Springs / Shock Absorbers / Gas Springs

### Simple Force Calculation Method (Reference)

Formula of Spring Constant:

\[ k = \frac{F}{x} \]

where:

- \( k \) = spring constant (N/mm)
- \( F \) = force (N)
- \( x \) = deflection (mm)

**Deflection Formula:**

\[ x = \frac{F}{k} \]

Torque (Nmm/deg):

\[ T = k \times \theta \]

where:

- \( T \) = torque (Nmm)
- \( \theta \) = angle (deg)

**Spring Constant (Torque):**

\[ k = \frac{T}{\theta} \]

**Deflection (Torque):**

\[ x = \frac{T}{k \times \theta} \]

**Design Considerations:**

- Ensure proper hole size to accommodate the spring's deflection and prevent bending or stress concentrations.
- Consider the material properties and surface finish to enhance durability and performance.
- Verify the clearance between the spring and surrounding components to prevent interference.

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### Flat Springs

**Material:** 304 Stainless Steel

**Common Types:**

- IBNW
- IBNS

- **Design Guidelines:**
  - Due to low temperature annealing, surface color is golden brown.
  - Deflection: 0.2 ±0.02
  - Length: 120 – 200
  - Plate thickness: 0.1 ±0.005

**Part Number Example:**

- IBNW C - T0.2 - H12 - L120 - A3.5 - X5 - P10

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### Torsion Springs

**Right Winding 90° / Left Winding 180°**

**Arm Angle:**

- 90°
- 135°
- 180°

**Part Number Example:**

- UA90R Right Winding
- UA90L Left Winding

**Design Considerations:**

- Hole size must accommodate deflection, and bends should be 3 mm or more.
- Arm angle should be 1.5 mm or more. 
- The hole and the edge should be 1.5 mm or more.

**Spring Constant (Torque):**

\[ k = \frac{T}{\theta} \]

where:

- \( k \) = spring constant (Nmm/deg)
- \( T \) = torque (Nmm)
- \( \theta \) = angle (deg)

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There's more on the web: misumiusa.com

Check out misumiusa.com for the most current pricing and lead time.

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