Butt Welds Formulas...





Butt Welds Formulas

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List of 16 Butt Welds Formulas

Butt Welds M

1) Average Tensile Stress in Butt Weld

$$\sigma_{
m t} = rac{
m P}{
m L \cdot h_{
m t}}$$

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

2) Efficiency of Butt Welded Joint 6

 $\eta = rac{\mathbf{P}}{\sigma_{\mathrm{t}} \cdot \mathbf{t_{\mathrm{n}}} \cdot \mathbf{L}}$

 $0.833485 = rac{16.5 ext{kN}}{56.4 ext{N/mm}^2 \cdot 18 ext{mm} \cdot 19.5 ext{mm}}$

$$0.833485 = \frac{10.5 \text{KW}}{56.4 \text{N/mm}^2 \cdot 18 \text{mm} \cdot 19.5 \text{mm}}$$

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

$$D_{i} = t \cdot 2 \cdot rac{\sigma_{t \; \mathrm{boiler}}}{P_{i}}$$

 $ag{1400} ext{mm} = 30 ext{mm} \cdot 2 \cdot rac{105 ext{N/mm}^2}{4.5 ext{MPa}}$





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

 $\left| \mathbf{F}_{i} = \mathbf{t} \cdot 2 \cdot rac{\sigma_{ ext{t boiler}}}{D_{i}}
ight|$

Open Calculator 🚰

 $oxed{ex} 4.5 ext{MPa} = 30 ext{mm} \cdot 2 \cdot rac{105 ext{N/mm}^2}{1400 ext{mm}}$

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

 \mathbf{f} $\mathbf{L} = rac{\mathbf{P}}{\mathbf{\sigma_t} \cdot \mathbf{h_t}}$

Open Calculator

 $ext{19.50355mm} = rac{16.5 ext{kN}}{56.4 ext{N/mm}^2 \cdot 15 ext{mm}}$

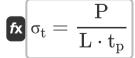
6) Length of Butt Weld given Efficiency of Welded Joint

 \mathbf{f} $\mathbf{L} = rac{\mathbf{P}}{\mathbf{\sigma_t} \cdot \mathbf{t_p} \cdot \mathbf{\eta}}$

Open Calculator 🗗

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

7) Permissible Tensile Stress in Butt Weld



Open Calculator

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



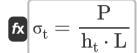
8) Permissible Tensile Stress in Butt Weld given Efficiency of Welded joint

$$\sigma_{
m t} = rac{
m P}{
m t_p \cdot L \cdot \eta}$$

Open Calculator

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

9) Strength of Butt Welded Joint



Open Calculator

$$ext{ex} \left[56.41026 ext{N} / ext{mm}^2 = rac{16.5 ext{kN}}{15 ext{mm} \cdot 19.5 ext{mm}}
ight]$$

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



Open Calculator 🚰

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

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

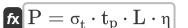
fx
$$P = \sigma_t \cdot h_t \cdot L$$

Open Calculator

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



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

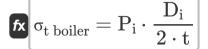


Open Calculator 🚰

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

10.4304kiv = 50.41v/iiiii × 10iiiiii × 13.5iiiiii × 0.055

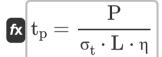




Open Calculator

 $extbf{ex} 105 ext{N/mm}^2 = 4.5 ext{MPa} \cdot rac{1400 ext{mm}}{2 \cdot 30 ext{mm}}$

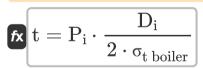
14) Thickness of Plate given Efficiency of Butt Welded Joint



Open Calculator

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

15) Thickness of Welded Boiler Shell given Stress in Weld



Open Calculator

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



16) Throat of Butt Weld given Average Tensile Stress 🛂



Open Calculator

$$\mathbf{h}_{\mathrm{t}} = rac{\mathrm{P}}{\mathrm{L} \cdot \mathbf{\sigma}_{\mathrm{t}}}$$

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



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)
- Pi Internal pressure in boiler (Megapascal)
- **t** Thickness of Boiler Wall (Millimeter)
- t_p Welded Base Plate Thickness (Millimeter)
- η Efficiency of Welded Joints
- σ_{t boiler} Tensile Stress in Boiler Butt Weld (Newton per Square Millimeter)
- σ_t Tensile Stress in Weld (Newton per Square Millimeter)





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





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

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