

SPRING TERMINOLOGY

Active Coils – those coils which are free to deflect under load.

Buckling – bowing or lateral deflection of compression springs when compressed, related to the slenderness ratio (L/D)

Closed Ends – ends of compression springs which pitch of the end coils is reduced so that the end coils touch

Closed and Ground Ends – as with closed ends, except that the end is ground to provide a flat plane

Close-Wound – coiled with adjacent coils touching

Coil per Inch – *See Pitch*

Deflection – motion of spring ends or legs under the application or removal of an external load

Endurance Limit – maximum stress at which any given material will operate indefinitely without failure for a given minimum stress

Free Angle – angle between the legs of a torsion spring when the spring is not loaded

Free Length – the overall length of a spring in the unloaded position. *NOTE: In the case of an extension spring this may include the anchor ends*

Frequency(natural) – the lowest inherent rate of free vibration of a spring itself (usually in cycles per second) with ends restrained

Helix – the spring form (open or closed) of compression, extension and torsion springs

Hooks – open loops or ends of an extension spring

Hydrogen Embrittlement – hydrogen absorbed in electroplating or pickling of carbon steel, tending to make the spring material brittle and susceptible to cracking and failure, particularly under sustained loads.

Hysteresis – the mechanical energy loss that always occurs under cyclic loading and unloading load-deflection curves within the elastic range of a spring.

Initial Tension – the force that tends to keep the coils of an extension springs closed and which must be overcome before the coils start to open

Load – the force applied to a spring that causes a deflection

Loops – coil like wire shapes at the ends of extension springs that provide for attachment and force application

Mean Coil Diameter – outside spring diameter (O.D) minus one wire diameter

Open Ends, Not Ground – end of a compression spring with a constant pitch for each coil

Open ends Ground – “open ends, not ground” followed by an end grinding operation

Passivating – acid treatment of stainless steel to remove contaminants and improve corrosion resistance

Permanent Set – a material that is deflected so far that its elastic properties have been exceeded and it does not return to its original condition upon release of load is said to have taken a “permanent set”

Pitch – the distance from centre to centre of the wire in adjacent active coils (recommended practice is to specify number of active coils rather than pitch)

Rate – change in load per unit deflection, generally given in pounds per inch or Newtons per millimetre

Remove Set – the process of closing to solid height a compression spring which has been coiled longer than the desired finished length, so as to increase the apparent elastic limit

Residual Stress – stress induced by set removal, shot peening, cold working, forming or other means. These stresses may or may not be beneficial, depending on the application

Scragged – *see Remove Set*

Set – permanent distortion which occurs when a spring is stressed beyond the elastic limit of the material

Solid Height – length of compression spring when under sufficient load to bring all coils into contact with adjacent coils

Spring Index – ratio of mean coil diameter (D) to wire diameter (d)

Stress Relieve – to subject springs to low – temperature heat treatment so as to relieve residual stresses

Shot Peening – a cold-working process in which the material surface is peened to induce compressive stresses and thereby improve fatigue life

Torque – a twisting action in torsion springs which tends to produce rotation, equal to the load multiplied by the distance (or moment arm) from the load to the axis of the spring body

Total Number of Coil – number of active coils plus the coils forming the ends