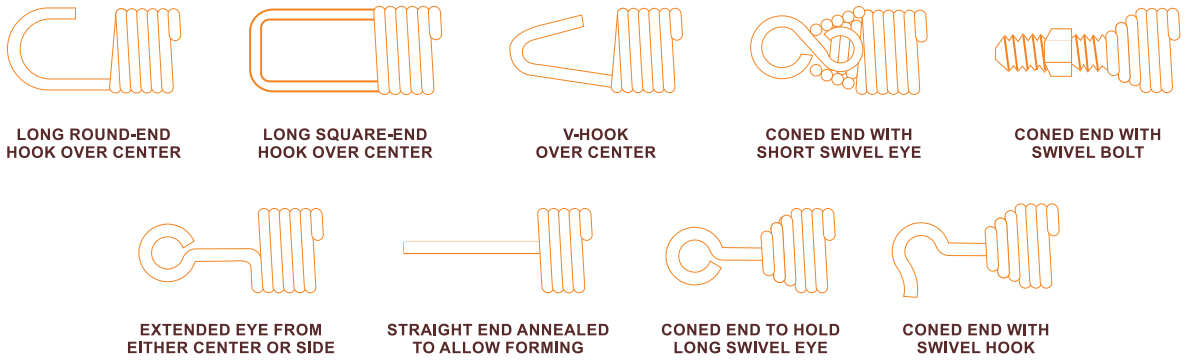
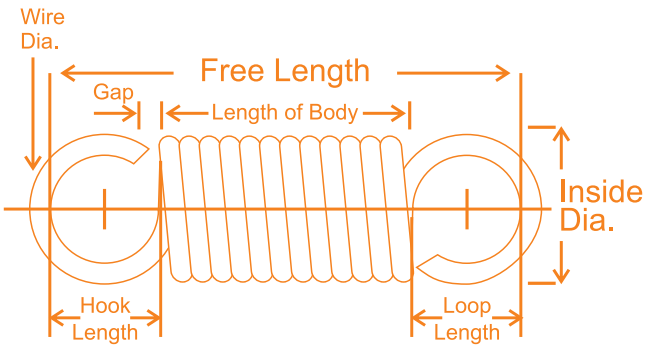
TENSION SPRING

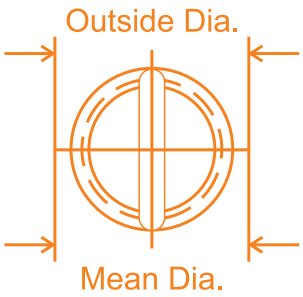
WIRECOM™ (INDIA) PRIVATE LIMITED
Where... Quality Springs to Life!

Tension Springs/Extension Springs are helical wound coils, wrapped tightly together to create tension. Extension springs are springs which absorb and store energy by offering resistance to a pulling force. Extension springs usually have hooks, loops, or end coils that are pulled out and formed from each end of the body. The function of an extension spring is to provide extended force when the spring is pulled apart from its original length.

Types Of Hooks An Loops







How to Design a Tension Spring

- The highest stressed point in an extension spring is where it bends to form the loop.
- The permissible Torsional Stress, St should be 35 – 45% of ultimate tensile strength.
- The permissible Bending stress, Sb (in hooks / loops) should be 55 – 75% of ultimate tensile strength.
- Spring rate tolerance ± 10%
- Load at length tolerance ± 10%
- Spring Index should be between 6 and 12. (Spring Index, I = Mean Diameter-D / Wire Diameter-d)
- The permissible shear stress for the spring wire should be half of the ultimate tensile strength.

Corporate Office:
27/39, 28 Sethi Industrial. Estate,
10/E Suren Road, Near Cinemax Cinema,
Andheri East, Mumbai 400 093, India.
Tel. +91 (22) 6129 9400-05

Vasai Plant:
A-17/18 & 3, Sagar Sangam Industrial Estate,
Sativali, Vasai (East), Palghar 401 208, India.
Tel. +91 (250) 6607 900-05

Chakan Pune Plant:
GAT #245, 246, 247, 249/3, Plot #3,
Kharabwadi, Village Chakan,
Tal: Khed, Dist: Pune 410501. India.
Tel. +91 (2135) 677 800 - 05

ISO 9001:2015 I ISO 45001:2018
IATF 16949:2016 I ZED CERTIFIED

info@wirecomindia.com I www.wirecomindia.com

TENSION SPRING

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

DESIGN FORMULAE

Parameter	Formula
Overall Length – 2 Wire Diameters = Length Inside Hooks	OL – 2WD = LIH
Body Length + 2 Hook Lengths = LIH	BL + 2HL = LIH
Load = Rate x Travel + Initial Tension	[L = kT + IT]
Rate = (Load – Initial Tension) ÷ Travel	[k = (L – IT) ÷ T]
Travel = (Load – Initial Tension) ÷ Rate	[T = (L – IT) ÷ k]
Initial Tension = Load - Rate x Travel	[IT = L – R (T)]
Spring Constant	R = (P2 – P1) / (L2 – L1)
Spring Constant	R = Gd^4 / 8D^3N
Stress correction factor	k = (w + 0.5) / (w - 0.75)
Initial Stress	To = (7.5 - 0.375 w) Rm / 100 N/mm2
Corrected stress related to F2	Tk2 = 8 k D F2 / (□ d3)

List of Parameters

G - Shear Modulus of Torsion
d - Wire Size
D - Mean Diameter
N - No. of Active Coils
Rf - Rate of Extension Spring (in lbs./inch)
S - Stress (lbs. /Sq. Inch)
P - Load (lbs.)
M - Moment (inch-lbs.)

Key Parameters

- The tension in between an extension spring's coils to keep the coils together is called initial tension. Initial tension is released once the extension spring is extended to a point where you can see gap in between the coils.
- Formula to calculate initial tension: IT = L – R (T)
- Where, IT = Initial Tension, L = Load, R = Rate & T = Travel
- The initial tension should be between 40% and 80% of UTS for best control

Reference Standards

- **IS4454(Part 1) :2001 –** Cold Drawn unalloyed Steel Wire - wire grades SL, SM, SH, DM & DH
- **IS4454 (Part 2) : 2001 –** Stainless Steel Wire

Common Applications

Automotive interiors and exteriors, Garage Door Assembles, Vise-Grip Pliers, Carburettors, Trampolines, Farm Machinery, Relays, Switches, Switchgears, Rotary Switch, Window & Car Curtains, Photocopy & Printing Machine, Stapler Pin Machines, Washing Machine, Hardware Locks & Handles, Textile Machinery, Looms, Toys & any type of spring tensioning device.

Corporate Office:
27/39, 28 Sethi Industrial. Estate,
10/E Suren Road, Near Cinemax Cinema,
Andheri East, Mumbai 400 093, India.
Tel. +91 (22) 6129 9400-05

Vasai Plant:
A-17/18 & 3, Sagar Sangam Industrial Estate,
Sativali, Vasai (East), Palghar 401 208, India.
Tel. +91 (250) 6607 900-05

Chakan Pune Plant:
GAT #245, 246, 247, 249/3, Plot #3,
Kharabwadi, Village Chakan,
Tal: Khed, Dist: Pune 410501. India.
Tel. +91 (2135) 677 800 - 05

ISO 9001:2015 I ISO 45001:2018
IATF 16949:2016 I ZED CERTIFIED

info@wirecomindia.com I www.wirecomindia.com

TENSION SPRING

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

WIRE – RANGE : 0.15 MM - 8 MM

Material

The most common material types for extension springs are music wire, hard drawn, stainless steel (type 302 and type 316), oil tempered, chrome silicon, and phosphor bronze.

Shear Modulus of Material (G)		
Material	**G Value N/mm^2 [Kgf/mm^2]**	**Material Grade**
Spring Steel	78 X 10^3 [8 X 10^3]	SUP 6, 7, 9, 9A, 10, 11A, 12, 13
Hard Steel Wire	78 X 10^3 [8 X 10^3]	SW-B, SW-C
Piano Wire	78 X 10^3 [8 X 10^3]	SWP
Oil Tempered Steel Wire	78 X 10^3 [8 X 10^3]	SWO, SWO-V, SWOC-V, SWOSC-V, SWOSM, AWOSC-B
Stainless Steel Wire	69 X 10^3 [7 X 10^3]	SUS 302
Stainless Steel Wire	69 X 10^3 [7 X 10^3]	SUS 304
Stainless Steel Wire	69 X 10^3 [7 X 10^3]	SUS 304 N1
Stainless Steel Wire	69 X 10^3 [7 X 10^3]	SUS 316
Stainless Steel Wire	74 X 10^3 [7.5 X 10^3]	SUS 631 J1

Finish

Tension 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.

Manufacturing Process

Tension 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. Springs are also tested for its lifecycles on special fatigue testing for specific requirements.

Corporate Office:
27/39, 28 Sethi Industrial. Estate,
10/E Suren Road, Near Cinemax Cinema,
Andheri East, Mumbai 400 093, India.
Tel. +91 (22) 6129 9400-05

Vasai Plant:
A-17/18 & 3, Sagar Sangam Industrial Estate,
Sativali, Vasai (East), Palghar 401 208, India.
Tel. +91 (250) 6607 900-05

Chakan Pune Plant:
GAT #245, 246, 247, 249/3, Plot #3,
Kharabwadi, Village Chakan,
Tal: Khed, Dist: Pune 410501. India.
Tel. +91 (2135) 677 800 - 05

ISO 9001:2015 I ISO 45001:2018
IATF 16949:2016 I ZED CERTIFIED

info@wirecomindia.com I www.wirecomindia.com