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Retaining Rings and Circlips Formulas

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List of 18 Retaining Rings and Circlips Formulas

Retaining Rings and Circlips

Depth of Groove

1) Depth of Groove given Allowable Impact Loading on Groove

Open Calculator

fx $$D_g = F_{ig} \cdot \frac{2}{F_{tg}}$$

ex $$3.888889\text{m} = 35\text{N} \cdot \frac{2}{18\text{N}}$$

2) Depth of Groove given Allowable Static Thrust Load and Allowable Impact Loading on Groove

Open Calculator

fx $$D_g = \frac{F_{ig} \cdot 2}{F_{tg}}$$

ex $$3.888889\text{m} = \frac{35\text{N} \cdot 2}{18\text{N}}$$

3) Depth of Groove given allowable Static Thrust Load on Groove

Open Calculator

$$D_g = \frac{f_s \cdot \Phi \cdot F_{tg}}{C \cdot D \cdot \pi \cdot \sigma_{sy}}$$

$$3.826149\text{m} = \frac{2.8 \cdot 0.85 \cdot 18\text{N}}{0.11 \cdot 3.6\text{m} \cdot \pi \cdot 9\text{Pa}}$$

4) Depth of Groove given Allowable Static Thrust Load on Ring which is Subject to Shear

Open Calculator

$$D_g = \frac{F_{ig} \cdot \frac{2}{F_{tg}}}{1000}$$

$$0.003889\text{m} = \frac{35\text{N} \cdot \frac{2}{18\text{N}}}{1000}$$

Factor of Safety

5) Factor of Safety given allowable Static Thrust Load on Groove

Open Calculator

$$f_s = \frac{C \cdot D \cdot D_g \cdot \pi \cdot \sigma_{sy}}{F_{tg} \cdot \Phi}$$

$$2.780864 = \frac{0.11 \cdot 3.6\text{m} \cdot 3.8\text{m} \cdot \pi \cdot 9\text{Pa}}{18\text{N} \cdot 0.85}$$

6) Factor of Safety given Allowable Static Thrust Load on Ring

Open Calculator

$$F_s = \frac{C \cdot D \cdot t \cdot \pi \cdot \tau_s}{F_{rT}}$$

$$5.831581 = \frac{0.11 \cdot 3.6\text{m} \cdot 5\text{m} \cdot \pi \cdot 6\text{N}}{6.4\text{N}}$$

Load Capacities of Groove

7) Allowable impact loading on groove

Open Calculator

$$F_{ig} = \frac{F_{tg} \cdot D_g}{2}$$

$$34.2\text{N} = \frac{18\text{N} \cdot 3.8\text{m}}{2}$$

8) Allowable Static Thrust Load given Allowable Impact Loading on Groove

Open Calculator

$$F_{tg} = F_{ig} \cdot \frac{2}{D_g}$$

$$18.42105\text{N} = 35\text{N} \cdot \frac{2}{3.8\text{m}}$$

9) Allowable Static Thrust Load on Groove

Open Calculator

$$F_{tg} = \frac{C \cdot D \cdot D_g \cdot \pi \cdot \sigma_{sy}}{f_s \cdot \Phi}$$

$$17.87698\text{N} = \frac{0.11 \cdot 3.6\text{m} \cdot 3.8\text{m} \cdot \pi \cdot 9\text{Pa}}{2.8 \cdot 0.85}$$

10) Shaft Diameter given allowable Static Thrust Load on Groove

Open Calculator

$$D = \frac{F_{tg} \cdot f_s \cdot \Phi}{C \cdot D_g \cdot \pi \cdot \sigma_{sy}}$$

$$3.624773\text{m} = \frac{18\text{N} \cdot 2.8 \cdot 0.85}{0.11 \cdot 3.8\text{m} \cdot \pi \cdot 9\text{Pa}}$$

11) Tensile Yield Strength of Groove Material given allowable Static Thrust Load on Groove

Open Calculator

$$\sigma_{sy} = \frac{f_s \cdot \Phi \cdot F_{tg}}{C \cdot D \cdot \pi \cdot D_g}$$

$$9.061932\text{Pa} = \frac{2.8 \cdot 0.85 \cdot 18\text{N}}{0.11 \cdot 3.6\text{m} \cdot \pi \cdot 3.8\text{m}}$$

Load Capacities of Retaining Rings

12) Allowable impact loading on ring

Open Calculator

fx $$F_{ir} = \frac{F_{rT} \cdot t}{2}$$

ex $$16\text{N} = \frac{6.4\text{N} \cdot 5\text{m}}{2}$$

13) Allowable Static Thrust Load on Ring given Allowable Impact Loading

Open Calculator

fx $$F_{rT} = F_{ir} \cdot \frac{2}{t}$$

ex $$6.4\text{N} = 16\text{N} \cdot \frac{2}{5\text{m}}$$

14) Allowable static thrust load on ring which is subject to shear

Open Calculator

fx $$F_{rT} = \frac{C \cdot D \cdot t \cdot \pi \cdot \tau_s}{F_s}$$

ex $$6.434848\text{N} = \frac{0.11 \cdot 3.6\text{m} \cdot 5\text{m} \cdot \pi \cdot 6\text{N}}{5.8}$$

15) Ring Thickness given Allowable Impact Loading on Ring

Open Calculator

fx $$t = F_{ir} \cdot \frac{2}{F_{rT}}$$

ex $$5\text{m} = 16\text{N} \cdot \frac{2}{6.4\text{N}}$$

16) Ring Thickness given Allowable Static Thrust Load on Ring which is subject to Shear

Open Calculator

fx $$t = F_{rT} \cdot \frac{F_s}{C \cdot D \cdot \pi \cdot \tau_s}$$

ex $$4.972922\text{m} = 6.4\text{N} \cdot \frac{5.8}{0.11 \cdot 3.6\text{m} \cdot \pi \cdot 6\text{N}}$$

17) Shaft Diameter given Allowable Static Thrust Load on Ring which is subject to Shear

Open Calculator

fx $$D = F_{rT} \cdot \frac{F_s}{C \cdot t \cdot \pi \cdot \tau_s}$$

ex $$3.580504\text{m} = 6.4\text{N} \cdot \frac{5.8}{0.11 \cdot 5\text{m} \cdot \pi \cdot 6\text{N}}$$

18) Shear Strength of Ring Material given Allowable Static Thrust Load on Ring

Open Calculator

fx $$\tau_s = F_{rT} \cdot \frac{F_s}{C \cdot t \cdot \pi \cdot D}$$

ex $$5.967507\text{N} = 6.4\text{N} \cdot \frac{5.8}{0.11 \cdot 5\text{m} \cdot \pi \cdot 3.6\text{m}}$$

Variables Used

- **C** Conversion Factor
- **D** Shaft Diameter *(Meter)*
- D_g Depth of Groove *(Meter)*
- F_{ig} Allowable Impact Loading on Groove *(Newton)*
- F_{ir} Allowable Impact Loading on Ring *(Newton)*
- F_{rT} Allowable Static Thrust Load on Ring *(Newton)*
- f_s Factor of Safety
- F_s Safety Factor
- F_{tg} Allowable Static Thrust Load on Groove Wall *(Newton)*
- **t** Ring Thickness *(Meter)*
- σ_{sy} Tensile Yield Strength of Groove Material *(Pascal)*
- τ_s Shear Strength of Metal Ring *(Newton)*
- **Φ** Reduction Factor

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Pressure** in Pascal (Pa)
  Pressure Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion

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