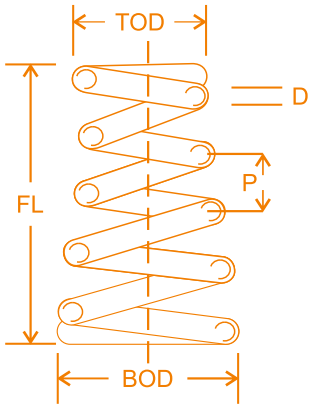
CONICAL SPRING

WIRECOM™ (INDIA) PRIVATE LIMITED
Where... Quality Springs to Life!

Compression Springs are designed to operate with a compressive load in "Push Mode". Compression Spring also has variable pitch between coils which are used to reduce solid height, buckling and surging to produce nonlinear load deflection characteristics. Compression springs offer resistance to linear compressing forces and are in fact one of the most efficient energy storage devices available.

How to Design a Conical Spring

- The normal square ness tolerance for ground ends is 2-3 degrees.
- Use conical compression springs when a short, solid height is needed to reduce buckling and surging.
- Leave the wind direction optional for compression springs. Use right hand wound when the compression spring is being threaded on a bolt, one right and one left when two springs are being used inside the other to avoid meshing coils.
- Specify a force with a tolerance (+/- 10 percent) at an exact compressed height rather than a definite deflection. Spring rate is the difference of two forces divided by the amount of deflection between those forces.
- Define unusual conditions such as temperature, corrosive environments, impact force, and fatigue life.
- Fix the exact wire size and number of coils.
- Define the spring travel and any solid height requirements.



WIRE – RANGE : 0.25 MM - 4 MM

Material

- Spring steel is considered a general use steel because of its ability to be durable, yet flexible with a high degree of strength. It has the unique ability to be formed, shaped, and post heat treated, which makes it one of the premium choices for manufacturing springs for automotive, auto electrical and electrical applications.
- Stainless steel is good for corrosion resistant and Inconel is best for springs being used at very high temperatures.
- When it comes to springs that are required to be non-magnetic, Stainless Steel 316 can be used. This material type isn't 100% non-magnetic though. Stainless steel 316 is only 90% non-magnetic.

Finish

Conical Springs are available in Nickel, Yellow and White Zinc Plating, Black Oxidizing, Lacquering, Green Passivation and Trivalent Passivation. Stainless Steel Springs are available with Bright Finish.

Corporate Office:
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DESIGN FORMULAE

Symbol	Units	Details	Formula
D_1	mm	Small Mean Diameter	
D_2	mm	Large Mean Diameter	
D_e	mm	External Diameter	$D_e = D_2 + n_{j2}\, d$
D_i	mm	Internal Diameter	$D_i = D_1 - n_{j1}\, d$
d	mm	Wire Diameter	
E	N/mm^2	Elastic Modulus	
G	N/mm^2	Torsion Modulus	
k		Stress Correction Factor	$k = (w + 0.5) / (w - 0.75)$
L_0	mm	Free Length	$L_0 = L_a + (n_{i1} + n_{i2})\, d$
L_1, L_2	mm	Operating Lengths Related to P_1, P_2	
L_a	mm	Active Length	$L_a = L - (n_{i1} + n_{i2})\, d$
L_c	mm	Solid Length	Depends on the Design of the Spring
L_T	mm	Transition Length	
n_a		Number of Active Coils	
n_{i1}		Effect of Small End Coil on Axial Length	
n_{i2}		Effect of Large End Coil on Axial Length	
n_{j1}		Effect of Small End Coil on Internal Diameter	
n_{j2}		Effect of the Large End Coil on External Diameter	
nm		No. of Dead Coils	
n_t		Total No. of Coils	$n_t = n_a + n_m + 2$
R	N/mm	Spring Rate in the Linear Range	**Constant Pitch:** $R = G\, d^4 / [2\, n_a\, (D_1^2 + D_2^2)(D_1 + D_2)]$ **Constant Helix Angle:** $R = 3\, G\, d^4\, L_n\, (D_2 / D_1) / [8\, n_a\, (D_2^3 - D_1^3)]$
Rm	N/mm^2	Ultimate Tensile Strength	
P_1, P_2	N	External Loads, Related to Lengths L_1, L_2	
P_c	N	Theoretical Load at Solid	
P_T	N	Transition Load	
S_h	mm	Spring Travel	$S_h = L_1 - L_2$
w_1		Small Spring Index	$w_1 = D_1 / d$
w_2		Large Spring Index	$w_2 = D_2 / d$

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Key Parameters

Spring rate: This parameter determines spring's resistance, while it is working. Tolerance for this parameter is (+/-) 15% (indicative).

Manufacturing Process

Conical Springs are manufactured on imported CNC Spring Coiling Machines with SPC on line with free length sorting device for critical load value.

Testing & Certification Process

Each spring manufactured goes through a series of rigorous tests conducted on in house testing facilities such as Computerized Load Testing, UTS Testing, Torsion testing, Profile Projector amongst others. All springs are supplied with ROHS raw material compliant report. We also provide PPAP documents for automobiles and electrical industries as per requirement.

Common Applications

Electrical contacts such as Push Buttons and Battery Contacts, Automobile Suspension Systems, Automotive Clutch Systems, Firing Mechanism of a Weapon, Medical Devices, Cell Phones, Large Stamping Presses and Lawnmowers, Motor Starter, Water Pumps, among other.

Reference Standards

- **Is4454 (Part 1) : 2001 –** Cold Drawn Unalloyed Steel Wire - Wire Grades SL, SM, SH, DM & DH
- **IS4454 (Part 2) : 2001 –** Oil Hardened and Tempered Steel Wire
- **IS4454 (Part 2) : 2001 –** Stainless Steel Wire

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