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# Braking Torque Formulas

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# List of 12 Braking Torque Formulas

## Braking Torque

### 1) Braking Torque for Band and Block Brake, Considering Thickness of Band

$$\text{fx } M_t = (T_1 - T_2) \cdot r_e$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b\_img.jpg\)](#)

$$\text{ex } 33\text{N}\cdot\text{m} = (720\text{N} - 500\text{N}) \cdot 0.15\text{m}$$

### 2) Braking Torque for Band and Block Brake, Neglecting Thickness of Band

$$\text{fx } M_t = (T_1 - T_2) \cdot r_d$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d\_img.jpg\)](#)

$$\text{ex } 35.2\text{N}\cdot\text{m} = (720\text{N} - 500\text{N}) \cdot 0.16\text{m}$$

### 3) Braking Torque for Double Block or Shoe Brake

$$\text{fx } M_t = (F_{t1} + F_{t2}) \cdot r_w$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d\_img.jpg\)](#)

$$\text{ex } 37.8\text{N}\cdot\text{m} = (8\text{N} + 12\text{N}) \cdot 1.89\text{m}$$

### 4) Braking Torque for Pivoted Block or Shoe Brake

$$\text{fx } M_t = \mu' \cdot R_n \cdot r_w$$

[Open Calculator !\[\]\(83bbbd261710c59db0214aa27b2edc0d\_img.jpg\)](#)

$$\text{ex } 4.536\text{N}\cdot\text{m} = 0.4 \cdot 6\text{N} \cdot 1.89\text{m}$$



### 5) Braking Torque for Shoe Brake

$$\text{fx } M_t = F_t \cdot r_w$$

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

$$\text{ex } 28.35\text{N}\cdot\text{m} = 15\text{N} \cdot 1.89\text{m}$$

### 6) Braking Torque for Shoe Brake given Force Applied at End of Lever

$$\text{fx } M_t = \frac{\mu_b \cdot P \cdot l \cdot r_w}{x}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0\_img.jpg\)](#)

$$\text{ex } 2.32848\text{N}\cdot\text{m} = \frac{0.35 \cdot 16\text{N} \cdot 1.1\text{m} \cdot 1.89\text{m}}{5\text{m}}$$

### 7) Braking Torque for Shoe Brake if Line of Action of Tangential Force Passes above Fulcrum Anti Clock

$$\text{fx } M_t = \frac{\mu_b \cdot r_w \cdot P \cdot l}{x + \mu_b \cdot a_s}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f\_img.jpg\)](#)

$$\text{ex } 1.870265\text{N}\cdot\text{m} = \frac{0.35 \cdot 1.89\text{m} \cdot 16\text{N} \cdot 1.1\text{m}}{5\text{m} + 0.35 \cdot 3.5\text{m}}$$

### 8) Braking Torque of Shoe Brake if Line of Action of Tangential Force Passes above Fulcrum Clockwise

$$\text{fx } M_t = \frac{\mu_b \cdot r_w \cdot P \cdot l}{x - \mu_b \cdot a_s}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754\_img.jpg\)](#)

$$\text{ex } 3.084079\text{N}\cdot\text{m} = \frac{0.35 \cdot 1.89\text{m} \cdot 16\text{N} \cdot 1.1\text{m}}{5\text{m} - 0.35 \cdot 3.5\text{m}}$$



### 9) Braking Torque of Shoe Brake if Line of Action of Tangential Force Passes below Fulcrum Anti Clock

$$\text{fx } M_t = \frac{\mu_b \cdot r_w \cdot P \cdot l}{x - \mu_b \cdot a_s}$$

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

$$\text{ex } 3.084079\text{N}\cdot\text{m} = \frac{0.35 \cdot 1.89\text{m} \cdot 16\text{N} \cdot 1.1\text{m}}{5\text{m} - 0.35 \cdot 3.5\text{m}}$$

### 10) Braking Torque of Shoe Brake if Line of Action of Tangential Force Passes below Fulcrum Clockwise

$$\text{fx } M_t = \frac{\mu_b \cdot r_w \cdot P \cdot l}{x + \mu_b \cdot a_s}$$

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

$$\text{ex } 1.870265\text{N}\cdot\text{m} = \frac{0.35 \cdot 1.89\text{m} \cdot 16\text{N} \cdot 1.1\text{m}}{5\text{m} + 0.35 \cdot 3.5\text{m}}$$

### 11) Braking Torque on Drum for Simple Band Brake Considering Band Thickness

$$\text{fx } M_t = (T_1 - T_2) \cdot r_e$$

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

$$\text{ex } 33\text{N}\cdot\text{m} = (720\text{N} - 500\text{N}) \cdot 0.15\text{m}$$

### 12) Braking Torque on Drum for Simple Band Brake, Neglecting Thickness of Band

$$\text{fx } M_t = (T_1 - T_2) \cdot r_d$$

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

$$\text{ex } 35.2\text{N}\cdot\text{m} = (720\text{N} - 500\text{N}) \cdot 0.16\text{m}$$






## Variables Used

- $\mu'$  Equivalent Coefficient of Friction
- $a_s$  Shift in Line of Action of Tangential Force (Meter)
- $F_t$  Tangential Braking Force (Newton)
- $F_{t1}$  Braking Forces on The Block 1 (Newton)
- $F_{t2}$  Braking Forces on The Block 2 (Newton)
- $l$  Distance Between Fulcrum And End of Lever (Meter)
- $M_t$  Braking or Fixing Torque on Fixed Member (Newton Meter)
- $P$  Force Applied at The End of The Lever (Newton)
- $r_d$  Radius of The Drum (Meter)
- $r_e$  Effective Radius of The Drum (Meter)
- $R_n$  Normal Force Pressing The Brake Block on The Wheel (Newton)
- $r_w$  Radius of Wheel (Meter)
- $T_1$  Tension in Tight Side of The Band (Newton)
- $T_2$  Tension in The Slack Side of Band (Newton)
- $x$  Distance Between Fulcrum And Axis of Wheel (Meter)
- $\mu_b$  Coefficient of Friction For Brake



## Constants, Functions, Measurements used

- **Measurement: Length** in Meter (m)  
*Length Unit Conversion* 
- **Measurement: Force** in Newton (N)  
*Force Unit Conversion* 
- **Measurement: Torque** in Newton Meter (N\*m)  
*Torque Unit Conversion* 



## Check other formula lists

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