HOW TO RATE COIL SPRINGS WITHOUT A RATER

$$\text{SPRING RATE} = GD^4/8ND^3$$

G = Torsional Modulus for Steel = 11.25×10^6
D = Wire Diameter in Inches
N = Number of Active Coils
D = Mean Coil Diameter in Inches. Mean Diameter is:
I.D. = 1 Wire plus inside Diameter
O.D. = 1 Wire minus outside Diameter
8 = A Constant for all Coil Springs

The "G" Factor is always the same for all coil springs made from steel (11.25×10^6 can also be written as 11,250,000).

EXAMPLE: 10 active coils and a mean coil diameter of 5.00 inches is a wire size of .625

$$\frac{11{,}250{,}000 \times .625 \times .625 \times .625 \times .625}{8 \times 10 \times 5.0 \times 5.0 \times 5.0} = \frac{171{,}661{,}370}{10{,}000}$$

Constant
Active Coils
Mean Dia.

Spring Rate = 171,661,370/10,000
Spring Rate = 171.66 lbs./per inch

HOW TO DETERMINE ACTIVE COILS OF A COIL SPRING:

Count total number of coils, subtract a coil for each coil that touches, these are dead coils. Ground flat ends are a dead coil. Start count with cut-off end facing you directly above would be one and so on. Not all coil springs are even coiled. You can have 1/4, 3/8, 1/2, 5/8, 3/4 or 1/8 of a coil (Example 10 1/8 coils).

---

1. If you cut one coil from a spring, the rate will increase.
2. Increasing wire diameter, will cause a great increase in rate.
3. Nothing in spring rate calculation indicates that a coil spring ever changes rate. The rate is determined by material and dimension of the spring. Coil springs don't wear out or lose their rate.
4. Spring load determines how much load a spring can support at a given height. The rate only tells how much height will change as load is changed. A spring can lose its load height over time if steel is not heat treated properly. When a spring sags, its rate is still the same as when it was new.