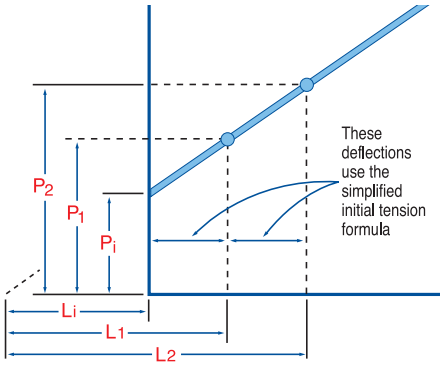
NEWCOMB SPRING CORP

Extension Springs



Most extension springs are wound with initial tension. This is an internal force that holds the coils together. The measure of the initial tension is the load necessary to overcome the internal force and begin coil separation. Unlike a compression spring that has zero load at zero deflection, an extension spring can have a preload at zero deflection (see graph). This built-in load, called initial tension, can be varied within limits, decreasing as the spring index increases. Note that there is a range of stress (and, therefore, force) for any spring index that can be held without problems. If the designer needs an extension spring with no initial tension, the spring should be designed with space between the coils.

Specifications

Our material size range for extension springs is from .005-inches to .625-inches in diameter.

For any extension spring there is a stress due to initial tension (load) that is easily calculable.

Torsion Stress due to Initial Tension (S_i)

$$S_i = \frac{8DP_i}{\pi d^3} \quad psi(MPa)$$

Rate can be measured by extending a spring to a length (L_1) such that definite coil separation occurs and measure the load (P_1). Extend the spring farther to a second length (L_2) and measure the load (P_2).

Rate (R)

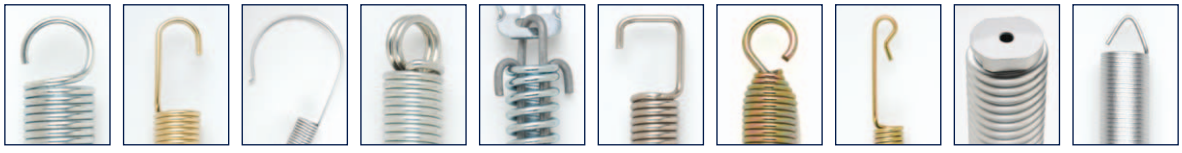
$$R = \frac{(P_2 - P_1)}{(L_2 - L_1)}$$

Initial Tension (P_1) is determined by extending the spring to a given length (L_1) ensuring coil separation. The spring is then extended an equal distance to (L_2). The amount of initial tension is equal to two (2) times the load achieved at (L_1) minus the load at (L_2).

Initial Tension Simplified (P_i)

$$P_i = 2P_1 - P_2$$

Common extension spring ends:



standard machine end | extended machine end | expanded machine end | double cross center loop | drawbar hooks | rectangular end | reduced end, swivel hook | tear-drop shaped end | threaded end | v-hook end

Spring Stresses

Stresses on a spring's ends are often higher then the stress on a spring's body. A minimum bend radius of $1\,^1/_2$ times the wire diameter is recommended. Designs should ensure the end's torsional stress does not exceed 40-50% of the tensile strength and the end's bending stress does not exceed 75% of the tensile strength.