



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

$$D_{
m g} = F_{
m ig} \cdot rac{2}{F_{
m tg}}$$

Open Calculator

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

$$\left[\mathrm{D_g} = rac{\mathrm{F_{ig}} \cdot 2}{\mathrm{F_{tg}}}
ight]$$

Open Calculator

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



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



Open Calculator 2

$$D_{g} = rac{f_{s} \cdot \Phi \cdot F_{tg}}{C \cdot D \cdot \pi \cdot \sigma_{sy}}$$

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

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

$$D_{
m g} = rac{{
m F}_{
m ig} \cdot rac{2}{{
m F}_{
m tg}}}{1000}$$

Open Calculator 2

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

Factor of Safety G

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

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

$$\mathbf{ex} \left[2.780864 = rac{0.11 \cdot 3.6 \mathrm{m} \cdot 3.8 \mathrm{m} \cdot \pi \cdot 9 \mathrm{Pa}}{18 \mathrm{N} \cdot 0.85}
ight]$$



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

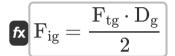


Open Calculator 🗗

$$=$$
 $5.831581 = rac{0.11 \cdot 3.6 ext{m} \cdot 5 ext{m} \cdot \pi \cdot 6 ext{N}}{6.4 ext{N}}$

Load Capacities of Groove

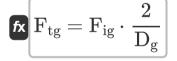
7) Allowable impact loading on groove



Open Calculator

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

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



Open Calculator

$$= 18.42105 \mathrm{N} = 35 \mathrm{N} \cdot rac{2}{3.8 \mathrm{m}}$$



9) Allowable Static Thrust Load on Groove

 $\mathbf{F}_{\mathrm{tg}} = rac{\mathrm{C}\cdot\mathrm{D}\cdot\mathrm{D}_{\mathrm{g}}\cdot\pi\cdot\sigma_{\mathrm{sy}}}{\mathrm{f}_{\mathrm{s}}\cdot\Phi}$

Open Calculator 🗗

ex $17.87698 ext{N} = rac{0.11 \cdot 3.6 ext{m} \cdot 3.8 ext{m} \cdot \pi \cdot 9 ext{Pa}}{2.8 \cdot 0.85}$

10) Shaft Diameter given allowable Static Thrust Load on Groove

 $egin{equation} \mathbf{f} \mathbf{x} \ D = rac{F_{tg} \cdot f_s \cdot \Phi}{C \cdot D_g \cdot \pi \cdot \sigma_{sy}} \end{aligned}$

Open Calculator

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

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

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

Open Calculator 🗗



Open Calculator 2

Open Calculator

Open Calculator 2

Load Capacities of Retaining Rings G

12) Allowable impact loading on ring

fx $\left| ext{F}_{ ext{ir}} = rac{ ext{F}_{ ext{rT}} \cdot ext{t}}{2}
ight|$

 $\boxed{16\mathrm{N} = \frac{6.4\mathrm{N} \cdot 5\mathrm{m}}{2}}$

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

 $\left| \mathbf{F}_{\mathrm{rT}} = \mathbf{F}_{\mathrm{ir}} \cdot rac{2}{\mathrm{t}}
ight|$

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

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

 $oxed{\mathrm{F_{rT}} = rac{\mathrm{C} \cdot \mathrm{D} \cdot \mathrm{t} \cdot \pi \cdot \mathrm{ au_s}}{\mathrm{F_s}}}$

 $\mathbf{ex} \left[6.434848 \mathrm{N} = \frac{0.11 \cdot 3.6 \mathrm{m} \cdot 5 \mathrm{m} \cdot \pi \cdot 6 \mathrm{N}}{} \right]$ 5.8

15) Ring Thickness given Allowable Impact Loading on Ring 🗗

Open Calculator

Open Calculator 2

Open Calculator G

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

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

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

 $t = F_{rT} \cdot rac{F_s}{C \cdot D \cdot \pi \cdot au}$

5.8 $\left| 4.972922\mathrm{m} = 6.4\mathrm{N} \cdot rac{5.6}{0.11 \cdot 3.6\mathrm{m} \cdot \pi \cdot 6\mathrm{N}}
ight|$

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

 $\left| \mathbf{D} = \mathbf{F}_{\mathrm{rT}} \cdot rac{\mathbf{F}_{\mathrm{s}}}{\mathbf{C} \cdot \mathbf{t} \cdot \pi \cdot au}
ight|$

 $= 3.580504 \mathrm{m} = 6.4 \mathrm{N} \cdot rac{5.8}{0.11 \cdot 5 \mathrm{m} \cdot \pi \cdot 6 \mathrm{N}}$

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



Open Calculator

$$= 5.967507 \mathrm{N} = 6.4 \mathrm{N} \cdot rac{5.8}{0.11 \cdot 5 \mathrm{m} \cdot \pi \cdot 3.6 \mathrm{m} }$$



Variables Used

- C Conversion Factor
- **D** Shaft Diameter (Meter)
- D_q Depth of Groove (Meter)
- Fig Allowable Impact Loading on Groove (Newton)
- Fir Allowable Impact Loading on Ring (Newton)
- Frt Allowable Static Thrust Load on Ring (Newton)
- f_s Factor of Safety
- F_s Safety Factor
- Ftq Allowable Static Thrust Load on Groove Wall (Newton)
- **t** Ring Thickness (Meter)
- σ_{sv} Tensile Yield Strength of Groove Material (Pascal)
- T_S Shear Strength of Metal Ring (Newton)
- D 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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