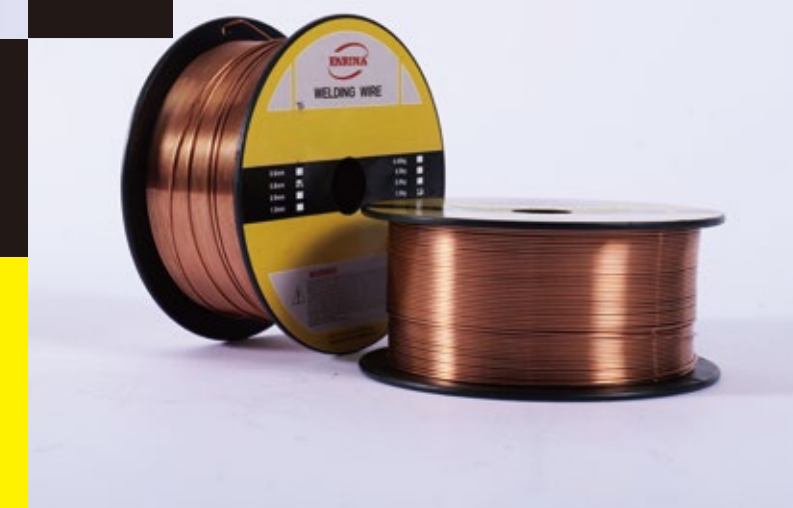




WELDING CONSUMABLES



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FARINA (JINAN) WELDTEC & MACHINERY CO.,LTD



BETTER QUALITY, BETTER SERVICE

COMPANY PROFILE

Farina (Jinan) Weldtec & Machinery Co., Ltd. since1993, is located in the “hot spring city” -- Shanghe County Industrial Park, Shandong Province. After more than 30 years of relentless effort, Farina has grown into a leading provider of welding materials and welding solutions in China. Farina’ s dedication has earned:

- National Specialized and New “Little Giant” Enterprise of China
- Specialized and New Enterprise of Shandong Province
- Manufacturing Champion of Shandong Province.

Farina is a national high-tech enterprise with a professional R&D team. We have established:

- Jinan High-Efficiency Welding Materials Engineering Technology & Research Center
- Shandong Academician Workstation(a specialized research center led by academicians)
- Jinan Academician Workstation(a specialized research center led by academicians)

Farina also cooperates deeply in Producing-Study-Development with:

- School of Materials Science and Engineering, Tianjin University
- School of Materials Science and Engineering, Jiangsu Science and Technology University
- School of Materials Science and Engineering, Shandong Jianzhu University

Farina has obtained ISO 9001/ISO 14001/ISO 45001/GB/T23001/BSCI certificates. Farina’ s products are also certified by ABS/DNV/GL/CCS/CE, ensuring exceptional quality and reliability.

Farina always insists on “Better Quality, Better Service” and engaged to provide customers with a wide range of high-quality welding materials under “**FARINA®**”and “**FLYBUL®**” brands:

- Solid Welding Wire
- Flux Cored Wire
- Hardfacing Welding Wire
- Stainless Steel Welding Wire
- Welding Electrode
- Aluminum Alloy Welding Wire
- Welding Flux

Farina’ s products are widely used in industries such as Shipbuilding, Offshore Engineering, Petrochemical, Automotive, and Power, earning high praise from customers both domestically and internationally. Farina is also a long-term partner of many globally well-known brands. The continuous innovation and technological research make Farina able to satisfy many and various customer requirements.





Specialized and New “Little Giant” Enterprise



High & New Technology Enterprise



Specialized, High-end, and Innovation-driven SME

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► SOLID WIRE



SOLID WIRE

FRN-ER50-6

AWS A5.18 ER70S-6

Introduction:
Strong resistance to surface scales and oil stains on the base metal, and low blowhole sensitivity.

Uses:
Used for welding 500 MPa low alloy steel in single and multi-pass welding, as well as for high-speed thin plates and pipeline steel welding. It is suitable for manual welding, automatic welding, and robot welding, such as in oil machinery, heavy crane machinery, pressure vessels, oil-chemical vessels, shipbuilding, bridges, and construction steel structures, etc.

Typical Chemical Composition of welding wire (%)								
C	Mn	Si	P	S	Cu	Ni	Cr	Mo
0.078	1.45	0.85	0.012	0.010	0.12	0.01	0.02	0.01

Typical Mechanical Properties of The Deposited Metal					
Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test		Shielding Gas
			Temperature(°C)	Impact Energy KV ₂ (J)	
460	570	30	-30°C	64	CO ₂ /75-80%Ar+CO ₂

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm	✓	✓	✓	✓	✓		
Plastic spool 5kg D200mm	✓	✓	✓	✓	✓	✓	
Plastic spool 15kg D270mm	✓	✓	✓	✓	✓	✓	✓
Metal basket 15kg K300mm	✓	✓	✓	✓	✓	✓	✓
Drum packing 100kg		✓	✓	✓	✓	✓	
Drum packing 250kg/350kg		✓	✓	✓	✓	✓	✓

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	✓	✓	✓	✓	✓	✓
TIG/1000mm x 10kg/tube	✓	✓	✓	✓	✓	✓

FRN-ER50-2 / FRN-ER50-3 / FRN-ER50-4

AWS A5.18 ER70S-2
AWS A5.18 ER70S-3
AWS A5.18 ER70S-4

Introduction:
ER70S-2: A solid wire for single-pass and multi-pass welding, suitable for butt or fillet structures made of 450MPa and 500MPa tensile strength steel, particularly for high-speed welding of sheets, such as in automobile manufacturing. It is mainly used for welding high-strength steel structures.
ER70S-3: A CO₂ gas-shielded welding wire with excellent welding performance, smooth and beautiful bead, and fewer spatters. It is used for welding low-carbon steel thin plates and low-carbon steel parts with thorough surface treatment.
ER70S-4: Use CO₂ or Ar+CO₂ (5%-20%) as shielding gas. It has excellent welding performance and good one-time shaping performance. When used in argon-rich mixed gas arc welding, the bead is delicate and beautiful. It is used for welding sheet metal and thin plates, as well as steel pipes.

Typical Chemical Composition of welding wire (%)											
AWS	C	Mn	Si	P	S	Ni	Cr	Mo	Al	Ti	Zr
ER70S-2	0.05	1.20	1.60	0.016	0.010	0.20	0.08	0.11	0.07	0.10	0.06
ER70S-3	0.078	1.09	0.67	0.005	0.004	0.01	0.01	0.01	0.12	0.12	0.07
ER70S-4	0.11	1.11	0.72	0.016	0.013	0.022	0.022	0.007	-	-	-

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER70S-2	475	550	32	-30	80	CO ₂
ER70S-3	435	525	28	-30	90	
ER70S-4	425	540	29	-30	75	CO ₂ /Ar+CO ₂ (5%-20%)

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm	✓	✓	✓	✓	✓		
Plastic spool 5kg D200mm	✓	✓	✓	✓	✓	✓	
Plastic spool 15kg D270mm	✓	✓	✓	✓	✓	✓	✓
Metal basket 15kg K300mm	✓	✓	✓	✓	✓	✓	✓
Drum packing 100kg		✓	✓	✓	✓	✓	
Drum packing 250kg/350kg		✓	✓	✓	✓	✓	✓

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	✓	✓	✓	✓	✓	✓
TIG/1000mm x 10kg/tube	✓	✓	✓	✓	✓	✓

SOLID WIRE



SOLID WIRE

FRN-ER50-G/FRN-ER55-G
FRN-ER60-G/FRN-ER70-G/FRN-ER80-G

Introduction:

ER70S-G: Enhanced welding current and efficiency, suitable for 500MPa structural steel, thick plates, and pipelines.
ER80S-G: Argon-rich, excellent welds, resistant to corrosion and cracks, used for 500MPa weathering-resistant structures like vehicles and bridges.
ER90S-G: 600MPa high toughness, all-position welding, used for high strength steel structures like machinery and ships.
ER100S-G: 700MPa NiMo type, stable arc, fewer spatters, used for high strength structures like construction and hoisting machinery.
ER110S-G: High strength, soft arc, high impact toughness, used for 790MPa structures like pressure vessels and mining machinery.

Typical Chemical Composition of welding wire (%)										
AWS	C	Mn	Si	P	S	Cu	Ti	Mo	Ni	Cr
ER70S-G	0.053	1.50	0.86	0.013	0.013	-	0.14	0.01	0.02	0.03
ER80S-G	0.105	1.00	0.60	0.010	0.05	0.050	-	0.50	0.03	1.25
ER90S-G	0.075	1.57	0.57	0.015	0.05	-	-	0.39	0.89	0.04
ER100S-G	0.053	1.58	0.34	0.009	0.014	-	-	0.29	1.73	0.04
ER110S-G	0.054	1.65	0.30	0.008	0.008	-	-	0.31	2.25	0.03

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ _s (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER70S-G	470	560	29	-40	78	CO ₂ /175%-80%Ar+CO ₂
ER80S-G	489	609	26.5	-30	172	98%Ar+ 2%O ₂
ER90S-G	648	714	23	-40	90	80%Ar+ 20%CO ₂
ER100S-G	665	745	20	-50	87	98%Ar+ 2%O ₂
ER110S-G	690	810	19	-50	82	

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm	√	√	√	√	√		
Plastic spool 5kg D200mm	√	√	√	√	√	√	
Plastic spool 15kg D270mm	√	√	√	√	√	√	√
Metal basket 15kg K300mm	√	√	√	√	√	√	√
Drum packing 100kg		√	√	√	√	√	
Drum packing 250kg/350kg		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

AWS A5.18 ER70S-G
AWS A5.28 ER80S-G
AWS A5.28 ER90S-G
AWS A5.28 ER100S-G
AWS A5.28 ER110S-G

FRN-H08A / FRN-H08MnA / FRN-EM12K
FRN-H10MnSi / FRN-H10Mn2 / FRN-EH12K

Introduction:

EL12: Low-manganese, low-silicon wire, excellent bead molding, used with fluxes HJ431, SJ301, SJ501 for high-speed and filling welding on 50kg class metals.
EM12: Medium-manganese, medium-silicon wire, excellent bead molding, used with fluxes HJ350, SJ101 for high-speed and filling welding on 50kg class metals.
EM12K: For 450MPa-500MPa structures like boilers and ships. Requires clean base metal and baked flux.
EM13K: Appropriate manganese and silicon content, high welding efficiency, used with fluxes SJ301, SJ101 for boilers, pressure vessels, bridges, and ships.
EH14: High-manganese wire, excellent bead molding, used with fluxes HJ350, SJ101 for high-speed and filling welding on 50kg class metals. Stable mechanical properties.
EH12K: For 450MPa-500MPa carbon steel or low alloy steel structures like boiler, bridges and pressure vessels.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	P	S	Cu	Ni	Cr
EL12	0.07	0.40	0.018	0.014	0.011	0.10	-	-
EM12	0.066	0.88	0.022	0.010	0.013	0.075	0.021	0.02
EM12K	0.056	1.30	0.30	0.020	0.010	0.050	0.010	0.025
EM13K	0.089	1.01	0.61	0.06	0.016	0.110	-	-
EH14	0.013	1.87	0.05	0.013	0.011	0.020	0.015	0.018
EH12K	0.084	1.84	0.65	0.020	0.009	0.046	0.021	0.020

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ _s (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
EL12	360	450	29	-20	80
EM12	360	480	31	-20	110
EM12K	420	510	31	-20	145
EM13K	425	535	32	-20	110
EH14	440	530	30	-20	150
EH12K	450	590	26	-20	85

Packing terms					
Diameter	2.0mm	2.4mm	3.2mmn	4.0mm	4.8mm
Small coil (Inner Dia 300mm) 25kg	√	√	√	√	√
Large coil (Inner Dia 550mm,630mm) 100kg,150kg,200kg,250kg,350kg	√	√	√	√	√
Metal spool (Inner Dia 300mm) 25kg	√	√	√	√	√

SOLID WIRE

AWS A5.17 EL12 AWS A5.17 EM12
AWS A5.17 EM12K AWS A5.17 EM13K
AWS A5.17 EH14 AWS A5.17 EH12K

► SOLID WIRE (Nickel Alloy Welding Wire)

SOLID WIRE

FRN- ERNi-1 / FRN- ERNiCu-7 / FRN- ERNiCr-3 FRN- ERNiCrMo-3 / FRN- ERNiCrMo-4

Introduction:

ERNi-1: A nickel welding wire with the chemical composition code NiTi3. It has excellent welding performance, beautiful weld formation, and excellent comprehensive mechanical properties. Mainly used for welding industrial pure nickel.

ERNiCu-7: A nickel-copper alloy welding wire with the chemical composition code NiCu30Mn3Ti. The presence of sufficient titanium effectively controls welding porosity. Mainly used for welding alloys such as ASTM B127, B163, B164, and B165.

ERNiCr-3: A nickel welding wire with the chemical composition code NiCr20Mn3. It has excellent welding performance, beautiful weld formation, and excellent comprehensive mechanical properties. Mainly used for welding nickel-based alloys and dissimilar steels.

ERNiCrMo-3: A nickel-based alloy welding wire with the chemical composition code NiCr22Mo9Nb. It has excellent welding performance, beautiful weld formation, and excellent comprehensive mechanical properties. Mainly used for welding nickel-based alloys and dissimilar steels.

ERNiCrMo-4: A nickel-based alloy welding wire with the chemical composition code NiCr15Mo15Fe6W4. It has excellent welding performance, beautiful weld formation, and excellent mechanical properties, as well as resistance to pitting, stress corrosion, and high-temperature oxidation. Mainly used for welding HASTELLOY C-276 and other nickel-based alloys, and can also be used for surfacing carbon steel.

Typical Chemical Composition of welding wire (%)												
AWS	C	Mn	Fe	P	S	Si	Ni	Cu	Ti	Al	Cr	other
ERNi-1	0.04	0.60	0.60	0.01	0.005	0.30	94.9	0.01	3.00	0.10	-	-
ERNiCu-7	0.006	2.50	1.50	0.003	0.001	1.00	63.00	30.00	1.85	0.65	-	-
ERNiCr-3	0.04	2.80	1.00	0.01	0.01	0.40	72.6	0.10	0.20	-	20.00	Nb:2.50
ERNiCrMo-3	0.03	0.30	3.00	0.01	0.01	0.40	61.6	0.03	0.03	0.10	22.5	Nb:2.50 Mo:8.70
ERNiCrMo-4	0.13	5.40	5.40	0.011	0.008	0.06	57.54	0.03	-	-	15.60	Mo:8.70 Co:0.05 W:3.90 V:0.09

AWS A5.14 ERNi-1
AWS A5.14 ERNiCu-7
AWS A5.14 ERNiCr-3
AWS A5.14 ERNiCrMo-3
AWS A5.14 ERNiCrMo-4

(Copper Alloy Welding Wire)

SOLID WIRE

FRN-CuSi3 / FRN-CuZn40 FRN-ERCuNi / FRN-ERCuAl-A2 / FRN-ERCu

Introduction:

CuSi3: Best for butt welding and hard facing of brass, especially for MIG welding of zinc-coated steel sheets. Pre-heating is suggested when performing MIG hardfacing on large-sized products. Use pulsed argon arc welding for hardfacing on steel.

CuZn40: Most commonly used as padding material for gas welding and carbon arc welding of brass. It can also be used in brazing copper, steel, copper-nickel alloys, cast iron, and for incrustation of carbide cutting tools.

ERCuNi: Especially good for seawater corrosion resistance. Particularly suitable for the welding and hard facing of copper-nickel alloys in machinery, seawater desalination, ship-building, oil refining, and food processing industries. Also suitable for welding nonferrous alloys and dissimilar steel materials.

ERCuAl-A2: Particularly suitable for hardfacing aluminum bronze on steel. It has increased resistance to wear and abrasion, as well as superior corrosion resistance to seawater. Widely used in ship construction, apparatus, and plumbing. For multilayer hard facing on steel, pulsed argon arc welding is recommended.

ERCu: Specifically recommended for argon arc welding of copper and for welding copper with steel, cast iron, and nickel alloys. Best suitable for large components.

Typical Chemical Composition of welding wire (%)												
AWS	Cu	Zn	Sn	Si	Mn	Ni	Fe	Pb	P	Al	Ti	others
CuSi3	Rem	Max 0.2	Max 0.2	2.8-4.0	0.5-1.5	-	Max 0.3	Max 0.02	Max 0.02	Max 0.01	-	Max 0.4
CuZn40	57.0-61.0	Rem	0.25-1.0	-	-	-	-	0.05	-	0.01	-	0.50
ERCuNi	Rem	-	-	0.25	1.0	29.0-32.0	0.40-0.75	0.02	0.02	-	0.20-0.50	0.50
ERCuAl-A2	Rem	0.02	-	0.10	-	-	0.5-1.5	0.02	-	8.5-11.0	-	0.50
ERCu	Min98.0	-	1.0	0.50	0.50	-	-	0.02	0.15	0.01	-	0.50

Physical Properties and Mechanical Properties						
AWS	Solids-Temperature	Liquids-Temperature	Density	Tensile Strength	Elongation	Brinell Hardness
CuSi3	910°C	901°C	8.45kg/dm3	375N/mm2	35%	85HB
CuZn40	886°C	1025°C	8.5kg/dm3	333-370N/mm2	40%	80-90HB
ERCuNi	1180°C	1240°C	8.9kg/dm3	420N/mm2	36%	115HB
ERCuAl-A2	1030°C	1040-1090°C	7.6kg/dm3	390-500N/mm2	35%	140HB
ERCu	1020°C	1050°C	8.9kg/dm3	210~220N/mm2	30-40%	60HB

DIN 1733 SG-CuSi3
BS EN14640 CuZn40
AWS A5.7 ERCuNi
AWS A5.7 ERCuAl-A2
AWS A5.7 ERCu



► **SOLID WIRE** (Titanium Welding Wire)

► **FLUX CORED WIRE** (Carbon Steel Self-shielded FCW)

SOLID WIRE

FRN-ERTi-1 / FRN-ERTi-2

AWS 5.16 ERTi-1
AWS 5.16 ERTi-2

Introduction
ERTi-1 : A specification for unalloyed titanium welding wire. It is the purest form of titanium, known for its excellent ductility and corrosion resistance. This type of welding wire is commonly used in applications where these properties are critical, such as in explosive cladding, movable bushings, expansion joints, and deep drilling. It is also used in electrolytic applications and anodic coatings produced by sodium chlorate or chlorine gas.

ERTi-2 : Another specification for unalloyed titanium welding wire, but it offers a balance of strength and ductility. This makes it suitable for welding commercially pure titanium grades 1, 2, 3, and 4. ERTi-2 is widely used in the chemical industry due to its excellent weldability and corrosion resistance. It is also used in applications such as seawater desalination, shipbuilding, and food processing industries.

Typical Chemical Composition of welding wire (%)				
Fe	C	O	N	H
0.054	0.40	0.011	0.005	0.01

FRN-YT71T-GS /FRN-YT71T-11

AWS A5.20 E71T-GS
AWS A5.20 E71T-11

Introduction:
FRN-YT71T-GS: Self-shielded flux cored wire for single pass applications in all positions. Arc is smooth and soft, good welding performance, full slag covering and easy slag removal. Suitable for welding of mild steel on bridge, oil production platform, petroleum pipeline and its dabber.

FRN-YT71T-11: Self-shielded flux cored wire for single and multi-pass applications in all positions. Arc is smooth and soft, good welding performance, full slag covering and easy slag removal.

FLUX CORED WIRE

Typical Chemical Composition of weld metal (%)											
AWS	C	Mn	Si	P	S	Al	Cr	Ni	Mo	V	Cu
E71T-GS	0.16	0.70	0.35	0.01	0.002	1.55	0.02	0.02	0.01	0.007	0.01
E71T-11	0.16	0.80	0.30	0.009	0.002	1.50	0.02	0.02	0.01	0.006	0.01

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
E71T-GS	410	525	26	-	-	None
E71T-11	418	565	18	-	-	

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	√	√	√	√	
Plastic spool 5kg D200mm	√	√	√	√	√
Plastic spool 15kg D270mm	√	√	√	√	√



► FLUX CORED WIRE (Stainless Steel Self-shielded FCW)

FLUX CORED WIRE

FRN-E308LT0-3 / FRN-E316LT0-3

AWS A5.22 E308LT0-3
AWS A5.22 E316LT0-3

Introduction:

E308LT0-3: Achieves self-shielded welding without the need for additional shielding gas. The weld metal contains an appropriate amount of ferrite, which reduces crack sensitivity. The arc is soft and stable, producing minimal spatter and a good appearance. It also offers excellent slag removal, stable wire feeding, and superior welding performance.

E316LT0-3: Flux-cored arc welding (FCAW) wire designed for welding types 316 and 316L stainless steels. It contains molybdenum for enhanced corrosion resistance, especially against pitting and crevice corrosion. Suitable for flat and horizontal welding positions, this wire typically does not require external shielding gas. It is commonly used in industries such as pulp and paper, chemical processing, textile processing, and marine environments. The wire offers a stable arc with low spatter, good bead appearance, and excellent slag removal.

Typical Chemical Composition of welding wire (%)										
AWS	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Fe
E308LT0-3	0.022	1.09	0.38	0.017	0.002	19.30	9.40	0.01	0.01	Rem
E316LT0-3	0.026	1.25	0.56	0.028	0.004	18.650	11.82	2.47	0.08	Rem

Typical Mechanical Properties of Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_s (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
E308LT0-3	-	543	35	-	-	None
E316LT0-3	-	574	39	-	-	

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	√	√	√	√	
Plastic spool 5kg D200mm	√	√	√	√	√
Plastic spool 12.5kg D300mm	√	√	√	√	√

(Carbon steel FCW)

FRN-YTE71T-1

AWS A5.20 E71T-1C

Introduction:

E71T-1C: A type of titania CO₂ gas-shielded flux-cored welding wire for low-carbon steel and 490 MPa high-strength steel. It offers excellent welding performance, a soft and stable arc, fewer spatters, good slag detachability, and a beautiful weld appearance. It also has excellent low-temperature toughness, good crack resistance, and stable, reliable inherent quality.

Uses:

Used for welding structures made of carbon steel and low-alloy structural steel with a tensile strength of 490 MPa or higher. It is most widely used for welding key structures such as those in shipbuilding, mechanical manufacturing, pressure vessels, boilers, petroleum machinery, chemical machinery, and hoisting machinery.

Typical Chemical Composition of all weld metal (%)									
C	Mn	Si	P	S	V	Cr	Ni	Mo	Cu
0.04	1.30	0.40	0.011	0.005	0.01	0.02	0.02	0.01	0.006

Typical Mechanical Properties of The Deposited Metal					
Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test		Shielding Gas
			Temperature(°C)	Impact Energy KV ₂ (J)	
520	580	24	-20	122	100%CO ₂

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	√	√	√	√	
Plastic spool 5kg D200mm	√	√	√	√	√
Plastic spool 15kg D270mm	√	√	√	√	√

FLUX CORED WIRE



► FLUX CORED WIRE (Carbon steel FCW)

(Low Temp. service Steel FCW)

FLUX CORED WIRE

FRN-YT711 / FRN-FJ507 / FRN-YT501T-1

AWS A5.20 E71T-1C-J
AWS A5.20 E71T-5C
AWS A5.18 E70C-6M

Introduction:
E71T-1C-J: All-position MAG flux-cored wire for low-temperature applications. Used in shipbuilding, bridges, and machinery. Stable arc, low spatter, good slag removal.

E71T-5C: CO₂ gas-shielded flux-cored wire for low-carbon and 490MPa steel. Excellent performance, stable arc, good slag removal, suitable for all positions. Used for key structures like ships and machinery.

E70C-6M: Metal-cored wire for flat/horizontal MAG welding of mild and 490N/mm² steel. High speed, good bead, low spatter, less slag. Used for key structures like ships and pressure vessels.

Typical Chemical Composition of all weld metal (%)								
AWS	C	Mn	Si	P	S	Ni	Cr	Mo
E71T-1C-J	0.05	1.41	0.39	0.011	0.006	-	-	-
E71T-5C	0.07	1.58	0.34	0.001	0.008	-	-	-
E70C-6M	0.045	1.25	0.45	0.01	0.005	0.02	0.02	0.01

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ ₅ (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
E71T-1C-J	465	540	26	-40	98	100%CO ₂
E71T-5C	480	570	25	-30	127	
E70C-6M	475	560	24	-30	120	75-80% Ar+CO ₂

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	√	√	√	√	
Plastic spool 5kg D200mm	√	√	√	√	√
Plastic spool 15kg D270mm	√	√	√	√	√
Drum packing 100-200kg				√	√

FLUX CORED WIRE

FRN-FJ602/FRN-FJ602Ni2 / FRN-FJ602Ni

AWS A5.29 E81T1-Ni1C
AWS A5.29 E81T1-Ni2C
AWS A5.20 E81T1-K2C

Introduction:
E81T1-Ni1C: Titania type flux-cored wire for all-position welding of 560N/mm² aluminum-killed steel for low temperaturesContains 1% Ni, maintains impact value at -30°C. Used for 590MPa lowalloy high strength steel in hoisting machinerybridges, storage tanks, etc.

E81T1-Ni2C: Titania tvoe CO₂ gas-shielded flux+cored wire for all-position welding. Touchened weld metal with excellen low-tempera-
ture toughness above -40'c. Used for 550MPa low-alloy high strength steel in hoisting machinery, bridgesstorage tanks, etc.

E81T1-K2C: Titania type CO₂ gas-shielded flux-cored wire for all-position welding. Toughened weld metal with excellent low-tempera-
ture toughness above -30°C. Used for 550MPa low-alloy high strength steel in hoisting machinery, bridges, storage tanks, etc.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	P	S	Cr	Ni	Mo
E81T1-Ni1C	0.04	1.34	0.30	0.010	0.005	0.02	0.93	0.02
E81T1-Ni2C	0.039	1.25	0.30	0.008	0.005	0.03	2.00	0.01
E81T1-K2C	0.034	1.22	0.30	0.010	0.005	0.02	1.59	0.01

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ ₅ (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
E81T1-Ni1C	520	610	24	-30	110	100% CO ₂
E81T1-Ni2C	590	625	24	-40	96	
E81T1-K2C	540	620	26	-30	110	

Packing terms			
Diameter	1.2mm	1.4mm	1.6mm
Plastic spool 1kg D100mm	√	√	
Plastic spool 5kg D200mm	√	√	√
Plastic spool 15kg D270mm	√	√	√



► FLUX CORED WIRE (Heat Resisting Steel FCW)

(Atmospheric Corrosion Resisting Steel FCW)

FLUX CORED WIRE

FRN-FR302 / FRN-FR402

AWS A5.29 E81T1-B2C
AWS A5.29 E91T1-B3C

Introduction:
E81T1-B2C: For all-position welding of 1.0%Cr-0.5%Mo high-temperature steel. Stable arc, low spatter, beautiful bead, good slag removal. Suitable for power plants, boilers, pressure vessels, and chemical industry.
E91T1-B3C: Titania type flux-cored wire for heat-resistant steel. Excellent performance, fewer spatters, stable arc, good slag removal, high efficiency. Suitable for welding 2.25%Cr-1%Mo steel below 520°C.

Typical Chemical Composition of welding wire (%)							
AWS	C	Mn	Si	P	S	Cr	Mo
E81T1-B2C	0.065	0.83	0.25	0.03	0.03	1.09	0.45
E91T1-B3C	0.055	0.85	0.32	0.01	0.005	2.2	1.0

Typical Mechanical Properties of The Deposited Metal				
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	PWHT
E81T1-B2C	545	625	23	(690°C±15°C)x1h
E91T1-B3C	650	730	20	(690°C±15°C)x1h

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	✓	✓	✓	✓	
Plastic spool 5kg D200mm	✓	✓	✓	✓	✓
Plastic spool 15kg D270mm	✓	✓	✓	✓	✓

FLUX CORED WIRE

FRN-YT81W2

AWS A5.29 E81T1-W2C

Introduction:
E81T1-W2C: A titania type flux-cored wire for all-position welding, used for welding high-strength weather-resistant steel. It features a stable arc, low spatter generation, beautiful bead appearance, and good slag removal. The weld metal contains Cr, Ni, and Cu, providing excellent weather resistance and crack resistance.
Uses:
Used for welding 550MPa atmospheric corrosion-resistant steel structures, such as railway locomotives, offshore engineering, bridges, etc.

Typical Chemical Composition of all weld metal (%)							
C	Mn	Si	S	P	Cu	Ni	Cr
0.030	1.00	0.40	0.01	0.007	0.39	0.70	0.50

Typical Mechanical Properties of The Deposited Metal					
Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test		Shielding Gas
			Temperature(°C)	Impact Energy KV ₂ (J)	
575	635	26	-30	112	100% CO ₂

Packing terms			
Diameter	1.2mm	1.4mm	1.6mm
Plastic spool 1kg D100mm	✓	✓	
Plastic spool 5kg D200mm	✓	✓	✓
Plastic spool 15kg D270mm	✓	✓	✓

►FLUX CORED WIRE (Stainless steel FCW)

FLUX CORED WIRE

FRN-YS308L / FRN-YS309L / FRN-YS316L

Introduction:

E308LT1-1: A stainless steel gas-shielded flux-cored wire for all-position welding of corrosion-resistant stainless steel structures below 300°C.

E309LT1-1: A stainless steel gas-shielded flux-cored wire for all-position welding of stainless steel, composite steel, and dissimilar steel, offering excellent crack resistance.

E316LT1-1: A stainless steel gas-shielded flux-cored wire for all-position welding of ultra-low-carbon stainless steel, providing excellent heat resistance, corrosion resistance, and crack resistance.

Typical Chemical Composition of welding wire (%)									
AWS	C	Mn	Si	P	S	Ni	Cr	Mo	Cu
E308LT1-1	0.022	1.06	0.45	0.002	0.002	9.75	19.50	0.01	0.02
E309LT1-1	0.025	1.35	0.55	0.001	0.03	13.30	23.70	0.04	0.03
E316LT1-1	0.025	1.40	0.54	0.021	0.005	12.00	19.00	2.60	0.03

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ ₅ (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
E308LT1-1	-	560	42	-	-	100% CO ₂
E309LT1-1	-	560	37	-	-	
E316LT1-1	-	555	41	-	-	

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	√	√	√	√	
Plastic spool 5kg D200mm	√	√	√	√	√
Plastic spool 12.5kg D300mm	√	√	√	√	√

AWS A5.22 E308LT1-1
AWS A5.22 E309LT1-1
AWS A5.22 E316LT1-1

(Stainless steel FCW)

FLUX CORED WIRE

FRN-E304LT1-1 / FRN-309LMoT1-1
FRN-E347T1-1 / FRN-E2209T1-1

Introduction:

E304LT1-1: Flux-cored wire designed for welding 304 and 304L stainless steels. It offers good corrosion resistance, a stable arc with minimal spatter, and easy slag removal, making it ideal for the food processing, chemical, and pharmaceutical industries.

309LMoT1-1: Ideal for welding dissimilar steels (stainless to carbon/low alloy steel) and for overlay welding. It has low crack sensitivity and provides a stable arc with minimal spatter and good slag removal.

E347T1-1: Used in petrochemical, pressure vessels, and food/medical machinery industries for welding SUS347 and S321 stainless steels. It offers excellent intergranular corrosion resistance due to niobium.

E2209T1-1: Suitable for welding duplex stainless steel (SUS2205) in the petrochemical industry. It combines austenitic and ferritic properties, providing excellent resistance to pitting and stress corrosion.

Typical Chemical Composition of welding wire (%)											
AWS	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	N	Nb
E304LT1-1	0.030	1.27	0.61	0.013	0.005	7.89	18.200	0.02	0.01	-	-
E309LMoT1-1	0.025	1.30	0.60	0.02	0.005	12.5	23.68	2.5	0.02	-	-
E347T1-1	0.025	1.35	0.45	0.022	0.003	9.8	19.5	0.02	0.02	-	0.45
E2209T1-1	0.02	1.00	0.55	0.02	0.003	8.85	22.69	3.5	0.02	0.11	-

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ ₅ (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
E304LT1-1	-	580	40	-	-	100%CO ₂
E309LMoT1-1	-	600	30	-	-	
E347T1-1	-	580	40	-	-	
E2209T1-1	-	815	26	-20	46	

Packing terms					
Diameter	0.8mm	0.9mm	1.0mm	1.2mm	1.6mm
Plastic spool 1kg D100mm	√	√	√	√	
Plastic spool 5kg D200mm	√	√	√	√	√
Plastic spool 12.5kg D300mm	√	√	√	√	√

AWS A5.22 E304LT1-1
AWS A5.22 309LMoT1-1
AWS A5.22 E347T1-1
AWS A5.22 E2209T1-1



► **HARDFACING WELDING WIRE** (Gas shielded FCW for Hardfacing)

HARDFACING
WELDING WIRE

FD100 & FD200: Metal powder cored type, wear-resistant, used for repairing the wear-resistant belt of petroleum drilling tools.

FD172 & FD212: Suitable for various worn parts, such as gears, buckets, and mining machinery.

FD256 & FD276: Austenitic high-manganese steel, characterized by work hardening, toughness, and wear resistance, used for surfacing welding of impact and easy-wear parts.

FD397 & FD497: Used for repair and hardfacing welding of hot forging dies, materials include 5CrMnMo, 5CrNiMo, etc.

FD350: Widely used for surfacing metal wear parts and light sand wear parts.

FD410 & FD420: 13% chromium martensitic wear-resistant and corrosion-resistant hardfacing flux cored wire, used for continuous casting rolls, steam valves, etc.

FD430: Ferritic type hardfacing flux cored wire containing 17% chromium, used for corrosion-resistant hardfacing.

FD414: Martensitic hardfacing flux cored wire, resistant to corrosion, wear, and thermal shock, used for fine-diameter continuous casting rolls.

FD450: Suitable for hardfacing welding of sand-resistant and intermetal-resistant parts.

FD507 & FD507Mo: 2Cr13 type hardfacing welding wire, used for shafts and valves of carbon steel or alloy steel with working temperatures below 410°C.

FD550: Widely used for sand-resistant parts.

FD556: Suitable for hardfacing workpieces worn by abrasives under moderate or strong impact, such as shield cutter heads, screw conveyor blades, etc.

FD600: Good abrasion resistance, widely used for parts resistant to sand and abrasion.

Product Type	Chemical Composition of Deposited Metal (%)							Hardness (HRC)
	C	Mn	Si	Cr	S	P	other	
FD100	0.3-0.5	≤1.50	≤1.00	4-6	0.007	0.011	2-3	50-55
FD200	0.5-0.8	≤1.50	≤1.00	6-9	0.01	0.012	4-6	53-57
FD172	0.2-0.4	≤1.50	≤1.00	≤3.0	0.007	0.02	≥1.0	24-28
FD212	0.3-0.5	≤2.0	≤1.50	5-8	0.006	0.015	≥1.0	54-57
FD256	≤1.0	14-16	≤1.00	≤2.0	0.003	0.007	-	20-23
FD276	0.1-0.3	13-15	0.5-1.0	14-16	0.01	0.02	-	22-25
FD397	0.2-0.5	≤1.00	≤1.00	≤5	0.01	0.02	≥1.5	40-44
FD497	0.4-0.5	1.0-2.5	0.2-0.5	3-5	0.01	0.02	3.5-4.5	48-52
FD350	0.1-0.3	≤2.0	≤1.50	≤3.0	0.01	0.017	≤1.00	32-36
FD410	≤0.15	≤1.00	≤1.00	12-14	0.012	0.018	≤1.5	38-42
FD420	0.2-0.4	≤1.50	≤1.50	12-14	0.012	0.017	≤1.5	51-56
FD430	≤0.10	≤1.50	≤1.50	17-18	0.015	0.019	≤1.00	22-26
FD414	≤0.10	≤2.0	≤1.50	13-15	0.016	0.018	≥5	42-48
FD450	0.1-02	≤2.0	≤1.00	≤5	0.009	0.019	≤1.5	44-48
FD507	0.1-0.2	≤2.0	≤1.00	13-15	0.015	0.019	≥2.0	40-44
FD507Mo	0.1-0.2	≤2.0	≤1.50	13-15	0.011	0.018	≥5.0	38-43
FD550	0.3-0.6	≤2.0	≤1.00	≤5	0.01	0.023	≥2.0	53-57
FD550	0.3-0.6	≤2.0	≤1.50	4-7	0.02	0.002	≥6.0	52-56
FD600	0.45-0.7	≤3.0	≤1.50	5-7	0.008	0.017	1.65	55-60

(Self-shielded FCW for Hardfacing)

FZ60, FZ61, FZ80, FZ81, FZ100, FZ100M, FZ100N, FZ200, FZ688, FZ888Ni, FZ888:

Mainly used in the cement industry, steel, power, mining, coal processing, and other wear-resistant applications.

FZ200N, FZ888W, FZ888N, FZ888N3, FZ888N7:

Mainly used in the steel industry, mining, and other industries that require wear resistance.

FZ200W, FZ200WNi:

Mainly used in cement, port, steel industry, mining, and other industries that require wear resistance.

FZ645:

Mainly used in smelting, cement industry, and petrochemical industry.

Product Type	Chemical Composition of Deposited Metal (%)					Hardness (HRC)
	C	Cr	Mn	Si	other	
FZ60	3.0-5.0	27-29	0.5-2.5	0.5-2.5	≤0.6	58-64
FZ61	3.0-5.5	25-28	1.0-2.5	0.5-1.5	≤0.6	60-65
FZ80	3.0-5.0	27-30	1.0-2.0	0.5-1.5	≤0.6	57-62
FZ81	3.5-5.0	24-27	1.0-2.0	0.5-1.5	≤0.6	55-62
FZ100	3.0-5.0	25-28	0.5-2.5	0.5-2.5	≤1.0	55-62
FZ100M	4.0-5.5	26-30	0.5-2.5	≤1.0	≤1.5	60-64
FZ100N	4.5-5.5	22-25	0.6-1.2	0.5-2.5	Nb:2.0-2.5	60-64
FZ200	3.0-5.0	22-25	0.5-2.5	0.5-2.5	Nb:3.0-4.0	58-62
FZ200N	3.0-5.5	20.24	0.5-2.5	0.5-2.5	Nb:5.5-6.5	57-63
FZ200W	3.0-5.5	22-26	0.5-2.5	0.5-2.5	W:3-5	58-63
FZ200WNi	3.0-5.0	22-28	0.5-2.5	0.5-2.5	W:3-5 Ni:1-3	58-63
FZ645	3.5-5.5	20-24	0.5-2.5	0.5-2.5	W:2-5 Nb:4-7 other: 4-6	57-62
FZ688	0.8-2.0	6-10	0.5-2.5	0.5-2.5	≤2.0	60-65
FZ888Ni	3.0-4.5	25-29	0.5-2.5	0.5-2.5	≤1.5	58-64
FZ888	3.0-4.5	25-29	0.5-2.5	0.5-2.5	≤1.0	58-64
FZ888W	3.5-5.5	24-26	0.5-2.5	0.5-2.5	W:1.0-2.0	58-63
FZ888N	3.5-5.5	22-25	0.5-2.5	0.5-2.5	Nb:1.0-1.5 Mo:0.6-1.0	58-64
FZ888N3	3.5-5.5	22-25	0.5-2.5	0.5-2.5	Nb:2.5-3.5	58-64
FZ888N7	3.5-5.5	22-25	0.5-2.5	0.5-2.5	Nb:6.0-7.0	58-64

HARDFACING
WELDING WIRE



► **HARDFACING WELDING WIRE** (FCW For Submerged Arc Welding)

► **STAINLESS STEEL WELDING WIRE**

HARDFACING
WELDING WIRE

FM213: FM213, FM313, FM420H:
3% chromium, corrosion and wear-resistant, suitable for continuous casting rolls and conveyor rolls.

FM430:
17% chromium, high-temperature corrosion-resistant, used for stainless steel composite steel primer welding.

FM414N:
Nitrogen-containing martensitic, corrosion, wear, and thermal shock-resistant, used for continuous casting rolls.

FM426, FM544, FM545, FM552, FM553, FM556, FM557, FM558:
Mainly for hardfacing repair of hot rolls and wear-resistant parts.

FM4501, FM4502, FM4505, FM4506:
Mainly for repair of support rollers and mandrels.

FM204, FM14, FM104Ni:
For repairing carbon steel and low alloy steel parts or as a primer for other hardfacing materials.

FM423:
For hardfacing of tension and straightening rollers at high temperatures, excellent corrosion, wear, and thermal shock resistance.

Product Type	Chemical Composition of Deposited Metal (%)						other	Hardness(HRC)
	C	Mn	Si	Cr	S	P		
FM213	0.15-0.25	1.20	0.60	12-14	0.012	0.018	≤1.0	42-52
FM313	0.25-0.35	1.33	0.70	12-14	0.012	0.017	≤1.0	46-54
FM420H	0.2-0.3	1.37	0.56	12-14	0.01	0.014	≥1.6	48-52
FM430	≤0.10	0.90	0.50	16-18	0.015	0.017	≤1.0	20-23
FM414N	≤0.10	1.06	0.62	12-14	0.014	0.017	3-7	42-48
FM426	≤0.2	1.70	0.85	12-14	0.02	0.022	≥3.0	42-48
FM544	0.2-0.3	1.23	1.15	≥12	0.01	0.02	≥3.0	46-50
FM545	0.2-0.4	1.55	0.86	5-7	0.013	0.015	≥3.0	50-54
FM552	0.2-0.4	1.68	0.75	5-7	0.008	0.017	≥4.5	52-55
FM553	0.3-0.5	1.74	0.67	5-8	0.01	0.02	≥5.0	54-58
FM556	0.4-0.6	0.82	0.55	6-8	0.012	0.016	≥5.5	56-60
FM557	0.3-0.5	1.30	0.67	5-8	0.017	0.02	≥4.5	53-57
FM558	0.3-0.5	1.13	1.40	6-8	0.016	0.023	≥4.5	52-56
FM4501	0.2-0.3	1.88	0.70	6-9	0.02	0.025	≥4.0	50-54
FM4502	0.3-0.5	1.40	0.54	5-8	0.02	0.02	≥5.5	54-58
FM4505	≤0.15	1.65	0.50	≥15	0.006	0.012	≥5.5	40-44
FM4506	≤0.15	1.57	0.55	12-14	0.007	0.012	≥7.0	42-46
FM204	≤0.10	1.25	0.42	≤5	0.012	0.015	≥2.0	28-32
FM14	≤0.15	2.10	0.75	≤5	0.011	0.017	≤1.5	HB200-240
FM104Ni	≤0.15	1.50	0.55	≤5	0.011	0.015	≤1.5	HB200-250
FM423	≤0.15	1.12	0.50	12-14	0.013	0.016	≥4.0	45-48

STAINLESS STEEL
WELDING WIRE

FRN-ER308 / FRN-ER308L / FRN-ER308LSi

AWS A5.9 ER308
AWS A5.9 ER308L
AWS A5.9 ER308LSi

Introduction:
ER308: Contains 18Cr-8Ni, widely used for all-position welding with excellent performance, smooth beads, and good crack and corrosion resistance. Commonly used in petrochemical, pressure vessels, food machinery, medical equipment, and nuclear reactors for welding materials like SUS 302 and SUS 304.
ER308L: Ultra-low carbon 18Cr-8Ni, suitable for all-position welding with similar excellent performance, smooth beads, and fewer spatters. It offers better resistance to intergranular corrosion and is used in similar applications as ER308, especially for welding SUS 304L.
ER308LSi: Ultra-low carbon 18Cr-8Ni with added silicon, enhancing weld fluidity and bead appearance. It provides smooth feeding, stable arc, and fewer spatters, making it ideal for the same industries as ER308 and ER308L, particularly for welding SUS 304L.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	Cr	Ni	Mo	P	S
ER308	0.045	1.77	0.54	20.10	9.65	0.05	0.020	0.006
ER308L	0.017	2.06	0.54	20.03	9.85	0.01	0.021	0.012
ER308LSi	0.014	2.05	0.85	19.77	9.67	0.01	0.010	0.011

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ ₅ (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER308	-	600	36	-40	110	98%Ar+2%O ₂
ER308L	-	585	38	-60	102	
ER308LSi	-	590	38	-40	105	

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm		√	√	√	√	√	√
Plastic spool 5kg D200mm		√	√	√	√	√	√
Plastic spool 15kg D270mm		√	√	√	√	√	√
Metal basket 15kg K300mm		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√



► STAINLESS STEEL WELDING WIRE

STAINLESS STEEL
WELDING WIRE

FRN-ER309 / FRN-ER309L / FRN-ER309LSi

AWS A5.9 ER309
AWS A5.9 ER309L
AWS A5.9 ER309LSi

Introduction:
ER309: Contains 22Cr-12Ni, suitable for all-position welding with excellent performance, smooth beads, and good crack and corrosion resistance. Ideal for welding dissimilar materials like carbon steel and stainless steel, used in petrochemical and fire station industries.
ER309L: Ultra-low carbon 22Cr-12Ni, offers similar excellent performance with better resistance to intergranular corrosion. Used for welding dissimilar materials in the petrochemical industry, especially for reaction vessel wall cladding and poor toughness martensitic or ferritic stainless steels.
ER309LSi: Ultra-low carbon 23Cr-13Ni with added silicon, enhancing weld fluidity and bead appearance. Provides smooth feeding, stable arc, and fewer spatters, making it ideal for the same industries as ER309 and ER309L, particularly for welding dissimilar materials and transition metal container wall cladding.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	Cr	Ni	Mo	P	S
ER309	0.031	1.97	0.45	23.15	13.45	0.01	0.019	0.010
ER309L	0.021	2.22	0.61	23.08	13.95	0.01	0.019	0.007
ER309LSi	0.016	1.83	0.92	23.21	13.38	0.01	0.023	0.005

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ _s (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER309	-	615	32	-40	74	98%Ar+2%O ₂
ER309L	-	580	38	-60	83	
ER309LSi	-	625	35	-40	97	

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm		√	√	√	√	√	√
Plastic spool 5kg D200mm		√	√	√	√	√	√
Plastic spool 15kg D270mm		√	√	√	√	√	√
Metal basket 15kg K300mm		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

STAINLESS STEEL
WELDING WIRE

FRN-ER316 / FRN-ER316L / FRN-ER316LSi

AWS A5.9 ER316
AWS A5.9 ER316L
AWS A5.9 ER316LSi

Introduction:
ER316: Contains 18Cr-12Ni-2Mo, suitable for all-position welding with excellent performance and good corrosion resistance against acids and salts. Commonly used in petrochemical and fertilizer equipment for welding materials like SUS 316.
ER316L: Ultra-low carbon 18Cr-12Ni-2Mo, offers similar excellent performance with better resistance to intergranular corrosion. Used in petrochemical and fertilizer equipment for welding materials like SUS 316L.
ER316LSi: Ultra-low carbon 18Cr-12Ni-2Mo with added silicon, enhancing weld fluidity and bead appearance. Ideal for the same industries as ER316 and ER316L, particularly for welding SUS 316L and composite steels.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	Cr	Ni	Mo	P	S
ER316	0.034	1.79	0.53	18.32	11.57	2.17	0.019	0.010
ER316L	0.019	2.02	0.56	18.91	12.03	2.42	0.022	0.011
ER316LSi	0.015	2.13	0.87	18.67	12.25	2.27	0.014	0.006

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ _s (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER316	-	595	32	-40	76	98%Ar+2%O ₂
ER316L	-	575	36	-60	76	
ER316LSi	-	675	36	-40	84	

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm		√	√	√	√	√	√
Plastic spool 5kg D200mm		√	√	√	√	√	√
Plastic spool 15kg D270mm		√	√	√	√	√	√
Metal basket 15kg K300mm		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

► STAINLESS STEEL WELDING WIRE

STAINLESS STEEL
WELDING WIRE

FRN-ER307 / FRN-ER310 / FRN-ER321 / FRN-ER347

Introduction:

ER307: Contains 18Cr-8Ni-4Mn, an austenitic stainless steel MIG wire with low crack sensitivity, suitable for welding non-magnetic, high manganese, and corrosion-resistant steels. Used in nuclear submarines, ballistic steel, and dissimilar steels.

ER310: Contains 25Cr-20Ni, an austenitic stainless steel MIG wire with high-temperature stability up to 1200°C. Used for welding high-temperature furnaces, coal coking equipment, and dissimilar steels.

ER321: Contains 18Cr-8Ni-Ti, an austenitic stainless steel MIG wire with added titanium to improve corrosion resistance, especially against grain boundary corrosion. Used in food machinery, medical equipment, pressure vessels, and petrochemical applications.

ER347: Contains 19Cr-11Ni-Nb, an austenitic stainless steel MIG wire with added niobium to enhance corrosion resistance, particularly against grain boundary corrosion. Used in food machinery, medical equipment, pressure vessels, and petrochemical applications.

Typical Chemical Composition of welding wire (%)										
AWS	C	Mn	Si	Cr	Ni	Mo	P	S	Ti	Cu
ER307	0.080	4.50	0.43	20.02	9.52	0.97	0.012	0.011	-	-
ER310	0.085	1.75	0.56	26.46	20.52	0.07	0.011	0.009	-	-
ER321	0.021	1.48	0.48	19.51	9.32	0.17	0.021	0.010	0.31	-
ER347	0.04	1.74	0.56	19.85	9.79	0.01	0.017	0.005	-	0.43

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ _s (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER307	-	630	34	-	-	98%Ar+2%O ₂
ER310	-	630	34	-	-	
ER321	-	550	38	-60	97	
ER347	-	615	36	-40	81	

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm		√	√	√	√	√	√
Plastic spool 5kg D200mm		√	√	√	√	√	√
Plastic spool 15kg D270mm		√	√	√	√	√	√
Metal basket 15kg K300mm		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

AWS A5.9 ER307
AWS A5.9 ER310
AWS A5.9 ER321
AWS A5.9 ER347

FRN-ER410 / FRN-ER430

Introduction:

ER410: Contains 13Cr, a martensitic stainless steel MIG wire suitable for all-position welding with excellent performance, smooth beads, and fewer spatters. Used in hydropower stations, valves, and other wear and corrosion applications, such as SUS 410.

ER430: Contains 17Cr, a ferritic stainless steel MIG wire suitable for all-position welding with excellent performance, smooth beads, and fewer spatters. Used for welding corrosion-resistant components, such as SUS 430 material devices, fences, and golf equipment.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	Cr	Ni	Mo	P	S
ER410	0.083	0.56	0.42	12.59	0.32	0.01	0.023	0.010
ER430	0.015	0.49	0.47	16.32	0.14	0.01	0.08	0.016

Typical Mechanical Properties of The Deposited Metal						
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ _s (%)	Impact test		Shielding Gas
				Temperature(°C)	Impact Energy KV ₂ (J)	
ER410	-	650	34	-	-	98%Ar+2%O ₂
ER430	-	455	23	-	-	

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm		√	√	√	√	√	√
Plastic spool 5kg D200mm		√	√	√	√	√	√
Plastic spool 15kg D270mm		√	√	√	√	√	√
Metal basket 15kg K300mm		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

AWS A5.9 ER410
AWS A5.9 ER430

STAINLESS STEEL
WELDING WIRE



►STAINLESS STEEL WELDING WIRE

►ALUMINUM ALLOY WELDING WIRE

STAINLESS STEEL
WELDING WIRE

FRN-ER2209

AWS A5.9 ER2209

Introduction:

The main components are 22% Cr (Chromium), 9% Ni (Nickel), 3% Mo (Molybdenum), and N (Nitrogen). The deposited metal contains about 40% ferrite, combining the properties of both austenitic and ferritic stainless steels, with excellent pitting and stress corrosion resistance. It offers smooth wire feeding, a stable arc, aesthetically pleasing weld seams, good fluidity of molten metal, and low spatter, providing excellent welding performance.

Uses:

Used for welding 22% Cr duplex stainless steels such as 00Cr22Ni5Mo3N (SUS2205) and S31803 in the petrochemical industry.

Typical Chemical Composition of welding wire (%)									
C	Mn	Si	Cr	Ni	Mo	N	P	S	Cu
0.016	1.85	0.51	22.59	8.72	3.02	0.16	0.023	0.012	0.10

Typical Mechanical Properties of The Deposited Metal					
Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ ₅ (%)	Impact test		Shielding Gas
			Temperature(°C)	Impact Energy KV ₂ (J)	
-	795	33	-40	95	98%Ar+2%O ₂

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 1kg D100mm		√	√	√	√	√	√
Plastic spool 5kg D200mm		√	√	√	√	√	√
Plastic spool 15kg D270mm		√	√	√	√	√	√
Metal basket 15kg K300mm		√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

ALUMINUM ALLOY
WELDING WIRE

FRN-ER1100

AWS A5.10 ER1100
GB/T10858-2008 SAl 1100

Introduction:

It is a corrosion-resistant pure aluminum wire with good plasticity, suitable for gas protective or argon arc welding.

Uses:

Pure aluminum welding wire used for welding in industries related to aluminum such as electric power, chemical, food, metallurgical, and railway locomotives.

Typical Chemical Composition of welding wire (%)								
Cu	Si	Fe	Mn	Mg	Cr	Zn	Ti	Al
0.10	1.00	-	0.05	-	-	0.10	-	99.5

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 0.5kg D100mm	√	√	√	√	√		
Plastic spool 2kg D200mm	√	√	√	√	√	√	
Plastic spool 7kg D270mm	√	√	√	√	√	√	√
Plastic spool 7kg D300mm	√	√	√	√	√	√	√
Metal basket 7kg K300mm	√	√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√
TIG/1000mm x 10kg/tube	√	√	√	√	√	√

►ALUMINUM ALLOY WELDING WIRE



ALUMINUM ALLOY
WELDING WIRE

FRN-ER5183 / FRN-ER5356/ FRN-ER5087

AWS A5.10 ER5183
AWS A5.10 ER5356
AWS A5.10 ER5087

Introduction:
ER5183: This Al-Mg alloy welding wire offers good corrosion resistance and high strength, making it suitable for argon arc welding. It is commonly used for welding ships, offshore platforms, railway locomotives, car manufacturing, and other aluminum-related industries.
ER5356: An aluminum-magnesium alloy wire with a small amount of titanium, ER5356 provides good corrosion resistance, heat resistance, crack resistance, high strength, and good ductility. The weld anodizing is white, ensuring a good color match. It is widely used for welding ships, offshore platforms, railway locomotives, car manufacturing, and other aluminum-related industries.
ER5087: Known for its good weldability, plasticity, and corrosion resistance, ER5087 is suitable for gas protective or argon arc welding and offers excellent mechanical performance. It is widely used in welding joints with special requirements for higher intensity, such as in engines, electric power, chemistry, and food industries.

Typical Chemical Composition of welding wire (%)									
AWS	Cu	Si	Fe	Mn	Mg	Cr	Zn	Ti	Al
ER5183	0.10	0.40	0.40	0.05-1.00	4.30-5.20	0.05-0.25	0.25	0.15	Rem
ER5356	0.10	0.25	0.40	0.05-0.20	4.50-5.50	0.05-0.20	0.10	0.06-0.20	Rem
ER5087	0.05	0.25	0.40	0.70-1.10	4.50-5.20	0.05-0.25	0.25	0.15	Rem

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 0.5kg D100mm	√	√	√	√	√		
Plastic spool 2kg D200mm	√	√	√	√	√	√	
Plastic spool 7kg D270mm	√	√	√	√	√	√	√
Plastic spool 7kg D300mm	√	√	√	√	√	√	√
Metal basket 7kg K300mm	√	√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√

FRN-ER4047 / FRN-ER4043

AWS A5.10 ER4047
AWS A5.10 ER4043

Introduction:
ER4047: This eutectic aluminum-silicon alloy welding wire contains about 12% silicon, making it suitable for Al-Si, Al-Si-Mg, and Al-Si-Mg-Cu wrought aluminum and aluminum (7% Si) argon arc welding. It has a low melting point and good fluidity, resulting in minimal welding deformation. It is mainly used for brazing and soldering, as well as for jointing or overlaying light alloy processing.
ER4043: One of the oldest and most widely used welding and brazing alloys, ER4043 is a general-purpose filler alloy. It is widely used for welding 6061, 6XXX series aluminum alloys, 3XXX series, and 2XXX series aluminum and alloys. This Al-Si welding wire is commonly used in the shipbuilding, chemical, mold, metallurgy, and automobile industries related to aluminum.

Typical Chemical Composition of welding wire (%)								
AWS	Cu	Si	Fe	Mn	Mg	Cr	Zn	Al
ER4047	0.30	11.0-13.0	0.80	0.15	0.10	0.05	0.20	Rem
ER4043	0.30	4.5-6.0	0.80	0.05	0.05	0.10	0.10	Rem

Packing terms							
Diameter	0.6mm	0.8mm	0.9mm	1.0mm	1.2mmn	1.6mm	2.0mm
Plastic spool 0.5kg D100mm	√	√	√	√	√		
Plastic spool 2kg D200mm	√	√	√	√	√	√	
Plastic spool 7kg D270mm	√	√	√	√	√	√	√
Plastic spool 7kg D300mm	√	√	√	√	√	√	√
Metal basket 7kg K300mm	√	√	√	√	√	√	√

Packing terms						
Diameter	1.2mm	1.6mm	2.0mm	2.4mm	3.2mm	4.0mm
TIG/1000mm x 5kg/tube	√	√	√	√	√	√

ALUMINUM ALLOY
WELDING WIRE



► WELDING ELECTRODE

WELDING ELECTRODE

FRN-E6010 / FRN-E6011 / FRN-E6013

AWS A5.1 E6010
AWS A5.1 E6011
AWS A5.1 E6013

Introduction:

E6010: This high cellulose sodium-coated electrode is ideal for vertical downward welding with a strong arc force, fewer slags, good slag detachability, and high welding speed. It provides excellent mechanical properties, blowhole resistance, and crack resistance, making it perfect for butt welding of circumferential seams on carbon steel pipes and vertical downward welding on general carbon steel structures, commonly used in pipeline workplaces.

E6011: A cellulose potassium-coated carbon steel electrode suitable for vertical-down welding, it can be used with both AC and DC currents, offering high welding efficiency and a beautiful weld appearance. It is widely used for welding carbon steel and low-alloy steel structures, particularly in shipbuilding, mechanical manufacturing, pressure vessels, boilers, petroleum machinery, chemical machinery, and hoisting machinery.

E6013: This carbon steel electrode with a titania type coating is suitable for all-position welding with AC/DC. It offers excellent welding performance, easy reignition, stable arc, and beautiful weld appearance, making it ideal for welding low-carbon steel structures, especially thin plates and cosmetic welding requiring beautiful and glossy weld beads.

Typical Chemical Composition of welding wire (%)								
AWS	C	Mn	Si	S	P	Ni	Cr	Mo
E6010	0.098	0.38	0.17	0.007	0.007	0.013	0.023	0.004
E6011	0.142	0.48	0.38	0.004	0.006	0.014	0.018	0.004
E6013	0.142	0.38	0.38	0.004	0.006	0.010	0.017	0.004

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E6010	425	515	25	-30	40
E6011	440	540	22	-30	48
E6013	447	533	20	-	-

WELDING ELECTRODE

FRN-E7015 / FRN-E7016 / FRN-E7018 / FRN-E7015-G

AWS A5.1 E7015
AWS A5.1 E7016
AWS A5.1 E7018
AWS A5.5 E7015-G

Introduction:

E7015: Low-hydrogen sodium-coated electrode for all-position welding with DCRP. Offers excellent mechanical properties, crack resistance, and low-temperature impact toughness. Used for medium-carbon and low-alloy steel structures under pressure and moving loads.

E7016: Low-hydrogen potassium-coated electrode for all-position welding with AC/DC. Provides excellent mechanical properties, crack resistance, and low-temperature impact toughness. Used for medium-carbon and low-alloy steel structures.

E7018: Iron powder low-hydrogen sodium-coated electrode for all-position welding with DCRP. High deposition efficiency, stable arc, and good slag detachability. Used for carbon and low-alloy steel structures.

E7015-G: Low-hydrogen sodium-coated electrode containing nickel for all-position welding with DCRP. Maintains impact toughness at -60°C. Used for low-temperature steel structures.

Typical Chemical Composition of welding wire (%)									
AWS	C	Mn	Si	S	P	Ni	Cr	Mo	V
E7015	0.075	1.17	0.50	0.009	0.017	0.02	0.04	0.007	0.01
E7016	0.061	1.36	0.45	0.010	0.017	0.02	0.05	0.01	0.01
E7018	0.071	1.28	0.45	0.008	0.016	0.01	0.02	0.04	0.01
E7015-G	0.075	1.45	0.35	0.010	0.017	0.50	0.03	0.004	0.01

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E7015	460	555	30	-30	120
E7016	415	570	31	-30	150
E7018	495	590	27	-30	138
E7015-G	450	550	27	-50	114



► **WELDING ELECTRODE** (Surfacing Electrode)

(Cast Iron Welding Electrode)

WELDING ELECTRODE

FRN-EFeMn-A / FRN-EFeMn-B

AWS A5.4 EFeMn-A
AWS A5.4 EFeMn-B

Introduction:

EFeMn-A: A high-manganese steel surfacing electrode with low-hydrogen potassium coating, suitable for AC/DC welding. Requires weak current and immediate hammering or water quenching to reduce crack tendency. The deposited metal is austenitic high-manganese steel, offering toughness and wear resistance. Used for surfacing welding on parts like crushers, high-manganese steel rails, buckets, and bulldozers.

EFeMn-B: Similar to EFeMn-A, but with added molybdenum (Mo) for increased crack and wear resistance. It is also a high-manganese steel surfacing electrode with low-hydrogen potassium coating, suitable for AC/DC welding. Requires weak current and immediate hammering or water quenching. Used for surfacing welding on parts like crushers, high-manganese steel rails, buckets, and bulldozers.

Typical Chemical Composition of welding electrode (%)					
AWS	C	Mn	Si	Mo	other
ER316	0.54	14.00	0.32	-	≤5.00
ER316L	0.65	14.60	0.75	1.00	≤1.00

WELDING ELECTRODE

FRN-ENi-CI / FRN-ENiFe-CI / FRN-ENiCu-B

AWS A5.15 ENi-CI
AWS A5.15 ENiFe-CI
AWS A5.15 ENiCu-B

Introduction:

ENi-CI: A cast iron electrode with a pure nickel core wire and strong reducibility graphite coating. It does not require preheating, offers excellent crack resistance and machinability, and is used for repair welding on thin cast iron pieces and machined surfaces, such as engine bearers and guide rails.

ENiEe-CI: A nickel-iron core wire, highly graphitized cast iron welding rod that does not require preheating. It features high strength, good plasticity, excellent crack resistance, and good fusion with the base material. Recommended for large or highly constrained components and high-strength, engineering-grade cast iron.

ENiCu-B: A cast iron electrode with a Ni-Cu alloy (Monel) core wire and strong reducibility graphite coating. Similar in performance and machinability to Z308 but with lower crack resistance and joint strength. Used for repair welding on gray cast iron pieces that do not require high strength, and can be used at normal temperature or slightly preheated.hammering or water quenching. Used for surfacing welding on parts like crushers, high-manganese steel rails, buckets, and bulldozers.

Typical Chemical Composition of welding electrode (%)									
AWS	C	Mn	Si	S	Ni	Cu	Fe	Fe	Al
ENi-CI	0.23	0.16	0.97	0.003	97.2	0.003	1.1	0.24	0.24
ENiFe-CI	0.59	0.26	0.93	0.005	55.10	0.025	42.8	-	0.18
ENiCu-B	0.45	1.9	0.45	0.007	65	29	4.5	-	-

► STAINLESS STEEL WELDING ELECTRODE

FRN-E307-16 / FRN-E308-16 / FRN-E308L-16

AWS A5.4 E307-16
AWS A5.4 E308-16
AWS A5.4 E308L-16

Introduction:

E307-16: Stainless steel electrode with titania coating, suitable for AC/DC. The weld metal has excellent crack resistance. Used for welding ASTM307 and other dissimilar steels, as well as surfacing on impact and corrosion-resistant steels and transition layers like high-manganese and quenched steel.

E308-16: A Cr19Ni10 stainless steel electrode with excellent mechanical properties, intercrystalline corrosion resistance, and welding performance. It is used for welding corrosion-resistant stainless steel structures below 300°C.

E308L-16: An ultra-low-carbon Cr19Ni10 stainless steel electrode with excellent intercrystalline corrosion resistance and welding performance. It is used for welding ultra-low-carbon stainless steel structures and corrosion-resistant structures below 300°C, mainly in synthetic fiber, chemical fertilizers, and petroleum equipment.

Typical Chemical Composition of welding electrode (%)									
AWS	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
E307-16	0.076	3.65	0.65	0.03	0.027	19.5	9.8	0.7	0.10
E307-16	0.038	1.3	0.65	0.004	0.028	19.8	9.4	0.04	0.10
E308L-16	0.032	0.89	0.60	0.004	0.024	19.7	9.5	0.01	0.10

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E307-16	-	610	38	-	-
E308-16	-	605	43	-	-
E308L-16	-	595	42	-	-

FRN-E309-16 / FRN-E309L-16 / FRN-E309MoL-16

AWS A5.4 E309-16
AWS A5.4 E309L-16
AWS A5.4 E309MoL-16

Introduction:

E309-16: A Cr23Ni13 stainless steel electrode with excellent crack and oxidation resistance. It is used for welding similar stainless steels, stainless steel linings, dissimilar steels, high-chrome, and high-manganese steels.

E309L-16: An ultra-low-carbon Cr23Ni13 stainless steel electrode that resists intercrystalline corrosion without stabilizers. It is used for welding similar stainless steel structures, composite steels, dissimilar steels, and for surfacing welding on nuclear reactors and pressure vessels.

E309MoL-16: An ultra-low-carbon Cr23Ni13Mo2 stainless steel electrode with a lime-titania type coating. Suitable for both AC and DC, the added Mo enhances the weld metal's crack and corrosion resistance. It is used for welding ultra-low-carbon stainless steel materials of the same type, such as urea synthesis tower linings, and dissimilar steels.

Typical Chemical Composition of welding electrode (%)									
AWS	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
E309-16	0.055	1.45	0.70	0.009	0.021	24.25	12.75	0.35	0.10
E309L-16	0.024	1.32	0.65	0.007	0.021	23.30	12.90	0.045	0.035
E309MoL-16	0.026	1.35	0.66	0.007	0.021	23.20	13.1	2.36	0.034

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E309-16	-	595	40	-	-
E309L-16	-	560	42	-	-
E309MoL-16	-	595	38	-	-

▶ STAINLESS STEEL WELDING ELECTRODE

STAINLESS STEEL
WELDING ELECTRODE

FRN-E310-16 / FRN-E316-16 / FRN-E316L-16

Introduction:

E310-16 : A Cr26Ni21 pure austenitic stainless steel electrode with a lime-titania type coating. It provides excellent oxidation resistance at high temperatures (900~1100°C) and has excellent welding performance. Suitable for both AC and DC, it is used for welding heat-resistant stainless steel, high-hardenability Cr steels (such as Cr5Mo, Cr9Mo, Cr13, Cr28), and dissimilar steel.

E316-16 : A low-carbon Cr18Ni12Mo2 stainless steel electrode with a lime-titania type coating. The addition of Mo gives it excellent corrosion resistance, heat resistance, and crack resistance, making it especially suitable for chloride ion pitting corrosion resistance. It has excellent welding performance and is used for welding 0Cr18Ni12Mo2 stainless steel equipment in organic and mineral acid mediums, as well as dissimilar steel.

E316L-16 : An ultra-low-carbon Cr18Ni12Mo2 stainless steel electrode with a lime-titania type coating. The deposited metal has a carbon content of 0.04% or less, providing excellent heat resistance, corrosion resistance, crack resistance, blowhole resistance, and welding performance. The coating is red-resistant and high-strength. Suitable for both AC and DC, it is used for welding urea and synthetic fiber equipment, stainless steel structures, Cr stainless steel that does not require post-weld heat treatment, composite steel, and dissimilar steel.

Typical Chemical Composition of welding electrode (%)									
AWS	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
E310-16	0.13	2.00	0.60	0.007	0.022	26.65	21.10	0.045	0.10
E316-16	0.045	1.40	0.65	0.009	0.022	19.35	12.04	2.52	0.10
E316L-16	0.025	1.20	0.60	0.007	0.021	19.05	11.60	2.45	0.038

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E310-15	-	600	35	-	-
E310-16	-	585	38	-	-
E316-16	-	575	39	-	-

AWS A5.4 E310-16
AWS A5.4 E316-16
AWS A5.4 E316L-16

FRN-E317-16 / FRN-E317L-16 / FRN-E347L-16

Introduction:

E317-16: Low-carbon Cr19Ni13Mo3 stainless steel electrode with high Mo content, offering excellent resistance to non-oxidizing acids and pitting corrosion. Used for welding similar stainless steels, composite steel, and dissimilar steel.

E317L-16: Ultra-low-carbon Cr18Ni12Mo3 stainless steel electrode with $\leq 0.04\%$ carbon. Provides excellent heat, corrosion, crack, and blowhole resistance. Used for welding ultra-low-carbon stainless steel, Cr stainless steel without post-weld heat treatment, composite steel, and dissimilar steel.

E347L-16: Cr19Ni10Nb stainless steel electrode with niobium for intergranular corrosion resistance. Offers good welding performance and high mechanical strength. Used for welding corrosion-resistant stainless steels stabilized with titanium or niobium, ideal for high-temperature environments, and commonly used in chemical and petrochemical equipment.

AWS A5.4 E317-16
AWS A5.4 E317L-16
AWS A5.4 E347L-16

STAINLESS STEEL
WELDING ELECTRODE

Typical Chemical Composition of welding electrode (%)									
AWS	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
E317-16	0.040	1.10	0.70	0.003	0.028	18.5	13.0	3.5	0.09
E317L-16	0.030	0.85	0.65	0.003	0.027	18.8	13.0	3.6	0.09
E347L-16	0.033	0.84	0.69	0.005	0.027	18.7	9.5	0.10	0.22

Typical Mechanical Properties of The Deposited Metal					
AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E317-16	-	615	39	-	-
E317L-16	-	605	40	-	-
E347L-16	-	615	36	-	-

► STAINLESS STEEL WELDING ELECTRODE

FRN-E410-15 / FRN-E410-16 FRN-E430-15 / FRN-E430-16

AWS A5.4 E410-15 AWS A5.4 E410-16
AWS A5.4 E430-15 AWS A5.4 E430-16

Introduction:

E410-15: Cr13 stainless steel electrode with basic coating, suitable for DCRP and all-position welding. Used for welding 0Cr13 and 1Cr13 stainless steel structures and corrosion-resistant surfacing.

E410-16: Cr13 stainless steel electrode with lime-titania coating, suitable for AC/DC. Used for welding 0Cr13 and 1Cr13 stainless steel structures, and for corrosion-resistant and wear-resistant surface overlaying.

E430-15: Cr17 stainless steel electrode with basic coating, suitable for DCRP and all-position welding. Used for welding nitric acid corrosion-resistant and heat-resistant Cr17 stainless steel structures.

E430-16: Cr17 stainless steel electrode with titania coating, suitable for AC/DC. Used for welding nitric acid corrosion-resistant and heat-resistant Cr17 stainless steel structures.

Typical Chemical Composition of welding electrode (%)

AWS	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
E410-15	0.12	1.0	0.9	0.03	0.04	11.0-14.0	0.70	0.75	0.75
E410-16	0.12	1.0	0.9	0.03	0.04	11.0-14.0	0.70	0.75	0.75
E430-15	0.10	1.0	0.9	0.03	0.04	15.0-18.0	0.60	0.75	0.75
E430-16	0.10	1.0	0.9	0.03	0.04	15.0-18.0	0.60	0.75	0.75

Typical Mechanical Properties of The Deposited Metal

AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E410-15	-	450	15	-	-
E410-16	-	450	15	-	-
E430-15	-	450	15	-	-
E430-16	-	450	15	-	-

FRN- E2209-16 / FRN- E2553-16 / FRN- E2594-16

AWS A5.4 E2209-16
AWS A5.4 E2553-16
AWS A5.4 E2594-16

Introduction:

E2209-16: Ultra-low carbon and nitrogen,Cr22Ni5Mo3N. Excellent chloride and pitting corrosion resistance. Used in petrochemical, marine, coastal, and water treatment industries for duplex stainless steels like 00Cr22Ni5Mo3N and SAF2205.

E2553-16: Super duplex, 25% Cr, Mo, and N. Excellent pitting and stress corrosion resistance. Used in petrochemical, marine, and chemical industries for duplex stainless steels like 2205 and 2507.

E2594-16: Ultra-low carbon,25%Cr,Mo,and N.Excellent stress corrosion and pitting resistance. Used in petrochemical, water treatment, and marine industries for duplex stainless steels like 00Cr22Ni7Mo4N and 03Cr25NiMo3Cu2N.

Typical Chemical Composition of welding electrode (%)

AWS	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
E2209-16	0.032	0.75	0.65	0.005	0.028	22.8	9.2	3.1	-	0.14
E2553-16	0.042	1.10	0.35	0.007	0.015	25.1	7.9	3.1	1.7	0.18
E2594-16	0.031	0.90	0.74	0.007	0.020	25.2	9.20	4.00	0.10	0.26

Typical Mechanical Properties of The Deposited Metal

AWS	Yield Strength ReL (Mpa)	Tensile Strength Rm(Mpa)	Elongation δ_5 (%)	Impact test	
				Temperature(°C)	Impact Energy KV ₂ (J)
E2209-16	-	835	26	-40	40
E2553-16	-	900	22	-	34
E2594-16	-	915	23	-	34

► TUNGSTEN ELECTRODES

Thoriated Tungsten Electrode



Thoriated tungsten has excellent comprehensive performance, including high electron emission, low work function value, and high current load capacity. It remains stable during long-term welding and is one of the most commonly used electrode types today. It facilitates easy arc starting, increases arc stability, and improves the current-carrying capacity of the rod. It is often used for D.C. welding of carbon steel, stainless steel, nickel alloy, and titanium alloy. The only disadvantage is its slight radioactive pollution.

Ceriated Tungsten Electrode



Ceriated tungsten electrode is a top-quality product that meets international standards. It aids inert gas in protecting the electric arc during welding and plasma cutting. It produces no radioactive pollution, thereby enhancing labor protection conditions. The compressed strength of its arc beam is narrower, more concentrated, and more stable. It easily generates and maintains a stable arc with low current. This tungsten electrode is very popular for low-current welding, especially for orbital tube, pipe, and small article welding, as well as intermittent and quantitative welding.

Products	Thoriated Tungsten Electrode	Ceriated Tungsten Electrode
Picture		
Mark	WT20/EWTh-2	WC20/EwCe-2
Specification	1.0-10mm*150/175mm	1.0-10mm*150/175mm
Added Oxide	ThO ₂	CeO ₂
Mass Percent%	1.70-2.20	1.80-2.20
Impurities%	≤0.10	≤0.10
Tungsten%	The rest	The rest
Density	18.15	18.20-18.20
Work Function.(eV)	2.0-3.0	2.6-2.8
Color Code	Red	Grey

Pure Tungsten Electrode



The original green pure tungsten electrodes contain at least 99.5% tungsten and have the highest consumption rate of all electrodes. They are typically less expensive than their alloyed counterparts. Pure tungsten electrodes have very high melting and boiling points, with less evaporation and burning loss compared to other tungsten electrodes. These electrodes form a clean, balled tip when heated and provide great arc stability for AC welding with a balanced wave. They are not typically used for DC welding because they don't provide the strong arc starting associated with thoriated or ceriated electrodes. They are suitable for welding under AC, mainly when welding magnesium, aluminum, and aluminum-alloy.

Lanthanated Tungsten Electrode



The lanthanated tungsten electrode has become very popular in the field of welding due to its excellent welding performance. Its current conduction is most similar to that of thoriated tungsten electrodes but without radioactive pollution. Therefore, it is the best product to replace thoriated tungsten electrodes without any changes needed in the welding operation process. It is highly effective for both D.C. and A.C. welding operations and is suitable for welding non-alloy steels as well as alloys of aluminum, steel, titanium, nickel, copper, and magnesium. It can also be used in micro-plasma welding.

Products	Pure Tungsten Electrode	Lanthanated Tungsten Electrode	Lanthanated Tungsten Electrode
Picture			
Mark	WP/EWP	WL15/EWLa-1.5 WL10/EWLa-1	WL20/EWLa-2
Specification	1.0-10mm*150/175mm	1.0-10mm*150/175mm	1.0-10mm*150/175mm
Added Oxide	/	La ₂ O ₃	La ₂ O ₃
Mass Percent%	/	0.8-1.70	1.80-2.20
Impurities%	≤0.10	≤0.10	≤0.10
Tungsten%	The rest	The rest	The rest
Density	19.1-19.2	18.40-18.80	18.4 - 18.6
Work Function.(eV)	4.5	2.6-3.0	2.8-3.2
Color Code	Green	Glod/Black	Sky Blue

► TUNGSTEN ELECTRODES

► WELDING FLUX

Zirconiated Tungsten Electrode

Zirconiated tungsten electrodes exhibit excellent welding performance under AC welding. They retain a balled end when melting, result in less tungsten permeation, and offer good corrosion resistance. The arc is more stable than that of pure tungsten electrodes, especially under high current load welding conditions, and cannot be replaced by any other electrodes in terms of performance. These electrodes are suitable for use with magnesium, aluminum, and their alloys.

Yttriated Tungsten Electrode

Yttriated tungsten electrodes are primarily used in the military and aviation industries at present. Their arc beam is slim and compressive, especially under medium and high current conditions, resulting in maximum welding penetration.

Multi-compound Tungsten Electrode

The performance of the new type of tungsten electrodes in welding can be significantly improved by adding two or more rare earth oxides. The composite electrode has superior arc starting and better ignition than the 2% thoriated tungsten electrode. It starts faster and maintains a stable arc. This electrode can be used in both AC and DC processes and runs cooler, extending tip life. Additionally, it maintains a stable tip geometry, resulting in a longer lifespan. It's a good choice for the environment and safer for the workplace because it does not contain radioactive oxides. Since the electrode has a lower work function, its welding properties are better than those of other electrodes in terms of wear, allowing the use of a smaller diameter tungsten for the same job. Users of 2% thoriated tungsten can switch to WE3 tungsten with confidence. WE3 requires fewer regrinds and provides a longer overall lifetime compared to 2% thoriated tungsten. Therefore, the composite tungsten electrode is your best choice to replace 2% thoriated electrodes.

Products	Zirconiated Tungsten Electrode	Yttriated Tungsten Electrode	Multi-compound Tungsten Electrode
Picture			
Mark	WZ8/EWZr-8 WZ3/EWZr-1	WY20/EWY-2	WX WE3/EWG WXR3
Specification	1.0-10mm*150/175mm	1.0-10mm*150/175mm	1.0-10mm*150/175mm
Added Oxide	ZrO ₂	Y ₂ O ₃	CeO ₂ /La ₂ O ₃ /Y ₂ O ₃ /ZrO ₂ etc
Mass Percent%	0.15-0.9	1.80-2.20	0.80-4.20
Impurities%	≤0.10	≤0.10	≤0.10
Tungsten%	The rest	The rest	The rest
Density	18.4-18.8	18.40-18.60	18.3-18.5
Work Function.(eV)	2.5-3.0	2.0-3.9	2.4-3.0
Color Code	White/Brow	Blue	Turquoise/Purple/Grass Green

FRN-SJ101

AWS A5.17 F7A4-EH14
AWS A5.17 F7A2-EM12

AWS A5.23 F7A0-EA2-A2

Introduction:

FRN-SJ101 : A fluoride-alkaline-type slag-series sintered flux, mesh 10-60 (2.0-0.3 mm). It has great capacity for sulfur removal, phosphorus removal, and anti-rust properties. The flux performs well, is easy to deslag, and produces a fine weld appearance, even in the narrow gap of deep slope entrances. The weld metal has good plasticity and toughness, with low hydrogen reactivity and excellent resistance to cold and heat cracking.

Usage:

It can be applied to different welding wires (such as H08MnA, H10Mn2, H08MnMoA, H08Mn2MoA, etc.) and is suitable for welding low-carbon steel and low alloy steel. Additionally, it can be used for fast welding of pipeline steel and for welding thick-walled structures of various high-tensile steels.

Cautions:

1. Oil, moisture, iron, and other foreign substances must be removed from the welding joint.
2. It is better to use direct current.
3. The welding flux must be baked at 300-350°C for 2 hours.

Typical Chemical Composition of Welding flux (%)

SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂	S	P
15-25	25-35	20-30	15-25	≤0.03	≤0.03

Typical Mechanical Properties of The Deposited Metal

Wires	Standard Models	Yield Strength σ _s (Mpa)	Tensile Strength σ _b (Mpa)	AKV (J)	Specific Elongation δ _s (%)
H08MnA H10Mn2	F4A2- H08MnA F5A4-H10Mn2	≥340 ≥410	≥420 ≥490	≥27(-20°C) ≥27(-40°C)	≥22% ≥22%



FRN-SJ301

AWS A5.17 F6A2-EL12
AWS A5.17 F7A0-EM12K

Introduction:
FRN-SJ301: A silicon-calcium-type sintered flux, mesh 10-40 (2.0-0.45 mm) with a basicity of 1.0-1.1. Either alternating or direct current can be used, but welding wires must be connected to the positive electrode when using direct current. The welding technology has good performance, easy slag detachability, and a fine weld appearance.

Usage:
The flux is suitable for submerged-arc welding of low-carbon steel and low-alloy steel when used with appropriate wires (such as H08A, H08MnA, and H08MnMoA). It is also suitable for fast single-pass and double-sided welding of thin steel sheets and is commonly used for the submerged-arc welding of liquefied gas storage tanks, gas bottles, and pipeline steel.

Cautions:
1. Oil, moisture, rust, and other foreign substances must be removed from the welding joint.
2. The welding flux must be baked at 300-350°C for 2 hours.
3. It is better to use direct current.

Typical Chemical Composition of Welding flux (%)					
SiO ₂ +TiO ₂	Al ₂ O ₃ +MnO	CaO+MgO	CaF ₂	S	P
25-35	30-40	15-25	5-15	≤0.05	≤0.05

Typical Mechanical Properties of The Deposited Metal					
Wires	Standard Models	Yield Strength σ _s (Mpa)	Tensile Strength σ _b (Mpa)	AKV (J)	Specific Elongation δ _s (%)
H08A H08MnA	F4A2-H08A F5A4-H08MnA	≥350 ≥410	≥420 ≥500	≥27(-20°C) ≥27(-40°C)	≥22% ≥22%

FRN-SJ302

AWS A5.17 F6A2-EL12
AWS A5.17 F7A2-EL12

Introduction:
FRN-SJ302 : A type of silicon-calcium medium sintered flux with a B // W ratio of 1.0-1.1 and a mesh size of 10-40 (2.0-0.45 mm). Either alternating or direct current can be used. The welding bead forms well, and the welding slag is “short slag.” Additionally, the welding seam exhibits excellent toughness, moisture resistance, and crack resistance.

Usage:
When applied to welding wires (H08A or H08MnA), it can weld boilers, pipeline steel, and common steel.

Cautions:
1. Oil, moisture, rust, and other foreign substances must be removed from the welding joint.
2. The welding flux must be baked at 300-350°C for 2 hours before welding.

Typical Chemical Composition of Welding flux (%)					
SiO ₂ +TiO ₂	Al ₂ O ₃	CaO+MgO	CaF ₂	S	P
20-30	30-40	15-25	7-10	≤0.06	≤0.06

Typical Mechanical Properties of The Deposited Metal					
Wires	Standard Models	Yield Strength σ _s (Mpa)	Tensile Strength σ _b (Mpa)	AKV (J)	Specific Elongation δ _s (%)
H08A H08MnA	F4A2-H08A F5A4-H08MnA	≥350 ≥410	≥420 ≥490	≥27 ≥27	≥22% ≥22%



► WELDING FLUX

WELDING FLUX

FRN-SJ501

AWS A5.17 F6A2-EL12
AWS A5.17 F7A0-EM12

Introduction:
FRN-SJ501: An aluminum-titanium sintered flux with a B || W ratio of 0.5-0.8 and a mesh size of 10-40 (2.0-0.45 mm). Either alternating or direct current can be used. It has high rust resistance, and the slag is easy to remove after welding. The welding bead is smooth, and the welding technology performs well.

Usage:
When applied to various welding wires such as H08A, H08MnA, H08MnMo, and H10MnSi, it can weld low-carbon steel, low-alloy steel, and pressure vessel steel. It is also suitable for fast welding of thin steel sheets, such as gas steel tanks and membrane water-cooled walls in boiler factories.

- Cautions:**
- 1. Oil, moisture, rust, and other foreign substances must be removed from the welding joint.
 - 2. The welding flux must be baked at 300-350°C for 2 hours before welding.

Typical Chemical Composition of Welding flux (%)					
SiO ₂ +TiO ₂	Al ₂ O ₃	CaO+MgO	CaF ₂	S	P
25-35	50-60	5-10	5-10	≤0.05	≤0.05

Typical Mechanical Properties of The Deposited Metal					
Wires	Standard Models	Yield Strength σ _s (Mpa)	Tensile Strength σ _b (Mpa)	AKV (J)	Specific Elongation δ _s (%)
H08A H08MnA	F4A2-H08A F5A2-H08MnA	≥330 ≥400	≥420 ≥500	≥27 ≥27	≥22% ≥22%

FRN-HJ431

AWS A5.17 F6A2-EL12

Introduction:
FRN-HJ431: A type of smelting flux, ranging in color from red-brown to light yellow, with a glassy granulated texture. It has high manganese and silicon content but low fluorine. The mesh sizes are 8-14 (2.5-1.5 mm), 8-40 (2.5-0.45 mm), and 14-40 (1.5-0.45 mm). Either alternating or direct current can be used, and welding wires must be connected to the positive electrode when using direct current. The welding technology performs well.

Usage:
When applied to welding wires such as H08A, H08MnA, and H10MnSi, it can weld low-carbon steel and some low-alloy steels like 16Mn and 15MnV, as well as ships, boilers, and high-pressure vessels. It can also be used for electro-slag and copper welding.

- Cautions:**
- 1. Oil, moisture, rust, and other foreign substances must be removed from the surface before welding.
 - 2. The flux must be baked at 300-400°C for 2 hours.

Typical Chemical Composition of Welding flux (%)				
SiO ₂ +TiO ₂	Al ₂ O ₃ +MgO	CaF ₂ +CaO	S	P
74-80	9-12	10-14	≤0.06	≤0.06

Typical Mechanical Properties of The Deposited Metal				
Standard Models	Yield Strength σ _s (Mpa)	Tensile Strength σ _b (Mpa)	AKV (J)	Specific Elongation δ _s (%)
Requirement Test Value	≥330 540	410-550 388	≥27 100	≥22 30

WELDING FLUX

Size(mm) Packing	0.5kg or 1kg/ D100mm Plastic Spool	2kg or 5kg/ D200mm Plastic Spool	15kg/D270mm Plastic Spool	15kg/D300mm Plastic Spool	15kg/K300mm or SV300mm Metal Basket	Pail pack			
						100kgs	200kgs	250kgs	350kgs
Φ0.6/Φ0.8/ Φ0.9/Φ1.0/ Φ1.2/Φ1.6	★	★	★	★	★	★	★	★	★

Technical drawing of a circular mechanical part. The drawing includes a top view (left), a side view (middle), and a perspective view (right). Dimensions are provided in millimeters (mm):

- Top view: Diameter $\phi 52 \pm 0.5$, radial dimension 44 ± 0.5 , and a central feature with a diameter of $\phi 100 \pm 1$.
- Side view: Total height 99.9 , a central section height of 27.2 , and a base diameter of 100.5 ± 0.5 .
- Perspective view: Shows the part's profile with a central opening.

Technical drawing of a circular part. The front view shows a circle with a central hole. The side view shows a rectangular profile with dimensions: 16.2, 21.2, 34.5, 40, 45, 38.3, and 100.7.

Size(mm) Packing	Plastic Tube	
Φ1.2/Φ1.6/ Φ2.0/Φ2.5/ Φ3.2/Φ4.0	5kgs	10kgs
	★	★

Size(mm)	Weight per Roll (kg)
Φ2.0/Φ2.5/ Φ3.2/Φ4.0/ Φ4.8	25/100/200/ 250/350

