.125 |
| AISI H-13 ASTM A681 | .32 - .45 | .8 - 1.2 | .2 - .5 | .03 | .03 | - | 4.75 - 5.5 | - | .8 - 1.2 | - | - | - | 1.1 - 1.75 | - | - |

MECHANICAL PROPERTIES OF DISC SPRINGS AFTER HEAT TREATMENT

| Material | Tensile Strength PSI | E-Modulus (70° F) PSI | Poisson's Ratio μ | Temperature Range ° F |
|-------------------------|-------------------------------|--------------------------|--------------------------|--------------------------|
| C1075 | 200-240,000 | 30×10^6 | .30 | 300 |
| SAE6150 | 200-240,000 | 30×10^6 | .30 | 400 |
| 17/7 PH (ARMCO RG.T.M.) | 170-220,000 | 29×10^6 | .28 | - 428/572 |
| AISI 301 | 170-220,000 | 28×10^6 | .29 | - 330/392 |
| INCONEL X-750 | Consult our Engineering Dept. | 31×10^6 | .29 | to 1200 |
| INCONEL 718 | Consult our Engineering Dept. | 29.8×10^6 | .29 | to 1300 |
| INCONEL 625 | Consult our Engineering Dept. | 30×10^6 | .30 | to 1000 |
| MONEL K500 | Consult our Engineering Dept. | 26×10^6 | .30 | to 1000 |

HARDNESS RANGES OF STAINLESS 301 / 302 (NOT HARDENABLE – WORK HARDENED ONLY)

| | | | |
|---|---|---|--|
| 1/4 Hard TS-125,000 psi min or Rc-25 min | 1/2 Hard TS-150,000 psi min or Rc-30 min | 3/4 Hard TS-175,000 psi min or Rc-35 min | Full Hard TS-185,000 psi min or Rc-40 min |
|---|---|---|--|

LOAD CHANGE (DECREASE) (ΔP) VS. TEMPERATURE

| Material | 70°F E $\text{psi} \cdot 10^6$ | 400°F | | 575°F | | 750°F | | 850°F | |
|----------|--------------------------------------|--------------|------------------------------|--------------|------------------------------|--------------|------------------------------|--------------|------------------------------|
| | E $\text{psi} \cdot 10^6$ | % ΔP | E $\text{psi} \cdot 10^6$ | % ΔP | E $\text{psi} \cdot 10^6$ | % ΔP | E $\text{psi} \cdot 10^6$ | % ΔP | E $\text{psi} \cdot 10^6$ |
| SAE 6150 | 30 | 28.5 | 5 | 27.5 | 8.3 | - | - | - | - |
| AISI 301 | 28 | 24.9 | 9.8 | - | - | - | - | - | - |
| 17/7 PH | 2.9 | 24.4 | 6.2 | 23.2 | 10.8 | - | - | - | - |

| Temperature Range | 70°F E $\text{psi} \cdot 10^6$ | 250°F E $\text{psi} \cdot 10^6$ | % ΔP | 500°F E $\text{psi} \cdot 10^6$ | % ΔP | 1000°F E $\text{psi} \cdot 10^6$ | % ΔP | 1200°F E $\text{psi} \cdot 10^6$ | % ΔP |
|-------------------|--------------------------------------|---------------------------------------|--------------|---------------------------------------|--------------|--|--------------|--|--------------|
| Inconel X-750 | - | - | - | - | - | - | - | - | - |
| | 31 | 30.8 | .6 | 28.7 | 7.4 | 25 | 19.4 | 23 | 25.8 |

Note: Designation of all stainless disc springs are suffixed with "S". In all cases customer must specify type of stainless required by giving identification following the part no. e.g., 17/7 PH or 301, etc.

ΔP = Load Change
 E = Modulus of Elasticity



Suggested Tightening Torque¹ Values To Produce Corresponding Bolt Clamping Loads

| Size | Bolt Diam. D (in.) | Tensile Stress Area A (sq. in.) | SAE GRADE 2 BOLTS | | | | | | SAE GRADE 5 BOLTS | | | | | | SAE GRADE 7 ³ | | | | | | SAE GRADE 8 ⁴ | | | | | |
|---------------------|-----------------------|------------------------------------|--------------------------------|---------------------|------------------------------------|------------|-------------|--------------------------------|---------------------|------------------------------------|------------|-------------|------------------------------------|------------|--------------------------|------------------------------------|------------|-------------|------------------------------------|------------|--------------------------|------------------------------------|------------|-------------|--|--|
| | | | Tensile Strength (min. psi) | Proof Load (psi) | Clamp ² Load P (lb.) | Dry K=0.20 | Lub. K=0.15 | Tensile Strength (min. psi) | Proof Load (psi) | Clamp ² Load P (lb.) | Dry K=0.20 | Lub. K=0.15 | Clamp ² Load P (lb.) | Dry K=0.20 | Lub. K=0.15 | Clamp ² Load P (lb.) | Dry K=0.20 | Lub. K=0.15 | Clamp ² Load P (lb.) | Dry K=0.20 | Lub. K=0.15 | Clamp ² Load P (lb.) | Dry K=0.20 | Lub. K=0.15 | | |
| | | | lb. in. | | lb. in. | | lb. in. | | lb. in. | | lb. in. | | lb. in. | | lb. in. | | lb. ft. | | lb. ft. | | lb. ft. | | lb. ft. | | | |
| 4-40 | 0.1120 | 0.00604 | 74.000 | 55.000 | 240 | 5 | 4 | 120.000 | 85.000 | 380 | 8 | 6 | 480 | 11 | 8 | 540 | 12 | 9 | 540 | 12 | 9 | 600 | 13 | 10 | | |
| 4-48 | 0.1120 | 0.00661 | | | 280 | 6 | 5 | | | 420 | 9 | 7 | 520 | 12 | 9 | | | | | | | | | | | |
| 6-32 | 0.1380 | 0.00909 | | | 380 | 10 | 8 | | | 580 | 16 | 12 | 720 | 20 | 15 | | | | | | | | | | | |
| 6-40 | 0.1380 | 0.01015 | | | 420 | 12 | 9 | | | 640 | 18 | 13 | 800 | 22 | 17 | | | | | | | | | | | |
| 6-32 | 0.1640 | 0.01400 | | | 580 | 19 | 14 | | | 900 | 30 | 22 | 1100 | 36 | 27 | | | | | | | | | | | |
| 8-36 | 0.1640 | 0.01474 | | | 600 | 20 | 15 | | | 940 | 31 | 23 | 1160 | 38 | 29 | | | | | | | | | | | |
| 10-24 | 0.1900 | 0.01750 | | | 720 | 27 | 21 | | | 1120 | 43 | 32 | 1380 | 52 | 39 | | | | | | | | | | | |
| 10-32 | 0.1900 | 0.02000 | | | 820 | 31 | 23 | | | 1285 | 49 | 36 | 1580 | 60 | 45 | | | | | | | | | | | |
| 1/4-20 | 0.2500 | 0.0318 | | | 1320 | 66 | 49 | | | 2020 | 96 | 75 | 2500 | 120 | 96 | | | | | | | | | | | |
| 1/4-28 | 0.2500 | 0.0364 | | | 1500 | 76 | 56 | | | 2320 | 120 | 86 | 2860 | 144 | 108 | | | | | | | | | | | |
| | | | lb. ft. | | lb. ft. | | | | lb. ft. | | lb. ft. | | | | lb. ft. | | lb. ft. | | lb. ft. | | lb. ft. | | lb. ft. | | | |
| % ₈ -18 | 0.3125 | 0.0524 | | | 2160 | 11 | 8 | | | 3340 | 17 | 13 | 4120 | 21 | 16 | | | | | | | | | | | |
| % ₁₆ -24 | 0.3125 | 0.0580 | | | 2400 | 12 | 9 | | | 3700 | 19 | 14 | 4560 | 24 | 18 | | | | | | | | | | | |
| % ₁₆ -24 | 0.3750 | 0.0775 | | | 3200 | 20 | 15 | | | 4940 | 30 | 23 | 6100 | 40 | 30 | | | | | | | | | | | |
| % ₁₆ -24 | 0.3750 | 0.0878 | | | 3620 | 23 | 17 | | | 5600 | 35 | 25 | 6900 | 45 | 30 | | | | | | | | | | | |
| % ₁₆ -14 | 0.4375 | 0.1063 | | | 4380 | 30 | 24 | | | 6800 | 50 | 35 | 8400 | 60 | 45 | | | | | | | | | | | |
| % ₁₆ -20 | 0.4375 | 0.1187 | | | 4900 | 35 | 25 | | | 7550 | 55 | 40 | 9350 | 70 | 50 | | | | | | | | | | | |
| % ₁₆ -13 | 0.5000 | 0.1419 | | | 5840 | 50 | 35 | | | 9050 | 75 | 55 | 11200 | 95 | 70 | | | | | | | | | | | |
| % ₁₆ -20 | 0.5000 | 0.1599 | | | 6600 | 55 | 40 | | | 10700 | 90 | 65 | 12600 | 100 | 80 | | | | | | | | | | | |
| % ₁₆ -12 | 0.5625 | 0.1820 | | | 7500 | 70 | 55 | | | 11600 | 110 | 80 | 14350 | 135 | 100 | | | | | | | | | | | |
| % ₁₆ -18 | 0.5625 | 0.2030 | | | 8400 | 80 | 60 | | | 12950 | 120 | 90 | 16000 | 150 | 110 | | | | | | | | | | | |
| % ₁₁ -11 | 0.6250 | 0.2260 | | | 9300 | 100 | 75 | | | 14400 | 150 | 110 | 17800 | 190 | 140 | | | | | | | | | | | |
| % ₁₈ -18 | 0.6250 | 0.2560 | | | 10600 | 110 | 85 | | | 16300 | 170 | 130 | 20150 | 210 | 160 | | | | | | | | | | | |
| % ₁₀ -10 | 0.7500 | 0.3340 | | | 13800 | 175 | 130 | | | 21300 | 260 | 200 | 26300 | 320 | 240 | | | | | | | | | | | |
| % ₁₆ -16 | 0.7500 | 0.3730 | | | 15400 | 195 | 145 | | | 23800 | 300 | 220 | 29400 | 360 | 280 | | | | | | | | | | | |
| % ₈ -9 | 0.8750 | 0.4620 | 60.000 | 33.000 | 11400 | 165 | 125 | | | 29400 | 430 | 320 | 36400 | 520 | 400 | | | | | | | | | | | |
| % ₁₄ -14 | 0.8750 | 0.5090 | | | 12600 | 185 | 140 | | | 32400 | 470 | 350 | 40100 | 580 | 440 | | | | | | | | | | | |
| 1-8 | 1.0000 | 0.6060 | | | 15000 | 250 | 190 | | | 38600 | 640 | 480 | 47700 | 800 | 600 | | | | | | | | | | | |
| 1-12 | 1.0000 | 0.6630 | | | 16400 | 270 | 200 | | | 42200 | 700 | 530 | 52200 | 860 | 660 | | | | | | | | | | | |
| 1 ₁ -7 | 1.1250 | 0.7630 | | | 18900 | 350 | 270 | 105.000 | 74.000 | 42300 | 800 | 600 | 60100 | 1120 | 840 | | | | | | | | | | | |
| 1 ₁ -12 | 1.1250 | 0.8560 | | | 21200 | 400 | 300 | | | 47500 | 880 | 660 | 67400 | 1260 | 940 | | | | | | | | | | | |
| 1 ₄ -7 | 1.2500 | 0.9690 | | | 24000 | 500 | 380 | | | 53800 | 1120 | 840 | 76300 | 1580 | 1100 | | | | | | | | | | | |
| 1 ₄ -12 | 1.2500 | 1.0730 | | | 26600 | 550 | 420 | | | 59600 | 1240 | 920 | 84500 | 1760 | 1320 | | | | | | | | | | | |
| 1 ₃ -6 | 1.3750 | 1.1550 | | | 28600 | 660 | 490 | | | 64100 | 1460 | 1100 | 91000 | 2080 | 1560 | | | | | | | | | | | |
| 1 ₃ -12 | 1.3750 | 1.3150 | | | 32500 | 740 | 560 | | | 73000 | 1680 | 1260 | 104000 | 2380 | 1780 | | | | | | | | | | | |
| 1 ₁ -6 | 1.5000 | 1.4050 | | | 34800 | 870 | 650 | | | 78000 | 1940 | 1460 | 111000 | 2780 | 2060 | | | | | | | | | | | |
| 1 ₁ -12 | 1.5000 | 1.5800 | | | 39100 | 980 | 730 | | | 87700 | 2200 | 1640 | 124005 | 3100 | 2320 | | | | | | | | | | | |

Notes:

1. Tightening torque values are calculated from the formula $T = KDP$ where T =tightening torque (lb.-in.); K =torque-friction coefficient; D =nominal bolt diameter (in.); P =bolt clamping load developed by tightening (lb.).

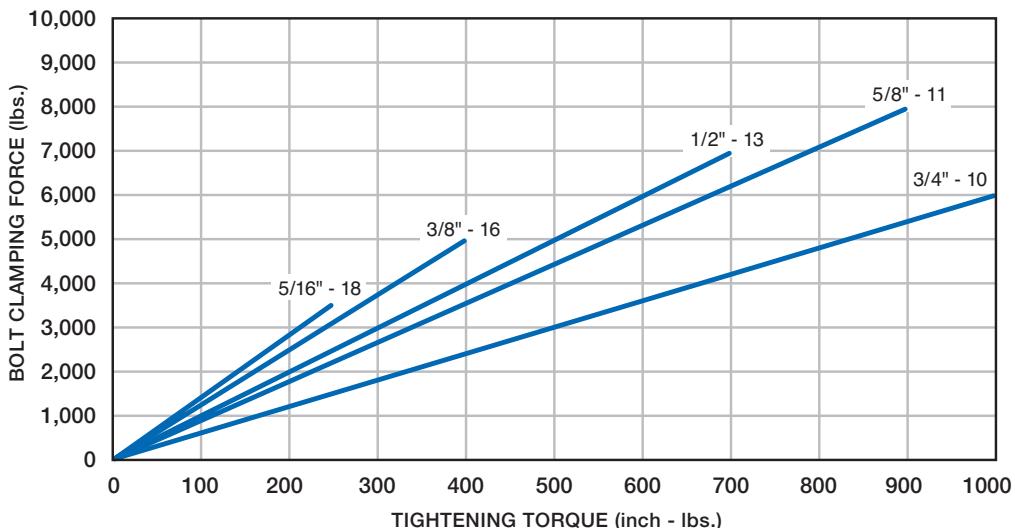
2. Clamp load is also known as preload or initial load in tension on bolt. Clamp load (lb.) is calculated by arbitrarily assuming the usable bolt strength is 75% of the bolt proof load (psi) multiplied by the stress area (sq. in.) of threaded section of each bolt size. Higher or lower values of clamp load can be used depending on the application requirements and the judgment of the designer.

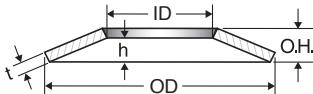
3. Tensile strength (min. psi) of all Grade 7 bolts = 133,000. Proof load = 105,000 psi.

4. Tensile strength (min. psi) of all Grade 8 bolts = 150,000 psi. Proof load = 120,000 psi.

Ref: "Fastening Reference," Machine Design (Nov 1977).

BOLT CLAMPING FORCE VS. TIGHTENING TORQUE FOR UNLUBRICATED STEEL BOLTS





Toll Free 877-231-6474
Fax 877-231-6472
discsprings@centuryspring.com
www.centurydiscsprings.com

COMPOSITE

Composite Disc Springs

Composite disc springs have a significant advantage over carbon steel because they are typically 70% lighter, non-corrosive, chemical resistant, and non-magnetic. Their composite material construction provides a high strength-to-weight ratio compared to traditional metallic construction and can be designed to provide the same functional performance as steel components.

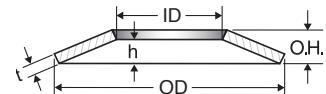
Composite disc springs are available in 2 designs: The CPW series is intended for use comparable to a metallic disc spring and the CCBS (Carbon Composite Bellows™ Spring) series is designed to be used as a replacement for a helical compression spring. The CCBS product features more deflection than a standard disc spring, it does not require the use of an ID or OD guide, and can be adapted for varying rate curve requirements.

Contact Century Spring's team of disc spring engineers who can assist in integrating composite disc springs at the design stage of new products and programs.



| CENTURY STOCK NUMBER | DIMENSIONS (Inches) | | | | | @ 25%h | | | @ 50%h | | | @ 75%h | | | @ 100%h | | |
|----------------------|---------------------|-------|-------|-------|-------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|
| | O.D. | I.D. | t | h | O.H. | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ |
| CPW-402010 | 1.570 | 0.803 | 0.092 | 0.051 | 0.143 | 164 | 0.013 | 31 | 271 | 0.025 | 63 | 433 | 0.038 | 89 | 553 | 0.051 | 122 |
| CPW-402015 | 1.570 | 0.803 | 0.114 | 0.052 | 0.166 | 456 | 0.013 | 23 | 472 | 0.026 | 58 | 788 | 0.039 | 99 | 994 | 0.052 | 124 |
| CPW-418601 | 1.860 | 0.642 | 0.159 | 0.041 | 0.200 | 258 | 0.010 | 26 | 795 | 0.020 | 61 | 1270 | 0.030 | 96 | 2082 | 0.040 | 152 |
| CPW-501813 | 1.970 | 0.724 | 0.116 | 0.058 | 0.174 | 500 | 0.015 | 33 | 443 | 0.030 | 65 | 641 | 0.045 | 95 | 737 | 0.058 | 109 |
| CPW-501820 | 1.970 | 0.724 | 0.146 | 0.053 | 0.199 | 363 | 0.013 | 30 | 724 | 0.027 | 65 | 1005 | 0.040 | 90 | 1312 | 0.053 | 116 |
| CPW-502513 | 1.970 | 1.000 | 0.105 | 0.065 | 0.170 | 619 | 0.016 | 24 | 335 | 0.032 | 50 | 484 | 0.048 | 74 | 966 | 0.064 | 111 |
| CPW-540650 | 4.065 | 3.218 | 0.188 | 0.072 | 0.260 | 383 | 0.018 | 19 | 877 | 0.036 | 32 | 1440 | 0.054 | 53 | 1934 | 0.072 | 73 |

Contact the disc spring team for CCBS series part numbers and specifications.



Series CDM Disc Springs

CDM series Belleville disc springs are precision springs specifically designed to meet the high performance requirements of dynamic loading applications. They are typically made from High Carbon (C1075) or Alloy (C6150) steel.



CDM Series Precision Disc Spring Tolerances

The following tolerances are for the CDM series disc springs (AISI 1075 or 6150 carbon steel) and their stainless steel counterparts (17/7 stainless).

Refer to the "CDM-S" columns for dimensional and/or tolerance differences required for ALL 17/7 PH stainless steel parts. ALL stainless steel materials will utilize these CDM-S specifications with the exception of materials not available in the standard tolerance range. In those cases, the closest material tolerance will be used.

When requesting parts made of stainless steel, add the letter "S" to the end of the existing part number. For example, carbon steel part number CDM-502520 becomes CDM-502520S for stainless steel.

For availability of other material types and achievable tolerances, please contact the disc spring team for assistance.

Design Note: stainless steel material thickness is different than steel and is subject to commercial availability. The overall height will be used to compensate for the difference in load due to the difference in thickness.

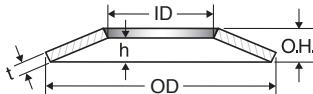
| HARDNESS TOLERANCE | | | |
|----------------------|-----------|--------------|---------------|
| CDM Series Tolerance | | CDM-S | |
| Thickness Range | | Rockwell HRC | Stainless HRC |
| MM | Inches | | |
| < 1.00 | < 0.039 | 46 - 51 | Minimum 38 |
| > = 1.00 | > = 0.039 | 44 - 49 | Minimum 38 |
| < 4.25 | < 0.157 | 42 - 48 | Minimum 38 |
| > = 4.25 | > = 0.157 | | |

| OUTSIDE & INSIDE DIAMETER TOLERANCE | | | | | |
|-------------------------------------|--------------------------|-------------------------|-------------------------------------|--------------------------|--------------------------|
| CDM Series (MM) Carbon Steel | | CDM-S (MM) Stainless | CDM SERIES (Inches) Carbon Steel | | CDM-S (In.) Stainless |
| Range | Tolerance | Tolerance | Range | Tolerance | Tolerance |
| < = 3.0 | ID + 0.102 OD - 0.102 | ID + 0.13 OD - 0.13 | < = 0.118 | ID + 0.004 OD - 0.004 | ID + 0.005 OD - 0.005 |
| > 3.0 | ID + 0.127 | ID + 0.15 | > 0.118 | ID + 0.005 | ID + 0.006 |
| < = 6.0 | OD - 0.127 | OD - 0.15 | < = 0.236 | OD - 0.005 | OD - 0.006 |
| > 6.0 | ID + 0.152 | ID + 0.18 | > 0.236 | ID + 0.006 | ID + 0.007 |
| < = 10.0 | OD - 0.152 | OD - 0.18 | < = 0.394 | OD - 0.006 | OD - 0.007 |
| > 10.0 | ID + 0.178 | ID + 0.20 | > 0.394 | ID + 0.007 | ID + 0.008 |
| < = 18.0 | OD - 0.178 | OD - 0.20 | < = 0.709 | OD - 0.007 | OD - 0.008 |
| > 18.0 | ID + 0.203 | ID + 0.23 | > 0.709 | ID + 0.008 | ID + 0.009 |
| < = 30.0 | OD - 0.203 | OD - 0.23 | < = 1.180 | OD - 0.008 | OD - 0.009 |
| > 30.0 | ID + 0.254 | ID + 0.28 | > 1.180 | ID + 0.010 | ID + 0.011 |
| < = 50.0 | OD - 0.254 | OD - 0.28 | < = 1.970 | OD - 0.010 | OD - 0.011 |
| > 50.0 | ID + 0.305 | ID + 0.33 | > 1.970 | ID + 0.012 | ID + 0.013 |
| < = 80.0 | OD - 0.305 | OD - 0.33 | < = 3.150 | OD - 0.012 | OD - 0.013 |
| > 80.0 | ID + 0.356 | ID + 0.38 | > 3.150 | ID + 0.014 | ID + 0.015 |
| < = 120 | OD - 0.356 | OD - 0.38 | < = 4.720 | OD - 0.014 | OD - 0.015 |
| > 120 | ID + 0.406 | ID + 0.43 | > 4.720 | ID + 0.016 | ID + 0.017 |
| < = 180 | OD - 0.406 | OD - 0.43 | < = 7.090 | OD - 0.016 | OD - 0.017 |
| > 180 | ID + 0.457 | ID + 0.48 | > 7.090 | ID + 0.018 | ID + 0.019 |
| | OD - 0.457 | OD - 0.48 | | OD - 0.018 | OD - 0.019 |

| OVERALL HEIGHT TOLERANCE | | | | | |
|--------------------------------------|------------------|-------------------------|--|---------------|--------------------------|
| CDM Series (MM) by part thickness | | CDM-S (MM) Stainless | CDM Series (Inches) by part thickness | | CDM-S (In.) Stainless |
| t Range | OH Tol. | OH Tol. | t Range | OH Tol. | OH Tol. |
| < = 1.25 | + 0.10 - 0.05 | + 0.11 - 0.06 | < = .049 | .004 -.002 | .0045 -.0025 |
| > 1.25 | + 0.15 | + 0.17 | > .049 | .006 | .0065 |
| < = 2.00 | - 0.08 | - 0.09 | < = .078 | -.003 | -.0035 |
| > 2.00 | + 0.30 | + 0.32 | > .078 | .012 | .0125 |
| < = 3.00 | - 0.10 | - 0.11 | < = .118 | -.004 | -.0045 |
| > 3.00 | + 0.30 | + 0.32 | > .118 | .012 | .0125 |
| < = 6.00 | - 0.15 | - 0.17 | < = .236 | -.006 | -.0065 |
| > 6.00 | + 0.30 - 0.30 | + 0.32 - 0.32 | > .236 | .012 -.012 | .0125 -.0125 |

| THICKNESS (t) TOLERANCE | | | |
|--------------------------------------|-----------|-----------------------|-----------|
| Carbon Steel AISI C1075 or AISI 6150 | | | |
| CDM Series (MM) | | CDM Series (Inches) | |
| Range | Tolerance | Range | Tolerance |
| < 0.70 | ± 0.025 | < 0.0276 | ± 0.001 |
| > = 0.70 | ± 0.051 | > = 0.0276 < 0.088 | ± 0.002 |
| < 2.25 | | > = 0.088 < 0.118 | ± 0.003 |
| > = 2.25 | ± 0.076 | | |
| < 3.00 | | > = 0.118 < 0.157 | ± 0.004 |
| > = 3.00 | ± 0.102 | | |
| < 4.00 | | > = 0.157 | ± 0.005 |
| > = 4.00 | ± 0.127 | | |

continued on next page



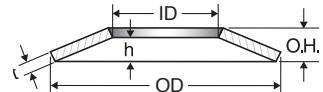
Toll Free 877-231-6474
 Fax 877-231-6472
discsprings@centuryspring.com
www.centurydiscsprings.com

Series CDM Disc Springs

| THICKNESS (t) TOLERANCE | | | |
|-------------------------|-----------|-----------------------|-----------|
| 17/7 PH Stainless Steel | | | |
| CDM-S Series (MM) | | CDM-S Series (Inches) | |
| Range | Tolerance | Range | Tolerance |
| < = 0.51 | ± 0.05 | < = 0.020 | ± 0.002 |
| > 0.51 | ± 0.08 | > 0.020 | ± 0.003 |
| < = 1.27 | ± 0.10 | > 0.050 | ± 0.004 |
| < = 2.34 | ± 0.13 | < = 0.092 | ± 0.005 |
| > 2.34 | ± 0.20 | > 0.125 | ± 0.008 |
| < = 3.18 | ± 0.13 | < = 0.195 | ± 0.010 |
| > 3.18 | ± 0.20 | > 0.195 | ± 0.010 |
| > 4.95 | ± 0.25 | > 0.195 | ± 0.010 |

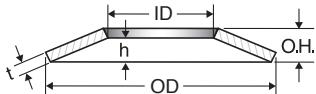
| OPERATION LOAD TOLERANCE | | | |
|--------------------------|----------|-------------------|--------------|
| Thickness Range | | CDM Series | CDM-S Series |
| MM | Inches | | |
| < = 1.25 | < = .049 | + 25.0% - 7.5% | ± 20% |
| > 1.25 | > .049 | + 15.0% - 7.5% | ± 20% |
| < = 3.00 | < = .118 | + 10.0% - 5.0% | ± 20% |
| > 3.00 | > .118 | + 5.0% - 5.0% | ± 20% |
| < = 6.00 | < = .236 | | |
| > 6.00 | > .236 | | |

| CENTURY STOCK NUMBER | DIMENSIONS (Inches) | | | | | @ 25%h | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | @ 50%h | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | @ 75%h | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | @ 100%h | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | |
|----------------------|---------------------|------|-------|-------|-------|--------|-------------|---------------------|--------------------------|--------|-------------|---------------------|--------------------------|--------|-------------|---------------------|--------------------------|---------|-------------|---------------------|--------------------------|--|
| | O.D. | I.D. | t | h | O.H. | | | | | | | | | | | | | | | | | |
| CDM-63203 | .236 | .126 | .0118 | .0060 | .0177 | .506 | 11 | .0015 | 69 | 20 | .0030 | 132 | 29 | .0045 | 188 | 37 | .0060 | 269 | | | | |
| CDM-83202 | .315 | .126 | .0079 | .0078 | .0157 | .991 | 3 | .0020 | 34 | 5 | .0039 | 64 | 6 | .0059 | 89 | 7 | .0078 | 109 | | | | |
| CDM-83203 | .315 | .126 | .0118 | .0099 | .0216 | .836 | 11 | .0025 | 61 | 19 | .0049 | 114 | 25 | .0074 | 159 | 30 | .0099 | 213 | | | | |
| CDM-83204 | .315 | .126 | .0157 | .0080 | .0236 | .507 | 17 | .0020 | 55 | 31 | .0040 | 121 | 44 | .0060 | 196 | 56 | .0080 | 280 | | | | |
| CDM-84202 | .315 | .165 | .0079 | .0099 | .0177 | 1.249 | 5 | .0025 | 61 | 8 | .0049 | 113 | 9 | .0074 | 155 | 10 | .0099 | 188 | | | | |
| CDM-84203 | .315 | .165 | .0118 | .0099 | .0216 | .840 | 12 | .0025 | 76 | 21 | .0050 | 143 | 28 | .0074 | 199 | 33 | .0099 | 246 | | | | |
| CDM-84204 | .315 | .165 | .0157 | .0080 | .0236 | .509 | 19 | .0020 | 68 | 35 | .0040 | 129 | 50 | .0060 | 186 | 64 | .0080 | 268 | | | | |
| CDM-103203 | .394 | .126 | .0118 | .0139 | .0256 | 1.175 | 12 | .0035 | 58 | 19 | .0069 | 106 | 23 | .0104 | 146 | 26 | .0139 | 177 | | | | |
| CDM-103204 | .394 | .126 | .0157 | .0120 | .0276 | .762 | 18 | .0030 | 54 | 32 | .0060 | 101 | 43 | .0090 | 173 | 52 | .0120 | 260 | | | | |
| CDM-103205 | .394 | .126 | .0197 | .0099 | .0295 | .500 | 25 | .0025 | 63 | 47 | .0049 | 135 | 66 | .0074 | 218 | 85 | .0099 | 311 | | | | |
| CDM-104204 | .394 | .165 | .0157 | .0120 | .0276 | .764 | 19 | .0030 | 62 | 33 | .0060 | 117 | 45 | .0090 | 164 | 55 | .0120 | 227 | | | | |
| CDM-104205 | .394 | .165 | .0197 | .0099 | .0295 | .501 | 26 | .0025 | 55 | 49 | .0049 | 119 | 70 | .0074 | 192 | 90 | .0099 | 275 | | | | |
| CDM-105225 | .394 | .205 | .0098 | .0120 | .0217 | 1.223 | 7 | .0030 | 58 | 11 | .0060 | 107 | 14 | .0090 | 147 | 15 | .0120 | 178 | | | | |
| CDM-105204 | .394 | .205 | .0157 | .0120 | .0276 | .767 | 21 | .0030 | 75 | 37 | .0060 | 141 | 50 | .0090 | 198 | 61 | .0120 | 246 | | | | |
| CDM-105205 | .394 | .205 | .0197 | .0099 | .0295 | .503 | 29 | .0025 | 66 | 54 | .0050 | 127 | 78 | .0074 | 186 | 99 | .0099 | 267 | | | | |
| CDM-124204 | .472 | .165 | .0157 | .0159 | .0315 | 1.012 | 20 | .0040 | 59 | 34 | .0079 | 109 | 42 | .0119 | 152 | 48 | .0159 | 193 | | | | |
| CDM-124205 | .472 | .165 | .0197 | .0139 | .0335 | .705 | 28 | .0035 | 55 | 50 | .0069 | 103 | 68 | .0104 | 174 | 84 | .0139 | 259 | | | | |
| CDM-124206 | .472 | .165 | .0236 | .0159 | .0394 | .674 | 54 | .0040 | 75 | 98 | .0080 | 147 | 135 | .0120 | 248 | 168 | .0159 | 366 | | | | |
| CDM-125205 | .472 | .205 | .0197 | .0158 | .0354 | .804 | 36 | .0040 | 76 | 63 | .0079 | 142 | 84 | .0119 | 199 | 101 | .0158 | 254 | | | | |
| CDM-125206 | .472 | .205 | .0236 | .0139 | .0374 | .591 | 47 | .0035 | 71 | 87 | .0070 | 134 | 122 | .0105 | 210 | 154 | .0139 | 306 | | | | |
| CDM-126205 | .472 | .244 | .0197 | .0140 | .0335 | .708 | 32 | .0035 | 73 | 57 | .0070 | 138 | 78 | .0105 | 195 | 97 | .0140 | 243 | | | | |
| CDM-126206 | .472 | .244 | .0236 | .0140 | .0374 | .593 | 52 | .0035 | 83 | 95 | .0070 | 157 | 133 | .0105 | 223 | 168 | .0140 | 300 | | | | |
| CDM-135205 | .492 | .205 | .0197 | .0139 | .0335 | .705 | 27 | .0035 | 56 | 48 | .0069 | 105 | 65 | .0104 | 148 | 80 | .0139 | 220 | | | | |
| CDM-136235 | .492 | .244 | .0138 | .0178 | .0315 | 1.293 | 20 | .0045 | 77 | 31 | .0089 | 142 | 36 | .0134 | 194 | 38 | .0178 | 235 | | | | |
| CDM-136205 | .492 | .244 | .0197 | .0139 | .0335 | .707 | 29 | .0035 | 64 | 51 | .0070 | 121 | 70 | .0104 | 171 | 87 | .0139 | 213 | | | | |
| CDM-136207 | .492 | .244 | .0276 | .0119 | .0394 | .433 | 58 | .0030 | 66 | 110 | .0060 | 133 | 159 | .0090 | 213 | 206 | .0119 | 302 | | | | |
| CDM-147235 | .551 | .283 | .0138 | .0178 | .0315 | 1.292 | 16 | .0045 | 63 | 25 | .0089 | 116 | 29 | .0134 | 159 | 31 | .0178 | 192 | | | | |
| CDM-147205 | .551 | .283 | .0197 | .0158 | .0354 | .804 | 28 | .0040 | 63 | 50 | .0079 | 119 | 66 | .0119 | 167 | 80 | .0158 | 207 | | | | |
| CDM-147208 | .551 | .283 | .0315 | .0119 | .0433 | .379 | 68 | .0030 | 60 | 131 | .0060 | 127 | 191 | .0090 | 201 | 249 | .0119 | 282 | | | | |
| CDM-155204 | .591 | .205 | .0157 | .0218 | .0374 | 1.389 | 24 | .0055 | 61 | 36 | .0109 | 112 | 41 | .0164 | 152 | 42 | .0218 | 183 | | | | |
| CDM-155205 | .591 | .205 | .0197 | .0198 | .0394 | 1.005 | 32 | .0050 | 58 | 52 | .0099 | 109 | 66 | .0149 | 150 | 76 | .0198 | 194 | | | | |
| CDM-155206 | .591 | .205 | .0236 | .0178 | .0413 | .754 | 41 | .0045 | 55 | 72 | .0089 | 103 | 96 | .0134 | 164 | 118 | .0178 | 247 | | | | |
| CDM-155207 | .591 | .205 | .0276 | .0158 | .0433 | .572 | 51 | .0039 | 54 | 94 | .0079 | 120 | 133 | .0118 | 197 | 168 | .0158 | 286 | | | | |
| CDM-156205 | .591 | .244 | .0197 | .0198 | .0394 | 1.007 | 33 | .0050 | 64 | 54 | .0099 | 120 | 69 | .0149 | 166 | 79 | .0198 | 203 | | | | |
| CDM-156206 | .591 | .244 | .0236 | .0178 | .0413 | .756 | 42 | .0045 | 61 | 74 | .0089 | 114 | 100 | .0134 | 161 | 123 | .0178 | 228 | | | | |
| CDM-156207 | .591 | .244 | .0276 | .0158 | .0433 | .573 | 53 | .0040 | 57 | 98 | .0079 | 111 | 138 | .0119 | 182 | 174 | .0158 | 265 | | | | |
| CDM-158207 | .591 | .323 | .0276 | .0159 | .0433 | .576 | 61 | .0040 | 73 | 114 | .0080 | 140 | 159 | .0119 | 198 | 202 | .0159 | 257 | | | | |
| CDM-158208 | .591 | .323 | .0315 | .0159 | .0472 | .506 | 88 | .0040 | 81 | 166 | .0080 | 154 | 236 | .0120 | 220 | 303 | .0159 | 308 | | | | |
| CDM-168204 | .630 | .323 | .0157 | .0198 | .0354 | 1.263 | 20 | .0050 | 60 | 31 | .0099 | 111 | 36 | .0149 | 152 | 38 | .0198 | 184 | | | | |
| CDM-168206 | .630 | .323 | .0236 | .0179 | .0413 | .757 | 41 | .0045 | 64 | 72 | .0089 | 120 | 97 | .0134 | 169 | 119 | .0179 | 210 | | | | |
| CDM-168207 | .630 | .323 | .0276 | .0179 | .0453 | .649 | 61 | .0045 | 71 | 111 | .0089 | 134 | 153 | .0134 | 189 | 191 | .0179 | 242 | | | | |
| CDM-168208 | .630 | .323 | .0315 | .0159 | .0472 | .504 | 74 | .0040 | 66 | 138 | .0079 | 125 | 197 | .0119 | 186 | 252 | .0159 | 268 | | | | |
| CDM-168209 | .630 | .323 | .0354 | .0140 | .0492 | .394 | 87 | .0035 | 60 | 167 | .0070 | 126 | 242 | .0105 | 200 | 315 | .0140 | 281 | | | | |
| CDM-186204 | .709 | .244 | .0157 | .0238 | .0390 | 1.515 | 20 | .0059 | 48 | 30 | .0119 | 88 | 33 | .0178 | 120 | 32 | .0238 | 143 | | | | |
| CDM-186205 | .709 | .244 | .0197 | .0237 | .0433 | 1.203 | 31 | .0059 | 53 | 49 | .0119 | 98 | 58 | .0178 | 134 | 63 | .0237 | 162 | | | | |
| CDM-186206 | .709 | .244 | .0236 | .0237 | .0472 | 1.005 | 45 | .0059 | 58 | 75 | .0119 | 108 | 95 | .0178 | 149 | 109 | .0237 | 195 | | | | |
| CDM-186207 | | | | | | | | | | | | | | | | | | | | | | |



Series CDM Disc Springs

| CENTURY STOCK NUMBER | DIMENSIONS (Inches) | | | | | | @ 25%h | | | @ 50%h | | | @ 75%h | | | @ 100%h | | |
|----------------------|---------------------|------|-------|-------|-------|-------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|
| | O.D. | I.D. | t | h | O.H. | h/t | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ |
| CDM-188210 | .709 | .323 | .0394 | .0158 | .0551 | .402 | 101 | .0040 | 59 | 194 | .0079 | 126 | 282 | .0119 | 200 | 366 | .0158 | 282 |
| CDM-189245 | .709 | .362 | .0177 | .0238 | .0413 | 1.343 | 28 | .0059 | 66 | 43 | .0119 | 122 | 50 | .0178 | 167 | 52 | .0238 | 201 |
| CDM-189207 | .709 | .362 | .0276 | .0198 | .0472 | .717 | 55 | .0049 | 64 | 99 | .0099 | 120 | 134 | .0148 | 169 | 165 | .0198 | 211 |
| CDM-189210 | .709 | .362 | .0394 | .0159 | .0551 | .403 | 108 | .0040 | 60 | 207 | .0079 | 124 | 300 | .0119 | 198 | 389 | .0159 | 280 |
| CDM-208206 | .787 | .323 | .0236 | .0278 | .0512 | 1.177 | 51 | .0069 | 66 | 81 | .0139 | 122 | 97 | .0208 | 167 | 107 | .0278 | 203 |
| CDM-208207 | .787 | .323 | .0276 | .0257 | .0531 | .930 | 62 | .0064 | 63 | 105 | .0128 | 118 | 135 | .0193 | 164 | 159 | .0257 | 201 |
| CDM-208208 | .787 | .323 | .0315 | .0238 | .0551 | .755 | 75 | .0059 | 61 | 133 | .0119 | 114 | 179 | .0178 | 161 | 219 | .0238 | 230 |
| CDM-208209 | .787 | .323 | .0354 | .0219 | .0571 | .618 | 89 | .0055 | 58 | 164 | .0109 | 110 | 227 | .0164 | 176 | 286 | .0219 | 259 |
| CDM-208210 | .787 | .323 | .0394 | .0218 | .0610 | .553 | 118 | .0054 | 62 | 220 | .0109 | 126 | 310 | .0163 | 207 | 394 | .0218 | 299 |
| CDM-201005 | .787 | .402 | .0197 | .0258 | .0453 | 1.309 | 34 | .0064 | 64 | 52 | .0129 | 118 | 60 | .0193 | 161 | 63 | .0258 | 195 |
| CDM-201008 | .787 | .402 | .0315 | .0218 | .0531 | .693 | 72 | .0055 | 64 | 130 | .0109 | 121 | 178 | .0164 | 171 | 220 | .0218 | 213 |
| CDM-201009 | .787 | .402 | .0354 | .0219 | .0571 | .620 | 99 | .0055 | 70 | 181 | .0110 | 132 | 251 | .0165 | 188 | 316 | .0219 | 248 |
| CDM-201010 | .787 | .402 | .0394 | .0219 | .0610 | .555 | 131 | .0055 | 75 | 243 | .0109 | 142 | 343 | .0164 | 202 | 436 | .0219 | 287 |
| CDM-201011 | .787 | .402 | .0433 | .0179 | .0610 | .413 | 132 | .0045 | 61 | 252 | .0090 | 124 | 364 | .0134 | 198 | 473 | .0179 | 280 |
| CDM-201013 | .787 | .402 | .0492 | .0200 | .0689 | .406 | 217 | .0050 | 78 | 415 | .0100 | 160 | 601 | .0150 | 255 | 781 | .0200 | 360 |
| CDM-201015 | .787 | .402 | .0591 | .0119 | .0709 | .202 | 207 | .0030 | 66 | 409 | .0060 | 135 | 608 | .0089 | 209 | 805 | .0119 | 285 |
| CDM-221106 | .886 | .441 | .0236 | .0317 | .0551 | 1.345 | 57 | .0079 | 74 | 87 | .0159 | 136 | 100 | .0238 | 186 | 104 | .0317 | 224 |
| CDM-221108 | .886 | .441 | .0315 | .0258 | .0571 | .820 | 73 | .0065 | 63 | 127 | .0129 | 118 | 167 | .0194 | 165 | 202 | .0258 | 204 |
| CDM-221113 | .886 | .441 | .0492 | .0199 | .0689 | .405 | 166 | .0050 | 59 | 318 | .0100 | 125 | 461 | .0149 | 199 | 600 | .0199 | 281 |
| CDM-238207 | .906 | .323 | .0276 | .0317 | .0591 | 1.147 | 66 | .0079 | 60 | 107 | .0158 | 112 | 129 | .0238 | 154 | 143 | .0317 | 186 |
| CDM-238208 | .906 | .323 | .0315 | .0297 | .0610 | .942 | 79 | .0074 | 58 | 133 | .0148 | 109 | 170 | .0223 | 151 | 199 | .0297 | 204 |
| CDM-238209 | .906 | .323 | .0354 | .0278 | .0630 | .784 | 93 | .0069 | 56 | 163 | .0139 | 106 | 208 | .0208 | 157 | 265 | .0278 | 238 |
| CDM-238210 | .906 | .323 | .0394 | .0277 | .0669 | .703 | 121 | .0069 | 60 | 217 | .0138 | 113 | 296 | .0208 | 187 | 366 | .0277 | 279 |
| CDM-231009 | .906 | .402 | .0354 | .0299 | .0650 | .844 | 111 | .0075 | 72 | 191 | .0149 | 135 | 252 | .0224 | 188 | 302 | .0299 | 232 |
| CDM-231010 | .906 | .402 | .0394 | .0278 | .0669 | .704 | 129 | .0069 | 69 | 230 | .0139 | 130 | 314 | .0208 | 183 | 388 | .0278 | 255 |
| CDM-231013 | .906 | .402 | .0492 | .0259 | .0748 | .526 | 210 | .0065 | 72 | 391 | .0129 | 142 | 555 | .0194 | 231 | 709 | .0259 | 333 |
| CDM-231210 | .906 | .480 | .0394 | .0239 | .0630 | .606 | 113 | .0060 | 65 | 208 | .0119 | 124 | 290 | .0179 | 176 | 365 | .0239 | 228 |
| CDM-231213 | .906 | .480 | .0492 | .0239 | .0728 | .487 | 208 | .0060 | 77 | 392 | .0120 | 147 | 560 | .0180 | 216 | 720 | .0239 | 310 |
| CDM-231215 | .906 | .480 | .0591 | .0199 | .0787 | .336 | 279 | .0050 | 73 | 542 | .0099 | 153 | 794 | .0149 | 241 | 1040 | .0199 | 337 |
| CDM-251010 | .984 | .402 | .0394 | .0297 | .0689 | .754 | 117 | .0074 | 61 | 207 | .0149 | 114 | 279 | .0233 | 160 | 342 | .0297 | 230 |
| CDM-251207 | .984 | .480 | .0276 | .0357 | .0630 | 1.293 | 79 | .0089 | 76 | 122 | .0178 | 140 | 142 | .0268 | 191 | 150 | .0357 | 231 |
| CDM-251209 | .984 | .480 | .0354 | .0278 | .0630 | .786 | 87 | .0070 | 59 | 153 | .0139 | 111 | 204 | .0209 | 156 | 248 | .0278 | 193 |
| CDM-251210 | .984 | .480 | .0394 | .0318 | .0709 | .808 | 140 | .0080 | 77 | 245 | .0159 | 144 | 325 | .0239 | 202 | 393 | .0318 | 250 |
| CDM-251213 | .984 | .480 | .0492 | .0279 | .0768 | .568 | 204 | .0070 | 73 | 378 | .0140 | 140 | 532 | .0209 | 200 | 675 | .0279 | 292 |
| CDM-251215 | .984 | .480 | .0591 | .0218 | .0807 | .370 | 250 | .0055 | 65 | 482 | .0109 | 138 | 702 | .0164 | 219 | 917 | .0218 | 307 |
| CDM-281008 | 1.100 | .402 | .0315 | .0376 | .0689 | 1.193 | 83 | .0094 | 57 | 131 | .0188 | 106 | 157 | .0282 | 145 | 171 | .0376 | 176 |
| CDM-281010 | 1.100 | .402 | .0394 | .0356 | .0748 | .904 | 123 | .0089 | 59 | 209 | .0178 | 110 | 270 | .0267 | 153 | 319 | .0356 | 210 |
| CDM-281013 | 1.100 | .402 | .0492 | .0317 | .089 | .645 | 177 | .0079 | 57 | 321 | .0159 | 112 | 444 | .0238 | 188 | 556 | .0317 | 276 |
| CDM-281015 | 1.100 | .402 | .0591 | .0277 | .0866 | .469 | 242 | .0069 | 65 | 457 | .0138 | 140 | 655 | .0208 | 225 | 845 | .0277 | 320 |
| CDM-281210 | 1.100 | .480 | .0394 | .0377 | .0768 | .957 | 142 | .0094 | 72 | 238 | .0189 | 134 | 303 | .0283 | 186 | 354 | .0377 | 228 |
| CDM-281213 | 1.100 | .480 | .0492 | .0338 | .0827 | .687 | 203 | .0085 | 70 | 366 | .0169 | 132 | 500 | .0254 | 185 | 621 | .0338 | 268 |
| CDM-281215 | 1.100 | .480 | .0591 | .0298 | .0886 | .504 | 278 | .0074 | 66 | 522 | .0149 | 136 | 743 | .0223 | 221 | 952 | .0298 | 317 |
| CDM-281408 | 1.100 | .559 | .0315 | .0398 | .0709 | 1.262 | 104 | .0099 | 79 | 163 | .0199 | 146 | 191 | .0298 | 200 | 204 | .0398 | 242 |
| CDM-281410 | 1.100 | .559 | .0394 | .0318 | .0709 | .807 | 114 | .0079 | 63 | 199 | .0159 | 119 | 264 | .0238 | 167 | 320 | .0318 | 206 |
| CDM-281413 | 1.100 | .559 | .0492 | .0339 | .0827 | .689 | 220 | .0085 | 80 | 395 | .0170 | 151 | 540 | .0254 | 213 | 670 | .0339 | 265 |
| CDM-281415 | 1.100 | .559 | .0591 | .0258 | .0846 | .436 | 249 | .0064 | 62 | 473 | .0129 | 122 | 683 | .0193 | 196 | 884 | .0258 | 278 |
| CDM-321210 | 1.240 | .480 | .0394 | .0436 | .0827 | 1.106 | 140 | .0109 | 65 | 226 | .0218 | 120 | 277 | .0327 | 166 | 310 | .0436 | 201 |
| CDM-321213 | 1.240 | .480 | .0492 | .0377 | .0866 | .765 | 181 | .0094 | 59 | 319 | .0188 | 111 | 429 | .0282 | 155 | 524 | .0377 | 233 |
| CDM-321215 | 1.240 | .480 | .0591 | .0336 | .0925 | .569 | 247 | .0084 | 56 | 457 | .0168 | 118 | 642 | .0252 | 194 | 814 | .0336 | 282 |
| CDM-321608 | 1.240 | .642 | .0315 | .0416 | .0728 | 1.321 | 91 | .0104 | 68 | 140 | .0208 | 125 | 161 | .0312 | 171 | 169 | .0416 | 206 |
| CDM-321613 | 1.240 | .642 | .0492 | .0358 | .0846 | .727 | 188 | .0089 | 68 | 335 | .0179 | 129 | 454 | .0268 | 182 | 559 | .0358 | 226 |
| CDM-321615 | 1.240 | .642 | .0591 | .0359 | .0945 | .607 | 304 | .0090 | 77 | 557 | .0179 | 147 | 776 | .0269 | 208 | 979 | .0359 | 276 |
| CDM-321618 | 1.240 | .642 | .0690 | .0278 | .0965 | .403 | 335 | .0070 | 61 | 641 | .0139 | 125 | 930 | .0209 | 199 | 1209 | .0278 | 281 |
| CDM-321620 | 1.240 | .642 | .0787 | .0300 | .1083 | .382 | 535 | .0075 | 75 | 1029 | .0150 | 158 | 1497 | .0225 | 251 | 1952 | .0300 | 353 |
| CDM-341210 | 1.340 | .484 | .0394 | .0495 | .0886 | 1.256 | 151 | .0124 | 65 | 237 | .0247 | 120 | 278 | .0371 | 164 | 297 | .0495 | 198 |
| CDM-341213 | 1.340 | .484 | .0492 | .0436 | .0925 | .885 | 194 | .0109 | 60 | 331 | .0218 | 112 | 431 | .0327 | 156 | 512 | .0436 | 221 |
| CDM-341215 | 1.340 | .484 | .0591 | .0396 | .0984 | .669 | 262 | .0099 | 58 | 472 | .0198 | 111 | 649 | .0297 | 187 | 809 | .0396 | 276 |
| CDM-341413 | 1.340 | .563 | .0492 | .0457 | .0945 | .928 | 217 | .0114 | 70 | 367 | .0228 | 131 | 473 | .0342 | 182 | 555 | .0457 | 224 |
| CDM-341415 | 1.340 | .563 | .0591 | .0417 | .1004 | .705 | 293 | .0104 | 68 | 523 | .0208 | 129 | 713 | .0312 | 181 | 882 | .0417 | 267 |
| CDM-341615 | 1.340 | .642 | .0591 | .0417 | .1004 | .706 | 309 | .0104 | 76 | 553 | .0209 | 143 | 753 | .0313 | 202 | 932 | .0417 | 259 |
| CDM-341620 | 1.340</ | | | | | | | | | | | | | | | | | |



Toll Free 877-231-6474

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Series CDM Disc Springs

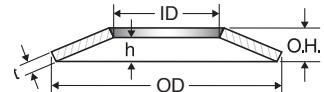
| CENTURY STOCK NUMBER | DIMENSIONS (Inches) | | | | | @ 25%h | | | @ 50%h | | | @ 75%h | | | @ 100%h | | | |
|----------------------|---------------------|-------|-------|-------|-------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-----|
| | O.D. | I.D. | t | h | O.H. | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | |
| CDM-402023 | 1.570 | .803 | .0886 | .0358 | .1240 | .404 | 565 | .0090 | 63 | 1083 | .0179 | 129 | 1570 | .0269 | 205 | 2042 | .0358 | 290 |
| CDM-402025 | 1.570 | .803 | .0984 | .0379 | .1358 | .385 | 817 | .0095 | 73 | 1573 | .0190 | 155 | 2286 | .0284 | 246 | 2979 | .0379 | 346 |
| CDM-452213 | 1.770 | .882 | .0492 | .0635 | .1122 | 1.291 | 248 | .0159 | 76 | 385 | .0318 | 139 | 447 | .0476 | 191 | 473 | .0635 | 231 |
| CDM-452218 | 1.770 | .882 | .0689 | .0517 | .1201 | .750 | 364 | .0129 | 66 | 644 | .0258 | 125 | 868 | .0388 | 176 | 1064 | .0517 | 218 |
| CDM-452225 | 1.770 | .882 | .0984 | .0398 | .1378 | .405 | 666 | .0100 | 59 | 1277 | .0199 | 125 | 1851 | .0299 | 199 | 2406 | .0398 | 281 |
| CDM-501813 | 1.970 | .724 | .0492 | .0633 | .1122 | 1.286 | 178 | .0158 | 49 | 277 | .0316 | 90 | 322 | .0474 | 123 | 342 | .0633 | 148 |
| CDM-501815 | 1.970 | .724 | .0591 | .0712 | .1299 | 1.205 | 327 | .0178 | 64 | 517 | .0356 | 118 | 616 | .0534 | 162 | 670 | .0712 | 196 |
| CDM-501820 | 1.970 | .724 | .0787 | .0595 | .1378 | .756 | 456 | .0149 | 57 | 806 | .0297 | 107 | 1085 | .0446 | 159 | 1328 | .0595 | 240 |
| CDM-501825 | 1.970 | .724 | .0984 | .0635 | .1614 | .646 | 891 | .0159 | 72 | 1618 | .0318 | 141 | 2235 | .0477 | 235 | 2798 | .0635 | 346 |
| CDM-501830 | 1.970 | .724 | .1181 | .0556 | .1732 | .471 | 1218 | .0139 | 82 | 2303 | .0278 | 176 | 3299 | .0417 | 283 | 4252 | .0556 | 402 |
| CDM-502020 | 1.970 | .803 | .0787 | .0595 | .1378 | .756 | 468 | .0149 | 60 | 826 | .0298 | 114 | 1111 | .0446 | 160 | 1360 | .0595 | 230 |
| CDM-502025 | 1.970 | .803 | .0984 | .0536 | .1516 | .545 | 720 | .0134 | 60 | 1339 | .0268 | 125 | 1891 | .0402 | 204 | 2409 | .0536 | 295 |
| CDM-502220 | 1.970 | .882 | .0787 | .0636 | .1417 | .808 | 535 | .0159 | 71 | 933 | .0318 | 134 | 1240 | .0477 | 187 | 1500 | .0636 | 231 |
| CDM-502225 | 1.970 | .882 | .0984 | .0556 | .1535 | .566 | 780 | .0139 | 68 | 1445 | .0278 | 129 | 2032 | .0417 | 203 | 2580 | .0556 | 294 |
| CDM-502513 | 1.970 | 1.000 | .0492 | .0634 | .1122 | 1.289 | 201 | .0159 | 62 | 312 | .0317 | 114 | 363 | .0476 | 156 | 384 | .0634 | 188 |
| CDM-502515 | 1.970 | 1.000 | .0591 | .0634 | .1220 | 1.073 | 293 | .0159 | 67 | 479 | .0317 | 125 | 592 | .0476 | 173 | 668 | .0634 | 211 |
| CDM-502520 | 1.970 | 1.000 | .0787 | .0557 | .1339 | .708 | 464 | .0139 | 66 | 829 | .0279 | 124 | 1129 | .0418 | 175 | 1396 | .0557 | 217 |
| CDM-502525 | 1.970 | 1.000 | .0984 | .0558 | .1535 | .567 | 834 | .0139 | 76 | 1543 | .0279 | 145 | 2169 | .0418 | 206 | 2754 | .0558 | 290 |
| CDM-502530 | 1.970 | 1.000 | .1181 | .0438 | .1614 | .371 | 1021 | .0110 | 65 | 1970 | .0219 | 138 | 2871 | .0329 | 218 | 3747 | .0438 | 306 |
| CDM-562915 | 2.200 | 1.122 | .0591 | .0773 | .1358 | 1.308 | 347 | .0193 | 74 | 537 | .0387 | 136 | 622 | .0580 | 186 | 654 | .0773 | 224 |
| CDM-562920 | 2.200 | 1.122 | .0787 | .0636 | .1417 | .808 | 456 | .0159 | 63 | 794 | .0318 | 119 | 1055 | .0477 | 167 | 1276 | .0636 | 207 |
| CDM-562930 | 2.200 | 1.122 | .1181 | .0518 | .1693 | .438 | 999 | .0129 | 63 | 1903 | .0259 | 122 | 2742 | .0388 | 196 | 3549 | .0518 | 279 |
| CDM-602120 | 2.360 | .807 | .0787 | .0832 | .1614 | 1.057 | 553 | .0208 | 63 | 906 | .0416 | 116 | 1125 | .0624 | 160 | 1278 | .0832 | 199 |
| CDM-602125 | 2.360 | .807 | .0984 | .0713 | .1693 | .725 | 723 | .0178 | 56 | 1287 | .0357 | 106 | 1745 | .0535 | 178 | 2150 | .0713 | 266 |
| CDM-602130 | 2.360 | .807 | .1181 | .0674 | .1850 | .570 | 1070 | .0168 | 63 | 1979 | .0337 | 140 | 2781 | .0505 | 229 | 3528 | .0674 | 331 |
| CDM-602625 | 2.360 | 1.004 | .0984 | .0754 | .1732 | .767 | 826 | .0189 | 69 | 1455 | .0377 | 130 | 1952 | .0566 | 183 | 2384 | .0754 | 249 |
| CDM-602630 | 2.360 | 1.004 | .1181 | .0656 | .1831 | .555 | 1081 | .0164 | 64 | 2006 | .0328 | 124 | 2827 | .0492 | 204 | 3596 | .0656 | 296 |
| CDM-603125 | 2.360 | 1.201 | .0984 | .0717 | .1693 | .729 | 828 | .0179 | 75 | 1473 | .0358 | 141 | 1995 | .0538 | 199 | 2456 | .0717 | 247 |
| CDM-603130 | 2.360 | 1.201 | .1181 | .0678 | .1850 | .574 | 1228 | .0169 | 78 | 2268 | .0339 | 148 | 3184 | .0508 | 210 | 4037 | .0678 | 294 |
| CDM-603135 | 2.360 | 1.201 | .1378 | .0557 | .1929 | .435 | 1599 | .0150 | 74 | 3047 | .0299 | 145 | 4393 | .0449 | 232 | 5690 | .0599 | 329 |
| CDM-633118 | 2.480 | 1.220 | .0709 | .0933 | .1634 | 1.316 | 563 | .0233 | 81 | 869 | .0467 | 150 | 1004 | .0700 | 206 | 1054 | .0933 | 248 |
| CDM-633125 | 2.480 | 1.220 | .0984 | .0695 | .1673 | .707 | 700 | .0174 | 62 | 1252 | .0348 | 118 | 1705 | .0521 | 166 | 2108 | .0695 | 208 |
| CDM-633130 | 2.480 | 1.220 | .1181 | .0717 | .1890 | .607 | 1176 | .0179 | 74 | 2155 | .0359 | 140 | 3004 | .0538 | 198 | 3786 | .0717 | 276 |
| CDM-633135 | 2.480 | 1.220 | .1378 | .0557 | .1929 | .404 | 1293 | .0139 | 58 | 2479 | .0278 | 125 | 3594 | .0418 | 199 | 4672 | .0557 | 281 |
| CDM-702620 | 2.760 | 1.004 | .0787 | .0990 | .1772 | 1.258 | 570 | .0248 | 61 | 890 | .0495 | 113 | 1046 | .0743 | 155 | 1118 | .0990 | 187 |
| CDM-703125 | 2.760 | 1.201 | .0984 | .0953 | .1929 | .968 | 892 | .0238 | 72 | 1493 | .0476 | 135 | 1900 | .0714 | 187 | 2210 | .0953 | 229 |
| CDM-703130 | 2.760 | 1.201 | .1181 | .0834 | .2008 | .706 | 1114 | .0209 | 66 | 1992 | .0417 | 125 | 2714 | .0626 | 175 | 3356 | .0834 | 249 |
| CDM-703630 | 2.760 | 1.398 | .1181 | .0836 | .2008 | .708 | 1201 | .0209 | 75 | 2148 | .0418 | 142 | 2924 | .0627 | 201 | 3615 | .0836 | 250 |
| CDM-703640 | 2.760 | 1.398 | .1575 | .0717 | .2283 | .456 | 2106 | .0179 | 74 | 3996 | .0359 | 142 | 5742 | .0538 | 229 | 7415 | .0717 | 326 |
| CDM-704140 | 2.760 | 1.595 | .1575 | .0641 | .2205 | .407 | 2024 | .0160 | 75 | 3878 | .0320 | 144 | 5619 | .0480 | 216 | 7304 | .0641 | 305 |
| CDM-704150 | 2.760 | 1.595 | .1968 | .0480 | .2441 | .244 | 2786 | .0120 | 70 | 5481 | .0240 | 146 | 8117 | .0360 | 227 | 10723 | .0480 | 313 |
| CDM-713620 | 2.800 | 1.420 | .0787 | .1033 | .1811 | 1.313 | 678 | .0258 | 81 | 1048 | .0517 | 149 | 1212 | .0775 | 204 | 1273 | .1033 | 246 |
| CDM-713625 | 2.800 | 1.420 | .0984 | .0795 | .1772 | .808 | 685 | .0199 | 61 | 1193 | .0397 | 114 | 1585 | .0596 | 160 | 1917 | .0795 | 198 |
| CDM-713640 | 2.800 | 1.420 | .1575 | .0637 | .2205 | .405 | 1766 | .0159 | 62 | 3386 | .0319 | 128 | 4907 | .0478 | 204 | 6380 | .0637 | 288 |
| CDM-803125 | 3.150 | 1.220 | .0984 | .1110 | .2087 | 1.128 | 874 | .0277 | 65 | 1407 | .0555 | 120 | 1714 | .0832 | 165 | 1906 | .1110 | 200 |
| CDM-803130 | 3.150 | 1.220 | .1181 | .0990 | .2165 | .839 | 1078 | .0248 | 60 | 1864 | .0495 | 112 | 2456 | .0743 | 157 | 2950 | .0990 | 217 |
| CDM-803140 | 3.150 | 1.220 | .1575 | .0833 | .2402 | .529 | 1753 | .0208 | 57 | 3272 | .0417 | 126 | 4637 | .0625 | 205 | 5923 | .0833 | 295 |
| CDM-803630 | 3.150 | 1.420 | .1181 | .1072 | .2244 | .908 | 1291 | .0268 | 75 | 2194 | .0536 | 140 | 2837 | .0804 | 194 | 3351 | .1072 | 239 |
| CDM-803640 | 3.150 | 1.420 | .1575 | .0875 | .2441 | .555 | 1960 | .0219 | 67 | 3637 | .0437 | 152 | 5125 | .0656 | 201 | 6520 | .0875 | 291 |
| CDM-804123 | 3.150 | 1.610 | .0886 | .1172 | .2047 | 1.322 | 878 | .0293 | 82 | 1354 | .0586 | 152 | 1562 | .0879 | 208 | 1635 | .1172 | 251 |
| CDM-804130 | 3.150 | 1.610 | .1181 | .0915 | .2087 | .775 | 1058 | .0229 | 66 | 1860 | .0457 | 124 | 2491 | .0686 | 174 | 3036 | .0915 | 216 |
| CDM-804140 | 3.150 | 1.610 | .1575 | .0877 | .2441 | .557 | 2097 | .0219 | 75 | 3890 | .0438 | 143 | 5480 | .0658 | 203 | 6969 | .0877 | 287 |
| CDM-804150 | 3.150 | 1.610 | .1968 | .0678 | .2638 | .345 | 2844 | .0170 | 67 | 5511 | .0339 | 142 | 8062 | .0509 | 224 | 10553 | .0678 | 314 |
| CDM-904625 | 3.540 | 1.810 | .0984 | .1271 | .2244 | 1.292 | 1007 | .0318 | 77 | 1563 | .0636 | 143 | 1818 | .0953 | 196 | 1923 | .1271 | 237 |
| CDM-904635 | 3.540 | 1.810 | .1378 | .0994 | .2362 | .721 | 1392 | .0248 | 64 | 2480 | .0497 | 121 | 3366 | .0745 | 171 | 4151 | .0994 | 213 |
| CDM-904650 | 3.540 | 1.810 | .1968 | .0797 | .2756 | .405 | 2709 | .0199 | 61 | 5191 | .0399 | 125 | 7524 | .0598 | 199 | 9781 | .0797 | 281 |
| CDM-1004140 | 3.940 | 1.610 | .1575 | .1270 | .2835 | .806 | 2077 | .0317 | 67 | 3622 | .0635 | 125 | 4812 | .0952 | 175 | 5825 | .1270 | 237 |
| CDM-1004150 | 3.940 | 1.610 | .1968 | .1092 | .3051 | .555 | 2951 | .0273 | 62 | 5477 | .0546 | 126 | 7719 | .0819 | 206 | 9820 | .1092 | 298 |
| CDM-1005127 | 3.940 | | | | | | | | | | | | | | | | | |

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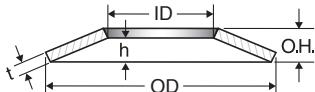


Series CDM Disc Springs

| CENTURY STOCK NUMBER | DIMENSIONS (Inches) | | | | | @ 25%h | | | @ 50%h | | | @ 75%h | | | @ 100%h | | | |
|----------------------|---------------------|-------|-------|-------|-------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-------------|---------------------|--------------------------|-----|
| | O.D. | I.D. | t | h | O.H. | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | Load (Lbs.) | Deflection (Inches) | Stress x 10 ³ | |
| CDM-1256435 | 4.920 | 2.520 | .1378 | .1788 | .3150 | 1.297 | 2027 | .0447 | 79 | 3141 | .0894 | 146 | 3648 | .1341 | 201 | 3851 | .1788 | 243 |
| CDM-1256450 | 4.920 | 2.520 | .1968 | .1392 | .3346 | .707 | 2919 | .0348 | 66 | 5219 | .0696 | 125 | 7107 | .1044 | 176 | 8788 | .1392 | 220 |
| CDM-1256480 | 4.920 | 2.520 | .2950 | .1241 | .4173 | .421 | 7662 | .0310 | 77 | 14640 | .0621 | 154 | 21163 | .0931 | 246 | 27458 | .1241 | 348 |
| CDM-1257160 | 4.920 | 2.800 | .2362 | .1319 | .3661 | .558 | 4721 | .0330 | 78 | 8754 | .0659 | 149 | 12330 | .0989 | 212 | 15676 | .1319 | 269 |
| CDM-1257180 | 4.920 | 2.800 | .2913 | .1203 | .4094 | .413 | 7713 | .0301 | 83 | 14760 | .0602 | 160 | 21342 | .0902 | 241 | 27725 | .1203 | 341 |
| CDM-1257110 | 4.920 | 2.800 | .3622 | .1045 | .4646 | .289 | 12284 | .0261 | 88 | 24024 | .0522 | 183 | 35443 | .0784 | 286 | 46644 | .1045 | 396 |
| CDM-1407238 | 5.510 | 2.840 | .1496 | .1945 | .3425 | 1.300 | 2256 | .0486 | 75 | 3495 | .0973 | 138 | 4055 | .1459 | 190 | 4277 | .1945 | 229 |
| CDM-1407250 | 5.510 | 2.840 | .1968 | .1590 | .3543 | .808 | 2853 | .0397 | 64 | 4972 | .0795 | 120 | 6603 | .1192 | 168 | 7990 | .1590 | 208 |
| CDM-1407280 | 5.510 | 2.840 | .2950 | .1480 | .4409 | .502 | 7588 | .0370 | 77 | 14254 | .0740 | 147 | 20306 | .1110 | 219 | 26051 | .1480 | 315 |
| CDM-1506150 | 5.910 | 2.400 | .1968 | .2102 | .4055 | 1.068 | 3634 | .0525 | 70 | 5934 | .1051 | 129 | 7346 | .1576 | 179 | 8313 | .2102 | 217 |
| CDM-1506160 | 5.910 | 2.400 | .2362 | .1905 | .4252 | .806 | 4663 | .0476 | 66 | 8130 | .0952 | 124 | 10801 | .1428 | 174 | 13074 | .1905 | 238 |
| CDM-1507160 | 5.910 | 2.800 | .2362 | .1909 | .4252 | .808 | 4953 | .0477 | 75 | 8632 | .0954 | 140 | 11462 | .1432 | 196 | 13868 | .1909 | 243 |
| CDM-1507180 | 5.910 | 2.800 | .2950 | .1796 | .4724 | .609 | 8168 | .0449 | 81 | 14967 | .0898 | 153 | 20852 | .1347 | 217 | 26281 | .1796 | 314 |
| CDM-1508180 | 5.910 | 3.190 | .2950 | .1682 | .4606 | .570 | 8090 | .0421 | 84 | 14960 | .0841 | 160 | 21018 | .1262 | 228 | 26669 | .1682 | 300 |
| CDM-1508110 | 5.910 | 3.190 | .3661 | .1482 | .5118 | .405 | 12535 | .0371 | 84 | 24026 | .0742 | 162 | 34736 | .1110 | 257 | 45213 | .1482 | 364 |
| CDM-1608243 | 6.300 | 3.230 | .1693 | .2223 | .3898 | 1.313 | 2884 | .0556 | 74 | 4456 | .1112 | 137 | 5153 | .1668 | 188 | 5412 | .2223 | 227 |
| CDM-1608260 | 6.300 | 3.230 | .2362 | .1789 | .4134 | .757 | 4092 | .0447 | 64 | 7225 | .0894 | 121 | 9719 | .1342 | 169 | 11892 | .1789 | 210 |
| CDM-1608210 | 6.300 | 3.230 | .3700 | .1639 | .5315 | .443 | 12321 | .0410 | 79 | 23437 | .0820 | 152 | 33750 | .1229 | 244 | 43660 | .1639 | 347 |
| CDM-1809248 | 7.090 | 3.620 | .1890 | .2461 | .4331 | 1.302 | 3464 | .0615 | 72 | 5365 | .1230 | 133 | 6223 | .1845 | 182 | 6560 | .2461 | 220 |
| CDM-1809260 | 7.090 | 3.620 | .2362 | .2025 | .4370 | .857 | 3915 | .0506 | 60 | 6738 | .1012 | 112 | 8834 | .1519 | 157 | 10565 | .2025 | 194 |
| CDM-1809210 | 7.090 | 3.620 | .3700 | .1836 | .5512 | .496 | 11120 | .0459 | 72 | 20914 | .0918 | 137 | 29824 | .1377 | 206 | 38293 | .1836 | 296 |
| CDM-2008280 | 7.870 | 3.230 | .2992 | .2619 | .5591 | .875 | 7957 | .0654 | 70 | 13641 | .1309 | 131 | 17800 | .1964 | 183 | 21196 | .2619 | 228 |
| CDM-2008210 | 7.870 | 3.230 | .3780 | .2343 | .6102 | .620 | 12024 | .0585 | 69 | 21991 | .1171 | 130 | 30571 | .1757 | 208 | 38457 | .2343 | 305 |
| CDM-2008212 | 7.870 | 3.230 | .4528 | .2026 | .6535 | .447 | 16216 | .0506 | 72 | 30847 | .1013 | 154 | 44373 | .1519 | 246 | 57386 | .2026 | 349 |
| CDM-2009210 | 7.870 | 3.620 | .3740 | .2429 | .6142 | .649 | 12836 | .0607 | 78 | 23287 | .1214 | 148 | 32148 | .1821 | 209 | 40226 | .2429 | 298 |
| CDM-2009212 | 7.870 | 3.620 | .4488 | .2151 | .6614 | .479 | 17772 | .0537 | 75 | 33577 | .1075 | 152 | 48048 | .1613 | 246 | 61850 | .2151 | 351 |
| CDM-2009214 | 7.870 | 3.620 | .5160 | .1992 | .7126 | .386 | 23996 | .0498 | 83 | 46160 | .0996 | 177 | 67103 | .1494 | 280 | 87434 | .1992 | 394 |
| CDM-20010255 | 7.870 | 4.020 | .2165 | .2779 | .4921 | 1.284 | 4710 | .0695 | 75 | 7322 | .1390 | 139 | 8536 | .2085 | 190 | 9051 | .2779 | 230 |
| CDM-20010280 | 7.870 | 4.020 | .2950 | .2430 | .5354 | .824 | 7474 | .0608 | 74 | 12974 | .1215 | 139 | 17158 | .1823 | 194 | 20684 | .2430 | 240 |
| CDM-20010210 | 7.870 | 4.020 | .3700 | .2477 | .6142 | .669 | 13575 | .0619 | 88 | 24507 | .1238 | 166 | 33676 | .1858 | 234 | 41963 | .2477 | 293 |
| CDM-20010212 | 7.870 | 4.020 | .4430 | .1972 | .6375 | .445 | 16230 | .0493 | 72 | 30859 | .0986 | 140 | 44422 | .1479 | 225 | 57451 | .1972 | 319 |
| CDM-20010214 | 7.870 | 4.020 | .5160 | .2039 | .7165 | .395 | 26090 | .0510 | 85 | 50101 | .1019 | 178 | 72728 | .1529 | 283 | 94662 | .2039 | 399 |
| CDM-20011212 | 7.870 | 4.410 | .4370 | .2043 | .6378 | .468 | 17471 | .0510 | 84 | 33094 | .1021 | 161 | 47460 | .1532 | 230 | 61198 | .2043 | 327 |
| CDM-20011214 | 7.870 | 4.410 | .5079 | .1845 | .6890 | .363 | 23615 | .0460 | 82 | 45714 | .0922 | 164 | 66685 | .1383 | 260 | 87160 | .1845 | 365 |
| CDM-20011216 | 7.870 | 4.410 | .5827 | .1604 | .7402 | .275 | 30125 | .0401 | 86 | 59027 | .0802 | 178 | 87113 | .1203 | 277 | 114789 | .1604 | 382 |
| CDM-22511265 | 8.860 | 4.410 | .2441 | .2936 | .5354 | 1.203 | 5321 | .0734 | 68 | 8421 | .1468 | 126 | 10040 | .2202 | 174 | 10918 | .2936 | 210 |
| CDM-22511280 | 8.860 | 4.410 | .2950 | .2784 | .5709 | .944 | 7271 | .0696 | 69 | 12243 | .1392 | 129 | 15681 | .2088 | 180 | 18353 | .2784 | 221 |
| CDM-22511212 | 8.860 | 4.410 | .4430 | .2289 | .6693 | .517 | 15165 | .0572 | 68 | 28392 | .1145 | 129 | 40326 | .1717 | 194 | 51613 | .2289 | 280 |
| CDM-25010210 | 9.840 | 4.020 | .3780 | .3334 | .7087 | .882 | 13127 | .0833 | 72 | 22463 | .1667 | 135 | 29251 | .2500 | 188 | 34779 | .3334 | 235 |
| CDM-25010212 | 9.840 | 4.020 | .4528 | .2978 | .7480 | .658 | 17196 | .0744 | 68 | 31152 | .1489 | 129 | 42916 | .2233 | 197 | 53608 | .2978 | 291 |
| CDM-25012770 | 9.840 | 5.000 | .2638 | .3214 | .5827 | 1.218 | 6101 | .0803 | 67 | 9627 | .1607 | 124 | 11427 | .2410 | 171 | 12368 | .3214 | 207 |
| CDM-25012710 | 9.840 | 5.000 | .3700 | .3025 | .6693 | .818 | 11651 | .0756 | 73 | 20257 | .1513 | 138 | 26833 | .2269 | 193 | 32393 | .3025 | 238 |
| CDM-25012712 | 9.840 | 5.000 | .4430 | .3212 | .7598 | .725 | 20008 | .0803 | 89 | 35617 | .1606 | 168 | 48293 | .2409 | 237 | 59503 | .3212 | 295 |
| CDM-25012714 | 9.840 | 5.000 | .5160 | .2591 | .7717 | .502 | 22121 | .0648 | 73 | 41550 | .1295 | 140 | 59185 | .1943 | 210 | 75924 | .2591 | 302 |
| CDM-25012716 | 9.840 | 5.000 | .5910 | .2716 | .8583 | .460 | 34298 | .0679 | 86 | 65017 | .1358 | 165 | 93351 | .2037 | 263 | 120456 | .2716 | 374 |



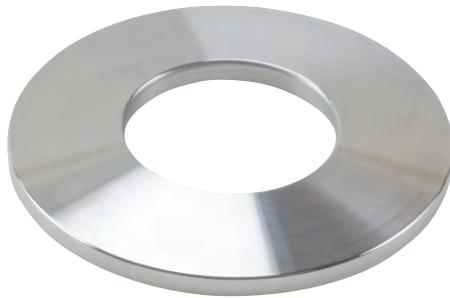
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Series CDS Disc Springs Sized for Bolts

CDS disc spring series (pre-stressed) are used to maintain load or tension in bolted assemblies. Pressure begins in the outer radius and flattens gradually toward the bolt as deflection progresses. Disc springs exert a uniform pressure that remains constant, despite tension losses caused by thermal expansion and contraction, compression set, or wear of parts. Because pressures are predictable, disc springs provide a simple and effective means of determining bolt tension that is far more accurate than "torque" readings.



CDS, BB, CDS-S, BB-S Series and Standard Spring Tolerances

The tolerances on this page are for the CDS and BB (AISI 1075 or AISI 6150 carbon steel) and CDS-S and BB-S (17/7 PH stainless steel) series parts.

Refer to the "CDS-S" and/or "BB-S" columns for dimensional and/or tolerance differences required for ALL 17/7 PH stainless steel parts.

| OUTSIDE & INSIDE DIAMETER TOLERANCE | | | | | | | |
|--------------------------------------|--------------------------|-------------------------------|-------------------------|--|--------------------------|-----------------------------------|-------------------|
| CDS & BB Series (MM) Carbon Steel | | CDS-S, BB-S (MM) Stainless | | CDS & BB SERIES (Inches) Carbon Steel | | CDS-S, BB-S (Inches) Stainless | |
| Range | Tolerance | Range | Tolerance | Range | Tolerance | Range | Tolerance |
| < = 3.0 | ID + 0.152 OD - 0.152 | ID + 0.152 OD - 0.152 | < = 0.118 OD - 0.006 | ID + 0.006 OD - 0.006 | ID + 0.006 OD - 0.006 | < = .049 -.002 | + .004 -.0025 |
| > 3.0 | ID + 0.178 | ID + 0.178 | > 0.118 | ID + 0.007 | ID + 0.007 | > .049 -.078 | + .006 -.003 |
| < = 6.0 | OD - 0.178 | OD - 0.178 | < = 0.236 | OD - 0.007 | OD - 0.007 | > .078 -.118 | + .0065 -.0045 |
| > 6.0 | ID + 0.203 | ID + 0.203 | > 0.236 | ID + 0.008 | ID + 0.008 | > .118 -.004 | + .0125 -.0045 |
| < = 10.0 | OD - 0.203 | OD - 0.203 | < = 0.394 | OD - 0.008 | OD - 0.008 | < = .236 -.006 | + .0125 -.0065 |
| > 10.0 | ID + 0.229 | ID + 0.229 | > 0.394 | ID + 0.009 | ID + 0.009 | > .236 -.012 | + .0125 -.0125 |
| < = 18.0 | OD - 0.229 | OD - 0.229 | < = 0.709 | OD - 0.009 | OD - 0.009 | < = .236 -.012 | + .0125 -.0125 |
| > 18.0 | ID + 0.254 | ID + 0.254 | > 0.709 | ID + 0.010 | ID + 0.010 | < = .276 -.0276 | + .0015 -.0015 |
| < = 30.0 | OD - 0.254 | OD - 0.254 | < = 1.180 | OD - 0.010 | OD - 0.010 | > = .276 -.088 | + .0025 -.0025 |
| > 30.0 | ID + 0.305 | ID + 0.305 | > 1.180 | ID + 0.012 | ID + 0.012 | < = .088 -.118 | + .0035 -.0035 |
| < = 50.0 | OD - 0.305 | OD - 0.305 | < = 1.970 | OD - 0.012 | OD - 0.012 | > = .088 -.118 | + .0045 -.0045 |
| > 50.0 | ID + 0.356 | ID + 0.356 | > 1.970 | ID + 0.014 | ID + 0.014 | < = .118 -.157 | + .0055 -.0055 |
| < = 80.0 | OD - 0.356 | OD - 0.356 | < = 3.150 | OD - 0.014 | OD - 0.014 | > = .118 -.157 | + .0065 -.0065 |
| > 80.0 | ID + 0.406 | ID + 0.406 | > 3.150 | ID + 0.016 | ID + 0.016 | < = .157 -.205 | + .0075 -.0075 |
| < = 120.0 | OD - 0.406 | OD - 0.406 | < = 4.720 | OD - 0.016 | OD - 0.016 | > = .205 -.253 | + .0085 -.0085 |
| > 120.0 | ID + 0.457 | ID + 0.457 | > 4.720 | ID + 0.018 | ID + 0.018 | < = .253 -.301 | + .0095 -.0095 |
| < = 180.0 | OD - 0.457 | OD - 0.457 | < = 7.090 | OD - 0.018 | OD - 0.018 | > = .301 -.349 | + .0105 -.0105 |
| > 180.0 | ID + 0.508 | ID + 0.508 | > 7.090 | ID + 0.020 | ID + 0.020 | < = .349 -.407 | + .0115 -.0115 |
| | OD - 0.508 | OD - 0.508 | | OD - 0.020 | OD - 0.020 | | |

continued on next page

ALL stainless steel materials will utilize these CDS-S or BB-S specifications with the exception of materials not available in the standard tolerance range. In those cases, the closest material tolerance will be used.

When requesting parts made of stainless steel, add the letter "S" to the end of the existing part number. For example, carbon steel part number BB-6312 becomes BB-6312S for stainless steel.

For availability of other material types and achievable tolerances, please contact the disc spring team for assistance.

Design Note: stainless steel material thickness is different than steel and is subject to commercial availability. The overall height will be used to compensate for the difference in load due to the difference in thickness.

| OVERALL HEIGHT TOLERANCE | | | | | |
|---|----------------|-------------------------------|----------------|--|-----------------|
| CDS & BB Series (MM) by part thickness | | CDS-S, BB-S (MM) Stainless | | CDS & BB Series (In.) by part thickness | |
| t Range | OH Tol. | OH Tol. | OH Tol. | t Range | OH Tol. |
| < = 1.25 | + 0.10 -.05 | + 0.11 -.06 | + 0.11 -.06 | < = .049 | + .004 -.002 |
| > 1.25 | + 0.15 | + 0.17 | + 0.17 | > .049 | + .006 |
| < = 2.00 | - 0.08 | - 0.09 | - 0.09 | < = .078 | - .003 |
| > 2.00 | + 0.30 | + 0.32 | + 0.32 | > .078 | + .012 |
| < = 3.00 | - 0.10 | - 0.11 | - 0.11 | < = .118 | - .004 |
| > 3.00 | + 0.30 | + 0.32 | + 0.32 | > .118 | + .012 |
| < = 6.00 | - 0.15 | - 0.17 | - 0.17 | < = .236 | - .006 |
| > 6.00 | + 0.30 -.30 | + 0.32 -.32 | + 0.32 -.32 | > .236 | + .012 -.012 |

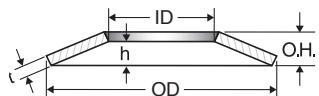
| THICKNESS (t) TOLERANCE | | | |
|--------------------------------------|-----------|--------------------------|-----------|
| Carbon Steel AISI C1075 or AISI 6150 | | CDS & BB Series (Inches) | |
| Range | Tolerance | Range | Tolerance |
| < 0.70 | ± 0.025 | < 0.276 | ± 0.0015 |
| > = 0.70 | ± 0.051 | > = 0.276 | ± 0.0025 |
| < 2.25 | | < 0.088 | |
| > = 2.25 | ± 0.076 | > = 0.088 | ± 0.0035 |
| < 3.00 | | < 0.118 | |
| > = 3.00 | ± 0.102 | > = 0.118 | ± 0.0045 |
| < 4.00 | | < 0.157 | |
| > = 4.00 | ± 0.127 | > = 0.157 | ± 0.0055 |

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Series CDS Disc Springs Sized for Bolts

| THICKNESS (t) TOLERANCE | | | |
|--------------------------|-----------|-----------------------------|-----------|
| 17/7 PH Stainless Steel | | | |
| CDS-S & BB-S Series (MM) | | CDS-S & SAK Series (Inches) | |
| Range | Tolerance | Range | Tolerance |
| < = 0.51 | ± 0.05 | < = 0.020 | ± 0.002 |
| > 0.51 | ± 0.08 | > 0.020 | ± 0.003 |
| < = 1.27 | ± 0.08 | < = 0.050 | ± 0.003 |
| > 1.27 | ± 0.10 | > 0.050 | ± 0.004 |
| < = 2.34 | ± 0.10 | < = 0.092 | ± 0.004 |
| > 2.34 | ± 0.13 | > 0.092 | ± 0.005 |
| < = 3.18 | ± 0.13 | < = 0.125 | ± 0.005 |
| > 3.18 | ± 0.20 | > 0.125 | ± 0.008 |
| < = 4.95 | ± 0.20 | < = 0.195 | ± 0.008 |
| > 4.95 | ± 0.25 | > 0.195 | ± 0.010 |

| HARDNESS TOLERANCE | | | |
|----------------------|-----------|--------------|---------------|
| CDS Series Tolerance | | CDS-S | |
| Thickness Range | | Rockwell HRC | Stainless HRC |
| MM | Inches | | |
| < 1.00 | < 0.039 | 46 - 51 | Minimum 38 |
| > = 1.00 | > = 0.039 | 44 - 49 | Minimum 38 |
| < 4.25 | < 0.157 | 42 - 48 | Minimum 38 |
| > = 4.25 | > = 0.157 | 42 - 48 | Minimum 38 |

| OPERATION LOAD TOLERANCE | | | |
|--------------------------|----------|-------------------|-------------------------|
| Thickness Range | | CDS Series | BB, CDS-S & BB-S Series |
| MM | Inches | | |
| < = 1.25 | < = .049 | + 25.0% - 7.5% | ± 20% |
| > 1.25 | > .049 | + 15.0% - 7.5% | ± 20% |
| < = 3.00 | < = .118 | | |
| > 3.00 | > .118 | + 10.0% - 5.0% | ± 20% |
| < = 6.00 | < = .236 | | |
| > 6.00 | > .236 | + 5.0% - 5.0% | ± 20% |

| HARDNESS TOLERANCE | | | |
|---------------------|--------|--------------|---------------|
| BB Series Tolerance | | BB-S | |
| Thickness Range | | Rockwell HRC | Stainless HRC |
| MM | Inches | | |
| ALL | ALL | 40 - 51 | Minimum 38 |

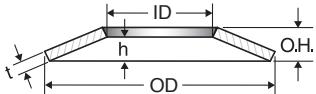
| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | DIMENSIONS (Inches) | | | | | @ 100%h | |
|----------------------|-------------------|---------------------|------|------|------|------|---------|-------|
| | | OD | ID | t | h | O.H. | Pmax. | fmax. |
| CDS-180907 | #2 | .187 | .093 | .007 | .006 | .013 | 12 | .006 |
| CDS-180910 | #2 | .187 | .093 | .010 | .005 | .015 | 29 | .005 |
| CDS-251209 | #4 | .250 | .125 | .009 | .008 | .017 | 19 | .008 |
| CDS-251213 | #4 | .250 | .125 | .013 | .007 | .020 | 50 | .007 |
| CDS-371219 | #4 | .375 | .125 | .019 | .010 | .028 | 81 | .010 |
| CDS-281310 | #6 | .281 | .138 | .010 | .010 | .020 | 23 | .010 |
| CDS-281313 | #6 | .281 | .138 | .013 | .008 | .021 | 43 | .008 |
| CDS-281315 | #6 | .281 | .138 | .015 | .008 | .023 | 69 | .008 |
| CDS-431322 | #6 | .437 | .138 | .022 | .010 | .032 | 98 | .010 |
| CDS-311511 | #6 | .312 | .156 | .011 | .011 | .022 | 30 | .011 |
| CDS-311517 | #6 | .312 | .156 | .017 | .008 | .025 | 82 | .008 |
| CDS-341613 | #8 | .343 | .164 | .013 | .011 | .024 | 38 | .011 |
| CDS-341616 | #8 | .343 | .164 | .016 | .010 | .026 | 65 | .010 |
| CDS-341619 | #8 | .343 | .164 | .019 | .009 | .028 | 104 | .009 |
| CDS-501625 | #8 | .500 | .164 | .025 | .012 | .037 | 131 | .012 |
| CDS-561919 | 3/16 | .562 | .190 | .019 | .018 | .037 | 67 | .018 |
| CDS-561928 | 3/16 | .562 | .190 | .028 | .014 | .042 | 163 | .014 |
| CDS-371915 | 3/16 | .375 | .195 | .015 | .012 | .027 | 59 | .012 |
| CDS-371918 | 3/16 | .375 | .195 | .018 | .010 | .028 | 85 | .010 |
| CDS-371920 | 3/16 | .375 | .195 | .020 | .010 | .030 | 118 | .010 |
| CDS-371930 | 3/16 | .375 | .195 | .030 | .010 | .040 | 410 | .010 |
| CDS-432216 | #12 | .437 | .220 | .016 | .015 | .031 | 60 | .015 |
| CDS-432220 | #12 | .437 | .220 | .020 | .012 | .032 | 98 | .012 |
| CDS-432223 | #12 | .437 | .220 | .023 | .011 | .034 | 139 | .011 |
| CDS-682234 | #12 | .687 | .220 | .034 | .016 | .050 | 229 | .016 |
| CDS-502522 | 1/4 | .500 | .255 | .022 | .015 | .036 | 115 | .015 |
| CDS-502525 | 1/4 | .500 | .255 | .025 | .013 | .038 | 165 | .013 |
| CDS-502538 | 1/4 | .500 | .255 | .038 | .010 | .048 | 454 | .010 |
| CDS-632532 | 1/4 | .637 | .255 | .032 | .016 | .048 | 222 | .016 |
| CDS-752525 | 1/4 | .750 | .255 | .025 | .024 | .049 | 114 | .024 |

continued on next page

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CDS

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Series CDS Disc Springs Sized for Bolts

| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | DIMENSIONS (Inches) | | | | | @ 100%h | |
|----------------------|-------------------|---------------------|-------|------|------|------|---------|-------|
| | | OD | ID | t | h | O.H. | Pmax. | fmax. |
| CDS-752536 | 1/4 | .750 | .255 | .036 | .018 | .054 | 261 | .018 |
| CDS-752552 | 1/4 | .750 | .255 | .052 | .013 | .065 | 560 | .013 |
| CDS-502519 | 1/4 | .500 | .258 | .019 | .016 | .035 | 89 | .016 |
| CDS-502523 | 1/4 | .500 | .258 | .023 | .016 | .039 | 160 | .016 |
| CDS-623122 | 5/16 | .625 | .317 | .022 | .020 | .042 | 110 | .020 |
| CDS-623132 | 5/16 | .625 | .317 | .032 | .016 | .048 | 273 | .016 |
| CDS-623147 | 5/16 | .625 | .317 | .047 | .012 | .059 | 600 | .012 |
| CDS-933130 | 5/16 | .937 | .317 | .030 | .030 | .060 | 159 | .030 |
| CDS-933145 | 5/16 | .937 | .317 | .045 | .022 | .067 | 404 | .022 |
| CDS-753227 | 5/16 | .750 | .320 | .028 | .024 | .052 | 174 | .024 |
| CDS-753231 | 5/16 | .750 | .320 | .032 | .024 | .056 | 261 | .024 |
| CDS-753282 | 3/8 | .750 | .380 | .028 | .023 | .051 | 180 | .023 |
| CDS-753384 | 3/8 | .750 | .380 | .034 | .021 | .055 | 297 | .021 |
| CDS-753386 | 3/8 | .750 | .380 | .056 | .014 | .070 | 897 | .014 |
| CDS-953847 | 3/8 | .950 | .380 | .047 | .023 | .070 | 484 | .023 |
| CDS-113853 | 3/8 | 1.125 | .380 | .053 | .027 | .080 | 535 | .027 |
| CDS-113878 | 3/8 | 1.125 | .380 | .078 | .019 | .097 | 1235 | .019 |
| CDS-683823 | 3/8 | .688 | .382 | .024 | .020 | .044 | 125 | .020 |
| CDS-683827 | 3/8 | .688 | .382 | .028 | .020 | .048 | 200 | .020 |
| CDS-753831 | 3/8 | .750 | .382 | .032 | .020 | .052 | 236 | .020 |
| CDS-753835 | 3/8 | .750 | .382 | .035 | .022 | .057 | 342 | .022 |
| CDS-753840 | 3/8 | .750 | .382 | .040 | .019 | .059 | 441 | .019 |
| CDS-874431 | 7/16 | .875 | .442 | .031 | .028 | .059 | 218 | .028 |
| CDS-874445 | 7/16 | .875 | .442 | .045 | .022 | .067 | 530 | .022 |
| CDS-104439 | 7/16 | 1.000 | .445 | .039 | .032 | .071 | 359 | .032 |
| CDS-125060 | 1/2 | 1.262 | .505 | .060 | .031 | .091 | 731 | .031 |
| CDS-155047 | 1/2 | 1.500 | .505 | .047 | .046 | .093 | 366 | .046 |
| CDS-155070 | 1/2 | 1.500 | .505 | .070 | .034 | .104 | 896 | .034 |
| CDS-155002 | 1/2 | 1.500 | .505 | .102 | .026 | .128 | 2060 | .026 |
| CDS-105135 | 1/2 | 1.000 | .512 | .035 | .032 | .067 | 277 | .032 |
| CDS-105139 | 1/2 | 1.000 | .512 | .039 | .036 | .075 | 436 | .036 |
| CDS-105043 | 1/2 | 1.000 | .512 | .043 | .028 | .071 | 431 | .028 |
| CDS-105149 | 1/2 | 1.000 | .512 | .049 | .034 | .083 | 825 | .034 |
| CDS-105050 | 1/2 | 1.000 | .512 | .050 | .025 | .075 | 600 | .025 |
| CDS-105159 | 1/2 | 1.000 | .512 | .059 | .028 | .087 | 1190 | .028 |
| CDS-105173 | 1/2 | 1.000 | .512 | .073 | .018 | .091 | 1442 | .018 |
| CDS-115139 | 1/2 | 1.100 | .512 | .039 | .036 | .075 | 339 | .036 |
| CDS-115149 | 1/2 | 1.100 | .512 | .049 | .030 | .083 | 640 | .034 |
| CDS-115159 | 1/2 | 1.100 | .512 | .059 | .028 | .087 | 923 | .028 |
| CDS-115638 | 9/16 | 1.125 | .567 | .038 | .035 | .073 | 303 | .035 |
| CDS-115656 | 9/16 | 1.125 | .567 | .056 | .028 | .084 | 784 | .028 |
| CDS-126340 | 5/8 | 1.250 | .630 | .040 | .042 | .082 | 344 | .042 |
| CDS-126351 | 5/8 | 1.250 | .630 | .051 | .036 | .087 | 582 | .036 |
| CDS-126362 | 5/8 | 1.250 | .630 | .062 | .030 | .092 | 922 | .030 |
| CDS-126389 | 5/8 | 1.250 | .630 | .089 | .022 | .111 | 2019 | .022 |
| CDS-186357 | 5/8 | 1.875 | .630 | .057 | .058 | .115 | 522 | .058 |
| CDS-186386 | 5/8 | 1.875 | .630 | .086 | .043 | .129 | 1319 | .043 |
| CDS-186327 | 5/8 | 1.875 | .630 | .127 | .031 | .158 | 3105 | .031 |
| CDS-136349 | 5/8 | 1.375 | .637 | .049 | .046 | .095 | 549 | .046 |
| CDS-136359 | 5/8 | 1.375 | .637 | .059 | .043 | .102 | 901 | .043 |
| CDS-136378 | 5/8 | 1.375 | .637 | .078 | .032 | .110 | 1556 | .032 |
| CDS-136944 | 11/16 | 1.375 | .692 | .045 | .044 | .089 | 423 | .044 |
| CDS-136967 | 11/16 | 1.375 | .692 | .067 | .034 | .101 | 1089 | .034 |
| CDS-157545 | 3/4 | 1.500 | .755 | .045 | .048 | .093 | 386 | .048 |
| CDS-157560 | 3/4 | 1.500 | .755 | .060 | .042 | .102 | 774 | .042 |
| CDS-157572 | 3/4 | 1.500 | .755 | .072 | .037 | .109 | 1235 | .037 |
| CDS-1575107 | 3/4 | 1.500 | .755 | .107 | .027 | .134 | 2991 | .027 |
| CDS-227568 | 3/4 | 2.250 | .755 | .068 | .069 | .137 | 732 | .069 |
| CDS-227510 | 3/4 | 2.250 | .755 | .102 | .051 | .153 | 1822 | .051 |
| CDS-227515 | 3/4 | 2.250 | .755 | .150 | .038 | .188 | 4295 | .038 |
| CDS-157689 | 3/4 | 1.500 | .761 | .059 | .055 | .114 | 1019 | .055 |
| CDS-157678 | 3/4 | 1.500 | .761 | .078 | .044 | .122 | 1897 | .044 |
| CDS-157698 | 3/4 | 1.500 | .761 | .098 | .036 | .134 | 3097 | .036 |
| CDS-178857 | 7/8 | 1.750 | .880 | .057 | .057 | .114 | 650 | .057 |
| CDS-178885 | 7/8 | 1.750 | .880 | .085 | .043 | .128 | 1735 | .043 |
| CDS-201084 | 1 | 2.000 | 1.000 | .084 | .052 | .136 | 1488 | .052 |
| CDS-201014 | 1 | 2.000 | 1.000 | .142 | .035 | .177 | 4824 | .035 |
| CDS-301090 | 1 | 3.000 | 1.000 | .090 | .090 | .180 | 1244 | .090 |
| CDS-301013 | 1 | 3.000 | 1.000 | .135 | .067 | .202 | 3118 | .067 |

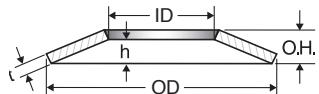
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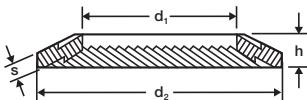


Series CDS Disc Springs Sized for Bolts

| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | DIMENSIONS (Inches) | | | | | @ 100%h | |
|----------------------|-------------------|---------------------|-------|------|------|------|---------|-------|
| | | OD | ID | t | h | O.H. | Pmax. | fmax. |
| CDS-201065 | 1 | 2.000 | 1.016 | .065 | .065 | .130 | 895 | .065 |
| CDS-201078 | 1 | 2.000 | 1.016 | .078 | .060 | .138 | 1436 | .060 |
| CDS-201098 | 1 | 2.000 | 1.016 | .098 | .060 | .158 | 2881 | .060 |
| CDS-201011 | 1 | 2.000 | 1.016 | .118 | .047 | .165 | 3944 | .047 |
| CDS-231078 | 1 | 2.375 | 1.016 | .078 | .079 | .157 | 1231 | .079 |
| CDS-231098 | 1 | 2.375 | 1.016 | .098 | .079 | .177 | 2463 | .079 |
| CDS-231011 | 1 | 2.375 | 1.016 | .118 | .063 | .181 | 3434 | .063 |
| CDS-221173 | 1-1/8 | 2.250 | 1.125 | .073 | .075 | .148 | 1100 | .075 |
| CDS-221111 | 1-1/8 | 2.250 | 1.125 | .111 | .054 | .165 | 2780 | .054 |
| CDS-221115 | 1-1/8 | 2.250 | 1.125 | .159 | .039 | .198 | 5973 | .039 |
| CDS-251280 | 1-1/4 | 2.500 | 1.250 | .080 | .080 | .160 | 1301 | .080 |
| CDS-251212 | 1-1/4 | 2.500 | 1.250 | .120 | .060 | .180 | 3322 | .060 |
| CDS-251217 | 1-1/4 | 2.500 | 1.250 | .175 | .044 | .219 | 7149 | .044 |
| CDS-371216 | 1-1/4 | 3.750 | 1.250 | .168 | .083 | .251 | 4754 | .083 |
| CDS-271387 | 1-3/8 | 2.750 | 1.375 | .087 | .086 | .173 | 1440 | .086 |
| CDS-271313 | 1-3/8 | 2.750 | 1.375 | .132 | .064 | .196 | 3210 | .064 |
| CDS-301593 | 1-1/2 | 3.000 | 1.500 | .093 | .096 | .189 | 1630 | .096 |
| CDS-301514 | 1-1/2 | 3.000 | 1.500 | .143 | .070 | .213 | 4380 | .070 |
| CDS-402012 | 2 | 4.000 | 2.000 | .125 | .125 | .250 | 2910 | .125 |
| CDS-402018 | 2 | 4.000 | 2.000 | .187 | .093 | .280 | 7280 | .093 |



CDS

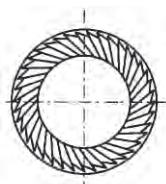


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Contact Disc Springs - Serrated

Very often disc springs are considered for use as safety washers for bolt connections to maintain a pre-load and to prevent loosening. For this application, the sizes of normal disc springs do not match the screw and bolt sizes. Century Spring now offers special elements for this application.

Serrated disc springs are a form of disc spring serrated on both sides of a trapezoid cross section. Because their diameters are matched to screw dimensions, the serrated disc springs can be used with practically any screw or bolt. The outer diameter of the serrated disc spring will match up to the head diameter of pan head and hexagon socket head cap screws, including recessed heads.



Serrated disc springs offer the following advantages to a designer:

- Locking effect at the outside diameter ensures the greatest resistance to loosening
- Positive locking serrations increase resistance to vibration
- Concentric application of force eliminates bending bolts
- Sliding surfaces allow tightening with no surface damage
- With proper transitional radius between bolt shaft and head, there is no splitting when tightening
- Suitable for captive fitting on a wide range of bolts
- Minimizes stock with universal applications

Material

| | |
|---------------------------|------------|
| Spring steel | DIN 17222 |
| Corrosion resistant steel | DIN 1.4301 |

Call for availability of stainless steel.

We offer two series to choose from depending on your application. OD and ID are the same for both series.

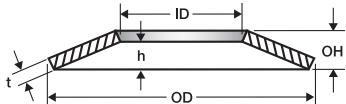
1. **Light Series:** suitable for normal duty, available for screw sizes: .063" to 1.417"

2. **Reinforced Series:** thicker, achieves higher pretension loads, available for screw sizes .197" to 1.181"

REINFORCED SERIES

| CENTURY STOCK NUMBER | d ₁ Inches | d ₂ Inches | s Inches | h max. Inches | h min. Inches |
|----------------------|--------------------------|--------------------------|-------------|------------------|------------------|
| CCS116 | .067 | .126 | .014 | .024 | .015 |
| CCS002 | .087 | .157 | .014 | .024 | .015 |
| CCS025 | .106 | .189 | .018 | .035 | .019 |
| CCS003 | .126 | .217 | .018 | .035 | .020 |
| CCS035 | .146 | .236 | .018 | .035 | .020 |
| CCS004 | .169 | .276 | .020 | .039 | .023 |
| CCS005 | .209 | .354 | .024 | .043 | .029 |
| CCS006 | .252 | .394 | .028 | .047 | .032 |
| CCS635 | .264 | .374 | .028 | .047 | .031 |
| CCS007 | .291 | .472 | .028 | .051 | .035 |
| CCS008 | .331 | .512 | .031 | .055 | .039 |
| CCS010 | .413 | .630 | .039 | .063 | .048 |
| CCS111 | .457 | .626 | .039 | .063 | .046 |
| CCS012 | .512 | .709 | .043 | .067 | .052 |
| CCS127 | .539 | .748 | .043 | .071 | .052 |
| CCS014 | .591 | .866 | .047 | .079 | .060 |
| CCS016 | .669 | .945 | .051 | .083 | .064 |
| CCS018 | .748 | 1.063 | .059 | .091 | .073 |
| CCS019 | .787 | 1.181 | .059 | .098 | .078 |
| CCS020 | .827 | 1.181 | .059 | .098 | .076 |
| CCS022 | .906 | 1.299 | .059 | .106 | .082 |
| CCS024 | 1.008 | 1.417 | .071 | .114 | .091 |
| CCS254 | 1.063 | 1.299 | .079 | .122 | .099 |
| CCS027 | 1.126 | 1.535 | .079 | .122 | .099 |
| CCS030 | 1.244 | 1.772 | .079 | .142 | .109 |
| CCS036 | 1.496 | 2.126 | .098 | .165 | .133 |

| CENTURY STOCK NUMBER | d ₁ Inches | d ₂ Inches | s Inches | h max. Inches | h min. Inches |
|----------------------|--------------------------|--------------------------|-------------|------------------|------------------|
| CVS005 | .209 | .354 | .039 | .051 | .042 |
| CVS006 | .252 | .394 | .039 | .055 | .043 |
| CVS008 | .331 | .512 | .047 | .067 | .052 |
| CVS010 | .413 | .630 | .059 | .079 | .065 |
| CVS012 | .512 | .709 | .059 | .083 | .065 |
| CVS014 | .591 | .866 | .059 | .087 | .069 |
| CVS016 | .669 | .945 | .079 | .102 | .087 |
| CVS018 | .748 | 1.063 | .079 | .106 | .089 |
| CVS020 | .827 | 1.181 | .079 | .110 | .092 |
| CVS022 | .906 | 1.299 | .079 | .118 | .095 |
| CVS024 | 1.008 | 1.417 | .098 | .134 | .113 |
| CVS027 | 1.126 | 1.535 | .098 | .138 | .115 |
| CVS030 | 1.244 | 1.772 | .098 | .150 | .123 |



Contact Disc Springs

Contact Belleville Disc Springs combine two important features for improved bolt connections:

1. Their conical shape provides reactive force and a high elasticity of spring return to compensate for developed looseness, loss of bolt tension due to applied surface deterioration, and movement due to the thermal expansion and contraction.
2. The hardened, serrated profile grips the lower surface of the bolt or nut to prevent the loss of tension that normally occurs during extreme vibration or severe shock.

CONTACT "REGULAR"

| CENTURY STOCK NUMBER | BOLT DIAMETER | METRIC SIZE | DIMENSIONS (Inches) | | | | Calculated Load Lbs. @ Flat** |
|----------------------|---------------|-------------|---------------------|-----------|--------|-----------|-------------------------------|
| | | | Max. O.D. | Min. I.D. | Ref. t | Ref. O.H. | |
| CBS650311 | - | 3 | .315 | .122 | .024 | .039 | 400 |
| CBS650252 | #6 | 3.5 | .362 | .142 | .028 | .047 | 590 |
| CBS650411 | #8 | 4 | .402 | .161 | .039 | .059 | 1480 |
| CBS650511 | #10 | 5 | .481 | .201 | .050 | .073 | 2420 |
| CBS650612 | - | 6 | .559 | .240 | .052 | .087 | 3350 |
| CBS650615 | - | 6 | .559 | .240 | .043 | .067 | 1210 |
| CBS650635 | .250 | 6 | .559 | .254 | .052 | .087 | 3450 |
| CBS650821 | .313 | 8 | .717 | .323 | .055 | .095 | 2680 |
| CBS650823 | .313 | 8 | .717 | .323 | .035 | .081 | 760 |
| CBS650921 | - | - | .798 | .362 | .062 | .095 | 3540 |
| CBS651022 | .375 | 10 | .877 | .402 | .062 | .108 | 3010 |
| CBS651201 | .438 | 12 | 1.074 | .489 | .078 | .120 | 3510 |
| CBS651271 | .500 | 12 | 1.074 | .512 | .078 | .120 | 3600 |
| CBS651442 | .563 | 14 | 1.192 | .567 | .098 | .138 | 5350 |
| CBS651642 | .625 | 15 | 1.273 | .646 | .098 | .156 | 7460 |
| CBS652002 | .750 | 20 | 1.570 | .781 | .118 | .185 | 9000 |

CONTACT "NARROW"

| CENTURY STOCK NUMBER | BOLT DIAMETER | METRIC SIZE | DIMENSIONS (Inches) | | | | Calculated Load Lbs. @ Flat** |
|----------------------|---------------|-------------|---------------------|-----------|--------|-----------|-------------------------------|
| | | | Max. O.D. | Min. I.D. | Ref. t | Ref. O.H. | |
| CBS550301 | - | 3 | .224 | .122 | .024 | .037 | 700 |
| CBS550351 | #6 | 3 | .284 | .140 | .028 | .043 | 930 |
| CBS550401 | #8 | 4 | .323 | .162 | .032 | .045 | 900 |
| CBS550501 | #10 | 5 | .402 | .201 | .039 | .059 | 1700 |
| CBS550601 | - | 6 | .481 | .240 | .050 | .071 | 2500 |
| CBS550721 | .281 | - | .559 | .284 | .055 | .081 | 3200 |
| CBS550801 | .313 | 8 | .638 | .323 | .055 | .095 | 3800 |
| CBS551021 | .375 | 10 | .798 | .402 | .062 | .095 | 2700 |
| CBS551241 | .438 | 12 | .955 | .489 | .062 | .102 | 2300 |

CONTACT "WIDE"

| CENTURY STOCK NUMBER | BOLT DIAMETER | METRIC SIZE | DIMENSIONS (Inches) | | | | Calculated Load Lbs. @ Flat** |
|----------------------|---------------|-------------|---------------------|-----------|--------|-----------|-------------------------------|
| | | | Max. O.D. | Min. I.D. | Ref. t | Ref. O.H. | |
| CBS750312 | - | 4 | .402 | .122 | .024 | .047 | 360 |
| CBS750412 | #8 | 5 | .559 | .161 | .039 | .071 | 1120 |
| CBS750512 | #10 | 6 | .638 | .201 | .050 | .085 | 1820 |
| CBS750614 | - | 6 | .717 | .240 | .055 | .100 | 2780 |
| CBS750636 | .250 | 8 | .717 | .254 | .055 | .100 | 2810 |
| CBS750822 | .313 | 10 | .877 | .323 | .055 | .095 | 1610 |
| CBS751023 | .375 | 12 | 1.074 | .402 | .062 | .112 | 1980 |
| CBS751232 | - | 12 | 1.273 | .488 | .069 | .138 | 2780 |
| CBS751272 | .500 | 12 | 1.273 | .512 | .069 | .138 | 2820 |

** Please note: Loads indicated are computed. Actual loads obtained in practice can vary as much as 25% due to fluctuation in overall height tolerance.



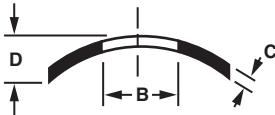
For general use



Typical use:
In the confined space under a socket head screw



Typical use: For oversized holes in sheet metal applications, making use of a wide bearing surface



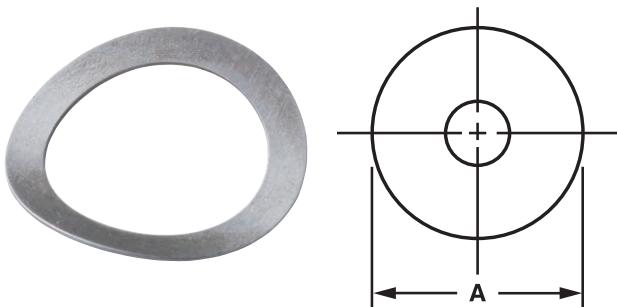
Curved Disc Springs

CURVED

The cylindrically Curved Disc Spring, or curved disc washer, is well suited for applications requiring flexibility, light loads (from ounces up to about 100 pounds), and repeated cycles through a range of motion. The curved disc spring exhibits the most uniform spring constant over the widest

range of deflection compared to the wave and Belleville type disc springs.

Curved disc springs are available in spring steel; call for availability of stainless.

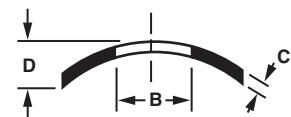


TOLERANCE

A = $\pm .010$ C = Commercial
 B = Up to/including No. 10: $\pm .005$ D = $\pm .010$
 Over No. 10: $\pm .010$

| CENTURY STOCK NUMBER | SCREW SIZE | B (I.D.) | | A (O.D.) | | D | | C | | Calc. Load at App. Defl. (Lbs) | App. Defl. (Inches) | (mm) |
|----------------------|------------|----------|--------|----------|--------|--------|--------|--------|--------|-----------------------------------|------------------------|-----------|
| | | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | | | |
| CRV-24417 | #00 | .040 | 1.02 | .105 | 2.67 | .018 | .46 | .006 | .15 | 3.3 | 14.21 | .002 .05 |
| CRV-24419 | #00 | .043 | 1.09 | .088 | 2.24 | .015 | .38 | .004 | .10 | 1.2 | 5.33 | .002 .05 |
| CRV-24421 | #00 | .047 | 1.19 | .120 | 3.05 | .025 | .64 | .004 | .10 | 1.4 | 6.22 | .004 .10 |
| CRV-24423 | #00 | .047 | 1.19 | .120 | 3.05 | .032 | .81 | .004 | .10 | 1.4 | 6.22 | .004 .10 |
| CRV-24425 | #00 | .051 | 1.30 | .378 | 9.60 | .047 | 1.19 | .005 | .13 | 3.1 | 13.76 | .035 .89 |
| CRV-24427 | #00 | .052 | 1.32 | .133 | 3.38 | .035 | .89 | .005 | .13 | 2.2 | 9.77 | .004 .10 |
| CRV-24429 | #00 | .055 | 1.40 | .240 | 6.10 | .040 | 1.02 | .015 | .38 | 25.4 | 112.78 | .005 .13 |
| CRV-24431 | #00 | .055 | 1.40 | .350 | 8.89 | .060 | 1.52 | .005 | .13 | 3.0 | 13.32 | .030 .76 |
| CRV-24433 | #00 | .059 | 1.50 | .183 | 4.65 | .047 | 1.19 | .005 | .13 | 2.4 | 10.66 | .008 .20 |
| CRV-24435 | #0 | .064 | 1.63 | .130 | 3.30 | .025 | .64 | .006 | .15 | 2.6 | 11.54 | .003 .08 |
| CRV-24437 | #0 | .064 | 1.63 | .130 | 3.30 | .032 | .81 | .006 | .15 | 2.6 | 11.54 | .003 .08 |
| CRV-24439 | #0 | .064 | 1.63 | .250 | 6.35 | .030 | .76 | .003 | .08 | .9 | 4.00 | .025 .64 |
| CRV-24441 | #0 | .064 | 1.63 | .379 | 9.63 | .047 | 1.19 | .010 | .25 | 12.1 | 53.72 | .018 .46 |
| CRV-24443 | #0 | .065 | 1.65 | .133 | 3.38 | .037 | .94 | .008 | .20 | 4.7 | 20.87 | .003 .08 |
| CRV-24445 | #0 | .065 | 1.65 | .371 | 9.42 | .065 | 1.65 | .018 | .46 | 39.1 | 173.60 | .009 .23 |
| CRV-24449 | #0 | .068 | 1.73 | .145 | 3.68 | .030 | .76 | .005 | .13 | 1.9 | 8.44 | .005 .13 |
| CRV-24451 | #0 | .070 | 1.78 | .240 | 6.10 | .055 | 1.40 | .005 | .13 | 2.5 | 11.10 | .014 .36 |
| CRV-24453 | #0 | .075 | 1.91 | .158 | 4.01 | .047 | 1.19 | .003 | .08 | .6 | 2.66 | .010 .25 |
| CRV-24455 | #1 | .084 | 2.13 | .130 | 3.30 | .035 | .89 | .008 | .20 | 3.3 | 14.65 | .003 .08 |
| CRV-24459 | #1 | .092 | 2.34 | .163 | 4.14 | .047 | 1.19 | .005 | .13 | 1.5 | 6.66 | .006 .15 |
| CRV-24461 | #1 | .093 | 2.36 | .170 | 4.32 | .026 | .66 | .004 | .10 | 1.0 | 4.44 | .009 .23 |
| CRV-24463 | #2 | .095 | 2.41 | .312 | 7.92 | .077 | 1.96 | .007 | .18 | 4.9 | 21.76 | .017 .43 |
| CRV-24465 | #2 | .095 | 2.41 | .320 | 8.13 | .055 | 1.40 | .008 | .20 | 6.6 | 29.30 | .016 .41 |
| CRV-24467 | #2 | .096 | 2.44 | .140 | 3.56 | .031 | .79 | .003 | .08 | .4 | 1.78 | .008 .20 |
| CRV-24469 | #2 | .096 | 2.44 | .250 | 6.35 | .040 | 1.02 | .005 | .13 | 2.2 | 9.77 | .015 .38 |
| CRV-24471 | #2 | .097 | 2.46 | .193 | 4.90 | .047 | 1.19 | .005 | .13 | 1.8 | 7.99 | .009 .23 |
| CRV-24473 | #2 | .097 | 2.46 | .193 | 4.90 | .047 | 1.19 | .010 | .25 | 7.2 | 31.97 | .005 .13 |
| CRV-24475 | #2 | .097 | 2.46 | .210 | 5.33 | .040 | 1.02 | .010 | .25 | 7.8 | 34.63 | .005 .13 |
| CRV-24477 | #2 | .097 | 2.46 | .302 | 7.67 | .030 | .76 | .006 | .15 | 3.5 | 15.54 | .019 .48 |
| CRV-24479 | #2 | .097 | 2.46 | .302 | 7.67 | .030 | .76 | .008 | .20 | 8.0 | 35.52 | .012 .30 |
| CRV-24481 | #2 | .098 | 2.49 | .403 | 10.24 | .047 | 1.19 | .006 | .15 | 3.9 | 17.32 | .033 .84 |
| CRV-24483 | #2 | .098 | 2.49 | .438 | 11.13 | .060 | 1.52 | .010 | .25 | 11.3 | 50.17 | .023 .58 |
| CRV-24485 | #2 | .099 | 2.51 | .205 | 5.21 | .040 | 1.02 | .010 | .25 | 7.5 | 33.30 | .005 .13 |
| CRV-26100 | 3/32 | .100 | 2.54 | .215 | 5.46 | .028 | .71 | .005 | .11 | 1.5 | 6.68 | .013 .33 |
| CRV-26102 | 3/32 | .100 | 2.54 | .215 | 5.46 | .025 | .64 | .006 | .14 | 2.3 | 10.01 | .010 .25 |
| CRV-24487 | #2 | .100 | 2.54 | .625 | 15.88 | .090 | 2.29 | .010 | .25 | 12.3 | 54.61 | .048 1.22 |
| CRV-24489 | #2 | .101 | 2.57 | .147 | 3.73 | .040 | 1.02 | .005 | .13 | 1.1 | 4.88 | .005 .13 |
| CRV-24491 | #3 | .109 | 2.77 | .203 | 5.16 | .032 | .81 | .005 | .13 | 1.6 | 7.10 | .010 .25 |
| CRV-24493 | #3 | .109 | 2.77 | .250 | 6.35 | .062 | 1.57 | .005 | .13 | 2.0 | 8.88 | .015 .38 |
| CRV-24495 | #3 | .112 | 2.84 | .220 | 5.59 | .025 | .64 | .003 | .08 | .6 | 2.66 | .020 .51 |
| CRV-24497 | #3 | .112 | 2.84 | .240 | 6.10 | .040 | 1.02 | .010 | .25 | 7.8 | 34.63 | .007 .18 |
| CRV-24499 | #3 | .112 | 2.84 | .273 | 6.93 | .047 | 1.19 | .005 | .13 | 2.1 | 9.32 | .018 .46 |
| CRV-24501 | #3 | .112 | 2.84 | .375 | 9.53 | .090 | 2.29 | .005 | .13 | 2.5 | 11.10 | .034 .86 |
| CRV-24503 | #3 | .112 | 2.84 | .437 | 11.10 | .090 | 2.29 | .005 | .13 | 2.7 | 11.99 | .047 1.19 |
| CRV-24505 | #4 | .117 | 2.97 | .313 | 7.95 | .047 | 1.19 | .008 | .20 | 5.8 | 25.75 | .015 .38 |

continued on next page



Curved Disc Springs

CURVED

| CENTURY STOCK NUMBER | SCREW SIZE | B (I.D.) | | A (O.D.) | | D | | C | | Calc. Load at App. Defl. | | App. Defl. | |
|----------------------|------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------------------|--------|------------|------|
| | | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | (Lbs) | (N) | (Inches) | (mm) |
| CRV-24507 | #4 | .118 | 3.00 | .203 | 5.16 | .032 | .81 | .005 | .13 | 1.5 | 6.66 | .010 | .25 |
| CRV-24509 | #4 | .122 | 3.10 | .250 | 6.35 | .036 | .91 | .016 | .41 | 19.2 | 85.25 | .005 | .13 |
| CRV-24511 | #4 | .122 | 3.10 | .377 | 9.58 | .060 | 1.52 | .007 | .18 | 4.8 | 21.31 | .025 | .64 |
| CRV-24513 | #4 | .122 | 3.10 | .378 | 9.60 | .047 | 1.19 | .008 | .20 | 6.3 | 27.97 | .022 | .56 |
| CRV-24515 | #4 | .125 | 3.18 | .247 | 6.27 | .062 | 1.57 | .003 | .08 | .6 | 2.66 | .025 | .64 |
| CRV-24517 | #4 | .125 | 3.18 | .247 | 6.27 | .062 | 1.57 | .005 | .13 | 1.8 | 7.99 | .015 | .38 |
| CRV-24519 | #4 | .125 | 3.18 | .250 | 6.35 | .047 | 1.19 | .008 | .20 | 4.6 | 20.42 | .010 | .25 |
| CRV-24521 | #4 | .125 | 3.18 | .250 | 6.35 | .047 | 1.19 | .012 | .30 | 10.5 | 46.62 | .006 | .15 |
| CRV-24523 | #4 | .125 | 3.18 | .406 | 10.31 | .070 | 1.78 | .008 | .20 | 6.4 | 28.42 | .025 | .64 |
| CRV-24525 | #4 | .126 | 3.20 | .213 | 5.41 | .035 | .89 | .005 | .13 | 1.4 | 6.22 | .011 | .28 |
| CRV-24527 | #4 | .127 | 3.23 | .176 | 4.47 | .032 | .81 | .010 | .25 | 4.0 | 17.76 | .004 | .10 |
| CRV-24529 | #4 | .127 | 3.23 | .213 | 5.41 | .018 | .46 | .005 | .13 | 1.4 | 6.22 | .011 | .28 |
| CRV-24531 | #4 | .127 | 3.23 | .406 | 10.31 | .050 | 1.27 | .005 | .13 | 2.5 | 11.10 | .040 | 1.02 |
| CRV-24470 | #4 | .127 | 3.23 | .500 | 12.70 | .068 | 1.73 | .012 | .30 | — | — | — | — |
| CRV-24533 | #4 | .128 | 3.25 | .198 | 5.03 | .040 | 1.02 | .008 | .20 | 3.3 | 14.65 | .006 | .15 |
| CRV-24535 | #4 | .128 | 3.25 | .230 | 5.84 | .047 | 1.19 | .008 | .20 | 4.1 | 18.20 | .008 | .20 |
| CRV-24537 | #4 | .128 | 3.25 | .240 | 6.10 | .041 | 1.04 | .005 | .13 | 1.7 | 7.55 | .014 | .36 |
| CRV-24539 | #4 | .128 | 3.25 | .240 | 6.10 | .041 | 1.04 | .008 | .20 | 4.3 | 19.09 | .009 | .23 |
| CRV-24541 | #4 | .128 | 3.25 | .250 | 6.35 | .025 | .64 | .012 | .30 | 10.3 | 45.73 | .006 | .15 |
| CRV-24543 | #4 | .128 | 3.25 | .750 | 19.05 | .030 | .76 | .005 | .13 | — | — | — | — |
| CRV-24545 | #5 | .130 | 3.30 | .219 | 5.56 | .032 | .81 | .007 | .18 | 2.9 | 12.88 | .008 | .20 |
| CRV-24549 | #5 | .130 | 3.30 | .468 | 11.89 | .060 | 1.52 | .005 | .13 | 2.6 | 11.54 | .054 | 1.37 |
| CRV-24551 | #5 | .130 | 3.30 | .687 | 17.45 | .060 | 1.52 | .010 | .25 | 10.3 | 45.73 | .050 | 1.27 |
| CRV-24553 | #5 | .132 | 3.35 | .503 | 12.78 | .078 | 1.98 | .010 | .25 | 10.8 | 47.95 | .031 | .79 |
| CRV-24555 | #5 | .133 | 3.38 | .285 | 7.24 | .062 | 1.57 | .006 | .15 | 2.8 | 12.43 | .017 | .43 |
| CRV-24557 | #5 | .134 | 3.40 | .437 | 11.10 | .094 | 2.39 | .010 | .25 | 10.1 | 44.84 | .023 | .58 |
| CRV-26104 | #5 | .135 | 3.43 | .245 | 6.22 | .049 | 1.24 | .004 | .10 | 1.0 | 4.45 | .023 | .58 |
| CRV-24559 | #5 | .135 | 3.43 | .245 | 6.22 | .032 | .81 | .006 | .15 | 2.3 | 10.21 | .012 | .30 |
| CRV-26106 | #5 | .135 | 3.43 | .245 | 6.22 | .034 | .86 | .006 | .15 | 2.0 | 8.90 | .014 | .36 |
| CRV-26108 | #5 | .135 | 3.43 | .270 | 6.86 | .038 | .97 | .005 | .13 | 1.5 | 6.68 | .018 | .46 |
| CRV-26110 | #5 | .135 | 3.43 | .270 | 6.86 | .029 | .74 | .008 | .19 | 3.0 | 13.35 | .011 | .28 |
| CRV-24561 | #5 | .135 | 3.43 | .285 | 7.24 | .062 | 1.57 | .006 | .15 | 2.7 | 11.99 | .017 | .43 |
| CRV-26112 | #5 | .135 | 3.43 | .307 | 7.80 | .037 | .94 | .007 | .18 | 4.0 | 17.80 | .017 | .43 |
| CRV-26114 | #5 | .135 | 3.43 | .307 | 7.80 | .034 | .86 | .009 | .22 | 6.0 | 26.70 | .014 | .36 |
| CRV-24563 | #5 | .136 | 3.45 | .312 | 7.92 | .062 | 1.57 | .006 | .15 | 2.9 | 12.88 | .020 | .51 |
| CRV-24565 | #5 | .136 | 3.45 | .312 | 7.92 | .062 | 1.57 | .010 | .25 | 8.2 | 36.41 | .012 | .30 |
| CRV-24567 | #5 | .136 | 3.45 | .370 | 9.40 | .035 | .89 | .008 | .20 | 5.9 | 26.20 | .021 | .53 |
| CRV-24569 | #5 | .136 | 3.45 | .400 | 10.16 | .065 | 1.65 | .010 | .25 | 9.6 | 42.62 | .020 | .51 |
| CRV-24571 | #5 | .137 | 3.48 | .250 | 6.35 | .020 | .51 | .005 | .13 | 1.6 | 7.10 | .015 | .38 |
| CRV-24573 | #5 | .137 | 3.48 | .253 | 6.43 | .047 | 1.19 | .005 | .13 | 1.6 | 7.10 | .016 | .41 |
| CRV-24577 | #5 | .137 | 3.48 | .283 | 7.19 | .062 | 1.57 | .005 | .13 | 1.8 | 7.99 | .020 | .51 |
| CRV-24575 | #5 | .137 | 3.48 | .283 | 7.19 | .047 | 1.19 | .008 | .20 | 4.8 | 21.31 | .012 | .30 |
| CRV-24579 | #5 | .137 | 3.48 | .283 | 7.19 | .062 | 1.57 | .010 | .25 | 7.5 | 33.30 | .010 | .25 |
| CRV-24581 | #5 | .139 | 3.53 | .317 | 8.05 | .062 | 1.57 | .010 | .25 | 8.2 | 36.41 | .012 | .30 |
| CRV-24583 | #6 | .140 | 3.56 | .365 | 9.27 | .065 | 1.65 | .005 | .13 | 2.2 | 9.77 | .033 | .84 |
| CRV-24585 | #6 | .140 | 3.56 | .406 | 10.31 | .060 | 1.52 | .005 | .13 | 2.4 | 10.66 | .040 | 1.02 |
| CRV-24587 | #6 | .140 | 3.56 | .490 | 12.45 | .080 | 2.03 | .020 | .51 | 41.9 | 186.04 | .015 | .38 |
| CRV-24589 | #6 | .140 | 3.56 | .562 | 14.27 | .060 | 1.52 | .012 | .30 | 15.8 | 70.15 | .032 | .81 |
| CRV-24591 | #6 | .141 | 3.58 | .213 | 5.41 | .048 | 1.22 | .008 | .20 | 3.1 | 13.76 | .007 | .18 |
| CRV-24593 | #6 | .141 | 3.58 | .281 | 7.14 | .047 | 1.19 | .008 | .20 | 4.6 | 20.42 | .012 | .30 |
| CRV-24595 | #6 | .141 | 3.58 | .373 | 9.47 | .062 | 1.57 | .010 | .25 | 9.1 | 40.40 | .017 | .43 |
| CRV-24597 | #6 | .141 | 3.58 | .467 | 11.86 | .058 | 1.47 | .010 | .25 | 10.2 | 45.29 | .027 | .69 |
| CRV-24599 | #6 | .144 | 3.66 | .312 | 7.92 | .047 | 1.19 | .016 | .41 | 20.2 | 89.69 | .007 | .18 |
| CRV-24601 | #6 | .144 | 3.66 | .312 | 7.92 | .048 | 1.22 | .016 | .41 | 20.2 | 89.69 | .007 | .18 |
| CRV-24603 | #6 | .145 | 3.68 | .312 | 7.92 | .030 | .76 | .003 | .08 | .4 | 1.78 | .027 | .69 |
| CRV-24605 | #6 | .145 | 3.68 | .490 | 12.45 | .080 | 2.03 | .005 | .13 | 2.5 | 11.10 | .059 | 1.50 |
| CRV-24607 | #6 | .147 | 3.73 | .640 | 16.26 | .062 | 1.57 | .005 | .13 | 1.6 | 7.10 | .057 | 1.45 |
| CRV-24609 | #6 | .148 | 3.76 | .200 | 5.08 | .060 | 1.52 | .015 | .38 | 8.5 | 37.74 | .003 | .08 |
| CRV-26116 | #6 | .148 | 3.76 | .270 | 6.86 | .052 | 1.32 | .005 | .11 | 1.3 | 5.56 | .024 | .61 |
| CRV-26118 | #6 | .148 | 3.76 | .270 | 6.86 | .035 | .89 | .007 | .18 | 2.5 | 11.13 | .013 | .33 |
| CRV-26120 | #6 | .148 | 3.76 | .322 | 8.18 | .037 | .94 | .008 | .21 | 5.0 | 22.25 | .016 | .41 |
| CRV-26122 | #6 | .148 | 3.76 | .322 | 8.18 | .034 | .86 | .010 | .25 | 7.5 | 33.38 | .013 | .33 |
| CRV-24611 | #6 | .149 | 3.78 | .277 | 7.04 | .060 | 1.52 | .004 | .10 | 1.0 | 4.44 | .023 | .58 |
| CRV-24613 | #6 | .149 | 3.78 | .277 | 7.04 | .062 | 1.57 | .007 | .18 | 3.3 | 14.65 | .013 | .33 |
| CRV-24615 | #6 | .149 | 3.78 | .322 | 8.18 | .030 | .76 | .010 | .25 | 7.8 | 34.63 | .013 | .33 |
| CRV-24617 | #6 | .150 | 3.81 | .240 | 6.10 | .045 | 1.14 | .010 | .25 | 5.5 | 24.42 | .007 | .18 |
| CRV-24619 | #6 | .150 | 3.81 | .275 | 6.99 | .062 | 1.57 | .005 | .13 | 1.6 | 7.10 | .018 | .46 |
| CRV-24621 | #6 | .155 | 3.94 | .312 | 7.92 | .062 | 1.57 | .010 | .25 | 7.3 | 32.41 | .012 | .30 |
| CRV-24623 | #6 | .157 | 3.99 | .381 | 9.68 | .062 | 1.57 | .010 | .25 | 8.6 | 38.18 | .018 | .46 |
| CRV-24625 | #6 | .159 | 4.04 | .562 | 14.27 | .070 | 1.78 | .015 | .38 | 23.6 | 104.78 | .026 | .66 |
| CRV-24627 | #6 | .161 | 4.09 | .249 | 6.32 | .047 | 1.19 | .005 | .13 | 1.2 | 5.33 | .015 | .38 |
| CRV-24629 | #6 | .161 | 4.09 | .249 | 6.32 | .047 | 1.19 | .007 | .18 | 2.5 | 11.10 | .011 | .28 |

continued on next page

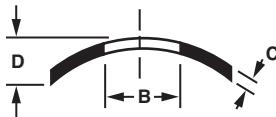


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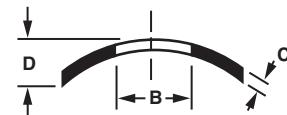
Curved Disc Springs

CURVED

| CENTURY STOCK NUMBER | SCREW SIZE | B (I.D.) | | A (O.D.) | | D | | C | | Calc. Load at App. Defl. | | App. Defl. | |
|----------------------|------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------------------|--------|------------|------|
| | | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | (Lbs) | (N) | (Inches) | (mm) |
| CRV-24631 | #6 | .161 | 4.09 | .249 | 6.32 | .047 | 1.19 | .010 | .25 | 5.1 | 22.64 | .008 | .20 |
| CRV-24633 | #6 | .161 | 4.09 | .301 | 7.65 | .047 | 1.19 | .005 | .13 | 1.7 | 7.55 | .022 | .56 |
| CRV-24635 | #6 | .161 | 4.09 | .302 | 7.67 | .080 | 2.03 | .005 | .13 | 1.7 | 7.55 | .022 | .56 |
| CRV-24637 | #8 | .166 | 4.22 | .270 | 6.86 | .030 | .76 | .008 | .20 | 3.6 | 15.98 | .011 | .28 |
| CRV-24639 | #8 | .168 | 4.27 | .280 | 7.11 | .046 | 1.17 | .010 | .25 | 5.8 | 25.75 | .010 | .25 |
| CRV-24641 | #8 | .169 | 4.29 | .312 | 7.92 | .030 | .76 | .005 | .13 | 1.6 | 7.10 | .024 | .61 |
| CRV-24643 | #8 | .169 | 4.29 | .437 | 11.10 | .060 | 1.52 | .005 | .13 | 2.2 | 9.77 | .047 | 1.19 |
| CRV-24645 | #8 | .169 | 4.29 | .517 | 13.13 | .090 | 2.29 | .010 | .25 | 9.8 | 43.51 | .033 | .84 |
| CRV-24647 | #8 | .169 | 4.29 | .518 | 13.16 | .062 | 1.57 | .015 | .38 | 22.2 | 98.57 | .022 | .56 |
| CRV-24649 | #8 | .170 | 4.32 | .405 | 10.29 | .062 | 1.57 | .010 | .25 | 8.5 | 37.74 | .020 | .51 |
| CRV-24651 | #8 | .172 | 4.37 | .241 | 6.12 | .040 | 1.02 | .006 | .15 | 1.5 | 6.66 | .012 | .30 |
| CRV-24653 | #8 | .172 | 4.37 | .302 | 7.67 | .048 | 1.22 | .005 | .13 | 1.5 | 6.66 | .022 | .56 |
| CRV-24655 | #8 | .172 | 4.37 | .344 | 8.74 | .050 | 1.27 | .006 | .15 | 2.6 | 11.54 | .024 | .61 |
| CRV-24657 | #8 | .172 | 4.37 | .365 | 9.27 | .065 | 1.65 | .005 | .13 | 1.9 | 8.44 | .033 | .84 |
| CRV-24659 | #8 | .172 | 4.37 | .562 | 14.27 | .070 | 1.78 | .015 | .38 | 22.9 | 101.68 | .026 | .66 |
| CRV-24661 | #8 | .173 | 4.39 | .625 | 15.88 | .030 | .76 | .015 | .38 | 11.2 | 49.73 | .015 | .38 |
| CRV-24663 | #8 | .174 | 4.42 | .250 | 6.35 | .040 | 1.02 | .015 | .38 | 10.0 | 44.40 | .005 | .13 |
| CRV-24665 | #8 | .174 | 4.42 | .322 | 8.18 | .064 | 1.63 | .005 | .13 | 1.6 | 7.10 | .025 | .64 |
| CRV-26124 | #8 | .174 | 4.42 | .322 | 8.18 | .042 | 1.07 | .008 | .19 | 3.0 | 13.35 | .017 | .43 |
| CRV-26126 | #8 | .174 | 4.42 | .370 | 9.40 | .044 | 1.12 | .009 | .23 | 6.0 | 26.70 | .020 | .51 |
| CRV-26128 | #8 | .174 | 4.42 | .370 | 9.40 | .039 | .99 | .011 | .29 | 9.0 | 40.05 | .015 | .38 |
| CRV-24667 | #8 | .174 | 4.42 | .400 | 10.16 | .030 | .76 | .006 | .15 | 2.1 | 9.32 | .024 | .61 |
| CRV-24669 | #8 | .177 | 4.50 | .993 | 25.22 | .062 | 1.57 | .010 | .25 | 5.2 | 23.09 | .052 | 1.32 |
| CRV-24671 | #8 | .178 | 4.52 | .375 | 9.53 | .090 | 2.29 | .010 | .25 | 7.7 | 34.19 | .017 | .43 |
| CRV-24673 | #8 | .178 | 4.52 | .498 | 12.65 | .062 | 1.57 | .030 | .76 | 84.8 | 376.51 | .010 | .25 |
| CRV-24675 | #8 | .185 | 4.70 | .315 | 8.00 | .062 | 1.57 | .015 | .38 | 13.6 | 60.38 | .008 | .20 |
| CRV-24677 | #8 | .187 | 4.75 | .440 | 11.18 | .030 | .76 | .010 | .25 | 7.1 | 31.52 | .020 | .51 |
| CRV-24679 | #8 | .187 | 4.75 | .440 | 11.18 | .062 | 1.57 | .010 | .25 | 8.4 | 37.30 | .024 | .61 |
| CRV-24681 | #8 | .187 | 4.75 | .562 | 14.27 | .078 | 1.98 | .008 | .20 | 6.2 | 27.53 | .048 | 1.22 |
| CRV-24683 | #8 | .188 | 4.78 | .314 | 7.98 | .047 | 1.19 | .005 | .13 | 1.4 | 6.22 | .024 | .61 |
| CRV-24685 | #8 | .188 | 4.78 | .375 | 9.53 | .040 | 1.02 | .008 | .20 | 4.6 | 20.42 | .021 | .53 |
| CRV-24687 | #8 | .189 | 4.80 | .312 | 7.92 | .062 | 1.57 | .004 | .10 | .9 | 4.00 | .030 | .76 |
| CRV-24689 | #8 | .189 | 4.80 | .343 | 8.71 | .030 | .76 | .010 | .25 | 6.5 | 28.86 | .014 | .36 |
| CRV-24691 | #8 | .190 | 4.83 | .375 | 9.53 | .050 | 1.27 | .005 | .13 | 1.8 | 7.99 | .034 | .86 |
| CRV-24695 | #8 | .193 | 4.90 | .312 | 7.92 | .066 | 1.68 | .006 | .15 | 2.01 | 9.00 | .021 | .53 |
| CRV-24697 | #8 | .193 | 4.90 | .437 | 11.10 | .065 | 1.65 | .008 | .20 | 5.2 | 23.09 | .029 | .74 |
| CRV-24699 | #10 | .194 | 4.93 | .370 | 9.40 | .050 | 1.27 | .008 | .20 | 4.4 | 19.54 | .021 | .53 |
| CRV-24701 | #10 | .194 | 4.93 | .375 | 9.53 | .070 | 1.78 | .006 | .15 | 2.5 | 11.10 | .029 | .74 |
| CRV-24703 | #10 | .194 | 4.93 | .630 | 16.00 | .090 | 2.29 | .020 | .51 | 40.6 | 180.26 | .024 | .61 |
| CRV-24705 | #10 | .195 | 4.95 | .277 | 7.04 | .060 | 1.52 | .005 | .13 | 1.0 | 4.44 | .019 | .48 |
| CRV-24707 | #10 | .195 | 4.95 | .312 | 7.92 | .030 | .76 | .010 | .25 | 5.5 | 24.42 | .012 | .30 |
| CRV-24709 | #10 | .195 | 4.95 | .400 | 10.16 | .060 | 1.52 | .016 | .41 | 19.2 | 85.25 | .012 | .30 |
| CRV-24711 | #10 | .195 | 4.95 | .490 | 12.45 | .030 | .76 | .010 | .25 | 6.0 | 26.64 | .020 | .51 |
| CRV-24713 | #10 | .195 | 4.95 | .562 | 14.27 | .070 | 1.78 | .008 | .20 | 6.1 | 27.08 | .048 | 1.22 |
| CRV-24715 | #10 | .196 | 4.98 | .750 | 19.05 | .093 | 2.36 | .020 | .51 | 43.3 | 192.25 | .034 | .86 |
| CRV-24717 | #10 | .198 | 5.03 | .442 | 11.23 | .062 | 1.57 | .010 | .25 | 8.0 | 35.52 | .024 | .61 |
| CRV-24719 | #10 | .199 | 5.05 | .375 | 9.53 | .041 | 1.04 | .010 | .25 | 6.8 | 30.19 | .017 | .43 |
| CRV-24721 | #10 | .199 | 5.05 | .443 | 11.25 | .055 | 1.40 | .005 | .13 | 2.0 | 8.88 | .048 | 1.22 |
| CRV-24723 | #10 | .200 | 5.08 | .302 | 7.67 | .045 | 1.14 | .005 | .13 | 1.2 | 5.33 | .022 | .56 |
| CRV-26130 | #10 | .200 | 5.08 | .370 | 9.40 | .069 | 1.75 | .006 | .15 | 2.3 | 10.01 | .034 | .86 |
| CRV-26132 | #10 | .200 | 5.08 | .370 | 9.40 | .047 | 1.19 | .009 | .23 | 4.5 | 20.03 | .019 | .48 |
| CRV-26134 | #10 | .200 | 5.08 | .423 | 10.74 | .047 | 1.19 | .011 | .29 | 9.0 | 40.05 | .020 | .51 |
| CRV-26136 | #10 | .200 | 5.08 | .423 | 10.74 | .043 | 1.09 | .014 | .36 | 13.5 | 60.08 | .016 | .41 |
| CRV-24725 | #10 | .200 | 5.08 | .430 | 10.92 | .070 | 1.78 | .010 | .25 | 7.8 | 34.63 | .023 | .58 |
| CRV-24727 | #10 | .200 | 5.08 | .990 | 25.15 | .062 | 1.57 | .010 | .25 | 5.0 | 22.20 | .052 | 1.32 |
| CRV-24729 | #10 | .201 | 5.11 | .300 | 7.62 | .050 | 1.27 | .010 | .25 | 4.8 | 21.31 | .011 | .28 |
| CRV-24731 | #10 | .201 | 5.11 | .374 | 9.50 | .065 | 1.65 | .005 | .13 | 1.6 | 7.10 | .034 | .86 |
| CRV-24733 | #10 | .202 | 5.13 | .312 | 7.92 | .062 | 1.57 | .010 | .25 | 5.1 | 22.64 | .012 | .30 |
| CRV-24735 | #10 | .202 | 5.13 | .505 | 12.83 | .062 | 1.57 | .005 | .13 | 2.0 | 8.88 | .057 | 1.45 |
| CRV-24737 | #10 | .202 | 5.13 | .505 | 12.83 | .062 | 1.57 | .012 | .30 | 12.6 | 55.94 | .026 | .66 |
| CRV-26138 | #10 | .203 | 5.16 | .322 | 8.18 | .053 | 1.35 | .005 | .13 | 1.1 | 4.98 | .027 | .69 |
| CRV-26140 | #10 | .203 | 5.16 | .322 | 8.18 | .043 | 1.09 | .007 | .17 | 1.8 | 7.79 | .018 | .46 |
| CRV-24480 | #10 | .203 | 5.16 | .322 | 8.18 | .060 | 1.52 | .015 | .38 | — | — | — | — |
| CRV-24739 | #10 | .203 | 5.16 | .365 | 9.27 | .032 | .81 | .005 | .13 | 1.3 | 5.77 | .027 | .69 |
| CRV-25100 | #10 | .203 | 5.16 | .375 | 9.53 | .062 | 1.57 | .005 | .13 | 1.6 | 7.10 | .034 | .86 |
| CRV-25102 | #10 | .203 | 5.16 | .375 | 9.53 | .062 | 1.57 | .010 | .25 | 6.7 | 29.75 | .017 | .43 |
| CRV-25104 | #10 | .203 | 5.16 | .406 | 10.31 | .047 | 1.19 | .005 | .13 | 1.8 | 7.99 | .040 | 1.02 |
| CRV-25106 | #10 | .203 | 5.16 | .438 | 11.13 | .070 | 1.78 | .010 | .25 | 7.8 | 34.63 | .023 | .58 |
| CRV-25108 | #10 | .203 | 5.16 | .500 | 12.70 | .080 | 2.03 | .015 | .38 | 19.6 | 87.02 | .020 | .51 |
| CRV-25110 | #10 | .203 | 5.16 | .501 | 12.73 | .074 | 1.88 | .015 | .38 | 19.6 | 87.02 | .020 | .51 |
| CRV-25112 | #10 | .204 | 5.18 | .438 | 11.13 | .070 | 1.78 | .010 | .25 | 7.8 | 34.63 | .023 | .58 |

continued on next page

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Curved Disc Springs

CURVED

| CENTURY STOCK NUMBER | SCREW SIZE | B (I.D.) | | A (O.D.) | | D | | C | | Calc. Load at App. Defl. | | App. Defl. | |
|----------------------|------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------------------|---------|------------|------|
| | | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | (Lbs) | (N) | (Inches) | (mm) |
| CRV-25114 | #10 | .204 | 5.18 | .565 | 14.35 | .052 | 1.32 | .025 | .64 | 58.5 | 259.74 | .016 | .41 |
| CRV-25116 | #10 | .204 | 5.18 | .640 | 16.26 | .045 | 1.14 | .005 | .13 | .9 | 4.00 | .040 | 1.02 |
| CRV-25118 | #10 | .205 | 5.21 | .369 | 9.37 | .080 | 2.03 | .005 | .13 | 1.6 | 7.10 | .033 | .84 |
| CRV-25120 | #10 | .205 | 5.21 | .500 | 12.70 | .080 | 2.03 | .015 | .38 | 19.4 | 86.14 | .020 | .51 |
| CRV-25122 | #10 | .205 | 5.21 | 1.010 | 25.65 | .085 | 2.16 | .063 | 1.60 | 463.9 | 2059.72 | .020 | .51 |
| CRV-25124 | #10 | .208 | 5.28 | .563 | 14.30 | .062 | 1.57 | .012 | .30 | 13.3 | 59.05 | .032 | .81 |
| CRV-25126 | #12 | .220 | 5.59 | .406 | 10.31 | .060 | 1.52 | .005 | .13 | 1.6 | 7.10 | .040 | 1.02 |
| CRV-25128 | #12 | .220 | 5.59 | .740 | 18.80 | .130 | 3.30 | .010 | .25 | 10.3 | 45.73 | .067 | 1.70 |
| CRV-25130 | #12 | .228 | 5.79 | .375 | 9.53 | .041 | 1.04 | .010 | .25 | 5.7 | 25.31 | .017 | .43 |
| CRV-25132 | #12 | .228 | 5.79 | .468 | 11.89 | .125 | 3.18 | .016 | .41 | 19.2 | 85.25 | .017 | .43 |
| CRV-26142 | #12 | .231 | 5.87 | .423 | 10.74 | .081 | 2.06 | .007 | .17 | 2.5 | 11.13 | .039 | .99 |
| CRV-25134 | #12 | .231 | 5.87 | .423 | 10.74 | .050 | 1.27 | .010 | .25 | 6.6 | 29.30 | .022 | .56 |
| CRV-26144 | #12 | .231 | 5.87 | .490 | 12.45 | .057 | 1.45 | .012 | .30 | 10.0 | 44.50 | .025 | .64 |
| CRV-26146 | #12 | .231 | 5.87 | .490 | 12.45 | .050 | 1.27 | .015 | .38 | 15.0 | 66.75 | .018 | .46 |
| CRV-25136 | #12 | .234 | 5.94 | .438 | 11.13 | .077 | 1.96 | .010 | .25 | 6.8 | 30.19 | .023 | .58 |
| CRV-25138 | #12 | .234 | 5.94 | .630 | 16.00 | .062 | 1.57 | .012 | .30 | 13.2 | 58.61 | .040 | 1.02 |
| CRV-25140 | #12 | .235 | 5.97 | .325 | 8.26 | .047 | 1.19 | .010 | .25 | 4.0 | 17.76 | .013 | .33 |
| CRV-25142 | #12 | .235 | 5.97 | .410 | 10.41 | .062 | 1.57 | .010 | .25 | 6.2 | 27.53 | .021 | .53 |
| CRV-25144 | #12 | .239 | 6.07 | .438 | 11.13 | .095 | 2.41 | .010 | .25 | 6.6 | 29.30 | .023 | .58 |
| CRV-25146 | #12 | .239 | 6.07 | .500 | 12.70 | .050 | 1.27 | .015 | .38 | 17.2 | 76.37 | .020 | .51 |
| CRV-25148 | #12 | .239 | 6.07 | .625 | 15.88 | .100 | 2.54 | .015 | .38 | 20.3 | 90.13 | .032 | .81 |
| CRV-25150 | #14 | .250 | 6.35 | .437 | 11.10 | .047 | 1.19 | .010 | .25 | 6.2 | 27.53 | .023 | .58 |
| CRV-25152 | #14 | .250 | 6.35 | .437 | 11.10 | .090 | 2.29 | .010 | .25 | 6.2 | 27.53 | .023 | .58 |
| CRV-25154 | #14 | .250 | 6.35 | .495 | 12.57 | .125 | 3.18 | .007 | .18 | 3.5 | 15.54 | .043 | 1.09 |
| CRV-25156 | #14 | .250 | 6.35 | .500 | 12.70 | .078 | 1.98 | .006 | .15 | 2.6 | 11.54 | .051 | 1.30 |
| CRV-25158 | #14 | .250 | 6.35 | .562 | 14.27 | .078 | 1.98 | .020 | .51 | 32.5 | 144.30 | .019 | .48 |
| CRV-25160 | #14 | .250 | 6.35 | .625 | 15.88 | .078 | 1.98 | .020 | .51 | 35.2 | 156.29 | .024 | .61 |
| CRV-25162 | #14 | .251 | 6.38 | .562 | 14.27 | .037 | .94 | .007 | .18 | 2.1 | 9.32 | .030 | .76 |
| CRV-25164 | #14 | .251 | 6.38 | .750 | 19.05 | .070 | 1.78 | .030 | .76 | 87.8 | 389.83 | .023 | .58 |
| CRV-25166 | #14 | .252 | 6.40 | 1.065 | 27.05 | .093 | 2.36 | .015 | .38 | 21.2 | 94.13 | .078 | 1.98 |
| CRV-25168 | 1/4 | .253 | 6.43 | .406 | 10.31 | .030 | .76 | .005 | .13 | .8 | 3.55 | .025 | .64 |
| CRV-25170 | 1/4 | .253 | 6.43 | .469 | 11.91 | .047 | 1.19 | .010 | .25 | 6.7 | 29.75 | .027 | .69 |
| CRV-25172 | 1/4 | .254 | 6.45 | .497 | 12.62 | .100 | 2.54 | .006 | .15 | 2.5 | 11.10 | .050 | 1.27 |
| CRV-25174 | 1/4 | .254 | 6.45 | .497 | 12.62 | .100 | 2.54 | .010 | .25 | 7.1 | 31.52 | .030 | .76 |
| CRV-25176 | 1/4 | .255 | 6.48 | .750 | 19.05 | .093 | 2.36 | .012 | .30 | 13.9 | 61.72 | .057 | 1.45 |
| CRV-25178 | 1/4 | .256 | 6.50 | .406 | 10.31 | .032 | .81 | .006 | .15 | 1.5 | 6.66 | .026 | .66 |
| CRV-25180 | 1/4 | .257 | 6.53 | .438 | 11.13 | .040 | 1.02 | .005 | .13 | 1.1 | 4.88 | .035 | .89 |
| CRV-25182 | 1/4 | .257 | 6.53 | .438 | 11.13 | .047 | 1.19 | .015 | .38 | 13.6 | 60.38 | .016 | .41 |
| CRV-25184 | 1/4 | .258 | 6.55 | .680 | 17.27 | .080 | 2.03 | .010 | .25 | 9.1 | 40.40 | .057 | 1.45 |
| CRV-25186 | 1/4 | .259 | 6.58 | .406 | 10.31 | .062 | 1.57 | .018 | .46 | 17.2 | 76.37 | .011 | .28 |
| CRV-25188 | 1/4 | .259 | 6.58 | .562 | 14.27 | .080 | 2.03 | .018 | .46 | 25.6 | 113.66 | .021 | .53 |
| CRV-25190 | 1/4 | .259 | 6.58 | .691 | 17.55 | .070 | 1.78 | .006 | .15 | 2.1 | 9.32 | .064 | 1.63 |
| CRV-25192 | 1/4 | .260 | 6.60 | .495 | 12.57 | .125 | 3.18 | .007 | .18 | 3.4 | 15.10 | .043 | 1.09 |
| CRV-25194 | 1/4 | .260 | 6.60 | .508 | 12.90 | .055 | 1.40 | .015 | .38 | 16.1 | 71.48 | .021 | .53 |
| CRV-25196 | 1/4 | .261 | 6.63 | .740 | 18.80 | .130 | 3.30 | .010 | .25 | 9.4 | 41.74 | .067 | 1.70 |
| CRV-25198 | 1/4 | .261 | 6.63 | .875 | 22.23 | .060 | 1.52 | .030 | .76 | 89.0 | 395.16 | .030 | .76 |
| CRV-25200 | 1/4 | .262 | 6.65 | .378 | 9.60 | .062 | 1.57 | .005 | .13 | 1.1 | 4.88 | .035 | .89 |
| CRV-25202 | 1/4 | .262 | 6.65 | .378 | 9.60 | .062 | 1.57 | .010 | .25 | 4.5 | 19.98 | .017 | .43 |
| CRV-25204 | 1/4 | .262 | 6.65 | .438 | 11.13 | .050 | 1.27 | .010 | .25 | 5.8 | 25.75 | .023 | .58 |
| CRV-25206 | 1/4 | .262 | 6.65 | .562 | 14.27 | .060 | 1.52 | .008 | .20 | 5.0 | 22.20 | .048 | 1.22 |
| CRV-25208 | 1/4 | .263 | 6.68 | .433 | 11.00 | .047 | 1.19 | .005 | .13 | 1.3 | 5.77 | .042 | 1.07 |
| CRV-25210 | 1/4 | .263 | 6.68 | .433 | 11.00 | .047 | 1.19 | .008 | .20 | 3.6 | 15.98 | .029 | .74 |
| CRV-25212 | 1/4 | .263 | 6.68 | .433 | 11.00 | .047 | 1.19 | .015 | .38 | 12.9 | 57.28 | .015 | .38 |
| CRV-25214 | 1/4 | .263 | 6.68 | .437 | 11.10 | .062 | 1.57 | .005 | .13 | 1.4 | 6.22 | .047 | 1.19 |
| CRV-25216 | 1/4 | .263 | 6.68 | .437 | 11.10 | .062 | 1.57 | .008 | .20 | 3.7 | 16.43 | .029 | .74 |
| CRV-25218 | 1/4 | .263 | 6.68 | .437 | 11.10 | .062 | 1.57 | .012 | .30 | 8.4 | 37.30 | .019 | .48 |
| CRV-25220 | 1/4 | .265 | 6.73 | .406 | 10.31 | .044 | 1.12 | .010 | .25 | 5.0 | 22.20 | .020 | .51 |
| CRV-25222 | 1/4 | .265 | 6.73 | .406 | 10.31 | .062 | 1.57 | .010 | .25 | 5.0 | 22.20 | .020 | .51 |
| CRV-25224 | 1/4 | .265 | 6.73 | .490 | 12.45 | .092 | 2.34 | .008 | .20 | 4.3 | 19.09 | .037 | .94 |
| CRV-26148 | 1/4 | .265 | 6.73 | .490 | 12.45 | .063 | 1.60 | .011 | .28 | 7.0 | 31.15 | .029 | .74 |
| CRV-25226 | 1/4 | .265 | 6.73 | .500 | 12.70 | .070 | 1.78 | .020 | .51 | 27.5 | 122.10 | .015 | .38 |
| CRV-25228 | 1/4 | .265 | 6.73 | .508 | 12.90 | .093 | 2.36 | .010 | .25 | 7.0 | 31.08 | .032 | .81 |
| CRV-25230 | 1/4 | .265 | 6.73 | .508 | 12.90 | .093 | 2.36 | .015 | .38 | 15.7 | 69.71 | .021 | .53 |
| CRV-25232 | 1/4 | .265 | 6.73 | .508 | 12.90 | .093 | 2.36 | .028 | .71 | 59.0 | 261.96 | .011 | .28 |
| CRV-26150 | 1/4 | .265 | 6.73 | .551 | 14.00 | .060 | 1.52 | .015 | .37 | 14.0 | 62.30 | .026 | .66 |
| CRV-26152 | 1/4 | .265 | 6.73 | .551 | 14.00 | .052 | 1.32 | .019 | .47 | 21.0 | 93.45 | .018 | .46 |
| CRV-25234 | 1/4 | .265 | 6.73 | .552 | 14.02 | .075 | 1.91 | .008 | .20 | 4.8 | 21.31 | .047 | 1.19 |
| CRV-25236 | 1/4 | .265 | 6.73 | .562 | 14.27 | .125 | 3.18 | .025 | .64 | 48.4 | 214.90 | .015 | .38 |
| CRV-25238 | 1/4 | .265 | 6.73 | .625 | 15.88 | .075 | 1.91 | .015 | .38 | 19.0 | 84.36 | .032 | .81 |
| CRV-26154 | 1/4 | .269 | 6.83 | .423 | 10.74 | .070 | 1.78 | .007 | .17 | 1.8 | 7.79 | .033 | .84 |
| CRV-26156 | 1/4 | .269 | 6.83 | .423 | 10.74 | .055 | 1.40 | .008 | .21 | 2.5 | 11.13 | .023 | .58 |
| CRV-25240 | 1/4 | .269 | 6.83 | .435 | 11.05 | .068 | 1.73 | .010 | .25 | 5.5 | 24.42 | .023 | .58 |

continued on next page

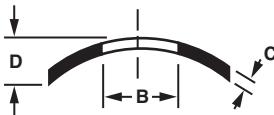


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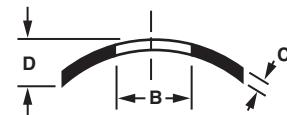
Curved Disc Springs

CURVED

| CENTURY STOCK NUMBER | SCREW SIZE | B (I.D.) | | A (O.D.) | | D | | C | | Calc. Load at App. Defl. | | App. Defl. | |
|----------------------|------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------------------|---------|------------|------|
| | | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | (Lbs) | (N) | (Inches) | (mm) |
| CRV-25242 | 1/4 | .270 | 6.86 | .380 | 9.65 | .060 | 1.52 | .010 | .25 | 4.2 | 18.65 | .018 | .46 |
| CRV-25244 | 1/4 | .270 | 6.86 | .500 | 12.70 | .060 | 1.52 | .010 | .25 | 6.7 | 29.75 | .031 | .79 |
| CRV-25246 | 1/4 | .270 | 6.86 | .500 | 12.70 | .060 | 1.52 | .020 | .51 | 26.9 | 119.44 | .015 | .38 |
| CRV-25248 | 1/4 | .272 | 6.91 | .496 | 12.60 | .060 | 1.52 | .010 | .25 | 6.6 | 29.30 | .030 | .76 |
| CRV-25250 | 1/4 | .275 | 6.99 | .599 | 15.21 | .055 | 1.40 | .010 | .25 | 7.9 | 35.08 | .044 | 1.12 |
| CRV-25252 | 1/4 | .275 | 6.99 | .600 | 15.24 | .035 | .89 | .018 | .46 | 17.9 | 79.48 | .017 | .43 |
| CRV-25254 | 1/4 | .280 | 7.11 | .375 | 9.53 | .030 | .76 | .005 | .13 | .6 | 2.66 | .025 | .64 |
| CRV-25256 | 1/4 | .280 | 7.11 | .500 | 12.70 | .090 | 2.29 | .010 | .25 | 6.4 | 28.42 | .031 | .79 |
| CRV-25258 | 1/4 | .280 | 7.11 | .552 | 14.02 | .075 | 1.91 | .015 | .38 | 16.2 | 71.93 | .025 | .64 |
| CRV-25260 | 1/4 | .280 | 7.11 | .625 | 15.88 | .093 | 2.36 | .006 | .15 | 2.9 | 12.88 | .080 | 2.03 |
| CRV-25262 | 1/4 | .280 | 7.11 | .625 | 15.88 | .093 | 2.36 | .008 | .20 | 5.1 | 22.64 | .060 | 1.52 |
| CRV-25264 | 1/4 | .280 | 7.11 | .625 | 15.88 | .093 | 2.36 | .010 | .25 | 8.0 | 35.52 | .048 | 1.22 |
| CRV-25266 | 1/4 | .280 | 7.11 | .625 | 15.88 | .093 | 2.36 | .012 | .30 | 11.6 | 51.50 | .040 | 1.02 |
| CRV-25268 | 1/4 | .280 | 7.11 | .625 | 15.88 | .093 | 2.36 | .015 | .38 | 18.2 | 80.81 | .032 | .81 |
| CRV-25270 | 1/4 | .280 | 7.11 | .625 | 15.88 | .093 | 2.36 | .020 | .51 | 32.3 | 143.41 | .024 | .61 |
| CRV-25272 | 1/4 | .280 | 7.11 | .740 | 18.80 | .135 | 3.43 | .010 | .25 | 9.1 | 40.40 | .067 | 1.70 |
| CRV-25274 | 1/4 | .290 | 7.37 | .437 | 11.10 | .060 | 1.52 | .005 | .13 | 1.2 | 5.33 | .047 | 1.19 |
| CRV-26158 | 9/32 | .296 | 7.52 | .551 | 14.00 | .101 | 2.57 | .009 | .22 | 4.0 | 17.80 | .046 | 1.17 |
| CRV-25276 | 1/4 | .296 | 7.52 | .551 | 14.00 | .085 | 2.16 | .010 | .25 | 6.7 | 29.75 | .037 | .94 |
| CRV-26160 | 9/32 | .296 | 7.52 | .551 | 14.00 | .070 | 1.78 | .012 | .30 | 8.0 | 35.60 | .032 | .81 |
| CRV-25278 | 1/4 | .301 | 7.65 | .671 | 17.04 | .093 | 2.36 | .012 | .30 | 11.6 | 51.50 | .046 | 1.17 |
| CRV-25280 | 1/4 | .312 | 7.92 | .562 | 14.27 | .093 | 2.36 | .020 | .51 | 26.0 | 115.44 | .019 | .48 |
| CRV-25282 | 1/4 | .315 | 8.00 | .500 | 12.70 | .060 | 1.52 | .010 | .25 | 5.4 | 23.98 | .031 | .79 |
| CRV-25284 | 1/4 | .315 | 8.00 | .625 | 15.88 | .062 | 1.57 | .010 | .25 | 7.2 | 31.97 | .048 | 1.22 |
| CRV-25286 | 5/16 | .315 | 8.00 | .625 | 15.88 | .095 | 2.41 | .010 | .25 | 7.2 | 31.97 | .048 | 1.22 |
| CRV-25288 | 5/16 | .316 | 8.03 | .490 | 12.45 | .040 | 1.02 | .010 | .25 | 5.2 | 23.09 | .029 | .74 |
| CRV-25290 | 5/16 | .316 | 8.03 | .625 | 15.88 | .098 | 2.49 | .020 | .51 | 29.0 | 128.76 | .024 | .61 |
| CRV-25292 | 5/16 | .319 | 8.10 | .500 | 12.70 | .075 | 1.91 | .015 | .38 | 11.9 | 52.84 | .020 | .51 |
| CRV-25294 | 5/16 | .320 | 8.13 | .625 | 15.88 | .080 | 2.03 | .012 | .30 | 10.3 | 45.73 | .040 | 1.02 |
| CRV-25296 | 5/16 | .320 | 8.13 | .688 | 17.48 | .080 | 2.03 | .010 | .25 | 7.8 | 34.63 | .058 | 1.47 |
| CRV-25298 | 5/16 | .323 | 8.20 | .415 | 10.54 | .062 | 1.57 | .003 | .08 | .2 | .89 | .059 | 1.50 |
| CRV-25300 | 5/16 | .323 | 8.20 | .415 | 10.54 | .062 | 1.57 | .008 | .20 | 2.0 | 8.88 | .026 | .66 |
| CRV-25302 | 5/16 | .323 | 8.20 | .415 | 10.54 | .062 | 1.57 | .015 | .38 | 7.3 | 32.41 | .014 | .36 |
| CRV-25304 | 5/16 | .326 | 8.28 | .490 | 12.45 | .062 | 1.57 | .010 | .25 | 4.9 | 21.76 | .029 | .74 |
| CRV-25306 | 5/16 | .326 | 8.28 | 1.000 | 25.40 | .093 | 2.36 | .050 | 1.27 | 247.1 | 1097.12 | .024 | .61 |
| CRV-26162 | 5/16 | .327 | 8.31 | .612 | 15.54 | .113 | 2.87 | .009 | .23 | 4.5 | 20.03 | .053 | 1.35 |
| CRV-26164 | 5/16 | .327 | 8.31 | .612 | 15.54 | .077 | 1.96 | .013 | .33 | 9.0 | 40.05 | .035 | .89 |
| CRV-25308 | 5/16 | .327 | 8.31 | .620 | 15.75 | .085 | 2.16 | .010 | .25 | 6.9 | 30.64 | .047 | 1.19 |
| CRV-26166 | 5/16 | .327 | 8.31 | .735 | 18.67 | .076 | 1.93 | .017 | .43 | 15.0 | 66.75 | .030 | .76 |
| CRV-26168 | 5/16 | .327 | 8.31 | .735 | 18.67 | .070 | 1.78 | .021 | .53 | 22.5 | 100.13 | .025 | .64 |
| CRV-25310 | 5/16 | .328 | 8.33 | .500 | 12.70 | .080 | 2.03 | .008 | .20 | 3.2 | 14.21 | .038 | .97 |
| CRV-25312 | 5/16 | .328 | 8.33 | .562 | 14.27 | .080 | 2.03 | .008 | .20 | 3.9 | 17.32 | .048 | 1.22 |
| CRV-25314 | 5/16 | .328 | 8.33 | .562 | 14.27 | .125 | 3.18 | .025 | .64 | 38.1 | 169.16 | .015 | .38 |
| CRV-25316 | 5/16 | .330 | 8.38 | .750 | 19.05 | .187 | 4.75 | .030 | .76 | 73.9 | 328.12 | .023 | .58 |
| CRV-25318 | 5/16 | .330 | 8.38 | .875 | 22.23 | .040 | 1.02 | .010 | .25 | 2.9 | 12.88 | .030 | .76 |
| CRV-26170 | 5/16 | .331 | 8.41 | .490 | 12.45 | .077 | 1.96 | .008 | .19 | 2.3 | 10.01 | .036 | .91 |
| CRV-26172 | 5/16 | .331 | 8.41 | .490 | 12.45 | .062 | 1.57 | .011 | .28 | 4.5 | 20.03 | .027 | .69 |
| CRV-25320 | 5/16 | .331 | 8.41 | .622 | 15.80 | .093 | 2.36 | .006 | .15 | 2.4 | 10.66 | .079 | 2.01 |
| CRV-25322 | 5/16 | .331 | 8.41 | .622 | 15.80 | .093 | 2.36 | .012 | .30 | 9.8 | 43.51 | .039 | .99 |
| CRV-25324 | 5/16 | .331 | 8.41 | .622 | 15.80 | .093 | 2.36 | .015 | .38 | 15.4 | 68.38 | .032 | .81 |
| CRV-25326 | 5/16 | .331 | 8.41 | .622 | 15.80 | .093 | 2.36 | .025 | .64 | 42.8 | 190.03 | .019 | .48 |
| CRV-25328 | 5/16 | .346 | 8.79 | .761 | 19.33 | .187 | 4.75 | .020 | .51 | 31.9 | 141.64 | .035 | .89 |
| CRV-26174 | 11/32 | .363 | 9.22 | .672 | 17.07 | .120 | 3.05 | .010 | .25 | 5.5 | 24.48 | .057 | 1.45 |
| CRV-25330 | 5/16 | .363 | 9.22 | .672 | 17.07 | .080 | 2.03 | .015 | .38 | 15.1 | 67.04 | .037 | .94 |
| CRV-26176 | 11/32 | .363 | 9.22 | .672 | 17.07 | .081 | 2.06 | .015 | .38 | 11.0 | 48.95 | .034 | .86 |
| CRV-25332 | 5/16 | .375 | 9.53 | .600 | 15.24 | .070 | 1.78 | .025 | .64 | 34.3 | 152.29 | .018 | .46 |
| CRV-25334 | 5/16 | .375 | 9.53 | .750 | 19.05 | .140 | 3.56 | .020 | .51 | 29.3 | 130.09 | .034 | .86 |
| CRV-25336 | 5/16 | .375 | 9.53 | .870 | 22.10 | .109 | 2.77 | .010 | .25 | 8.3 | 36.85 | .093 | 2.36 |
| CRV-25338 | 5/16 | .377 | 9.58 | .465 | 11.81 | .093 | 2.36 | .006 | .15 | .9 | 4.00 | .044 | 1.12 |
| CRV-24664 | 5/16 | .378 | 9.60 | .562 | 14.27 | .080 | 2.03 | .010 | .25 | — | — | — | — |
| CRV-25340 | 5/16 | .378 | 9.60 | .685 | 17.40 | .100 | 2.54 | .005 | .13 | 1.3 | 5.77 | .095 | 2.41 |
| CRV-25342 | 5/16 | .379 | 9.63 | .500 | 12.70 | .070 | 1.78 | .010 | .25 | 3.5 | 15.54 | .031 | .79 |
| CRV-25344 | 5/16 | .379 | 9.63 | .563 | 14.30 | .080 | 2.03 | .010 | .25 | 4.7 | 20.87 | .039 | .99 |
| CRV-25346 | 5/16 | .379 | 9.63 | .563 | 14.30 | .080 | 2.03 | .020 | .51 | 19.1 | 84.80 | .019 | .48 |
| CRV-25348 | 5/16 | .379 | 9.63 | .686 | 17.42 | .093 | 2.36 | .010 | .25 | 6.5 | 28.86 | .058 | 1.47 |
| CRV-25350 | 3/8 | .383 | 9.73 | .625 | 15.88 | .078 | 1.98 | .010 | .25 | 5.6 | 24.86 | .048 | 1.22 |
| CRV-25352 | 3/8 | .383 | 9.73 | .691 | 17.55 | .070 | 1.78 | .008 | .20 | 3.5 | 15.54 | .062 | 1.57 |
| CRV-25354 | 3/8 | .385 | 9.78 | .687 | 17.45 | .040 | 1.02 | .016 | .41 | 10.9 | 48.40 | .024 | .61 |
| CRV-25356 | 3/8 | .390 | 9.91 | .553 | 14.05 | .075 | 1.91 | .006 | .15 | 1.5 | 6.66 | .062 | 1.57 |
| CRV-25358 | 3/8 | .390 | 9.91 | .740 | 18.80 | .140 | 3.56 | .010 | .25 | 6.9 | 30.64 | .067 | 1.70 |
| CRV-25360 | 3/8 | .390 | 9.91 | .740 | 18.80 | .140 | 3.56 | .020 | .51 | 27.7 | 122.99 | .033 | .84 |
| CRV-25362 | 3/8 | .391 | 9.93 | .656 | 16.66 | .125 | 3.18 | .025 | .64 | 37.0 | 164.28 | .021 | .53 |

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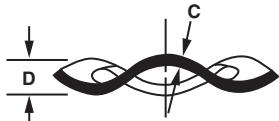
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Curved Disc Springs

CURVED

| CENTURY STOCK NUMBER | SCREW SIZE | B (I.D.) | | A (O.D.) | | D | | C | | Calc. Load at App. Defl. | | App. Defl. | |
|----------------------|------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------------------|--------|------------|------|
| | | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | (Lbs) | (N) | (Inches) | (mm) |
| CRV-26178 | 3/8 | .395 | 10.03 | .735 | 18.67 | .129 | 3.28 | .011 | .28 | 6.0 | 26.70 | .056 | 1.42 |
| CRV-26180 | 3/8 | .395 | 10.03 | .735 | 18.67 | .086 | 2.18 | .016 | .41 | 12.0 | 53.40 | .036 | .91 |
| CRV-25364 | 3/8 | .400 | 10.16 | .600 | 15.24 | .093 | 2.36 | .012 | .30 | 7.0 | 31.08 | .037 | .94 |
| CRV-26182 | 3/8 | .400 | 10.16 | .612 | 15.54 | .098 | 2.49 | .009 | .23 | 3.0 | 13.35 | .042 | 1.07 |
| CRV-26184 | 3/8 | .400 | 10.16 | .612 | 15.54 | .074 | 1.88 | .013 | .33 | 6.0 | 26.70 | .031 | .79 |
| CRV-26186 | 3/8 | .400 | 10.16 | .672 | 17.07 | .115 | 2.92 | .010 | .25 | 4.5 | 20.03 | .056 | 1.42 |
| CRV-26188 | 3/8 | .400 | 10.16 | .672 | 17.07 | .079 | 2.01 | .015 | .38 | 9.0 | 40.05 | .033 | .84 |
| CRV-25366 | 3/8 | .406 | 10.31 | .524 | 13.31 | .060 | 1.52 | .010 | .25 | 3.3 | 14.65 | .034 | .86 |
| CRV-25368 | 3/8 | .438 | 11.13 | .740 | 18.80 | .140 | 3.56 | .015 | .38 | 13.4 | 59.50 | .045 | 1.14 |
| CRV-25370 | 3/8 | .439 | 11.15 | .623 | 15.82 | .093 | 2.36 | .012 | .30 | 6.2 | 27.53 | .040 | 1.02 |
| CRV-25372 | 7/16 | .455 | 11.56 | .740 | 18.80 | .140 | 3.56 | .010 | .25 | 5.6 | 24.86 | .067 | 1.70 |
| CRV-26190 | 7/16 | .462 | 11.73 | .857 | 21.77 | .152 | 3.86 | .012 | .30 | 7.5 | 33.38 | .073 | 1.85 |
| CRV-26192 | 7/16 | .462 | 11.73 | .857 | 21.77 | .100 | 2.54 | .018 | .46 | 15.0 | 66.75 | .043 | 1.09 |
| CRV-26194 | 7/16 | .462 | 11.73 | .980 | 24.89 | .107 | 2.72 | .021 | .53 | 22.5 | 100.13 | .046 | 1.17 |
| CRV-26196 | 7/16 | .467 | 11.86 | .672 | 17.07 | .115 | 2.92 | .010 | .25 | 3.8 | 16.69 | .055 | 1.40 |
| CRV-26198 | 7/16 | .467 | 11.86 | .672 | 17.07 | .084 | 2.13 | .015 | .38 | 7.5 | 33.38 | .039 | .99 |
| CRV-25374 | 7/16 | .468 | 11.89 | .686 | 17.42 | .130 | 3.30 | .005 | .13 | 1.1 | 4.88 | .115 | 2.92 |
| CRV-25376 | 7/16 | .470 | 11.94 | .870 | 22.10 | .116 | 2.95 | .010 | .25 | 6.7 | 29.75 | .093 | 2.36 |
| CRV-25378 | 7/16 | .474 | 12.04 | .709 | 18.01 | .115 | 2.92 | .015 | .38 | 10.9 | 48.40 | .041 | 1.04 |
| CRV-25380 | 7/16 | .477 | 12.12 | .708 | 17.98 | .120 | 3.05 | .010 | .25 | 4.2 | 18.51 | .061 | 1.55 |
| CRV-25382 | 7/16 | .502 | 12.75 | 1.003 | 25.48 | .093 | 2.36 | .012 | .30 | 8.3 | 36.85 | .081 | 2.06 |
| CRV-25384 | 1/2 | .504 | 12.80 | .938 | 23.83 | .100 | 2.54 | .032 | .81 | 69.4 | 308.14 | .034 | .86 |
| CRV-25386 | 1/2 | .505 | 12.83 | .740 | 18.80 | .125 | 3.18 | .010 | .25 | 4.6 | 20.42 | .067 | 1.70 |
| CRV-25388 | 1/2 | .505 | 12.83 | .740 | 18.80 | .130 | 3.30 | .015 | .38 | 10.4 | 46.18 | .045 | 1.14 |
| CRV-25390 | 1/2 | .505 | 12.83 | .815 | 20.70 | .093 | 2.36 | .029 | .74 | 46.9 | 208.24 | .028 | .71 |
| CRV-25394 | 1/2 | .514 | 13.06 | .874 | 22.20 | .032 | .81 | .020 | .51 | 6.2 | 27.53 | .012 | .30 |
| CRV-25396 | 1/2 | .515 | 13.08 | .875 | 22.23 | .125 | 3.18 | .015 | .38 | 13.5 | 59.94 | .062 | 1.57 |
| CRV-25398 | 1/2 | .516 | 13.11 | .744 | 18.90 | .093 | 2.36 | .010 | .25 | 4.4 | 19.54 | .068 | 1.73 |
| CRV-25402 | 1/2 | .520 | 13.21 | .870 | 22.10 | .109 | 2.77 | .005 | .13 | 5.9 | 26.20 | .093 | 2.36 |
| CRV-26200 | 1/2 | .525 | 13.34 | .980 | 24.89 | .164 | 4.17 | .014 | .36 | 10.0 | 44.50 | .081 | 2.06 |
| CRV-26202 | 1/2 | .525 | 13.34 | .980 | 24.89 | .131 | 3.33 | .018 | .46 | 15.0 | 66.75 | .058 | 1.47 |
| CRV-25404 | 1/2 | .525 | 13.34 | .980 | 24.89 | .110 | 2.79 | .021 | .53 | 30.0 | 133.20 | .056 | 1.42 |
| CRV-26204 | 1/2 | .525 | 13.34 | 1.225 | 31.12 | .151 | 3.84 | .021 | .53 | 25.0 | 111.25 | .066 | 1.68 |
| CRV-26206 | 1/2 | .531 | 13.49 | .795 | 20.19 | .129 | 3.28 | .011 | .29 | 5.0 | 22.25 | .060 | 1.52 |
| CRV-26208 | 1/2 | .531 | 13.49 | .795 | 20.19 | .098 | 2.49 | .017 | .43 | 10.0 | 44.50 | .044 | 1.12 |
| CRV-25406 | 1/2 | .531 | 13.49 | .873 | 22.17 | .156 | 3.96 | .010 | .25 | 5.7 | 25.31 | .093 | 2.36 |
| CRV-25408 | 1/2 | .537 | 13.64 | .753 | 19.13 | .093 | 2.36 | .012 | .30 | 6.0 | 26.64 | .058 | 1.47 |
| CRV-25410 | 1/2 | .585 | 14.86 | .875 | 22.23 | .135 | 3.43 | .010 | .25 | 4.8 | 21.31 | .094 | 2.39 |
| CRV-26210 | 9/16 | .598 | 15.19 | .857 | 21.77 | .145 | 3.68 | .012 | .30 | 5.5 | 24.48 | .071 | 1.80 |
| CRV-26212 | 9/16 | .598 | 15.19 | .857 | 21.77 | .110 | 2.79 | .018 | .46 | 11.0 | 48.95 | .051 | 1.30 |
| CRV-25412 | 1/2 | .600 | 15.24 | .850 | 21.59 | .080 | 2.03 | .020 | .51 | 17.2 | 76.37 | .044 | 1.12 |
| CRV-25414 | 1/2 | .614 | 15.60 | .880 | 22.35 | .062 | 1.57 | .020 | .51 | 15.7 | 69.71 | .042 | 1.07 |
| CRV-25416 | 5/8 | .640 | 16.26 | .750 | 19.05 | .050 | 1.27 | .010 | .25 | 1.2 | 5.33 | .040 | 1.02 |
| CRV-25418 | 5/8 | .640 | 16.26 | .875 | 22.23 | .060 | 1.52 | .010 | .25 | 2.1 | 9.32 | .050 | 1.27 |
| CRV-25420 | 5/8 | .640 | 16.26 | 1.000 | 25.40 | .100 | 2.54 | .030 | .76 | 47.5 | 210.90 | .041 | 1.04 |
| CRV-25422 | 5/8 | .658 | 16.71 | 1.750 | 44.45 | .219 | 5.56 | .020 | .51 | 36.6 | 162.50 | .187 | 4.75 |
| CRV-26214 | 5/8 | .663 | 16.84 | .980 | 24.89 | .169 | 4.29 | .014 | .36 | 7.0 | 31.15 | .077 | 1.96 |
| CRV-26216 | 5/8 | .663 | 16.84 | .980 | 24.89 | .118 | 3.00 | .021 | .53 | 14.0 | 62.30 | .051 | 1.30 |
| CRV-25424 | 5/8 | .665 | 16.89 | .980 | 24.89 | .100 | 2.54 | .020 | .51 | 18.8 | 83.47 | .059 | 1.50 |
| CRV-25426 | 5/8 | .720 | 18.29 | 1.000 | 25.40 | .150 | 3.81 | .015 | .38 | 9.2 | 40.85 | .081 | 2.06 |
| CRV-25428 | 3/4 | .765 | 19.43 | .910 | 23.11 | .100 | 2.54 | .020 | .51 | 9.3 | 41.29 | .051 | 1.30 |
| CRV-26218 | 3/4 | .800 | 20.32 | 1.103 | 28.02 | .185 | 4.70 | .016 | .41 | 8.0 | 35.60 | .087 | 2.21 |
| CRV-26220 | 3/4 | .800 | 20.32 | 1.103 | 28.02 | .138 | 3.51 | .021 | .53 | 12.0 | 53.40 | .069 | 1.75 |
| CRV-25430 | 3/4 | .890 | 22.61 | 1.093 | 27.76 | .130 | 3.30 | .010 | .25 | 2.2 | 9.77 | .120 | 3.05 |
| CRV-25432 | 3/4 | .890 | 22.61 | 1.095 | 27.81 | .093 | 2.36 | .032 | .81 | 28.1 | 124.76 | .046 | 1.17 |



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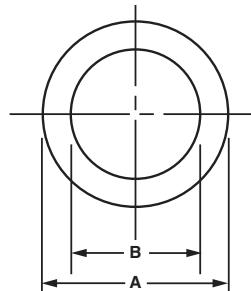
Wave Disc Springs

A Wave Disc Spring or wave disc washer is an efficient method of obtaining the required loading when the load is static, the working range is small, and the allowable amount of axial space is limited. Loads obtainable from wave disc springs are usually in the range of a few pounds to hundreds of pounds. These springs are often used as cushion springs or cushion spacers between parts on shafts, or to take up the expected amount of variation in



assembled parts. Wave disc springs can be made in a large range of sizes.

Wave disc springs are available in spring steel; call for availability of stainless.

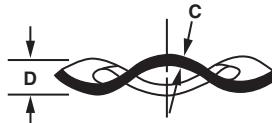


TOLERANCE

| | |
|--|----------------|
| A = $\pm .010$ | C = Commercial |
| B = Up to/including No. 10: $\pm .005$ | D = $\pm .010$ |
| Over No. 10: $\pm .010$ | |

| CENTURY STOCK NUMBER | B (I.D.) | | A (O.D.) | | D | | C Inches Metric | NO. OF WAVES | APP. MAX. LOAD (Lbs) (N) | | APP. DEFL. (Inches) (mm) | |
|----------------------|----------|--------|----------|--------|--------|--------|-----------------------|--------------|-----------------------------|-------|-----------------------------|----------|
| | Inches | Metric | Inches | Metric | Inches | Metric | | | (Lbs) | (N) | (Inches) | (mm) |
| WAV-24981 | .093 | 2.36 | .205 | 5.21 | .030 | .76 | .004 | .10 | — | — | .004 | .10 |
| WAV-24983 | .096 | 2.44 | .187 | 4.75 | .025 | .64 | .005 | .13 | 3 | 7.0 | .31.08 | .003 .08 |
| WAV-24985 | .096 | 2.44 | .250 | 6.35 | .030 | .76 | .004 | .10 | 3 | — | — | .005 .13 |
| WAV-24987 | .098 | 2.49 | .152 | 3.86 | .032 | .81 | .005 | .13 | 3 | 4.0 | 17.76 | .002 .05 |
| WAV-24989 | .110 | 2.79 | .196 | 4.98 | .033 | .84 | .012 | .30 | 3 | 33.7 | 149.63 | .001 .03 |
| WAV-24991 | .110 | 2.79 | .250 | 6.35 | .040 | 1.02 | .008 | .20 | 3 | — | — | .003 .08 |
| WAV-24993 | .120 | 3.05 | .225 | 5.72 | .030 | .76 | .006 | .15 | 3 | 9.4 | 41.74 | .003 .08 |
| WAV-24995 | .125 | 3.18 | .250 | 6.35 | .062 | 1.57 | .032 | .81 | 3 | — | — | .001 .03 |
| WAV-24997 | .128 | 3.25 | .250 | 6.35 | .015 | .38 | .003 | .08 | 3 | 2.5 | 11.10 | .008 .20 |
| WAV-24741 | .128 | 3.25 | .281 | 7.14 | .045 | 1.14 | .006 | .15 | 3 | — | — | .005 .13 |
| WAV-24743 | .128 | 3.25 | .402 | 10.21 | .035 | .89 | .007 | .18 | 3 | — | — | .007 .18 |
| WAV-24745 | .129 | 3.28 | .375 | 9.53 | .040 | 1.02 | .005 | .13 | 3 | — | — | .009 .23 |
| WAV-24747 | .131 | 3.33 | .249 | 6.32 | .015 | .38 | .003 | .08 | 3 | 2.4 | 10.66 | .008 .20 |
| WAV-24749 | .132 | 3.35 | .222 | 5.64 | .032 | .81 | .005 | .13 | 3 | 5.1 | 22.64 | .004 .10 |
| WAV-24750 | .134 | 3.40 | .183 | 4.65 | .023 | .58 | .004 | .09 | 2 | .4 | 1.78 | .012 .30 |
| WAV-24751 | .143 | 3.63 | .282 | 7.16 | .042 | 1.07 | .005 | .13 | 3 | 7.1 | 31.52 | .006 .15 |
| WAV-24753 | .154 | 3.91 | .281 | 7.14 | .042 | 1.07 | .005 | .13 | 3 | 6.1 | 27.08 | .006 .15 |
| WAV-24755 | .155 | 3.94 | .281 | 7.14 | .045 | 1.14 | .006 | .15 | 3 | 8.7 | 38.63 | .005 .13 |
| WAV-24757 | .160 | 4.06 | .345 | 8.76 | .060 | 1.52 | .012 | .30 | 3 | — | — | .003 .08 |
| WAV-24759 | .165 | 4.19 | .250 | 6.35 | .025 | .64 | .005 | .13 | 3 | 3.7 | 16.43 | .006 .15 |
| WAV-24761 | .167 | 4.24 | .375 | 9.53 | .040 | 1.02 | .006 | .15 | 3 | — | — | .008 .20 |
| WAV-24763 | .167 | 4.24 | .375 | 9.53 | .040 | 1.02 | .016 | .41 | 3 | — | — | .003 .08 |
| WAV-24765 | .169 | 4.29 | .306 | 7.77 | .060 | 1.52 | .008 | .20 | 3 | 15.5 | 68.82 | .005 .13 |
| WAV-24767 | .169 | 4.29 | .500 | 12.70 | .050 | 1.27 | .016 | .41 | 3 | — | — | .005 .13 |
| WAV-24769 | .175 | 4.45 | .375 | 9.53 | .030 | .76 | .007 | .18 | 4 | — | — | .004 .10 |
| WAV-24771 | .180 | 4.57 | .343 | 8.71 | .030 | .76 | .010 | .25 | 3 | 26.9 | 119.44 | .005 .13 |
| WAV-24773 | .185 | 4.70 | .375 | 9.53 | .035 | .89 | .006 | .15 | 3 | — | — | .009 .23 |
| WAV-24775 | .187 | 4.75 | .265 | 6.73 | .060 | 1.52 | .008 | .20 | 3 | 7.1 | 31.52 | .004 .10 |
| WAV-24777 | .190 | 4.83 | .281 | 7.14 | .030 | .76 | .010 | .25 | 3 | 13.4 | 59.50 | .004 .10 |
| WAV-24779 | .193 | 4.90 | .280 | 7.11 | .040 | 1.02 | .016 | .41 | 3 | 27.9 | 123.88 | .002 .05 |
| WAV-24780 | .194 | 4.93 | .242 | 6.15 | .030 | .76 | .006 | .14 | 2 | .8 | 3.33 | .015 .38 |
| WAV-24781 | .198 | 5.03 | .438 | 11.13 | .060 | 1.52 | .015 | .38 | 4 | — | — | .003 .08 |
| WAV-24783 | .198 | 5.03 | .438 | 11.13 | .060 | 1.52 | .025 | .64 | 4 | — | — | .002 .05 |
| WAV-24785 | .200 | 5.08 | .307 | 7.80 | .060 | 1.52 | .008 | .20 | 3 | 9.9 | 43.96 | .005 .13 |
| WAV-24787 | .201 | 5.11 | .308 | 7.82 | .040 | 1.02 | .005 | .13 | 3 | — | — | — |
| WAV-24789 | .203 | 5.16 | .368 | 9.35 | .045 | 1.14 | .016 | .41 | 3 | 62.2 | 276.17 | .003 .08 |
| WAV-24791 | .203 | 5.16 | .375 | 9.53 | .031 | .79 | .005 | .13 | 3 | 6.3 | 27.97 | .011 .28 |
| WAV-24793 | .203 | 5.16 | .376 | 9.55 | .055 | 1.40 | .006 | .15 | 4 | 16.2 | 71.93 | .005 .13 |
| WAV-24795 | .203 | 5.16 | .438 | 11.13 | .050 | 1.27 | .010 | .25 | 4 | — | — | .004 .10 |
| WAV-24797 | .206 | 5.23 | .360 | 9.14 | .060 | 1.52 | .010 | .25 | 3 | 22.4 | 99.46 | .005 .13 |
| WAV-24799 | .219 | 5.56 | .414 | 10.52 | .071 | 1.80 | .020 | .51 | 3 | 105.9 | 470.20 | .003 .08 |
| WAV-24801 | .221 | 5.61 | .374 | 9.50 | .050 | 1.27 | .010 | .25 | 3 | 20.7 | 91.91 | .006 .15 |
| WAV-24802 | .243 | 6.17 | .305 | 7.75 | .030 | .76 | .007 | .17 | 2 | .8 | 3.33 | .015 .38 |
| WAV-24805 | .255 | 6.48 | .345 | 8.76 | .030 | .76 | .008 | .20 | 3 | 5.5 | 24.42 | .008 .20 |
| WAV-24807 | .265 | 6.73 | .365 | 9.27 | .030 | .76 | .006 | .15 | 3 | 3.4 | 15.10 | .011 .28 |
| WAV-24809 | .265 | 6.73 | .375 | 9.53 | .030 | .76 | .010 | .25 | 4 | 19.6 | 87.02 | .004 .10 |
| WAV-24811 | .265 | 6.73 | .406 | 10.31 | .030 | .76 | .016 | .41 | 3 | 34.6 | 153.62 | .005 .13 |

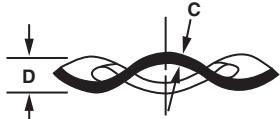
continued on next page



Wave Disc Springs

| CENTURY STOCK NUMBER | B (I.D.) | | A (O.D.) | | D | | C | | NO. OF WAVES | APP. MAX. LOAD | | APP. DEF'L. | |
|----------------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------|----------------|--------|-------------|------|
| | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | | (Lbs) | (N) | (Inches) | (mm) |
| WAV-24813 | .265 | 6.73 | .432 | 10.97 | .045 | 1.14 | .016 | .41 | 3 | 42.1 | 186.92 | .005 | .13 |
| WAV-24815 | .265 | 6.73 | .500 | 12.70 | .045 | 1.14 | .006 | .15 | 3 | 9.5 | 42.18 | .016 | .41 |
| WAV-24817 | .265 | 6.73 | .500 | 12.70 | .045 | 1.14 | .008 | .20 | 3 | 16.8 | 74.59 | .012 | .30 |
| WAV-24819 | .265 | 6.73 | .500 | 12.70 | .045 | 1.14 | .010 | .25 | 3 | 26.3 | 116.77 | .010 | .25 |
| WAV-24821 | .265 | 6.73 | .500 | 12.70 | .045 | 1.14 | .016 | .41 | 3 | 59.3 | 263.29 | .007 | .18 |
| WAV-24823 | .265 | 6.73 | .562 | 14.27 | .070 | 1.78 | .010 | .25 | 3 | — | — | .011 | .28 |
| WAV-24825 | .288 | 7.32 | .410 | 10.41 | .062 | 1.57 | .005 | .13 | 3 | 2.8 | 12.43 | .006 | .15 |
| WAV-24827 | .290 | 7.37 | .531 | 13.49 | .070 | 1.78 | .010 | .25 | 3 | 24.8 | 110.11 | .011 | .28 |
| WAV-24829 | .312 | 7.92 | .463 | 11.76 | .031 | .79 | .016 | .41 | 4 | 54.6 | 242.42 | .004 | .10 |
| WAV-24831 | .312 | 7.92 | .463 | 11.76 | .050 | 1.27 | .020 | .51 | 4 | 97.2 | 431.57 | .003 | .08 |
| WAV-24833 | .322 | 8.18 | .420 | 10.67 | .040 | 1.02 | .006 | .15 | 3 | 2.3 | 10.21 | .015 | .38 |
| WAV-24835 | .325 | 8.26 | .500 | 12.70 | .055 | 1.40 | .008 | .20 | 3 | 10.0 | 44.40 | .014 | .36 |
| WAV-24837 | .325 | 8.26 | .500 | 12.70 | .055 | 1.40 | .015 | .38 | 3 | 35.1 | 155.84 | .008 | .20 |
| WAV-24839 | .328 | 8.33 | .682 | 17.32 | .062 | 1.57 | .010 | .25 | 3 | — | — | .017 | .43 |
| WAV-24841 | .335 | 8.51 | .562 | 14.27 | .060 | 1.52 | .010 | .25 | 4 | 36.0 | 159.84 | .008 | .20 |
| WAV-24843 | .346 | 8.79 | .562 | 14.27 | .080 | 2.03 | .003 | .08 | 3 | — | — | — | — |
| WAV-24845 | .346 | 8.79 | .562 | 14.27 | .080 | 2.03 | .005 | .13 | 3 | 4.6 | 20.42 | .028 | .71 |
| WAV-24847 | .346 | 8.79 | .562 | 14.27 | .080 | 2.03 | .010 | .25 | 3 | 18.5 | 82.14 | .014 | .36 |
| WAV-24848 | .350 | 8.89 | .492 | 12.50 | .035 | .89 | .007 | .18 | 3 | 4.0 | 17.76 | .020 | .51 |
| WAV-24849 | .355 | 9.02 | .500 | 12.70 | .045 | 1.14 | .005 | .13 | 3 | 2.7 | 11.99 | .024 | .61 |
| WAV-24851 | .355 | 9.02 | .561 | 14.25 | .080 | 2.03 | .010 | .25 | 3 | 17.0 | 75.48 | .014 | .36 |
| WAV-24853 | .365 | 9.27 | .485 | 12.32 | .060 | 1.52 | .006 | .15 | 3 | 2.7 | 11.99 | .020 | .51 |
| WAV-24855 | .382 | 9.70 | .625 | 15.88 | .080 | 2.03 | .007 | .18 | 3 | 9.2 | 40.85 | .024 | .61 |
| WAV-24857 | .385 | 9.78 | .500 | 12.70 | .050 | 1.27 | .005 | .13 | 3 | 1.5 | 6.66 | .026 | .66 |
| WAV-24859 | .385 | 9.78 | .500 | 12.70 | .050 | 1.27 | .010 | .25 | 3 | 6.3 | 27.97 | .013 | .33 |
| WAV-24861 | .385 | 9.78 | .531 | 13.49 | .035 | .89 | .010 | .25 | 3 | 9.6 | 42.62 | .015 | .38 |
| WAV-24863 | .386 | 9.80 | .495 | 12.57 | .050 | 1.27 | .010 | .25 | 3 | 10.3 | 45.73 | .013 | .33 |
| WAV-24865 | .390 | 9.91 | .562 | 14.27 | .060 | 1.52 | .010 | .25 | 3 | 12.0 | 53.28 | .015 | .38 |
| WAV-24867 | .390 | 9.91 | .625 | 15.88 | .080 | 2.03 | .016 | .41 | 3 | 40.1 | 178.04 | .012 | .30 |
| WAV-24869 | .390 | 9.91 | .655 | 16.64 | .093 | 2.36 | .010 | .25 | 3 | 20.3 | 90.13 | .018 | .46 |
| WAV-24871 | .390 | 9.91 | .655 | 16.64 | .110 | 2.79 | .016 | .41 | 3 | 45.7 | 202.91 | .012 | .30 |
| WAV-24873 | .390 | 9.91 | .655 | 16.64 | .110 | 2.79 | .020 | .51 | 3 | 81.2 | 360.53 | .009 | .23 |
| WAV-24874 | .397 | 10.08 | .484 | 12.29 | .029 | .74 | .009 | .23 | 3 | 4.0 | 17.76 | .020 | .51 |
| WAV-24875 | .406 | 10.31 | .650 | 16.51 | .085 | 2.16 | .010 | .25 | 3 | 17.7 | 78.59 | .019 | .48 |
| WAV-24877 | .420 | 10.67 | .524 | 13.31 | .068 | 1.73 | .003 | .08 | 3 | .8 | 3.55 | .050 | 1.27 |
| WAV-24879 | .437 | 11.10 | .550 | 13.97 | .036 | .91 | .010 | .25 | 3 | 9.6 | 42.62 | .016 | .41 |
| WAV-24881 | .440 | 11.18 | .618 | 15.70 | .040 | 1.02 | .004 | .10 | 3 | 1.3 | 5.77 | .036 | .91 |
| WAV-24883 | .440 | 11.18 | .618 | 15.70 | .040 | 1.02 | .008 | .20 | 3 | 6.8 | 30.19 | .023 | .58 |
| WAV-24885 | .441 | 11.20 | .654 | 16.61 | .075 | 1.91 | .010 | .25 | 3 | 13.6 | 60.38 | .020 | .51 |
| WAV-24887 | .441 | 11.20 | .655 | 16.64 | .094 | 2.39 | .010 | .25 | 3 | 13.7 | 60.83 | .020 | .51 |
| WAV-24889 | .441 | 11.20 | .655 | 16.64 | .094 | 2.39 | .016 | .41 | 3 | 30.8 | 136.75 | .013 | .33 |
| WAV-24891 | .441 | 11.20 | .750 | 19.05 | .080 | 2.03 | .015 | .38 | 3 | 47.2 | 209.57 | .016 | .41 |
| WAV-24893 | .445 | 11.30 | .610 | 15.49 | .094 | 2.39 | .004 | .10 | 3 | 1.4 | 6.22 | .047 | 1.19 |
| WAV-24895 | .445 | 11.30 | .610 | 15.49 | .094 | 2.39 | .006 | .15 | 3 | 3.3 | 14.65 | .031 | .79 |
| WAV-24897 | .445 | 11.30 | .610 | 15.49 | .094 | 2.39 | .010 | .25 | 3 | 9.3 | 41.29 | .019 | .48 |
| WAV-24899 | .450 | 11.43 | .605 | 15.37 | .050 | 1.27 | .007 | .18 | 3 | 4.0 | 17.76 | .027 | .69 |
| WAV-24901 | .455 | 11.56 | .870 | 22.10 | .094 | 2.39 | .010 | .25 | 3 | 27.0 | 119.88 | .029 | .74 |
| WAV-24902 | .459 | 11.66 | .608 | 15.44 | .037 | .94 | .008 | .20 | 3 | 4.0 | 17.76 | .025 | .64 |
| WAV-24903 | .470 | 11.94 | .880 | 22.35 | .045 | 1.14 | .005 | .13 | 4 | 11.5 | 51.06 | .034 | .86 |
| WAV-24905 | .470 | 11.94 | .880 | 22.35 | .045 | 1.14 | .007 | .18 | 4 | 22.6 | 100.34 | .025 | .64 |
| WAV-24907 | .490 | 12.45 | .610 | 15.49 | .032 | .81 | .008 | .20 | 4 | — | — | — | — |
| WAV-24909 | .505 | 12.83 | .656 | 16.66 | .070 | 1.78 | .006 | .15 | 4 | 4.0 | 17.76 | .021 | .53 |
| WAV-24911 | .505 | 12.83 | .750 | 19.05 | .045 | 1.14 | .010 | .25 | 3 | 13.7 | 60.83 | .026 | .66 |
| WAV-24913 | .515 | 13.08 | .865 | 21.97 | .093 | 2.36 | .010 | .25 | 3 | 20.3 | 90.13 | .032 | .81 |
| WAV-24915 | .520 | 13.21 | .740 | 18.80 | .080 | 2.03 | .016 | .41 | 3 | 25.6 | 113.66 | .018 | .46 |
| WAV-24917 | .530 | 13.46 | .780 | 19.81 | .125 | 3.18 | .012 | .30 | 3 | 22.3 | 99.01 | .022 | .56 |
| WAV-24916 | .530 | 13.46 | .734 | 18.64 | .050 | 1.27 | .009 | .23 | 3 | 5.5 | 24.42 | .030 | .76 |
| WAV-24923 | .545 | 13.84 | .852 | 21.64 | .080 | 2.03 | .032 | .81 | 3 | 168.9 | 749.92 | .010 | .25 |
| WAV-24925 | .560 | 14.22 | .750 | 19.05 | .045 | 1.14 | .010 | .25 | 3 | 8.0 | 35.52 | .029 | .74 |
| WAV-24927 | .563 | 14.30 | .760 | 19.30 | .110 | 2.79 | .018 | .46 | 3 | 27.4 | 121.66 | .016 | .41 |
| WAV-24929 | .565 | 14.35 | .687 | 17.45 | .062 | 1.57 | .010 | .25 | 3 | 8.1 | 35.96 | .026 | .66 |
| WAV-24931 | .580 | 14.73 | .730 | 18.54 | .040 | 1.02 | .010 | .25 | 3 | 9.6 | 42.62 | .029 | .74 |
| WAV-24932 | .588 | 14.94 | .731 | 18.57 | .047 | 1.19 | .009 | .23 | 3 | 4.0 | 17.76 | .030 | .76 |
| WAV-24933 | .609 | 15.47 | .859 | 21.82 | .062 | 1.57 | .010 | .25 | 3 | 10.8 | 47.95 | .036 | .91 |
| WAV-24935 | .620 | 15.75 | .750 | 19.05 | .045 | 1.14 | .010 | .25 | 4 | 14.1 | 62.60 | .018 | .46 |
| WAV-24937 | .640 | 16.26 | .866 | 22.00 | .045 | 1.14 | .020 | .51 | 3 | 41.6 | 184.70 | .017 | .43 |
| WAV-24939 | .641 | 16.28 | .875 | 22.23 | .125 | 3.18 | .008 | .20 | 3 | 5.8 | 25.75 | .048 | 1.22 |
| WAV-24941 | .642 | 16.31 | 1.000 | 25.40 | .105 | 2.67 | .016 | .41 | 3 | 36.6 | 162.50 | .030 | .76 |
| WAV-24943 | .650 | 16.51 | .790 | 20.07 | .062 | 1.57 | .010 | .25 | 3 | 8.1 | 35.96 | .035 | .89 |
| WAV-24944 | .650 | 16.51 | .855 | 21.72 | .060 | 1.52 | .010 | .25 | 3 | 5.5 | 24.42 | .030 | .76 |
| WAV-24945 | .688 | 17.48 | .937 | 23.80 | .141 | 3.58 | .012 | .30 | 3 | 12.9 | 57.28 | .037 | .94 |
| WAV-24947 | .691 | 17.55 | 1.000 | 25.40 | .092 | 2.34 | .010 | .25 | 3 | 12.3 | 54.61 | .048 | 1.22 |
| WAV-24949 | .695 | 17.65 | .945 | 24.00 | .078 | 1.98 | .025 | .64 | 3 | 55.4 | 245.98 | .018 | .46 |

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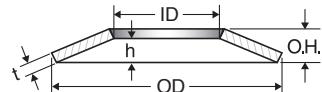
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www.centurydiscsprings.com

Wave Disc Springs

| CENTURY STOCK NUMBER | B (I.D.) | | A (O.D.) | | D | | C | | NO. OF WAVES | APP. MAX. LOAD | | APP. DEFL. | |
|----------------------|----------|--------|----------|--------|--------|--------|--------|--------|--------------|----------------|---------|------------|------|
| | Inches | Metric | Inches | Metric | Inches | Metric | Inches | Metric | | (Lbs) | (N) | (Inches) | (mm) |
| WAV-24951 | .700 | 17.78 | .850 | 21.59 | .090 | 2.29 | .010 | .25 | 3 | 8.1 | 35.96 | .040 | 1.02 |
| WAV-24953 | .700 | 17.78 | .875 | 22.23 | .090 | 2.29 | .007 | .18 | 3 | 4.5 | 19.98 | .059 | 1.50 |
| WAV-24955 | .718 | 18.24 | .920 | 23.37 | .050 | 1.27 | .010 | .25 | 3 | 9.2 | 40.85 | .040 | 1.02 |
| WAV-24957 | .718 | 18.24 | 1.000 | 25.40 | .087 | 2.21 | .010 | .25 | 3 | 10.1 | 44.84 | .049 | 1.24 |
| WAV-24958 | .719 | 18.26 | .925 | 23.50 | .066 | 1.68 | .010 | .25 | 3 | 7.5 | 33.30 | .033 | .84 |
| WAV-24959 | .750 | 19.05 | 1.000 | 25.40 | .136 | 3.45 | .012 | .30 | 3 | 11.2 | 49.73 | .043 | 1.09 |
| WAV-24961 | .767 | 19.48 | 1.125 | 28.58 | .105 | 2.67 | .016 | .41 | 3 | 27.3 | 121.21 | .040 | 1.02 |
| WAV-24962 | .780 | 19.81 | 1.004 | 25.50 | .071 | 1.80 | .011 | .27 | 3 | 8.5 | 37.74 | .036 | .91 |
| WAV-24963 | .780 | 19.81 | 1.060 | 26.92 | .120 | 3.05 | .008 | .20 | 3 | 5.6 | 24.86 | .071 | 1.80 |
| WAV-24965 | .781 | 19.84 | 1.000 | 25.40 | .080 | 2.03 | .012 | .30 | 3 | 14.8 | 65.71 | .044 | 1.12 |
| WAV-24967 | .781 | 19.84 | 1.000 | 25.40 | .080 | 2.03 | .020 | .51 | 3 | 41.2 | 182.93 | .027 | .69 |
| WAV-24969 | .800 | 20.32 | .900 | 22.86 | .090 | 2.29 | .018 | .46 | 3 | 15.9 | 70.60 | .027 | .69 |
| WAV-24971 | .812 | 20.62 | .983 | 24.97 | .080 | 2.03 | .010 | .25 | 3 | 7.9 | 35.08 | .054 | 1.37 |
| WAV-24973 | .812 | 20.62 | 1.095 | 27.81 | .062 | 1.57 | .010 | .25 | 3 | 7.1 | 31.52 | .052 | 1.32 |
| WAV-24975 | .828 | 21.03 | 1.432 | 36.37 | .125 | 3.18 | .020 | .51 | 3 | 87.4 | 388.06 | .043 | 1.09 |
| WAV-24976 | .839 | 21.31 | 1.080 | 27.43 | .073 | 1.85 | .012 | .29 | 3 | 10.0 | 44.40 | .036 | .91 |
| WAV-25000 | .856 | 21.74 | 1.102 | 27.99 | .075 | 1.91 | .012 | .30 | 3 | 8.4 | 37.30 | .054 | 1.37 |
| WAV-25002 | .885 | 22.48 | 1.311 | 33.30 | .125 | 3.18 | .007 | .18 | 4 | 11.8 | 52.39 | .065 | 1.65 |
| WAV-25004 | .901 | 22.89 | 1.150 | 29.21 | .060 | 1.52 | .012 | .30 | 3 | 12.0 | 53.28 | .048 | 1.22 |
| WAV-25005 | .901 | 22.89 | 1.159 | 29.44 | .080 | 2.03 | .013 | .33 | 3 | 12.0 | 53.28 | .040 | 1.02 |
| WAV-25096 | .910 | 23.11 | 1.410 | 35.81 | .120 | 3.05 | .020 | .51 | 3 | 64.0 | 284.16 | .045 | 1.14 |
| WAV-25008 | .914 | 23.22 | 1.078 | 27.38 | .120 | 3.05 | .005 | .13 | 3 | 1.4 | 6.22 | .115 | 2.92 |
| WAV-25010 | .915 | 23.24 | 1.110 | 28.19 | .120 | 3.05 | .010 | .25 | 3 | 8.0 | 35.52 | .069 | 1.75 |
| WAV-25012 | .926 | 23.52 | 1.116 | 28.35 | .090 | 2.29 | .018 | .46 | 3 | 25.2 | 111.89 | .039 | .99 |
| WAV-25014 | .959 | 24.36 | 1.115 | 28.32 | .055 | 1.40 | .020 | .51 | 3 | 24.5 | 108.78 | .035 | .89 |
| WAV-25016 | .960 | 24.38 | 1.110 | 28.19 | .048 | 1.22 | .012 | .30 | 3 | 5.2 | 23.09 | .036 | .91 |
| WAV-25017 | .961 | 24.41 | 1.235 | 31.37 | .087 | 2.21 | .014 | .36 | 3 | 15.0 | 66.60 | .043 | 1.09 |
| WAV-25018 | .970 | 24.64 | 1.210 | 30.73 | .062 | 1.57 | .012 | .30 | 4 | 23.6 | 104.78 | .037 | .94 |
| WAV-25020 | 1.014 | 25.76 | 1.245 | 31.62 | .145 | 3.68 | .028 | .71 | 3 | 67.2 | 298.37 | .031 | .79 |
| WAV-25022 | 1.015 | 25.78 | 1.250 | 31.75 | .050 | 1.27 | .006 | .15 | 3 | .9 | 4.00 | .044 | 1.12 |
| WAV-25024 | 1.016 | 25.81 | 1.437 | 36.50 | .156 | 3.96 | .012 | .30 | 3 | 15.9 | 70.60 | .084 | 2.13 |
| WAV-25026 | 1.016 | 25.81 | 1.500 | 38.10 | .085 | 2.16 | .016 | .41 | 3 | 29.8 | 132.31 | .070 | 1.78 |
| WAV-25028 | 1.044 | 26.52 | 1.235 | 31.37 | .090 | 2.29 | .018 | .46 | 3 | 22.7 | 100.79 | .048 | 1.22 |
| WAV-25029 | 1.051 | 26.70 | 1.351 | 34.32 | .099 | 2.51 | .015 | .38 | 3 | 18.0 | 79.92 | .049 | 1.24 |
| WAV-25030 | 1.068 | 27.13 | 1.368 | 34.75 | .072 | 1.83 | .020 | .51 | 3 | 41.3 | 183.37 | .050 | 1.27 |
| WAV-25032 | 1.093 | 27.76 | 1.365 | 34.67 | .093 | 2.36 | .012 | .30 | 3 | 12.8 | 56.83 | .081 | 2.06 |
| WAV-25034 | 1.135 | 28.83 | 1.470 | 37.34 | .062 | 1.57 | .012 | .30 | 3 | 4.6 | 20.42 | .050 | 1.27 |
| WAV-25036 | 1.185 | 30.10 | 1.437 | 36.50 | .075 | 1.91 | .020 | .51 | 3 | 30.7 | 136.31 | .055 | 1.40 |
| WAV-25038 | 1.201 | 30.51 | 1.543 | 39.19 | .105 | 2.67 | .016 | .41 | 3 | 26.7 | 118.55 | .079 | 2.01 |
| WAV-25039 | 1.201 | 30.51 | 1.543 | 39.19 | .125 | 3.18 | .020 | .51 | 3 | 31.0 | 137.64 | .062 | 1.57 |
| WAV-25039A | 1.239 | 31.47 | 1.593 | 40.46 | .110 | 2.79 | .018 | .46 | 3 | 24.0 | 106.56 | .055 | 1.40 |
| WAV-25040 | 1.250 | 31.75 | 1.453 | 36.91 | .090 | 2.29 | .016 | .41 | 4 | 28.6 | 126.98 | .043 | 1.09 |
| WAV-25042 | 1.250 | 31.75 | 2.004 | 50.90 | .140 | 3.56 | .032 | .81 | 3 | 160.6 | 713.06 | .059 | 1.50 |
| WAV-25043 | 1.261 | 32.03 | 1.621 | 41.17 | .112 | 2.84 | .019 | .47 | 3 | 25.5 | 113.22 | .056 | 1.42 |
| WAV-25044 | 1.310 | 33.27 | 1.556 | 39.52 | .172 | 4.37 | .020 | .51 | 3 | 28.7 | 127.43 | .069 | 1.75 |
| WAV-25045 | 1.404 | 35.66 | 1.819 | 46.20 | .125 | 3.18 | .020 | .51 | 3 | 30.0 | 133.20 | .062 | 1.57 |
| WAV-25050 | 1.565 | 39.75 | 2.010 | 51.05 | .150 | 3.81 | .032 | .81 | 3 | 106.8 | 474.19 | .067 | 1.70 |
| WAV-25051 | 1.575 | 40.01 | 2.028 | 51.51 | .140 | 3.56 | .022 | .56 | 3 | 35.0 | 155.40 | .069 | 1.75 |
| WAV-25053 | 1.658 | 42.11 | 2.132 | 54.15 | .148 | 3.76 | .023 | .58 | 3 | 38.0 | 168.72 | .073 | 1.85 |
| WAV-25054 | 1.700 | 43.18 | 1.800 | 45.72 | .050 | 1.27 | .025 | .64 | 4 | 14.4 | 63.94 | .025 | .64 |
| WAV-25056 | 1.750 | 44.45 | 2.000 | 50.80 | .150 | 3.81 | .025 | .64 | 4 | 62.1 | 275.72 | .053 | 1.35 |
| WAV-25058 | 1.781 | 45.24 | 2.000 | 50.80 | .187 | 4.75 | .020 | .51 | 4 | 34.5 | 153.18 | .067 | 1.70 |
| WAV-25059 | 1.872 | 47.55 | 2.420 | 61.47 | .168 | 4.27 | .025 | .64 | 3 | 45.0 | 199.80 | .082 | 2.08 |
| WAV-25060 | 2.000 | 50.80 | 2.250 | 57.15 | .200 | 5.08 | .020 | .51 | 3 | 19.7 | 87.47 | .151 | 3.84 |
| WAV-25062 | 2.032 | 51.61 | 2.875 | 73.03 | .215 | 5.46 | .016 | .41 | 4 | 44.2 | 196.25 | .151 | 3.84 |
| WAV-25063 | 2.057 | 52.25 | 2.645 | 67.18 | .184 | 4.67 | .028 | .71 | 3 | 57.0 | 253.08 | .090 | 2.29 |
| WAV-25065 | 2.200 | 55.88 | 2.816 | 71.53 | .197 | 5.00 | .030 | .76 | 3 | 65.0 | 288.60 | .097 | 2.46 |
| WAV-25067 | 2.420 | 61.47 | 3.118 | 79.20 | .207 | 5.26 | .035 | .89 | 3 | 88.0 | 390.72 | .104 | 2.64 |
| WAV-25069 | 2.603 | 66.12 | 3.328 | 84.53 | .227 | 5.77 | .036 | .91 | 3 | 90.0 | 399.60 | .112 | 2.84 |
| WAV-25071 | 2.740 | 69.60 | 3.519 | 89.38 | .234 | 5.94 | .038 | .97 | 3 | 101.0 | 448.44 | .116 | 2.95 |
| WAV-25073 | 3.047 | 77.39 | 3.917 | 99.49 | .258 | 6.55 | .042 | 1.07 | 3 | 121.0 | 537.24 | .128 | 3.25 |
| WAV-25075 | 3.370 | 85.60 | 4.300 | 109.22 | .302 | 7.67 | .045 | 1.14 | 3 | 140.0 | 621.60 | .148 | 3.76 |
| WAV-25076 | 3.475 | 88.27 | 3.790 | 96.27 | .100 | 2.54 | .050 | 1.27 | 4 | 81.2 | 360.53 | .050 | 1.27 |
| WAV-25077 | 3.612 | 91.74 | 4.627 | 117.53 | .334 | 8.48 | .047 | 1.19 | 3 | 156.0 | 692.64 | .162 | 4.11 |
| WAV-25079 | 3.890 | 98.81 | 4.997 | 126.92 | .355 | 9.02 | .050 | 1.27 | 3 | 177.0 | 785.88 | .172 | 4.37 |
| WAV-25081 | 4.208 | 106.88 | 5.408 | 137.36 | .388 | 9.86 | .053 | 1.35 | 3 | 197.0 | 874.68 | .187 | 4.75 |
| WAV-25083 | 4.530 | 115.06 | 5.817 | 147.75 | .440 | 11.18 | .055 | 1.40 | 3 | 220.0 | 976.80 | .209 | 5.31 |
| WAV-25085 | 4.803 | 122.00 | 6.173 | 156.79 | .463 | 11.76 | .058 | 1.47 | 3 | 239.0 | 1061.16 | .220 | 5.59 |
| WAV-25087 | 5.120 | 130.05 | 6.550 | 166.37 | .496 | 12.60 | .061 | 1.55 | 3 | 251.0 | 1114.44 | .235 | 5.97 |
| WAV-25089 | 5.408 | 137.36 | 6.945 | 176.40 | .538 | 13.67 | .063 | 1.60 | 3 | 277.0 | 1229.88 | .253 | 6.43 |
| WAV-25091 | 5.672 | 144.07 | 7.325 | 186.06 | .575 | 14.61 | .065 | 1.65 | 3 | 305.0 | 1354.20 | .269 | 6.83 |

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SP Series Disc Springs for Heavy Bolted Sections

SP Series Disc Springs for heavy bolted applications are used wherever there is a need to overcome the effects of thermal expansion and contraction, such as those required

for bus bar and transformer applications. SP Series Disc Springs are normally manufactured from high carbon or alloy steel AISI C1075 or 6150 material.

| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | METRIC SIZE | DIMENSIONS (Inches) | | | | | LOAD LBS. @ FLAT | WEIGHT POUNDS PER M |
|----------------------|-------------------|-------------|---------------------|-------|------|---------|---------|------------------|---------------------|
| | | | O.D. | I.D. | t | 1) O.H. | 2) O.H. | | |
| SP-52203 | | M2 | .197 | .087 | .012 | .020 | .016 | 65 | .1 |
| SP-62704 | | M2.5 | .236 | .106 | .016 | .026 | .020 | 146 | .2 |
| SP-73205 | .125, #5 | M3 | .276 | .126 | .020 | .030 | .025 | 210 | .3 |
| SP-83705 | #6 | M3.5 | .315 | .146 | .020 | .031 | .027 | 176 | .3 |
| SP-94308 | .156, #8 | M4 | .354 | .169 | .031 | .043 | .037 | 590 | .7 |
| SP-115310 | .188, #10 | M5 | .433 | .209 | .039 | .055 | .047 | 1070 | 1.3 |
| SP-146412 | .125 | M6 | .551 | .252 | .050 | .067 | .056 | 1390 | 2.5 |
| SP-177415 | | M7 | .669 | .291 | .059 | .079 | .070 | 1800 | 4.8 |
| SP-188420 | .313 | M8 | .709 | .331 | .078 | .102 | .088 | 4755 | 6.9 |
| SP-218425 | .313 | M8 | .827 | .331 | .098 | .118 | .108 | 5345 | 12.5 |
| SP-231120 | .0375 | M10 | .906 | .413 | .078 | .106 | .094 | 3200 | 11.4 |
| SP-241130 | .375 | M10 | .945 | .413 | .118 | .146 | .130 | 8000 | 18.9 |
| SP-291325 | .500 | M12 | 1.142 | .512 | .098 | .130 | .116 | 4700 | 22.9 |
| SP-321335 | .500 | M12 | 1.260 | .512 | .138 | .169 | .156 | 9900 | 40.0 |
| SP-351530 | .563 | M14 | 1.378 | .591 | .118 | .157 | .141 | 6500 | 40.7 |
| SP-391540 | .563 | M14 | 1.535 | .591 | .157 | .197 | .181 | 12000 | 70.0 |
| SP-391735 | .625 | M16 | 1.535 | .669 | .138 | .185 | .162 | 10000 | 58.5 |
| SP-421740 | .625 | M16 | 1.654 | .669 | .157 | .204 | .201 | 13000 | 90.0 |
| SP-471950 | | M18 | 1.850 | .748 | .197 | .244 | .222 | 20000 | 125.0 |
| SP-522160 | .750 | M20 | 2.047 | .827 | .236 | .287 | .246 | 31000 | 159.0 |
| SP-562360 | .875 | M22 | 2.205 | .906 | .236 | .311 | .268 | 40276 | 212.0 |
| SP-622565 | | M24 | 2.441 | .984 | .256 | .335 | .291 | 43600 | 284.0 |
| SP-702870 | 1.000 | M27 | 2.756 | 1.102 | .276 | .362 | .317 | 46000 | 392.0 |
| SP-773175 | 1.125 | M30 | 3.031 | 1.220 | .295 | .386 | .343 | 49000 | 508.0 |

1) When delivered 2) After first loading

A "K" factor of .2 was used for the dry torque calculation. Use .15 if lubricated. The basic metric formula used for foot pounds is $T = K(D/12)P$ (T = torque, K = K factor for the coefficient of friction and D = normal bolt diameter).

Note: SP Belleville Springs are available in stainless 17/7 PH. Call for availability of stainless.

TOLERANCE

OD: $+.000 / -.15\% \times OD$

ID: $-.000 / +1.5\% ID$

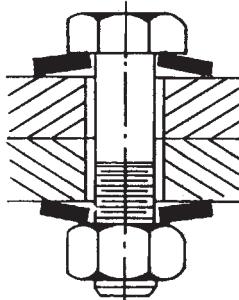
THICKNESS: thickness is subject to mil-run tolerances

OH: is a reference and used to control the needed load

LOAD: $\pm 20\%$ of nominal shown

HARDNESS: RC 43-50

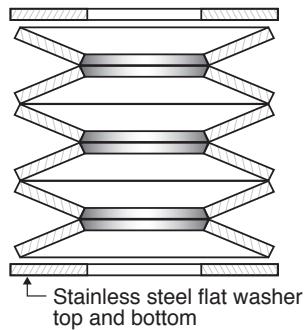
IMPORTANT NOTICE:
SP Series springs are not pre-stressed. They are designed for static bolted applications only.



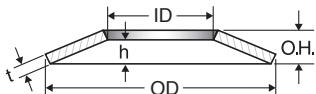
Stainless Steel Flat Washers

National USS high-strength stainless steel flat washers are made of 17-7 precipitation hardened (PH) stainless steel and heat-treated to Rockwell C40-48 hardness. These flat washers provide the strength of heat treatment and the

corrosion-resistance of stainless steel and can be used in environments where regular, well-plated steel, cannot survive.



| CENTURY STOCK NUMBER | BOLT DIAMETER SIZE | I.D. | O.D. | t |
|----------------------|--------------------|-------|-------|------|
| SFW-753163S | .250 | .500 | .750 | .063 |
| SFW-873778S | .500 | .375 | .875 | .078 |
| SFW-104378S | .375 | .438 | 1.000 | .078 |
| SFW-125078S | .438 | .500 | 1.250 | .078 |
| SFW-135678S | .500 | .563 | 1.375 | .078 |
| SFW-188290S | .563 | .625 | 1.500 | .090 |
| SFW-1768120S | .625 | .688 | 1.750 | .120 |
| SFW-2081131S | .750 | .813 | 2.000 | .131 |
| SFW-2010131S | 1.000 | 1.113 | 2.000 | .131 |



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discsprings@centuryspring.com
www.centurydiscsprings.com

FL & MFL Series Flange Disc Springs

FL (inch) & MFL (metric) Series Flange Disc Springs are elastic mechanical elements designed primarily for pipe flange applications. When used in bolt joints that are subject to thermal or mechanical shock, they deflect and move with the bolted joint. Hence, they compensate for developed looseness. The reactive power of the flange disc spring serves to keep the bolt joint tight under all conditions. Principal applications include piping construction, compression joints, steam piping joints, valve and pump connections, and others in the petrochemical field.

Abnormally high loads, produced by thermal expansion and contraction of a bolted joint, are a principle cause of flange leakage. Generally, flanges are under static load conditions. However, in large piping systems there may also be mechanical shock from compressor related piping. Thermal and mechanical shock differential can cause variation and yielding in bolt loads. To protect against these

conditions, always use flange spring discs under the nut or bolt head.

Pre-stressing or torquing the bolt at factory installation is not sufficient to protect the flange joint under unexpected temperature variations and mechanical shock loads in the field. Flange spring discs absorb peak stresses, therefore preventing damage to the bolt, gasket, and joint.

Material

Stainless: 17-7 precipitation hardened

Hardness: Rc 40-45 for ID < 1.250 inches
Rc 38-42 for ID ≥ 1.250 inches

Temperature Range: -220°C to +300°C for higher temperatures – to +600°C, Inconel™ 718 can be supplied (Inconel X-750 is non-standard)



| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | METRIC SIZE | DIMENSIONS (Inches) | | | | LOAD @ FLAT IN LBS. | TORQUE TO FLAT (FT. LBS.) |
|----------------------|-------------------|-------------|---------------------|-------|------|------|---------------------|---------------------------|
| | | | O.D. | I.D. | t | O.H. | | |
| FL-388S | .375 | M10 | .714 | .390 | .080 | .086 | 1200 | 8 |
| FL-716S | .438 | | .820 | .452 | .080 | .097 | 2800 | 23 |
| FL-889S | .500 | M12 | .900 | .515 | .089 | .100 | 2100 | 19 |
| FL-10125S | .625 | M16 | 1.145 | .656 | .125 | .143 | 6000 | 70 |
| FL-12131S | .750 | M20 | 1.365 | .781 | .131 | .150 | 5100 | 70 |
| FL-14160S | .875 | M22 | 1.585 | .906 | .160 | .180 | 7100 | 113 |
| FL-16168S | 1.000 | M26 | 1.805 | 1.032 | .168 | .195 | 8600 | 156 |
| FL-18187S | 1.125 | M29 | 2.020 | 1.156 | .187 | .217 | 10600 | 217 |
| FL-20190S | 1.250 | M32 | 2.240 | 1.281 | .190 | .225 | 10500 | 239 |
| FL-22250S | 1.375 | M35 | 2.450 | 1.406 | .250 | .290 | 23000 | 576 |
| FL-24250S | 1.500 | M38 | 2.680 | 1.531 | .250 | .290 | 19000 | 520 |
| FL-26262S | 1.625 | M42 | 2.960 | 1.687 | .262 | .307 | 20000 | 590 |
| FL-28281S | 1.750 | M45 | 3.170 | 1.812 | .281 | .329 | 23000 | 730 |
| FL-30300S | 1.875 | M48 | 3.380 | 1.937 | .300 | .353 | 28000 | 960 |
| FL-32321S | 2.000 | M52 | 3.600 | 2.062 | .318 | .375 | 32000 | 1120 |
| FL-36356S | 2.250 | M58 | 4.040 | 2.312 | .356 | .418 | 39000 | 1600 |
| FL-40394S | 2.500 | M64 | 4.470 | 2.562 | .394 | .464 | 48000 | 2200 |

Note: Load calculated for 17-7 PH stainless steel with large radii, R=1/4

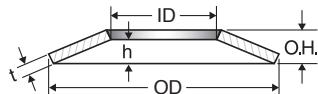
TOLERANCE

OD: + .000/- 1.5% x OD
(Designed for standard flange spot face diameter)
ID: -.000 / + 1.5% ID
THICKNESS: ± 5% x nominal thickness shown
LOAD: ± 20% of nominal shown



| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | METRIC SIZE | DIMENSIONS (mm) | | | | LOAD @ FLAT NEWTONS | TORQUE TO FLAT (N) (METERS) |
|----------------------|-------------------|-------------|-----------------|------|------|------|---------------------|-----------------------------|
| | | | O.D. | I.D. | t | O.H. | | |
| MFL-8050S | 8 | M8 | 15 | 8.4 | 1.25 | 1.70 | 6000 | 9.5 |
| MFL-8078S | 8 | M8 | 15 | 8.4 | 2.00 | 2.30 | 17000 | 30 |
| MFL-10078S | 10 | M10 | 18 | 10.4 | 2.00 | 2.30 | 11000 | 24 |
| MFL-12090S | 12 | M12 | 22 | 12.4 | 2.30 | 2.60 | 13000 | 34 |
| MFL-14098S | 14 | M14 | 25 | 14.4 | 2.50 | 2.95 | 18000 | 56 |
| MFL-20160S | 20 | M20 | 36 | 20.8 | 4.00 | 4.60 | 43000 | 190 |
| MFL-24160S | 24 | M24 | 43 | 24.8 | 4.00 | 4.80 | 39000 | 200 |
| MFL-27168S | 27 | M27 | 49 | 27.8 | 4.30 | 5.00 | 40000 | 240 |
| MFL-30190S | 30 | M30 | 54 | 30.8 | 4.80 | 5.60 | 42000 | 275 |
| MFL-36250S | 36 | M36 | 68 | 36.8 | 6.40 | 7.50 | 92000 | 725 |
| MFL-39250S | 39 | M39 | 70 | 39.6 | 6.40 | 7.50 | 91000 | 775 |

Note: Load calculated for 17-7 PH stainless steel with large radii, R=1/4



NDS Series Flange Disc Springs

NDS

NDS (National Disc Spring) Flange Disc Springs maintain bolt tension and gasket pressure around the flange, especially under conditions of thermal variations or mechanical shock, which may disturb the bolted joint. They counteract loosening and assure the integrity of the bolted flange under the most severe conditions. The proper use of NDS series flange disc springs will ensure that the gasketed joints will completely maintain the seal - no leaking, reducing pollution, ensuring safety, and reducing pipeline downtime.

The NDS series flange disc spring is "live loaded", which means it automatically adjusts for thermal variation, vibration, and mechanical shock stress.

| CENTURY STOCK NUMBER | NOMINAL BOLT SIZE | DIMENSIONS (Inches) | | | Deflection @ Flat | Load @ Flat in Lbs. | Torque in Ft. Lbs. |
|----------------------|-------------------|---------------------|-------|------|-------------------|---------------------|--------------------|
| | | I.D. | O.D. | t | | | |
| NDS-1-60 | .500 | .515 | 1.011 | .148 | .014 | 8500 | 80 |
| NDS-1-45 | .500 | .515 | 1.011 | .140 | .010 | 6400 | 45 |
| NDS-1-30 | .500 | .515 | 1.011 | .130 | .010 | 4200 | 30 |
| NDS-2-60 | .625 | .644 | 1.148 | .187 | .012 | 13500 | 120 |
| NDS-2-45 | .625 | .644 | 1.148 | .180 | .011 | 9900 | 90 |
| NDS-2-30 | .625 | .644 | 1.148 | .152 | .012 | 6500 | 60 |
| NDS-3-60 | .750 | .773 | 1.370 | .224 | .015 | 20000 | 200 |
| NDS-3-45 | .750 | .773 | 1.370 | .220 | .012 | 15000 | 150 |
| NDS-3-30 | .750 | .773 | 1.370 | .190 | .013 | 9700 | 100 |
| NDS-4-60 | .875 | .901 | 1.590 | .280 | .015 | 28000 | 320 |
| NDS-4-45 | .875 | .901 | 1.590 | .265 | .013 | 20000 | 240 |
| NDS-4-30 | .875 | .901 | 1.590 | .220 | .015 | 13000 | 160 |
| NDS-5-60 | 1.000 | 1.030 | 1.810 | .316 | .018 | 36000 | 490 |
| NDS-5-45 | 1.000 | 1.030 | 1.810 | .305 | .015 | 27000 | 365 |
| NDS-5-30 | 1.000 | 1.030 | 1.810 | .260 | .016 | 18000 | 245 |
| NDS-6-60 | 1.125 | 1.155 | 2.025 | .370 | .018 | 47000 | 700 |
| NDS-6-45 | 1.125 | 1.155 | 2.025 | .345 | .017 | 35000 | 550 |
| NDS-6-30 | 1.125 | 1.155 | 2.025 | .285 | .020 | 23000 | 350 |
| NDS-7-60 | 1.250 | 1.281 | 2.310 | .405 | .023 | 60000 | 1000 |
| NDS-7-45 | 1.250 | 1.281 | 2.310 | .395 | .019 | 45000 | 750 |
| NDS-7-30 | 1.250 | 1.281 | 2.310 | .325 | .023 | 30000 | 500 |
| NDS-8-60 | 1.375 | 1.406 | 2.470 | .446 | .024 | 74000 | 1350 |
| NDS-8-45 | 1.375 | 1.406 | 2.470 | .440 | .019 | 55000 | 1000 |
| NDS-8-30 | 1.375 | 1.406 | 2.470 | .358 | .023 | 36000 | 680 |
| NDS-9-60 | 1.200 | 1.531 | 2.680 | .513 | .024 | 89000 | 1600 |
| NDS-9-45 | 1.200 | 1.531 | 2.680 | .503 | .025 | 79000 | 1500 |
| NDS-9-30 | 1.200 | 1.531 | 2.680 | .400 | .024 | 44000 | 800 |
| NDS-10-60 | 1.625 | 1.649 | 2.950 | .542 | .028 | 106000 | 2200 |
| NDS-10-45 | 1.625 | 1.649 | 2.950 | .513 | .025 | 80000 | 1700 |
| NDS-10-30 | 1.625 | 1.649 | 2.950 | .436 | .027 | 53000 | 1100 |
| NDS-11-60 | 1.750 | 1.774 | 3.170 | .593 | .029 | 125000 | 3000 |
| NDS-11-45 | 1.750 | 1.774 | 3.170 | .550 | .027 | 92000 | 2300 |
| NDS-11-30 | 1.750 | 1.774 | 3.170 | .470 | .029 | 60000 | 1500 |
| NDS-12-60 | 1.875 | 1.899 | 3.389 | .618 | .030 | 128000 | 4000 |
| NDS-12-45 | 1.875 | 1.899 | 3.389 | .597 | .028 | 107000 | 3000 |
| NDS-12-30 | 1.875 | 1.899 | 3.389 | .510 | .030 | 70000 | 2000 |
| NDS-13-60 | 2.000 | 2.024 | 3.600 | .636 | .032 | 132000 | 4400 |
| NDS-13-45 | 2.000 | 2.024 | 3.600 | .628 | .031 | 120000 | 3000 |
| NDS-13-30 | 2.000 | 2.024 | 3.600 | .545 | .032 | 83000 | 2200 |
| NDS-14-60 | 2.250 | 2.281 | 4.040 | .725 | .036 | 169000 | 6000 |
| NDS-14-45 | 2.250 | 2.281 | 4.040 | .716 | .032 | 155000 | 5000 |
| NDS-14-30 | 2.250 | 2.281 | 4.040 | .615 | .036 | 105000 | 4000 |
| NDS-15-60 | 2.500 | 2.531 | 4.483 | .810 | .038 | 210000 | 9000 |
| NDS-15-45 | 2.500 | 2.531 | 4.483 | .795 | .038 | 196000 | 6600 |
| NDS-15-30 | 2.500 | 2.531 | 4.483 | .695 | .038 | 130000 | 4000 |
| NDS-16-60 | 2.750 | 2.781 | 4.920 | .880 | .045 | 260000 | 12000 |
| NDS-16-45 | 2.750 | 2.781 | 4.920 | .875 | .042 | 240000 | 9000 |
| NDS-16-30 | 2.750 | 2.781 | 4.920 | .755 | .045 | 164000 | 6000 |
| NDS-17-60 | 3.000 | 3.031 | 5.360 | .984 | .046 | 310000 | 15000 |
| NDS-17-45 | 3.000 | 3.031 | 5.360 | .975 | .042 | 290000 | 12000 |
| NDS-17-30 | 3.000 | 3.031 | 5.360 | .835 | .046 | 190000 | 8000 |



TOLERANCE

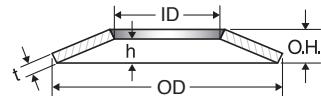
OD: + .000/- 1.5% x OD
(Designed for standard flange spot face diameter)
ID: -.000 / + 1.5% ID
THICKNESS: ± 5% x nominal thickness shown
OH: is a reference and used to control the needed load
LOAD: ± 20% of nominal shown
HRC: 4-45

National Disc Spring H11/H13 steel flange disc springs are designed to meet specific bolt stress requirements:

| Parts ending in | Bolt stress PSI |
|-----------------|-----------------|
| -60 | 60,000 |
| -45 | 45,000 |
| -30 | 30,000 |

All parts are heat treated with a plain finish.

Loads for the NDS series have a tolerance of ± 20% of loads indicated.



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BB Series Disc Springs

BB (Ball Bearing) Series Disc Springs are specially designed as preloading springs for use with radial ball bearings. These disc springs help to maintain positioning accuracy of the bearing with no endplay. They also minimize vibration and shaft deflection. Proper preloading will increase bearing rigidity and eliminate excessive running noise.

Refer to pages 18-19 for the standard spring tolerances of the BB/BB-S Series Disc Springs.

FOR BALL BEARINGS

Material

C1075 Steel
17/7 PH stainless steel
Rockwell hardness C40-51

TOLERANCE

LOAD: ± 20% @ .75h



When requesting parts made of stainless steel, add the letter "S" to the end of the existing part number. For example, carbon steel part number BB-6312 becomes BB-6312S.

| CENTURY STOCK NUMBER | BALL BEARING SIZE | O.D. | | I.D. | | t | O.H. | | LOAD @ .75h DEFL. | | | | |
|----------------------|-------------------|--------|---------|--------|---------|------|--------|--------|-------------------|--------|------|------|------|
| | | Inches | Metric | Inches | Metric | | Inches | Metric | Lbs | Inches | kg | mm | |
| BB-R-2 | R-2 | .366 | 9.300 | .228 | 5.800 | .008 | .200 | .016 | .400 | 5.90 | .006 | 2.7 | .15 |
| BB-623 | 623, EL-3 | .386 | 9.800 | .244 | 6.200 | .008 | .200 | .016 | .400 | 5.40 | .006 | 2.5 | .15 |
| BB-R-3 | R-3 | .492 | 12.500 | .319 | 8.100 | .010 | .250 | .020 | .500 | 8.30 | .008 | 3.8 | .20 |
| BB-624 | 624, EL-4 | .504 | 12.800 | .283 | 7.200 | .010 | .250 | .020 | .500 | 6.70 | .008 | 3.1 | .19 |
| BB-R-4 | R-4 | .618 | 15.700 | .406 | 10.300 | .010 | .250 | .022 | .560 | 6.80 | .009 | 3.1 | .23 |
| BB-625 | 625, 634, EL-5 | .622 | 15.800 | .323 | 8.200 | .010 | .250 | .022 | .550 | 5.30 | .009 | 2.4 | .23 |
| BB-626 | 626, 635, EL-6 | .740 | 18.800 | .362 | 9.200 | .012 | .300 | .026 | .650 | 7.20 | .010 | 3.3 | .26 |
| BB-607 | 607, EL-7 | .740 | 18.800 | .402 | 10.200 | .014 | .350 | .028 | .700 | 11.80 | .010 | 5.3 | .26 |
| BB-608 | 608, 627, EL-8 | .858 | 21.800 | .484 | 12.300 | .014 | .350 | .030 | .750 | 10.70 | .012 | 4.8 | .30 |
| BB-R-6 | R-6 | .862 | 21.900 | .539 | 13.700 | .014 | .360 | .030 | .760 | 11.80 | .012 | 5.3 | .30 |
| BB-609 | 609, EL-9 | .933 | 23.700 | .563 | 14.300 | .016 | .400 | .035 | .900 | 18.50 | .015 | 8.4 | .38 |
| BB-6000 | 6000, 629 | 1.012 | 25.700 | .563 | 14.300 | .016 | .400 | .035 | .900 | 14.50 | .015 | 8.3 | .38 |
| BB-6001 | 6001 | 1.091 | 27.700 | .681 | 17.300 | .016 | .400 | .039 | 1.000 | 18.40 | .018 | 8.3 | .45 |
| BB-R-8 | R-8 | 1.110 | 28.200 | .724 | 18.400 | .016 | .400 | .043 | 1.100 | 24.10 | .021 | 10.9 | .53 |
| BB-6200 | 6200 | 1.169 | 29.700 | .685 | 17.400 | .016 | .400 | .043 | 1.100 | 19.00 | .021 | 8.6 | .53 |
| BB-6002 | 6002, 6201 | 1.248 | 31.700 | .803 | 20.400 | .016 | .400 | .043 | 1.100 | 18.60 | .021 | 8.4 | .53 |
| BB-R-10 | R-10 | 1.358 | 34.500 | 1.000 | 25.400 | .020 | .500 | .047 | 1.200 | 34.80 | .021 | 15.8 | .53 |
| BB-6300 | 6300 | 1.362 | 34.600 | .803 | 20.400 | .016 | .400 | .043 | 1.100 | 14.10 | .021 | 6.4 | .53 |
| BB-6003 | 6003, 6202 | 1.362 | 34.600 | .882 | 22.400 | .020 | .500 | .047 | 1.200 | 27.30 | .021 | 12.4 | .53 |
| BB-6301 | 6301 | 1.441 | 36.600 | .803 | 20.400 | .020 | .500 | .051 | 1.300 | 25.50 | .024 | 11.5 | .60 |
| BB-6203 | 6203 | 1.559 | 39.600 | 1.004 | 25.500 | .020 | .500 | .051 | 1.300 | 25.30 | .024 | 11.5 | .60 |
| BB-6004 | 6004, 6302 | 1.638 | 41.600 | 1.004 | 25.500 | .020 | .500 | .055 | 1.400 | 26.10 | .027 | 11.8 | .68 |
| BB-6005 | 6005, 6204, 6303 | 1.831 | 46.500 | 1.201 | 30.500 | .024 | .600 | .059 | 1.500 | 35.30 | .027 | 16.0 | .68 |
| BB-6205 | 6205, 6304 | 2.028 | 51.500 | 1.398 | 35.300 | .024 | .600 | .059 | 1.500 | 31.10 | .027 | 14.1 | .68 |
| BB-6006 | 6006 | 2.146 | 54.500 | 1.594 | 40.500 | .024 | .600 | .059 | 1.500 | 32.50 | .027 | 14.7 | .68 |
| BB-6007 | 6007, 6206, 6305 | 2.421 | 61.500 | 1.594 | 40.500 | .028 | .700 | .071 | 1.800 | 40.30 | .033 | 18.3 | .83 |
| BB-6008 | 6008 | 2.657 | 67.500 | 1.988 | 50.500 | .028 | .700 | .067 | 1.700 | 37.10 | .030 | 16.8 | .75 |
| BB-6306 | 6306 | 2.815 | 71.500 | 1.791 | 45.500 | .028 | .700 | .083 | 2.100 | 42.50 | .041 | 19.3 | 1.05 |
| BB-6207 | 6207 | 2.815 | 71.500 | 1.988 | 50.500 | .028 | .700 | .083 | 2.100 | 50.30 | .042 | 22.8 | 1.05 |
| BB-6009 | 6009 | 2.933 | 74.500 | 2.185 | 55.500 | .032 | .800 | .075 | 1.900 | 48.50 | .033 | 22.0 | .83 |
| BB-6307 | 6307 | 3.130 | 79.500 | 1.988 | 50.500 | .032 | .800 | .091 | 2.300 | 52.20 | .045 | 23.7 | 1.13 |
| BB-6010 | 6010, 6208 | 3.130 | 79.500 | 2.185 | 55.500 | .032 | .800 | .091 | 2.300 | 60.60 | .045 | 27.5 | 1.13 |
| BB-6209 | 6209 | 3.327 | 84.500 | 2.382 | 60.500 | .035 | .900 | .098 | 2.500 | 82.40 | .048 | 37.4 | 1.21 |
| BB-6308 | 6308 | 3.524 | 89.500 | 2.382 | 60.500 | .035 | .900 | .098 | 2.500 | 65.90 | .047 | 29.9 | 1.20 |
| BB-6011 | 6011, 6210 | 3.524 | 89.500 | 2.579 | 65.500 | .035 | .900 | .098 | 2.500 | 76.90 | .048 | 34.9 | 1.21 |
| BB-6012 | 6012 | 3.720 | 94.500 | 2.972 | 75.500 | .039 | 1.000 | .087 | 2.200 | 74.80 | .036 | 33.9 | .91 |
| BB-6309 | 6309 | 3.898 | 99.000 | 2.579 | 65.500 | .039 | 1.000 | .102 | 2.600 | 67.10 | .047 | 30.4 | 1.20 |
| BB-6013 | 6013, 6211 | 3.898 | 99.000 | 2.776 | 70.500 | .039 | 1.000 | .102 | 2.600 | 76.40 | .047 | 34.6 | 1.21 |
| BB-6310 | 6310 | 4.291 | 109.000 | 2.776 | 70.500 | .049 | 1.250 | .106 | 2.700 | 81.70 | .043 | 37.1 | 1.09 |
| BB-6014 | 6014, 6212 | 4.291 | 109.000 | 2.972 | 75.500 | .049 | 1.250 | .106 | 2.700 | 91.10 | .043 | 41.3 | 1.09 |
| BB-6015 | 6015 | 4.488 | 114.000 | 3.563 | 90.500 | .049 | 1.250 | .097 | 2.450 | 91.40 | .036 | 41.5 | .91 |
| BB-6311 | 6311 | 4.685 | 119.000 | 2.972 | 75.500 | .049 | 1.250 | .110 | 2.800 | 73.00 | .046 | 33.1 | 1.16 |
| BB-6213 | 6213 | 4.685 | 119.000 | 3.366 | 85.500 | .049 | 1.250 | .110 | 2.800 | 89.80 | .046 | 40.7 | 1.17 |
| BB-6016 | 6016, 6214 | 4.882 | 124.000 | 3.563 | 90.500 | .049 | 1.250 | .118 | 3.000 | 101.90 | .052 | 46.2 | 1.32 |
| BB-6312 | 6312 | 5.079 | 129.000 | 3.366 | 85.500 | .049 | 1.250 | .126 | 3.200 | 92.70 | .058 | 42.0 | 1.47 |
| BB-6017 | 6017, 6215 | 5.079 | 129.000 | 3.760 | 95.500 | .049 | 1.250 | .126 | 3.200 | 114.70 | .058 | 52.0 | 1.47 |
| BB-6313 | 6313 | 5.472 | 139.000 | 3.563 | 90.500 | .049 | 1.250 | .128 | 3.250 | 80.90 | .059 | 36.7 | 1.50 |
| BB-6018 | 6018, 6216 | 5.472 | 139.000 | 3.976 | 101.000 | .049 | 1.250 | .128 | 3.250 | 98.40 | .059 | 44.6 | 1.51 |
| BB-6314 | 6314 | 5.866 | 149.000 | 3.760 | 95.500 | .059 | 1.500 | .126 | 3.200 | 86.80 | .050 | 39.4 | 1.28 |
| BB-6020 | 6020, 6217 | 5.866 | 149.000 | 4.173 | 106.000 | .059 | 1.500 | .126 | 3.200 | 103.00 | .050 | 46.7 | 1.28 |

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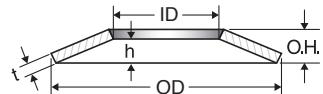
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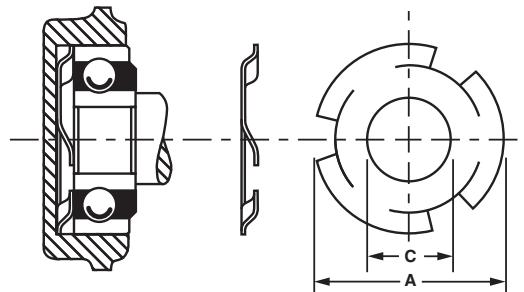


BB Series Disc Springs

| CENTURY STOCK NUMBER | BALL BEARING SIZE | O.D. | | I.D. | | t | O.H. | | LOAD @ .75h DEFL. | | | | |
|----------------------|-------------------|--------|---------|--------|---------|------|--------|--------|-------------------|--------|------|-------|------|
| | | Inches | Metric | Inches | Metric | | Inches | Metric | Lbs | Inches | kg | mm | |
| BB-6315 | 6315 | 6.260 | 159.000 | 3.976 | 101.000 | .059 | 1.500 | .138 | 3.500 | 94.30 | .059 | 42.8 | 1.50 |
| BB-6021 | 6021, 6218 | 6.260 | 159.000 | 4.370 | 111.000 | .059 | 1.500 | .138 | 3.500 | 109.20 | .059 | 49.5 | 1.50 |
| BB-6316 | 6316 | 6.654 | 169.000 | 4.370 | 111.000 | .059 | 1.500 | .150 | 3.800 | 107.50 | .068 | 48.8 | 1.73 |
| BB-6022 | 6022, 6219 | 6.654 | 169.000 | 4.764 | 121.000 | .059 | 1.500 | .150 | 3.800 | 125.00 | .068 | 56.7 | 1.73 |
| BB-6317 | 6317 | 7.047 | 179.000 | 4.764 | 121.000 | .079 | 2.000 | .165 | 4.200 | 197.70 | .065 | 89.7 | 1.66 |
| BB-6024 | 6024, 6220 | 7.047 | 179.000 | 4.961 | 126.000 | .079 | 2.000 | .165 | 4.200 | 212.50 | .065 | 96.4 | 1.66 |
| BB-6318 | 6318 | 7.441 | 189.000 | 4.764 | 121.000 | .079 | 2.000 | .169 | 4.300 | 173.30 | .068 | 78.6 | 1.73 |
| BB-6221 | 6221 | 7.441 | 189.000 | 5.157 | 131.000 | .079 | 2.000 | .169 | 4.300 | 196.10 | .068 | 88.9 | 1.73 |
| BB-6319 | 6319 | 7.795 | 198.000 | 5.157 | 131.000 | .079 | 2.000 | .177 | 4.500 | 185.50 | .074 | 84.1 | 1.88 |
| BB-6026 | 6026, 6222 | 7.795 | 198.000 | 5.551 | 141.000 | .079 | 2.000 | .177 | 4.500 | 211.00 | .074 | 95.7 | 1.88 |
| BB-6224 | 6224, 6320 | 8.386 | 213.000 | 5.945 | 151.000 | .089 | 2.250 | .177 | 4.500 | 215.20 | .067 | 97.6 | 1.69 |
| BB-6030 | 6030, 6321 | 8.780 | 223.000 | 6.339 | 161.000 | .089 | 2.250 | .181 | 4.600 | 215.30 | .070 | 97.7 | 1.77 |
| BB-6226 | 6226 | 8.976 | 228.000 | 6.339 | 161.000 | .089 | 2.250 | .195 | 4.950 | 237.00 | .080 | 107.5 | 2.03 |
| BB-6322 | 6322 | 9.370 | 238.000 | 6.339 | 161.000 | .089 | 2.250 | .207 | 5.250 | 233.40 | .089 | 105.9 | 2.26 |
| BB-6228 | 6228 | 9.764 | 248.000 | 6.732 | 171.000 | .098 | 2.500 | .197 | 5.000 | 229.30 | .074 | 104.0 | 1.88 |
| BB-6324 | 6324 | 10.157 | 258.000 | 6.732 | 171.000 | .098 | 2.500 | .217 | 5.500 | 252.50 | .089 | 114.5 | 2.25 |
| BB-6230 | 6230 | 10.551 | 268.000 | 7.126 | 181.000 | .098 | 2.500 | .224 | 5.700 | 263.60 | .095 | 119.6 | 2.41 |
| BB-6232 | 6232 | 11.339 | 288.000 | 7.520 | 191.000 | .108 | 2.750 | .226 | 5.750 | 261.50 | .089 | 118.6 | 2.25 |
| BB-6328 | 6328 | 11.732 | 298.000 | 7.520 | 191.000 | .108 | 2.750 | .250 | 6.350 | 298.60 | .107 | 135.4 | 2.70 |
| BB-6234 | 6234 | 12.126 | 308.000 | 7.953 | 202.000 | .118 | 3.000 | .240 | 6.100 | 296.70 | .092 | 134.6 | 2.33 |
| BB-6236 | 6236, 6330 | 12.520 | 318.000 | 8.346 | 212.000 | .118 | 3.000 | .244 | 6.200 | 297.00 | .095 | 134.7 | 2.40 |
| BB-6238 | 6238, 6332 | 13.307 | 338.000 | 9.134 | 232.000 | .118 | 3.000 | .260 | 6.600 | 322.50 | .107 | 146.3 | 2.70 |
| BB-6240 | 6240, 6334 | 14.094 | 358.000 | 9.528 | 242.000 | .118 | 3.000 | .284 | 7.200 | 348.90 | .124 | 158.3 | 3.16 |

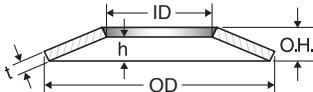
Finger Disc Springs

Finger Spring Disc or Finger Spring Washers counteract noise, excess wear, endplay, and vibration, especially at high speeds. The finger springs promote efficiency and smooth operation, reducing skidding wear on rotating elements. They are also extremely useful in cases of unavoidable loose, internal clearances due to special application conditions.



| CENTURY STOCK NUMBER | O.D. Inches | I.D. Inches | LOAD AT HT. @ .062 Inches | MATERIAL Inches |
|----------------------|-------------|-------------|---------------------------|-----------------|
| CFW-593110 | .595 | .312 | .3-1.0 | .010 |
| CFW-723406 | .728 | .344 | 4-8 | .006 |
| CFW-844506 | .846 | .453 | 3-7 | .006 |
| CFW-844508 | .846 | .453 | 9-14 | .008 |
| CFW-924507 | .926 | .453 | 6-10 | .007 |
| CFW-923410 | .926 | .344 | 21-30 | .010 |
| CFW-105106 | 1.004 | .516 | 5-10 | .006 |
| CFW-105107 | 1.004 | .516 | 7-13 | .007 |
| CFW-116809 | 1.164 | .688 | 8-14 | .009 |
| CFW-114010 | 1.164 | .406 | 14-23 | .010 |
| CFW-116818 | 1.164 | .688 | 55-81 | .018 |
| CFW-126808 | 1.240 | .688 | 9-15 | .008 |
| CFW-125609 | 1.240 | .563 | 15-22 | .009 |
| CFW-126810 | 1.240 | .688 | 14-23 | .010 |
| CFW-138111 | 1.360 | .814 | 10-17 | .011 |
| CFW-138114 | 1.360 | .814 | 16-26 | .014 |
| CFW-159714 | 1.555 | .971 | 13-23 | .014 |
| CFW-151018 | 1.555 | 1.000 | 28-42 | .018 |
| CFW-181116 | 1.830 | 1.189 | 14-26 | .016 |
| CFW-201319 | 2.022 | 1.359 | 13-27 | .019 |

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Slotted Disc Springs

The inclusion of slots on either the inner or outer diameter creates a lever that works on the un-slotted portion of the spring. This effect reduces the spring load and increases the deflection, giving the spring a softer characteristic with larger deflection, in proportion to the outside diameter smaller spring loads.

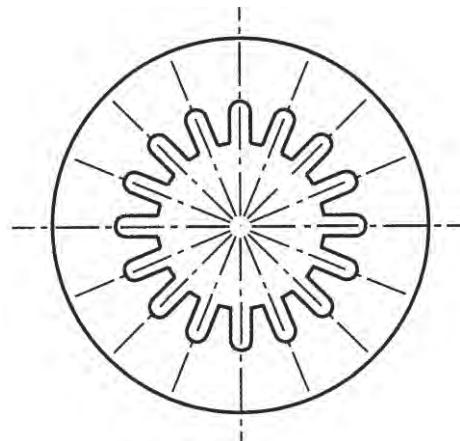
With this type of spring, it is most important that the permissible stresses in the annular portion are not exceeded. If necessary, the outside diameter must be increased to compensate.

Benefits of slotted disc springs include:

- Generates very small loads
- Accommodates large deflections
- Achieves quiet-run bearing assembly
- Accommodates the build up of tolerances within assembly
- Eliminates thermal movements

Material

Slotted disc springs are made of spring steel; call for availability of stainless steel.



SLOTTED

| OD Inches | CENTURY STOCK NUMBER | ID Inches | t Inches | 0/Ht Inches | h Inches | h/t Inches | DEFL. Inches | FORCE Lbs. | BALL BEARING TYPE | O.D. Inches | Inches | I.D. Inches | Inches |
|--------------|----------------------------|--------------|-------------|----------------|-------------|---------------|-----------------|---------------|-------------------------|----------------|--------|----------------|--------|
| .386 | CSW-241150 | .244 | .006 | .024 | .018 | .039 | .014 | 3 | 623 (EL3) | .394 | .118 | | |
| .504 | CSW-241350 | .283 | .008 | .026 | .018 | .036 | .014 | 4 | 624 (EL4) | .512 | .157 | | |
| .622 | CSW-241650 | .323 | .010 | .030 | .020 | .029 | .016 | 4 | 625 (EL5), 634 (R4) | .630 | .197 | | |
| .740 | CSW-241675 | .362 | .010 | .039 | .030 | .038 | .022 | 4 | 626 (EL6), 635 (R5) | .630 | .236 | | |
| .740 | CSW-241750 | .402 | .010 | .041 | .031 | .045 | .024 | 5 | 607 (EL7) | .748 | .276 | | |
| .858 | CSW-241850 | .484 | .010 | .049 | .039 | .058 | .030 | 5 | 608 (EL8), 627 (R7) | .866 | .315 | .276 | |
| .933 | CSW-242050 | .563 | .012 | .051 | .039 | .047 | .030 | 6 | 609 (EL9) | .945 | .354 | | |
| 1.012 | CSW-242150 | .563 | .012 | .055 | .043 | .047 | .031 | 6 | 6000, 629 (R9) | 1.024 | .394 | .354 | |
| 1.091 | CSW-242250 | .681 | .014 | .057 | .043 | .041 | .031 | 7 | 6001 | 1.102 | .472 | | |
| 1.169 | CSW-242450 | .681 | .014 | .061 | .047 | .051 | .035 | 7 | 6200 | 1.181 | .394 | | |
| 1.248 | CSW-242550 | .803 | .014 | .061 | .047 | .051 | .035 | 7 | 6002, 6201 | 1.260 | .591 | .472 | |
| 1.362 | CSW-242750 | .803 | .014 | .065 | .051 | .043 | .039 | 7 | 6300 | 1.378 | | .394 | |
| 1.362 | CSW-242850 | .882 | .014 | .061 | .047 | .047 | .035 | 7 | 6003, 6202 | 1.378 | .669 | .591 | .472 |
| 1.441 | CSW-242950 | .803 | .016 | .075 | .059 | .057 | .043 | 8 | 6301 | 1.457 | | | |
| 1.559 | CSW-243050 | 1.004 | .016 | .075 | .059 | .048 | .043 | 8 | 6203 | 1.575 | .669 | | |
| 1.638 | CSW-243150 | 1.004 | .018 | .081 | .063 | .045 | .047 | 9 | 6004, 6302 | 1.654 | .787 | .591 | |
| 1.831 | CSW-243250 | 1.201 | .018 | .081 | .063 | .044 | .047 | 10 | 6005, 6204, 6303 | 1.850 | .984 | .787 | .669 |
| 2.028 | CSW-243350 | 1.398 | .018 | .083 | .065 | .050 | .049 | 11 | 6205, 6304 | 2.047 | | .984 | .787 |
| 2.146 | CSW-243450 | 1.594 | .018 | .085 | .067 | .069 | .051 | 12 | 6006 | 2.165 | 1.181 | | |
| 2.421 | CSW-243550 | 1.594 | .022 | .100 | .079 | .048 | .059 | 12 | 6007, 6206, 6305 | 2.441 | 1.378 | 1.181 | .984 |
| 2.657 | CSW-243650 | 1.988 | .020 | .102 | .083 | .054 | .063 | 18 | 6008 | 2.677 | 1.575 | | |
| 2.815 | CSW-243750 | 1.791 | .024 | .114 | .091 | .058 | .067 | 17 | 6306 | 2.835 | | 1.181 | 1.181 |
| 2.815 | CSW-243850 | 1.988 | .024 | .114 | .091 | .072 | .067 | 29 | 6207 | 2.835 | | 1.378 | |
| 2.933 | CSW-243950 | 2.185 | .024 | .114 | .091 | .052 | .067 | 20 | 6009 | 2.953 | 1.772 | | |
| 3.130 | CSW-244125 | 1.988 | .028 | .122 | .094 | .054 | .071 | 19 | 6307 | 3.150 | | | 1.378 |
| 3.130 | CSW-244150 | 2.185 | .028 | .114 | .087 | .059 | .065 | 29 | 6010, 6208 | 3.150 | 1.969 | 1.575 | |
| 3.327 | CSW-244250 | 2.382 | .030 | .124 | .094 | .034 | .071 | 18 | 6209 | 3.346 | | 1.772 | |
| 3.524 | CSW-244350 | 2.382 | .031 | .130 | .098 | .043 | .075 | 23 | 6308 | 3.543 | | | 1.575 |
| 3.524 | CSW-244450 | 2.579 | .031 | .134 | .102 | .053 | .077 | 42 | 6011, 6210 | 3.543 | 2.165 | 1.969 | |
| 3.720 | CSW-244550 | 2.972 | .031 | .136 | .104 | .055 | .079 | 46 | 6012 | 3.740 | 2.362 | | |



Custom Disc Springs

Can't find a stock/catalog disc spring that meets your project requirements? No problem! Our disc spring team will engineer a custom solution for you!

MWI's MPS/Rolex location is a leader in custom, precision disc springs, having designed and manufactured thousands of custom disc springs for a range of customers' unique applications.

If your application needs an engineered solution due to special environmental conditions, tight space constraints, special load requirements, or service life expectations then let us help. Together we will optimize the performance of your system by providing insight into manufacturing methods that minimize your cost.

In addition to custom designs, we offer special packaging of disc springs including stacking, to make your final assembly operation more efficient.

Contact our disc spring team for any information about custom disc spring design and manufacturing.

We empower innovation. We engineer value.

Material options include:

Carbon steels

Alloy steels

Stainless steel alloys

Tool steels

Specialty metals



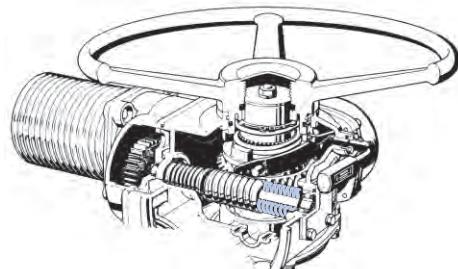
Applications for Disc Springs

Disc springs are used in applications throughout a wide range of industries and markets. A few examples showing the use and importance of MWI's disc springs include:

Valve Actuator Assembly

Normal spring return actuators:

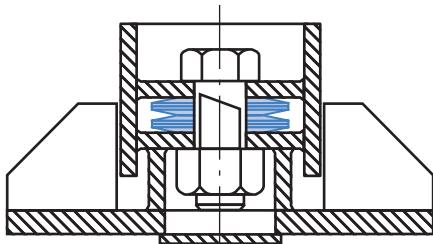
The electrical or pneumatic actuator compresses the springs to actuate the valve. When the controller releases power or pressure, the force stored in the spring returns the actuator to its start position, allowing for simpler and less expensive control/actuator systems.



Fail-safe spring actuators: During powered operation the springs travel with the actuator. The actuator opens and closes the valve, and provides braking. Under loss of power, the spring is released and drives the actuator to the pre-designated fail-safe position.

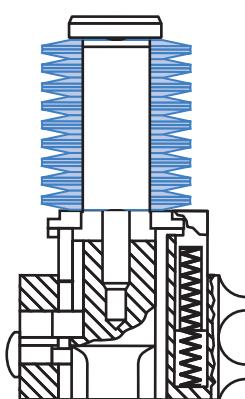
Shock Absorbing Bolted Assembly

Disc springs are largely self-damping, particularly when they are stacked in parallel. This makes the springs useful in dissipating energy in bolted assemblies that are subjected to shock loading and vibration.



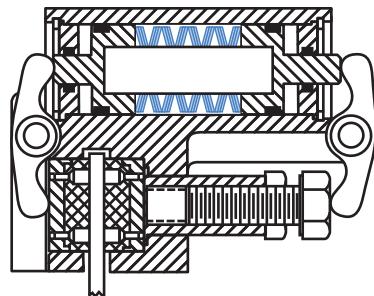
Punch Stripper Assembly

Stacks of disc springs can be used to provide the retraction force ("stripping") for punches. The compact size of the springs is ideal for punch cassettes that can be used in CNC punch machine tool changers.



Fail-Safe Brake Assembly

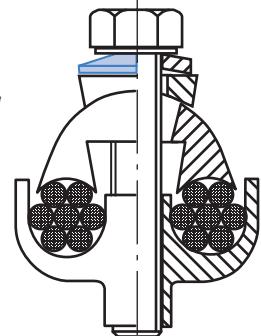
In many machinery applications it is necessary that a brake be applied in case power to the equipment is lost.



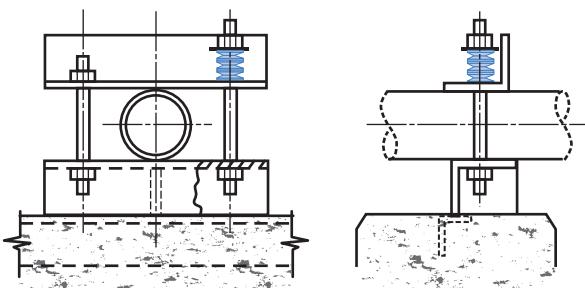
In these situations disc springs can be installed so that they are compressed when the machine engages to release the brake and then, if power is lost, the springs apply the brake and stop the machinery.

Cable Support Assembly

Often when materials such as wires or cables are clamped using a screw or bolt, the wire or cable will compress over time and the assembly will become loose. Disc springs can provide for this compression and keep the assembly tight.



Pipe Hold-Down Assembly

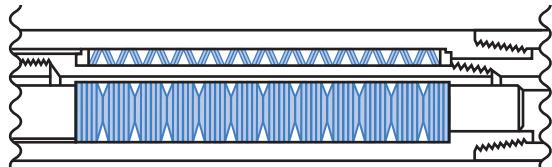


Long pipe runs require structural support, but are also subject to movement due to temperature changes. A structural support that includes disc springs can both support and control the pipe, by allowing some movement when required.



Applications for Disc Springs

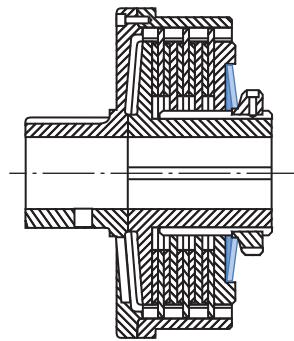
Shock Absorber Assembly for Drill Bit



Deep down-hole drilling for oil and gas exploration creates extreme shock loads on the drill bits. Stacks of disc springs can be used to cushion the drill bit, giving it a longer bit life.

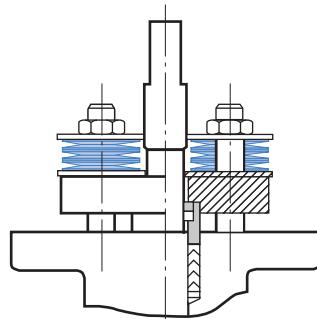
Friction Assembly

Friction assemblies like clutches, traction drives, and brakes use disc springs to provide even pressure as friction materials wear away and actuation deflections change.



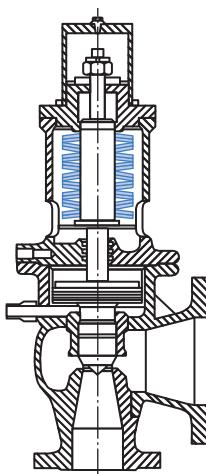
Live Loaded Joints

Many joints, particularly pipe flanges are subject to loosening due to temperature change cycles. This loosening often results in leakage at the joints. Disc springs are part of a "live loading" assembly that help maintain leak-tight joints, greatly reducing maintenance costs.



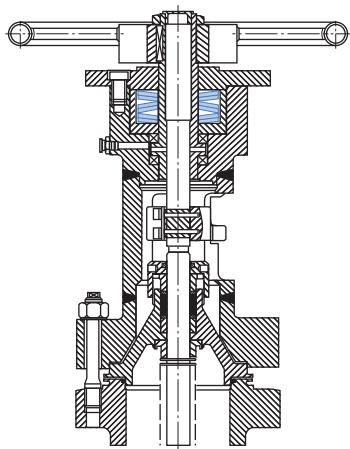
High Pressure Valve

Disc springs are used to provide control in pressure valves. The disc springs keep the valve closed until the control fluid pressure rises to the point where it overcomes the designed load of the springs, and at that point, the valve opens releasing pressure.



Valve Packing Assembly

Disc springs are used in valves to maintain pressure on the packing so that the seal around the valve stem does not leak. Over time the packing material will compress and the disc springs will take up the slack.



Markets and industries using disc springs:

- Agricultural
- Automotive
- Auto Racing
- Aviation/Aerospace
- Chemical Processing
- Computers
- Electrical
- Energy
- Hand and Power Tools
- Heavy Trucks
- Machine Tools
- Material Handling
- Medical
- Mining
- Off-Road Machinery
- Oil Field Equipment
- Outdoor Power Equipment
- Retail Products
- Display Fixtures
- Telecommunications
- Transportation
- Valves
- And More!

Call, fax or e-mail this form to our disc spring team for a fast quote on your next project.

Call us toll free at **877-231-6474**, fax to **877-231-6472**

or email us at **discsprings@centuryspring.com**.



Request for Quote

(*required)

Date _____ Time _____

First name* _____ Last name* _____

Company name* _____

Street address* _____

City* _____ State* _____

Zip/postal code _____ Email address _____

Telephone* _____ Fax _____

Please provide the following information (please state units of measurement used in each field):

Outside diameter _____ Inside diameter _____

Thickness _____ Reduced thickness _____

Overall height _____

For custom disc springs please provide the following information (please state units of measurement used in each field):

Loads at which deflections (if known) _____

Loads at which heights (if known) _____

Maximum OD _____ Minimum OD _____

Maximum ID _____ Minimum ID _____

Maximum deflection _____ Maximum height possible _____

Avg. operating temp. (or temp. range) _____ Maximum temp. _____

Cycles desired? _____ Dynamic or Static

Corrosive media? Yes (please indicate) _____ No

Are the disc springs guided on OD or ID?

Is guiding element hardened (56 HRC min) and ground? Yes No

Lubrication _____

Quantity required & frequency _____

All information provided will be treated in the strictest confidence and will not be made available to third parties.



Disc Springs Cross-Reference Guide

| ROLEX | CSC | PG | ROLEX | CSC | PG | ROLEX | CSC | PG | ROLEX | CSC | PG |
|-----------|------------|----|------------|-------------|----|-----------|------------|----|------------|-------------|----|
| 55-03-01 | CBS-550301 | 23 | AI-126362 | CDS-126362 | 20 | AI-753831 | CDS-753831 | 20 | AK-623 | BB-623 | 36 |
| 55-03-51 | CBS-550351 | 23 | AI-126389 | CDS-126389 | 20 | AI-753834 | CDS-753834 | 20 | AK-6230 | BB-6230 | 37 |
| 55-04-01 | CBS-550401 | 23 | AI-136349 | CDS-136349 | 20 | AI-753835 | CDS-753835 | 20 | AK-6232 | BB-6232 | 37 |
| 55-05-01 | CBS-550501 | 23 | AI-136359 | CDS-136359 | 20 | AI-753840 | CDS-753840 | 20 | AK-6234 | BB-6234 | 37 |
| 55-06-01 | CBS-550601 | 23 | AI-136378 | CDS-136378 | 20 | AI-753856 | CDS-753856 | 20 | AK-6236 | BB-6236 | 37 |
| 55-07-21 | CBS-550721 | 23 | AI-136944 | CDS-136944 | 20 | AI-874431 | CDS-874431 | 20 | AK-6238 | BB-6238 | 37 |
| 55-08-01 | CBS-550801 | 23 | AI-136967 | CDS-136967 | 20 | AI-874445 | CDS-874445 | 20 | AK-624 | BB-624 | 36 |
| 55-10-21 | CBS-551021 | 23 | AI-1575107 | CDS-1575107 | 20 | AI-933145 | CDS-933145 | 20 | AK-6240 | BB-6240 | 37 |
| 55-12-41 | CBS-551241 | 23 | AI-157545 | CDS-157545 | 20 | AI-953847 | CDS-953847 | 20 | AK-625 | BB-625 | 36 |
| 65-02-52 | CBS-650252 | 23 | AI-157572 | CDS-157572 | 20 | AK-6000 | BB-6000 | 36 | AK-626 | BB-626 | 36 |
| 65-03-11 | CBS-650311 | 23 | AI-157659 | CDS-157659 | 20 | AK-6001 | BB-6001 | 36 | AK-6300 | BB-6300 | 36 |
| 65-04-11 | CBS-650411 | 23 | AI-157678 | CDS-157678 | 20 | AK-6002 | BB-6002 | 36 | AK-6301 | BB-6301 | 36 |
| 65-05-11 | CBS-650511 | 23 | AI-157698 | CDS-157698 | 20 | AK-6003 | BB-6003 | 36 | AK-6306 | BB-6306 | 36 |
| 65-06-12 | CBS-650612 | 23 | AI-178885 | CDS-178885 | 20 | AK-6004 | BB-6004 | 36 | AK-6307 | BB-6307 | 36 |
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| 65-06-35 | CBS-650635 | 23 | AI-180910 | CDS-180910 | 19 | AK-6006 | BB-6006 | 36 | AK-6309 | BB-6309 | 36 |
| 65-08-21 | CBS-650821 | 23 | AI-201011 | CDS-201011 | 21 | AK-6007 | BB-6007 | 36 | AK-6310 | BB-6310 | 36 |
| 65-08-23 | CBS-650823 | 23 | AI-201065 | CDS-201065 | 21 | AK-6008 | BB-6008 | 36 | AK-6311 | BB-6311 | 36 |
| 65-09-21 | CBS-650921 | 23 | AI-201078 | CDS-201078 | 21 | AK-6009 | BB-6009 | 36 | AK-6312 | BB-6312 | 36 |
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| 75-06-14 | CBS-750614 | 23 | AI-311511 | CDS-311511 | 19 | AK-6020 | BB-6020 | 36 | AK-6328 | BB-6328 | 37 |
| 75-06-36 | CBS-750636 | 23 | AI-311517 | CDS-311517 | 19 | AK-6021 | BB-6021 | 37 | AK-R10 | BB-R-10 | 36 |
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| AI-126340 | CDS-126340 | 20 | AI-753828 | CDS-753828 | 20 | AK-6228 | BB-6228 | 37 | AM-104205 | CDM-104205 | 14 |



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Disc Springs Cross-Reference Guide

| ROLEX | CSC | PG | ROLEX | CSC | PG | ROLEX | CSC | PG | ROLEX | CSC | PG |
|------------|-------------|----|-------------|--------------|----|-------------|--------------|----|-----------|------------|----|
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| AM-136205 | CDM-136205 | 14 | AM-20010210 | CDM-20010210 | 17 | AM-25012716 | CDM-25012716 | 17 | AM-402025 | CDM-402025 | 16 |
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| AM-155205 | CDM-155205 | 14 | AM-201009 | CDM-201009 | 15 | AM-281410 | CDM-281410 | 15 | AM-502525 | CDM-502525 | 16 |
| AM-155206 | CDM-155206 | 14 | AM-201010 | CDM-201010 | 15 | AM-281413 | CDM-281413 | 15 | AM-502530 | CDM-502530 | 16 |
| AM-155207 | CDM-155207 | 14 | AM-201011 | CDM-201011 | 15 | AM-281415 | CDM-281415 | 15 | AM-562915 | CDM-562915 | 16 |
| AM-156205 | CDM-156205 | 14 | AM-201013 | CDM-201013 | 15 | AM-321210 | CDM-321210 | 15 | AM-562920 | CDM-562920 | 16 |



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| ROLEX | CSC | PG | ROLEX | CSC | PG | ROLEX | CSC | PG | ROLEX | CSC |
|-----------|------------|----|-----------|------------|----|-------------|--------------|----|------------|-------------|
| AM-562930 | CDM-562930 | 16 | FL-20190 | FL-20190S | 34 | NDS-3-30 | NDS-3-30 | 35 | SAI-180907 | CDS-180907S |
| AM-602120 | CDM-602120 | 16 | FL-22250 | FL-22250S | 34 | NDS-3-45 | NDS-3-45 | 35 | SAI-180910 | CDS-180910S |
| AM-602125 | CDM-602125 | 16 | FL-24250 | FL-24250S | 34 | NDS-3-60 | NDS-3-60 | 35 | SAI-201011 | CDS-201011S |
| AM-602130 | CDM-602130 | 16 | FL-26262 | FL-26262S | 34 | NDS-4-30 | NDS-4-30 | 35 | SAI-201065 | CDS-201065S |
| AM-602625 | CDM-602625 | 16 | FL-28281 | FL-28281S | 34 | NDS-4-45 | NDS-4-45 | 35 | SAI-201078 | CDS-201078S |
| AM-602630 | CDM-602630 | 16 | FL-30300 | FL-30300S | 34 | NDS-4-60 | NDS-4-60 | 35 | SAI-201098 | CDS-201098S |
| AM-603125 | CDM-603125 | 16 | FL-32318 | FL-32318S | 34 | NDS-5-30 | NDS-5-30 | 35 | SAI-231011 | CDS-231011S |
| AM-603130 | CDM-603130 | 16 | FL-36356 | FL-36356S | 34 | NDS-5-45 | NDS-5-45 | 35 | SAI-231078 | CDS-231078S |
| AM-603135 | CDM-603135 | 16 | FL-388 | FL-388S | 34 | NDS-5-60 | NDS-5-60 | 35 | SAI-231098 | CDS-231098S |
| AM-63203 | CDM-63203 | 14 | FL-40394 | FL-40394S | 34 | NDS-6-30 | NDS-6-30 | 35 | SAI-251209 | CDS-251209S |
| AM-633118 | CDM-633118 | 16 | FL-716 | FL-716S | 34 | NDS-6-45 | NDS-6-45 | 35 | SAI-251212 | CDS-251212S |
| AM-633125 | CDM-633125 | 16 | FL-889 | FL-889S | 34 | NDS-6-60 | NDS-6-60 | 35 | SAI-251213 | CDS-251213S |
| AM-633130 | CDM-633130 | 16 | MFL-10078 | MFL-10078S | 34 | NDS-7-30 | NDS-7-30 | 35 | SAI-251280 | CDS-251280S |
| AM-633135 | CDM-633135 | 16 | MFL-12090 | MFL-12090S | 34 | NDS-7-45 | NDS-7-45 | 35 | SAI-281315 | CDS-281315S |
| AM-702620 | CDM-702620 | 16 | MFL-14098 | MFL-14098S | 34 | NDS-7-60 | NDS-7-60 | 35 | SAI-311511 | CDS-311511S |
| AM-703125 | CDM-703125 | 16 | MFL-20160 | MFL-20160S | 34 | NDS-8-30 | NDS-8-30 | 35 | SAI-311517 | CDS-311517S |
| AM-703130 | CDM-703130 | 16 | MFL-24160 | MFL-24160S | 34 | NDS-8-45 | NDS-8-45 | 35 | SAI-341619 | CDS-341619S |
| AM-703630 | CDM-703630 | 16 | MFL-27168 | MFL-27168S | 34 | NDS-8-60 | NDS-8-60 | 35 | SAI-371915 | CDS-371915S |
| AM-703640 | CDM-703640 | 16 | MFL-30190 | MFL-30190S | 34 | NDS-9-30 | NDS-9-30 | 35 | SAI-371918 | CDS-371918S |
| AM-704140 | CDM-704140 | 16 | MFL-36250 | MFL-36250S | 34 | NDS-9-45 | NDS-9-45 | 35 | SAI-371920 | CDS-371920S |
| AM-704150 | CDM-704150 | 16 | MFL-39250 | MFL-39250S | 34 | NDS-9-60 | NDS-9-60 | 35 | SAI-371930 | CDS-371930S |
| AM-713620 | CDM-713620 | 16 | MFL-8050 | MFL-8050S | 34 | SAI-104435 | CDS-104435S | | SAI-431322 | CDS-431322S |
| AM-713625 | CDM-713625 | 16 | MFL-8078 | MFL-8078S | 34 | SAI-104439 | CDS-104439S | | SAI-502518 | CDS-502518S |
| AM-713640 | CDM-713640 | 16 | NDS-10-30 | NDS-10-30 | 35 | SAI-104449 | CDS-104449S | | SAI-502519 | CDS-502519S |
| AM-803125 | CDM-803125 | 16 | NDS-10-45 | NDS-10-45 | 35 | SAI-105135 | CDS-105135S | | SAI-502523 | CDS-502523S |
| AM-803130 | CDM-803130 | 16 | NDS-10-60 | NDS-10-60 | 35 | SAI-105139 | CDS-105139S | | SAI-502525 | CDS-502525S |
| AM-803140 | CDM-803140 | 16 | NDS-11-30 | NDS-11-30 | 35 | SAI-105149 | CDS-105149S | | SAI-502538 | CDS-502538S |
| AM-803630 | CDM-803630 | 16 | NDS-11-45 | NDS-11-45 | 35 | SAI-105159 | CDS-105159S | | SAI-623122 | CDS-623122S |
| AM-803640 | CDM-803640 | 16 | NDS-11-60 | NDS-11-60 | 35 | SAI-115139 | CDS-115139S | | SAI-623132 | CDS-623132S |
| AM-804123 | CDM-804123 | 16 | NDS-12-30 | NDS-12-30 | 35 | SAI-115149 | CDS-115149S | | SAI-683823 | CDS-683823S |
| AM-804130 | CDM-804130 | 16 | NDS-12-45 | NDS-12-45 | 35 | SAI-115159 | CDS-115159S | | SAI-683827 | CDS-683827S |
| AM-804140 | CDM-804140 | 16 | NDS-12-60 | NDS-12-60 | 35 | SAI-115656 | CDS-115656S | | SAI-753227 | CDS-753227S |
| AM-804150 | CDM-804150 | 16 | NDS-13-30 | NDS-13-30 | 35 | SAI-126340 | CDS-126340S | | SAI-753231 | CDS-753231S |
| AM-83202 | CDM-83202 | 14 | NDS-13-45 | NDS-13-45 | 35 | SAI-126362 | CDS-126362S | | SAI-753828 | CDS-753828S |
| AM-83203 | CDM-83203 | 14 | NDS-13-60 | NDS-13-60 | 35 | SAI-126389 | CDS-126389S | | SAI-753831 | CDS-753831S |
| AM-83204 | CDM-83204 | 14 | NDS-14-30 | NDS-14-30 | 35 | SAI-136349 | CDS-136349S | | SAI-753834 | CDS-753834S |
| AM-84202 | CDM-84202 | 14 | NDS-14-45 | NDS-14-45 | 35 | SAI-136359 | CDS-136359S | | SAI-753835 | CDS-753835S |
| AM-84203 | CDM-84203 | 14 | NDS-14-60 | NDS-14-60 | 35 | SAI-136378 | CDS-136378S | | SAI-753840 | CDS-753840S |
| AM-84204 | CDM-84204 | 14 | NDS-15-30 | NDS-15-30 | 35 | SAI-136944 | CDS-136944S | | SAI-753856 | CDS-753856S |
| AM-904625 | CDM-904625 | 16 | NDS-15-45 | NDS-15-45 | 35 | SAI-136967 | CDS-136967S | | SAI-874431 | CDS-874431S |
| AM-904635 | CDM-904635 | 16 | NDS-15-60 | NDS-15-60 | 35 | SAI-1575107 | CDS-1575107S | | SAI-874445 | CDS-874445S |
| AM-904650 | CDM-904650 | 16 | NDS-16-30 | NDS-16-30 | 35 | SAI-157545 | CDS-157545S | | SAI-933145 | CDS-933145S |
| FL-10125 | FL-10125S | 34 | NDS-16-45 | NDS-16-45 | 35 | SAI-157572 | CDS-157572S | | SAI-953847 | CDS-953847S |
| FL-12131 | FL-12131S | 34 | NDS-16-60 | NDS-16-60 | 35 | SAI-157659 | CDS-157659S | | SAK-6000 | BB-6000S |
| FL-14160 | FL-14160S | 34 | NDS-17-30 | NDS-17-30 | 35 | SAI-157678 | CDS-157678S | | SAK-6001 | BB-6001S |
| FL-16168 | FL-16168S | 34 | NDS-17-45 | NDS-17-45 | 35 | SAI-157698 | CDS-157698S | | SAK-6002 | BB-6002S |
| FL-18187 | FL-18187S | 34 | NDS-17-60 | NDS-17-60 | 35 | SAI-178885 | CDS-178885S | | SAK-6003 | BB-6003S |



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| ROLEX | CSC | ROLEX | CSC | ROLEX | CSC | ROLEX | CSC |
|----------|----------|-------------|--------------|-------------|--------------|--------------|---------------|
| SAK-6004 | BB-6004S | SAK-6307 | BB-6307S | SAM-1255150 | CDM-1255150S | SAM-1809248 | CDM-1809248S |
| SAK-6005 | BB-6005S | SAK-6308 | BB-6308S | SAM-1255160 | CDM-1255160S | SAM-1809260 | CDM-1809260S |
| SAK-6006 | BB-6006S | SAK-6309 | BB-6309S | SAM-1256150 | CDM-1256150S | SAM-186204 | CDM-186204S |
| SAK-6007 | BB-6007S | SAK-6310 | BB-6310S | SAM-1256160 | CDM-1256160S | SAM-186205 | CDM-186205S |
| SAK-6008 | BB-6008S | SAK-6311 | BB-6311S | SAM-1256180 | CDM-1256180S | SAM-186206 | CDM-186206S |
| SAK-6009 | BB-6009S | SAK-6312 | BB-6312S | SAM-1256435 | CDM-1256435S | SAM-186207 | CDM-186207S |
| SAK-6010 | BB-6010S | SAK-6313 | BB-6313S | SAM-1256450 | CDM-1256450S | SAM-186208 | CDM-186208S |
| SAK-6011 | BB-6011S | SAK-6314 | BB-6314S | SAM-1256480 | CDM-1256480S | SAM-188205 | CDM-188205S |
| SAK-6012 | BB-6012S | SAK-6315 | BB-6315S | SAM-1257110 | CDM-1257110S | SAM-188207 | CDM-188207S |
| SAK-6013 | BB-6013S | SAK-6316 | BB-6316S | SAM-1257160 | CDM-1257160S | SAM-188208 | CDM-188208S |
| SAK-6014 | BB-6014S | SAK-6317 | BB-6317S | SAM-1257180 | CDM-1257180S | SAM-188210 | CDM-188210S |
| SAK-6015 | BB-6015S | SAK-6318 | BB-6318S | SAM-126205 | CDM-126205S | SAM-189207 | CDM-189207S |
| SAK-6016 | BB-6016S | SAK-6319 | BB-6319S | SAM-126206 | CDM-126206S | SAM-189210 | CDM-189210S |
| SAK-6017 | BB-6017S | SAK-6322 | BB-6322S | SAM-135205 | CDM-135205S | SAM-189245 | CDM-189245S |
| SAK-6018 | BB-6018S | SAK-6324 | BB-6324S | SAM-136205 | CDM-136205S | SAM-20010210 | CDM-20010210S |
| SAK-6020 | BB-6020S | SAK-6328 | BB-6328S | SAM-136207 | CDM-136207S | SAM-20010212 | CDM-20010212S |
| SAK-6021 | BB-6021S | SAK-R10 | BB-R-10S | SAM-136235 | CDM-136235S | SAM-20010214 | CDM-20010214S |
| SAK-6022 | BB-6022S | SAK-R2 | BB-R-2S | SAM-1407240 | CDM-1407240S | SAM-20010260 | CDM-20010260S |
| SAK-6024 | BB-6024S | SAK-R3 | BB-R-3S | SAM-1407250 | CDM-1407250S | SAM-20010280 | CDM-20010280S |
| SAK-6026 | BB-6026S | SAK-R4 | BB-R-4S | SAM-1407280 | CDM-1407280S | SAM-20011212 | CDM-20011212S |
| SAK-6030 | BB-6030S | SAK-R6 | BB-R-6S | SAM-147205 | CDM-147205S | SAM-20011214 | CDM-20011214S |
| SAK-607 | BB-607S | SAK-R8 | BB-R-8S | SAM-147208 | CDM-147208S | SAM-20011216 | CDM-20011216S |
| SAK-608 | BB-608S | SAM-1004140 | CDM-1004140S | SAM-147235 | CDM-147235S | SAM-2008210 | CDM-2008210S |
| SAK-609 | BB-609S | SAM-1004150 | CDM-1004150S | SAM-1506150 | CDM-1506150S | SAM-2008212 | CDM-2008212S |
| SAK-6200 | BB-6200S | SAM-1005127 | CDM-1005127S | SAM-1506160 | CDM-1506160S | SAM-2008280 | CDM-2008280S |
| SAK-6203 | BB-6203S | SAM-1005135 | CDM-1005135S | SAM-1507160 | CDM-1507160S | SAM-2009210 | CDM-2009210S |
| SAK-6205 | BB-6205S | SAM-1005140 | CDM-1005140S | SAM-1507180 | CDM-1507180S | SAM-2009212 | CDM-2009212S |
| SAK-6207 | BB-6207S | SAM-1005150 | CDM-1005150S | SAM-1508110 | CDM-1508110S | SAM-2009214 | CDM-2009214S |
| SAK-6209 | BB-6209S | SAM-1005160 | CDM-1005160S | SAM-1508180 | CDM-1508180S | SAM-201005 | CDM-201005S |
| SAK-6213 | BB-6213S | SAM-103203 | CDM-103203S | SAM-155204 | CDM-155204S | SAM-201008 | CDM-201008S |
| SAK-6221 | BB-6221S | SAM-103204 | CDM-103204S | SAM-155205 | CDM-155205S | SAM-201009 | CDM-201009S |
| SAK-6224 | BB-6224S | SAM-103205 | CDM-103205S | SAM-155206 | CDM-155206S | SAM-201010 | CDM-201010S |
| SAK-6226 | BB-6226S | SAM-104204 | CDM-104204S | SAM-155207 | CDM-155207S | SAM-201011 | CDM-201011S |
| SAK-6228 | BB-6228S | SAM-104205 | CDM-104205S | SAM-156205 | CDM-156205S | SAM-201013 | CDM-201013S |
| SAK-623 | BB-623S | SAM-105204 | CDM-105204S | SAM-156206 | CDM-156206S | SAM-201015 | CDM-201015S |
| SAK-6230 | BB-6230S | SAM-105205 | CDM-105205S | SAM-156207 | CDM-156207S | SAM-208206 | CDM-208206S |
| SAK-6232 | BB-6232S | SAM-105225 | CDM-105225S | SAM-158207 | CDM-158207S | SAM-208207 | CDM-208207S |
| SAK-6234 | BB-6234S | SAM-1125730 | CDM-1125730S | SAM-158208 | CDM-158208S | SAM-208208 | CDM-208208S |
| SAK-6236 | BB-6236S | SAM-1125740 | CDM-1125740S | SAM-1608210 | CDM-1608210S | SAM-208209 | CDM-208209S |
| SAK-6238 | BB-6238S | SAM-1125760 | CDM-1125760S | SAM-1608243 | CDM-1608243S | SAM-208210 | CDM-208210S |
| SAK-624 | BB-624S | SAM-124204 | CDM-124204S | SAM-1608260 | CDM-1608260S | SAM-221106 | CDM-221106S |
| SAK-6240 | BB-6240S | SAM-124205 | CDM-124205S | SAM-168204 | CDM-168204S | SAM-221108 | CDM-221108S |
| SAK-625 | BB-625S | SAM-124206 | CDM-124206S | SAM-168206 | CDM-168206S | SAM-221113 | CDM-221113S |
| SAK-626 | BB-626S | SAM-125205 | CDM-125205S | SAM-168207 | CDM-168207S | SAM-22511212 | CDM-22511212S |
| SAK-6300 | BB-6300S | SAM-125206 | CDM-125206S | SAM-168208 | CDM-168208S | SAM-22511280 | CDM-22511280S |
| SAK-6301 | BB-6301S | SAM-1254140 | CDM-1254140S | SAM-168209 | CDM-168209S | SAM-22511285 | CDM-22511285S |
| SAK-6306 | BB-6306S | SAM-1255140 | CDM-1255140S | SAM-1809210 | CDM-1809210S | SAM-231009 | CDM-231009S |



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| ROLEX | CSC | ROLEX | CSC | ROLEX | CSC | PG | ROLEX | CSC | PG |
|--------------|---------------|--------------|-------------|--------------|-------------|-----------|--------------|------------|-----------|
| SAM-231010 | CDM-231010S | SAM-341620 | CDM-341620S | SAM-633135 | CDM-633135S | | SP-62704 | SP-62704 | 33 |
| SAM-231013 | CDM-231013S | SAM-361809 | CDM-361809S | SAM-702620 | CDM-702620S | | SP-702870 | SP-702870 | 33 |
| SAM-231210 | CDM-231210S | SAM-361813 | CDM-361813S | SAM-703125 | CDM-703125S | | SP-73205 | SP-73205 | 33 |
| SAM-231213 | CDM-231213S | SAM-361820 | CDM-361820S | SAM-703130 | CDM-703130S | | SP-773175 | SP-773175 | 33 |
| SAM-231215 | CDM-231215S | SAM-401413 | CDM-401413S | SAM-703630 | CDM-703630S | | SP-83705 | SP-83705 | 33 |
| SAM-238207 | CDM-238207S | SAM-401415 | CDM-401415S | SAM-703640 | CDM-703640S | | SP-94308 | SP-94308 | 33 |
| SAM-238208 | CDM-238208S | SAM-401420 | CDM-401420S | SAM-704140 | CDM-704140S | | SSP-115310 | SP-115310S | |
| SAM-238209 | CDM-238209S | SAM-401615 | CDM-401615S | SAM-704150 | CDM-704150S | | SSP-146412 | SP-146412S | |
| SAM-238210 | CDM-238210S | SAM-401620 | CDM-401620S | SAM-713620 | CDM-713620S | | SSP-177415 | SP-177415S | |
| SAM-25010210 | CDM-25010210S | SAM-401820 | CDM-401820S | SAM-713625 | CDM-713625S | | SSP-188420 | SP-188420S | |
| SAM-25010212 | CDM-25010212S | SAM-402010 | CDM-402010S | SAM-713640 | CDM-713640S | | SSP-218425 | SP-218425S | |
| SAM-25012710 | CDM-25012710S | SAM-402015 | CDM-402015S | SAM-803125 | CDM-803125S | | SSP-231120 | SP-231120S | |
| SAM-25012712 | CDM-25012712S | SAM-402020 | CDM-402020S | SAM-803130 | CDM-803130S | | SSP-241130 | SP-241130S | |
| SAM-25012714 | CDM-25012714S | SAM-402023 | CDM-402023S | SAM-803140 | CDM-803140S | | SSP-291325 | SP-291325S | |
| SAM-25012716 | CDM-25012716S | SAM-402025 | CDM-402025S | SAM-803630 | CDM-803630S | | SSP-321335 | SP-321335S | |
| SAM-25012770 | CDM-25012770S | SAM-452213 | CDM-452213S | SAM-803640 | CDM-803640S | | SSP-351530 | SP-351530S | |
| SAM-251010 | CDM-251010S | SAM-452218 | CDM-452218S | SAM-804123 | CDM-804123S | | SSP-391540 | SP-391540S | |
| SAM-251207 | CDM-251207S | SAM-452225 | CDM-452225S | SAM-804130 | CDM-804130S | | SSP-391735 | SP-391735S | |
| SAM-251209 | CDM-251209S | SAM-501813 | CDM-501813S | SAM-804140 | CDM-804140S | | SSP-421740 | SP-421740S | |
| SAM-251210 | CDM-251210S | SAM-501815 | CDM-501815S | SAM-804150 | CDM-804150S | | SSP-471950 | SP-471950S | |
| SAM-251213 | CDM-251213S | SAM-501820 | CDM-501820S | SAM-83202 | CDM-83202S | | SSP-52203 | SP-52203S | |
| SAM-251215 | CDM-251215S | SAM-501825 | CDM-501825S | SAM-83203 | CDM-83203S | | SSP-522160 | SP-522160S | |
| SAM-281008 | CDM-281008S | SAM-501830 | CDM-501830S | SAM-83204 | CDM-83204S | | SSP-562360 | SP-562360S | |
| SAM-281010 | CDM-281010S | SAM-502020 | CDM-502020S | SAM-84202 | CDM-84202S | | SSP-622565 | SP-622565S | |
| SAM-281013 | CDM-281013S | SAM-502025 | CDM-502025S | SAM-84203 | CDM-84203S | | SSP-62704 | SP-62704S | |
| SAM-281015 | CDM-281015S | SAM-502220 | CDM-502220S | SAM-84204 | CDM-84204S | | SSP-702870 | SP-702870S | |
| SAM-281210 | CDM-281210S | SAM-502225 | CDM-502225S | SAM-904625 | CDM-904625S | | SSP-73205 | SP-73205S | |
| SAM-281213 | CDM-281213S | SAM-502513 | CDM-502513S | SAM-904635 | CDM-904635S | | SSP-773175 | SP-773175S | |
| SAM-281215 | CDM-281215S | SAM-502515 | CDM-502515S | SAM-904650 | CDM-904650S | | SSP-83705 | SP-83705S | |
| SAM-281408 | CDM-281408S | SAM-502520 | CDM-502520S | SP-115310 | SP-115310 | 33 | SSP-94308 | SP-94308S | |
| SAM-281410 | CDM-281410S | SAM-502525 | CDM-502525S | SP-146412 | SP-146412 | 33 | | | |
| SAM-281413 | CDM-281413S | SAM-502530 | CDM-502530S | SP-177415 | SP-177415 | 33 | | | |
| SAM-281415 | CDM-281415S | SAM-562915 | CDM-562915S | SP-188420 | SP-188420 | 33 | | | |
| SAM-321210 | CDM-321210S | SAM-562920 | CDM-562920S | SP-218425 | SP-218425 | 33 | | | |
| SAM-321213 | CDM-321213S | SAM-562930 | CDM-562930S | SP-231120 | SP-231120 | 33 | | | |
| SAM-321215 | CDM-321215S | SAM-602120 | CDM-602120S | SP-241130 | SP-241130 | 33 | | | |
| SAM-321608 | CDM-321608S | SAM-602125 | CDM-602125S | SP-291325 | SP-291325 | 33 | | | |
| SAM-321613 | CDM-321613S | SAM-602130 | CDM-602130S | SP-321335 | SP-321335 | 33 | | | |
| SAM-321615 | CDM-321615S | SAM-602625 | CDM-602625S | SP-351530 | SP-351530 | 33 | | | |
| SAM-321618 | CDM-321618S | SAM-602630 | CDM-602630S | SP-391540 | SP-391540 | 33 | | | |
| SAM-321620 | CDM-321620S | SAM-603125 | CDM-603125S | SP-391735 | SP-391735 | 33 | | | |
| SAM-341210 | CDM-341210S | SAM-603130 | CDM-603130S | SP-421740 | SP-421740 | 33 | | | |
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