

# Important Constant Wear Theory Formulas PDF



**Formulas**  
**Examples**  
**with Units**

## List of 13 Important Constant Wear Theory Formulas

### 1) Axial Force on Clutch from Constant Wear Theory given Friction Torque Formula

Formula

$$P_a = 4 \cdot \frac{M_T}{\mu \cdot (d_o + d_i)}$$

Example with Units

$$15900 \text{ N} = 4 \cdot \frac{238500 \text{ N}\cdot\text{mm}}{0.2 \cdot (200 \text{ mm} + 100 \text{ mm})}$$

Evaluate Formula 

### 2) Axial Force on Clutch from Constant Wear Theory given Permissible Intensity of Pressure Formula

Formula

$$P_a = \pi \cdot p_a \cdot d_i \cdot \frac{d_o - d_i}{2}$$

Example with Units

$$15899.9931 \text{ N} = 3.1416 \cdot 1.012225 \text{ N/mm}^2 \cdot 100 \text{ mm} \cdot \frac{200 \text{ mm} - 100 \text{ mm}}{2}$$

Evaluate Formula 

### 3) Axial Force on Cone Clutch from Constant Wear Theory given Permissible Pressure Intensity Formula

Formula

$$P_a = \pi \cdot p_a \cdot d_i \cdot \frac{d_o - d_i}{2}$$

Example with Units

$$15899.9931 \text{ N} = 3.1416 \cdot 1.012225 \text{ N/mm}^2 \cdot 100 \text{ mm} \cdot \frac{200 \text{ mm} - 100 \text{ mm}}{2}$$

Evaluate Formula 

### 4) Axial Force on Cone Clutch from Constant Wear Theory given Pressure Formula

Formula

$$P_a = \pi \cdot P_p \cdot \frac{(d_o^2) - (d_i^2)}{4}$$

Example with Units

$$15900.7785 \text{ N} = 3.1416 \cdot 0.67485 \text{ N/mm}^2 \cdot \frac{(200 \text{ mm}^2) - (100 \text{ mm}^2)}{4}$$

Evaluate Formula 



## 5) Coefficient of Friction of Clutch from Constant Wear Theory Formula

Formula

$$\mu = 8 \cdot \frac{M_T}{\pi \cdot p_a \cdot d_i \cdot \left( (d_o^2) - (d_i^2) \right)}$$

Evaluate Formula 

Example with Units

$$0.2 = 8 \cdot \frac{238500 \text{ N}^*\text{mm}}{3.1416 \cdot 1.012225 \text{ N/mm}^2 \cdot 100 \text{ mm} \cdot \left( (200 \text{ mm}^2) - (100 \text{ mm}^2) \right)}$$

## 6) Coefficient of Friction of Clutch from Constant Wear Theory given Axial Force Formula

Formula

$$\mu = 4 \cdot \frac{M_T}{P_a \cdot (d_o + d_i)}$$

Example with Units

$$0.2 = 4 \cdot \frac{238500 \text{ N}^*\text{mm}}{15900 \text{ N} \cdot (200 \text{ mm} + 100 \text{ mm})}$$

Evaluate Formula 

## 7) Friction Torque on Clutch from Constant Wear Theory given Diameters Formula

Formula

$$M_T = \mu \cdot P_a \cdot \frac{d_o + d_i}{4}$$

Example with Units

$$238500 \text{ N}^*\text{mm} = 0.2 \cdot 15900 \text{ N} \cdot \frac{200 \text{ mm} + 100 \text{ mm}}{4}$$

Evaluate Formula 

## 8) Friction Torque on Cone Clutch from Constant Wear Theory given Axial Force Formula

Formula

$$M_T = \mu \cdot P_m \cdot \frac{d_o + d_i}{4 \cdot \sin(\alpha)}$$

Example with Units

$$238500.8133 \text{ N}^*\text{mm} = 0.2 \cdot 15900.03 \text{ N} \cdot \frac{200 \text{ mm} + 100 \text{ mm}}{4 \cdot \sin(89.9^\circ)}$$

Evaluate Formula 

## 9) Friction Torque on Cone Clutch from Constant Wear Theory given Semi-Cone Angle Formula

Formula

$$M_T = \pi \cdot \mu \cdot p_a \cdot d_i \cdot \frac{(d_o^2) - (d_i^2)}{8 \cdot \sin(\alpha)}$$

Example with Units

$$238500.26 \text{ N}^*\text{mm} = 3.1416 \cdot 0.2 \cdot 1.012225 \text{ N/mm}^2 \cdot 100 \text{ mm} \cdot \frac{(200 \text{ mm}^2) - (100 \text{ mm}^2)}{8 \cdot \sin(89.9^\circ)}$$

Evaluate Formula 



## 10) Friction Torque on Multiple Disk Clutch from Constant Wear Theory Formula

Formula

$$M_T = \mu \cdot P_m \cdot z \cdot \frac{d_o + d_i}{4}$$

Evaluate Formula 

Example with Units

$$238524.3 \text{ N*mm} = 0.2 \cdot 15900.03 \text{ N} \cdot 1.0001 \cdot \frac{200 \text{ mm} + 100 \text{ mm}}{4}$$

## 11) Frictional Torque on Clutch from Constant Wear Theory given Diameters Formula

Formula

$$M_T = \pi \cdot \mu \cdot p_a \cdot d_i \cdot \frac{(d_o^2) - (d_i^2)}{8}$$

Evaluate Formula 

Example with Units

$$238499.8968 \text{ N*mm} = 3.1416 \cdot 0.2 \cdot 1.012225 \text{ N/mm}^2 \cdot 100 \text{ mm} \cdot \frac{(200 \text{ mm}^2) - (100 \text{ mm}^2)}{8}$$

## 12) Permissible Pressure Intensity on Clutch from Constant Wear Theory given Axial Force Formula

Formula

$$p_a = 2 \cdot \frac{P_a}{\pi \cdot d_i \cdot (d_o - d_i)}$$

Example with Units

$$1.0122 \text{ N/mm}^2 = 2 \cdot \frac{15900 \text{ N}}{3.1416 \cdot 100 \text{ mm} \cdot (200 \text{ mm} - 100 \text{ mm})}$$

Evaluate Formula 

## 13) Permissible Pressure Intensity on Clutch from Constant Wear Theory given Friction Torque Formula

Formula

$$p_a = 8 \cdot \frac{M_T}{\pi \cdot \mu \cdot d_i \cdot ((d_o^2) - (d_i^2))}$$

Evaluate Formula 

Example with Units






$$1.0122 \text{ N/mm}^2 = 8 \cdot \frac{238500 \text{ N*mm}}{3.1416 \cdot 0.2 \cdot 100 \text{ mm} \cdot ((200 \text{ mm}^2) - (100 \text{ mm}^2))}$$



## Variables used in list of Constant Wear Theory Formulas above

- $d_i$  Inner Diameter of Clutch (Millimeter)
- $d_o$  Outer Diameter of Clutch (Millimeter)
- $M_T$  Friction Torque on Clutch (Newton Millimeter)
- $p_a$  Permissible Intensity of Pressure in Clutch (Newton per Square Millimeter)
- $P_a$  Axial Force for Clutch (Newton)
- $P_m$  Operating Force for Clutch (Newton)
- $P_p$  Pressure between Clutch Plates (Newton per Square Millimeter)
- $z$  Pairs of Contacting Surface of Clutch
- $\alpha$  Semi-Cone Angle of Clutch (Degree)
- $\mu$  Coefficient of Friction Clutch

## Constants, Functions, Measurements used in list of Constant Wear Theory Formulas above

- **constant(s):**  $\pi$ , 3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Functions:**  $\sin$ ,  $\sin(\text{Angle})$   
*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.*
- **Measurement: Length** in Millimeter (mm)  
*Length Unit Conversion* 
- **Measurement: Pressure** in Newton per Square Millimeter (N/mm<sup>2</sup>)  
*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* 



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