Single-V Butt Weld Metal Volume and Mass

Weld metal cross-section and mass of a single-V butt weld from plate thickness, included angle, root gap, root face and reinforcement, with consumables.

Method: Groove geometry: root gap rectangle plus the two bevel triangles; (t − f)² tan(α/2)

Input parameters

Unit system: SI

Parameter	Value	Unit
Plate thickness	12.000	mm
Included groove angle	60.000	°
Root gap	2.0000	mm
Root face	1.5000	mm
Reinforcement allowance (share of the groove)	10.000	%
Weld length	20.000	m
Weld metal density	7,850.0	kg/m³
Deposition efficiency	60.000	%

Calculated results

Parameter	Value	Unit
Weld cross-section	96.418	mm²
Weld metal deposited	15.138	kg
Consumables needed	25.229	kg

Formula and method

$$A = \left[g t + (t - f)^2 \tan\frac{\alpha}{2} \right] (1 + k_r)$$

Variables

t	Plate thickness	m
α	Included groove angle	rad
g	Root gap	m
f	Root face	m
k_r	Reinforcement allowance (share of the groove)	-
L	Weld length	m
ρ	Weld metal density	kg/m³
η_d	Deposition efficiency	-
A	Weld cross-section	m²
m_w	Weld metal deposited	kg
m_c	Consumables needed	kg

Method and standards

Geometry.

Assumptions and limits

- Single-V, no backing.

References

- Groove geometry: root gap rectangle plus the two bevel triangles
- (t − f)² tan(α/2)

Report details

Report reference	FCC-13T4-S3ST (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/materials/welding/weld-metal-vgroove

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.