
Torsion Springs

Torsion Springs

A torsion spring is a spring that works by torsion or twisting; that is, a flexible elastic object that stores mechanical energy when it is twisted. When it is twisted, it exerts a force (actually torque) in the opposite direction, proportional to the amount (angle) it is twisted. There are two types. A torsion bar is a straight bar of metal or rubber that is subjected to twisting (shear stress) about its axis by torque applied at its ends. A more delicate form used in sensitive instruments, called a torsion fiber consists of a fiber of silk, glass, or quartz under tension, that is twisted about its axis.

Helical springs used to apply a torque or store rotational energy are commonly referred to as torsion springs. The two most common types are single and double-bodied helical springs.

Torsion springs are found in clothespins, window shades, counterbalance mechanisms, ratchets, hinges and various other machine components. They are also used as couplings between concentric shafts such as in a motor pump assembly. Torsion springs are generally mounted around a shaft or arbor, and must be supported at three or more points.

Torsion springs are stressed in bending. If possible, a torsion spring should always be loaded in a direction that causes the body diameter to decrease. The residual forming stresses are favorable in this direction, but unfavorable when the spring is loaded in a direction that increases body diameter. Unless there are unfavorable residual stresses in the end bends, spring makers normally heat-treat these springs at a low temperature to stabilize the end positions rather than fully stress-relieve them. If the direction of loading tends to increase body diameter, the spring maker should be advised to stress-relieve the springs.





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