Thermostat metal

PEP Polymet
PRECISION ENGINEERED PRODUCTS

Design engineering formulas

Definitions

Mechanical Force (F_M): The force required to bend a mechanical member, without regard to heat.

Thermal Force (F_T): The force developed by thermostat metal over the temperature range normally used, if completely restrained from movement.

Thermal Deflection (D_T): The amount of movement of a thermostat metal member, over the operating temperature range.

Symbols

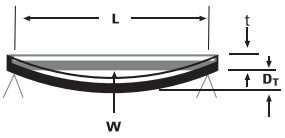
t	Thickness in inches
w	Width in inches
F_L	Flexivity value °F
M	Modulus of elasticity lbs/in²
L	Active length inches
A	Angular rotation in degrees
D_T	Deflection inches
r	Radius inches at point load applied
ø	Disc diameter inches
d	Diameter of hole in disc inches
ΔT	Temperature change °F
W	Force in ounces

Cantilever

Thermal Deflection $D_T = \frac{0.53F_L\Delta TL^2}{t}$

Mechanical Force $W = \frac{4MD_Twt^3}{L^3}$

Thermal Force $W = \frac{2.12MF_L\Delta Twt^2}{L}$

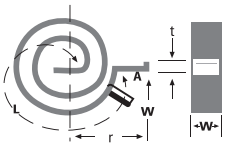


Simple Beam

Thermal Deflection $D_T = \frac{0.133F_L\Delta TL^2}{t}$

Mechanical Force $W = \frac{64MD_Twt^3}{L^3}$

Thermal Force $W = \frac{8.51MF_L\Delta Twt^2}{L}$

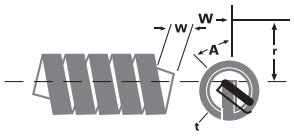


Spiral Coil

Thermal Deflection $A = \frac{67F_L\Delta TL}{t}$

Mechanical Force $W = \frac{0.0232MAwt^3}{Lr}$

Thermal Force $W = \frac{1.55MF_L\Delta Twt^2}{r}$

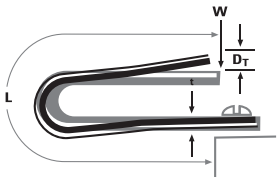


Helix Coil

Thermal Deflection $A = \frac{67F_L\Delta TL}{t}$

Mechanical Force $W = \frac{0.0232MAwt^3}{Lr}$

Thermal Force $W = \frac{1.55MF_L\Delta Twt^2}{r}$

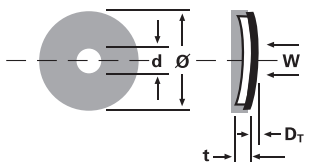


U-Shape

Thermal Deflection $D_T = \frac{0.265F_L\Delta TL^2}{t}$

Mechanical Force $W = \frac{16MD_Twt^3}{L^3}$

Thermal Force $W = \frac{4.24MF_L\Delta Twt^2}{L}$



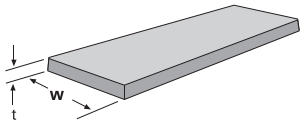
Disc

Thermal Deflection $D_T = \frac{0.106F_L\Delta T\,(ø^2-d^2)}{t}$

Mechanical Force $W = \frac{64MD_Tt^3}{(ø^2-d^2)}$

Thermal Force $W = 6.78MF_L\Delta Tt^2$

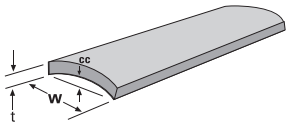
Specifications



Standard Dimensional Tolerances

Thickness Tolerances (in.)	Width Tolerances (in.)
.005 to .010 ± .0004	Up to .500 ± .003
.011 to .020 ± .0005	500 to .999 ± .004
.020 and over ± 2 ½%	1.00 and over ± .005

Premium process tolerances available; consult factory.

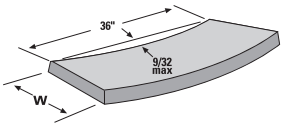


Cross Curvature (ASTM Test B478)

cc = 10% of thickness + $\frac{(.00025w^2)}{t}$ or 1/16"

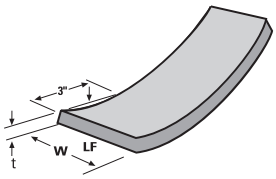
Whichever is smaller where:
cc = Cross curvature in inches
t = Thickness in inches
w = Width in inches

Direction of cross curvature is High Expansion Side concave. Consult factory for special requirements.



Edgewise Camber

9/32" max. in 3 feet when measured by placing a 3-foot straightedge on the concave edge of material. Camber is measured from the center of the straight edge to the strip edge.



Lengthwise Flatness (Coil Set)

Lengthwise Flatness = .0005/t in inches
Maximum in 3 inches at 75°F where t is thickness in inches. Coil set may be High Expansion Side or Low Expansion Side concave

Standard Etch Patterns

Polymet PMC Type number and LO indicating low expansion side is standard unless otherwise specified by customer. A wide variety of other etch patterns are available to meet your requirements.