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# Packing Formulas

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# List of 56 Packing Formulas

## Packing

### Bolt Loads in Gasket Joints

#### 1) Actual Cross-sectional Area of Bolts given Root Diameter of Thread

$$fx \quad A_b = \frac{2 \cdot \pi \cdot y_{sl} \cdot G \cdot N}{\sigma_{sbat}}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2\_img.jpg\)](#)

$$ex \quad 126.6466\text{mm}^2 = \frac{2 \cdot \pi \cdot 3.85\text{N/mm}^2 \cdot 32\text{mm} \cdot 4.1\text{mm}}{25.06\text{N/mm}^2}$$

#### 2) Bolt Load in Design of Flange for Gasket Seating

$$fx \quad W_{m1} = \left( \frac{A_m + A_b}{2} \right) \cdot \sigma_{sbat}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa\_img.jpg\)](#)

$$ex \quad 15612.38\text{N} = \left( \frac{1120\text{mm}^2 + 126\text{mm}^2}{2} \right) \cdot 25.06\text{N/mm}^2$$


#### 3) Bolt load under operating condition

$$fx \quad W_{m1} = H + H_p$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d\_img.jpg\)](#)

$$ex \quad 15486\text{N} = 3136\text{N} + 12350\text{N}$$




4) Bolt Load under operating condition given Hydrostatic End Force 

$$fx \quad W_{m1} = \left( \left( \frac{\pi}{4} \right) \cdot (G)^2 \cdot P \right) + (2 \cdot b \cdot \pi \cdot G \cdot P \cdot m)$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

ex

$$15486.8N = \left( \left( \frac{\pi}{4} \right) \cdot (32mm)^2 \cdot 3.9MPa \right) + (2 \cdot 4.2mm \cdot \pi \cdot 32mm \cdot 3.9MPa \cdot 3.75)$$

5) Deflection of Spring Initial Bolt Load to Seal Gasket Joint 

$$fx \quad y_{sl} = \frac{W_{m2}}{\pi \cdot b \cdot G}$$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc\_img.jpg\)](#)

$$ex \quad 3.801245N/mm^2 = \frac{1605N}{\pi \cdot 4.2mm \cdot 32mm}$$

6) Gasket Width given actual Cross-sectional Area of Bolts 

$$fx \quad N = \frac{\sigma_{sbat} \cdot A_b}{2 \cdot \pi \cdot y_{sl} \cdot G}$$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e\_img.jpg\)](#)

$$ex \quad 4.079069mm = \frac{25.06N/mm^2 \cdot 126mm^2}{2 \cdot \pi \cdot 3.85N/mm^2 \cdot 32mm}$$

7) Hydrostatic Contact Force given Bolt Load under Operating condition 

$$fx \quad H_p = W_{m1} - \left( \left( \frac{\pi}{4} \right) \cdot (G)^2 \cdot P \right)$$

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639\_img.jpg\)](#)

$$ex \quad 12349.43N = 15486N - \left( \left( \frac{\pi}{4} \right) \cdot (32mm)^2 \cdot 3.9MPa \right)$$

8) Hydrostatic end force 

$$fx \quad H = W_{m1} - H_p$$

[Open Calculator !\[\]\(c15650232aa6660c9deb34f3b82dcb72\_img.jpg\)](#)

$$ex \quad 3136N = 15486N - 12350N$$



### 9) Hydrostatic End Force given Bolt Load under Operating condition

$$fx \quad H = W_{m1} - (2 \cdot b \cdot \pi \cdot G \cdot m \cdot P)$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)

$$ex \quad 3135.771N = 15486N - (2 \cdot 4.2mm \cdot \pi \cdot 32mm \cdot 3.75 \cdot 3.9MPa)$$

### 10) Initial Bolt Load to seat Gasket Joint

$$fx \quad W_{m2} = \pi \cdot b \cdot G \cdot y_{sl}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)

$$ex \quad 1625.586N = \pi \cdot 4.2mm \cdot 32mm \cdot 3.85N/mm^2$$

### 11) Load on bolts based on hydrostatic end force

$$fx \quad F_b = f_s \cdot P_t \cdot A_m$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

$$ex \quad 18816N = 3 \cdot 5.6MPa \cdot 1120mm^2$$

### 12) Stress Required for Gasket Seating

$$fx \quad \sigma_{sbat} = \frac{2 \cdot \pi \cdot y_{sl} \cdot G \cdot N}{A_b}$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b\_img.jpg\)](#)

$$ex \quad 25.18859N/mm^2 = \frac{2 \cdot \pi \cdot 3.85N/mm^2 \cdot 32mm \cdot 4.1mm}{126mm^2}$$


### 13) Stress Required for Gasket Seating given Bolt Load

$$fx \quad \sigma_{sbat} = \frac{W_{m1}}{\frac{A_m + A_b}{2}}$$

[Open Calculator !\[\]\(40770d9ed6ed4f1222ebf89a1396e8b2\_img.jpg\)](#)


$$ex \quad 24.85714N/mm^2 = \frac{15486N}{\frac{1120mm^2 + 126mm^2}{2}}$$



14) Test pressure given Bolt Load [Open Calculator !\[\]\(bd1a142de767a21e5362c595f844a4ff\_img.jpg\)](#)

$$fx \quad P_t = \frac{F_b}{f_s \cdot A_m}$$

$$ex \quad 5.401786MPa = \frac{18150N}{3 \cdot 1120mm^2}$$

15) Total cross-sectional area of bolt at root of thread [Open Calculator !\[\]\(830769b31eeeaca920791081939ff8ba\_img.jpg\)](#)


$$fx \quad A_{m1} = \frac{W_{m1}}{\sigma_{sbd}}$$

$$ex \quad 297.8077mm^2 = \frac{15486N}{52N/mm^2}$$

16) Width of U Collar given Initial Bolt Load to Seat Gasket Joint [Open Calculator !\[\]\(47734e4656765d20df4fdbd5b7aff048\_img.jpg\)](#)

$$fx \quad b = \frac{W_{m2}}{\pi \cdot G \cdot y_{sl}}$$

$$ex \quad 4.146813mm = \frac{1605N}{\pi \cdot 32mm \cdot 3.85N/mm^2}$$

Elastic Packing 17) Diameter of Bolt given Frictional Force exerted by Soft packing on Reciprocating rod [Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80\_img.jpg\)](#)

$$fx \quad d = \frac{F_{friction}}{.005 \cdot p}$$

$$ex \quad 13.86792mm = \frac{294N}{.005 \cdot 4.24MPa}$$




18) Fluid pressure by soft packing exerted by frictional force on reciprocating rod 

$$\text{fx } p = \frac{F_{\text{friction}}}{.005 \cdot d}$$

Open Calculator 

$$\text{ex } 4.2\text{MPa} = \frac{294\text{N}}{.005 \cdot 14\text{mm}}$$

19) Fluid Pressure given Friction Resistance 

$$\text{fx } p = \frac{F_{\text{friction}} - F_0}{\mu \cdot A}$$

Open Calculator 


$$\text{ex } 4.20202\text{MPa} = \frac{294\text{N} - 190\text{N}}{0.3 \cdot 82.5\text{mm}^2}$$

20) Fluid Pressure given Torsional Resistance 

$$\text{fx } p = \frac{M_t \cdot 2}{.005 \cdot (d)^2}$$

Open Calculator 

$$\text{ex } 4.204082\text{MPa} = \frac{2.06\text{N} \cdot 2}{.005 \cdot (14\text{mm})^2}$$

21) Friction resistance 

$$\text{fx } F_{\text{friction}} = F_0 + (\mu \cdot A \cdot p)$$

Open Calculator 

$$\text{ex } 294.94\text{N} = 190\text{N} + (0.3 \cdot 82.5\text{mm}^2 \cdot 4.24\text{MPa})$$

22) Frictional force exerted by soft packing on reciprocating rod 

$$\text{fx } F_{\text{friction}} = .005 \cdot p \cdot d$$

Open Calculator 

$$\text{ex } 296.8\text{N} = .005 \cdot 4.24\text{MPa} \cdot 14\text{mm}$$




23) Seal resistance 

$$fx \quad F_0 = F_{\text{friction}} - (\mu \cdot A \cdot p)$$

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5\_img.jpg\)](#)

$$ex \quad 189.06\text{N} = 294\text{N} - (0.3 \cdot 82.5\text{mm}^2 \cdot 4.24\text{MPa})$$

24) Torsional Resistance given Fluid Pressure 

$$fx \quad M_t = \frac{.005 \cdot (d)^2 \cdot p}{2}$$

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5\_img.jpg\)](#)

$$ex \quad 2.0776\text{N} = \frac{.005 \cdot (14\text{mm})^2 \cdot 4.24\text{MPa}}{2}$$

25) Torsional resistance in rotary motion friction 

$$fx \quad M_t = \frac{F_{\text{friction}} \cdot d}{2}$$

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2\_img.jpg\)](#)

$$ex \quad 2.058\text{N} = \frac{294\text{N} \cdot 14\text{mm}}{2}$$

Metallic Gaskets 26) Frictional Force given Minor diameter of bolt 

$$fx \quad F_{\mu} = \frac{\left( d_2 - \left( \frac{\sqrt{\left( (d_1)^2 - (d_{gb})^2 \right) \cdot p_{\text{seal}}}}{\sqrt{(i \cdot F_c)}} \right) \right) \cdot 3.14 \cdot i \cdot F_c}{4}$$

[Open Calculator !\[\]\(683dba75afe26e28cd4de5730b776760\_img.jpg\)](#)


$$ex \quad 560.3676\text{N} = \frac{\left( 9.5\text{mm} - \left( \frac{\sqrt{\left( (34\text{mm})^2 - (11.5\text{mm})^2 \right) \cdot 4.25\text{MPa}}}{\sqrt{(2 \cdot 24.18\text{N}/\text{mm}^2)}} \right) \right) \cdot 3.14 \cdot 2 \cdot 24.18\text{N}/\text{mm}^2}{4}$$



27) Minor Diameter of Bolt given Working Strength [Open Calculator !\[\]\(3d8c13c92b853674f749aac6fa869926\_img.jpg\)](#)

$$fx \quad d_2 = \left( \frac{\sqrt{\left( (d_1)^2 - (d_{gb})^2 \right) \cdot P_{seal}}}{\sqrt{i \cdot 68.7}} \right) + \frac{4 \cdot F_{\mu}}{3.14 \cdot i \cdot 68.7}$$

$$ex \quad 10822.58mm = \left( \frac{\sqrt{\left( (34mm)^2 - (11.5mm)^2 \right) \cdot 4.25MPa}}{\sqrt{(2 \cdot 68.7)}} \right) + \frac{4 \cdot 560.36N}{3.14 \cdot 2 \cdot 68.7}$$

Self Sealing Packing 28) Diameter of bolt given Radial ring wall thickness [Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6\_img.jpg\)](#)

$$fx \quad d_b = \frac{\left( \frac{h}{6.36 \cdot 10^{-3}} \right)^1}{.2}$$

$$ex \quad 825.4717mm = \frac{\left( \frac{1.05mm}{6.36 \cdot 10^{-3}} \right)^1}{.2}$$


29) Radial ring wall thickness considering SI units [Open Calculator !\[\]\(4688aadfd656ded00cd6bdfae55089a9\_img.jpg\)](#)

$$fx \quad h = 6.36 \cdot 10^{-3} \cdot d_b^2$$

$$ex \quad 6.12065mm = 6.36 \cdot 10^{-3} \cdot (825.4717mm)^2$$





30) Radial Ring Wall Thickness given Width of U shaped collar 

$$fx \quad h = \frac{b}{4}$$

[Open Calculator !\[\]\(c3d993ca47bfe2a953c700506ce31fa0\_img.jpg\)](#)


$$ex \quad 1.05\text{mm} = \frac{4.2\text{mm}}{4}$$

31) Width of U collar 

$$fx \quad b = 4 \cdot h$$

[Open Calculator !\[\]\(17413706fd4997a1a4bdf85c6864eee1\_img.jpg\)](#)


$$ex \quad 4.2\text{mm} = 4 \cdot 1.05\text{mm}$$

V Ring Packing Multiple spring installations 32) Bolt Load given Flange pressure 

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

[Open Calculator !\[\]\(b4eeff342f60cc7bcd67d869b4fedca2\_img.jpg\)](#)

$$ex \quad 15.4\text{N} = 5.5\text{MPa} \cdot 100\text{mm}^2 \cdot \frac{0.14}{5}$$


33) Bolt Load given Modulus of Elasticity and Increment Length 

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

[Open Calculator !\[\]\(1f56542a42e2413e44a2b2023033aa2e\_img.jpg\)](#)

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



34) Bolt load in gasket joint 

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

Open Calculator 

$$ex \quad 9821.429N = 11 \cdot \frac{2.5N}{2.8mm}$$

35) Flange pressure developed due to tightening of bolt 

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

Open Calculator 


$$ex \quad 6482.143MPa = 5 \cdot \frac{18150N}{100mm^2 \cdot 0.14}$$

36) Flange pressure given Twisting moment 

$$fx \quad p_f = 2 \cdot n \cdot \frac{T}{a \cdot C_u \cdot d_{bolt}}$$

Open Calculator 

$$ex \quad 1031.746MPa = 2 \cdot 5 \cdot \frac{13N^*m}{100mm^2 \cdot 0.14 \cdot 9mm}$$


37) Gasket Area given Flange pressure 

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

Open Calculator 

$$ex \quad 117857.1mm^2 = 5 \cdot \frac{18150N}{5.5MPa \cdot 0.14}$$



38) Initial Bolt Torque given Bolt Load [Open Calculator](#) 

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

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

39) Minimum percentage compression [Open Calculator](#) 

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

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

40) Nominal Bolt Diameter given Bolt Load [Open Calculator](#) 

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


$$ex \quad 1.515152mm = 11 \cdot \frac{2.5N}{18150N}$$

41) Number of Bolts given Flange pressure [Open Calculator](#) 

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

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




42) Twisting Moment given Flange Pressure 

$$\text{fx } T = \frac{p_f \cdot a \cdot C_u \cdot d_{\text{bolt}}}{2 \cdot n}$$

Open Calculator 

$$\text{ex } 0.0693\text{N}\cdot\text{m} = \frac{5.5\text{MPa} \cdot 100\text{mm}^2 \cdot 0.14 \cdot 9\text{mm}}{2 \cdot 5}$$

43) Uncompressed gasket thickness 

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

Open Calculator 


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

44) Width of u collar given uncompressed Gasket Thickness 

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

Open Calculator 

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

Single spring installations 45) Actual Diameter of Spring Wire given Actual mean diameter of Conical spring 

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

Open Calculator 

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



46) Actual Diameter of Spring Wire given Deflection of Spring 

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

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a\_img.jpg\)](#)

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

47) Actual mean diameter of conical spring 

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

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021\_img.jpg\)](#)


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

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

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

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd\_img.jpg\)](#)

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

49) Deflection of conical spring 

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

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80\_img.jpg\)](#)

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



50) Diameter of wire for spring given Mean diameter of Conical spring [Open Calculator](#) 


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

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

51) Inside diameter of member given Mean diameter of Conical spring [Open Calculator](#) 

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

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

52) Mean diameter of conical spring [Open Calculator](#) 

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


$$ex \quad 18.15mm = 5.4mm + \left(\left(\frac{3}{2}\right) \cdot 8.5mm\right)$$

53) Mean diameter of conical spring given Diameter of spring wire [Open Calculator](#) 

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

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



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

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

Open Calculator 

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

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

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

Open Calculator 

$$ex \quad 10.4\text{mm} = (21\text{mm} - 5.4\text{mm}) \cdot \frac{2}{3}$$

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

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

Open Calculator 

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



## Variables Used

- **a** Gasket Area (Square Millimeter)
- **A** Area of seal contacting sliding member (Square Millimeter)
- **A<sub>b</sub>** Actual Bolt Area (Square Millimeter)
- **A<sub>i</sub>** Area of cross section at the inlet (Square Millimeter)
- **A<sub>m</sub>** Greater Cross-section Area of Bolts (Square Millimeter)
- **A<sub>m1</sub>** Bolt Cross-sectional Area at Root of Thread (Square Millimeter)
- **A<sub>t</sub>** Area of cross section at the throat (Square Millimeter)
- **b** Width of u-collar (Millimeter)
- **b** Width of U-Collar (Millimeter)
- **C<sub>u</sub>** Torque Friction Coefficient
- **d** Diameter of elastic packing bolt (Millimeter)
- **d<sub>1</sub>** Outside Diameter of Seal Ring (Millimeter)
- **d<sub>2</sub>** Minor Diameter of Metallic Gasket Bolt (Millimeter)
- **d<sub>b</sub>** Diameter of Bolt (Millimeter)
- **d<sub>bolt</sub>** Diameter of Bolt (Millimeter)
- **D<sub>driver a</sub>** Actual mean diameter of spring (Millimeter)
- **d<sub>gb</sub>** Nominal diameter of metallic gasket bolt (Millimeter)
- **D<sub>i</sub>** Inside Diameter (Millimeter)
- **D<sub>m</sub>** Mean Diameter of Conical Spring (Millimeter)
- **D<sub>o</sub>** Outer diameter of spring wire (Millimeter)
- **d<sub>sw</sub>** Diameter of spring wire (Millimeter)
- **dl** Incremental Length in Direction of Velocity (Millimeter)
- **dn** Nominal Bolt Diameter (Millimeter)
- **E** Modulus of Elasticity (Megapascal)
- **F<sub>0</sub>** Seal Resistance (Newton)











- $F_b$  Bolt Load in Gasket Joint (*Newton*)
- $F_c$  Design Stress for metallic gasket (*Newton per Square Millimeter*)
- $F_{friction}$  Friction Force in elastic packing (*Newton*)
- $f_s$  Factor of Safety for Bolt Packing
- $F_\mu$  Friction force in metallic gasket (*Newton*)
- $G$  Gasket Diameter (*Millimeter*)
- $h$  Radial Ring Wall Thickness (*Millimeter*)
- $H$  Hydrostatic End Force in Gasket Seal (*Newton*)
- $h_i$  Uncompressed gasket thickness (*Millimeter*)
- $H_p$  Total Joint Surface Compression Load (*Newton*)
- $i$  Number of bolts in metallic gasket seal
- $l_1$  Length of joint 1 (*Millimeter*)
- $l_2$  Length of joint 2 (*Millimeter*)
- $m$  Gasket Factor
- $M_t$  Torsional Resistance in Elastic Packing (*Newton*)
- $m_{ti}$  Initial bolt torque (*Newton*)
- $n$  Number of Bolts
- $N$  Gasket Width (*Millimeter*)
- $p$  Fluid Pressure in elastic packing (*Megapascal*)
- $P$  Pressure at Outer Diameter of Gasket (*Megapascal*)
- $p_f$  Flange pressure (*Megapascal*)
- $P_s$  Minimum Percentage Compression
- $p_{seal}$  Fluid Pressure on Metallic Gasket Seal (*Megapascal*)
- $P_t$  Test Pressure in Bolted Gasket Joint (*Megapascal*)
- $T$  Twisting Moment (*Newton Meter*)
- $w$  Nominal Packing Cross-section of Bush Seal (*Millimeter*)
- $W_{m1}$  Bolt Load Under Operating Condition for Gasket (*Newton*)
- $W_{m2}$  Initial bolt load to seat the gasket joint (*Newton*)



- **y** Deflection of Conical Spring (*Millimeter*)
- **y<sub>sl</sub>** Gasket Unit Seating Load (*Newton per Square Millimeter*)
- **μ** Coefficient of Friction in elastic packing
- **σ<sub>sbat</sub>** Stress Required for Gasket Seating (*Newton per Square Millimeter*)
- **σ<sub>sbd</sub>** Stress Required for Operating Condition for Gasket (*Newton per Square Millimeter*)



## Constants, Functions, Measurements used

- **Constant:** pi, 3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Function:** sqrt, sqrt(Number)  
*A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- **Measurement: Length** in Millimeter (mm)  
*Length Unit Conversion* 
- **Measurement: Area** in Square Millimeter (mm<sup>2</sup>)  
*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* 
- **Measurement: Stress** in Newton per Square Millimeter (N/mm<sup>2</sup>)  
*Stress Unit Conversion* 



## Check other formula lists

- [Design of Clamp and Muff Coupling Formulas](#) 
- [Design of Cotter Joint Formulas](#) 
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- [Retaining Rings and Circlips Formulas](#) 
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