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Butt Welds Formulas

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List of 16 Butt Welds Formulas

Butt Welds

1) Average Tensile Stress in Butt Weld

Open Calculator

fx $$\sigma_t = \frac{P}{L \cdot h_t}$$

ex $$56.41026\text{N/mm}^2 = \frac{16.5\text{kN}}{19.5\text{mm} \cdot 15\text{mm}}$$

2) Efficiency of Butt Welded Joint

Open Calculator

fx $$\eta = \frac{P}{\sigma_t \cdot t_p \cdot L}$$

ex $$0.833485 = \frac{16.5\text{kN}}{56.4\text{N/mm}^2 \cdot 18\text{mm} \cdot 19.5\text{mm}}$$

3) Inner Diameter of Boiler given Thickness of Welded Boiler Shell

Open Calculator

fx $$D_i = t \cdot 2 \cdot \frac{\sigma_{t\ \text{boiler}}}{P_i}$$

ex $$1400\text{mm} = 30\text{mm} \cdot 2 \cdot \frac{105\text{N/mm}^2}{4.5\text{MPa}}$$

4) Internal Pressure in Boiler given Thickness of Welded Boiler Shell

Open Calculator

fx $$P_i = t \cdot 2 \cdot \frac{\sigma_{t\ boiler}}{D_i}$$

ex $$4.5\text{MPa} = 30\text{mm} \cdot 2 \cdot \frac{105\text{N/mm}^2}{1400\text{mm}}$$

5) Length of Butt Weld given Average Tensile Stress in Weld

Open Calculator

fx $$L = \frac{P}{\sigma_t \cdot h_t}$$

ex $$19.50355\text{mm} = \frac{16.5\text{kN}}{56.4\text{N/mm}^2 \cdot 15\text{mm}}$$

6) Length of Butt Weld given Efficiency of Welded Joint

Open Calculator

fx $$L = \frac{P}{\sigma_t \cdot t_p \cdot \eta}$$

ex $$19.51135\text{mm} = \frac{16.5\text{kN}}{56.4\text{N/mm}^2 \cdot 18\text{mm} \cdot 0.833}$$

7) Permissible Tensile Stress in Butt Weld

Open Calculator

fx $$\sigma_t = \frac{P}{L \cdot t_p}$$

ex $$47.00855\text{N/mm}^2 = \frac{16.5\text{kN}}{19.5\text{mm} \cdot 18\text{mm}}$$

8) Permissible Tensile Stress in Butt Weld given Efficiency of Welded joint

Open Calculator

fx $$\sigma_t = \frac{P}{t_p \cdot L \cdot \eta}$$

ex $$56.43283\text{N/mm}^2 = \frac{16.5\text{kN}}{18\text{mm} \cdot 19.5\text{mm} \cdot 0.833}$$

9) Strength of Butt Welded Joint

Open Calculator

fx $$\sigma_t = \frac{P}{h_t \cdot L}$$

ex $$56.41026\text{N/mm}^2 = \frac{16.5\text{kN}}{15\text{mm} \cdot 19.5\text{mm}}$$

10) Tensile Force on Butt Welded Plates given Thickness of Plate

Open Calculator

fx $$P = \sigma_t \cdot L \cdot h_t$$

ex $$16.497\text{kN} = 56.4\text{N/mm}^2 \cdot 19.5\text{mm} \cdot 15\text{mm}$$

11) Tensile Force on Plates given Average Tensile Stress in Butt Weld

Open Calculator

fx $$P = \sigma_t \cdot h_t \cdot L$$

ex $$16.497\text{kN} = 56.4\text{N/mm}^2 \cdot 15\text{mm} \cdot 19.5\text{mm}$$

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12) Tensile Force on Plates given Efficiency of Butt Welded Joint

Open Calculator

fx $$P = \sigma_t \cdot t_p \cdot L \cdot \eta$$

ex $$16.4904\text{kN} = 56.4\text{N/mm}^2 \cdot 18\text{mm} \cdot 19.5\text{mm} \cdot 0.833$$

13) Tensile Stress in Boiler Butt Weld given Thickness of Boiler Shell

Open Calculator

fx $$\sigma_{t\ \text{boiler}} = P_i \cdot \frac{D_i}{2 \cdot t}$$

ex $$105\text{N/mm}^2 = 4.5\text{MPa} \cdot \frac{1400\text{mm}}{2 \cdot 30\text{mm}}$$

14) Thickness of Plate given Efficiency of Butt Welded Joint

Open Calculator

fx $$t_p = \frac{P}{\sigma_t \cdot L \cdot \eta}$$

ex $$18.01048\text{mm} = \frac{16.5\text{kN}}{56.4\text{N/mm}^2 \cdot 19.5\text{mm} \cdot 0.833}$$

15) Thickness of Welded Boiler Shell given Stress in Weld

Open Calculator

fx $$t = P_i \cdot \frac{D_i}{2 \cdot \sigma_{t\ \text{boiler}}}$$

ex $$30\text{mm} = 4.5\text{MPa} \cdot \frac{1400\text{mm}}{2 \cdot 105\text{N/mm}^2}$$

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16) Throat of Butt Weld given Average Tensile Stress

Open Calculator

fx $$h_t = \frac{P}{L \cdot \sigma_t}$$

ex $$15.00273\text{mm} = \frac{16.5\text{kN}}{19.5\text{mm} \cdot 56.4\text{N/mm}^2}$$

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Variables Used

- **D_i** Inner diameter of boiler *(Millimeter)*
- **h_t** Throat Thickness of Weld *(Millimeter)*
- **L** Length of Weld *(Millimeter)*
- **P** Tensile Force on Welded Plates *(Kilonewton)*
- **P_i** Internal pressure in boiler *(Megapascal)*
- **t** Thickness of Boiler Wall *(Millimeter)*
- **t_p** Welded Base Plate Thickness *(Millimeter)*
- **η** Efficiency of Welded Joints
- **$\sigma_{t\ boiler}$** Tensile Stress in Boiler Butt Weld *(Newton per Square Millimeter)*
- **σ_t** Tensile Stress in Weld *(Newton per Square Millimeter)*

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Constants, Functions, Measurements used

- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Pressure** in Megapascal (MPa)
  Pressure Unit Conversion
- Measurement: **Force** in Kilonewton (kN)
  Force Unit Conversion
- Measurement: **Stress** in Newton per Square Millimeter (N/mm²)
  Stress Unit Conversion

Check other formula lists

- **Butt Welds Formulas**
- **Parallel Fillet Welds Formulas**
- **Transverse Fillet Weld Formulas**

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