How to Calculate Axial elongation of prismatic bar due to external load?

Axial elongation of prismatic bar due to external load calculator uses *elongation = Load*Length of Rod/(Area*Elastic Modulus)* to calculate the Elongation, Axial elongation of prismatic bar due to external load is product of length of rod and the ratio of stress to elastic modulus. Elongation is denoted by **Δ** symbol.

How to calculate Axial elongation of prismatic bar due to external load using this online calculator? To use this online calculator for Axial elongation of prismatic bar due to external load, enter Load **(W)**, Length of Rod **(l)**, Area **(A)** & Elastic Modulus **(E)** and hit the calculate button. Here is how the Axial elongation of prismatic bar due to external load calculation can be explained with given input values -> **0.8 = 1000*2/(50*50)**.

What is Axial elongation of prismatic bar due to external load?

Axial elongation of prismatic bar due to external load is product of length of rod and the ratio of stress to elastic modulus and is represented as $\Delta = W*l/(A*E)$ or *elongation = Load*Length of Rod/(Area*Elastic Modulus)*. Load is the instantaneous load applied perpendicular to the specimen cross section, The length of the rod is defined as the total length of the conducting rod, The area is the amount of two-dimensional space taken up by an object & The Elastic Modulus is the ratio of Stress to Strain.

Axial elongation of prismatic bar due to external load Formula

elongation = Load*Length of Rod/(Area*Elastic Modulus)

$$\Delta = W*l/(A*E)$$

What is elastic modulus?

Elastic modulus (Young's modulus or modulus of elasticity) Young's modulus describes the relative stiffness of a material, which is measured by the slope of elastic of a stress and strain graph. ... A constant of proportionality will result, which is known as the modulus of elasticity, or Youngs modulus (E).

An **elastic modulus** (also known as **modulus of elasticity**) is a quantity that measures an object or substance's resistance to being deformed elastically (i.e., non-permanently) when a stress is applied to it. The elastic modulus of an object is defined as the slope of its stress–strain curve in the elastic deformation region:[1] A stiffer material will have a higher elastic modulus. An elastic modulus has the form:

$$\delta \stackrel{\text{def}}{=} \frac{\text{stress}}{\text{strain}}$$

where *stress* is the force causing the deformation divided by the area to which the force is applied and *strain* is the ratio of the change in some parameter caused by the deformation to the original value of the parameter. Since strain is a dimensionless quantity, the units of δ will be the same as the units of stress.[2]

Specifying how stress and strain are to be measured, including directions, allows for many types of elastic moduli to be defined. The three primary ones are:

▲VARIABLES USED▲

⏭Load - Load is the instantaneous load applied perpendicular to the specimen cross section. (Measured in Newton)
⏭Length of Rod - The length of the rod is defined as the total length of the conducting rod. (Measured in Meter)
⏭Area - The area is the amount of two-dimensional space taken up by an object. (Measured in Square Meter)
⏭Elastic Modulus - The Elastic Modulus is the ratio of Stress to Strain. (Measured in Newton per Square Meter)

How many ways are there to calculate Elongation?

In this formula, Elongation uses Load, Length of Rod, Area & Elastic Modulus. We can use 10 other way(s) to calculate the same, which is/are as follows -

- youngs_modulus = Load*Elongation/(Area*Initial length)
- maximum_shearing_stress = 1.5*Shearing force/Area
- direct_stress = Axial Thrust/Cross sectional area
- bending_stress = Bending moment*Distance from the Neutral axis/Moment of Inertia
- shearing_stress = (Shearing force*First Moment of Area)/(Moment of Inertia*Thickness)
- factorofsafety = Fracture Stress/Working Stress
- strain_energy_density = 0.5*Principle Stress*Principle Strain
- shear_modulus = Shear Stress/Shear Strain
- shear_stress = 4*Shearing force/3*Area
- torsional_shear_stress = Torque*Radius of Shaft/Polar moment of Inertia