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Temperature Stresses Formulas

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List of 9 Temperature Stresses Formulas

Temperature Stresses

1) Coefficient of Thermal Expansion using Initial and Final Temperature of Water Pipe

Open Calculator

fx $$\alpha = \frac{\sigma_t}{E_{gpa} \cdot (T_f - t_i)}$$

ex $$0.000434^\circ C^{-1} = \frac{1.4 GPa}{200.0 GPa \cdot (22^\circ C - 5.87^\circ C)}$$

2) Coefficient of Thermal Expansion using Temperature Variation in Water Pipe

Open Calculator

fx $$\alpha = \frac{\sigma_t}{E_{gpa} \cdot \Delta t}$$

ex $$0.000434^\circ C^{-1} = \frac{1.4 GPa}{200.0 GPa \cdot 16.12^\circ C}$$

3) Final Temperature of Pipe

Open Calculator

fx $$T_f = \left(\frac{\sigma_t}{E_{gpa} \cdot \alpha} \right) + t_i$$

ex $$21.99903^\circ C = \left(\frac{1.4 GPa}{200.0 GPa \cdot 0.000434^\circ C^{-1}} \right) + 5.87^\circ C$$

4) Initial Temperature of Pipe

Open Calculator

fx $$t_i = T_f - \left(\frac{\sigma_t}{E_{gpa} \cdot \alpha} \right)$$

ex $$5.870968^\circ C = 22^\circ C - \left(\frac{1.4 GPa}{200.0 GPa \cdot 0.000434^\circ C^{-1}} \right)$$

5) Modulus of Elasticity of Pipe Material

Open Calculator

fx $$E_{gpa} = \frac{\sigma_t}{\alpha \cdot \Delta t}$$

ex $$200.1121 GPa = \frac{1.4 GPa}{0.000434^\circ C^{-1} \cdot 16.12^\circ C}$$

6) Modulus of Elasticity of Pipe Material using Initial and Final Temperature

Open Calculator

fx $$E_{gpa} = \frac{\sigma_t}{\alpha \cdot (T_f - t_i)}$$

ex $$199.988 GPa = \frac{1.4 GPa}{0.000434^\circ C^{-1} \cdot (22^\circ C - 5.87^\circ C)}$$

7) Temperature Stress using Initial and Final Temperature

Open Calculator

fx $$\sigma_t = E_{gpa} \cdot \alpha \cdot (T_f - t_i)$$

ex $$1.400084 GPa = 200.0 GPa \cdot 0.000434^\circ C^{-1} \cdot (22^\circ C - 5.87^\circ C)$$

8) Temperature Stress using Temperature Variation in Water Pipe

Open Calculator

fx $$\sigma_t = E_{gpa} \cdot \alpha \cdot \Delta t$$

ex $$1.399216\text{GPa} = 200.0\text{GPa} \cdot 0.000434\,^\circ\text{C}^{-1} \cdot 16.12\,^\circ\text{C}$$

9) Temperature Variation using Thermal Stress Developed in Pipes

Open Calculator

fx $$\Delta t = \frac{\sigma_t}{E_{gpa} \cdot \alpha}$$

ex $$16.12903\,^\circ\text{C} = \frac{1.4\text{GPa}}{200.0\text{GPa} \cdot 0.000434\,^\circ\text{C}^{-1}}$$

Variables Used

- E_{gpa} Modulus of Elasticity in Gpa *(Gigapascal)*
- T_f Final Temperature *(Celsius)*
- t_i Initial Temperature *(Celsius)*
- α Coefficient of Thermal Expansion *(Per Degree Celsius)*
- Δt Change in Temperature *(Degree Celsius)*
- σ_t Thermal Stress *(Gigapascal)*

Constants, Functions, Measurements used

- Measurement: **Temperature** in Celsius (°C)
  Temperature Unit Conversion
- Measurement: **Temperature Difference** in Degree Celsius (°C)
  Temperature Difference Unit Conversion
- Measurement: **Temperature Coefficient of Resistance** in Per Degree Celsius ($°C^{-1}$)
  Temperature Coefficient of Resistance Unit Conversion
- Measurement: **Stress** in Gigapascal (GPa)
  Stress Unit Conversion

Check other formula lists

- **Internal Water Pressure Formulas**
- **Stresses at Bends Formulas**
- **Stresses Due to External Loads Formulas**
- **Temperature Stresses Formulas**

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