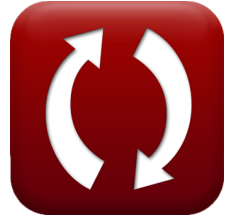




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List of 103 Power Screws Formulas

Power Screws

Acme Thread

1) Coefficient of Friction of Power Screw given Effort in Lowering Load with Acme Threaded Screw

$$\text{fx } \mu = \frac{P_{lo} + W \cdot \tan(\alpha)}{W \cdot \sec(0.253) - P_{lo} \cdot \sec(0.253) \cdot \tan(\alpha)}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 0.145345 = \frac{120\text{N} + 1700\text{N} \cdot \tan(4.5^\circ)}{1700\text{N} \cdot \sec(0.253) - 120\text{N} \cdot \sec(0.253) \cdot \tan(4.5^\circ)}$$

2) Coefficient of Friction of Power Screw given Effort in Moving Load with Acme Threaded Screw

$$\text{fx } \mu = \frac{P_{li} - W \cdot \tan(\alpha)}{\sec\left(14.5 \cdot \frac{\pi}{180}\right) \cdot (W + P_{li} \cdot \tan(\alpha))}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 0.149953 = \frac{402\text{N} - 1700\text{N} \cdot \tan(4.5^\circ)}{\sec\left(14.5 \cdot \frac{\pi}{180}\right) \cdot (1700\text{N} + 402\text{N} \cdot \tan(4.5^\circ))}$$

3) Coefficient of Friction of Power Screw given Torque Required in Lifting Load with Acme Thread

$$\text{fx } \mu = \frac{2 \cdot Mt_{li} - W \cdot d_m \cdot \tan(\alpha)}{\sec(0.253) \cdot (W \cdot d_m + 2 \cdot Mt_{li} \cdot \tan(\alpha))}$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d_img.jpg\)](#)

$$\text{ex } 0.150412 = \frac{2 \cdot 9265\text{N} \cdot \text{mm} - 1700\text{N} \cdot 46\text{mm} \cdot \tan(4.5^\circ)}{\sec(0.253) \cdot (1700\text{N} \cdot 46\text{mm} + 2 \cdot 9265\text{N} \cdot \text{mm} \cdot \tan(4.5^\circ))}$$



4) Coefficient of Friction of Power Screw given Torque Required in Lowering Load with Acme Thread

$$\text{fx } \mu = \frac{2 \cdot Mt_{lo} + W \cdot d_m \cdot \tan(\alpha)}{\sec(0.253) \cdot (W \cdot d_m - 2 \cdot Mt_{lo} \cdot \tan(\alpha))}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 0.150386 = \frac{2 \cdot 2960\text{N} \cdot \text{mm} + 1700\text{N} \cdot 46\text{mm} \cdot \tan(4.5^\circ)}{\sec(0.253) \cdot (1700\text{N} \cdot 46\text{mm} - 2 \cdot 2960\text{N} \cdot \text{mm} \cdot \tan(4.5^\circ))}$$

5) Efficiency of Acme Threaded Power Screw

$$\text{fx } \eta = \tan(\alpha) \cdot \frac{1 - \mu \cdot \tan(\alpha) \cdot \sec(0.253)}{\mu \cdot \sec(0.253) + \tan(\alpha)}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 0.332752 = \tan(4.5^\circ) \cdot \frac{1 - 0.15 \cdot \tan(4.5^\circ) \cdot \sec(0.253)}{0.15 \cdot \sec(0.253) + \tan(4.5^\circ)}$$

6) Effort Required in Lifting Load with Acme Threaded Screw

$$\text{fx } P_{li} = W \cdot \left(\frac{\mu \cdot \sec((0.253)) + \tan(\alpha)}{1 - \mu \cdot \sec((0.253)) \cdot \tan(\alpha)} \right)$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 402.0803\text{N} = 1700\text{N} \cdot \left(\frac{0.15 \cdot \sec((0.253)) + \tan(4.5^\circ)}{1 - 0.15 \cdot \sec((0.253)) \cdot \tan(4.5^\circ)} \right)$$

7) Effort Required in Lowering Load with Acme Threaded Screw

$$\text{fx } P_{lo} = W \cdot \left(\frac{\mu \cdot \sec((0.253)) - \tan(\alpha)}{1 + \mu \cdot \sec((0.253)) \cdot \tan(\alpha)} \right)$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$\text{ex } 128.0306\text{N} = 1700\text{N} \cdot \left(\frac{0.15 \cdot \sec((0.253)) - \tan(4.5^\circ)}{1 + 0.15 \cdot \sec((0.253)) \cdot \tan(4.5^\circ)} \right)$$



8) Helix Angle of Power Screw given Effort Required in Lifting Load with Acme Threaded Screw

$$\text{fx } \alpha = a \tan \left(\frac{P_{li} - W \cdot \mu \cdot \sec(0.253)}{W + P_{li} \cdot \mu \cdot \sec(0.253)} \right)$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 4.497438^\circ = a \tan \left(\frac{402\text{N} - 1700\text{N} \cdot 0.15 \cdot \sec(0.253)}{1700\text{N} + 402\text{N} \cdot 0.15 \cdot \sec(0.253)} \right)$$

9) Helix Angle of Power Screw given Load and Coefficient of Friction

$$\text{fx } \alpha = a \tan \left(\frac{W \cdot \mu \cdot \sec(0.253) - P_{lo}}{W + (P_{lo} \cdot \mu \cdot \sec(0.253))} \right)$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 4.769225^\circ = a \tan \left(\frac{1700\text{N} \cdot 0.15 \cdot \sec(0.253) - 120\text{N}}{1700\text{N} + (120\text{N} \cdot 0.15 \cdot \sec(0.253))} \right)$$

10) Helix Angle of Power Screw given Torque Required in Lifting Load with Acme Threaded Screw

$$\text{fx } \alpha = a \tan \left(\frac{2 \cdot Mt_{li} - W \cdot d_m \cdot \mu \cdot \sec\left(0.253 \cdot \frac{\pi}{180}\right)}{W \cdot d_m + 2 \cdot Mt_{li} \cdot \mu \cdot \sec\left(0.253 \cdot \frac{\pi}{180}\right)} \right)$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 4.799891^\circ = a \tan \left(\frac{2 \cdot 9265\text{N} \cdot \text{mm} - 1700\text{N} \cdot 46\text{mm} \cdot 0.15 \cdot \sec\left(0.253 \cdot \frac{\pi}{180}\right)}{1700\text{N} \cdot 46\text{mm} + 2 \cdot 9265\text{N} \cdot \text{mm} \cdot 0.15 \cdot \sec\left(0.253 \cdot \frac{\pi}{180}\right)} \right)$$



11) Helix Angle of Power Screw given Torque Required in Lowering Load with Acme Threaded Screw

$$fx \quad \alpha = a \tan \left(\frac{W \cdot d_m \cdot \mu \cdot \sec(0.253) - 2 \cdot Mt_{lo}}{W \cdot d_m + 2 \cdot Mt_{lo} \cdot \mu \cdot \sec(0.253)} \right)$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$ex \quad 4.477712^\circ = a \tan \left(\frac{1700N \cdot 46mm \cdot 0.15 \cdot \sec(0.253) - 2 \cdot 2960N \cdot mm}{1700N \cdot 46mm + 2 \cdot 2960N \cdot mm \cdot 0.15 \cdot \sec(0.253)} \right)$$

12) Load on Power Screw given Effort Required in Lifting Load with Acme Threaded Screw

$$fx \quad W = P_{li} \cdot \frac{1 - \mu \cdot \sec(0.253) \cdot \tan(\alpha)}{\mu \cdot \sec(0.253) + \tan(\alpha)}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$ex \quad 1699.661N = 402N \cdot \frac{1 - 0.15 \cdot \sec(0.253) \cdot \tan(4.5^\circ)}{0.15 \cdot \sec(0.253) + \tan(4.5^\circ)}$$

13) Load on Power Screw given Effort Required in Lowering Load with Acme Threaded Screw

$$fx \quad W = P_{lo} \cdot \frac{1 + \mu \cdot \sec(0.253) \cdot \tan(\alpha)}{\mu \cdot \sec(0.253) - \tan(\alpha)}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$ex \quad 1593.369N = 120N \cdot \frac{1 + 0.15 \cdot \sec(0.253) \cdot \tan(4.5^\circ)}{0.15 \cdot \sec(0.253) - \tan(4.5^\circ)}$$

14) Load on Power Screw given Torque Required in Lifting Load with Acme Threaded Screw

$$fx \quad W = 2 \cdot Mt_{li} \cdot \frac{1 - \mu \cdot \sec(0.253) \cdot \tan(\alpha)}{d_m \cdot (\mu \cdot \sec(0.253) + \tan(\alpha))}$$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

$$ex \quad 1703.153N = 2 \cdot 9265N \cdot mm \cdot \frac{1 - 0.15 \cdot \sec(0.253) \cdot \tan(4.5^\circ)}{46mm \cdot (0.15 \cdot \sec(0.253) + \tan(4.5^\circ))}$$



15) Load on Power Screw given Torque Required in Lowering Load with Acme Threaded Screw

$$\text{fx } W = 2 \cdot Mt_{lo} \cdot \frac{1 + \mu \cdot \sec((0.253)) \cdot \tan(\alpha)}{d_m \cdot (\mu \cdot \sec((0.253)) - \tan(\alpha))}$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 1708.831\text{N} = 2 \cdot 2960\text{N*mm} \cdot \frac{1 + 0.15 \cdot \sec((0.253)) \cdot \tan(4.5^\circ)}{46\text{mm} \cdot (0.15 \cdot \sec((0.253)) - \tan(4.5^\circ))}$$

16) Mean Diameter of Power Screw given Torque Required in Lowering Load with Acme Threaded Screw

$$\text{fx } d_m = 2 \cdot Mt_{lo} \cdot \frac{1 + \mu \cdot \sec((0.253)) \cdot \tan(\alpha)}{W \cdot (\mu \cdot \sec((0.253)) - \tan(\alpha))}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 46.23895\text{mm} = 2 \cdot 2960\text{N*mm} \cdot \frac{1 + 0.15 \cdot \sec((0.253)) \cdot \tan(4.5^\circ)}{1700\text{N} \cdot (0.15 \cdot \sec((0.253)) - \tan(4.5^\circ))}$$


17) Torque Required in Lifting Load with Acme Threaded Power Screw

$$\text{fx } Mt_{li} = 0.5 \cdot d_m \cdot W \cdot \left(\frac{\mu \cdot \sec((0.253)) + \tan(\alpha)}{1 - \mu \cdot \sec((0.253)) \cdot \tan(\alpha)} \right)$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$\text{ex } 9247.846\text{N*mm} = 0.5 \cdot 46\text{mm} \cdot 1700\text{N} \cdot \left(\frac{0.15 \cdot \sec((0.253)) + \tan(4.5^\circ)}{1 - 0.15 \cdot \sec((0.253)) \cdot \tan(4.5^\circ)} \right)$$



18) Torque Required in Lowering Load with Acme Threaded Power Screw 



fx

Open Calculator 

$$Mt_{lo} = 0.5 \cdot d_m \cdot W \cdot \left(\frac{(\mu \cdot \sec((0.253))) - \tan(\alpha)}{1 + (\mu \cdot \sec((0.253)) \cdot \tan(\alpha))} \right)$$

ex

$$2944.704N*mm = 0.5 \cdot 46mm \cdot 1700N \cdot \left(\frac{(0.15 \cdot \sec((0.253))) - \tan(4.5^\circ)}{1 + (0.15 \cdot \sec((0.253)) \cdot \tan(4.5^\circ))} \right)$$

Torque Requirement in Lowering Load using Square threaded Screws 19) Coefficient of Friction of Screw Thread given Load 


fx

Open Calculator 

$$\mu = \frac{P_{lo} + \tan(\alpha) \cdot W}{W - P_{lo} \cdot \tan(\alpha)}$$

ex

$$0.150124 = \frac{120N + \tan(4.5^\circ) \cdot 1700N}{1700N - 120N \cdot \tan(4.5^\circ)}$$

20) Coefficient of Friction of Screw Thread given Torque Required in Lowering Load 

fx


Open Calculator 

$$\mu = \frac{2 \cdot Mt_{lo} + W \cdot d_m \cdot \tan(\alpha)}{W \cdot d_m - 2 \cdot Mt_{lo} \cdot \tan(\alpha)}$$

ex

$$0.15533 = \frac{2 \cdot 2960N*mm + 1700N \cdot 46mm \cdot \tan(4.5^\circ)}{1700N \cdot 46mm - 2 \cdot 2960N*mm \cdot \tan(4.5^\circ)}$$



21) Effort Required in Lowering Load 

$$fx \quad P_{lo} = W \cdot \left(\frac{\mu - \tan(\alpha)}{1 + \mu \cdot \tan(\alpha)} \right)$$

Open Calculator 

$$ex \quad 119.7929N = 1700N \cdot \left(\frac{0.15 - \tan(4.5^\circ)}{1 + 0.15 \cdot \tan(4.5^\circ)} \right)$$

22) Helix Angle of Power Screw given Effort Required in Lowering Load 

$$fx \quad \alpha = a \tan \left(\frac{W \cdot \mu - P_{lo}}{\mu \cdot P_{lo} + W} \right)$$

Open Calculator 

$$ex \quad 4.493055^\circ = a \tan \left(\frac{1700N \cdot 0.15 - 120N}{0.15 \cdot 120N + 1700N} \right)$$

23) Helix Angle of Power Screw given Torque Required in Lowering Load 

$$fx \quad \alpha = a \tan \left(\frac{\mu \cdot W \cdot d_m - (2 \cdot Mt_{lo})}{2 \cdot Mt_{lo} \cdot \mu + (W \cdot d_m)} \right)$$

Open Calculator 

$$ex \quad 4.201542^\circ = a \tan \left(\frac{0.15 \cdot 1700N \cdot 46mm - (2 \cdot 2960N*mm)}{2 \cdot 2960N*mm \cdot 0.15 + (1700N \cdot 46mm)} \right)$$

24) Load on power Screw given Effort Required in Lowering Load 

$$fx \quad W = \frac{P_{lo}}{\frac{\mu - \tan(\alpha)}{1 + \mu \cdot \tan(\alpha)}}$$

Open Calculator 

$$ex \quad 1702.939N = \frac{120N}{\frac{0.15 - \tan(4.5^\circ)}{1 + 0.15 \cdot \tan(4.5^\circ)}}$$




25) Load on power Screw given Torque Required in Lowering Load 

$$\text{fx } W = \frac{Mt_{lo}}{0.5 \cdot d_m \cdot \left(\frac{\mu - \tan(\alpha)}{1 + \mu \cdot \tan(\alpha)} \right)}$$

Open Calculator 

$$\text{ex } 1826.34\text{N} = \frac{2960\text{N} \cdot \text{mm}}{0.5 \cdot 46\text{mm} \cdot \left(\frac{0.15 - \tan(4.5^\circ)}{1 + 0.15 \cdot \tan(4.5^\circ)} \right)}$$

26) Mean Diameter of Power Screw given Torque Required in Lowering Load 

$$\text{fx } d_m = \frac{Mt_{lo}}{0.5 \cdot W \cdot \left(\frac{\mu - \tan(\alpha)}{1 + \mu \cdot \tan(\alpha)} \right)}$$

Open Calculator 

$$\text{ex } 49.41862\text{mm} = \frac{2960\text{N} \cdot \text{mm}}{0.5 \cdot 1700\text{N} \cdot \left(\frac{0.15 - \tan(4.5^\circ)}{1 + 0.15 \cdot \tan(4.5^\circ)} \right)}$$

27) Torque Required in Lowering Load on Power Screw 

$$\text{fx } Mt_{lo} = 0.5 \cdot W \cdot d_m \cdot \left(\frac{\mu - \tan(\alpha)}{1 + \mu \cdot \tan(\alpha)} \right)$$

Open Calculator 

$$\text{ex } 2755.237\text{N} \cdot \text{mm} = 0.5 \cdot 1700\text{N} \cdot 46\text{mm} \cdot \left(\frac{0.15 - \tan(4.5^\circ)}{1 + 0.15 \cdot \tan(4.5^\circ)} \right)$$



Collar Friction

28) Coefficient of Friction at Collar of Screw according to Uniform Pressure Theory

$$\text{fx } \mu_{\text{collar}} = \frac{3 \cdot T_c \cdot ((D_o^2) - (D_i^2))}{W \cdot ((D_o^3) - (D_i^3))}$$

[Open Calculator !\[\]\(339a16584d5da0f0a3ca4e9ec17bf6a1_img.jpg\)](#)

$$\text{ex } 0.144058 = \frac{3 \cdot 10000\text{N} \cdot \text{mm} \cdot (((100\text{mm})^2) - ((60\text{mm})^2))}{1700\text{N} \cdot (((100\text{mm})^3) - ((60\text{mm})^3))}$$

29) Coefficient of Friction at Collar of Screw according to Uniform Wear Theory

$$\text{fx } \mu_{\text{collar}} = \frac{4 \cdot T_c}{W \cdot ((D_o) + (D_i))}$$

[Open Calculator !\[\]\(6059a5aa8b4ca7bb793408023d6c6e42_img.jpg\)](#)

$$\text{ex } 0.147059 = \frac{4 \cdot 10000\text{N} \cdot \text{mm}}{1700\text{N} \cdot ((100\text{mm}) + (60\text{mm}))}$$

30) Collar Friction Torque for Screw according to Uniform Pressure Theory

$$\text{fx } T_c = \frac{\mu_{\text{collar}} \cdot W \cdot ((R_1^3) - (R_2^3))}{(\frac{3}{2}) \cdot ((R_1^2) - (R_2^2))}$$

[Open Calculator !\[\]\(e3275251d0893157c3584e20c81dc3ba_img.jpg\)](#)

$$\text{ex } 11951.13\text{N} \cdot \text{mm} = \frac{0.16 \cdot 1700\text{N} \cdot (((54\text{mm})^3) - ((32\text{mm})^3))}{(\frac{3}{2}) \cdot (((54\text{mm})^2) - ((32\text{mm})^2))}$$



31) Collar Friction Torque for Screw according to Uniform Wear Theory

$$\text{fx } T_c = \mu_{\text{collar}} \cdot W \cdot \frac{R_1 + R_2}{2}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 11696\text{N*mm} = 0.16 \cdot 1700\text{N} \cdot \frac{54\text{mm} + 32\text{mm}}{2}$$

32) Load on Screw given Collar Friction Torque according to Uniform Pressure Theory

$$\text{fx } W = \frac{3 \cdot T_c \cdot ((D_o^2) - (D_i^2))}{\mu_{\text{collar}} \cdot ((D_o^3) - (D_i^3))}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 1530.612\text{N} = \frac{3 \cdot 10000\text{N*mm} \cdot (((100\text{mm})^2) - ((60\text{mm})^2))}{0.16 \cdot (((100\text{mm})^3) - ((60\text{mm})^3))}$$

33) Load on Screw given Collar Friction Torque according to Uniform Wear Theory

$$\text{fx } W = \frac{4 \cdot T_c}{\mu_{\text{collar}} \cdot ((D_o) + (D_i))}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 1562.5\text{N} = \frac{4 \cdot 10000\text{N*mm}}{0.16 \cdot ((100\text{mm}) + (60\text{mm}))}$$



Design of Screw and Nut

34) Axial Load on Screw given Direct Compressive Stress

$$fx \quad W_a = \frac{\sigma_c \cdot \pi \cdot d_c^2}{4}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$ex \quad 130231.6N = \frac{94N/mm^2 \cdot \pi \cdot (42mm)^2}{4}$$

35) Axial Load on Screw given Transverse Shear Stress

$$fx \quad W_a = (\tau_s \cdot \pi \cdot d_c \cdot t \cdot z)$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$ex \quad 131102.4N = (27.6N/mm^2 \cdot \pi \cdot 42mm \cdot 4mm \cdot 9)$$

36) Axial Load on Screw given Transverse Shear Stress at Root of Nut

$$fx \quad W_a = \pi \cdot t_n \cdot t \cdot d \cdot z$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

$$ex \quad 131758.4N = \pi \cdot 23.3N/mm^2 \cdot 4mm \cdot 50mm \cdot 9$$


37) Axial Load on Screw given Unit Bearing Pressure

$$fx \quad W_a = \pi \cdot z \cdot S_b \cdot \frac{(d^2) - (d_c^2)}{4}$$

[Open Calculator !\[\]\(c1168d6a8b365d11e842ece304635fa7_img.jpg\)](#)

$$ex \quad 129541.7N = \pi \cdot 9 \cdot 24.9N/mm^2 \cdot \frac{((50mm)^2) - ((42mm)^2)}{4}$$




38) Bearing Area between Screw and Nut for One Thread 

$$fx \quad A = \pi \cdot \frac{(d^2) - (d_c^2)}{4}$$

Open Calculator 


$$ex \quad 578.053\text{mm}^2 = \pi \cdot \frac{((50\text{mm})^2) - ((42\text{mm})^2)}{4}$$

39) Core Diameter of Power Screw 

$$fx \quad d_c = d - p$$

Open Calculator 


$$ex \quad 42.2\text{mm} = 50\text{mm} - 7.8\text{mm}$$

40) Core Diameter of Screw given Direct Compressive Stress 

$$fx \quad d_c = \sqrt{\frac{4 \cdot W_a}{\pi \cdot \sigma_c}}$$

Open Calculator 

$$ex \quad 42.12373\text{mm} = \sqrt{\frac{4 \cdot 131000\text{N}}{\pi \cdot 94\text{N}/\text{mm}^2}}$$

41) Core Diameter of Screw given Torsional Shear Stress 

$$fx \quad d_c = \left(16 \cdot \frac{Mt_t}{\pi \cdot \tau}\right)^{\frac{1}{3}}$$

Open Calculator 

$$ex \quad 42.00011\text{mm} = \left(16 \cdot \frac{658700\text{N} \cdot \text{mm}}{\pi \cdot 45.28\text{N}/\text{mm}^2}\right)^{\frac{1}{3}}$$




42) Core Diameter of Screw given Transverse Shear Stress in Screw 

$$fx \quad d_c = \frac{W_a}{\tau_s \cdot \pi \cdot t \cdot z}$$

Open Calculator 

$$ex \quad 41.96719\text{mm} = \frac{131000\text{N}}{27.6\text{N/mm}^2 \cdot \pi \cdot 4\text{mm} \cdot 9}$$

43) Core Diameter of Screw given Unit Bearing Pressure 

$$fx \quad d_c = \sqrt{(d)^2 - \left(4 \cdot \frac{W_a}{S_b \cdot \pi \cdot z}\right)}$$

Open Calculator 


$$ex \quad 41.90125\text{mm} = \sqrt{(50\text{mm})^2 - \left(4 \cdot \frac{131000\text{N}}{24.9\text{N/mm}^2 \cdot \pi \cdot 9}\right)}$$

44) Direct Compressive Stress in Screw 

$$fx \quad \sigma_c = \frac{W_a \cdot 4}{\pi \cdot d_c^2}$$

Open Calculator 

$$ex \quad 94.55464\text{N/mm}^2 = \frac{131000\text{N} \cdot 4}{\pi \cdot (42\text{mm})^2}$$


45) Helix Angle of Thread 

$$fx \quad \alpha = a \tan\left(\frac{L}{\pi \cdot d_m}\right)$$

Open Calculator 

$$ex \quad 4.352823^\circ = a \tan\left(\frac{11\text{mm}}{\pi \cdot 46\text{mm}}\right)$$




46) Lead of Screw given Helix angle 

$$fx \quad L = \tan(\alpha) \cdot \pi \cdot d_m$$

Open Calculator 


$$ex \quad 11.37344\text{mm} = \tan(4.5^\circ) \cdot \pi \cdot 46\text{mm}$$

47) Lead of Screw given Overall Efficiency 

$$fx \quad L = 2 \cdot \pi \cdot \eta \cdot \frac{Mt_t}{W_a}$$

Open Calculator 


$$ex \quad 11.05769\text{mm} = 2 \cdot \pi \cdot 0.35 \cdot \frac{658700\text{N} \cdot \text{mm}}{131000\text{N}}$$

48) Mean Diameter of Power Screw 

$$fx \quad d_m = d - 0.5 \cdot p$$

Open Calculator 

$$ex \quad 46.1\text{mm} = 50\text{mm} - 0.5 \cdot 7.8\text{mm}$$

49) Mean diameter of Screw given Helix Angle 

$$fx \quad d_m = \frac{L}{\pi \cdot \tan(\alpha)}$$

Open Calculator 

$$ex \quad 44.48962\text{mm} = \frac{11\text{mm}}{\pi \cdot \tan(4.5^\circ)}$$

50) Nominal Diameter of Power Screw 

$$fx \quad d = d_c + p$$

Open Calculator 

$$ex \quad 49.8\text{mm} = 42\text{mm} + 7.8\text{mm}$$



51) Nominal Diameter of Power Screw given Mean Diameter 

$$fx \quad d = d_m + (0.5 \cdot p)$$

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107_img.jpg\)](#)


$$ex \quad 49.9\text{mm} = 46\text{mm} + (0.5 \cdot 7.8\text{mm})$$

52) Nominal Diameter of Screw given Transverse Shear Stress at Root of Nut 

$$fx \quad d = \frac{W_a}{\pi \cdot t_n \cdot t \cdot z}$$

[Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6_img.jpg\)](#)

$$ex \quad 49.7122\text{mm} = \frac{131000\text{N}}{\pi \cdot 23.3\text{N}/\text{mm}^2 \cdot 4\text{mm} \cdot 9}$$

53) Nominal Diameter of Screw given Unit Bearing Pressure 

$$fx \quad d = \sqrt{\left(4 \cdot \frac{W_a}{S_b \cdot \pi \cdot z}\right) + (d_c)^2}$$

[Open Calculator !\[\]\(4688aadfd656ded00cd6bdfae55089a9_img.jpg\)](#)

$$ex \quad 50.08279\text{mm} = \sqrt{\left(4 \cdot \frac{131000\text{N}}{24.9\text{N}/\text{mm}^2 \cdot \pi \cdot 9}\right) + (42\text{mm})^2}$$

54) Number of Threads in Engagement with Nut given Transverse Shear Stress 

$$fx \quad z = \frac{W_a}{\pi \cdot t \cdot \tau_s \cdot d_c}$$

[Open Calculator !\[\]\(4146d17f71dced09c6ad789cacceaa6d_img.jpg\)](#)

$$ex \quad 8.992968 = \frac{131000\text{N}}{\pi \cdot 4\text{mm} \cdot 27.6\text{N}/\text{mm}^2 \cdot 42\text{mm}}$$



55) Number of Threads in Engagement with Nut given Transverse Shear Stress at Root of Nut

$$fx \quad z = \frac{W_a}{\pi \cdot d \cdot t_n \cdot t}$$

[Open Calculator !\[\]\(c3d993ca47bfe2a953c700506ce31fa0_img.jpg\)](#)

$$ex \quad 8.948196 = \frac{131000N}{\pi \cdot 50mm \cdot 23.3N/mm^2 \cdot 4mm}$$

56) Number of Threads in Engagement with Nut given Unit Bearing Pressure

$$fx \quad z = 4 \cdot \frac{W_a}{(\pi \cdot S_b \cdot ((d^2) - (d_c^2)))}$$

[Open Calculator !\[\]\(17413706fd4997a1a4bdf85c6864eee1_img.jpg\)](#)

$$ex \quad 9.101317 = 4 \cdot \frac{131000N}{(\pi \cdot 24.9N/mm^2 \cdot (((50mm)^2) - ((42mm)^2)))}$$

57) Overall Efficiency of Power Screw

$$fx \quad \eta = W_a \cdot \frac{L}{2 \cdot \pi \cdot Mt_t}$$

[Open Calculator !\[\]\(4b7a79268f6ba26c1471d4232fffa85a_img.jpg\)](#)

$$ex \quad 0.348174 = 131000N \cdot \frac{11mm}{2 \cdot \pi \cdot 658700N*mm}$$


58) Pitch of Power Screw

$$fx \quad p = d - d_c$$

[Open Calculator !\[\]\(3342c215b2a8b663596a81468d5dc314_img.jpg\)](#)

$$ex \quad 8mm = 50mm - 42mm$$




59) Pitch of Screw given Mean Diameter 

$$fx \quad p = \frac{d - d_m}{0.5}$$

Open Calculator 

$$ex \quad 8\text{mm} = \frac{50\text{mm} - 46\text{mm}}{0.5}$$

60) Thread Thickness at Core Diameter of Screw given Transverse Shear Stress 

$$fx \quad t = \frac{W_a}{\pi \cdot \tau_s \cdot d_c \cdot z}$$

Open Calculator 

$$ex \quad 3.996875\text{mm} = \frac{131000\text{N}}{\pi \cdot 27.6\text{N/mm}^2 \cdot 42\text{mm} \cdot 9}$$

61) Thread Thickness at Root of Nut given Transverse Shear Stress at Root of Nut 

$$fx \quad t = \frac{W_a}{\pi \cdot d \cdot z \cdot t_n}$$

Open Calculator 

$$ex \quad 3.976976\text{mm} = \frac{131000\text{N}}{\pi \cdot 50\text{mm} \cdot 9 \cdot 23.3\text{N/mm}^2}$$


62) Torsional Moment in Screw given Torsional Shear Stress 

$$fx \quad Mt_t = \tau \cdot \pi \cdot \frac{d_c^3}{16}$$

Open Calculator 

$$ex \quad 658694.7\text{N}^*\text{mm} = 45.28\text{N/mm}^2 \cdot \pi \cdot \frac{(42\text{mm})^3}{16}$$




63) Torsional Shear Stress of Screw 

$$fx \quad \tau = 16 \cdot \frac{Mt_t}{\pi \cdot (d_c^3)}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)


$$ex \quad 45.28036 \text{N/mm}^2 = 16 \cdot \frac{658700 \text{N} \cdot \text{mm}}{\pi \cdot ((42 \text{mm})^3)}$$

64) Transverse Shear Stress at Root of Nut 

$$fx \quad t_n = \frac{W_a}{\pi \cdot d \cdot t \cdot z}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 23.16589 \text{N/mm}^2 = \frac{131000 \text{N}}{\pi \cdot 50 \text{mm} \cdot 4 \text{mm} \cdot 9}$$

65) Transverse Shear Stress in Screw 

$$fx \quad \tau_s = \frac{W_a}{\pi \cdot d_c \cdot t \cdot z}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 27.57844 \text{N/mm}^2 = \frac{131000 \text{N}}{\pi \cdot 42 \text{mm} \cdot 4 \text{mm} \cdot 9}$$

66) Unit Bearing Pressure for Thread 

$$fx \quad S_b = 4 \cdot \frac{W_a}{\pi \cdot z \cdot ((d^2) - (d_c^2))}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 25.18031 \text{N/mm}^2 = 4 \cdot \frac{131000 \text{N}}{\pi \cdot 9 \cdot (((50 \text{mm})^2) - ((42 \text{mm})^2))}$$



Torque Requirement in Lifting Load using Square Threaded Screw

67) Coefficient of Friction for Screw Thread given Efficiency of Square Threaded Screw

$$fx \quad \mu = \frac{\tan(\alpha) \cdot (1 - \eta)}{\tan(\alpha) \cdot \tan(\alpha) + \eta}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$ex \quad 0.143619 = \frac{\tan(4.5^\circ) \cdot (1 - 0.35)}{\tan(4.5^\circ) \cdot \tan(4.5^\circ) + 0.35}$$

68) Coefficient of Friction of Power Screw given Effort Required to Lift Load

$$fx \quad \mu = \frac{P_{li} - W \cdot \tan(\alpha)}{W + P_{li} \cdot \tan(\alpha)}$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$ex \quad 0.154886 = \frac{402N - 1700N \cdot \tan(4.5^\circ)}{1700N + 402N \cdot \tan(4.5^\circ)}$$

69) Coefficient of Friction of Power Screw given Torque Required to Lift Load

$$fx \quad \mu = \frac{\left(2 \cdot \frac{Mt_{li}}{d_m}\right) - W \cdot \tan(\alpha)}{W - \left(2 \cdot \frac{Mt_{li}}{d_m}\right) \cdot \tan(\alpha)}$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)


$$ex \quad 0.161262 = \frac{\left(2 \cdot \frac{9265N \cdot mm}{46mm}\right) - 1700N \cdot \tan(4.5^\circ)}{1700N - \left(2 \cdot \frac{9265N \cdot mm}{46mm}\right) \cdot \tan(4.5^\circ)}$$



70) Efficiency of Square Threaded Power Screw [Open Calculator](#) 

$$fx \quad \eta = \frac{\tan(\alpha)}{\frac{\mu + \tan(\alpha)}{1 - \mu \cdot \tan(\alpha)}}$$

$$ex \quad 0.340061 = \frac{\tan(4.5^\circ)}{\frac{0.15 + \tan(4.5^\circ)}{1 - 0.15 \cdot \tan(4.5^\circ)}}$$

71) Effort Required in Lifting load using Power Screw [Open Calculator](#) 


$$fx \quad P_{li} = W \cdot \left(\frac{\mu + \tan(\alpha)}{1 - \mu \cdot \tan(\alpha)} \right)$$

$$ex \quad 393.4375N = 1700N \cdot \left(\frac{0.15 + \tan(4.5^\circ)}{1 - 0.15 \cdot \tan(4.5^\circ)} \right)$$

72) Effort Required to Lift Load given Torque Required to Lift Load [Open Calculator](#) 

$$fx \quad P_{li} = 2 \cdot \frac{Mt_{li}}{d_m}$$

$$ex \quad 402.8261N = 2 \cdot \frac{9265N \cdot mm}{46mm}$$

73) External Torque required to raise Load given Efficiency [Open Calculator](#) 

$$fx \quad Mt_t = W_a \cdot \frac{L}{2 \cdot \pi \cdot \eta}$$

$$ex \quad 655263.6N \cdot mm = 131000N \cdot \frac{11mm}{2 \cdot \pi \cdot 0.35}$$



74) Helix Angle of Power Screw given Effort Required to Lift Load 

$$\text{fx } \alpha = a \tan \left(\frac{P_{li} - W \cdot \mu}{P_{li} \cdot \mu + W} \right)$$

Open Calculator 

$$\text{ex } 4.773608^\circ = a \tan \left(\frac{402\text{N} - 1700\text{N} \cdot 0.15}{402\text{N} \cdot 0.15 + 1700\text{N}} \right)$$

75) Helix Angle of Power Screw given Torque Required to Lift Load 

$$\text{fx } \alpha = a \tan \left(\frac{2 \cdot Mt_{li} - W \cdot d_m \cdot \mu}{2 \cdot Mt_{li} \cdot \mu + W \cdot d_m} \right)$$

Open Calculator 

$$\text{ex } 4.799973^\circ = a \tan \left(\frac{2 \cdot 9265\text{N} \cdot \text{mm} - 1700\text{N} \cdot 46\text{mm} \cdot 0.15}{2 \cdot 9265\text{N} \cdot \text{mm} \cdot 0.15 + 1700\text{N} \cdot 46\text{mm}} \right)$$

76) Load on Power Screw given Effort Required to Lift Load 

$$\text{fx } W = \frac{P_{li}}{\frac{\mu + \tan(\alpha)}{1 - \mu \cdot \tan(\alpha)}}$$

Open Calculator 

$$\text{ex } 1736.997\text{N} = \frac{402\text{N}}{\frac{0.15 + \tan(4.5^\circ)}{1 - 0.15 \cdot \tan(4.5^\circ)}}$$


77) Load on Power Screw given Torque Required to Lift Load 

$$\text{fx } W = \left(2 \cdot \frac{Mt_{li}}{d_m} \right) \cdot \left(\frac{1 - \mu \cdot \tan(\alpha)}{\mu + \tan(\alpha)} \right)$$

Open Calculator 


$$\text{ex } 1740.567\text{N} = \left(2 \cdot \frac{9265\text{N} \cdot \text{mm}}{46\text{mm}} \right) \cdot \left(\frac{1 - 0.15 \cdot \tan(4.5^\circ)}{0.15 + \tan(4.5^\circ)} \right)$$



78) Load on Screw given Overall Efficiency [Open Calculator !\[\]\(feabb98897b440bc8695a03336a6e2df_img.jpg\)](#)


$$fx \quad W_a = 2 \cdot \pi \cdot Mt_t \cdot \frac{\eta}{L}$$

$$ex \quad 131687N = 2 \cdot \pi \cdot 658700N \cdot mm \cdot \frac{0.35}{11mm}$$

79) Maximum Efficiency of Square Threaded Screw [Open Calculator !\[\]\(642aa997563f9a325b310230bb5078b7_img.jpg\)](#)

$$fx \quad \eta_{max} = \frac{1 - \sin(a \tan(\mu))}{1 + \sin(a \tan(\mu))}$$

$$ex \quad 0.741644 = \frac{1 - \sin(a \tan(0.15))}{1 + \sin(a \tan(0.15))}$$

80) Mean Diameter of Power Screw given Torque Required to Lift Load [Open Calculator !\[\]\(51514032c8ca341817228f39f1307b05_img.jpg\)](#)

$$fx \quad d_m = 2 \cdot \frac{Mt_{li}}{P_{li}}$$

$$ex \quad 46.09453mm = 2 \cdot \frac{9265N \cdot mm}{402N}$$

81) Torque Required to Lift Load given Effort [Open Calculator !\[\]\(f219cfc00b8db0cd1a81ae1fc9afaf28_img.jpg\)](#)

$$fx \quad Mt_{li} = P_{li} \cdot \frac{d_m}{2}$$


$$ex \quad 9246N \cdot mm = 402N \cdot \frac{46mm}{2}$$



82) Torque Required to Lift Load given Load [Open Calculator !\[\]\(3d8c13c92b853674f749aac6fa869926_img.jpg\)](#)

$$fx \quad Mt_{li} = \left(W \cdot \frac{d_m}{2} \right) \cdot \left(\frac{\mu + \tan(\alpha)}{1 - \mu \cdot \tan(\alpha)} \right)$$

$$ex \quad 9049.063N \cdot mm = \left(1700N \cdot \frac{46mm}{2} \right) \cdot \left(\frac{0.15 + \tan(4.5^\circ)}{1 - 0.15 \cdot \tan(4.5^\circ)} \right)$$

Trapezoidal Thread 83) Coefficient of Friction of Power Screw given Efficiency of Trapezoidal Threaded Screw [Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6_img.jpg\)](#)

$$fx \quad \mu = (\tan(\alpha)) \cdot \frac{1 - \eta}{\sec(0.253) \cdot (\eta + (\tan(\alpha))^2)}$$


$$ex \quad 0.139047 = (\tan(4.5^\circ)) \cdot \frac{1 - 0.35}{\sec(0.253) \cdot (0.35 + (\tan(4.5^\circ))^2)}$$

84) Coefficient of Friction of Screw given Efficiency of Trapezoidal Threaded Screw [Open Calculator !\[\]\(4688aadfd656ded00cd6bdfae55089a9_img.jpg\)](#)

$$fx \quad \mu = \tan(\alpha) \cdot \frac{1 - \eta}{\sec(0.2618) \cdot (\eta + \tan(\alpha) \cdot \tan(\alpha))}$$

$$ex \quad 0.138725 = \tan(4.5^\circ) \cdot \frac{1 - 0.35}{\sec(0.2618) \cdot (0.35 + \tan(4.5^\circ) \cdot \tan(4.5^\circ))}$$



85) Coefficient of Friction of Screw given Effort for Trapezoidal Threaded Screw 

$$\text{fx } \mu = \frac{P_{li} - (W \cdot \tan(\alpha))}{\sec(0.2618) \cdot (W + P_{li} \cdot \tan(\alpha))}$$

Open Calculator 


$$\text{ex } 0.149609 = \frac{402\text{N} - (1700\text{N} \cdot \tan(4.5^\circ))}{\sec(0.2618) \cdot (1700\text{N} + 402\text{N} \cdot \tan(4.5^\circ))}$$

86) Coefficient of Friction of Screw given Effort in Lowering Load 

$$\text{fx } \mu = \frac{P_{lo} + W \cdot \tan(\alpha)}{W \cdot \sec(0.2618) - P_{lo} \cdot \sec(0.2618) \cdot \tan(\alpha)}$$

Open Calculator 


$$\text{ex } 0.145009 = \frac{120\text{N} + 1700\text{N} \cdot \tan(4.5^\circ)}{1700\text{N} \cdot \sec(0.2618) - 120\text{N} \cdot \sec(0.2618) \cdot \tan(4.5^\circ)}$$

87) Coefficient of Friction of Screw given Torque Required in Lifting Load with Trapezoidal Thread 

$$\text{fx } \mu = \frac{2 \cdot Mt_{li} - W \cdot d_m \cdot \tan(\alpha)}{\sec(0.2618) \cdot (W \cdot d_m + 2 \cdot Mt_{li} \cdot \tan(\alpha))}$$

Open Calculator 

$$\text{ex } 0.150064 = \frac{2 \cdot 9265\text{N} \cdot \text{mm} - 1700\text{N} \cdot 46\text{mm} \cdot \tan(4.5^\circ)}{\sec(0.2618) \cdot (1700\text{N} \cdot 46\text{mm} + 2 \cdot 9265\text{N} \cdot \text{mm} \cdot \tan(4.5^\circ))}$$


88) Coefficient of Friction of Screw given Torque Required in Lowering Load with Trapezoidal Thread 

$$\text{fx } \mu = \frac{2 \cdot Mt_{lo} + W \cdot d_m \cdot \tan(\alpha)}{\sec(0.2618) \cdot (W \cdot d_m - 2 \cdot Mt_{lo} \cdot \tan(\alpha))}$$

Open Calculator 

$$\text{ex } 0.150038 = \frac{2 \cdot 2960\text{N} \cdot \text{mm} + 1700\text{N} \cdot 46\text{mm} \cdot \tan(4.5^\circ)}{\sec(0.2618) \cdot (1700\text{N} \cdot 46\text{mm} - 2 \cdot 2960\text{N} \cdot \text{mm} \cdot \tan(4.5^\circ))}$$



89) Efficiency of Trapezoidal Threaded Screw 

$$\text{fx } \eta = \tan(\alpha) \cdot \frac{1 - \mu \cdot \tan(\alpha) \cdot \sec(0.2618)}{\mu \cdot \sec(0.2618) + \tan(\alpha)}$$

Open Calculator 


$$\text{ex } 0.332231 = \tan(4.5^\circ) \cdot \frac{1 - 0.15 \cdot \tan(4.5^\circ) \cdot \sec(0.2618)}{0.15 \cdot \sec(0.2618) + \tan(4.5^\circ)}$$

90) Effort Required in Lifting Load with Trapezoidal Threaded Screw 

$$\text{fx } P_{li} = W \cdot \left(\frac{\mu \cdot \sec((0.2618)) + \tan(\alpha)}{1 - \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)} \right)$$

Open Calculator 

$$\text{ex } 402.7102\text{N} = 1700\text{N} \cdot \left(\frac{0.15 \cdot \sec((0.2618)) + \tan(4.5^\circ)}{1 - 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)} \right)$$

91) Effort Required in Lowering Load with Trapezoidal Threaded Screw 

$$\text{fx } P_{lo} = W \cdot \left(\frac{\mu \cdot \sec((0.2618)) - \tan(\alpha)}{1 + \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)} \right)$$

Open Calculator 

$$\text{ex } 128.6305\text{N} = 1700\text{N} \cdot \left(\frac{0.15 \cdot \sec((0.2618)) - \tan(4.5^\circ)}{1 + 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)} \right)$$

92) Helix Angle of Screw given Effort Required in Lifting Load with Trapezoidal Threaded Screw 

$$\text{fx } \alpha = a \tan \left(\frac{P_{li} - W \cdot \mu \cdot \sec(0.2618)}{W + (P_{li} \cdot \mu \cdot \sec(0.2618))} \right)$$

Open Calculator 

$$\text{ex } 4.477334^\circ = a \tan \left(\frac{402\text{N} - 1700\text{N} \cdot 0.15 \cdot \sec(0.2618)}{1700\text{N} + (402\text{N} \cdot 0.15 \cdot \sec(0.2618))} \right)$$



93) Helix Angle of Screw given Effort Required in Lowering Load with Trapezoidal Threaded Screw

$$\text{fx } \alpha = a \tan \left(\frac{W \cdot \mu \cdot \sec\left(15 \cdot \frac{\pi}{180}\right) - P_{lo}}{W + (P_{lo} \cdot \mu \cdot \sec\left(15 \cdot \frac{\pi}{180}\right))} \right)$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 4.789327^\circ = a \tan \left(\frac{1700\text{N} \cdot 0.15 \cdot \sec\left(15 \cdot \frac{\pi}{180}\right) - 120\text{N}}{1700\text{N} + (120\text{N} \cdot 0.15 \cdot \sec\left(15 \cdot \frac{\pi}{180}\right))} \right)$$

94) Helix Angle of Screw given Torque Required in Lifting Load with Trapezoidal Threaded Screw

$$\text{fx } \alpha = a \tan \left(\frac{2 \cdot Mt_{li} - (W \cdot d_m \cdot \mu \cdot \sec(0.2618))}{(W \cdot d_m) + (2 \cdot Mt_{li} \cdot \mu \cdot \sec(0.2618))} \right)$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 4.503699^\circ = a \tan \left(\frac{2 \cdot 9265\text{N*mm} - (1700\text{N} \cdot 46\text{mm} \cdot 0.15 \cdot \sec(0.2618))}{(1700\text{N} \cdot 46\text{mm}) + (2 \cdot 9265\text{N*mm} \cdot 0.15 \cdot \sec(0.2618))} \right)$$

95) Helix Angle of Screw given Torque Required in Lowering Load with Trapezoidal Threaded Screw

$$\text{fx } \alpha = a \tan \left(\frac{(W \cdot d_m \cdot \mu \cdot \sec(0.2618)) - (2 \cdot Mt_{lo})}{(W \cdot d_m) + (2 \cdot Mt_{lo} \cdot \mu \cdot \sec(0.2618))} \right)$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 4.497816^\circ = a \tan \left(\frac{(1700\text{N} \cdot 46\text{mm} \cdot 0.15 \cdot \sec(0.2618)) - (2 \cdot 2960\text{N*mm})}{(1700\text{N} \cdot 46\text{mm}) + (2 \cdot 2960\text{N*mm} \cdot 0.15 \cdot \sec(0.2618))} \right)$$



96) Load on Screw given Effort Required in Lifting Load with Trapezoidal Threaded Screw

$$\text{fx } W = \frac{P_{li}}{\frac{\mu \cdot \sec((0.2618)) + \tan(\alpha)}{1 - \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)}}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 1697.002\text{N} = \frac{402\text{N}}{\frac{0.15 \cdot \sec((0.2618)) + \tan(4.5^\circ)}{1 - 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)}}$$

97) Load on Screw given helix Angle

$$\text{fx } W = P_{lo} \cdot \frac{1 + \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)}{(\mu \cdot \sec((0.2618)) - \tan(\alpha))}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 1585.938\text{N} = 120\text{N} \cdot \frac{1 + 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)}{(0.15 \cdot \sec((0.2618)) - \tan(4.5^\circ))}$$

98) Load on Screw given Torque Required in Lifting Load with Trapezoidal Threaded Screw

$$\text{fx } W = Mt_{li} \cdot \frac{1 - \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)}{0.5 \cdot d_m \cdot ((\mu \cdot \sec((0.2618)) + \tan(\alpha)))}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 1700.489\text{N} = 9265\text{N} \cdot \text{mm} \cdot \frac{1 - 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)}{0.5 \cdot 46\text{mm} \cdot ((0.15 \cdot \sec((0.2618)) + \tan(4.5^\circ)))}$$



99) Load on Screw given Torque Required in Lowering Load with Trapezoidal Threaded Screw

$$fx \quad W = \frac{Mt_{lo}}{0.5 \cdot d_m \cdot \left(\frac{(\mu \cdot \sec((0.2618))) - \tan(\alpha)}{1 + (\mu \cdot \sec((0.2618))) \cdot \tan(\alpha)} \right)}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$ex \quad 1700.861N = \frac{2960N \cdot mm}{0.5 \cdot 46mm \cdot \left(\frac{(0.15 \cdot \sec((0.2618))) - \tan(4.5^\circ)}{1 + (0.15 \cdot \sec((0.2618))) \cdot \tan(4.5^\circ)} \right)}$$

100) Mean Diameter of Screw given Torque in Lifting Load with Trapezoidal Threaded Screw

$$fx \quad d_m = \frac{Mt_{li}}{0.5 \cdot W \cdot \left(\frac{\mu \cdot \sec((0.2618)) + \tan(\alpha)}{1 - \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)} \right)}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$ex \quad 46.01324mm = \frac{9265N \cdot mm}{0.5 \cdot 1700N \cdot \left(\frac{0.15 \cdot \sec((0.2618)) + \tan(4.5^\circ)}{1 - 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)} \right)}$$


101) Mean Diameter of Screw given Torque in Lowering Load with Trapezoidal Threaded Screw

$$fx \quad d_m = \frac{Mt_{lo}}{0.5 \cdot W \cdot \left(\frac{\mu \cdot \sec((0.2618)) - \tan(\alpha)}{1 + \mu \cdot \sec((0.2618)) \cdot \tan(\alpha)} \right)}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$ex \quad 46.0233mm = \frac{2960N \cdot mm}{0.5 \cdot 1700N \cdot \left(\frac{0.15 \cdot \sec((0.2618)) - \tan(4.5^\circ)}{1 + 0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ)} \right)}$$



102) Torque Required in Lifting Load with Trapezoidal Threaded Screw 


fx

Open Calculator 

$$Mt_{li} = 0.5 \cdot d_m \cdot W \cdot \left(\frac{(\mu \cdot \sec((0.2618))) + \tan(\alpha)}{1 - (\mu \cdot \sec((0.2618)) \cdot \tan(\alpha))} \right)$$

ex

$$9262.334N^*mm = 0.5 \cdot 46mm \cdot 1700N \cdot \left(\frac{(0.15 \cdot \sec((0.2618))) + \tan(4.5^\circ)}{1 - (0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ))} \right)$$

103) Torque Required in Lowering Load with Trapezoidal Threaded Screw 

fx

Open Calculator 

$$Mt_{lo} = 0.5 \cdot d_m \cdot W \cdot \left(\frac{(\mu \cdot \sec((0.2618))) - \tan(\alpha)}{1 + (\mu \cdot \sec((0.2618)) \cdot \tan(\alpha))} \right)$$

ex

$$2958.501N^*mm = 0.5 \cdot 46mm \cdot 1700N \cdot \left(\frac{(0.15 \cdot \sec((0.2618))) - \tan(4.5^\circ)}{1 + (0.15 \cdot \sec((0.2618)) \cdot \tan(4.5^\circ))} \right)$$



Variables Used







- **A** Bearing area between screw and nut (*Square Millimeter*)
- **d** Nominal diameter of screw (*Millimeter*)
- **d_c** Core diameter of screw (*Millimeter*)
- **D_i** Inner Diameter of Collar (*Millimeter*)
- **d_m** Mean Diameter of Power Screw (*Millimeter*)
- **D_o** Outer Diameter of Collar (*Millimeter*)
- **L** Lead of Power Screw (*Millimeter*)
- **Mt_{li}** Torque for lifting load (*Newton Millimeter*)
- **Mt_{lo}** Torque for lowering load (*Newton Millimeter*)
- **Mt_t** Torsional Moment on Screw (*Newton Millimeter*)
- **p** Pitch of power screw thread (*Millimeter*)
- **P_{li}** Effort in lifting load (*Newton*)
- **P_{lo}** Effort in lowering load (*Newton*)
- **R₁** Outer Radius of Power Screw Collar (*Millimeter*)
- **R₂** Inner Radius of Power Screw Collar (*Millimeter*)
- **S_b** Unit bearing pressure for nut (*Newton per Square Millimeter*)
- **t** Thread Thickness (*Millimeter*)
- **T_c** Collar Friction Torque for Power Screw (*Newton Millimeter*)
- **t_n** Transverse shear stress in nut (*Newton per Square Millimeter*)
- **W** Load on screw (*Newton*)
- **W_a** Axial load on screw (*Newton*)
- **z** Number of Engaged Threads
- **α** Helix angle of screw (*Degree*)
- **η** Efficiency of power screw
- **η_{max}** Maximum Efficiency of Power Screw




- μ Coefficient of friction at screw thread
- μ_{collar} Coefficient of Friction for Collar
- σ_c Compressive stress in screw (*Newton per Square Millimeter*)
- T Torsional shear stress in screw (*Newton per Square Millimeter*)
- T_s Transverse Shear Stress in Screw (*Newton per Square Millimeter*)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Function:** **atan**, atan(Number)
Inverse tan is used to calculate the angle by applying the tangent ratio of the angle, which is the opposite side divided by the adjacent side of the right triangle.
- **Function:** **sec**, sec(Angle)
Secant is a trigonometric function that is defined ratio of the hypotenuse to the shorter side adjacent to an acute angle (in a right-angled triangle); the reciprocal of a cosine.
- **Function:** **sin**, sin(Angle)
Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- **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.
- **Function:** **tan**, tan(Angle)
The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.
- **Measurement:** **Length** in Millimeter (mm)
Length Unit Conversion 
- **Measurement:** **Area** in Square Millimeter (mm²)
Area Unit Conversion 
- **Measurement:** **Pressure** in Newton per Square Millimeter (N/mm²)
Pressure Unit Conversion 
- **Measurement:** **Force** in Newton (N)
Force Unit Conversion 
- **Measurement:** **Angle** in Degree (°)
Angle Unit Conversion 
- **Measurement:** **Torque** in Newton Millimeter (N*mm)
Torque Unit Conversion 



- **Measurement: Stress** in Newton per Square Millimeter (N/mm²)
Stress Unit Conversion 



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- **Refrigeration and Air Conditioning Formulas** 

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