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# Design of Splines Formulas

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# List of 9 Design of Splines Formulas

## Design of Splines

### 1) Major Diameter of Spline given Mean Radius

$$fx \quad D = 4 \cdot R_m - d$$

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

$$ex \quad 60\text{mm} = 4 \cdot 28\text{mm} - 52\text{mm}$$

### 2) Mean Radius of Splines

$$fx \quad R_m = \frac{D + d}{4}$$

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

$$ex \quad 28\text{mm} = \frac{60\text{mm} + 52\text{mm}}{4}$$

### 3) Mean Radius of Splines given Torque Transmitting Capacity

$$fx \quad R_m = \frac{M_t}{p_m \cdot A}$$

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

$$ex \quad 26.56805\text{mm} = \frac{224500\text{N} \cdot \text{mm}}{6.5\text{N}/\text{mm}^2 \cdot 1300\text{mm}^2}$$

### 4) Minor Diameter of Spline given Mean Radius

$$fx \quad d = 4 \cdot R_m - D$$

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

$$ex \quad 52\text{mm} = 4 \cdot 28\text{mm} - 60\text{mm}$$



## 5) Permissible Pressure on Splines given Torque Transmitting Capacity

$$fx \quad p_m = \frac{M_t}{A \cdot R_m}$$

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

$$ex \quad 6.167582N/mm^2 = \frac{224500N \cdot mm}{1300mm^2 \cdot 28mm}$$

## 6) Torque Transmitting Capacity of Splines

$$fx \quad M_t = p_m \cdot A \cdot R_m$$

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

$$ex \quad 236600N \cdot mm = 6.5N/mm^2 \cdot 1300mm^2 \cdot 28mm$$

## 7) Torque Transmitting Capacity of Splines given Diameter of Splines

$$fx \quad M_t = \frac{p_m \cdot l_h \cdot n \cdot (D^2 - d^2)}{8}$$

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

$$ex \quad 283920N \cdot mm = \frac{6.5N/mm^2 \cdot 65mm \cdot 6 \cdot ((60mm)^2 - (52mm)^2)}{8}$$

## 8) Total Area of Splines

$$fx \quad A = 0.5 \cdot (l_h \cdot n) \cdot (D - d)$$

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

$$ex \quad 1560mm^2 = 0.5 \cdot (65mm \cdot 6) \cdot (60mm - 52mm)$$



## 9) Total Area of Splines given Torque Transmitting Capacity

[Open Calculator !\[\]\(dfbd6b3763a6d1d9afaa974f64e2e4b5\_img.jpg\)](#)

$$\text{fx } A = \frac{M_t}{p_m \cdot R_m}$$

$$\text{ex } 1233.516\text{mm}^2 = \frac{224500\text{N} \cdot \text{mm}}{6.5\text{N}/\text{mm}^2 \cdot 28\text{mm}}$$



## Variables Used

- **A** Total Area of Splines (*Square Millimeter*)
- **d** Minor Diameter of Spline Key Shaft (*Millimeter*)
- **D** Major Diameter of Spline Key Shaft (*Millimeter*)
- **$l_h$**  Length of Hub on Keyed Shaft (*Millimeter*)
- **$M_t$**  Transmitted Torque By Keyed Shaft (*Newton Millimeter*)
- **n** Number of Splines
- **$p_m$**  Permissible Pressure on Splines (*Newton per Square Millimeter*)
- **$R_m$**  Mean Radius of Spline of Shaft (*Millimeter*)



## Constants, Functions, Measurements used

- **Measurement: Length** in Millimeter (mm)  
*Length Unit Conversion* 
- **Measurement: Area** in Square Millimeter (mm<sup>2</sup>)  
*Area Unit Conversion* 
- **Measurement: Pressure** in Newton per Square Millimeter (N/mm<sup>2</sup>)  
*Pressure Unit Conversion* 
- **Measurement: Torque** in Newton Millimeter (N\*mm)  
*Torque Unit Conversion* 



## Check other formula lists

- [Design of Flywheel Formulas](#) 
- [Design of Splines Formulas](#) 

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