

TIG Filler Rod Selection Guide

Comprehensive Reference for GTAW Filler Metals

Selecting the correct filler rod is critical for producing quality TIG welds. This guide covers the most common filler metals for various base materials, their applications, and key characteristics. Match filler metal composition to base metal whenever possible for optimal results.

Mild and Carbon Steel Filler Rods

Classification	Composition	Applications	Characteristics
ER70S-2	Triple deoxidized	Dirty/rusty steel, galvanized	Best for contaminated metals
ER70S-3	Low silicon	General purpose, sheet metal	Good puddle control
ER70S-6	High silicon/manganese	Most common, general fab	Excellent flow, versatile
ER80S-D2	Low alloy	High strength applications	80-100 ksi tensile strength
ER90S-B3	Chrome-moly	Pressure vessels, pipe	High temperature service

Stainless Steel Filler Rods

Classification	Base Metal Match	Applications	Key Features
ER308L	304, 304L SS	Food service, general fab	Low carbon, prevents sensitization
ER309L	Dissimilar metals	SS to mild steel joints	High crack resistance
ER316L	316, 316L SS	Marine, chemical, medical	Superior corrosion resistance
ER308LSi	304 SS	Autobody, general welding	Improved flow characteristics
ER312	Dissimilar SS grades	High temp, maintenance	Handles thermal expansion
ER410	410, 420 SS	Hardenable stainless	Magnetic, heat treatable

Aluminum Filler Rods

Classification	Base Metal Match	Applications	Characteristics
ER4043	3003, 6061, cast Al	General purpose, extrusions	Best flow, lower melting point
ER5356	5052, 5083, 5086	Marine, structural, high strength	Higher strength welds
ER5183	5052, 5083, 5456	Marine, cryogenic service	Excellent ductility

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ER4047	Brazing applications	Aluminum repair, low temp	Lowest melting point (12% Si)
ER5556	5052, 5083, 5086, 5456	High strength applications	Maximum strength retention
ER1100	1100, 3003 Al	Pure aluminum, thin sheet	Best color match for pure Al

Specialty Filler Rods

Material Type	Classification	Applications	Notes
Cast Iron	RCI-A, RCI-B	Cast iron repair	Preheat usually required
Nickel Alloys	ERNi-1, ERNiCrMo-3	High temp, corrosive env.	Expensive, special storage
Copper	ERCu, ERCuSi-A	Pure copper welding	High heat input required
Bronze	ERCuSn-A, ERCuAl-A2	Bronze/brass repair	Dezincification risk with brass
Titanium	ERTi-2, ERTi-5	Aerospace, medical	Inert atmosphere critical
Magnesium	EZ33A-RA60	Magnesium fabrication	Fire hazard, special precautions

Filler Rod Diameter Selection Guide

General Rule: Filler rod diameter should match or be slightly smaller than material thickness:

- 0.020"-0.050" material → 1/16" (1.6mm) rod
- 0.050"-0.125" material → 3/32" (2.4mm) rod
- 0.125"-0.250" material → 1/8" (3.2mm) rod
- 0.250"-0.500" material → 5/32" or 3/16" rod

Thin Material Exception: Use 1/16" rod for all materials under 1/8" thick for better puddle control.

Filler Rod Storage and Handling

- Store rods in clean, dry location away from moisture and contaminants
- Keep aluminum filler rods in sealed containers to prevent oxidation
- Clean rods with acetone or denatured alcohol before use
- Remove any discoloration or oxidation with stainless steel brush
- Keep different alloys separated to prevent cross-contamination
- Verify rod classification markings before use
- Discard bent or damaged rods to prevent weld defects

Quick Selection Reference

Most Common Choices:

- Mild Steel → ER70S-6 (most versatile)
- Stainless 304 → ER308L
- Stainless 316 → ER316L
- Aluminum 6061 → ER4043 or ER5356
- Dissimilar metals → ER309L
- Dirty/rusty steel → ER70S-2

DISCLAIMER: This information is provided for educational purposes only. Always follow manufacturer guidelines, local codes, and safety regulations. Welding involves significant hazards including burns,

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electric shock, fumes, and fire. Proper training, certification, and safety equipment are essential before attempting any welding operations.

For more welding resources, visit: <https://bestweldinghelmet.net>