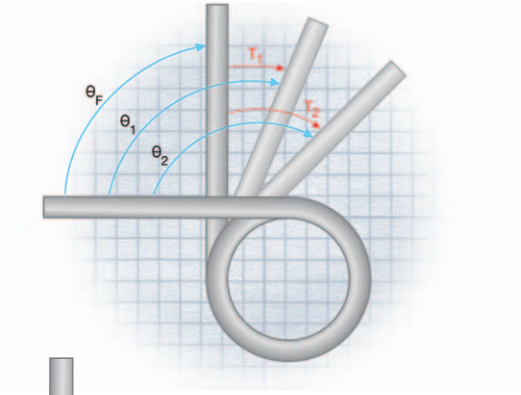
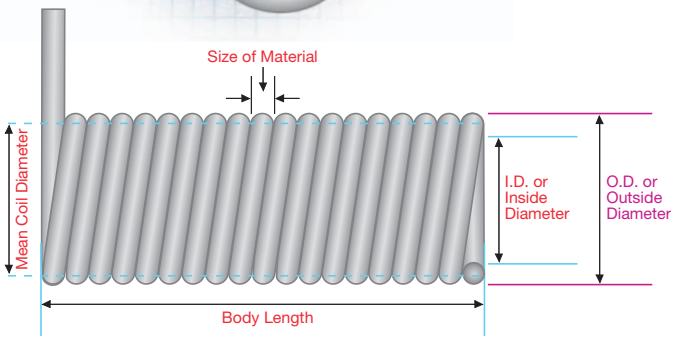
NEWCOMB SPRING CORP

Torsion Springs



Torsion springs are used to store rotational energy or to apply torque. It is always best to design these springs to wind up in use and to apply force in the direction of the wind – otherwise unfavorable bending stresses will occur. As a torsion spring deflects in the direction of the wind, the spring's diameter will decrease and its body length will increase. In these situations it is recommended that the spring be supported on its inner diameter *(I.D.)* with a shaft or tube, sized so that there will be no binding as the torsion spring deflects.

Double-torsion springs are a common type of torsion spring. They are made of a left hand component and a right hand component which are connected at the center. It is possible to have the two components connect at the outside edge, though this is not recommended.



Most springs are wound with the coils touching but with minimal initial tension. For these springs the body length can be calculated by multiplying the wire diameter by the number of coils, then adding one.

Body Length (L)

$L = (d \times N_t) + 1$

Design Considerations

Newcomb Spring's modern forming machinery and production techniques allow for an infinite variety of torsion spring end shapes. When specifications call for very long spring legs, we recommend discussing your requirements with a Newcomb Spring sales engineer. Our staff can verify manufacturing capabilities and will work to keep your production costs as low as possible.

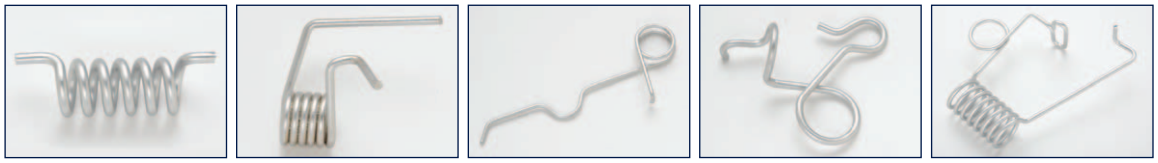
It is important to consider the direction of loading when designing bends or forms off a spring's body or in spring legs. Favorable residual stresses can be created when bends are loaded in a direction that reduces the radius or curvature.

Specifications

Our material size range for torsion springs is from .004-inches to 2.0-inches in diameter.

Examples of torsion spring ends:

**custom spring ends also available*



straight | bent | twisted | hooked | looped to your needs

D = Mean Coil Diameter (in. or mm)
d = Diameter of Round Wire (in. or mm)
Nt = Number of Coils
E = Modulus of Elasticity (psi or MPa)
T = Deflection, number of turns or revolutions of spring
M = Moment or Torque (lbin or Nmm)
b = Width (in. or mm)
t = Thickness (in. or mm)
S = Bending Stress* (psi or MPa)

**Typically the maximum design stress is 75% of the minimum tensile strength of the material.*

Basic Design Formulas for Torsion Springs

Note: The constants 10.8 and 6.6 generate results close to actual versus other theoretical values.

Round Wire	Rectangular Wire *Wound on Flat*	Rectangular Wire *Wound on Edge*	Square Wire
$M = \frac{Ed^4T}{10.8N_tD}$	$M = \frac{Ebt^3T}{6.6N_tD}$	$M = \frac{Etb^3T}{6.6N_tD}$	$M = \frac{Et^4T}{6.6N_tD}$
$S = \frac{32M}{\pi d^3}$	$S = \frac{6M}{bt^2}$	$S = \frac{6M}{tb^2}$	$S = \frac{6M}{t^3}$