ACE Hardware Zimbabwe

Welding Reference Chart

Electrode codes, which rod for which job, current settings, shielding gases, tungstens, lens shades and weld symbols.

Workshop Reference Charts
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Stick electrodes

Reading an AWS A5.1 / A5.5 stick electrode code

Part	Example E7018	Meaning
E	E	Electrode for arc welding
First 2 (or 3) digits	70	Minimum tensile strength in ksi: 60 = 60 000 psi (414 MPa), 70 = 70 000 psi (483 MPa)
Next digit	1	Welding position: 1 = all positions, 2 = flat and horizontal fillet only, 4 = all including vertical-down
Last two digits	18	Coating type and current (see table)

Coating and current (last two digits)

Ending	Coating	Current	Character
10	High cellulose, sodium	DC+	Deep, forceful arc; root runs and pipe
11	High cellulose, potassium	AC or DC+	Like 10 but runs on AC sets
12	High titania (rutile), sodium	AC or DC−	Medium penetration, bridges poor fit-up
13	High titania (rutile), potassium	AC or DC±	Soft, easy arc; neat finish on light work
14	Rutile + iron powder	AC or DC±	Faster deposition than 13
15	Low hydrogen, sodium	DC+	Crack-resistant welds
16	Low hydrogen, potassium	AC or DC+	Crack-resistant welds on AC
18	Low hydrogen, potassium + iron powder	AC or DC+	Structural and pressure work; keep rods dry
20	High iron oxide	AC or DC±	Flat and horizontal fillets
24	Rutile + iron powder (heavy)	AC or DC±	Fast flat fillets
27	Iron oxide + iron powder	AC or DC±	High deposition, flat position
28	Low hydrogen + iron powder (heavy)	AC or DC+	Fast low-hydrogen flat fillets

Choosing and setting up

Which rod for which job

Electrode	Best for	Watch out for
E6010 / E6011	Root passes, rusty or dirty steel, pipe	Rough finish; needs skill
E6013	General light fabrication, sheet, gates, repairs	Not for crack-sensitive or high-strength steel
E7018	Structural steel, heavier sections, anything load-bearing	Must be kept dry (rod oven); hard to strike when damp
E7024	Long flat or horizontal fillets fast	Flat and horizontal only
E308L-16	304 / 304L stainless	Use E316L for 316 / marine
E309L-16	Joining stainless to mild steel	-
ENiFe-CI	Cast iron repairs, cast iron to steel	Weld short runs, peen, cool slowly

Stick welding current (guide)

Rod dia. mm	E6013 amps	E7018 amps	Typical plate mm
2.0	40 - 70	-	1.5 - 3
2.5	60 - 95	70 - 100	2 - 5
3.2	90 - 130	100 - 140	3 - 8
4.0	120 - 180	140 - 190	6 - 12
5.0	160 - 230	190 - 260	10 +

MIG wire size (guide)

Wire dia. mm	Amps	Steel thickness mm
0.6	30 - 90	0.6 - 2
0.8	40 - 150	0.8 - 4
0.9	50 - 180	1 - 5
1.0	70 - 220	2 - 8
1.2	120 - 300	4 +

> Rule of thumb for stick welding: about **40 A per mm** of rod diameter. Start in the middle of the range and adjust: too cold leaves a tall, narrow bead that sits on top; too hot undercuts and spatters.

Gas, tungsten and safety

Shielding gas

Process / metal	Shielding gas	Notes
MIG - mild steel	Argon + 15-20% CO_2	General purpose, low spatter
MIG - mild steel	100% CO_2	Deep penetration, cheaper, more spatter
MIG - stainless	Argon + 2% CO_2 (or tri-mix)	Avoid high CO_2
MIG - aluminium	100% argon	Use a spool gun or Teflon liner
TIG - all metals	100% argon	Typical flow 8 - 15 L/min
Flux-cored (gasless)	None	Good outdoors in wind

TIG tungsten electrodes

Tungsten (ISO 6848)	Tip colour	Use
WP pure	Green	AC aluminium on older transformer sets
WC20 2% ceriated	Grey	AC/DC, good low-amp starts
WL15 1.5% lanthanated	Gold	AC/DC all-rounder
WL20 2% lanthanated	Blue	AC/DC all-rounder
WT20 2% thoriated	Red	DC steel and stainless (slightly radioactive: extract grinding dust)
WZ8 0.8% zirconiated	White	AC aluminium, holds a balled tip

Lens shade (guide)

Process	Current	Filter shade
Stick (MMA)	40 - 80 A	10
	80 - 175 A	11
	175 - 300 A	12
	over 300 A	13
MIG / MAG	up to 100 A	10
	100 - 175 A	11
	175 - 300 A	12
TIG	up to 50 A	10
	50 - 150 A	11
	150 - 250 A	12
Gas welding / brazing	-	4 - 6

> Start with a darker lens and go lighter only until the weld pool is clearly visible. Always weld with ventilation or extraction, especially on galvanised, painted or stainless material.

Weld symbols - the basics

Symbol	Means
Triangle	Fillet weld; the number in front is the leg size (AWS) or throat *a* / leg *z* (ISO 2553)
Two parallel lines	Square butt weld
V	Single-V butt weld
Half V (one vertical side)	Single-bevel butt weld
U / J shape	U or J groove
Circle on the arrow junction	Weld all round
Flag	Field (site) weld
Symbol below the line (AWS)	Weld on the arrow side; above the line = other side
Dashed line (ISO)	Symbol on the solid line = arrow side; on the dashed line = other side

Guide values for general workshop use. Always follow the equipment or fastener maker's figure where one is given, and check critical work against the relevant standard.

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