Important Flanged Coupling Formulas PDF

Formulas
Examples
with Units

List of 16
Important Flanged Coupling Formulas

1) Diameter of bolt given maximum load that can be resisted by one bolt Formula

Evaluate Formula

Formula

$$d_{bolt} = \sqrt{\frac{4 \cdot W}{\pi \cdot f_s}}$$

Example with Units

$$18.0943\,\text{mm} = \sqrt{\frac{4 \cdot 3.6\,\text{kN}}{3.1416 \cdot 14\,\text{N/mm}^2}}$$

2) Diameter of bolt given torque resisted by n bolts Formula

Evaluate Formula

Formula

$$d_{bolt} = \sqrt{\frac{8 \cdot T_{bolt}}{f_s \cdot \pi \cdot n \cdot d_{pitch}}}$$

Example with Units

$$18.0827\,\text{mm} = \sqrt{\frac{8 \cdot 49\,\text{N*m}}{14\,\text{N/mm}^2 \cdot 3.1416 \cdot 1.001 \cdot 27.23\,\text{mm}}}$$

3) Diameter of bolt given torque resisted by one bolt Formula

Evaluate Formula

Formula

$$d_{bolt} = \sqrt{\frac{8 \cdot T_{bolt}}{f_s \cdot \pi \cdot d_{pitch}}}$$

Example with Units

$$18.0917\,\text{mm} = \sqrt{\frac{8 \cdot 49\,\text{N*m}}{14\,\text{N/mm}^2 \cdot 3.1416 \cdot 27.23\,\text{mm}}}$$

4) Diameter of bolt pitch circle given torque resisted by n bolts Formula

Evaluate Formula

Formula

$$d_{pitch} = \frac{8 \cdot T_{bolt}}{f_s \cdot \pi \cdot \left(d_{bolt}^2\right) \cdot n}$$

Example with Units

$$27.208\,\text{mm} = \frac{8 \cdot 49\,\text{N*m}}{14\,\text{N/mm}^2 \cdot 3.1416 \cdot \left(18.09\,\text{mm}^2\right) \cdot 1.001}$$

5) Diameter of bolt pitch circle given torque resisted by one bolt Formula

Evaluate Formula

Formula

$$d_{pitch} = \frac{8 \cdot T_{bolt}}{f_s \cdot \pi \cdot \left(d_{bolt}^2\right)}$$

Example with Units

$$27.2352\,\text{mm} = \frac{8 \cdot 49\,\text{N*m}}{14\,\text{N/mm}^2 \cdot 3.1416 \cdot \left(18.09\,\text{mm}^2\right)}$$

6) Diameter of shaft given torque transmitted by shaft Formula

Evaluate Formula

Formula

$$d_s = \left(\frac{16 \cdot T_{shaft}}{\pi \cdot \tau}\right)^{\frac{1}{3}}$$

Example with Units

$$50.308\,\text{mm} = \left(\frac{16 \cdot 50\,\text{N*m}}{3.1416 \cdot 2\,\text{MPa}}\right)^{\frac{1}{3}}$$

7) Maximum amount of load that can be resisted by one bolt Formula

Evaluate Formula

Formula

$$W = \frac{f_s \cdot \pi \cdot d_{bolt}^{\,2}}{4}$$

Example with Units

$$3.5983\,\text{kN} = \frac{14\,\text{N/mm}^2 \cdot 3.1416 \cdot 18.09\,\text{mm}^2}{4}$$

8) Number of bolts given torque resisted by n bolts Formula

Evaluate Formula

Formula

$$n = \frac{8 \cdot T_{bolt}}{f_s \cdot \pi \cdot \left(d_{bolt}^{\,2}\right) \cdot d_{pitch}}$$

Example with Units

$$1.0002 = \frac{8 \cdot 49\,\text{N*m}}{14\,\text{N/mm}^2 \cdot 3.1416 \cdot \left(18.09\,\text{mm}^2\right) \cdot 27.23\,\text{mm}}$$

9) Shear stress in bolt given torque resisted by n bolts Formula

Evaluate Formula

Formula

$$f_s = \frac{8 \cdot T_{bolt}}{n \cdot \pi \cdot \left(d_{bolt}^{\,2}\right) \cdot d_{pitch}}$$

Example with Units

$$13.9887\,\text{N/mm}^2 = \frac{8 \cdot 49\,\text{N*m}}{1.001 \cdot 3.1416 \cdot \left(18.09\,\text{mm}^2\right) \cdot 27.23\,\text{mm}}$$

10) Shear stress in bolt given torque resisted by one bolt Formula

Evaluate Formula

Formula

$$f_s = \frac{8 \cdot T_{bolt}}{\pi \cdot \left(d_{bolt}^{\,2}\right) \cdot d_{pitch}}$$

Example with Units

$$14.0027\,\text{N/mm}^2 = \frac{8 \cdot 49\,\text{N*m}}{3.1416 \cdot \left(18.09\,\text{mm}^2\right) \cdot 27.23\,\text{mm}}$$

11) Shear Stress in Bolt using Maximum Load that can be Resisted by One Bolt Formula

Evaluate Formula

Formula

$$f_s = \frac{4 \cdot W}{\pi \cdot \left(d_{bolt}^{\,2}\right)}$$

Example with Units

$$14.0067\,\text{N/mm}^2 = \frac{4 \cdot 3.6\,\text{kN}}{3.1416 \cdot \left(18.09\,\text{mm}^2\right)}$$

12) Shear stress in shaft given torque transmitted by shaft Formula

Evaluate Formula

Formula

$$\tau = \frac{16 \cdot T_{shaft}}{\pi \cdot \left(d_s^{\,3} \right)}$$

Example with Units

$$2.0009\,\text{MPa} = \frac{16 \cdot 50\,\text{N*m}}{3.1416 \cdot \left(50.3\,\text{mm}^{\,3} \right)}$$

13) Torque resisted by one bolt given shear stress in bolt Formula

Evaluate Formula

Formula

$$T_{bolt} = \frac{f_s \cdot \pi \cdot \left(d_{bolt}^{\,2} \right) \cdot d_{pitch}}{8}$$

Example with Units

$$48.9906\,\text{N*m} = \frac{14\,\text{N/mm}^2 \cdot 3.1416 \cdot \left(18.09\,\text{mm}^{\,2} \right) \cdot 27.23\,\text{mm}}{8}$$

14) Torque Resisted by One Bolt using Load Resisted by One Bolt Formula

Evaluate Formula

Formula

$$T_{bolt} = W \cdot \frac{d_{pitch}}{2}$$

Example with Units

$$49.014\,\text{N*m} = 3.6\,\text{kN} \cdot \frac{27.23\,\text{mm}}{2}$$

15) Torque transmitted by shaft Formula

Evaluate Formula

Formula

$$T_{shaft} = \frac{\pi \cdot \tau \cdot d_s^{\,3}}{16}$$

Example with Units

$$49.9763\,\text{N*m} = \frac{3.1416 \cdot 2\,\text{MPa} \cdot 50.3\,\text{mm}^{\,3}}{16}$$

16) Total torque resisted by n number of bolts Formula

Evaluate Formula

Formula

$$T_{bolt} = \frac{n \cdot f_s \cdot \pi \cdot \left(d_{bolt}^{\,2} \right) \cdot d_{pitch}}{8}$$

Example with Units

$$49.0396\,\text{N*m} = \frac{1.001 \cdot 14\,\text{N/mm}^2 \cdot 3.1416 \cdot \left(18.09\,\text{mm}^{\,2} \right) \cdot 27.23\,\text{mm}}{8}$$

Variables used in list of Flanged Coupling Formulas above

- d_{bolt} Diameter of Bolt *(Millimeter)*
- d_{pitch} Diameter of Bolt Pitch Circle *(Millimeter)*
- d_s Diameter of Shaft *(Millimeter)*
- f_s Shear Stress in Bolt *(Newton per Square Millimeter)*
- **n** Number of Bolts
- T_{bolt} Torque Resisted by Bolt *(Newton Meter)*
- T_{shaft} Torque Transmitted by Shaft *(Newton Meter)*
- **W** Load Resisted by One Bolt *(Kilonewton)*
- τ Shear Stress in Shaft *(Megapascal)*

Constants, Functions, Measurements used in list of Flanged Coupling Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **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: **Pressure** in Newton per Square Millimeter (N/mm²) *Pressure Unit Conversion*
- Measurement: **Force** in Kilonewton (kN) *Force Unit Conversion*
- Measurement: **Torque** in Newton Meter (N*m) *Torque Unit Conversion*
- Measurement: **Stress** in Megapascal (MPa) *Stress Unit Conversion*

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