

# Important Fastner Geometry Formulas PDF



## Formulas Examples with Units

### List of 38 Important Fastner Geometry Formulas

#### 1) Core Diameter of Bolt Formula ↗

Formula

$$d_c' = \frac{P}{\pi \cdot \tau \cdot h_n}$$

Example with Units

$$8.5003 \text{ mm} = \frac{28200 \text{ N}}{3.1416 \cdot 120 \text{ N/mm}^2 \cdot 8.8 \text{ mm}}$$

Evaluate Formula ↗

#### 2) Core Diameter of Bolt given Nominal Diameter Formula ↗

Formula

$$d_c' = 0.8 \cdot d_b$$

Example with Units

$$8 \text{ mm} = 0.8 \cdot 10 \text{ mm}$$

Evaluate Formula ↗

#### 3) Core Diameter of Bolt given Pitch Formula ↗

Formula

$$d_c' = d_b - (1.22687 \cdot p_b)$$

Example with Units

$$8.4664 \text{ mm} = 10 \text{ mm} - (1.22687 \cdot 1.25 \text{ mm})$$

Evaluate Formula ↗

#### 4) Core diameter of Bolt given Tensile Stress Formula ↗

Formula

$$d_c' = \sqrt{4 \cdot \frac{P}{\pi \cdot \sigma_t}}$$

Example with Units

$$15.736 \text{ mm} = \sqrt{4 \cdot \frac{28200 \text{ N}}{3.1416 \cdot 145 \text{ N/mm}^2}}$$

Evaluate Formula ↗

#### 5) Height of Basic Profile of Screw Threads Formula ↗

Formula

$$h = 0.640327 \cdot p$$

Example with Units

$$2.5549 \text{ mm} = 0.640327 \cdot 3.99 \text{ mm}$$

Evaluate Formula ↗

#### 6) Height of Fundamental Triangle of Screw Threads Formula ↗

Formula

$$H = 0.960491 \cdot p$$

Example with Units

$$3.8324 \text{ mm} = 0.960491 \cdot 3.99 \text{ mm}$$

Evaluate Formula ↗



## 7) Height of Fundamental Triangle of Screw Threads given Minor Diameter of External Thread

### Formula

#### Formula

$$H = \frac{12}{17} \cdot (d - d_c)$$

#### Example with Units

$$3.4659 \text{ mm} = \frac{12}{17} \cdot (29.8 \text{ mm} - 24.89 \text{ mm})$$

[Evaluate Formula !\[\]\(a870788d6ed9b8fd294b7654a8c8526b\_img.jpg\)](#)

## 8) Height of Fundamental Triangle of Screw Threads given Minor Diameter of Internal Thread

### Formula

#### Formula

$$H = \frac{D - D_c}{1.25}$$

#### Example with Units

$$3.464 \text{ mm} = \frac{30 \text{ mm} - 25.67 \text{ mm}}{1.25}$$

[Evaluate Formula !\[\]\(e3275251d0893157c3584e20c81dc3ba\_img.jpg\)](#)

## 9) Height of Fundamental Triangle of Screw Threads given Pitch Diameter of External Thread

### Formula

#### Formula

$$H = \frac{d - d_p}{0.75}$$

#### Example with Units

$$3.4667 \text{ mm} = \frac{29.8 \text{ mm} - 27.2 \text{ mm}}{0.75}$$

[Evaluate Formula !\[\]\(291e070cef6c4d5e78fefe4696ef53be\_img.jpg\)](#)

## 10) Height of Fundamental Triangle of Screw Threads given Pitch Diameter of Internal Thread

### Formula

#### Formula

$$H = \frac{D - D_p}{0.75}$$

#### Example with Units

$$3.4667 \text{ mm} = \frac{30 \text{ mm} - 27.4 \text{ mm}}{0.75}$$

[Evaluate Formula !\[\]\(26cddea01ddf7f002af4ba779c4999ee\_img.jpg\)](#)

## 11) Height of nut Formula

#### Formula

$$h_n = \frac{P}{\pi \cdot \tau \cdot d_c'}$$

#### Example with Units

$$8.8003 \text{ mm} = \frac{28200 \text{ N}}{3.1416 \cdot 120 \text{ N/mm}^2 \cdot 8.5 \text{ mm}}$$

[Evaluate Formula !\[\]\(3a9e77fc60554e54e5412caa0cfeb534\_img.jpg\)](#)

## 12) Major Diameter of External Thread given Height of Fundamental Triangle Formula

#### Formula

$$d = d_p + (0.75 \cdot H)$$

#### Example with Units

$$29.795 \text{ mm} = 27.2 \text{ mm} + (0.75 \cdot 3.46 \text{ mm})$$

[Evaluate Formula !\[\]\(191974d92f8997746d184d15a9426fc7\_img.jpg\)](#)

## 13) Major Diameter of External Thread given Minor Diameter of External Thread Formula

#### Formula


$$d = d_c + \left( \frac{17}{12} \cdot H \right)$$

#### Example with Units

$$29.7917 \text{ mm} = 24.89 \text{ mm} + \left( \frac{17}{12} \cdot 3.46 \text{ mm} \right)$$

[Evaluate Formula !\[\]\(2dd31094e9abb3cd10eefa84a6d86409\_img.jpg\)](#)

#### 14) Major Diameter of External Thread given Pitch and Pitch Diameter of External Thread

Formula 

Formula

$$d = d_p + (0.650 \cdot p)$$

Example with Units

$$29.7935 \text{ mm} = 27.2 \text{ mm} + (0.650 \cdot 3.99 \text{ mm})$$

Evaluate Formula 

#### 15) Major Diameter of Internal Thread given Height of Fundamental triangle

Formula 

Formula


$$D = D_c + (1.25 \cdot H)$$

Example with Units

$$29.995 \text{ mm} = 25.67 \text{ mm} + (1.25 \cdot 3.46 \text{ mm})$$

Evaluate Formula 

#### 16) Major Diameter of Internal Thread given Pitch and Minor Diameter of External Thread

Formula 

Formula


$$D = d_c + (1.227 \cdot p)$$

Example with Units

$$29.7857 \text{ mm} = 24.89 \text{ mm} + (1.227 \cdot 3.99 \text{ mm})$$

Evaluate Formula 

#### 17) Major Diameter of Internal Thread given Pitch and Minor Diameter of Internal Thread

Formula 

Formula

$$D = (1.083 \cdot p) + D_c$$

Example with Units

$$29.9912 \text{ mm} = (1.083 \cdot 3.99 \text{ mm}) + 25.67 \text{ mm}$$

Evaluate Formula 

#### 18) Major Diameter of Internal Thread given Pitch Diameter of Internal Thread

Formula 

Formula

$$D = D_p + (0.75 \cdot H)$$

Example with Units

$$29.995 \text{ mm} = 27.4 \text{ mm} + (0.75 \cdot 3.46 \text{ mm})$$

Evaluate Formula 

#### 19) Minor Diameter of External Thread given Height of Fundamental Triangle

Formula 

Formula


$$d_c = d - \left( \frac{17}{12} \cdot H \right)$$

Example with Units

$$24.8983 \text{ mm} = 29.8 \text{ mm} - \left( \frac{17}{12} \cdot 3.46 \text{ mm} \right)$$

Evaluate Formula 

#### 20) Minor Diameter of External Thread given Pitch and Major Diameter of Internal Thread

Formula 

Formula

$$d_c = D - (1.227 \cdot p)$$

Example with Units

$$25.1043 \text{ mm} = 30 \text{ mm} - (1.227 \cdot 3.99 \text{ mm})$$

Evaluate Formula 

#### 21) Minor Diameter of Internal Thread given Height of Fundamental Triangle

Formula 

Formula

$$D_c = D - (1.25 \cdot H)$$


Example with Units

$$25.675 \text{ mm} = 30 \text{ mm} - (1.25 \cdot 3.46 \text{ mm})$$

Evaluate Formula 



## 22) Minor Diameter of Internal Thread given Pitch and Major Diameter of Internal Thread

Formula 

Formula


$$D_c = D - (1.083 \cdot p)$$

Example with Units

$$25.6788 \text{ mm} = 30 \text{ mm} - (1.083 \cdot 3.99 \text{ mm})$$

Evaluate Formula 

## 23) Minor Diameter of Internal Thread given Pitch and Pitch Diameter of Internal Thread

Formula 

Formula

$$D = D_p + (0.650 \cdot p)$$

Example with Units

$$29.9935 \text{ mm} = 27.4 \text{ mm} + (0.650 \cdot 3.99 \text{ mm})$$

Evaluate Formula 

## 24) Nominal Diameter of Bolt Formula

Formula

$$d_b = d_c' + (1.22687 \cdot p_b)$$

Example with Units

$$10.0336 \text{ mm} = 8.5 \text{ mm} + (1.22687 \cdot 1.25 \text{ mm})$$

Evaluate Formula 

## 25) Nominal Diameter of Bolt given Core Diameter Formula

Formula

$$d_b = \frac{d_c'}{0.8}$$

Example with Units

$$10.625 \text{ mm} = \frac{8.5 \text{ mm}}{0.8}$$

Evaluate Formula 

## 26) Pitch Diameter of External Thread given Height of Fundamental Triangle Formula

Formula

$$d_p = d - (0.75 \cdot H)$$

Example with Units

$$27.205 \text{ mm} = 29.8 \text{ mm} - (0.75 \cdot 3.46 \text{ mm})$$

Evaluate Formula 

## 27) Pitch Diameter of External Thread given Pitch Formula

Formula

$$d_p = d - (0.650 \cdot p)$$

Example with Units

$$27.2065 \text{ mm} = 29.8 \text{ mm} - (0.650 \cdot 3.99 \text{ mm})$$

Evaluate Formula 

## 28) Pitch Diameter of Internal Thread given Height of Fundamental Triangle Formula

Formula

$$D_p = D - (0.75 \cdot H)$$

Example with Units

$$27.405 \text{ mm} = 30 \text{ mm} - (0.75 \cdot 3.46 \text{ mm})$$

Evaluate Formula 

## 29) Pitch Diameter of Internal Thread given Pitch Formula

Formula

$$D_p = D - (0.650 \cdot p)$$

Example with Units

$$27.4065 \text{ mm} = 30 \text{ mm} - (0.650 \cdot 3.99 \text{ mm})$$

Evaluate Formula 



### 30) Pitch of bolt thread Formula

Formula

$$p_b = \frac{d_b - d_c'}{1.22687}$$

Example with Units

$$1.2226\text{mm} = \frac{10\text{mm} - 8.5\text{mm}}{1.22687}$$

Evaluate Formula 

### 31) Pitch of Screw Threads given Radius of Root Formula

Formula

$$p = \frac{r}{0.137329}$$

Example with Units

$$2.9127\text{mm} = \frac{0.4\text{mm}}{0.137329}$$

Evaluate Formula 

### 32) Pitch of Threads given Height of Basic Profile Formula

Formula

$$p = \frac{h}{0.640327}$$

Example with Units

$$3.9823\text{mm} = \frac{2.55\text{mm}}{0.640327}$$

Evaluate Formula 

### 33) Pitch of Threads given Height of Fundamental Triangle Formula

Formula

$$p = \frac{H}{0.960491}$$

Example with Units

$$3.6023\text{mm} = \frac{3.46\text{mm}}{0.960491}$$

Evaluate Formula 

### 34) Pitch of Threads given Major Diameter of Internal Thread Formula

Formula

$$p = \frac{D - d_c}{1.227}$$

Example with Units

$$4.1646\text{mm} = \frac{30\text{mm} - 24.89\text{mm}}{1.227}$$

Evaluate Formula 

### 35) Pitch of Threads given Minor Diameter of Internal Thread Formula

Formula

$$p = \frac{D - D_c}{1.083}$$

Example with Units

$$3.9982\text{mm} = \frac{30\text{mm} - 25.67\text{mm}}{1.083}$$

Evaluate Formula 

### 36) Pitch of Threads given Pitch Diameter of External Thread Formula

Formula

$$p = \frac{d - d_p}{0.650}$$

Example with Units

$$4\text{mm} = \frac{29.8\text{mm} - 27.2\text{mm}}{0.650}$$

Evaluate Formula 

### 37) Pitch of Threads given Pitch Diameter of Internal Thread Formula

Formula

$$p = \frac{D - D_p}{0.650}$$

Example with Units

$$4\text{mm} = \frac{30\text{mm} - 27.4\text{mm}}{0.650}$$

Evaluate Formula 



### 38) Radius of Root of Threads Formula

Formula

$$r = 0.137329 \cdot p$$

Example with Units

$$0.5479_{\text{mm}} = 0.137329 \cdot 3.99_{\text{mm}}$$




Evaluate Formula 



## Variables used in list of Fastner Geometry Formulas above

- **d** Major Diameter of External Thread (Millimeter)
- **D** Major Diameter of Internal Thread (Millimeter)
- **d<sub>b</sub>** Nominal Diameter of Threaded Bolt (Millimeter)
- **d<sub>c</sub>** Minor Diameter of External Thread (Millimeter)
- **d<sub>c</sub>'** Core Diameter of Threaded Bolt (Millimeter)
- **D<sub>c</sub>** Minor Diameter of Internal Thread (Millimeter)
- **d<sub>p</sub>** Pitch Diameter of External Thread (Millimeter)
- **D<sub>p</sub>** Pitch Diameter of Internal Thread (Millimeter)
- **h** Height of Basic Profile (Millimeter)
- **H** Height of Fundamental Triangle (Millimeter)
- **h<sub>n</sub>** Height of Nut (Millimeter)
- **p** Pitch of Threads (Millimeter)
- **P** Tensile Force on Bolt (Newton)
- **p<sub>b</sub>** Pitch of Bolt Threads (Millimeter)
- **r** Radius of Root of Thread (Millimeter)
- **σ<sub>t</sub>** Tensile Stress in Bolt (Newton per Square Millimeter)
- **τ** Shear Stress in Bolt (Newton per Square Millimeter)

## Constants, Functions, Measurements used in list of Fastner Geometry 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: Force** in Newton (N)  
*Force Unit Conversion* 
- **Measurement: Stress** in Newton per Square Millimeter (N/mm²)  
*Stress Unit Conversion* 



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