

Spot Welding Best Practices Cheat Sheet

Heat input, parameters, spacing, thickness and testing

ENGINEERING
CHEAT SHEET

Key equations

Quantity	Equation	Notes
Resistance heating	$Q = I^2 R t$	Heat (J) from current, interface resistance and weld time
Most sensitive parameter	Current (squared in Q)	Then electrode force and weld time
Weld time unit	1 cycle $\approx 1/60$ s	On 60 Hz power
Spot spacing (multi-row)	$\approx 5 \times \text{nugget diameter}$	Avoids overlapping heat-affected zones
Thickness ratio limit	$t_{\text{thick}} / t_{\text{thin}} \leq 5 : 1$	Same-thickness attachments preferred
Tab projection	$\approx 2/3 \times \text{mating stock thickness (T2)}$	Slot and tab alignment feature
Typical tab/slot W	4, 12, 15 mm	Slot can be tighter if positioning is critical
Weld gun throat depth	250 to 750 mm	Plan clearance for gun, operator, light curtains

Key takeaways

- Three core parameters: current, electrode force, weld time. Start from the equipment maker's values or validate on scrap.
- Preferred pairings: low carbon to low carbon, stainless to stainless, low carbon to stainless, chemically cleaned aluminum to aluminum.
- Plated steel (except chromium) can be spot welded; plating may shorten electrode life. Anodize aluminum after welding.
- Tests: peel (nugget button), tensile-shear (max shear load), cross-section (nugget size, porosity, cracks), visual (spatter, indentation).
- Semi-perforations: use hole-and-slot, not hole-to-hole, to avoid tighter tolerances and extra cost.
- The shear-strength tables by material and thickness are images in the post; use them for values.
- Conflict to resolve: this post gives a 5:1 thickness ratio limit, while the automotive spot welding post gives 3:1.

Semi-perf and mating feature sizes as listed in the post (mm)

Stock T, over-thru	Value 1	Value 2
0.8 - 1.2	3	3.1
1.2 - 2	4	4.1
2 - 3	5	5.1