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V Ring Packing Formulas

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List of 25 V Ring Packing Formulas

V Ring Packing

Multiple spring installations

1) Bolt Load given Flange pressure

Open Calculator

fx $$F_b = p_f \cdot A \cdot \frac{C_u}{n}$$

ex $$25.66667\text{N} = 5.5\text{MPa} \cdot 100\text{mm}^2 \cdot \frac{0.14}{3}$$

2) Bolt Load given Modulus of Elasticity and Increment Length

Open Calculator

fx $$F_b = E \cdot \frac{dl}{\left(\frac{l_1}{A_i}\right) + \left(\frac{l_2}{A_t}\right)}$$

ex $$99.53362\text{N} = 10.01\text{MPa} \cdot \frac{1.5\text{mm}}{\left(\frac{3.2\text{mm}}{53\text{mm}^2}\right) + \left(\frac{3.8\text{mm}}{42\text{mm}^2}\right)}$$

3) Bolt load in gasket joint

Open Calculator

fx $$F_b = 11 \cdot \frac{m_{ti}}{dn}$$

ex $$7857.143\text{N} = 11 \cdot \frac{2\text{N}}{2.8\text{mm}}$$

4) Flange pressure developed due to tightening of bolt

Open Calculator

fx $$p_f = n \cdot \frac{F_b}{A \cdot C_u}$$

ex $$3889.286\text{MPa} = 3 \cdot \frac{18150\text{N}}{100\text{mm}^2 \cdot 0.14}$$

5) Flange pressure given Twisting moment

Open Calculator

fx $$p_f = 2 \cdot n \cdot \frac{M_t}{A \cdot C_u \cdot d_{bolt}}$$

ex $$619.0476\text{MPa} = 2 \cdot 3 \cdot \frac{13\text{N*m}}{100\text{mm}^2 \cdot 0.14 \cdot 9\text{mm}}$$

6) Gasket Area given Flange pressure

Open Calculator

fx $$A = n \cdot \frac{F_b}{p_f \cdot C_u}$$

ex $$70714.29\text{mm}^2 = 3 \cdot \frac{18150\text{N}}{5.5\text{MPa} \cdot 0.14}$$

7) Initial Bolt Torque given Bolt Load

Open Calculator

fx $$m_{ti} = dn \cdot \frac{F_b}{11}$$

ex $$4.62\text{N} = 2.8\text{mm} \cdot \frac{18150\text{N}}{11}$$

8) Minimum percentage compression

Open Calculator

fx $$P_s = 100 \cdot \left(1 - \left(\frac{b}{h_i}\right)\right)$$

ex $$30 = 100 \cdot \left(1 - \left(\frac{4.2\text{mm}}{6\text{mm}}\right)\right)$$

9) Nominal Bolt Diameter given Bolt Load

Open Calculator

fx $$dn = 11 \cdot \frac{m_{ti}}{F_b}$$

ex $$1.212121\text{mm} = 11 \cdot \frac{2\text{N}}{18150\text{N}}$$

10) Number of Bolts given Flange pressure

Open Calculator

fx $$n = p_f \cdot A \cdot \frac{C_u}{F_b}$$

ex $$0.004242 = 5.5\text{MPa} \cdot 100\text{mm}^2 \cdot \frac{0.14}{18150\text{N}}$$

11) Twisting Moment given Flange Pressure

Open Calculator

fx $$M_t = \frac{p_f \cdot A \cdot C_u \cdot d_{bolt}}{2 \cdot n}$$

ex $$0.1155\text{N*m} = \frac{5.5\text{MPa} \cdot 100\text{mm}^2 \cdot 0.14 \cdot 9\text{mm}}{2 \cdot 3}$$

12) Uncompressed gasket thickness

Open Calculator

fx $$h_i = \frac{100 \cdot b}{100 - P_s}$$

ex $$5\text{mm} = \frac{100 \cdot 4.2\text{mm}}{100 - 16}$$

13) Width of u collar given uncompressed Gasket Thickness

Open Calculator

fx $$b = \frac{(h_i) \cdot (100 - P_s)}{100}$$

ex $$5.04\text{mm} = \frac{(6\text{mm}) \cdot (100 - 16)}{100}$$

Single spring installations

14) Actual Diameter of Spring Wire given Actual mean diameter of Conical spring

Open Calculator

fx $$d = 2 \cdot \left(D_{\text{driver a}} + D_o - \left(\frac{w}{2}\right)\right)$$

ex $$21.5\text{mm} = 2 \cdot \left(8\text{mm} + 7\text{mm} - \left(\frac{8.5\text{mm}}{2}\right)\right)$$

15) Actual Diameter of Spring Wire given Deflection of Spring

Open Calculator

fx $$d = .0123 \cdot \frac{(D_{driver\ a})^2}{y}$$

ex $$0.302769mm = .0123 \cdot \frac{(8mm)^2}{2.6mm}$$

16) Actual mean diameter of conical spring

Open Calculator

fx $$D_{driver\ a} = D_o - \left(\frac{1}{2}\right) \cdot (w + d)$$

ex $$0.75mm = 7mm - \left(\frac{1}{2}\right) \cdot (8.5mm + 4mm)$$

17) Actual Mean Diameter of Conical Spring given Deflection of Spring

Open Calculator

fx $$D_{driver\ a} = \frac{\left(\frac{y \cdot d}{0.0123}\right)^1}{2}$$

ex $$0.422764mm = \frac{\left(\frac{2.6mm \cdot 4mm}{0.0123}\right)^1}{2}$$

18) Deflection of conical spring

Open Calculator

fx $$y = .0123 \cdot \frac{(D_{driver\ a})^2}{d}$$

ex $$0.1968mm = .0123 \cdot \frac{(8mm)^2}{4mm}$$

19) Diameter of wire for spring given Mean diameter of Conical spring

Open Calculator

fx $$d = \frac{\left(\frac{\pi \cdot (D_m)^2}{139300}\right)^1}{3}$$

ex $$3.3E\hat{}\text{-}6mm = \frac{\left(\frac{\pi \cdot (21mm)^2}{139300}\right)^1}{3}$$

20) Inside diameter of member given Mean diameter of Conical spring

Open Calculator

fx $$D_i = D_m - \left(\left(\frac{3}{2}\right) \cdot w\right)$$

ex $$8.25mm = 21mm - \left(\left(\frac{3}{2}\right) \cdot 8.5mm\right)$$

21) Mean diameter of conical spring

Open Calculator

fx $$D_m = D_i + \left(\left(\frac{3}{2}\right) \cdot w\right)$$

ex $$17.75\text{mm} = 5\text{mm} + \left(\left(\frac{3}{2}\right) \cdot 8.5\text{mm}\right)$$

22) Mean diameter of conical spring given Diameter of spring wire

Open Calculator

fx $$D_m = \frac{\left(\frac{(d)^3 \cdot 139300}{\pi}\right)^1}{2}$$

ex $$1.418898\text{mm} = \frac{\left(\frac{(4\text{mm})^3 \cdot 139300}{\pi}\right)^1}{2}$$

23) Nominal packing cross section given Actual mean diameter of Conical spring

Open Calculator

fx $$w = 2 \cdot \left(D_{\text{driver a}} + D_o - \left(\frac{d}{2}\right)\right)$$

ex $$26\text{mm} = 2 \cdot \left(8\text{mm} + 7\text{mm} - \left(\frac{4\text{mm}}{2}\right)\right)$$

24) Nominal packing cross section given Mean diameter of Conical spring

Open Calculator

fx $$w = (D_m - D_i) \cdot \frac{2}{3}$$

ex $$10.66667\text{mm} = (21\text{mm} - 5\text{mm}) \cdot \frac{2}{3}$$

25) Outer Diameter of spring wire given Actual mean diameter of Conical spring

Open Calculator

fx $$D_o = D_{\text{driver a}} - \left(\frac{1}{2}\right) \cdot (w + d)$$

ex $$1.75\text{mm} = 8\text{mm} - \left(\frac{1}{2}\right) \cdot (8.5\text{mm} + 4\text{mm})$$

Variables Used

- **A** Area *(Square Millimeter)*
- **A_i** Area of cross section at the inlet *(Square Millimeter)*
- **A_t** Area of cross section at the throat *(Square Millimeter)*
- **b** Width of u-collar *(Millimeter)*
- **C_u** Torque Friction Coefficient
- **d** Diameter of spring wire *(Millimeter)*
- **d_{bolt}** Diameter of Bolt *(Millimeter)*
- **$D_{driver\ a}$** Actual mean diameter of spring *(Millimeter)*
- **D_i** Inside Diameter *(Millimeter)*
- **D_m** Mean Diameter of Conical Spring *(Millimeter)*
- **D_o** Outer diameter of spring wire *(Millimeter)*
- **dl** Incremental Length in Direction of Velocity *(Millimeter)*
- **dn** Nominal Bolt Diameter *(Millimeter)*
- **E** Modulus of Elasticity *(Megapascal)*
- **F_b** Bolt Load in Gasket Joint *(Newton)*
- **h_i** Uncompressed gasket thickness *(Millimeter)*
- **l_1** Length of joint 1 *(Millimeter)*
- **l_2** Length of joint 2 *(Millimeter)*
- **M_t** Twisting Moment *(Newton Meter)*
- **m_{ti}** Initial bolt torque *(Newton)*
- **n** Number of Bolts

- p_f Flange pressure *(Megapascal)*
- P_s Minimum Percentage Compression
- **w** Nominal Packing Cross-section of Bush Seal *(Millimeter)*
- **y** Deflection of Conical Spring *(Millimeter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Area** in Square Millimeter (mm²)
  Area Unit Conversion
- Measurement: **Pressure** in Megapascal (MPa)
  Pressure Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Moment of Force** in Newton Meter (N*m)
  Moment of Force Unit Conversion

Check other formula lists

- **Bolt Loads in Gasket Joints Formulas**
- **Elastic Packing Formulas**
- **V Ring Packing Formulas**

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