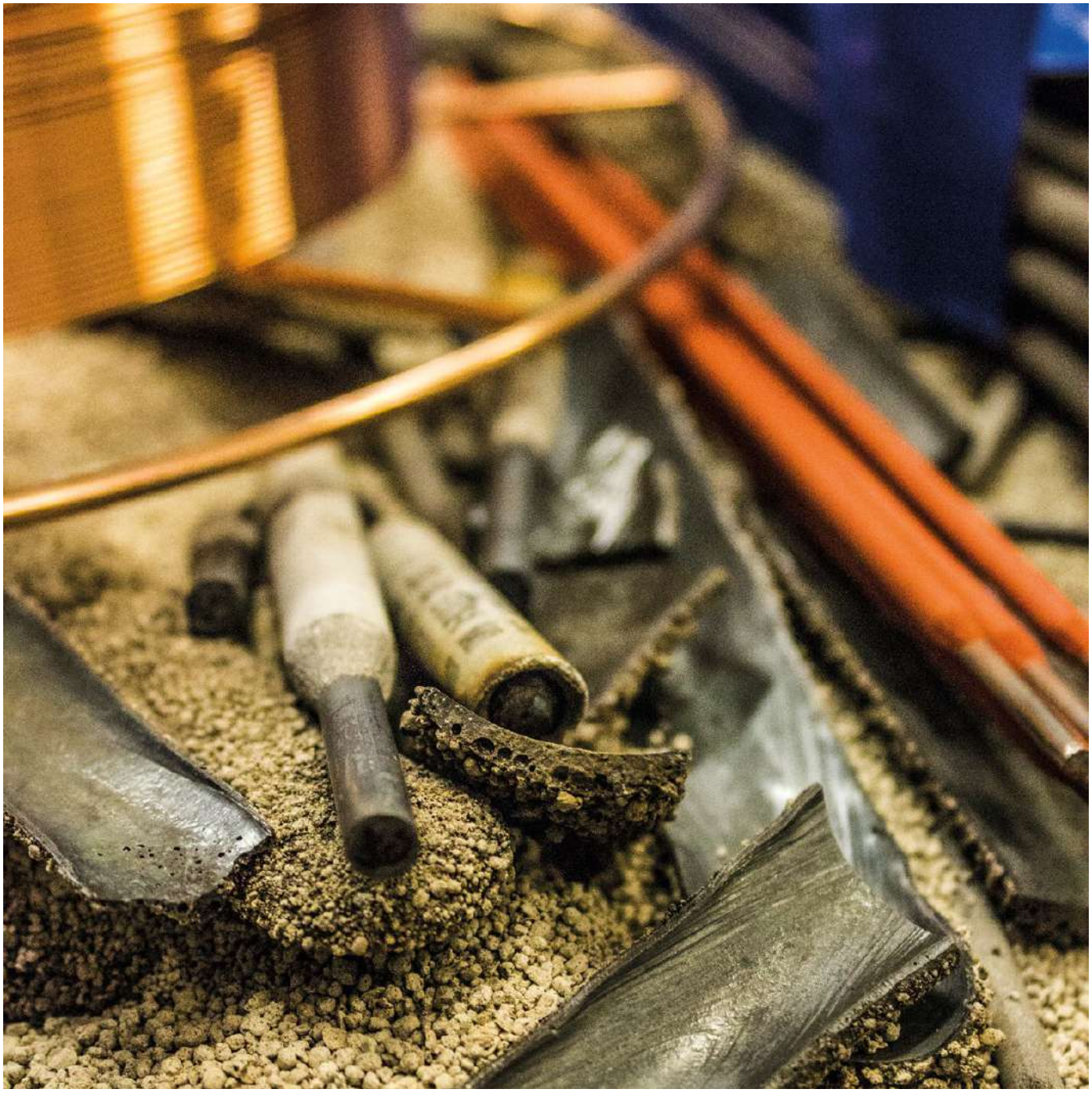
magmaweld

07 / 2025



WELDING CONSUMABLES

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CORPORATE

Magmaweld is a leading and trusted brand in welding. Since its foundation in 1957, the company has played a pioneering role in the development of the Turkish welding industry, building a strong reputation through a comprehensive and evolving product portfolio.

Responding to the needs of an advancing industrial landscape, Magmaweld expanded its manufacturing capabilities to include MIG/MAG and TIG wires, flux-cored wires, and submerged arc wires and fluxes. In 1971, the company started producing welding machines, later extending into robotic welding solutions through a strategic partnership with Panasonic in 1998.

In 2000, Magmaweld centralized its R&D, production, and logistics operations in a state-of-the-art facility in Manisa, Turkey. The move significantly enhanced efficiency, innovation, and quality. With this strategic step, Magmaweld strengthened its global presence and introduced its internationally recognized brand "Magmaweld". The name reflects the resemblance between molten magma beneath the Earth's surface and the molten weld pool.

Today, Magmaweld operates local production and sales organizations in **6 countries** across **3 continents** and exports to more than **75 countries** worldwide.

With a commitment to **"Non-Stop Welding"**, Magmaweld empowers industries with high-quality products, advanced technologies, and solution-driven engineering excellence, ensuring seamless and reliable welding operations across the globe.

Welding Consumables Factory
Organize Sanayi Bölgesi 2. Kısım, Manisa, Turkey

Welding Machines and Automation Factory
Organize Sanayi Bölgesi 5. Kısım, Manisa, Turkey

Welding Consumables Factory
Saint Petersburg, Petergof, Novye Zavody Street, Building 56, Block 5, Unit 1 Russia

INDEX

STICK ELECTRODES

CONTENTS

STICK ELECTRODES

Rutile, Basic ve High Efficiency Electrodes

Cellulosic Electrodes

CONTENTS

STICK ELECTRODES

Low Alloyed, High Strenght and Creep Resistance Steel Electrodes

CONTENTS

STICK ELECTRODES

Stainless Steel Electrodes

CONTENTS

STICK ELECTRODES

Aluminium Alloy Electrodes

Copper Alloy Electrode

Electrodes for Cast Irons

Nickel Alloy Electrodes

CONTENTS

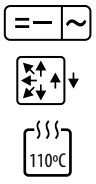
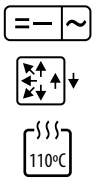
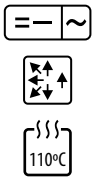
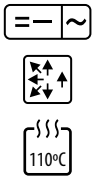
STICK ELECTRODES

Hardfacing Electrodes

*This standard is no longer valid. Added for informational purposes.

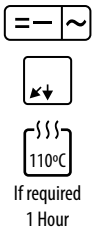
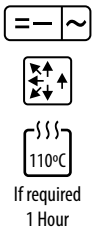
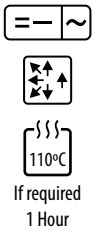
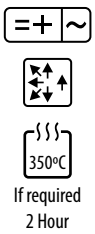
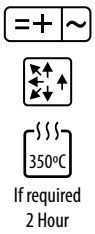
Cutting and Gouging Electrodes

Rutile, Basic ve High Efficiency Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
ESR 11 AWS/ASME SFA - 5.1 E6013 EN ISO 2560 - A E 38 0 RC 11 TS EN ISO 2560 - A E 38 0 RC 11	Especially suitable for welding in sheets thinner than 5 mm, galvanized sheets and tubes, primer painted, painted and slightly rusty steels and in production of tanks and boilers, tube installations. Very easily operated in positional welding, including vertically-down. Good gap-bridging. Smooth arc, well suited for tack-welding due to its easy arc striking and re-striking properties. Possible to use equally well both with AC and DC. Welds are smooth, slightly concave and blending into base metal without undercutting. Slag is self-releasing.	 If required 1 Hour
ESR 12 AWS/ASME SFA - 5.1 E6012 EN ISO 2560 - A E 38 0 RC 11 TS EN ISO 2560 - A E 38 0 RC 11	Especially suitable for welding in sheets thinner than 5 mm, galvanized sheets and tubes, primer painted, painted and slightly rusty steels and in production of tanks and boilers, tube installations. Very easily operated in positional welding, including vertically-down. Good gap-bridging even at wide root openings. Smooth arc, well suited for tack-welding due to its easy arc striking and re-striking properties. Possible to use equally well both with AC and DC. Welds are smooth and blending into base metal without undercutting.	 If required 1 Hour
ESR 13 AWS/ASME SFA - 5.1 E6013 EN ISO 2560 - A E 42 0 RR 12 TS EN ISO 2560 - A E 42 0 RR 12	Suitable for joining and repair welding of light steel fabrications, iron works, wrought iron works, agricultural machines, boiler, chassis of vehicles. Used in all position except vertical-down. Particularly suited for the welding of horizontal fillets. Very smooth weld bead appearance, with easy arc striking and re-striking properties, quite and stable arc with fine-droplet metal transfer. Possible to use equally well both with AC and DC. Slag is completely self-releasing.	 If required 1 Hour
ESR 14 AWS/ASME SFA - 5.1 E7014 EN ISO 2560 - A E 42 0 RR 12 TS EN ISO 2560 - A E 42 0 RR 12	Preferably used in mild steel fabrication, sheet metal and ornamental iron works on poor fit up joints. Due to its iron powder addition in covering, particularly suited for the welding of horizontal fillets grooves with higher speed. Suitable for all position welding except vertical-down. High current carrying capacity, low spatter. Quite, stable arc characteristics with fine and fast droplet metal transfer. Very easy arc striking and re-striking. Very smooth welds blending into base metal without undercuts. Slag is completely self-releasing. Possible to use equally well both with AC and DC.	 If required 1 Hour

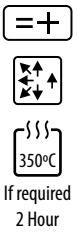
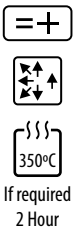
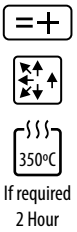
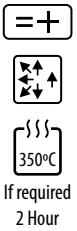
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.45 **Mn:** 0.70	480	550	25	0°C: 55	2.00 x 300 2.00 x 350 2.50 x 300 2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard Plastic
C: 0.10 **Si:** 0.35 **Mn:** 0.75	470	540	26	0°C: 47	2.00 x 300 2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 450	Cardboard
C: 0.07 **Si:** 0.45 **Mn:** 0.60	500	560	28	0°C: 50	2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 350 5.00 x 450 6.00 x 450	Cardboard Plastic
C: 0.07 **Si:** 0.45 **Mn:** 0.50	480	560	28	-20°C: 40 0°C: 70	2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 350 5.00 x 450	Cardboard

Rutile, Basic ve High Efficiency Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
ESA 20 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E6027 E 38 2 RA 73 E 38 2 RA 73	Acid-rutile coated, high efficiency electrode having a weld metal approx. 165 %. Especially designed for welding fillets and narrow angle grooves. Produces complete root fusion and equal-leg fillet welds. Suitable for welding of galvanized, primer painted and slightly rusted components. Due to it's low Silicon (Si) content, weld metal is also suited for subsequent galvanizing, enameling and plastic coating after welding. Provides very smooth welds without undercut. Slag is easily released, even from narrow angles. Welds are of X-ray quality.	 If required 1 Hour
ESR 30 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E6013 E 38 A RR 12 E 38 A RR 12	Rutile type heavy coated electrode which is especially used in fabrication and repair welds of molten zinc bath made of Armco iron and very low carbon steels. Weld metal ensures high crack resistance against the effect of molten zinc. Possible to use equally well both with AC and DC.	 If required 1 Hour
ESR 35 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E6013 E 38 2 RB 12 E 38 2 RB 12	Rutile-basic type coated electrode, particularly suitable for welding root passes and positional welding in fabrication of pipes, boilers and tanks. Also suitable for depositing backing-up beads in submerged arc welding. Owing to its low Si-content, weld metal is suited for subsequent galvanizing and enamelling.	 If required 1 Hour
ESB 42 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7016 H8 E 42 4 B 12 H10 E 42 4 B 12 H10	Multi-purpose electrode for assembly work, workshop and maintenance welding. Particularly used for repair welding of earthmoving equipment booms and approved for rail joint welding. Suitable for root passes as well as positional welding. Smooth and clean welds, merging into base metal without undercuts. Good gap bridging properties. Welds are of X-ray quality.	 If required 2 Hour
ESB 44 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7016 H8 E42 3 B 12 H10 E42 3 B 12 H10	Suitable for fabrication and repair welding of dynamically loaded steel constructions, machines and agricultural equipments, workshop and maintenance welding. Smooth and clean welds, blending into base metal without undercuts. Excellent gap bridging properties. The double covering of this electrode produces a stable, concentrated and directed arc, thus being ideally suited for root pass and positional welding and is suited for AC welding. Welds are of X-ray quality.	 If required 2 Hour

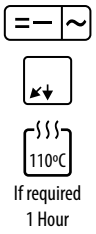
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.07 **Si:** 0.45 **Mn:** 1.15	450	530	24	-20°C: 60 20°C: 100	3.25 x 450 4.00 x 450 5.00 x 450	Cardboard
C: 0.02 **Si:** 0.15 **Mn:** 0.40	380	440	25	20°C: 70	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard
C: 0.08 **Si:** 0.20 **Mn:** 0.50	480	530	23	-20°C: 50 0°C: 60 20°C: 100	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 450	Cardboard
C: 0.06 **Si:** 0.35 **Mn:** 0.85	490	580	29	-40°C: 65 -20°C: 105	2.50 x 350 3.25 x 350 4.00 x 450	Cardboard
C: 0.06 **Si:** 0.65 **Mn:** 1.10	450	550	25	-30°C: 55 -20°C: 70	2.00 x 350 2.50 x 350 3.25 x 350 3.25 x 450 4.00 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic Vacuum

Rutile, Basic ve High Efficiency Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
ESB 48 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7018 H8 E 42 3 B 42 H10 E 42 3 B 42 H10	Suitable for welding fabrication of dynamically loaded steel contructions, bridge, shipbuilding, pipe-line, pressure vessels, tanks, boiler and machines where high tougness is required. Weld metal recovery is appx. 115 %. Smooth and clean welds merging into base metal without undercuts. Good gap bridging properties. Welds are of X-ray quality. It is suited for depositing buffer layers on higher carbon steels.	 If required 2 Hour
ESB 50 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7018 H8 E 42 4 B 42 H5 E 42 4 B 42 H5	Suitable for welding fabrication of dynamically loaded heavy steel constructions, bridge, shipbuilding, pipe line, pressure vessels, tanks, boiler and machines where mechanical properties are required. Weld metal exhibits good toughness properties down to -50°C and produce tough and crack-free welded joints even on steels having a carbon content of up to 0.4%. Weld metal recovery amounts to approx. 120%. Welds are of X-ray quality. Electrode is suitable for depositing buffer layers on higher carbon steels.	 If required 2 Hour
ESB 51 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7018-1 H4 E 42 4 B 42 H5 E 42 4 B 42 H5	Suitable for welding dynamically loaded structures, like bridge, heavy steel construction, pipeline joints, tanks, pressure vessels, boilers and machinery, where high strength and toughness are required. The weld metal has low diffusible hydrogen and high notch impact toughness down to -40°C. It has 115% weld metal efficiency. Provides smooth and clean weld beads, mixing with the base metal without undercut. Good gap bridging and position welding capability. The welds are of X-ray quality. It is also suitable for making buffer passes in high-carbon steels.	 If required 2 Hour
ESB 52 AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A CSA W48	 E7018-1 H4R E 42 5 B 42 H5 E 42 5 B 42 H5 E4918-1-H4	Suitable for welding of steel constructions, bridge, dam, thermal power plants, petrochemical industry, shipbuilding, high strength pipe-lines, pressure vessels, tanks, which are dynamically loaded and require high mechanical properties. The weld metal has a very low hydrogen content and is resistant to ageing. Produces tough and crack-free welded joints, also suite for welding steels having a carbon content of up to 0.6 % and joining of rails. Good operating characteristic, also in root pass and positional welding. Very good gap bridging properties. Welds are of X-ray quality.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.08 **Si:** 0.40 **Mn:** 1.10	460	560	28	-40°C: 90 -30°C: 140	2.00 x 350 2.50 x 350 3.25 x 350 3.25 x 450 4.00 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Plastic Vacuum
C: 0.07 **Si:** 0.35 **Mn:** 1.45	470	560	29	-50°C: 60 -30°C: 100	2.00 x 300 2.00 x 350 2.50 x 350 3.25 x 350 3.25 x 450 4.00 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Plastic Vacuum
C: 0.07 **Si:** 0.40 **Mn:** 1.20	470	560	28	-51°C: 80 -40°C: 100	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard
C: 0.07 **Si:** 0.40 **Mn:** 1.20	460	550	28	-50°C: 100	2.00 x 300 2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Vacuum

Rutile, Basic ve High Efficiency Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
ESH 160R AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7024 E 42 A RR 73 E 42 A RR 73	Suitable for welding of large sections and fillets in shipbuilding with it's 165% recovery. Produces very smooth, concave and clean welds, merging into base metal without undercuts. Suitable for welding prepainted plates. Easy arc striking and restriking. Slag is self-releasing in most cases.	 If required 1 Hour
ESH 160B AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7028 H8 E 38 5 B 73 H10 E 38 5 B 73 H10	Suitable for welding of large sections and fillets with it's 165% recovery. Weld metal has high toughness and crack resistance. Produces very smooth and clean welds, merging into base metal without undercuts. Suitable for welding prepainted plates. Slag removal is easy. Welds are of X-ray quality.	 If required 2 Hour
ESH 180R AWS/ASME SFA - 5.1 EN ISO 2560 - A TS EN ISO 2560 - A	 E7024-1 E 38 A RR 73 E 38 A RR 73	Heavy coated, rutile type high-efficiency electrode having a weld metal recovery of approx. 180 %. It is suited to produce long fillet welds and economically filling-up large weld sections especially in shipbuilding. Suitable to use in pre-painted plates. Has a short burn-off time relatively at low current intensities. Easy arc striking and restriking. Slag is self-releasing in most cases.	 If required 1 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.65 **Mn:** 1.05	530	580	24	20°C: 50	2.50 x 350 3.25 x 450 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard
C: 0.05 **Si:** 0.50 **Mn:** 1.10	450	520	24	-50°C: 60 -20°C: 85	3.25 x 450 4.00 x 450 5.00 x 450	Cardboard
C: 0.07 **Si:** 0.55 **Mn:** 0.80	480	550	25	-20°C: 30 20°C: 50	2.50 x 350 3.25 x 450 4.00 x 450 5.00 x 450	Cardboard

Cellulosic Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information

ESC 60

AWS/ASME SFA - 5.1 E6010
EN ISO 2560 - A E 42 2 C 21
TS EN ISO 2560 - A E 42 2 C 21

Medium coated, cellulosic electrode, especially designed for welding of pipes and plates in all positions at low welding currents. Due to its high penetration, particularly suitable for root pass and fill passes in vertical down direction. Used in pipe-line construction, shipbuilding, storage vessels and assembly works. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.


Root Pass.

Fill Pass.


Not Applicable

ESC 60P

AWS/ASME SFA - 5.1 E6010
EN ISO 2560 - A E 42 3 C 21
TS EN ISO 2560 - A E 42 3 C 21

Medium coated, cellulosic type electrode, especially designed for easy welding of pipe joints in pipe-line construction. Due to its high penetration, particularly suitable for root pass and fill passes in vertical down direction. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.


Root Pass.

Fill Pass.


Not Applicable

ESC 61

AWS/ASME SFA - 5.1 E6011
EN ISO 2560 - A E 35 2 C 21
TS EN ISO 2560 - A E 35 2 C 21

Medium coated, cellulosic electrode, especially designed for use in AC, as well as in DC. Due to its high penetration, it is suitable for root pass and fill passes in vertical down direction. Used in shipbuilding, strorage vessels, boilers, pipeline constructions, assembly and repair works in mild steels, steel casting, galvanized sheets and machinery parts. AC or DCEN (-) is ideal in root passes and AC or DCEP (+) is recommended for fill and cap passes in vertical down direction.


Root Pass.

Fill Pass.


Not Applicable

ESC 70G

AWS/ASME SFA - 5.5 E7010-G
EN ISO 2560 - A E 42 2 C 21
TS EN ISO 2560 - A E 42 2 C 21

Medium coated and Ni (nickel) alloyed cellulosic type electrode, suitable for welding high strength steels, micro-alloyed and low alloyed steels and pipes. Due to its high penetration, it is suitable for root pass and fill passes in the vertical down direction. Well-suited for welding high strength unalloyed and low alloy steels in shipbuilding, storage vessels, boilers, pipe-line constructions and assembly works. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.


Root Pass.

Fill Pass.


Not Applicable

ESC 70P

AWS/ASME SFA - 5.5 E7010-P1
EN ISO 2560 - A E 42 3 1NiMo C 21
TS EN ISO 2560 - A E 42 3 1NiMo C 21

Medium coated, Ni (nickel) and Mo (molybdenum) alloyed cellulosic type electrode, especially designed for easy welding of pipe joints. Suitable for welding high strength steels pipes, micro alloyed and low alloyed steel pipes in pipe-line construction. Due to its high penetration, it is suitable for root pass and fill passes in the vertical down direction. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.


Root Pass.

Fill Pass.


Not Applicable

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.12 **Si:** 0.20 **Mn:** 0.60	470	530	25	-30°C: 40 -20°C: 60	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard TIN
C: 0.10 **Si:** 0.15 **Mn:** 0.50	450	560	27	-30°C: 60	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard TIN
C: 0.12 **Si:** 0.20 **Mn:** 0.55	470	530	24	-20°C: 50	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard TIN
C: 0.15 **Si:** 0.30 **Mn:** 1.30 **Ni:** 0.20	500	560	26	-30°C: 60 -20°C: 70	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard TIN
C: 0.10 **Si:** 0.15 **Mn:** 0.50 **Ni:** 0.80 **Mo:** 0.30	500	610	26	-30°C: 60	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard TIN

Cellulosic Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
ESC 80G AWS/ASME SFA - 5.5 E8010-G EN ISO 2560 - A E 42 3 1Ni C 21 TS EN ISO 2560 - A E 42 3 1Ni C 21	Medium coated and Ni (nickel) alloyed cellulosic type electrode for welding high strength and low alloyed steels and pipes. Due to its high penetration, it is suitable for root pass and fill passes in vertical down direction for use in pipe-line construction, shipbuilding, storage vessels and assembly works. DCEN (-) is ideal in root passes DCEP (+) is recommended for fill and cap passes in vertical down position.	 Root Pass.  Fill Pass.   Not Applicable
ESC 80P AWS/ASME SFA - 5.5 E8010-P1 EN ISO 2560 - A E 46 4 1NiMo C 21 TS EN ISO 2560 - A E 46 4 1NiMo C 21	Medium coated, Ni (nikel) and Mo (molybdenum) alloyed cellulosic type electrode, especially designed for easy welding of pipe joints in pipe-line contruction. Due to its high penetration, it is suitable for root pass and fill passes in the vertical down direction. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.	 Root Pass.  Fill Pass.   Not Applicable
ESC 90G AWS/ASME SFA - 5.5 E9010-G EN ISO 2560-A E 50 2 1NiMo C 21 TS EN ISO 2560-A E 50 2 1NiMo C 21	Medium coated and nickel (Ni) and molybdenum (Mo) alloyed cellulosic type electrode for welding high strength steels and pipes. Due to its high penetration, it is suitable for root pass and fill passes in vertical down direction for use in pipe-line construction, shipbuilding, storage vessels and assembly works. DCEN (-) is ideal in root passes DCEP (+) is recommended for fill and cap passes in vertical down position.	 Root Pass.  Fill Pass.   Not Applicable

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.15 **Si:** 0.25 **Mn:** 1.00 **Ni:** 1.00	500	570	24	-30°C: 50 -20°C: 60	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard TIN
C: 0.09 **Si:** 0.15 **Mn:** 0.55 **Ni:** 0.70 **Mo:** 0.32	515	620	25	-40°C: 55	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350 6.00 x 350	Cardboard TIN
C: 0.14 **Si:** 0.30 **Mn:** 1.20 **Ni:** 0.60 **Mo:** 0.30	540	650	27	-30°C: 45 -20°C: 55	3.25 x 350	Cardboard TIN

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 138 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E7018-G H4 E 46 6 1Ni B 42 H5 E 46 6 1Ni B 42 H5	Basic coated electrode, producing tough and crack-free welded joints. Suitable for welding of high strength and low alloyed steels and fine grained structural steels. Weld deposit is of extremely high metallurgical purity and has a very low hydrogen content. Owing to it's double coating, electrode features a stable and concentrated arc, making especially up to 3,25 mm, are well-suited for positional welding. Welds are of X-ray quality.	=+ 350°C If required 2 Hour
EM 140 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E7018-G H4R E 42 4 Z 1Ni B 42 H5 E 42 4 Z 1Ni B 42 H5	Basic coated electrode, designed to resist to atmospheric corrosion and to provide high charpy impact energy down to -40°C. Suitable for welding steel constructions like bridge, off-shore platforms, stadium, which are made of weathering steels and thick sections of them. Especially 2,50 mm and 3,25 mm diameter well suited for positional welding. Welds are of X-ray quality.	=+ 350°C If required 2 Hour
EM 150 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E8018-C3 H4R E 46 6 1Ni B 42 H5 E 46 6 1Ni B 42 H5	Heavy coated basic type electrode, suitable for welding steel constructions, off-shore platforms, bridge, machinery, production and in their root pass applications where low alloy high strength steels and fine grained structural steels used. Weld metal is high crack resistance under difficult operating conditions such as dynamic loads and especially low environmental temperatures.	=+ 350°C If required 2 Hour
EM 150W AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E8018-W2 E 50 6 Z 1Ni B 42 E 50 6 Z 1Ni B 42	Heavy coated basic type electrode, designed for welding weathering steels, like COR-TEN steels, high strength steels, particularly copper containing steels which are resistant to atmospheric corrosion. Due to its high crack resistance under difficult operating conditions such as dynamic loads, high and low environmental temperatures, suitable to use in fabrication of steel constructions like bridge, stadium, off-shore platforms. Easy to use in root and fill passes. Welds are of X-ray quality.	=+ 350°C If required 2 Hour
EM 160 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E8018-G H4 E 50 6 Mn1Ni B 42 H5 E 50 6 Mn1Ni B 42 H5	Heavy coated basic type electrode with high efficiency, which is for welding low alloy steels, fine grained structural steels and high strength pipes. Due to it's high crack resistance under difficult conditions such as dynamic loads and service temperatures between -60°C and 450°C, it is suitable for use in heavy steel structures, off-shore platform, heavy machinery, pressure vessels, tanks, boiler production, welding and repair jobs of pipes and in their root pass applications. Welds are of X-ray quality.	=+ 350°C If required 2 Hour

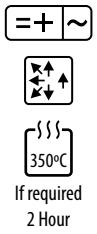
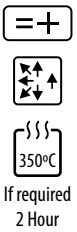
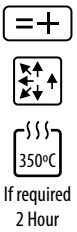
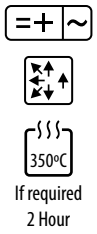
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.06	As Welded				2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 450	Cardboard
Si: 0.30	460	530-680	20	-60°C: 70 20°C: 190		
Mn: 1.20	After Heat Treatment (580°C 15 Hour)					
Ni: 0.95	420	500-640	25	-60°C: 60 20°C: 190		
C: 0.05 **Si:** 0.30 **Mn:** 0.90 **Ni:** 1.00 **Cu:** 0.60	460	580	26	-40°C: 70 -20°C: 120	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum
C: 0.04 **Si:** 0.20 **Mn:** 1.10 **Ni:** 1.00	530	600	25	-60°C: 60	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Vacuum
C: 0.05 **Si:** 0.60 **Mn:** 1.10 **Cr:** 0.55 **Ni:** 0.70 **Cu:** 0.60	580	690	22	-60°C: 55	2.50 x 350 3.25 x 350 3.25 x 450 4.00 x 450 5.00 x 450	Cardboard Vacuum
C: 0.07 **Si:** 0.60 **Mn:** 1.75 **Ni:** 0.85	600	680	22	-60°C: 55	2.00 x 300 2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 165 AWS/ASME SFA-5.5 EN ISO 18275 - A TS EN ISO 18275 - A EN ISO 18275 - A TS EN ISO 18275 - A	 E9018-G H4R E 55 5 Mn1NiMo B 42 H5 E 55 5 Mn1NiMo B 42 H5 E 55 5 Mn1NiMo B T 42 H5 E 55 5 Mn1NiMo B T 42 H5	Heavy coated basic type electrode with high efficiency, which is for welding low alloy steels, fine grained structural steels and high strength steel pipes. Provides high crack resistance under difficult conditions such as dynamic loads, impact, pressure, vibration and service temperatures between -60°C and 450°C. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. Especially 2,50 mm and 3,25 mm diameter well suited for easy positional welding which makes it suitable for joint welding and repair jobs of oil and gas pipes up to X70. Welds are of X-ray quality.	=+   350°C If required 2 Hour
EM 170 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E9018-G H4 E 50 6 Mn1Ni B 42 H5 E 50 6 Mn1Ni B 42 H5	Heavy coated basic type electrode with high efficiency, for welding low alloy high strength steels, fine grained structural steels and high strength steel pipes. Provides high crack resistance under difficult conditions such as dynamic loads, impact, pressure, vibration and service temperatures between -60°C and 450°C. Weld deposit is of a extremely high metallurgical purity and very low hydrogen content. Especially 2,50 mm and 3,25 mm diameter electrodes feature stable and concentrated arc, rendering it well-suited for positional welding. Suitable for welding and repair jobs up to X70 oil and gas pipes. Weld are of X-ray quality.	=+   350°C If required 2 Hour
EM 171 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E8018-C1 H4 E 46 6 2Ni B 42 H5 E 46 6 2Ni B 42 H5	Heavy coated basic type electrode for welding fine grained structural steels and especially cryogenic steels, subjected to low service temperatures up to -60°C. Electrode produces tough and crack-free welded joints. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. Owing to high crack resistance under difficult conditions such as dynamic loads, impact, vibration and low service temperatures, it is suitable for use in welding of storage tanks and piping. Suitable for use in root passes and joints in pipes and equipments of cold storage rooms with service temperatures down to -60°C. Electrode features a stable and concentrated arc. Especially 2,50 mm and 3,25 mm diameters are well-suited for positional welding. Welds are X-ray quality.	=+   350°C If required 2 Hour
EM 172 AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E8018-C2 H4R E 46 6 3Ni B 42 H5 E 46 6 3Ni B 42 H5	Heavy coated basic type electrode for welding fine grained structural steels and especially cryogenic steels. Electrode produces tough and crack-free welded joints. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. Owing to high crack resistance under difficult conditions such as dynamic loads and low service temperatures up to -60°C. It is suitable for use in welding of storage tanks and piping which are subjected to low temperatures. Electrode features a stable and concentrated arc. Especially 2,50 mm and 3,25 mm diameters are well-suited for positional welding. Welds are of X-ray quality.	=+   350°C If required 2 Hour
EM 172L AWS/ASME SFA - 5.5 EN ISO 2560 - A TS EN ISO 2560 - A	 E7018-C2L H4R E 46 6 3Ni B 42 H5 E 46 6 3Ni B 42 H5	High-efficiency basic type electrode used for welding fine-grained structural steels, especially impact-resistant steels at low temperatures. It provides high-toughness and crack-free welded joints. The weld metal is metallurgically very pure and has a low hydrogen content. Due to its low carbon content and consequently high crack resistance, it is suitable for use under demanding operating conditions such as dynamic loads and low service temperatures down to -100°C. It can be safely used in the welding of cold storage facilities, piping systems, storage tanks, and root passes. The welds have very high radiographic quality.	=+ ~   350°C If required 2 Hour

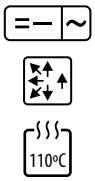
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.06 **Si:** 0.40 **Mn:** 1.75 **Ni:** 0.90 **Mo:** 0.45	As Welded				2.50 x 350 3.25 x 350 3.25 x 450 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Vacuum
	570	650	20	-60°C: 40 -50°C: 50		
	After Heat Treatment (590°C 1 Hour)					
	650	740	24	-60°C: 40 -50°C: 50		
C: 0.05 **Si:** 0.40 **Mn:** 1.70 **Ni:** 1.00	570	650	25	-60°C: 60	2.50 x 350 3.25 x 350 3.25 x 450 4.00 x 350 4.00 x 450 5.00 x 350 5.00 x 450	Cardboard Vacuum
C: 0.05 **Si:** 0.30 **Mn:** 1.00 **Ni:** 2.40 **Cu:** 0.08	As Welded				2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Vacuum
	490	580	27	-60°C: 100		
	After Heat Treatment (605°C 1 Hour)					
	470	550	29	-60°C: 120		
C: 0.05 **Si:** 0.30 **Mn:** 0.90 **Ni:** 3.50	As Welded				2.50 x 350 3.25 x 350 4.00 x 450	Cardboard
	500	610	28	-60°C: 50		
	After Heat Treatment (605°C 1 Hour)					
	520	580	30	-75°C: 50		
C: 0.05 **Si:** 0.25 **Mn:** 0.90 **Ni:** 3.50	After Heat Treatment (605°C 1 Hour)				3.25 x 350 4.00 x 450	Cardboard Vacuum
	510	590	30	-100°C: 40 -60°C: 80		

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 174 AWS/ASME SFA - 5.5	E9018M H4R	EM 174 is a low-hydrogen basic electrode designed for welding high-strength, low-alloy steels. The weld metal, with a tensile strength of 620 MPa (90 ksi), offers excellent toughness and crack resistance. Its specially formulated coating prevents moisture absorption, reducing the risk of hydrogen-induced cracking.It delivers outstanding results when welding high-strength steels such as T-1, HY-80, HY-90, and ASTM A514. With easy arc striking and restriking capabilities, it ensures reliable performance even under challenging conditions. The electrode provides high mechanical strength and radiographic quality in the as-welded condition, with no need for post-weld heat treatment, even at low temperatures.	 If required 2 Hour
EM 175 AWS/ASME SFA - 5.5 EN ISO 18275 - A TS EN ISO 18275 - A	E10018-G H4 E 69 4 Mn2NiCrMo B 42 H5 E 69 4 Mn2NiCrMo B 42 H5	Heavy coated basic type electrode for welding fine grained structural steels which have yield strength up to 690N/mm^2. Suitable for welding high strength steels used in fabrication of cranes, earthmoving and similar heavy construction equipments. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. Electrode features a stable and concentrated arc. Especially 2,50 mm and 3,25 mm diameter well suited for easy positional welding. Welds are of X-ray quality. Producing tough and crack-free welded joints. If normalizing is required after welding, EM 176 should be used.	 If required 2 Hour
EM 176 AWS/ASME SFA - 5.5 EN ISO 18275 - A TS EN ISO 18275 - A	E9018-G E 62 6 Mn2NiMo B 42 E 62 6 Mn2NiMo B 42	Heavy coated basic type electrode for welding fine grained and low alloy steels which will be subsequently normalized or normalized + tempered after welding. Weld deposit is tough and crack-free and has a low hydrogen content. Especially 2,50 mm and 3,25 mm diameters well suited for easy positional welding. Welds are of X-ray quality.	 If required 2 Hour
EM 178 AWS/ASME SFA - 5.5	E10018-D2 H4R	It is a high-efficiency basic electrode developed for welding low-alloy and high-tensile strength steels. It is ideal for applications requiring welds with a minimum tensile strength of 690 MPa and is particularly preferred for the repair and fabrication of Cr-Mo and Mn-Mo alloyed steels.Thanks to its low hydrogen content and high metallurgical purity, it ensures crack-free and highly tough joints. It delivers superior performance under demanding conditions such as dynamic loads and impacts at low temperatures down to -51°C.It can be safely used in critical applications such as cold storage facilities, storage tanks, pressure vessels, and piping systems.	 If required 2 Hour
EM 180 AWS/ASME SFA - 5.5 EN ISO 18275 - A TS EN ISO 18275 - A	E11018-G H4 E 69 6 Mn2NiCrMo B 42 H5 E 69 6 Mn2NiCrMo B 42 H5	Heavy coated basic type electrode for welding fine grained and high strength structural steels which have yield strength up to 690N/mm^2 and tensile strength to 850N/mm^2. Suitable for welding high strength steels used in the fabrication of crane, earthmoving equipment, heavy machinery parts. Due to its high toughness, crack resistance even under difficult operating conditions such as dynamic loads, high and low envriomental temperatures, it is suitable for use is steel constructions, pressure vessels, tanks, boilers and special fabrications and in their root pass applications with safely. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. The electrode features a stable and concentrated arc. Especially 2,50 mm and 3,25 mm diameters well suited for easy positional welding. Welds are of X-ray quality.	 If required 2 Hour

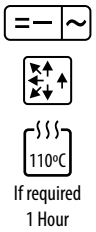
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.05 **Si:** 0.40 **Mn:** 1.10 **Ni:** 1.65 **Mo:** 0.25	570	660	25	-60°C: 60	2.50 x 350 3.25 x 350 4.00 x 450	Cardboard
C: 0.05 **Si:** 0.30 **Mn:** 1.60 **Cr:** 0.45 **Ni:** 2.30 **Cu:** 0.40	730	820	19	-40°C: 85	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum
C: 0.05 **Si:** 0.30 **Mn:** 1.60 **Ni:** 2.00 **Mo:** 0.40	695	765	19	-60°C: 60	3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.09 **Si:** 0.35 **Mn:** 1.90 **Ni:** 0.50 **Mo:** 0.30	640	740	23	-51°C: 55	3.25 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard
C: 0.05 **Si:** 0.30 **Mn:** 1.60 **Cr:** 0.40 **Ni:** 2.20 **Mo:** 0.45	775	890	18	-60°C: 50	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450 6.00 x 450	Cardboard Vacuum

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 181 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	E11018M H4R	Heavy coated basic type electrode for welding low alloy high strength steels, particularly fine grained structural steels. Due to its crack resistance even under difficult operating conditions such as dynamic loads, high and low environmental temperatures, it is suitable for use in steel constructions, pressure vessels, tanks, boiler and special fabrications such as submarines and ships where military specifications are required. It can also be used for root pass applications of these constructions with safely. Weld metal is tough, resistant to cracking and X-ray quality.	 If required 2 Hour
EM 201 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	E8013-G E Mo R 12 E Mo R 12	Rutile type, heavy coated electrode for welding creep resistant steels employed in the construction of pressure vessels, boilers and pipes, subjected to operating temperatures of up to 500°C. Due to its rutile covering, also possible to work in alternatig current (AC). Easy arc striking and re-striking. Very smooth and clean welds, blending into base without undercuts. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	 If required 1 Hour
EM 202 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	E7018-A1 H8 E Mo B 42 H5 E Mo B 42 H5	Basic type, heavy coated electrode for welding creep resistant steels employed in the fabrication of pressure vessels, boilers and pipes, subjected to operating temperatures of up to 500°C. Welds are of X-ray quality. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	 If required 2 Hour
EM 203 AWS/ASME SFA - 5.5 EN ISO 3580-A TS EN ISO 3580-A	E7018-A1 H4R E Mo B 42 H5 E Mo B 42 H5	Basic type electrode for welding creep resistant steels subjected to operating temperatures of up to 350°C. Generally used for joining and maintenance of rotary oven plates in cement industry. Welds are of X-ray quality. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	 If required 2 Hour
EM 206 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	E9018-D1 E Z Mo B 42 E Z Mo B 42	Basic type electrode for welding creep resistant steels employed in the fabrication of pressure vessels, boilers and pipes, subjected to operating temperatures of up to 500°C and high strength steels with high impact resistance up to -50°C. Welds are of X-ray quality. Especially preferred for welding of thick sections where high mechanical properties, charpy impact values and X-ray quality are required. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	 If required 2 Hour

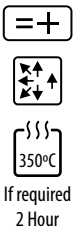
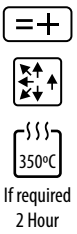
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.05 **Si:** 0.30 **Mn:** 1.80 **Cr:** 0.30 **Ni:** 2.00 **Mo:** 0.35	825	865	19	-50°C: 85	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.07 **Si:** 0.35 **Mn:** 0.50 **Mo:** 0.45	After Heat Treatment (620°C 1 Hour)				2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 450	Cardboard
	540	620	23	20°C: 60		
C: 0.05 **Si:** 0.30 **Mn:** 0.65 **Mo:** 0.50	As Welded				2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum
	485	580	27	20°C: 175		
	After Heat Treatment (620°C 1 Hour)					
	500	575	26	20°C: 160		
C: 0.09 **Si:** 0.45 **Mn:** 0.90 **Mo:** 0.50	510	600	26	20°C: 130	2.50 x 350 3.25 x 350 4.00 x 350	Cardboard
C: 0.07 **Si:** 0.50 **Mn:** 1.40 **Ni:** 0.50 **Mo:** 0.35	620	700	23	-50°C: 65	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 211 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	 E8013-G E CrMo1 R 12 E CrMo1 R 12	Rutile type, heavy coated electrode for welding creep resistant steels employed in the fabrication of pressure vessels, boilers and pipes, subjected to operating temperatures of up to 570°C. Due to its rutile covering, also possible to work in alternating current (AC). Easy arc striking and restriking. Very smooth welds, blending into base metal without undercuts. For thick sections, basic covered EM 212 shall be preferred. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	 If required 1 Hour
EM 212 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	 E8018-B2 H4R E CrMo1 B 42 H5 E CrMo1 B 42 H5	Basic type, heavy coated electrode for welding creep resistant steels employed in the fabrication of pressure vessels, boilers and pipes, subjected to operating temperatures of up to 570°C. Welds are of X-ray quality. Weld metal has a low diffusible hydrogen content (4ml/100g). Generally preferred in thick sections an where high mechanical properties and X-ray quality are necessary. Preheating interpass temperature and post-weld heat treatment shall be done according to base metal used.	 If required 2 Hour
EM 222 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	 E9018-B3 H4R E CrMo2 B 42 H5 E CrMo2 B 42 H5	Basic type, heavy coated electrode for welding creep resistant and high pressure hydrogen resistant steels used in construction of pressure vessels, boiler and piping subjected to operating tempeta-rures up to 600°C. Generally preferred in thick sections with high mechanical properties and X-ray quality necessary. Has a stable arc, low spatter and smooth weld beads. Slag removal is easy. Weld metal has low diffusible hydrogen content (4ml/100g). Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	 If required 2 Hour
EM 223 AWS/ASME SFA - 5.5 EN ISO 3580-A TS EN ISO 3580-A	 E9016-B3 E CrMo2 B 12 H5 E CrMo2 B 12 H5	Basic type heavy coated electrode for welding creep resistant steels used in construction of pressure vessels, boiler and piping, subjected to high operating temperatures. Generally used in joining and maintenance jobs in power plants, chemical and petrochemical industries. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	 If required 2 Hour
EM 235 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	 E8015-B6 H4R E CrMo5 B 42 H5 E CrMo5 B 42 H5	Basic type electrode for welding creep resistant steels. Weld metal matches the composition of steel grade 12CrMo19-5 featuring equal resistance to high-pressure hydrogen attack, creep resistance and creep rupture strength. Typical applications are : petrochemical process plants, hydrocrackers in chemical industries. Suitable to use in pressure vessels and boilers subject to operating temperatures up to 600°C. Weld metal has a low diffisuble hydrogen content (4ml/100g). Preheating, interpass temperature and post weld heat treatment should be done in accordance with base metal to be welded.	 If required 2 Hour

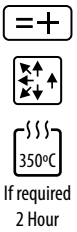
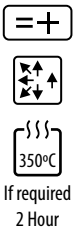
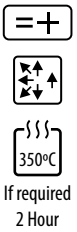
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.06 **Si:** 0.30 **Mn:** 0.50 **Cr:** 1.05 **Mo:** 0.50	After Heat Treatment (690°C 1 Hour) 630	690	21	20°C: 80	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.06 **Si:** 0.40 **Mn:** 0.65 **Cr:** 1.25 **Mo:** 0.55	After Heat Treatment (690°C 1 Hour) 530	610	22	20°C: 140	2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum
C: 0.06 **Si:** 0.30 **Mn:** 0.60 **Cr:** 2.20 **Mo:** 1.00	After Heat Treatment (690°C 1 Hour) 565	660	22	20°C: 160	2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum
C: 0.07 **Si:** 0.30 **Mn:** 0.75 **Cr:** 2.30 **Mo:** 1.00	After Heat Treatment (690°C 1 Hour) 550	650	19	20°C: 50	3.25 x 350 4.00 x 450	Vacuum
C: 0.07 **Si:** 0.20 **Mn:** 0.60 **Cr:** 5.30 **Mo:** 0.50	After Heat Treatment (740°C 1 Hour) 510	610	21	20°C: 120	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Vacuum

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 243 AWS/ASME SFA - 5.5	E12018-G	Basic type electrode for welding cementation steels and 1% Cr, 2.5% Ni, 0.7% Mo containing steels and cast steels. Suitable to use in machine building and construction of apparatus, as well as for repair welding of components made of similar steels grades. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	 If required 2 Hour
EM 251		Basic type electrode for welding and building of Cr-Ni-Mo- V containing steels and cast steels with similar composition. Suitable to use in machine building and construction of apparatus, as well as for repair welding of components made of similar steels grades. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	 If required 2 Hour
EM 253 AWS/ASME SFA - 5.5	E11018-G	Basic type electrode for welding hot work tool steels and cast steels with similar composition, which are subjected to high temperatures up to 550-600°C. Suitable for welding Cr, Mo, V, W containing low alloy steels and hot work tool steels. Also suitable for surfacing and hardfacing on machine parts, forging and drawing dies, shafts which were made of hot work tool steels and similiar compositions. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	 If required 2 Hour
EM 255 EN ISO 3580 - A TS EN ISO 3580 - A	E CrMoV1 B 42 H10 E CrMoV1 B 42 H10	Basic type, electrode for Cr-Mo-V type, designed for welding cast steels of identical composition, subjected to operating temperatures of up to 600°C. Suitable for joining and repair purposes on steam turbine parts, valves and seats, pumps, shafts and rolls. Observe specifications as to preheating and post-weld heat treatment to base metal.	 If required 2 Hour
EM 285 AWS/ASME SFA - 5.5 EN ISO 3580 - A TS EN ISO 3580 - A	E8015-B8 H4R E (CrMo9) B 42 H5 E (CrMo9) B 42 H5	Basic type, covered electrode for welding high temperature creep resistant steels type 9Cr-1Mo steels with operating temperatures of up to 625°C. Suitable for welding of boilers and pipe fabrication.	 If required 2 Hour

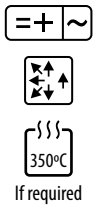
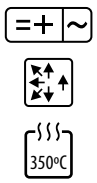
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.04 **Si:** 0.50 **Mn:** 0.60 **Cr:** 1.10 **Ni:** 2.40 **Mo:** 0.75	Hardness 300 HB 790	870	18	20°C: 60	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.09 **Si:** 0.75 **Mn:** 0.60 **Cr:** 1.30 **Ni:** 0.40 **Mo:** 0.90 **V:** 0.50 **Cu:** 0.10	700	850	15	-	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.10 **Si:** 0.90 **Mn:** 1.05 **Cr:** 3.50 **Mo:** 0.70 **V:** 0.55 **W:** 0.60	Hardness 44 HRc 800	920	18	20°C: 45	2.00 x 300 2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.10 **Si:** 0.55 **Mn:** 0.90 **Cr:** 1.20 **Mo:** 1.00 **V:** 0.20	After Heat Treatment (700°C 1 Hour) 550	630	18	20°C: 50	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 0.07 **Si:** 0.30 **Mn:** 0.75 **Cr:** 9.20 **Ni:** 0.10 **Mo:** 1.00	After Heat Treatment (740°C 1 Hour) 560	700	20	20°C: 65	2.50 x 350 3.25 x 350	Vacuum

Low Alloyed, High Strength and Creep Resistance Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EM 295 AWS/ASME SFA - 5.5 EN ISO 3580-A TS EN ISO 3580-A	 E9015-B91 H4R E (CrMo91) B 42 H5 E (CrMo91) B 42 H5	Basic type, covered electrode for welding high temperature creep resistant steels of type 9Cr-1Mo-V-Nb-N with operating temperatures of up to 650°C. Suitable for welding piping and components produced from P91, F91 and T91 steels. Can be used both in thin walled and thick walled pipes and casting successfully, especially in power plants, chemical and petrochemical industry. Welds are X-ray quality.	 If required 2 Hour
EM 296 AWS/ASME SFA - 5.5 EN ISO 3580-A TS EN ISO 3580-A	 E9015-B92 H4R E ZCrMoWVNb9 0.5 B 32 H5 E ZCrMoWVNb9 0.5 B 32 H5	Designed for welding P92 steels used in high-temperature applications such as power plants, refineries, and gasification facilities, these consumables are resistant to service temperatures up to 650 °C. Cr-Mo-Ni-V-W-Nb alloyed and offer stable arc performance, low spatter, easy slag removal, and low-hydrogen weld metal characteristics.	 If required 2 Hour
EM 298 AWS/ASME SFA - 5.5 EN ISO 3580-A TS EN ISO 3580-A	 E9018-B91 H4 E (CrMo91) B 42 H5 E (CrMo91) B 42 H5	Basic type electrode for welding high temperature creep, oxidation and fatigue resistant steels, 9Cr-1Mo-V-Nb-N steels with operating temperatures of up to 650°C. Suitable for welding in piping and equipment production from P91, F91 and T91 with thin and thick walled and casting successfully, especially in power plants, chemical and petrochemical industry. Welds are X-ray quality.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10						
Si: 0.20						
Mn: 0.75						
Cr: 9.25		After Heat Treatment (760°C 2 Hour)			2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Vacuum
Ni: 0.55	620	730	20	20°C: 70		
Mo: 1.00						
V: 0.20						
Nb: 0.04						
N: 0.04						
C: 0.10						
Si: 0.20						
Mn: 0.80						
Cr: 9.50		After Heat Treatment (760°C 2 Hour)				
Ni: 0.50						
Mo: 0.50	620	730	22	20°C: 45	3.25 x 350	Cardboard
V: 0.20						
Nb: 0.05						
W: 1.80						
N: 0.06						
C: 0.10						
Si: 0.20						
Mn: 0.80						
Cr: 9.50		After Heat Treatment (760°C 2 Hour)			2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	
Ni: 0.55	650	750	18	20°C: 50		Cardboard
Mo: 0.90						
V: 0.20						
Nb: 0.05						
N: 0.03						

Stainless Steel Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
EI 307R **AWS/ASME SFA - 5.4** ~E307-16 **EN ISO 3581 - A** E 18 8 Mn R 12 **TS EN ISO 3581 - A** E 18 8 Mn R 12 DIN M. No. 1.4370	Rutile coated electrode for joining dissimilar steels, depositing buffer layer before hardfacing and claddings on ferritic steels. The weld metal consists of austenitic Cr-Ni-Mn steel with possible small amounts of delta ferrite. The weld metal is highly crack resistant and therefore suited for joining difficult to weld steels and depositing stress relaxing buffer layers on crack sensitive base metal prior to hardfacing deposits. Weld metal work hardens by impact and pressure. Suitable for armour plates, high-manganese steels, rails, cross-overs, crane wheels, idlers, which are subjected to dynamically loading, pressure, impact and abrasion. It is non-scaling up to 850°C and highest operating temperature for dissimilar steel joints is 300°C. In the case of higher temperatures, use ENI 422 electrodes. Easy to use in positional welding and possible to use equally well both with AC and DC.	 If required 2 Hour
EI 307B **AWS/ASME SFA - 5.4** ~E307-15 **EN ISO 3581 - A** E 18 8 Mn B 22 **TS EN ISO 3581 - A** E 18 8 Mn B 22 DIN M. No. 1.4370	Basic coated electrode for joining dissimilar steels and depositing buffer layer before hardfacing and claddings on ferritic steels. The weld metal consists of austenitic Cr-Ni-Mn steel with possible small amounts of delta ferrite. The weld metal is highly crack resistant and therefore suited to joining difficult to weld steels and depositing stress relaxing buffer layers on crack sensitive base metal prior hardfacing deposits. Weld metal work hardens by impact and pressure. Suitable for armour plates, rail, cross-over, crane wheels, idlers, which are subjected to dynamically loading, pressure, impact and abrasion. It is non-scaling up to 850°C and highest operating temperature for dissimilar steel joints is 300°C. In the case of higher temperatures, use ENI 422 electrodes. Used with DCEP (DC+).	 If required 2 Hour
EIS 307 **AWS/ASME SFA - 5.4** ~E307-26 **EN ISO 3581 - A** E 18 8 Mn R 53 **TS EN ISO 3581 - A** E 18 8 Mn R 53 DIN M. No. 1.4370	High efficiency (160 %) electrode for joining dissimilar steels and depositing buffer layer before hardfacing and claddings on ferritic steels. The weld metal consists of austenitic Cr-Ni-Mn steel with possible small amounts of delta ferrite. The weld metal is highly crack resistant and therefore suited for joining difficult to weld steels and depositing stress relaxing buffer layers on crack sensitive base metal prior to hardfacing deposits. Weld metal work hardens by impact and pressure. Suitable for armour plates, rail, cross-overs, crane wheels, idlers, which are subjected to dynamically loading, pressure, impact and abrasion. It is non-scaling up to 850°C and highest operating temperature for dissimilar steel joints is 300°C. In the case of higher temperatures, use ENI 422 electrodes. High current carrying capacity due to its low alloy steel core wire and possible to use equally well both with AC and DC.	 If required 2 Hour
EI 308L **AWS/ASME SFA - 5.4** E308L-16 **EN ISO 3581 - A** E 19 9 L R 12 **TS EN ISO 3581 - A** E 19 9 L R 12 DIN M. No. 1.4316	Rutile coated electrode for welding austenitic stainless Cr-Ni steels or cast steels, having an extra low carbon content, as well as stainless or heat resisting chromium steels or cast steels. Suitable for welding stainless steel tanks, valves, pipes and linings in chemical, food, beverage, pharmaceutical industries. For operating temperatures of up to 350°C, non-scaling up to 800°C. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.	 If required 2 Hour
EI 308LB **AWS/ASME SFA - 5.4** E308L-15 **EN ISO 3581-A** E 19 9 L B 22 **TS EN ISO 3581-A** E 19 9 L B 22 DIN M. No 1.4316	Basic coated electrode for welding austenitic stainless Cr-Ni steels or cast steels, having an extra low carbon content, as well as stainless or heat resisting chromium steels or cast steels. Suitable for welding stainless steel tanks, valves, pipes and linings in chemical, petrochemical, energy, food, beverage, pharmaceutical industries. For operating temperatures of up to 350°C, non-scaling up to 800°C. Possible to use with DC. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, provides high strength weld metal.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.45 **Mn:** 6.00 **Cr:** 19.50 **Ni:** 9.00	500	650	37	20°C: 80	2.50 x 300 3.25 x 300 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.08 **Si:** 0.30 **Mn:** 6.00 **Cr:** 19.50 **Ni:** 9.50	500	640	38	20°C: 70	2.50 x 250 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Vacuum
C: 0.07 **Si:** 1.00 **Mn:** 6.50 **Cr:** 19.50 **Mo:** 9.50	440	610	40	20°C: 70	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350 6.00 x 350	Plastic Vacuum
C: 0.02 **Si:** 0.70 **Mn:** 0.90 **Cr:** 19.50 **Ni:** 10.00	440	570	42	20°C: 70	2.00 x 250 2.00 x 300 2.50 x 250 2.50 x 300 2.50 x 350 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.03 **Si:** 0.40 **Mn:** 0.80 **Cr:** 19.00 **Ni:** 10.00	440	580	45	20°C: 70	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350	Vacuum

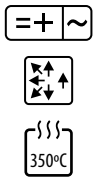
Stainless Steel Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information

EI 308LRS

AWS/ASME SFA - 5.4 E308L-17
EN ISO 3581 - A E 19 9 L R 12
TS EN ISO 3581 - A E 19 9 L R 12
DIN M. No. 1.4316

Rutile type electrode for welding austenitic stainless Cr-Ni steels or cast steels, having an extra low carbon content, as well as stainless or heat resisting chromium steels or cast steels. Suitable for welding stainless steel tanks, valves, pipes and linings in chemical, food, beverage, pharmaceutical industries. For operating temperatures of up to 350°C, non-scaling up to 800°C. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, very finely rippled, flat and smooth bead surface especially in fillet welds, easily removable slag.



If required
2 Hour

EI 308Mo

AWS/ASME SFA - 5.4 E308Mo-15
EN ISO 3581 - A E 20 10 3 B 22
TS EN ISO 3581 - A E 20 10 3 B 22
DIN M. No. 1.4443

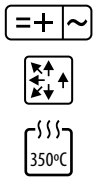
Basic electrode, particularly designed for welding armour plates, dissimilar steels and for surfacing purposes. The weld metal consists of austenitic Cr-Ni-Mn-Mo stainless steel. It features high resistance to cracking caused by impact and high temperature and is therefore indicated for difficult to weld steels and depositing stress relaxing buffer layers on crack sensitive base metal or beneath hardfacing deposits. Use with DCEP. No pre-heat or post welding heat treatment is needed when welding armour plates. Interpass temperature should not exceed 120°C. Shall be used with shortest possible stick-out distance, at 90° angle to the work piece.

If required
2 Hour

EI 308H

AWS/ASME SFA - 5.4 E308H-16
EN ISO 3581 - A E 19 9 H R 12
TS EN ISO 3581 - A E 19 9 H R 12
DIN M. No. 1.4302

Rutile type austenitic stainless steel electrode for welding especially 304H and similar austenitic stainless steels or cast steels and heat resistant steels, having high carbon content. Suitable for welding stainless steel tanks, valves, pipes and linings in chemical, food, beverage, pharmaceutical, fertilizer industries. Weld metal is suitable for use at high operating temperatures and it is also non-scaling. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.



If required
2 Hour

EI 308MA

EN ISO 3581 - A E 21 10 R
TS EN ISO 3581 - A E 21 10 R
DIN M. No. 1.4835

EI 308MA is a special rutile-type electrode designed for welding high-temperature stainless steels such as Outokumpu 253 MA and EI 308MA. These steels and filler metals, used in furnaces, combustion chambers, and burners, provide exceptional resistance to oxidation up to 1100°C. The chemical composition of EI 308MA is optimized to produce a weld metal with high crack resistance. These steels typically form a thick oxide layer during welding or hot rolling, and oxidized plates and welds must be cleaned before welding. The electrode offers easy arc initiation and re-ignition, features fine droplet transfer, and ensures good fusion with the base metal. The slag is easy to remove.
It demonstrates excellent resistance to corrosion at high temperatures but is not designed for aqueous corrosion resistance.

If required
2 Hour

EIS 308

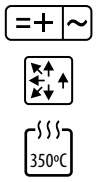
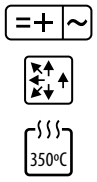
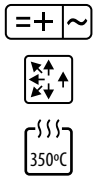
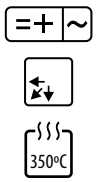
AWS/ASME SFA - 5.4 E308-26
EN ISO 3581 - A E 19 9 R 53
TS EN ISO 3581 - A E 19 9 R 53
DIN M. No. ~1.4301

Rutile type stainless steel electrode with high recovery (160%) for welding 18Cr/8Ni austenitic stainless steels to mild steels and low alloyed steels and also for surfacing applications on such steels. Weld metal deposit is austenitic-ferritic stainless steels. Possible to use equally well both with AC and DC. High current carrying capacity, since core wire is not made of stainless steel.

If required
2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.02 **Si:** 0.70 **Mn:** 0.90 **Cr:** 19.50 **Ni:** 10.00	440	570	42	20°C: 70	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.08 **Si:** 0.55 **Mn:** 1.80 **Cr:** 20.00 **Ni:** 11.50 **Mo:** 2.50	440	690	40	20°C: 70	2.50 x 250 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.06 **Si:** 0.70 **Mn:** 1.00 **Cr:** 20.00 **Ni:** 10.50	440	600	45	20°C: 60	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.08 **Si:** 1.50 **Mn:** 0.75 **Cr:** 21.75 **Ni:** 11.00 **N:** 0.15	520	700	35	20°C: 60	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.04 **Si:** 0.80 **Mn:** 0.80 **Cr:** 19.00 **Ni:** 10.50	460	600	37	20°C: 65	2.00 x 300 2.50 x 350 3.25 x 350 4.00 x 350	Vacuum

Stainless Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EI 309L **AWS/ASME SFA - 5.4** **EN ISO 3581-A** **TS EN ISO 3581-A** DIN M. No	 **E309L-16** **E 23 12 L R 12** **E 23 12 L R 12** 1.4337	Electrode for joining dissimilar steels (austenitic steels to ferritic steels) and for austenitic claddings on ferritic steels. Weld metal consists of austenite with approx. 15% delta-ferrite. Claddings on unalloyed and low alloy steels are already corrosion resistant in the first layer. Highest operating temperature for joints between dissimilar steels is 300°C. In case of higher temperatures use ENI 422 electrodes. Fine metal droplet transfer, good fusion of joint faces, finely ripped bead surface, easy slag removal, easy arc striking and restriking.	 If required 2 Hour
EI 309LB **AWS/ASME SFA - 5.4** **EN ISO 3581-A** **EN ISO 3581 - A** DIN M. No.	 **E309L-15** **E 23 12 L B 22** **E 23 12 L B 22** 1.4332	Basic type electrode for joining dissimilar steels (austenitic steels to ferritic steels) and for austenitic claddings on ferritic steels. Weld metal consists of austenite with approx. 15% delta-ferrite. Claddings on unalloyed and low alloy steels are already corrosion resistant in the first layer. Higher operating temperature for joints between dissimilar steels is 300°C. Fine metal droplet transfer, good fusion of joint faces, finely ripped bead surface, easy slag removal.	 If required 2 Hour
EI 309LRS **AWS/ASME SFA - 5.4** **EN ISO 3581 - A** **TS EN ISO 3581 - A** DIN M. No.	 **E309L-17** **E 23 12 L R 12** **E 23 12 L R 12** 1.4332	Rutile type electrode for joining dissimilar steels (austenitic steels to ferritic steels) and for austenitic claddings on ferritic steels. Weld metal consists of austenite with approx. 15% delta-ferrite. Claddings on unalloyed and low alloy steels are already corrosion resistant in the first layer. Higher operating temperature for joints between dissimilar steels is 300°C. Fine metal droplet transfer, good fusion of joint faces, finely ripped flat and smooth bead surface, especially in fillet welds. Easy slag removal of slag.	 If required 2 Hour
EI 309MoL **AWS/ASME SFA - 5.4** **EN ISO 3581 - A** **TS EN ISO 3581 - A** DIN M. No.	 **E309LMo-16** **E 23 12 2 L R 12** **E 23 12 2 L R 12** 1.4459	Rutile type stainless electrode for joining dissimilar steels (austenitic steels to ferritic steels) and for austenitic claddings. Weld metal consists of austenite with approx. 15% delta-ferrite. Claddings on unalloyed and low-alloy steels are already corrosion resistant in the first layer, due to Mo (molybdenum) content. Higher operating temperature for joints between dissimilar steels is 300°C. In the cases of higher temperatures, use ENI 422 electrodes. Fine metal droplet transfer, good fusion of joint faces, finely ripped bead surface, easy slag removal, easy arc striking and restriking.	 If required 2 Hour
EIS 309 **AWS/ASME SFA - 5.4** **EN ISO 3581 - A** **TS EN ISO 3581 - A** DIN M. No.	 **E309-26** **E (22 12) R 53** **E (22 12) R 53** ~1.4833	Rutile type, high recovery (160%) stainless steel electrode for welding of heat resistant 22Cr/12Ni austenitic stainless steels to mild steels and low alloyed steels and also for surfacing applications on such steels. Weld metal deposit is austenitic-ferritic stainless steels. Possible to use equally well both with AC and DC. High current carrying capacity, since core wire is not made of stainless steel.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.03 **Si:** 0.90 **Mn:** 1.10 **Cr:** 23.00 **Ni:** 12.50	450	570	40	20°C: 60	2.50 x 250 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.02 **Si:** 0.30 **Mn:** 1.30 **Cr:** 23.00 **Ni:** 13.00	430	530	35	20°C: 60	2.50 x 300 3.25 x 300 3.25 x 350	Vacuum
C: 0.03 **Si:** 0.90 **Mn:** 1.10 **Cr:** 23.00 **Ni:** 12.50	450	570	40	20°C: 60	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.02 **Si:** 0.90 **Mn:** 0.95 **Cr:** 23.50 **Ni:** 12.50 **Mo:** 2.50	600	720	30	20°C: 50	2.00 x 300 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350	Plastic Vacuum
C: 0.07 **Si:** 0.85 **Mn:** 0.75 **Cr:** 23.50 **Ni:** 13.00	440	580	36	20°C: 70	2.00 x 300 2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Vacuum

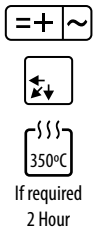
Stainless Steel Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information

EIS 309Mo

AWS/ASME SFA - 5.4 E309Mo-26
EN ISO 3581-A E Z 23 12 2 L R 53
TS EN ISO 3581-A E Z 23 12 2 L R 53

Rutile type, high recovery (160%) stainless steel electrode for welding dissimilar steels ferritic to austenitic steels and depositing austenitic stainless claddings. The austenitic weld metal has a delta-ferrite content of approx. 15 %. Claddings on unalloyed steels are already corrosion resistant in the first layer, due to Mo (molybdenum) content. Highest operating temperature for dissimilar steel joints is 300°C. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easy slag removal. High current carrying capacity, since core wire is not made of stainless steel.

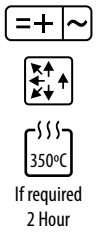


If required
2 Hour

EI 310

AWS/ASME SFA - 5.4 E310-16
EN ISO 3581 - A E 25 20 R 32
TS EN ISO 3581 - A E 25 20 R 32
DIN M. No. 1.4842

Rutile type stainless steel electrode for welding heat resisting chromium and chromium-nickel steels as well as cast steels. Weld metal deposit is fully austenitic stainless steel, containing 25% chromium and 20% nickel. Suitable for welding heat treatment and industrial furnaces and equipments which are subjected to service temperatures up to 1200°C. Weld metal is non-scaling up to 1250°C. Especially it is resistant to hot crack. Exhibits high charpy impact energy at low temperatures. Weld metal is not corrosion resistant to sulphurous combustion gases. Possible to use equally well both with AC and DC.



If required
2 Hour

EI 310B

AWS/ASME SFA - 5.4 E310-15
EN ISO 3581 - A E 25 20 B 12
TS EN ISO 3581 - A E 25 20 B 12
DIN M. No. 1.4842

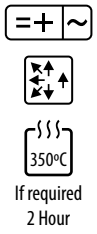
Basic coated stainless steel electrode for welding heat resisting chromium and chromium-nickel steels as well as cast steels. Weld metal deposit is fully austenitic stainless steel, containing 25% chromium and 20% nickel. Suitable for welding heat treatment and industrial fumaces and equipments which are service temperatures up to 1200°C. Weld metal is non-scaling up to 1250°C. Especially high charpy impact energy at low temperatures. Weld metal is not corrosion resistant to sulphurous combustion gases. Used with DCEP.

If required
2 Hour

EI 312

AWS/ASME SFA - 5.4 E312-16
EN ISO 3581 - A E 29 9 R 12
TS EN ISO 3581 - A E 29 9 R 12
DIN M. No. 1.4337

Rutile type stainless steel electrode for joining dissimilar steels and depositing claddings on ferritic steels. The ferritic-austenitic Cr-Ni weld metal contains approximately 50% of delta-ferrite and is non-scaling up to 1100°C. It features high resistance to cracking and is therefore suited for joining difficult to weld steels and depositing stress-relaxing buffer layers on crack sensitive base metals. Especially used in crack repair and build-up of tool and die steels, rebuilding of worn or cracked gear teeth, buffer layer on cutting blades. Suitable for welding galvanized steel plates. Possible to use equally well both AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joints faces, finely rippled bead surface, easy slag removal.

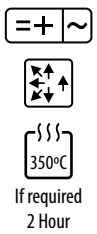


If required
2 Hour

EI 312BLUE

AWS/ASME SFA - 5.4 ~E312-16
EN ISO 3581 - A E 29 9 R 32
TS EN ISO 3581 - A E 29 9 R 32

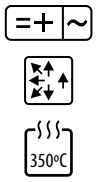
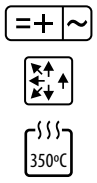
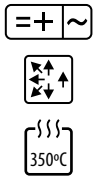
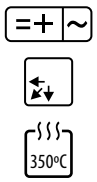
EI 312BLUE is a rutile coated stainless steel electrode for joint welding of different steels and for coating applications on ferritic steels. The ferritic-austenitic Cr-Ni alloy weld metal contains about 50% delta-ferrite and is scale resistant up to +1100°C. Due to its high crack resistance, it is suitable for joint welding of low weldability steels and for buffer layer applications prior to hardfacing on crack sensitive steels. It is especially used in crack repair, buffer pass applications, repair of eaten or cracked threads and buffer layer applications of cutting blades on mold and tool steels. It is also suitable for welding galvanized steels. EI 312BLUE provides superior performance when joining different steels, welding tool steels, manganese steels and spring steels. It can be welded with both AC and DC current, has a fine metal drop transition and ensures good fusion with base metal surfaces. It is characterized by soft melting, good seam appearance and easy to clean slag.



If required
2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.07 **Si:** 0.80 **Mn:** 1.60 **Cr:** 22.50 **Ni:** 12.50 **Mo:** 2.40	440	580	33	20°C: 50	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.10 **Si:** 0.60 **Mn:** 1.65 **Cr:** 25.50 **Ni:** 21.00	440	600	30	20°C: 70	2.00 x 250 2.00 x 300 2.50 x 250 2.50 x 300 3.25 x 300 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.10 **Si:** 0.65 **Mn:** 1.40 **Cr:** 26.00 **Ni:** 21.00	440	600	33	20°C: 60	2.50 x 250 3.25 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.10 **Si:** 0.60 **Mn:** 1.00 **Cr:** 29.50 **Ni:** 9.00	660	760	20	20°C: 50	2.00 x 300 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.09 **Si:** 1.10 **Mn:** 0.75 **Cr:** 29.00 **Ni:** 9.50 **Mo:** 0.30	680	800	25	20°C: 50	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum

Stainless Steel Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
EI 312RS **AWS/ASME SFA - 5.4** E312-17 **EN ISO 3581 - A** E 29 9 R 12 **TS EN ISO 3581 - A** E 29 9 R 12 DIN M. No. 1.4337	Rutile type stainless steel electrode for joining dissimilar steels and depositing claddings on ferritic steels. The ferritic-austenitic Cr-Ni weld metal contains approximately 50% of delta-ferrite and is non-scaling up to 1100°C. It features high resistance to cracking and is therefore suited for joining difficult to weld steels and depositing stress-relaxing buffer layers on crack sensitive base metals. Especially used in crack repair and build-up of tool and die steels, rebuilding of worn or cracked gear teeth, buffer layer on cutting blades. Suitable for welding galvanized steel plates. Possible to use equally well both AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joints faces, finely rippled flat and smooth bead surface, especially in fillet welds. Easy slag removal of slag.	 If required 2 Hour
EI 316L **AWS/ASME SFA - 5.4** E316L-16 **EN ISO 3581-A** E 19 12 3 L R 32 **TS EN ISO 3581-A** E 19 12 3 L R 32 DIN M. No 1.4430	Rutile type stainless steel electrode for welding austenitic stainless Cr-Ni-Mo steels or cast steels, having an extra low carbon content. For operating temperatures of up to 400°C. Especially suitable for welding of stainless steel chemical tanks and pipes in chemical, textile, paint, paper industries. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.	 If required 2 Hour
EI 316LB **AWS/ASME SFA - 5.4** E316L-15 **EN ISO 3581 - A** E 19 12 3 L B 42 **TS EN ISO 3581 - A** E 19 12 3 L B 42 DIN M. No. 1.4430	Basic type stainless steel electrode for welding austenitic stainless Cr-Ni-Mo steels and cast steels, having a low carbon content. For operating temperatures up to 400°C. Especially suitable for welding of stainless steel chemical tanks and pipes made of low carbon austenitic 19Cr/12Ni/2-3Mo stainless steels in chemical, textile, paint, paper industries. Used with DCEP.	 If required 2 Hour
EI 316LRS **AWS/ASME SFA - 5.4** E316L-17 **EN ISO 3581 - A** E 19 12 3 L R 32 **TS EN ISO 3581 - A** E 19 12 3 L R 32 DIN M. No. 1.4430	Rutile type stainless steel electrode for welding austenitic stainless Cr-Ni-Mo steels or cast steels, having an extra low carbon content. For operating temperatures of up to 400°C. Especially suitable for welding of stainless steel chemical tanks and pipes in chemical, textile, paint, paper industries. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, finely ripped flat and smooth bead surface, especially in fillet welds. Easy slag removal of slag.	 If required 2 Hour
EIS 316 **AWS/ASME SFA - 5.4** E316-26 **EN ISO 3581 - A** E 19 12 2 R 53 **TS EN ISO 3581 - A** E 19 12 2 R 53 DIN M. No. ~1.4443	Rutile type, high recovery (160%) stainless steel electrode for welding 19Cr/12Ni/2-3Mo austenitic stainless steels to mild steels and low alloyed steels and also for surfacing applications on such steels. Weld metal deposit is austenitic-ferritic stainless steels. Possible to use equally well both with AC and DC. High current carrying capacity, since core wire is not made of stainless steel.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.60 **Mn:** 1.00 **Cr:** 29.50 **Ni:** 9.00	660	760	20	20°C: 50	3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Vacuum
C: 0.03 **Si:** 0.80 **Mn:** 0.90 **Cr:** 19.00 **Ni:** 12.00 **Mo:** 2.80	460	560	40	20°C: 70	2.00 x 250 2.00 x 300 2.50 x 250 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.02 **Si:** 0.50 **Mn:** 0.80 **Cr:** 18.00 **Ni:** 13.00 **Mo:** 2.80	480	590	38	20°C: 70	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.03 **Si:** 0.80 **Mn:** 0.90 **Cr:** 19.00 **Ni:** 12.00 **Mo:** 2.80	460	560	40	20°C: 70	3.25 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.07 **Si:** 0.85 **Mn:** 0.60 **Cr:** 18.00 **Ni:** 12.50 **Mo:** 2.70	470	600	35	20°C: 50	2.00 x 300 2.50 x 350 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Vacuum

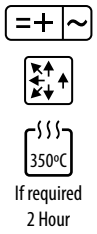
Stainless Steel Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information

EI 318

AWS/ASME SFA - 5.4 E318-16
EN ISO 3581 - A E 19 12 3 Nb R 32
TS EN ISO 3581 - A E 19 12 3 Nb R 32
DIN M. No. 1.4576

Rutile type stainless steel electrode for welding stabilized Cr-Ni-Mo austenitic stainless and cast steels. Suitable for using operating temperatures up to 400°C. Especially used for welding of stainless steels acid, salt and alkaline tanks, valves and pipes in chemical, textile, paint and paper industries. Possible to use equally well both with AC and DC. Easy arc striking and re-striking.
Fine-droplet metal transfer, good wash-in of joint sides, easily removable slag.

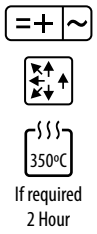


If required
2 Hour

EI 347

AWS/ASME SFA - 5.4 E347-16
EN ISO 3581-A E 19 9 Nb R 32
TS EN ISO 3581-A E 19 9 Nb R 32
DIN M. No 1.4551

Rutile type stainless steel electrode for welding stabilized austenitic stainless Cr-Ni steels, and cast steels, as well as stainless or heat resisting chromium steels to cast steels. Stabilized with Nb (Niobium) and resistant to intergranular corrosion. Weld metal is suitable for operating temperatures up to 400°C, non-scaling up to 800°C. Especially suitable for welding of stainless steel tanks, valves and pipes in milk, beverage, food, chemical and petrochemical industries. Possible to use equally well both with AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.

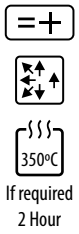


If required
2 Hour

EI 347B

AWS/ASME SFA - 5.4 E347-15
EN ISO 3581 - A E 19 9 Nb B 12
TS EN ISO 3581 - A E 19 9 Nb B 12
DIN M. No. 1.4551

Basic type stainless steel electrode for welding stabilized austenitic stainless Cr-Ni steels, and cast steels, as well as stainless or heat resisting chromium steels to cast steels. Stabilized with Nb (Niobium) and resistant to intergranular corrosion. Weld metal is suitable for operating temperatures up to 400°C, non-scaling up to 800°C. Especially suitable for welding of stainless steel tanks, valves and pipes in milk, beverage, food, chemical and petrochemical industries. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.

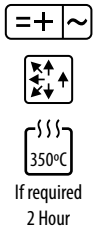


If required
2 Hour

EI 385

AWS/ASME SFA - 5.4 E385-16
EN ISO 3581 - A E 20 25 5 Cu N L R 12
TS EN ISO 3581 - A E 20 25 5 Cu N L R 12
DIN M. No. 1.4539

Rutile type fully-austenitic stainless steel electrode for welding of unstabilized or stabilized corrosion resisting Cr-Ni-Mo alloyed stainless steels like 904L/1.4539. Especially used in flue gas desulphurization plants, fertilizer plants, sea water transfer fittings, in petrochemical, paper and pulp industries, etc. Due to high Ni, Mo and low C content, weld metal have high resistant to intergranular, pitting, crevice and stress corrosion types in chloride containing solutions, phosphorus-, sulphur-, formic acids and sea water. Possible to use equally well both AC and DC. Easy arc striking and re-striking. Fine metal droplet transfer, good fusion of joints faces, finely rippled flat and smooth bead surface, especially in fillet welds. Easy slag removal of slag.

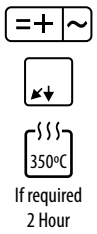


If required
2 Hour

EI 385RS

AWS/ASME SFA - 5.4 E385-17
EN ISO 3581 - A E 20 25 5 Cu N L R 53
TS EN ISO 3581 - A E 20 25 5 Cu N L R 53
DIN M. No. 1.4539

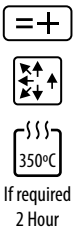
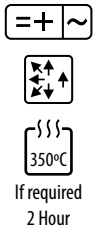
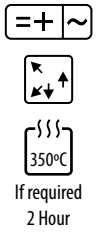
Fully austenitic rutile covered stainless steel welding electrode with 160% efficiency and with an alloyed core wire. Especially used in steel construction and cladding. It is designed for joint welding of corrosion resistant CrNiMoCu alloy steels and low alloy steels. Coatings with this electrode give a weld metal that is resistant to intergranular corrosion, pitting and stress corrosion, especially from environments containing sulfuric, phosphoric acids or ammonium acetate. Can be welded both in AC and DC. Slag is easy to clean.



If required
2 Hour

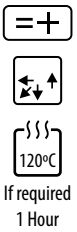
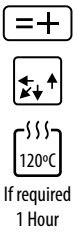
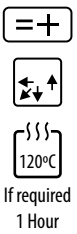
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.02 **Si:** 0.80 **Mn:** 0.90 **Cr:** 19.00 **Ni:** 12.00 **Mo:** 2.90 **Nb:** 0.25	500	600	35	20°C: 70	2.00 x 250 2.00 x 300 2.50 x 250 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Vacuum
C: 0.02 **Si:** 0.80 **Mn:** 0.90 **Cr:** 19.50 **Ni:** 10.00 **Nb:** 0.30	480	600	42	20°C: 70	2.00 x 250 2.00 x 300 2.50 x 250 2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
C: 0.03 **Si:** 0.40 **Mn:** 1.50 **Cr:** 20.00 **Ni:** 10.00 **Nb:** 0.70	490	620	38	20°C: 70	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 350	Plastic Vacuum
C: 0.02 **Si:** 0.70 **Mn:** 1.25 **Cr:** 20.50 **Ni:** 25.00 **Mo:** 5.00 **Cu:** 1.60	420	590	35	20°C: 70	2.50 x 300 3.25 x 350 4.00 x 350	Plastic Vacuum
C: 0.02 **Si:** 0.70 **Mn:** 1.30 **Cr:** 20.50 **Ni:** 25.00 **Mo:** 4.50 **Cu:** 1.50	420	590	35	-40°C: 65 20°C: 70	3.25 x 350	Vacuum

Stainless Steel Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EIS 410 **AWS/ASME SFA - 5.4** **EN ISO 3581 - A** **TS EN ISO 3581 - A** DIN M. No.	 **E410-15** **E (13) B 42** **E (13) B 42** ~1.4009	Basic type stainless steel electrode with high recovery, which is used for welding of approx. 13% Cr containing stainless and heat resistant chromium steels or cast steels. Deposits martensitic stainless steel weld metal. Also suitable for corrosion and abrasion resistant surfacing of contact surfaces of gas, water and steam fan, fan blades and fittings subjected to operating temperatures up to 450°C. Weld metal is non-scaling up to 850°C. Use with DCEP. Depending on type of base metal and wall thickness, preheating and interpass temperatures from 100 to 400°C and tempering at 650 to 750°C are advisable.	 If required 2 Hour
EIS 410NiMo **AWS/ASME SFA - 5.4** **EN ISO 3581 - A** **TS EN ISO 3581 - A** DIN M. No.	 **E410NiMo-15** **E 13 4 B 42** **E 13 4 B 42** 1.4317	Basic type stainless steel electrode with high recovery, which is used for welding of 12-14% Cr and 3-4% Ni containing stainless and heat resistant chromium steels or cast steels. Deposits martensitic stainless steel weld metal. Also suitable for corrosion and abrasion resistant surfacing of contact surfaces of gas, water, sea water and steam fan, fan blades and fittings in hydro-electric plants and continuous casting rolls. Used with DCEP. For wall thickness over 10 mm preheating to max. 150°C and after welding tempering or normalizing + tempering are recommended. Especially in joint welding a buffer layer with EI 312 or EIS 307 electrode is advisable.	 If required 2 Hour
EIS 430 **AWS/ASME SFA - 5.4** **EN ISO 3581-A** **TS EN ISO 3581-A** DIN M. No	 **E430-15** **E 17 B 62** **E 17 B 62** ~1.4104	Basic type electrode which provides 17% Cr containing ferritic stainless steel weld metal. Generally used for joining of stainless steels with similar composition and surfacing of seating surfaces of steam, water and gas valves, which are made of stainless steels. Also used for corrosion resistant build-up, buffer or wear resistant surfaces on Cr containing steels and stainless steels. Preheating and interpass temperature shall be 200 - 300 °C and post weld heat treatment at 730 - 800 °C is necessary.	 If required 2 Hour
EI 2209 **AWS/ASME SFA - 5.4** **EN ISO 3581 - A** **TS EN ISO 3581 - A** DIN M. No.	 **E2209-16** **E 22 9 3 N L R 12** **E 22 9 3 N L R 12** ~1.4462	Electrode for welding dublex (ferritic-austenitic) stainless Cr-Ni-Mo steels. Especially used in welding of acid tanks and pipes, in chemical, petrochemical, paper, shipbuilding and desalination industries. Suitable also for welding dublex stainless steels to carbon steels. The delta-ferrite content of the as-deposited weld metal amounts to approx. 25 to 35 %. The high-strength and ductile weld metal exhibits good resistance to pitting, crevice corrosion and stress corrosion cracking in chloride-bearing media. For operating temperatures of up to 250°C. Possible to use equally well both with AC and DC. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easy arc striking, restriking and slag removal.	 If required 2 Hour
EI 2209RS **AWS/ASME SFA - 5.4** **EN ISO 3581 - A**	 **E2209-17** **E 22 9 3 N L R 12**	Duplex stainless steel electrode used for welding ferritic-austenitic (duplex) stainless steels containing Cr-Ni-Mo. It is used in the welding of acid tanks and piping systems in the chemical, petrochemical, paper, shipbuilding, and seawater treatment industries. It can also be used for joining duplex stainless steels with carbon steels. The delta-ferrite content of the weld metal is approximately between 25% and 35%. The weld metal has high strength and ductility, and offers excellent resistance to pitting corrosion and stress corrosion cracking in chloride-containing solutions. It can be used in service temperatures up to 250°C. Fine droplet transfer ensures smooth weld seams by providing good fusion with base metal surfaces. Welding can be performed using both AC and DC. Arc striking, re-ignition, and slag removal are easy.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.06						
Si: 0.45		After Heat Treatment (740°C 1 Hour)				
Mn: 0.80	-	750	22	20°C: 50	2.50 x 350 3.25 x 350 4.00 x 350	Vacuum
Cr: 12.00		Hardness 375 HB				
Ni: 0.50						
C: 0.06						
Si: 0.40		After Heat Treatment (600°C 1 Hour)				
Mn: 0.80	-	850	17	20°C: 47	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
Cr: 12.00		Hardness 410 HB				
Ni: 4.00						
Mo: 0.50						
C: 0.08						
Si: 0.65		After Heat Treatment (780°C 2 Hour)				
Mn: 0.80	475	720	23	-	2.50 x 350 3.25 x 350	Vacuum
Cr: 16.50		Hardness 220 HB				
C: 0.02						
Si: 0.70						
Mn: 1.00						
Cr: 22.50	660	800	28	-20°C: 35 20°C: 47	2.50 x 300 2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Plastic Vacuum
Ni: 9.80						
Mo: 3.20						
N: 0.10						
C: 0.02						
Si: 0.90						
Mn: 0.90						
Cr: 23.00	-	>750	25	-20°C: 35 20°C: 47	2.50 x 300 3.25 x 350	Vacuum
Ni: 9.50						
Mo: 2.80						
N: 0.15						

Aluminium Alloy Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
EAL 1100 **AWS/ASME SFA - 5.3** E1100 **EN ISO 18273** E Al 1080 A(Al 99,8) **TS EN ISO 18273** E Al 1080 A(Al 99,8) **TS 9604** EL-Al99.5 DIN M No. 3.0286	Special coated electrode for welding pure aluminium. Weld metal has good color matching with base metal and high electrical conductivity. Hold the electrode perpendicularly to workpiece, with a short arc length, during welding. If the thickness is greater than 10 mm or in large workpieces, preheating shall be applied between 150°C to 250°C. Since slag residues are corrosive, they must be completely removed from the weld bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, electrodes must be stored in an absolutely dry location, or redried if required.	 If required 1 Hour
EAL 4043 **AWS/ASME SFA - 5.3** E4043 **EN ISO 18273** E Al 4043 (AlSi 5) **TS EN ISO 18273** E Al 4043 (AlSi 5) **TS 9604** EL-AlSi5 DIN M No. 3.2245	Special coated electrode for welding aluminium-silicon alloys and for joining dissimilar aluminium alloys. Suitable to use also in aluminium castings, containing up to 5% silicon. Used with DCEP. Hold the electrode perpendicularly to workpiece, with a short arc length, during welding. If the thickness is greater than 10 mm or in large workpieces, preheating shall be applied between 150°C to 250°C. Since slag residues are corrosive, they must be completely removed from the weld bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, electrodes must be stored in an absolutely dry location, or redried if required.	 If required 1 Hour
EAL 4047 **AWS/ASME SFA - 5.3** E4047 **EN ISO 18273** E Al 4047 (AlSi 12) **TS EN ISO 18273** E Al 4047 (AlSi 12) **TS 9604** EL-AlSi12 DIN M No. 3.2585	Special coated electrode for aluminium-silicon and aluminium-magnesium-silicon castings. Suitable to use also in aluminium castings, containing up to 12% silicon. Used with DCEP. Hold the electrode perpendicularly to workpiece, with a short arc length, during welding. If the thickness is greater than 10 mm or in large workpieces, preheating shall be applied between 150°C to 250°C. Since slag residues are corrosive, they must be completely removed from the weld bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, electrodes must be stored in an absolutely dry location, or redried if required.	 If required 1 Hour

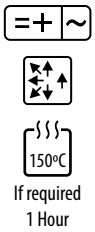
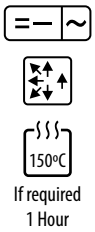
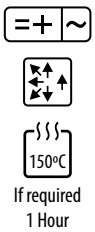
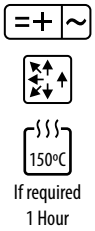
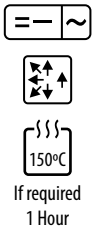
Copper Alloy Electrode

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
ECU Sn7 **AWS/ASME SFA - 5.6** ~ ECuSn-C **DIN 1733** EL-CuSn7	Electrode for joining and surfacing of pure copper and copper alloys and also surfacing of steels, cast steels, grey cast iron such as piston arms, sprockets, guides, turbine and centrifugal blades, ship screw propellers, motor collectors etc. For surfacing application, the initial runs should be welded at the lowest possible amperage. To obtain the typical mechanical properties, preheat the workpiece to 350°C and maintain this heat throughout the welding operation.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Dimension (mm)	Packing Weigth (kg) Box Type
Al: 99.80	55	85	25	-	2.50 x 350 3.25 x 350 4.00 x 350	TIN
Si: 5.00 **Mn:** 0.20 **Fe:** 0.30 **Cu:** 0.20 **Al:** 94.50	90	120	15	-	2.50 x 350 3.25 x 350	TIN
Si: 12.00 **Fe:** 0.30 **Cu:** 0.20 **Al:** 87.70	80	200	8	-	2.50 x 350 3.25 x 350 4.00 x 350	TIN

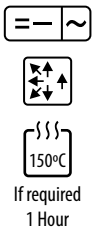
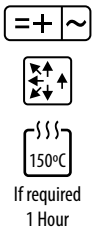
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
Mn: 0.30 **Ni:** 0.40 **Cu:** 91.00 **Cr:** 0.30 **Sn:** 8.00	130	290	-	110	2.50 x 300 3.25 x 350 4.00 x 350 5.00 x 350	Vacuum

Electrodes for Cast Irons

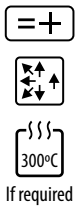
Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
ENI 400 (Ni) AWS/ASME SFA - 5.15 EN ISO 1071 TS EN ISO 1071	 ENi-CI E C Ni-CI 3 E C Ni-CI 3	Electrode having a pure nickel core wire, designed for the welding of cast iron with preheat. Suitable for welding grey cast iron, white and grey mallable cast iron, nodular cast iron. For reparing cracked an worn castings or joining cast iron parts to components made of steel, copper and nickel materials. Provides easy arc striking, restriking and stable arc. Weld metal is machinable. Weld short beads (approx. 30 to 50 mm long). For reducing weld residual stresses, hammer peen welds before cooling. Preferably used with DCEP but possible to use also with AC.	 If required 1 Hour
ENI 402 (Ni) AWS/ASME SFA - 5.15 EN ISO 1071 TS EN ISO 1071	 ENi-CI E C Ni-CI 3 E C Ni-CI 3	Electrode having a pure nickel core wire for welding cast iron without or with low preheating (max. 300°C). Suitable for welding cast iron with lamellar graphite, white and black heart malleable and nodular cast iron. Used also for repair welding of cracked cast iron parts or joining components made of steel, copper or nickel materials to cast irons. Weld metal is machinable. Provides easy arc striking and restriking, stable arc and smooth bead surface. Weld short beads, about 30 to 50 mm long. In order to reduce weld residual stresses, hammer-peen welds slightly before cooling. Preferably used with DCEP but possible to use also with AC.	 If required 1 Hour
ENI 403 (Ni) AWS/ASME SFA - 5.15 EN ISO 1071 TS EN ISO 1071	 ENi-CI E C Ni - CI 3 E C Ni - CI 3	It is a basic-graphite coated electrode without barium, featuring a pure nickel core wire, and does not strike arc from its coating. It is suitable for the cold welding of grey cast iron, malleable cast iron, and cast steels, as well as for repair welding of castings showing signs of fatigue. Specifically designed for welding in deep holes or in applications where the coating may come into contact with the base material. It offers excellent welding performance even at low amperages. Produces a weld metal that is easy to machine and ensures a smooth fusion with the base material. It is used for the repair of engine blocks, machine tool frames, gearboxes, reduction parts, valve and pump housings.	 If required 1 Hour
ENI 404 (Mo) AWS/ASME SFA - 5.15 EN ISO 1071 TS EN ISO 1071	 ENiCu-B E C NiCu-B 3 E C NiCu-B 3	Electrode having a nickel-copper core wire for welding cast iron with preheating. Iron admixture from base metal should be kept low. Well-suited to welding cast iron with lamellar graphite, white, and black heart malleable cast iron, nodular cast iron. Weld metal closely matches colour of base metal. Thus electrode is preferably used for making filler and cover passes or for filling-up shrinkage cavities. Provides easy arc striking and restriking and stable arc. Weld metal is machinable. Weld short beads, about 30 to 50 mm long. In order to reduce weld residual stresses, hammer-peen welds slightly before cooling.	 If required 1 Hour
ENI 406 (Mo) AWS/ASME SFA - 5.15 EN ISO 1071 TS EN ISO 1071	 ENiCu-B E C NiCu-B 3 E C NiCu-B 3	Electrode having a nickel-copper core wire for welding cast iron without or with low preheating (up to 300°C). Well-suited to welding cast iron with lamellar graphite, white and black heart malleable cast iron, nodular cast iron. Weld metal closely matches colour of base metal. Electrode is preferably used for making filler and cover passes of for filling-up shrinkage cavities. Weld metal is machinable. Provides easy arc striking and restriking, stable arc, smooth bead surface. Weld short beads, about 30 to 50 mm long. In order to reduce weld residual stresses, hammer-peen welds slightly before cooling.	 If required 1 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.50 **Si:** 0.25 **Mn:** 0.25 **Fe:** 1.00 **Ni:** 98.00	~ 160 HB	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400	Plastic Vacuum
C: 0.40 **Si:** 0.45 **Mn:** 0.20 **Ni:** 97.50 **Ti:** 0.45 **Fe:** 1.00	160 HB	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400 5.00 x 400	Plastic Vacuum
C: 0.55 **Si:** 0.60 **Mn:** 0.20 **Ni:** 87.00 **Cu:** 0.70 **Fe:** 8.00	~170 HB	2.50 x 300 3.25 x 300	Plastic
C: 0.50 **Si:** 0.20 **Mn:** 0.80 **Fe:** 3.50 **Ni:** 64.00 **Cu:** 31.00	160 HB	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400	Vacuum
C: 0.50 **Si:** 0.50 **Mn:** 1.00 **Fe:** 3.50 **Ni:** 64.00 **Cu:** 30.00 **Ti:** 0.50	160 HB	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400 5.00 x 400	Plastic Vacuum

Electrodes for Cast Irons

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
ENI 412 AWS/ASME SFA - 5.15 ENi-CI EN ISO 1071 E C Ni-CI 3 TS EN ISO 1071 E C Ni-CI 3	Electrode having a nickel core wire, for welding on grey cast iron with and without preheating. Suitable for welding joints as well as for surfacing of worn cast iron parts. Suitable to use in repair of machine frames, machine housings, machine parts and bearing blocks. The electrode has a very soft, regular fusion, and a quiet and steady arc. It is well suited for positional welding. Very little dilution with the parent metal takes place, resulting in good machinability of the transition area. Weld short beads, about 30 to 50 mm long. In order to reduce weld residual stresses, hammer-peen welds slightly before cooling. Preferably is used with DCEN but possible to use with also AC.	 If required 1 Hour
ENI 416 (NiFe) AWS/ASME SFA - 5.15 ENiFe-CI EN ISO 1071 E C NiFe-CI 3 TS EN ISO 1071 E C NiFe-CI 3	Electrode having a nickel-iron core wire, for welding cast iron with or without preheating. The weld metal features a low coefficient of thermal expansion and as a result, little shrinkage. It has higher strength properties than pure nickel weld metal and is therefore preferably used for welding nodular cast iron, white and black heart malleable cast iron, as well as austenitic nodular cast iron or joining these metals to components made of steel, copper or nickel materials. Easy arc striking and restriking, stable arc, smooth bead. Weld metal is machinable. Weld short beads.	 If required 1 Hour
ESt AWS/ASME SFA - 5.15 ~ESt EN ISO 1071 E C Z Fe-1 TS EN ISO 1071 E C Z Fe-1	ENI 418 acts as a first-pass layer on cast irons with low weldability (such as grey cast iron and old castings), forming a bonding interface between the base metal and subsequent filler layers. It is also used to remove or reduce surface contaminants that may be present on aged or degraded castings. It provides an ideal underlay for second-pass welding with pure nickel or nickel-iron electrodes. Additionally, it is suitable for single-pass wear-resistant surface build-ups. ENI 418 stands out with its excellent weldability and can be easily applied using the stringer bead technique. It ensures high deposition efficiency while operating with low penetration, minimizing the impact on the base material during welding.	 If required 1 Hour

Nickel Alloy Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
ENI 422 AWS/ASME SFA - 5.11 ENiCrFe-3 EN ISO 14172 E Ni 6182 TS EN ISO 14172 E Ni 6182 DIN M No. 2.4620	Basic coated electrode with Ni-Cr-Fe type nickel base deposit. Used for repairing and joining of nickel alloys, 5 - 9% Nickel steels, cryogenic stainless steels down to -196°C, Incoloy 800 and other high temperature steels. Provides a weld metal which has a operating temperatures from -196°C to 800°C. Used for joining dissimilar materials as stainless steels/low alloyed steels, stainless steels/ Nickel alloys, buffering of difficult to weld steels. Weld metal deposit is insensitive to cracks, has very good resistance to acids, salts and alkaline solutions, molten salt (e.g. cyanide) in oxidizing and carburization atmospheres (avoid a sulphurous atmosphere). Generally used for welding on oven parts, burners, heat treatment equipment, cement works, moulds, transport and storage tanks of liquid gas. Has a wide range of application in chemical industry, petrochemical industry, glassworks, civil engineering, repairing and maintenance workshops.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.80 **Si:** 0.80 **Mn:** 0.20 **Ni:** 97.00 **Al:** 0.10 **Fe:** 0.75 **Ti:** 0.35	175 HB	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400	Vacuum
C: 0.45 **Si:** 1.60 **Mn:** 0.65 **Ni:** 52.00 **Fe:** 44.50 **Al:** 0.80	210 HB	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400	Plastic Vacuum
C: 1.50 **Si:** 1.80 **Mn:** 1.50	350 HB	2.50 x 300 3.25 x 350 4.00 x 350	Cardboard

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.03 **Si:** 0.50 **Mn:** 6.50 **Cr:** 16.00 **Ni:** 68.00 **Mo:** 1.50 **Nb:** 2.00 **Fe:** 5.00	400	660	38	-196°C : 100 20'C : 120	-	2.50 x 300 3.25 x 350 4.00 x 350 5.00 x 450	Cardboard Vacuum

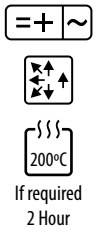
Nickel Alloy Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information

ENI 424

AWS/ASME SFA - 5.11 ~ENiCrMo-4
EN ISO 14172 E Ni 6275
TS EN ISO 14172 E Ni 6275
DIN 8555 E 23-UM-200-CZKT

Heavy coated, high recovery (170%) surfacing and hard surfacing electrode which gives Nickel-Chromium-Molybdenum alloy weld metal. Weld metal is resistant to abrasion, impact, corrosion and high temperatures. Especially used in welding of hot-work press tools which are subjected to above service conditions. Suitable to use inmaintenance welding of hot-work press tools and hammers, forging and extrusion dies and parts, pressure casting pistons and dies, rolling rolls, hot-stripping tools, pump rotors and valves. Preheating to 400-500°C is required, depending on the size, shape and chemical analysis of the part to be welded. Has a stable arc, smooth weld bead surface and weld metal is free of cracks and porosity. Welding shall be performed with short stick-out distance, perpendicular to base metal and craters shall be filled well. Preferred to use with DC, electrode in positive (+) and possible to use also in AC.



If required
2 Hour

ENI 425

AWS/ASME SFA - 5.11 ENiCrMo-3
EN ISO 14172 E Ni 6625
TS EN ISO 14172 E Ni 6625

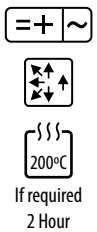
ENI 425 is a Ni-Cr-Mo alloyed covered electrode that deposits weld metal with a composition of Ni-22Cr-9Mo-3.5Nb. It is specifically designed for welding highly corrosion-resistant Ni-Cr-Mo alloys such as Alloy 625, 825, and similar materials.This electrode demonstrates excellent toughness at cryogenic temperatures as low as -196°C, making it suitable for welding cryogenic nickel alloys, such as X1NiCrMoCuN25-20-7.The weld metal is resistant to oxidation up to 1200°C in sulfur-free atmospheres and can be used at service temperatures up to 500°C in sulfur-containing environments. It offers high resistance to stress corrosion cracking, pitting, and crevice corrosion in environments containing phosphoric acid, organic acids, seawater, and highly polluted conditions. The weld metal is insensitive to cracking and exhibits excellent resistance to thermal shocks. ENI 425 is used for joining dissimilar nickel alloys, welding dissimilar stainless steels, joining low-alloy steels to stainless steels or nickel alloys, and for buffering and cladding applications. It is also ideal for repair welding of these materials.

If required
2 Hour

ENI 426

AWS/ASME SFA - 5.11 ENiCrMo-6
EN ISO 14172 E Ni 6620
TS EN ISO 14172 E Ni 6620

Ni-Cr-Mo-based basic coated electrode depositing a Ni-Cr-Mo-Nb-W alloy weld metal. It provides high performance for welding 9% Ni steels used in cryogenic applications such as LNG tanks (X8Ni9, ASTM A353, ASTM A553, JIS G3127 SL9N). The weld metal delivers high impact toughness down to -196°C, ensuring reliable performance under cryogenic conditions.In sulfur-free environments, the weld metal is resistant to scaling (oxidation) up to 1200°C, while in sulfur-containing environments it can be used at temperatures up to 500°C. In addition to stress corrosion cracking resistance, it offers excellent resistance to pitting and similar forms of corrosion in phosphoric acid, organic acid, seawater, and highly contaminated environments. It also provides high resistance to cracking and thermal shock.It can be used with AC polarity to prevent or reduce magnetic arc blow. It is suitable for welding different stainless steels, various nickel alloys, or for joining low-alloy steels to stainless steels or nickel alloys. Moreover, it can be safely employed for buffer and cladding passes on steels with low weldability and for repair welding of these alloys.



If required
2 Hour

ENI 429

AWS/ASME SFA - 5.11 ENiCrCoMo-1
EN ISO 14172 E Ni 6117
TS EN ISO 14172 E Ni 6117

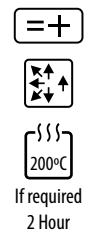
ENI 429 is a basic-coated electrode developed for joining nickel-based alloys and similar heat-resistant materials, offering high performance at service temperatures up to 1000°C. It is suitable for welding alloys such as 2.4663 (NiCr21Co12Mo), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrAlTi 32 20), and 1.4859 (GX 10 NiCrNb 32 20). Provides strong resistance to oxidizing and carburizing atmospheres, with scaling resistance up to 1100°C. The weld metal shows excellent resistance to hot cracking and maintains high-temperature strength even without post-weld heat treatment. It produces a stable arc, smooth weld bead, and has easily removable slag for efficient operation. ENI 429 is ideal for high-temperature applications like gas turbines, ethylene plants, chemical reactors, and petrochemical equipment. Preheating should be adjusted according to the base material to minimize residual stress and reduce cracking risk.

If required
2 Hour

ENI 440

AWS/ASME SFA - 5.11 ENiCu-7
EN ISO 14172 E Ni 4060
TS EN ISO 14172 E Ni 4060
DIN M No. 2.4366

Electrode having monel core wire, designed for joining and surfacing welds of Monel-clad steels. Suitable for joining Monel alloys to steel weld surfacing of steel with corrosion-resistant Monel coating. The weld metal is free of porosity and resistant to many chemicals. Suitable for applications with working temperatures from -196°C to 450°C. Weld groove preparation and cleaning should be done carefully. Generally welding should be done in horizontal position with short stick-out distance without weaving. Due to porosity risk of the weld metal, welding and striking shall be started on end plate. Possible to use with DCEP.



If required
2 Hour

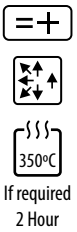
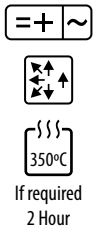
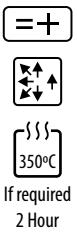
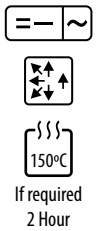
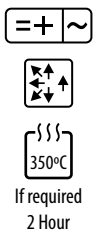
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.02 **Si:** 0.50 **Mn:** 0.60 **Cr:** 14.50 **Ni:** 55.00 **Mo:** 17.50 **Fe:** 5.50 **W:** 3.20 **Co:** 2.00	520	720	33	-	200 HB	2.50 x 300 2.50 x 350 3.25 x 300 3.25 x 350 4.00 x 400 5.00 x 350	Vacuum
C: 0.02 **Si:** 0.45 **Mn:** 0.65 **Cr:** 20.50 **Ni:** 66.00 **Mo:** 9.00 **Fe:** 0.40 **Nb+Ta:** 3.40	520	780	42	-196°C : 70 20°C : 75	-	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.04 **Si:** 0.65 **Mn:** 3.00 **Cr:** 15.00 **Ni:** 66.00 **Mo:** 7.50 **W:** 1.80 **Nb:** 1.45 **Fe:** 4.00	450	700	45	-196°C : 75 20°C : 90	-	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.06 **Si:** 0.70 **Mn:** 1.00 **Cr:** 21.50 **Ni:** 53.00 **Mo:** 9.00 **Co:** 11.00 **Fe:** 1.50	440	740	40	20°C : 75	-	2.50 x 300 3.25 x 350 4.00 x 350	Vacuum
C: 0.01 **Mn:** 1.00 **Ni:** 65.00 **Cu:** 30.00 **Fe:** 2.50	320	550	40	20°C: 120	-	2.50 x 300 3.25 x 300 3.25 x 350 4.00 x 400 5.00 x 400	Cardboard Vacuum

Hardfacing Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EH 245 **AWS/ASME SFA - 5.13** **EN ISO 14700** **TS EN ISO 14700** DIN 8555	 **E FeMn-A** **E Fe9** **E Fe9** E 7-UM-200-KP	Basic covered, austenitic manganese steel electrode for wear resisting hardfacing deposits on high manganese (12-14%) steels. Weld metal will adopt high hardness by cold-working, it is therefore particularly suited for parts which are subjected mainly to wear caused by heavy impact and shock. During welding, the workpieces should not become too hot and if necessary, be allowed to cool down. When welding large workpieces made of austenitic manganese steel, such as crusher jaw plates, it is advisable to weld them in a water bath. Welding shall be done at low welding currents, with stringer and short bead lengths, to avoid the workpiece cool down. So, high welding currents and wide-weave beads must be avoided. When building up various layers, it is good practice depositing a buffer layer with EI 307 weld metal. When making joint welds on austenitic manganese steel, it is preferable to use EI 307B electrodes. Suitable for hardfacing and repair welding of wear resisting parts made of austenitic manganese steel, such as crusher jaw plates, crusher cones, rolls, pulverizing hammers, beating arms and others. Preferably used with DC, electrode in positive (+) pole and also possible to use with AC.	   If required 2 Hour
EH 247 **AWS/ASME SFA - 5.13** **AWS/ASME SFA - 5.13** **EN 14700** **TS EN 14700** DIN 8555	 **EFeMn-C** **~EFeMn-A** **E Z Fe9** **E Z Fe9** ~E 7-UM-200-KP	High recovery (120%), austenitic manganese steel electrode for hardfacing and joining of high manganese steels. Due to it excellent impact resistance, particularly suited for parts which are subjected to heavy impact, shock and cavitation. The addition of Ni and Cr alloys, increases the resistance against cracks and abrasion. Weld metal work hardens by cold-working. During welding, the workpieces should not become too hot and it shall be cool down, when necessary. High welding currents and wide-weave beads must be avoided. Machining is possible with tungsten carbide tipped tools. Suitable for hardfacing and repair welding of dredge pumps, hydraulic press pistons, crane wheels, rail crossings, crusher jaws, excavator and grab teeth, mill hammers, rock crusher.	   If required 2 Hour
EH 250 **AWS/ASME SFA - 5.13** **EN 14700** **TS EN 14700** DIN 8555	 **~E FeMnCr** **E Z Fe9** **E Z Fe9** E 7-UM-250-KPR	High recovery (140%), austenitic manganese steel electrode for joining and hardfacing of high manganese steels which are subjected to very high pressure, shocks and abrasion. It is suitable to use as a buffer layer prior to hardfacing. Due to it is 12% Cr content, weld metal has high crack resistance and abrasion resistance with respect to other manganese steel electrodes. Weld metal work hardens by cold-working. Workpiece shall not become too hot during welding and when necessary, it shall be cool down before next hardfacing passes. High welding currents and wide-weave beads must be avoided. When welding large workpieces made of austenitic manganese steels, it is advisable to weld them in a water bath. Suitable for hardfacing and repair welding of dredge pumps, hydraulic press pistons, crane wheels, rail crossings, crusher parts subjected to impact of soft minerals.	   If required 2 Hour
EH 325 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe1** **E Fe1** E 1-UM-250	Thick basic-covered electrode for producing build-up, buffer and hardfacing deposits of medium hardness, which can be machined by chip-forming. Particularly suited for build-up, buffer and hardfacing of wear resisting parts subjected to metal-to-metal wear, heavy impact and shock. Can easily be welded in all positions, except vertical-down. Weld metal is high crack resistant and free of pores.DC, electrode in positive (+) is preferred and possible to use also in AC. **Typical Applications:** Suitable for reconditioning of rails, rail crossings, switch points, sprockets and wearing parts, such as rope pulleys, tumblers, rollers, caterpillar track rollers and links, wheel flanges, stud links and others.	   If required 2 Hour
EH 330 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe1** **E Fe1** E 1-UM-300-P	Thick basic-covered electrode for producing hardfacing deposits of medium hardness, which can be machined by chip-forming. Particularly suited for wear resisting parts subjected to metal-to-metal wear, heavy impact and shock. EH 330 can be easily welded in all positions, except vertical-down. Weld metal is crack resistant and free of pores. suitable for reconditioning of rails, rail crossings, switch points, sprockets and wearing parts, such as rope pulleys, tumblers, rollers, caterpillar track rollers and links, wheel flanges, stud links and others. DC, electrode in positive (+) is preferred and possible to use also in AC.	   If required 2 Hour

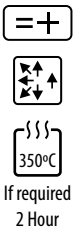
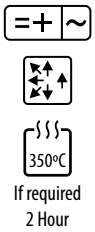
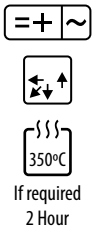
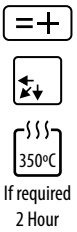
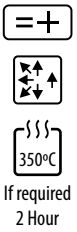
Typical Chemical Analysis of All-Weld Metal (%)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.60 **Mn:** 14.00 **Ni:** 2.70 **Fe:** 82.70	As Welded: 200 HB Work Hardened: 450 HB	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic
C: 0.70 **Si:** 0.40 **Mn:** 13.50 **Cr:** 3.30 **Ni:** 3.10 **Fe:** 79.00	As Welded: 225 HB Work Hardened: 450 HB	3.25 x 350 4.00 x 450	Plastic
C: 0.50 **Si:** 0.70 **Mn:** 16.00 **Cr:** 12.00	As Welded: 230 HB Work Hardened: 450 HB	3.25 x 350 4.00 x 450	Cardboard
C: 0.20 **Si:** 0.50 **Mn:** 0.80 **Cr:** 1.00	175 - 225 HB	3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic
C: 0.05 **Si:** 0.80 **Mn:** 0.65 **Cr:** 3.40 **Fe:** 95.10	320 HB	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic

Hardfacing Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EH 335 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe1** **E Fe1** E 1-UM-350-P	Thick basic-covered electrode for hardfacing of parts especially subjected to metal-to-metal wear, heavy impact and shock. Electrode deposits weld metal with medium hardness, which can be machined by chip-forming. Suitable for reconditioning of rails, rail crossings, switch points, sprockets and wearing parts, such as rope pulleys, tumblers, rollers, caterpillar track rollers and links, wheel flanges, stud links and others. Can easily be welded in all positions, except vertical-down. Weld metal is high crack resistant and free of pores. DC, electrode in positive (+) is preferred and possible to use also in AC.	 If required 2 Hour
EH 340 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe1** **E Fe1** E 1-UM-400-P	Thick basic-covered electrode for producing highly wear resisting hardfacing deposits. It is particularly resistant to metal-to-metal wear, impact and shock. Suitable for reconditioning of rails, rail crossings and switch points, wearing parts such as dredger parts, polygon edges, bearing surfaces, striking tools, die tyres, wheel flanges, slide surfaces subject to heavy wear, reconditioning of lower dies, punches and others.Weld metal can be machined only by using sintered hard metal tipped tools. Even a large number of layers can be deposited without the need of intermediate buffer layers. A tough buffer layer using ESB 40 or EI 307B electrodes is solely required in case of very crack sensitive base metal. EH 340 can be welded in all positions, except vertical-down. Preferred to use with DC, electrode in positive (+) pole and also possible to use with AC.	 If required 2 Hour
EH 350 **EN 14700** **TS EN 14700** DIN 8555	 **E Z Fe2** **E Z Fe2** ~E 2-UM-50-GP	Thick basic-covered electrode for producing wear resisting hardfacing deposits, which is particularly resistant to metal-to-metal wear, impact and abrasion. Suitable for reconditioning of rails, rail crossings and switch points, wearing parts such as dredger parts, polygon edges, bearing surfaces, striking tools, die tyres, wheel flanges, slide surfaces subject to heavy wear, reconditioning of lower dies, punches, cutting blades, table and rolling rolls. Weld metal can be machined only by using sintered hard metal tipped tools. A tough buffer layer using ESB 40 or EI 307B electrodes is solely required in case of very crack sensitive base metal. Can be welded in all positions, except vertical-down. Preferred to use with DC, electrode in positive (+) pole and also possible to use with AC.	 If required 2 Hour
EH 360R **EN 14700** **TS EN 14700** DIN 8555	 **E Fe8** **E Fe8** E 6-UM-60-GPT	Thick rutile-covered electrode for depositing tough and wear resisting hardfacing overlays. It is particularly resistant to high metal-to-metal wear, moderate impact and abrasion. The weld metal has sufficient red hardness up to 600°C. It is machinable only by grinding. Suitable hardfacing applications where wear resistance at higher temperatures is a prime concern, as in hot cut offs, dies for pressure castings, rolls, crushers excavator parts, bucket edges and bucket teeth, drilling bits, coal planes, conveyor screws. In case of crack sensitive base metals, a tough buffer layer made by ESB 40 or EI 307B electrodes, is required and a further one after every third hardfacing layer. The as-welded hardness of 59 HRc can be increased to 60-65 HRc by single or double tempering. Possible to use equally well both with AC and DC.	 If required 2 Hour
EH 360B **EN 14700** **TS EN 14700** DIN 8555	 **E Fe8** **E Fe8** E 6-UM-60-GPT	Thick basic-covered electrode for depositing tough and wear resisting overlays on structural members, subjected to severe wear. It is particularly resistant to high metal-to-metal wear, moderate impact and abrasion. The weld metal has sufficient red hardness up to 600°C. It can be machined only by grinding. Suitable hardfacing applications where wear resistance at higher temperatures is a prime concern, as in hot cut offs, dies for pressure castings, rolls, crushers excavator parts, bucket edges and bucket teeth, drilling bits, coal planes, conveyor screws. Multi-layers deposits will be free of cracks, even without depositing intermediate buffer layers. Only in case of very crack sensitive base metals, a tough buffer layer, made with ESB 40 or EI 307B electrodes, is required. Preferred to use with DC, electrode in positive (+) pole and also possible to use with AC.	 If required 2 Hour

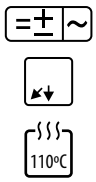
Typical Chemical Analysis of All-Weld Metal (%)	Hardness (HB)	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.13 **Si:** 0.80 **Mn:** 1.00 **Cr:** 2.50	39 HRc	2.50 x 350 3.25 x 350 4.00 x 450	Cardboard
C: 0.15 **Si:** 0.80 **Mn:** 0.60 **Cr:** 2.80 **Fe:** 95.65	42 HRc	3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic
C: 0.20 **Si:** 0.85 **Mn:** 1.30 **Cr:** 5.40 **Fe:** 92.25	50 HRc	3.25 x 350 4.00 x 450	Plastic
C: 0.50 **Si:** 0.65 **Mn:** 0.60 **Cr:** 9.00 **Mo:** 0.45 **V:** 0.40 **Fe:** 88.85	58 HRc	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic
C: 0.50 **Si:** 0.80 **Mn:** 0.60 **Cr:** 8.00 **Mo:** 0.50 **V:** 0.65 **Fe:** 88.95	59 HRc	2.50 x 350 3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic

Hardfacing Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EH 360Si **EN 14700** **TS EN 14700** DIN 8555	 **E Z Fe2** **E Z Fe2** ~E 2-UM-60-G	Thick basic-covered electrode for depositing wear resisting overlays on structural members subjected to severe abrasive wear. Weld metal can be machined only by grinding. Suitable for hardfacing applications of crushing and grinding of coal, mineral, soil, rocks, excavator parts, bucket edges and bucket teeth, drilling bits, coal planes, conveyor screws. In case of very crack sensitive base metals, a tough buffer layer, made with ESB 40 or EI 307B electrodes, is required, before hardfacing. Preferred to use with DC, electrode in positive (+) pole and also possible to use with AC.	 If required 2 Hour
EH 361 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe8** **E Fe8** E 6-UM-60	Thick basic covered electrode for hardfacing of parts subjected to high metal-to-metal friction, mineral abrasion and moderate impact. Hardfacing of ceramic tile moulds, mixer blades, crushers, earth moving equipments, hot cut-offs, shear blades, dies for pressure casting, scraper blades, conveyors and rollers. A tough buffer layer with ESB 42 is recommended before hardfacing, if base metal has high carbon content and low weldability. Heat treatment after hardfacing will decrease as-welded hardness. Weld metal can be grinded and machined by carbide-tipped tools.	 If required 2 Hour
EH 380 **AWS/ASME SFA - 5.13** **EN 14700** **TS EN 14700** DIN 8555	 **~EFe6** **E Fe4** **E Fe4** E 4-UM-60-ST	Hardfacing electrode for manufacturing and repair welding of turning and plaining chisels, reaming and shear blades, special spiral drills. Also suitable for manufacturing tools from unalloyed and low alloy steels and hardfacing the edges of cutting tools made of tool steel. Unalloyed and low alloy steels shall be preheated to 250-400°C before welding and postweld heat treatment at 400°C and then welded parts shall be cooled slowly. If buffer layer is needed, can be performed by EI 312 or EI 307B electrodes (max. 2,5 mm) and then hardfacing can be performed by EH 380 (max. 5 mm in heigth). Possible to use with DC, electrode in positive (+) pole and with AC.	 If required 2 Hour
EH 381 **EN 14700** **TS EN 14700** DIN 8555	 **E Z Fe3** **E Z Fe3** E 3-UM-40-PT	Basic coated electrode for hardfacing of parts, subjected to high metal-to-metal wear, compression and impact at elevated temperatures. Due to it's Cr and Mo alloy content, weld metal has high mechanical strength, toughness and thermal resistance to operating temperatures up to 550° C. Used for hot and cold cutting tools, hot shear blades, forging dies, die cast moulds. It enables the production of new tools at more affordable costs by hardfacing base metals which have adequate tensile strength and alloying elements. Has excellent welding properties, a stable and regular metal drop flow, good weld bead appearance and very easy slag removal.	 If required 2 Hour
EH 382 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe3** **E Fe3** E 3-UM-45-ST	Basic coated electrode for build-up and hardfacing of parts subjected to high metal-to-metal wear, compression, impact at elevated temperatures. Weld metal is resistant to operating temperatures up to 550° C. Due to it's high strength, toughness and heat resistance ideally suited for hot and cold cutting tools, hot shears blades, forging dies, saddles, hammers, die cast moulds. Electrode can also be used for production of new hot and cold cutting tools and their edges, which are made of low alloy steels. Has a stable arc, good bead appearance and very easy slag removal.	 If required 2 Hour

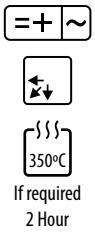
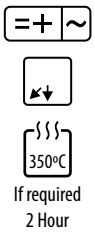
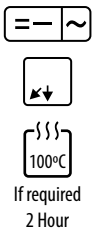
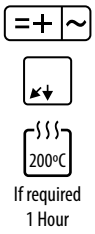
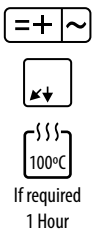
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.65 **Si:** 4.00 **Mn:** 0.55 **Cr:** 2.00 **Fe:** 92.80	60 HRc	3.25 x 350 4.00 x 450 5.00 x 450	Cardboard Plastic
C: 0.50 **Si:** 2.60 **Mn:** 0.40 **Cr:** 9.00 **Fe:** 87.00	57 HRc	3.25 x 350 4.00 x 450 5.00 x 450	Cardboard
C: 1.10 **Si:** 1.40 **Mn:** 1.30 **Cr:** 3.50 **Mo:** 9.00 **V:** 2.20 **W:** 1.90 **Fe:** 79.60	As Welded: 60 HRc PWHT:: 64 HRc	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard Plastic
C: 0.10 **Si:** 0.60 **Mn:** 0.60 **Cr:** 6.00 **Mo:** 3.00	As Welded: 40 - 42 HRc	2.50 x 350 3.25 x 350 4.00 x 350	Cardboard
C: 0.20 **Si:** 0.40 **Mn:** 0.60 **Cr:** 5.00 **Mo:** 4.00 **Fe:** 89.80	48 HRc	2.50 x 350 3.25 x 350 4.00 x 350	Cardboard Plastic

Hardfacing Electrodes

Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EH 384 **EN 14700** **TS EN 14700** DIN 8555	**E Fe3** **E Fe3** E 3-UM-60-ST	Rutile coated electrode for build-up and hardfacing of parts subjected to high metal-to-metal wear, compression, impact at elevated temperatures. Weld metal is resistant to operating temperatures up to 600° C, because of it's Cr, Mo, W, V content. Due to it's high strength, toughness and heat resistance ideally suited for hot forging dies, saddles, hammers, hot and cold cutting tools, hot shears blades and rolling mills. Electrode can also be used for production of new hot and cold cutting tools and their edges, which are made of low alloy steels. Has a stable arc, good bead appearance and very easy slag removal.	 If required 2 Hour
EH 386 **EN 14700** **TS EN 14700** DIN 8555	**E Z Fe8** **E Z Fe8** E 3-UM-50-GTZ	Rutile coated electrode for hardfacing of parts, subjected to high metal-to-metal wear, compression and impact at elevated temperatures. Used for hot work tool steels, hot shear blades, forging dies, aluminum casting and extrusion plactic screws. Due to it's Cr, Mo and Co alloy content, weld metal has high mechanical strength, toughness and thermal resistance to operating temperatures up to 650° C. Has excellent welding properties, a stable and regular metal drop flow, good weld appearance and very easy slag removal.	 If required 2 Hour
EH 387 **EN 14700** **TS EN 14700** DIN 8555	**E Z Fe3** **E Z Fe3** E 3-UM-50-ST	Rutile coated electrode used for hardfacing of parts, subjected compression, moderate impact, mechanical, thermal shocks and metal-to-metal friction wear. Especially designed for hardfacing of hot and cold cutting blades, rolling rollers and shear blades because weld metal has high tensile strength, toughness and heat resistance. Suitable for hardfacing of crusher rollers and hammers, crane wheels and pulleys. Has excellent welding properties, a stable and regular metal drop flow, good weld appearance very easy slag removal.	 If required 2 Hour
EH 388 **EN 14700** **TS EN 14700** DIN 8555	**E Fe8** **E Fe8** E 3-UM-55-ST	Basic coated electrode for hardfacing of parts, subjected to high metal-to-metal wear, compression and impact at elevated temperatures. Due to it's Cr and Mo alloy content, has high mechanical strength, toughness and thermal resistance to operating temperatures up to 550° C. Especially designed for hardfacing of hot and cold cutting tools, hot shear blades, extrusion press pristons, forging dies, die cast moulds, glide and guiding surfaces. It provides a great advantage in the production, cladding and filling of sharp edges of new hot and cold cutting blades from the base metals with high tensile strength and proper alloying. Has excellent welding properties, a stable and regular metal flow, good weld bead appearance and very easy slag removal.	 If required 2 Hour
EH 389 **N 14700** **TS EN 14700** DIN 8555	**E Fe8** **E Fe8** E 3-UM-60-ST	Rutile coated electrode for hardfacing welding of parts, subjected to high metal-to-metal wear, compression and impact at elevated temperatures. Especially designed for hot and cold cutting tools, hot shear blades also new hot and cold cutting tools. Due to it's Cr and Mo alloy content, has high mechanical strength, toughness and thermal resistance to operating temperatures up to 550° C. Electrode can also be used for production of new hot and cold cutting tools and their edges, which are made of low alloy steels. Has excellent welding properties, a stable and regular metal drop flow, good weld appearance and very easy slag removal.	 If required 2 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.40 **Si:** 0.40 **Mn:** 0.60 **Cr:** 1.40 **Mo:** 0.50 **V:** 0.50 **W:** 9.00 **Co:** 3.00 **Fe:** 84.70	60 HRc	3.25 x 350	Cardboard Plastic
C: 0.10 **Si:** 0.40 **Mn:** 0.10 **Cr:** 10.0 **Mo:** 3.50 **Co:** 14.0	50 HRc	2.50 x 300 3.25 x 350 4.00 x 350	Plastic
C: 0.25 **Si:** 1.10 **Mn:** 0.60 **Cr:** 5.70 **Mo:** 1.50 **W:** 1.90	As Welded: 52-55 HRc After Heat Treatment (575°C 8 Hour) 45 HRc	2.50 x 350 3.25 x 350 4.00 x 350	Cardboard Plastic
C: 0.40 **Si:** 0.75 **Mn:** 1.50 **Cr:** 7.50 **Mo:** 2.50	As Welded: 55 HRc	2.50 x 350 3.25 x 350 4.00 x 350	Cardboard Plastic
C: 0.30 **Si:** 0.80 **Mn:** 0.40 **Cr:** 5.00 **Mo:** 1.50 **V:** 0.50 **W:** 1.80 **Fe:** 89.70	57 HRc	2.50 x 350 3.25 x 350 4.00 x 350	Cardboard

Hardfacing Electrodes

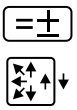
Product Name and Standards		Applications and Properties	Polarity Welding Positions Re-drying Information
EH 515 **EN 14700** **TS EN 14700** DIN 8555	 **E Z Fe14** **E Z Fe14** E 10-UM-60-CGRZ	High recovery (160%), thick rutile-covered electrode depositing hypereutectic chromium hard metal. It is suitable for producing highly wear resisting deposits subject to abrasion by mineral particles. Suitable for hardfacing worn parts subject to mineral abrasion, such as, conveyor screws, mixer blades, concrete pump parts, slurry pumps, stirring and agitator parts, crusher parts, excavator bucket edges, coal planes and worn parts in petrochemical industry, which are subject to corrosion at elevated temperatures. The typical transverse cracks appearing in this hardfacing weld metal are not detrimental to abrasion resistance. Weld metal is machinable only by grinding. On difficult-to-weld steels, a buffer layer made with EIS 307 electrodes is required. Produces very smooth and clean weld beads with flat penetration. Possible to use both with AC and DC.	 If required 2 Hour
EH 528 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe15** **E Fe15** E 10-UM-65-GR	Basic type, high recovery (180%) electrode for depositing primary and eutectic Cr and Nb carbides in austenitic matrix. Suitable for hardfacing of parts, subjected to heavy abrasion with moderate impact. Service temperature is max. 450°C. Suitable to use in hardfacing of cement crushers, cement presses and brick conveyor screws, mixer blades, press screws in oil industry, bucket lips and teeths in earth moving equipments. The typical transverse cracks occuring in such a hard metal is not suitable for applications where impact and shock conditions prevail. Wear coefficient of one layer deposit is 0.5 % with SiO2. The weld metal is machinable only by grinding. Weld with long arc length and shall not be welded more than 2 layers. Possible to use with both DC and AC.	 If required 2 Hour
EH 531 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe15** **E Fe15** E 10-UM-65-GR	Heavy coated, high recovery (235%) hardfacing electrode, depositing evenly distributed Cr and B-carbides in austenitic stainless steel matrix. Required hardness and abrasion resistance can be obtained in the first layer even on low alloy steels. Suitable for hardfacing of parts subjected to heavy abrasion with moderate impact. Particularly used in excavator teeth, leading edges of excavator buckets, mixer blades, gravel pumps, cement fans, conveyor worn-screws, conveyor belts. The typical transverse cracks occuring in such a hard metal is not suitable for applications where impact and shock conditions prevail. The hardfacing layers have a very smooth surface and machinable only by grinding. Possible to use with both DC and AC.	 If required 2 Hour
EH 540 **EN 14700** **TS EN 14700** DIN 8555	 **E Fe16** **E Fe16** E 10-UM-65-GRZ	Basic type, high recovery (235%) hardfacing electrode for depositing primary and eutectic Cr, Nb, Mo, W and V-carbides in austenitic matrix. Suitable for hardfacing of parts subjected to heavy abrasion with moderate impact and service temperatures up to 600°C. Suitable for use in crushing and screening plants, sinter plant parts, wear bars and plates, scraper bars, blast furnace charging systems, cement furnaces, bucket teeth and lips. The typical transverse cracks occuring in such a hard metal is not suitable for applications where impact and shock conditions prevail. Wear coefficient of 1 layer deposit is 0,3% with SiO_2. The weld metal is machinable only by grinding. It has a quiet and regular fusion. Weld with long arc length and shall not be welded more than 4 layers. Possible to use with both DC and AC.	 If required 1 Hour
EH 711 **EN 14700** **TS EN 14700**	 **E Z Fe13** **E Z Fe13**	Chromium-free hardfacing electrode for hardfacing of components exposed to abrasion by soil, sand and abrasives in agriculture, quarrying, mining and infrastructure. Also ideal for mixer shafts, impellers, buckets, shovels, augers and crushers for the concrete industry. It gives a hard, wear-resistant weld metal similar to conventional chromium carbide coatings. It is specially formulated to remove chromium from the welding electrode, but still provides outstanding wear resistance. The absence of chromium in the electrode reduces or completely eliminates the release of potentially harmful CrIV gas during welding. It is recommended not to apply more than two passes. It has low impact resistance and should be used where non-impact wear is encountered.	 If required 1 Hour

Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Dimension (mm)	Packing Weigth (kg) Box Type
C: 3.70 **Si:** 1.50 **Mn:** 0.20 **Cr:** 32.00 **Fe:** 62.60	60 HRc	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard Plastic
C: 5.50 **Si:** 1.40 **Mn:** 1.90 **Cr:** 25.00 **Nb:** 5.50 **Fe:** 60.70	63 HRc	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard Plastic
C: 4.50 **Si:** 1.00 **Mn:** 0.30 **Cr:** 33.00 **B:** 1.00 **Fe:** 60.20	Single Pass: 65 HRc	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard Plastic
C: 4.50 **Si:** 1.30 **Mn:** 0.85 **Cr:** 20.50 **Mo:** 6.20 **V:** 1.10 **Nb:** 4.00 **W:** 2.20 **Fe:** 59.35	64 HRc	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	Cardboard Plastic
	68 HRc	3.25 x 350 4.00 x 350	Cardboard

Hardfacing Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
EH 801 **AWS/ASME SFA - 5.13** ECoCr-C **EN 14700** E Co3 **TS EN 14700** E Co3 DIN 8555 E 20-UM-55-CSTZ	Rutile-basic coated hardfacing electrode which deposits Co-Cr-W alloy weld metal. Suitable to use in hardfacing of parts subjected to either the single or combined effect of: heavy metal-to-metal wear or abrasion, high temperatures (ranging from 500°C to 900°C) and corrosive environments. Due to its very high hardness it is recommmended for applications where shocks are low or moderate. Suitable for rolling mill guides, extrusion dies, valve seats, mechanical parts of steam turbines, pump tubing and shafts and mixer blades. Preferred to use with DC, electrode in positive (+) and possible to use with also AC.	 If required 1 Hour
EH 806 **AWS/ASME SFA - 5.13** ECoCr-A **EN 14700** E Co2 **TS EN 14700** E Co2 DIN 8555 E 20-UM-40-CTZ	Rutile-basic type coated hardfacing electrode which deposits Co-Cr-W alloy weld metal. Suitable to use in hardfacing of parts subjected to either the single or combined effect of : heavy metal-to-metal wear or abrasion, high temperatures (ranging from 500°C to 900°C) and corrosive environments. Due to its very higher toughness and shock resistance extends its use for service conditions involving mechanical impacts and thermal shocks. Suitable for blades for hot shearing, ingot tong ends, glass moulds, valves and valve seats, nozzles. Preferred to use with DC, electrode in positive (+) and possible to use with also AC.	 If required 1 Hour
EH 812 **AWS/ASME SFA - 5.13** ECoCr-B **EN 14700** E Co3 **TS EN 14700** E Co3 DIN 8555 E 20-UM-50-CTZ	Rutile-basic type coated hardfacing electrode which deposits Co-Cr-W alloy weld metal. Suitable to use in hardfacing of parts subjected to either the single or combined effect of: heavy metal-to-metal wear or abrasion, high temperatures (ranging from 500°C to 900°C) and corrosive environments. Due to its very higher toughness and shock resistance extends its use for service conditions involving mechanical impacts and thermal shocks. Suitable for plastic extrusion screws, tools to cut paper, cardboard flor coverings, roofing, wood, galvanizing baths. Preferred to use with DC, electrode in positive (+) and possible to use with also AC.	 If required 1 Hour

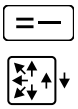
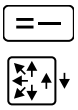
Cutting and Gouging Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
E CUT	Electrode used for cutting, bevelling and piercing works. Particularly suitable for cutting industrial metals like steels, cast irons, non-ferrous metals and also metals which are difficult or impossible to cut with oxyacetylene process. Suitable for cleaning faulty welding places and defective surfaces at high speed and in all positions. Electrode should be definitely not left to dry, but should contain certain amount of dampness. Possible to use in DCEN or DCEP. DCEN provides higher metal removal speed.	

Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Dimension (mm)	Packing Weigth (kg) Box Type
Co: 48.60	55 HRc	3.25 x 350 4.00 x 350	Plastic
C: 2.20			
Si: 1.20			
Mn: 1.00			
Ni: 2.50			
Cr: 30.00			
W: 12.50			
Fe: 2.00			
Co: 60.10	42 HRc	3.25 x 350 4.00 x 350	Plastic
C: 1.00			
Si: 0.90			
Mn: 1.00			
Ni: 2.50			
Cr: 28.00			
W: 4.50			
Fe: 2.00			
Co: 53.10	48 HRc	3.25 x 350 4.00 x 350	Plastic
C: 1.40			
Si: 1.00			
Mn: 1.00			
Ni: 2.50			
Cr: 30.00			
W: 8.50			
Fe: 2.50			

	Dimension (mm)	Packing Weigth (kg) Box Type
	3.25 x 350 3.25 x 450 4.00 x 450 5.00 x 450	Cardboard

Cutting and Gouging Electrodes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
E CUT S	Electrode especially used for all cutting, gouging, bevelling and piercing purposes. Particularly suitable for cutting industrial metals like steels, cast irons, non-ferrous metals and also metals which are difficult or impossible to cut with oxyacetylene process. Resulted surface finish is very clean and smooth. ECUT-S should be definetely not left to dry, but should contain certain amount of dampness. DCEN provides higher metal removal speed.	
EC 900	Electrode used for gouging and piercing works. Suitable for cleaning faulty welding places, defective surfaces and back-gouging on steels, cast iron, non-ferrous metals. The depth of the groove cut at one gouging should not exceed the diameter of the electrode. For cutting deep gouges the operation should be repeated several times. Electrode should be definitely not left to dry, but should contain certain amount of dampness. Prefered to use in DCEN due to it's higher metal speed.	

	Dimension (mm)	Packing Weigth (kg) Box Type
	3.25 x 350 4.00 x 350 4.00 x 450 5.00 x 450	Cardboard
	3.25 x 350 4.00 x 350 5.00 x 350	Cardboard

GAS ARC TUNGSTEN (TIG) AND OXY-ACETYLENE WELDING RODS

CONTENTS

GAS ARC TUNGSTEN (TIG) AND OXY-ACETYLENE WELDING RODS

Unalloyed Steel TIG and Oxy-Acetylene Welding Rods

Low-Alloyed, High Strength and Creep Resistant Steel Welding TIG Rods

Stainless Steel TIG Welding Rods

CONTENTS

GAS ARC TUNGSTEN (TIG) AND OXY-ACETYLENE WELDING RODS

Aluminium Alloy TIG Welding Rods

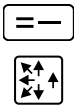
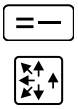
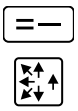
Nickel Alloy TIG Welding Rods

Copper Alloy TIG Welding Rods

Hardfacing TIG Rods

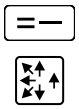
*This standard is no longer valid. Added for informational purposes.

Unalloyed Steel TIG and Oxy-Acetylene Welding Rods

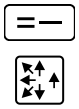
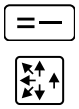
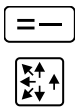
Product Name and Standards		Applications and Properties	Polarity Welding Positions
OG 1 **AWS/ASME SFA - 5.2** **EN 12536** **TS 3623 EN 12536**	 **R45** **O I** **O I**	Low carbon steel welding rod for oxy-acetylene welding. It is a general purpose rod for welding low carbon steels and wrought iron with the required tensile strenght does not exceed 310 N/mm^2. Generally used for automotive repair works like tears and rips in the body or patching on badly damaged parts, joining steel sheets and plates, tubing and piping installation where and intense heat source is required for straightening, forming, preheating post weld heat treatment, regardless of the complexity and position in which welding has to be done. Weld metal has got good ductility and machinability. Welding shall be performed in neutral flame characteristics. It has got a fluid weld puddle.	
OG 2 **AWS/ASME SFA - 5.2** **EN 12536** **TS 3623 EN 12536**	 **R 60** **O II** **O II**	Low carbon steel welding rod, for oxy-acetylene gas welding, containing slightly higher manganese. It is a general purpose welding rod with medium strength, used for welding carbon steels and low alloy steels with tensile strenghts up to 410 N/mm^2. Commonly used for carbon steel pipe installation and repair works in power plants, process piping, machine and agricultural tool repair, joining steel plates and wrought irons, filling holes and edged on wrought iron, where an intense heat source is required for straightening, forming, preheating post weld heat treatment, regardless of the complexity and position in which welding has to be done. Welding shall be performed in neutral flame characteristics. It has got a fluid weld puddle.	
TG 1 **AWS/ASME SFA - 5.18** **EN ISO 636 - A** **TS EN ISO 636 - A** DIN M. No.	 **ER70S-3** **W 42 3 2Si** **W 42 3 2Si** 1.5112	GTA (TIG) welding rod for unalloyed steels, fine grained steels and pipes. Particularly suitable for welding of galvanized and pre-painted steels, welding low alloy steels in pipe-lines, boilers and tank production. Used in root and cap passes in chemical, petrochemical, water, natural gas pipes joints safely. Suitable also welding in thin metal plates and repair welds. Characterized by a reduced slag formation and smooth welding deposit. Thin and homogeneous copper coating increase resistance to rusting.	
TG 2 **AWS/ASME SFA - 5.18** **EN ISO 636 - A** **TS EN ISO 636 - A** DIN M. No.	 **ER70S-6** **W 42 2 3Si1** **W 42 2 3Si1** 1.5125	GTA (TIG) welding rod for unalloyed steels, fine grained steels and pipes. Particularly used in root and cap passes in chemical, petrochemical, water, natural gas pipes joints safely. Suitable also welding of thin metal plates, tanks, boilers and repair welds of them. Thin and homogeneous copper coating increase resistance to rusting.	
TG 3 **AWS/ASME SFA - 5.18** **EN ISO 636 - A** **TS EN ISO 636 - A** DIN M. No.	 **ER70S-6** **W 46 3 4Si1** **W 46 3 4Si1** 1.5130	GTA (TIG) welding rod for unalloyed steels, fine grained steels and pipes. Provides high mechanical properties. Particularly used in root and cap passes in chemical, petrochemical, water, natural gas pipes joints safely. Suitable also welding of thin metal plates, tanks, boilers and repair welds of them. Thin and homogeneous copper coating increase resistance to rusting.	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.05 **Si:** 0.05 **Mn:** 0.50	280	450	20	20°C: 50	-	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000 5.00 x 1000	Cardboard
C: 0.10 **Si:** 0.30 **Mn:** 1.00	300	440	20	20°C: 50	-	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000	Cardboard
C: 0.05 **Si:** 0.60 **Mn:** 1.30	440	530	29	-30°C: 100	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000	Cardboard / Plastic
C: 0.06 **Si:** 0.80 **Mn:** 1.45	480	560	28	-30°C: 80 -20°C: 95	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000	Cardboard / Plastic
C: 0.07 **Si:** 0.90 **Mn:** 1.65	490	580	28	-30°C: 80	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic

Unalloyed Steel TIG and Oxy-Acetylene Welding Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TG 102		Micro-alloyed, GTA (TIG) welding rod for unalloyed steels. Due to it's titanium (Ti) and aluminium (Al) micro alloy contents, particularly suitable for single pass welding of galvanized, pre-painted, rusty and dirty steels, welding low alloy steels in pipe-lines, boilers and tank construction. Suitable also welding in thin metal plates and repair welds. Thin and homogeneous copper coating increase resistance to rusting.	
AWS/ASME SFA - 5.18	**ER70S-2**		
EN ISO 636 - A	**W 42 2 2Ti**		
TS EN ISO 636 - A	**W 42 2 2Ti**		

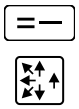
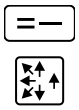
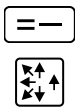
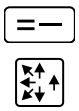
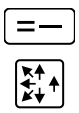
Low-Alloyed, High Strength and Creep Resistant Steel Welding TIG Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TG 150		Low alloyed GTA (TIG) welding rod for steels subjected to operating temperatures down to -60°C. Weld metal has high strength and high toughness. Suitable to use in petrochemical, chemical, oil/gas industries and off-shore platforms, especially used for root and fill passes of pipes, boilers, tanks and also valves, pumps which are made of cast or forged steels.	
AWS/ASME SFA - 5.28	**ER80S-Ni1**		
EN ISO 636 - A	**W 46 6 3Ni1**		
TS EN ISO 636 - A	**W 46 6 3Ni1**		
TG 171		Low alloyed GTA (TIG) welding rod for steels subjected to operating temperatures down to -90°C. Produces high strength and tough welded joints. Suitable to use in petrochemical, chemical, oil/gas industries and off-shore platforms, especially root and fill passes of pipes, boilers, tanks and also valves, pumps which are made of cast or forged steels.	
AWS/ASME SFA - 5.28	**ER80S-Ni2**		
EN ISO 636 - A	**W 42 9 2Ni2**		
TS EN ISO 636 - A	**W 42 9 2Ni2**		
TG 201		Low alloyed GTA (TIG) welding rod for Mo-alloyed creep resisting steels, subjected to operating temperatures up to 530°C. Particularly used in root and cap passes of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre-and post-weld heat treatment of base metal.	
AWS/ASME SFA 5.28	**ER80S-G**		
AWS/ASME SFA - 5.28	**ER70S-A1**		
EN ISO 21952 - A	**W MoSi**		
TS EN ISO 21952 - A	**W MoSi**		
DIN M. No.	1.5424		

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.05 **Si:** 0.70 **Mn:** 1.20 **Zr:** 0.08 **Ti:** 0.13 **Al:** 0.10	520	630	23	-30°C: 60	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000	Cardboard / Plastic

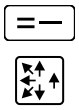
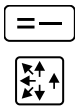
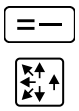
Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.60 **Mn:** 1.10 **Ni:** 0.90	480	570	28	-60°C: 90	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.09 **Si:** 0.55 **Mn:** 1.10 **Ni:** 2.45	As Welded 470 After Heat Treatment (620°C 1 Hour) 500	550 630	20 26	20°C: 200 -90°C: 47 -90°C: 150	I1 (%100 Ar)	2.40 x 1000	Cardboard / Plastic
C: 0.10 **Si:** 0.80 **Mn:** 1.20 **Mo:** 0.50	As Welded 540 After Heat Treatment (620°C 1 Hour) 530	620 610	26 27	-20°C: 60 20°C: 110 20°C: 150	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic

Low-Alloyed, High Strength and Creep Resistant Steel Welding TIG Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TG 201A **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A**	 **ER80S-D2** **W Z MnMo** **W Z MnMo**	Low alloyed, GTA (TIG) welding rod for Mo-alloyed creep resisting steels, subjected to operating temperatures up to 530°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Particularly used in root and cap pass welding of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.	
TG 211 **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A** DIN M. No.	 **ER80S-G** **W CrMo1Si** **W CrMo1Si** 1.7339	Low alloyed GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 570°C. Particularly used in root and cap passes of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.	
TG 211A **AWS/ASME SFA - 5.28** **EN ISO 21952 - B** **TS EN ISO 21952 - B**	 **ER80S-B2** **W 55 1CM** **W 55 1CM**	Low alloyed, GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 570°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Particularly used in root and cap pass welding of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.	
TG 222 **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A** DIN M. No.	 **ER90S-G** **W CrMo2Si** **W CrMo2Si** 1.7384	Low alloyed, GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 600°C. Particularly used in root and cap passes of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.	
TG 222A **AWS/ASME SFA - 5.28** **EN ISO 21952 - B** **TS EN ISO 21952 - B**	 **ER90S-B3** **W 62 2C1M** **W 62 2C1M**	Low alloyed, GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 600°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Particularly used in root and cap pass welding of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.70 **Mn:** 1.80 **Mn:** 0.45	540	620	26	-30°C: 65 20°C: 110	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.10 **Si:** 0.60 **Mn:** 1.00 **Cr:** 1.20 **Mo:** 0.50	As Welded 510	620	23	-20°C: 50 20°C: 80	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
	After Heat Treatment (680°C 1 Hour) 500	600	24	-20°C: 60 20°C: 90			
C: 0.10 **Si:** 0.60 **Mn:** 0.50 **Cr:** 1.40 **Mo:** 0.50	As Welded 550	620	21	20°C: 80	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000	Cardboard / Plastic
	After Heat Treatment (620°C 1 Hour) 540	600	22	20°C: 100			
C: 0.08 **Si:** 0.60 **Mn:** 0.90 **Cr:** 2.45 **Mo:** 1.00	As Welded 560	650	22	20°C: 100	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
	After Heat Treatment (700°C 1 Hour) 550	640	23	20°C: 110			
C: 0.10 **Si:** 0.50 **Mn:** 0.50 **Cr:** 2.50 **Mo:** 1.00	After Heat Treatment (690°C 1 Hour) 560	650	22	20°C: 110	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic

Low-Alloyed, High Strength and Creep Resistant Steel Welding TIG Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TG 235 **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A** DIN M. No.	 **ER80S-B6** **W CrMo5Si** **W CrMo5Si** 1.7373	Medium-alloyed GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 650°C. Suitable for welding 12 CrMo19-5, P5 / T5 steels in power generation and petrochemical industries. Due to it's high steam and hot hydrogen corrosion resistance, particularly used in root and cap passes of in steam generators, boilers, piping in refineries. where high X-ray quality is required. Observe directions of pre- and post-weld heat treatment of base metal.	
TG 285 **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A**	 **ER80S-B8** **W CrMo9** **W CrMo9**	9Cr- 1Mo alloyed GTA (TIG) welding rod for creep resisting steels, subjected to operating temperatures up to 600°C. Suitable for welding P9 / T9 steels in power generation and petrochemical industries. Due to it's high steam and hot hydrogen corrosion resistance, particularly used in root and cap passes of in steam generators, boilers, pressure vessels and piping in refineries, where high X-ray quality is required. Observe directions of pre- and post-weld heat treatment of base metal.	
TG 295 **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A** DIN M. No.	 **ER90S-B9** **W CrMo91** **W CrMo91** 1.4903	High-alloyed, GTA (TIG) welding rod for creep, oxidation and corrosion resistant Cr-Mo-V-Nb alloyed steels, subjected to operating temperatures in 650°C. Suitable for welding P91 and T91 steels used in steam generators, turbine rotors, boiler, piping in refineries, chemical industry and thermal power generation industry. Due to it's high steam and hot hydrogen corrosion resistance, particularly used in root and cap passes of in steam generators, boilers, pressure vessels and piping in refineries, where high X-ray quality is required. Observe directions of pre- and post-weld heat treatment of base metal.	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.10 **Si:** 0.40 **Mn:** 0.50 **Cr:** 6.00 **Mo:** 0.55	As Welded				I1 (%100 Ar)	2.00 x 1000 2.40 x 1000	Cardboard / Plastic
	580	660	23	20°C: 80			
	After Heat Treatment (750°C 1 Hour)						
	570	650	24	20°C: 100			
C: 0.08 **Si:** 0.40 **Mn:** 0.60 **Cr:** 9.00 **Ni:** 0.20 **Mo:** 1.00	After Heat Treatment (750°C 1 Hour)				I1 (%100 Ar)	2.00 x 1000 2.40 x 1000	Cardboard / Plastic
	610	700	20	20°C: 110			
C: 0.10 **Si:** 0.30 **Mn:** 0.50 **Cr:** 9.20 **Ni:** 0.65 **Mo:** 0.95 **Cu:** 0.02 **Nb:** 0.05 **V:** 0.20	After Heat Treatment (780°C 2 Hour)				I1 (%100 Ar)	2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
	650	750	19	20°C: 100			

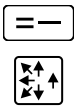
Stainless Steel TIG Welding Rods

Product Name and Standards	Applications and Properties	Polarity Welding Positions

TI 307Si

AWS/ASME SFA - 5.9 ~ER307
EN ISO 14343 - A W 18 8 Mn
TS EN ISO 14343 - A W 18 8 Mn
DIN M. No. 1.4370

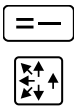
Austenitic stainless steel wire rod for GTA (TIG) welding of dissimilar steels, difficult to weld steels, armour plates, high manganese steels, rails, crossovers. Suitable also for depositing stress relaxing buffer layers on crack sensitive base metals and hard surfacing jobs, e.g. crane wheels,cutting blades and dies where high degree of pressure and dynamical loads exists. Weld metal has a high degree of corroison resistance and resistant to operating temperatures up to 300°C and non-scalling up to 850°C. Depending on chemical composition of base metal, proper welding procedure, preheating and interpass temparatures shall be applied by also avoiding high admixture of base metal.



TI 308L

AWS/ASME SFA - 5.9 ER308L
EN ISO 14343 - A W 19 9 L
TS EN ISO 14343 - A W 19 9 L
DIN M. No. 1.4316

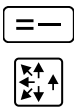
Austenitic stainless steel welding rod for GTA (TIG) welding of unstabilized or stabilized corrosion resisting Cr-Ni steels. Used in tank, pipe, equipment welding in food, beverage, chemical and pharmaceutical industries. Resistant to intergranular corrosion up to 350°C. Non-scaling up to 800°C, in air or oxidizing combustion gases.



TI 309L

AWS/ASME SFA - 5.9 ER309L
EN ISO 14343 - A W 23 12 L
TS EN ISO 14343 - A W 23 12 L
DIN M. No. 1.4332

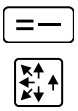
Austenitic-ferritic wire electrode for GTA (TIG)-welding of stainless steels to unalloyed or low-alloyed steels, subject to operating temperatures up to 300°C. Low carbon content increases resistance to intergranular corrosion. Suitable to use also as buffer layer on carbon steel before welding with 308 and 308 L to reach 304 and 304L surface layer.



TI 310

AWS/ASME SFA - 5.9 ER310
EN ISO 14343 - A W 25 20
TS EN ISO 14343 - A W 25 20
DIN M. No. 1.4842

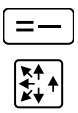
Fully austenitic welding rod for GTA (TIG) welding of heat resisting steels containing approximatelly 25% chromium and 20% nickel which are used in heat treatment and industrial furnaces and equipments, like cement and steel industries. Also suited for welding heat resisting and non-scaling ferritic chromium steels, provided that corrosion attack by reducing sulphur bearing combustion gases is not to be expected. Non-scaling up to 1200°C. Weld metal exhibits good toughness values down to -196°C.



TI 312

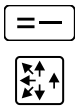
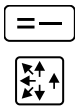
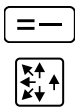
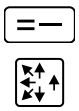
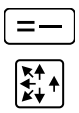
AWS/ASME SFA - 5.9 ER312
EN ISO 14343 - A W 29 9
TS EN ISO 14343 - A W 29 9
DIN M. No. 1.4337

Austenitic-ferritic stainless steel wire electrode for TIG welding of dissimilar steels and depositing buffer layers on ferritic steels. It features high resistance to cracking and toughness, is therefore suited for joining difficult to weld steels and depositing stress-relaxing buffer layers on crack sensitive base metals. Weld metal is non-scaling up to 1100°C. Especially used in die and tool repair, crack repairs in difficult to weld steels, gear teeth repair and rebuilding, buffer layer application on cutting blades. Suitable also for welding galvanized steel plates.



Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.07 **Si:** 0.80 **Mn:** 7.00 **Cr:** 18.00 **Ni:** 8.00	470	630	42	20°C: 150 -60°C: 100	I1 (%100 Ar)	2.40 x 1000	Cardboard / Plastic
C: 0.02 **Si:** 0.45 **Mn:** 1.80 **Cr:** 19.75 **Ni:** 10.50	460	620	39	20°C: 195 -196°C: 50	I1 (%100 Ar)	1.20 x 1000 1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.02 **Si:** 0.35 **Mn:** 1.75 **Cr:** 23.50 **Ni:** 13.50	550	670	30	-30°C: 90 -196°C: 62	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.10 **Si:** 0.40 **Mn:** 1.60 **Cr:** 26.00 **Ni:** 21.00	450	580	36	20°C: 150 -60°C: 100	I1 (%100 Ar)	1.20 x 1000 1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.10 **Si:** 0.40 **Mn:** 1.80 **Cr:** 30.00 **Ni:** 9.00	700	770	21	20°C: 60	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000	Cardboard / Plastic

Stainless Steel TIG Welding Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TI 316L		Austenitic stainless steel welding rod for GTA (TIG) welding of unstabilized or stabilized high corrosion resisting Cr-Ni-Mo stainless steels. Due to it's low C (carbon) content, resistant to intergranular corrosion up to 400°C. Especially used in welding chemical tanks, pipes and equipments which are used in chemical, petrochemical, paint, paper and shipbuilding industries, etc.	
AWS/ASME SFA - 5.9	**ER316L**		
EN ISO 14343 - A	**W 19 12 3 L**		
TS EN ISO 14343 - A	**W 19 12 3 L**		
DIN M. No.	1.4430		
TI 318		Austenitic stainless steel welding rod for GTA (TIG) welding of unstabilized or stabilized corrosion resisting Cr-Ni-Mo steels. Stabilized with Nb (Niobium) and resistant to intergranular corrosion up to 400°C.Especially used in welding of chemical tanks, pipes and equipments which are used in chemical, petrochemical, paper, paint, shipbuilding industries.	
AWS/ASME SFA - 5.9	**ER318**		
EN ISO 14343 - A	**W 19 12 3 Nb**		
TS EN ISO 14343 - A	**W 19 12 3 Nb**		
DIN M. No.	1.4576		
TI 347		Stabilized austenitic stainless steel welding rod for GTA (TIG) welding of unstabilized and stabilized corrosion resisting Cr-Ni steels. Generally used for welding pipes, tanks and equipments in food, beverage, chemical and pharmaceutical industries. Stabilized with Nb (Niobium) and resistant to intergranular corrosion. Weld metal is suitable for operating temperatures of up to 400°C, non-scaling up to 800°C, in air and oxidizing combustion gases.	
AWS/ASME SFA - 5.9	**ER347**		
EN ISO 14343 - A	**W 19 9 Nb**		
TS EN ISO 14343 - A	**W 19 9 Nb**		
DIN M. No.	1.4551		
TI 385		Fully-austenitic stainless steel rod for GTA (TIG)-welding of unstabilized or stabilized corrosion resisting Cr-Ni-Mo alloyed stainless steels like 904L/1.4539. Especially used in flue gas desulphurization plants, fertilizer plants, sea water transfer fittings, petrochemical, paper and pulp industries, etc. Due to high Ni, Mo and low C content, weld metal have high resistant to intergranular, pitting, crevice and stress corrosion types in chloride containing solutions, phosphorus-, sulphur-, acetic-, formic acids, sea water.	
AWS/ASME SFA - 5.9	**ER385**		
EN ISO 14343 - A	**W 20 25 5 Cu L**		
TS EN ISO 14343 - A	**W 20 25 5 Cu L**		
DIN M. No.	~1.4539		
TI 410		Martensitic stainless steel rod for GTA (TIG) welding of martensitic stainless steels, heat resistant steels and cast steels which contain approx. 13% chromium. Suitable for joining and surfacing of gas, water and steam fan, fan blades and fittings subjected corrosion, erosion and operating temperatures up to 450°C. Depending on type of base metal composition and thickness, preheating between 200 and 300°C, keeping the interpass temperature during welding and tempering between 700 and 750°C after welding are advisable.	
AWS/ASME SFA - 5.9	**ER410**		
EN ISO 14343 - A	**W 13**		
TS EN ISO 14343 - A	**W 13**		
DIN M. No.	~1.4009		

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.02 **Si:** 0.35 **Mn:** 1.75 **Cr:** 18.50 **Ni:** 11.50 **Mo:** 2.75	510	630	35	-20°C: 120 -196°C: 90	I1 (%100 Ar)	1.20 x 1000 1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.04 **Si:** 0.40 **Mn:** 1.70 **Cr:** 19.50 **Ni:** 11.50 **Mo:** 2.60 **Nb:** 0.70	480	640	32	20°C: 130	I1 (%100 Ar)	1.20 x 1000 1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.04 **Si:** 0.35 **Mn:** 1.35 **Cr:** 19.50 **Ni:** 9.50 **Nb:** 0.60	460	650	36	-20°C: 70	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
C: 0.01 **Si:** 0.40 **Mn:** 1.80 **Cr:** 20.00 **Ni:** 25.50 **Mo:** 4.50 **Cu:** 1.50	440	580	32	-196°C: 170	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000	Cardboard / Plastic
C: 0.12 **Si:** 0.45 **Mn:** 0.50 **Cr:** 12.50	As Welded				I1 (%100 Ar)	1.60 x 1000 2.40 x 1000	Cardboard / Plastic
	450	600	20	0°C: 170			
	After Heat Treatment (760°C 1 Hour)						
	530	660	23	0°C: 180 -20°C: 100			

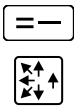
Stainless Steel TIG Welding Rods

Product Name and Standards	Applications and Properties	Polarity Welding Positions

TI 630

AWS/ASME SFA - 5.9 **ER630**
EN ISO 14343 - B **SS630**
TS EN ISO 14343 - B **SS630**
DIN M. No. 1.4542

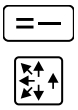
GTA (TIG) welding rod for welding of 17Cr/4 Ni containing, 630 (1.4542) and similar precipitation hardening-martensitic stainless steels. Especially used in hydraulic equipment components, impellers, pump shafts, valves which are exposed to high corrosion in petrochemical industry, chemical plants. In order to gain precipitation hardening martensitic steel properties of the the weld metal after welding, solution heat treatment shall be done at 1052°C (±28°C) to have austenite matrix, then quenching to 149-93°C to transform the matrix to martensite and then precipitation/aging heat treatment at 482-621°C for 4 hours. After precipitation hardening heat treatment, weld metal has very high mechanical strength and high toughness, as well as very good corrosion and oxidation resistance.



TI 2209

AWS/ASME SFA - 5.9 **ER2209**
EN ISO 14343 - A **W 22 9 3 N L**
TS EN ISO 14343 - A **W 22 9 3 N L**
DIN M. No. ~1.4462

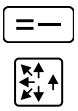
Dublex (ferritic-austenitic) stainless steel welding rod for GTA (TIG) welding of dublex Cr-Ni-Mo stainless steels. Especially used in welding of acid tanks and pipes, in chemical, petrochemical, paper, shipbuilding and desalination industries. Suitable also for welding dublex stainless steels to carbon steels. The high-strength and ductile weld metal exhibits good resistance to pitting, crevice corrosion and stress corrosion cracking in chloride-bearing media. Suitable for operating temperatures of up to 250°C.



TI 2594

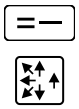
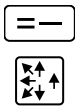
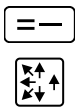
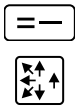
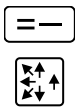
AWS/ASME SFA - 5.9 **ER2594**
EN ISO 14343 - A **W 25 9 4 N L**
TS EN ISO 14343 - A **W 25 9 4 N L**
DIN M. No. ~1.4417

Super dublex (ferritic-austenitic) stainless steel GTA (TIG) welding rod for welding Cr-Ni-Mo containing super dublex (ferritic-austenitic) stainless steels. Suitable for welding acid tanks and piping in chemical, petrochemical, paper, shipbuilding, sea water desalination industries and offshore platforms. It is also suitable for root pass welding of 22%Cr containing dublex stainless steels and joining of 13%Cr containing martensitic steels. Weld metal with high mechanical strength with high ductility and also gerally has also high stres corrosion resistance, especially in chloride containing media. PREN:40 value provides high resistance to pitting corrosion.



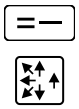
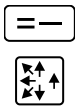
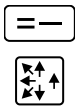
Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.02							
Si: 0.40							
Mn: 0.40	After Heat Treatment (1050°C 1 Hour)						
Cr: 16.25	980	1020	17	0°C: 100 -20°C: 70	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000	Cardboard / Plastic
Ni: 4.70							
Cu: 3.40							
Nb: 0.22							
C: 0.01							
Si: 0.45							
Mn: 1.45							
Cr: 23.00	640	810	20	20°C: 150 -40°C: 120 -60°C: 100	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000	Cardboard / Plastic
Ni: 8.50							
Mo: 3.25							
N: 0.15							
C: 0.02							
Si: 0.40							
Mn: 0.60							
Cr: 25.00	690	850	28	-40°C: 200	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000	Cardboard / Plastic
Ni: 9.20							
Mo: 4.00							
N: 0.25							

Aluminium Alloy TIG Welding Rods

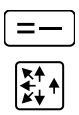
Product Name and Standards		Applications and Properties	Polarity Welding Positions
TAL 1100		Pure aluminium GTA(TIG) welding of unalloyed aluminium base metals. It has got good colour matching with the aluminium base metals. High corrosion resistance and excellent electrical conductivity.	
AWS/ASME SFA - 5.10	**ER1070**		
AWS/ASME SFA - 5.10	**~ER1100**		
EN ISO 18273	**S Al 1070 (Al99.7)**		
TS 6204 EN ISO 18273	**S Al 1070 (Al99.7)**		
DIN M. No.	3.0259		
TAL 4043		5% Silicon containing aluminium welding rod for GTA (TIG) welding of aluminium and aluminium alloys. Suitable for welding aluminium castings containig up to 7% silicon and Al-Mg-Si alloys which are containing up to 2 % Magnesium as alloying elements.	
AWS/ASME SFA - 5.10	**ER4043**		
EN ISO 18273	**S Al 4043 (AlSi5)**		
TS EN ISO 18273	**S Al 4043 (AlSi5)**		
DIN M. No.	3.2245		
TAL 4047		Aluminium-Silicon alloy filler metal used both for brazing and GTA (TIG) welding of aluminium alloys. Suitable for welding Al-Si and Al-Si-Mg cast aluminium alloys, having silicon content of > 7%. Very good capillary flow in brazing and brazed joints are matching structure and colour of aluminium alloys. Suitable for brazing of rolled and cast aluminium alloys. Excess acetylene flame has to be used during brazing. Widely used in production of kettle, frier, solar heaters. Used in combination with BF14 flux in brazing applications.	
AWS/ASME SFA - 5.10	**ER4047**		
EN ISO 18273	**S Al 4047A (AlSi12(A))**		
TS EN ISO 18273	**S Al 4047A (AlSi12(A))**		
DIN M. No.	3.2585		
TAL 5183		5% Mg (Magnesium) and Mn (Manganese) containing aluminium alloy welding rod for GTA (TIG) welding of Al-alloys with high tensile strength requirements. Suitable for welding Al-Mg alloys and Al-Mg-Mn alloys.	
AWS/ASME SFA - 5.10	**ER5183**		
EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**		
TS EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**		
DIN M. No.	3.3548		
TAL 5356		5% Mg (Magnesium) containing aluminium welding rod for GTA (TIG) welding of Al-Mg (Aluminimum- Magnesium) alloys and Al-Mg-Si (Aluminimum-Magnesium-Silicon) alloys. Gives colour match with base metal after anodizing process. Has excellent ductility and very good corrosion resistance especially in sea water.	
AWS/ASME SFA - 5.10	**ER5356**		
EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**		
TS EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**		
DIN M. No.	3.3556		

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
Al: 99.50	50	70	35	-	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000	Cardboard / Plastic
Si: 5.00 **Mn:** 0.05 **Al:** 94.95	80	150	12	-	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000	Cardboard / Plastic
Si: 12.00 **Al:** 88.00	80	170	5	-	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
Mg: 4.75 **Mn:** 0.60 **Ti:** 0.10 **Al:** 94.55	130	260	17	-	I1 (%100 Ar)	2.00 x 1000 2.40 x 1000 3.20 x 1000	Cardboard / Plastic
Mg: 4.75 **Cr:** 0.10 **Al:** 95.15	120	270	28	-	I1 (%100 Ar)	1.60 x 1000 2.00 x 1000 2.40 x 1000 3.20 x 1000 4.00 x 1000	Cardboard / Plastic

Nickel Alloy TIG Welding Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TNI 422 **AWS/ASME SFA-5.14** **EN ISO 18274-A** **TS EN ISO 18274-A** DIN M. No.	 **ERNiCr-3** **SNi 6082** **SNi 6082** 2.4806	Ni-Cr-Fe alloyed GTA (TIG) welding rod, depositing Ni-20Cr3Mn2,5Nb weld metal. Especially used for welding of highly creep resistant, heat and corrosion resistant Ni-Cr alloys, like Incoloy 800, 5-9% Ni containing steels, cryogenic stainless steels down to -196°C. Also suitable for joining dissimilar materials as stainless steels to low alloyed steels, stainless steels to nickel alloys, buffering of difficult to weld steels cladding on steels and repair welds of them. Weld metal deposit is insensitive to cracks, has very good resistance to acids, salts and alkaline solutions, molten salt (e.g. cyanide) in oxidizing and carburization atmospheres. In sulphurous atmospheres the weld metal can be used up to 500°C. Generally used for welding on LPG and LNG processing and storing plants, oven parts, burners, heat treatment equipment, cement works, moulds, transport and storage tanks of liquid gases in chemical, petrochemical industries, glassworks, civil engineering, repairing and maintenance workshops.	
TNI 424 **AWS/ASME SFA - 5.14** **EN ISO 18274** **TS EN ISO 18274** DIN M. No.	 **ERNiCrMo4** **NiCr15Mo16Fe6W4** **NiCr15Mo16Fe6W4** 2.4886	It is specially developed for welding nickel-chromium-molybdenum alloys and different materials to each other. The welding metal has high corrosion resistance against pitting and stress corrosion cracking in chlorine, hypochlorite, chlorine dioxide, corrosive gases, and oxidizing atmospheres. It has high toughness down to -196°C. It has a wide range of applications in the chemical and paper industries, waste recycling plants, natural gas recovery, and cryogenic environments. It is also preferred for applications requiring dynamic load conditions and high elongation properties.	
TNI 425 **AWS/ASME SFA-5.14** **EN ISO 18274-A** **TS EN ISO 18274-A** DIN M. No.	 **ERNiCrMo-3** **SNi 6625 (NiCr22Mo9Nb)** **SNi 6625 (NiCr22Mo9Nb)** 2.4831	Ni-Cr-Mo alloyed GTA (TIG) welding rod, depositing Ni-22Cr9Mo3,5Nb weld metal. TNI 425 is used for welding of highly corrosion resistant Ni-Cr-Mo alloys, like Alloy 625, 825 and similar alloys. Due to it's good cryogenic toughness down to -196°C, preferred for welding of cyrogenic nickel alloys, e.g. X1NiCrMoCuN25-20-7. In sulphur free atmospheres the weld metal is non-scaling 1200°C, in sulphurous atmospheres the weld metal can be used in service temperatures up to 500°C. It is also highly resistant stress corrosion cracking and pitting corrosion in phosphoric acid, organic acids, sea water and polluting environments. Weld metal is insensitive to cracking and very resistant to thermal shocks. Used for joining of dissimilar nickel alloys, joining dissimilar stainless steels, low alloyed steels to stainless steels or to nickel alloys, buffering of difficult to weld steels and repair welding of them.	

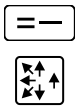
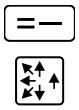
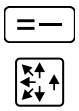
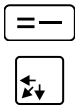
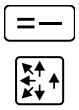
Copper Alloy TIG Welding Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TCU AI8 **AWS/ASME SFA - 5.07** **EN ISO 24373** **TS EN ISO 24373** DIN M. No.	 **ERCuAl-A1** **S Cu 6100 (CuAl7)** **S Cu 6100 (CuAl7)** 2.0921	Aluminium bronze welding rod for GTA (TIG) welding of aluminium bronzes, high strength brass and surfacing of steel, gray cast iron used in machine building and in the chemical industry, as well as in shipbuilding. Alloy showing resistance to corrosion and erosion to sea water, with a very good metal to metal sliding properties. Suitable for also welding joints on corrosion resistant aluminium bronze or high strength brass pipes. Joining copper tubing to steel. Surface build-up on ship propellers, skid rails, bearing surfaces, bearings, valves, slide gates, fittings.	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 0.03	500	700	40	20°C: 170 -196°C: 160	I1 (%100 Ar)	1.60 x 1000 2.40 x 1000	Cardboard / Plastic
Si: 0.10							
Mn: 3.00							
Cr: 20.00							
Ni: 72.50							
Nb: 2.40							
Ti: 0.30							
Fe: 1.30							
Mn: 0.52	570	760	39	20°C: 135 -196°C: 130	I1 (%100 Ar)	1.60 x 1000 2.40 x 1000	Cardboard / Plastic
Cr: 15.50							
Ni: 57.20							
Mo: 16.15							
W: 3.88							
Fe: 6.20							
C: 0.01	570	760	39	20°C: 135 -196°C: 130	I1 (%100 Ar)	1.60 x 1000 2.40 x 1000	Cardboard / Plastic
Si: 0.04							
Mn: 0.02							
Cr: 22.25							
Ni: 65.00							
Mo: 8.70							
Nb: 3.70							
Ti: 0.20							
Fe: 0.30							

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
Mn: 0.20	Hardness: 100 HB						
Ni: 0.30	200	430	40	20°C: 135 -196°C: 130	I1 (%100 Ar)	2.40 x 1000 3.20 x 1000	Cardboard / Plastic
Cu: 91.50							
Al: 8.00							

Hardfacing TIG Rods

Product Name and Standards		Applications and Properties	Polarity Welding Positions
TH 801 **AWS/ASME SFA - 5.21** **EN 14700** **TS EN 14700** DIN 8555	 **ERCoCr-C** **T Co3** **T Co3** WSG 20-GO-55-CSTZ	Co-Cr-W alloy GTA (TIG) welding rod for hardfacing applications. Weld metal has got high resistance to metal-to-metal wear, corrosion and high temperatures from 500°C to 900°C. Resistant to low and medium level of mechanical and thermal shocks, due to its high hardness. Widely used for hardfacing of wire guides, rolling mill guides, extrusion dies and screws, valve seats, mechanical parts of steam turbines, cement screws, continuous casting dies and parts, pump tubing and shafts, mixes blades, wood saws.	
TH 806 **AWS/ASME SFA - 5.21** **EN 14700** **TS EN 14700** DIN 8555	 **ERCoCr-A** **T Co2** **T Co2** WSG 20-GO-40-CTZ	Co-Cr-W alloy GTA (TIG) welding rod for hardfacing applications. Weld metal has got high resistance to metal-to-metal wear, corrosion and high temperatures from 500°C to 900°C. Due to weld metal toughness, it is resistant to mechanical and thermal shocks. Widely used for hardfacing of hot shearing blades, ingot tong ends, valves and valve seats, nozzles and glass dies.	
TH 812 **AWS/ASME SFA - 5.21** **EN 14700** **TS EN 14700** DIN 8555	 **ERCoCr-B** **T Co3** **T Co3** WSG 20-GO-45-CTZ	Co-Cr-W alloy TIG welding rod for hardfacing applications. Weld metal has got high resistance to metal-to-metal wear, corrosion and high temperatures from 500°C to 900°C. Due to weld metal toughness, it is resistant to mechanical and thermal shocks. Widely used for hardfacing of tools for cutting and machining of paper, cardboard, floor coverings, roofing and wood, extrusion screws, glass dies.	
T CARBIDE 2350 DIN 8555	 G 21-UM-55-CG	Flexible rod for hard surfacing by TIG/oxy-gas welding. Consists of a small diameter pure nickel core wire thickly coated tungsten carbides in a Ni-Cr-B-Si matrix. The weld metal is a heterogeneous metal composed of tungsten carbides (W2C, WC) distributed in a hard and tough matrix. Shows extremely high abrasion resistance. It has got a quiet melting and good wetting. Especially used for hard surfacing of mixers, crushing mills, die blades and heads, sand foundary equipment, drilling tricones.	
T CARBIDE 3000 **EN 14700** **TS EN 14700** DIN 8555	 **T Ni20** **T Ni20** G21 UM-55-CG	Flexible rod for hardfacing by oxy-gas welding. Consist of a small diameter pure nickel core wire thickly coated tungsten carbides in a Ni-Cr-B-Si matrix. The weld metal is a heterogeneous metal composed of tungsten carbides (W2C,WC) distributed in a hard and tough matrix. Shows extremely high abrasion resistance. It has got a quiet melting and good wetting. Especially used for hardfacing of mixers, crushing mills, die blades and heads, sand foundary equipment, drilling tricones.	

Typical Chemical Analysis of Welding Rod (%)	Hardness (HRc)	Shielding Gas	Dimension (mm)	Packing Weigth (kg) Box Type
C: 2.30 **Si:** 1.00 **Mn:** 0.50 **Cr:** 30.00 **Ni:** 2.20 **Fe:** 2.50 **W:** 12.50 **Co:** 49.00	55	I1 (%100 Ar)	3.20 x 1000 5.00 x 1000	Cardboard
C: 1.00 **Si:** 1.00 **Mn:** 0.50 **Cr:** 28.00 **Ni:** 2.00 **Fe:** 2.50 **W:** 5.00 **Co:** 60.00	40	I1 (%100 Ar)	3.20 x 1000 4.00 x 1000 5.00 x 1000	Cardboard
C: 1.40 **Si:** 1.00 **Mn:** 0.10 **Cr:** 30.00 **Ni:** 2.00 **Fe:** 2.50 **W:** 8.00 **Co:** 55.00	45	I1 (%100 Ar)	3.20 x 1000 4.00 x 1000 5.00 x 1000	Cardboard
C: 2.50 **Si:** 1.30 **Cr:** 2.60 **Ni:** 33.00 **B:** 0.60 **W:** 60.00	Matrix: 40-45 HRc SFTC: 2350 HV	I1 (%100 Ar)	5.00 x 450	Cardboard
C: 2.50 **Si:** 1.30 **Cr:** 2.60 **Ni:** 33.00 **B:** 0.60 **W:** 60.00	Matrix: 40-45 HRc SFTC: 3000 HV	I1 (%100 Ar)	5.00 x 450	Cardboard

GAS METAL ARC (MIG/MAG) WELDING WIRES

CONTENTS

GAS METAL ARC (MIG/MAG) WELDING WIRES

Unalloyed Steel MIG/MAG Welding Wires

Low-Alloyed, High Strength and Creep Resistant Steel MIG/MAG Welding Wires

Stainless Steel MIG Welding Wires

CONTENTS

GAS METAL ARC (MIG/MAG) WELDING WIRES

Aluminium Alloy MIG Welding Wires

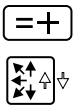
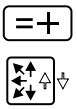
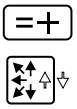
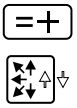
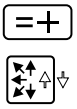
Nickel Alloy MIG Welding Wires

Hardfacing MIG/MAG Welding Wires

*This standard is no longer valid. Added for informational purposes.

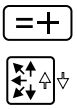
Copper Alloy TIG Welding Rods

Unalloyed Steel MIG/MAG Welding Wires

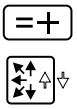
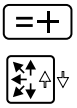
Product Name and Standards		Applications and Properties	Polarity Welding Positions
MG 1		Unalloyed wire electrode for GMA (MIG/MAG) welding of unalloyed steels by using CO_2 or mixed gases, depending on thickness of the base metal. Characterized by a reduced slag formation and smooth welding deposit. Particularly suitable for welding of galvanized and pre-paint steels, welding unalloyed steels in pipe-lines, boilers and tank construction. Suitable also welding thin metal plates and repair welds. A thin and homogeneous copper coating increases electrical conducvitiy and protects the wire from using.	
AWS/ASME SFA - 5.18	**ER70S-3**		
EN ISO 14341 - A	**G 38 3 C1 2Si**		
EN ISO 14341 - A	**G 38 3 M21 2Si**		
TS EN ISO 14341 - A	**G 38 3 C1 2Si**		
TS EN ISO 14341 - A	**G 38 3 M21 2Si**		
DIN M. No.	1.5125		
MG 2		Unalloyed wire electrode for GMA (MIG/MAG) welding of general structural steels, pipe steels, and cast steels using CO_2 or mixed shielding gases, depending on thickness of hte base metal. Generally used in steel construction, shipbuilding, machine, tank, boiler production, automotive industry. Preheating is required, depending on the plate thickness and carbon equivalent of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.	
AWS/ASME SFA - 5.18	**ER70S-6**		
EN ISO 14341 - A	**G 42 4 M21 3Si1**		
EN ISO 14341 - A	**G 42 3 C1 3Si1**		
TS EN ISO 14341 - A	**G 42 4 M21 3Si1**		
TS EN ISO 14341 - A	**G 42 3 C1 3Si1**		
DIN M. No.	1.5125		
MG 3		Unalloyed wire electrode for GMA (MIG/MAG) welding of general structural steels, pipes and cast steels by using CO_2 or mixed shielding gases can be used depending on thickness of the base metal. Generally used in steel construction, machine, tank, boiler production. Preheating is required, depending on the plate thickness and carbon equivalent of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.	
AWS/ASME SFA - 5.18	**ER70S-6**		
EN ISO 14341 - A	**G 46 4 M21 4Si1**		
EN ISO 14341 - A	**G 46 4 C1 4Si1**		
TS EN ISO 14341 - A	**G 46 4 M21 4Si1**		
TS EN ISO 14341 - A	**G 46 4 C1 4Si1**		
DIN M. No.	1.5130		
MG 20		Non-copper coated and unalloyed GMA (MIG/MAG) wire electrode, especially produced for welding without spatter or very low level of spatter. Suitable for welding of general structural steels, boiler steels, pipe steels and cast steels. Due to it's special coating provides stable arc and no spatter especially with mixed shielding gases which can be used depending on the thickness. Generally preferred in robotic applications, due to it's high welding performance without spatter and cleaning needs. Also provides cost advantages in cleaning after welding, torch spare part consumptions like, contact tip, spiral, driving wheel, anti-spatter sprey. Due to these advantages preferably used in automotive, machine and steel furniture production.	
AWS/ASME SFA - 5.18	**ER70S-6**		
EN ISO 14341 - A	**G 42 4 M21 3Si1**		
EN ISO 14341 - A	**G 42 3 C1 3Si1**		
TS EN ISO 14341 - A	**G 42 4 M21 3Si1**		
TS EN ISO 14341 - A	**G 42 3 C1 3Si1**		
DIN M. No.	1.5125		
MG 30		Non-copper coated and unalloyed GMA (MIG/MAG) wire electrode, especially produced for welding without spatter or very low level of spatter. Suitable for welding of general structural steels, boiler steels, pipe steels and cast steels. Due to it's special coating provides stable arc and no spatter especially with mixed shielding gases which can be used depending on the thickness. Generally preferred in robotic applications due to it's high welding performance without spatter and cleaning needs. Also provides cost advantages in cleaning after welding, torch spare part consumptions like, contact tip, spiral, driving wheel, anti-spatter sprey. Due to these advantages preferably used in automotive, machine and steel furniture production.	
AWS/ASME SFA - 5.18	**ER70S-6**		
EN ISO 14341 - A	**G 46 4 M21 4Si1**		
EN ISO 14341 - A	**G 46 4 C1 4Si1**		
TS EN ISO 14341 - A	**G 46 4 M21 4Si1**		
TS EN ISO 14341 - A	**G 46 4 C1 4Si1**		
DIN M. No.	1.5130		

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.07 **Si:** 0.70 **Mn:** 1.25	With M21 Shielding Gas 420	520	30	-30°C: 80	**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2) **M24** (Ar + %5-15 CO_2 + %0.5-3 O_2) **M26** (Ar + %15-25 CO_2 + %0.5-3 O_2)	0.80 1.00 1.20 1.60	D100 D200 D300 (0.60 mm) K300MS / K300 / D300 Drum
	With C1 Shielding Gas 400	470	30	-30°C: 100			
C: 0.07 **Si:** 0.90 **Mn:** 1.45	With M21 Shielding Gas 460	560	27	-30°C: 95 -40°C: 75 -50°C: 60	**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2) **M24** (Ar + %5-15 CO_2 + %0.5-3 O_2) **M26** (Ar + %15-25 CO_2 + %0.5-3 O_2)	0.60 0.80 0.90 1.00 1.20 1.40 1.60 2.00 2.40	D100 D200 D300 (0.60 mm) K300MS / K300 / D300 Drum
	With C1 Shielding Gas 430	540	29	-20°C: 90 -30°C: 70			
C: 0.07 **Si:** 0.95 **Mn:** 1.70	With M21 Shielding Gas 480	580	27	-30°C: 95 -40°C: 80 -50°C: 65	**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2) **M24** (Ar + %5-15 CO_2 + %0.5-3 O_2) **M26** (Ar + %15-25 CO_2 + %0.5-3 O_2)	0.60 0.80 0.90 1.00 1.20 1.40 1.60 2.00 2.40	D100 D200 K300MS / K300 / D300 Drum
	With C1 Shielding Gas 460	570	30	-40°C: 70			
C: 0.07 **Si:** 0.90 **Mn:** 1.45	With M21 Shielding Gas 460	560	27	-30°C: 95 -40°C: 75 -50°C: 60	**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2) **M24** (Ar + %5-15 CO_2 + %0.5-3 02) **M26** (Ar + %15-25 CO_2 + %0.5-3 O_2)	0.80 1.00 1.20 1.40 1.60	D100 D200 K300MS / K300 / D300 Drum
	With C1 Shielding Gas 430	540	29	-20°C: 90 -30°C: 70			
C: 0.07 **Si:** 0.95 **Mn:** 1.70	With M21 Shielding Gas 480	580	27	-30°C: 95 -40°C: 80 -50°C: 65	**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2) **M24** (Ar + %5-15 CO_2 + %0.5-3 O_2) **M26** (Ar + %15-25 CO_2 + %0.5-3 O_2)	1.00 1.20	D100 D200 K300MS / K300 / D300 Drum
	With C1 Shielding Gas 460	570	30	-40°C: 70			

Unalloyed Steel MIG/MAG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MG 102		Micro-alloyed wire electrode for GMA (MIG/MAG) welding of unalloyed and low-alloy steels. Characterized by a reduced slag formation and smooth welding deposit. Due to its Al and Ti micro-alloy content, particularly suitable for single pass welding of galvanized, pre-painted, rusty and dirty steels, welding low alloy steels in pipe-lines, boilers and tank production. Suitable also welding in thin metal plates and repair welds. CO_2 or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wires from rusting.	
AWS/ASME SFA - 5.18	ER70S-2		
EN ISO 14341 - A	G 42 3 M21 2Ti		
EN ISO 14341 - A	G 42 3 C1 2Ti		
TS EN ISO 14341 - A	G 42 3 M21 2Ti		
TS EN ISO 14341 - A	G 42 3 C1 2Ti		

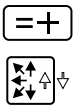
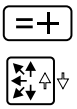
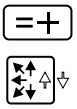
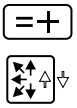
Low-Alloyed, High Strength and Creep Resistant Steel MIG/MAG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MG 150		Low alloyed wire electrode for GMA (MIG/MAG) welding of steels, which are subjected to operating temperatures down to -60°C. Weld metal has high strength and high toughness. Suitable to use in petrochemical, chemical, oil/gas industries and off-shore platforms, especially welding of pipes, boilers, tanks and valves, pumps which are made of cast or forged steels.	
AWS/ASME SFA - 5.28	ER80S-Ni1		
EN ISO 14341 - A	G 50 6 M21 3Ni1		
TS EN ISO 14341 - A	G 50 6 M21 3Ni1		
MG 150W		Low-alloyed GMA (MIG/MAG) welding wire designed for welding of weathering steels (like COR-TEN) with high mechanical properties. Due to nickel and copper alloys, it provides higher corrosion resistance then carbon steels. Suitable for welding in steel construction manufacturing such as bridge, stadium and steel construction.	
AWS/ASME SFA - 5.18	ER80S-G		
EN ISO 14341 - A	G 42 2 M21 Z2NiCu		
TS EN ISO 14341 - A	G 42 2 M21 Z2NiCu		
MG 182		Low alloyed wire electrode for GMA (MIG/MAG) welding of fine grained and high strength steels with yield strength of up to 690 N/mm^2. Weld metal exhibits good toughness properties down to -60°C. Especially used in high strength pipe-lines, earthmoving and mining equipments, trucks, mobile cranes, concrete pumps cranes and lift productions.	
AWS/ASME SFA - 5.28	ER110S-G		
EN ISO 16834 - A	G 69 6 M21 Mn4Ni1,5CrMo		
TS EN ISO 16834 - A	G 69 6 M21 Mn4Ni1,5CrMo		

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.04							
Si: 0.50							
Mn: 1.10	With C1 Shielding Gas				**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)	0.60 0.80 0.90 1.00 1.20 1.60	D100 D200 K300MS / K300 / D300 Drum
Ti: 0.13	460	530	25	-30°C: 60			
Zr: 0.08							
Al: 0.10							

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.09							
Si: 0.50	500	570	28	-60°C: 60	**M21** (Ar + %15-25 CO_2)	0.80 1.00 1.20	K300MS
Mn: 1.05							
Ni: 0.90							
C: 0.09							
Si: 0.80							
Mn: 1.40	470	600	27	-20°C: 47	**M21** (Ar + %15-25 CO_2)	1.00 1.20	K300MS
Ni: 0.80							
Cu: 0.40							
C: 0.09							
Si: 0.55							
Mn: 1.55							
Cr: 0.25	750	820	20	-60°C: 55	**M21** (Ar + %15-25 CO_2)	1.00 1.20	K300MS
Ni: 1.35							
Mo: 0.25							
Ti: 0.07							

Low-Alloyed, High Strength and Creep Resistant Steel MIG/MAG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MG 183 **AWS/ASME SFA - 5.28** **AWS/ASME SFA - 5.28** **EN ISO 16834 - A** **TS EN ISO 16834 - A**	 **ER110S-G** **ER100S-G** **G 69 4 M21 Mn3Ni1CrMo** **G 69 4 M21 Mn3Ni1CrMo**	Low alloyed wire electrode for GMA (MIG/MAG) welding of fine grained and high strength steels with yield strength of up to 690 N/mm^2. Weld metal exhibits good toughness properties down to -40°C. Especially used in high strength pipe-lines, earthmoving and mining equipments, trucks, mobile cranes, concrete pumps cranes and lift productions.	
MG 192 **AWS/ASME SFA - 5.28** **EN ISO 16834 - A** **TS EN ISO 16834 - A**	 **ER120S-G** **G 89 6 M21 Mn4Ni2CrMo** **G 89 6 M21 Mn4Ni2CrMo**	Low alloyed wire electrode for GMA (MIG/MAG) welding of fine grained and high strength steels with yield strength of up to 960 N/mm^2. Weld metal exhibits good toughness properties down to -60°C. Especially used in earthmoving, mining equipments, trucks, mobile cranes, concrete pumps crane,lift and oilfield equipments productions.	
MG 201 **AWS/ASME SFA - 5.28** **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A** DIN M. No.	 **ER70S-A1** **ER80S-G** **G MoSi** **G MoSi** 1.5424	Low alloyed wire electrode for GMA (MIG/MAG) welding of creep resistant boiler and pipe steels subjected to operating temperatures up to 500°C. Also suitable for joining C-Mn steels, which will be postweld heat treated. CO_2 or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.	
MG 201A **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A**	 **ER80S-D2** **G Z MnMo** **G Z MnMo**	Low alloyed wire electrode for GMA (MIG/MAG) welding of creep resistant boiler and pipe steels subjected to operating temperatures up to 530°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Welds are of X-ray quality. Also suitable for joining C-Mn steels to be postweld heat treated. Observe directions as to pre and post weld heat treatment of base material. CO_2 or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.	
MG 211 **AWS/ASME SFA - 5.28** **EN ISO 21952 - A** **TS EN ISO 21952 - A** DIN M. No.	 **ER80S-G** **G CrMo1Si** **G CrMo1Si** 1.7339	Low-alloy wire electrode for GMA (MIG/MAG) welding of Cr-Mo alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 570°C. Also suitable for joining C-Mn steels to be postweld heat treated. Observe directions as to pre and post weld heat treatment of base material. CO_2 or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.	

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.09 **Si:** 0.55 **Mn:** 1.55 **Cr:** 0.30 **Ni:** 1.40 **Mo:** 0.25	710	780	19	-40°C: 65	**M21** (Ar + %15-25 CO_2)	1.00 1.20 1.60	K300MS Drum
C: 0.09 **Si:** 0.80 **Mn:** 1.80 **Cr:** 0.30 **Ni:** 2.20 **Mo:** 0.55	980	1050	15	-60°C: 50	**M21** (Ar + %15-25 CO_2)	1.00 1.20	K300MS
C: 0.10 **Si:** 0.60 **Mn:** 1.20 **Mo:** 0.50	500	600	23	0°C: 50 20°C: 100	**M21** (Ar + %15-25 CO_2)	0.80 1.00 1.20 1.60	K300MS
C: 0.09 **Si:** 0.75 **Mn:** 1.90 **Mo:** 0.45	520	600	22	0°C: 60 -20°C: 50	**M21** (Ar + %15-25 CO_2)	0.80 1.00 1.20 1.60	K300MS
C: 0.09 **Si:** 0.60 **Mn:** 1.00 **Cr:** 1.20 **Mo:** 0.50	As Welded 630	750	18	20°C: 80	**M21** (Ar + %15-25 CO_2)	0.80 1.00 1.20 1.60	K300MS
	After Heat Treatment (680°C 1 Hour) 500	600	28	20°C: 120			

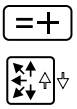
Low-Alloyed, High Strength and Creep Resistant Steel MIG/MAG Welding Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions

MG 211A

AWS/ASME SFA - 5.28	ER80S-B2
EN ISO 21952 - A	G Z CrMo1Si
TS EN ISO 21952 - A	G Z CrMo1Si
EN ISO 21952 - B	G 55M 1CM
EN ISO 21952 - B	G 55C 1CM
TS EN ISO 21952 - B	G 55M 1CM
TS EN ISO 21952 - B	G 55C 1CM

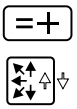
Low-alloy wire electrode for GMA (MIG/MAG) welding of Cr-Mo alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 570°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Welds are of X-ray quality. Also suitable for joining C-Mn steels to be postweld heat treated. Observe directions as to pre and post weld heat treatment of base material. CO2 or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.



MG 222

AWS/ASME SFA - 5.28	ER90S-G
AWS/ASME SFA - 5.28	~ER90S-B3
EN ISO 21952 - A	G CrMo2Si
TS EN ISO 21952 - A	G CrMo2Si
DIN M. No	1.7384

Low-alloy wire electrode for GMA (MIG/MAG) welding of Cr-Mo alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 600°C. Also suitable for joining C-Mn steels to be postweld heat treated. Observe directions as to pre and post weld heat treatment of base material. CO_2 or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.



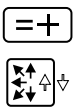
Stainless Steel MIG Welding Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions

MI 307Si

AWS/ASME SFA - 5.9	~ER307
EN ISO 14343 - A	G 18 8 Mn
TS EN ISO 14343 - A	G 18 8 Mn
DIN M. No.	1.4370

Austenitic stainless steel wire electrode for GMA (MIG/MAG) welding of dissimilar steels, difficult to weld steels, armour plates, high manganese steels, rails, crossovers. Suitable also for depositing stress relaxing buffer layers on crack sensitive base metals and hardfacing jobs, e.g. crane wheel surfacing where high degree of pressure and dynamical loads exists. Weld metal has a high degree of corrosion resistance and resistant to operating temperatures up to 300°C and non-scalling up to 850°C. Observe welding procedures, preheating temperature and avoid high admixture of base metal.



MI 308LSi

AWS/ASME SFA - 5.9	ER308LSi
EN ISO 14343 - A	G 19 9 LSi
TS EN ISO 14343 - A	G 19 9 LSi
DIN M. No.	1.4316

Austenitic stainless steel welding wire for GMA (MIG/MAG) welding of unstabilized or stabilized corrosion resisting Cr-Ni steels tanks, pipes and equipments used in food beverage and pharmaceutical industry. Resistant to intergranular corrosion up to 350°C. Non-scaling up to 800°C, in air or oxidizing combustion gasas.

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.09 **Si:** 0.55 **Mn:** 1.55 **Cr:** 1.35 **Mo:** 0.50	As Welded With M21 Shielding Gas				**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)	0.80 1.00 1.20	K300MS
	600	720	21	20°C: 90			
	After Heat Treatment (620°C 1 Hour)						
	570	670	23	20°C: 100			
C: 0.08 **Si:** 0.65 **Mn:** 1.00 **Cr:** 2.50 **Mo:** 1.00	As Welded With M21 Shielding Gas				**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)	1.00 1.20 1.60	K300MS
	740	900	22	-20°C: 40 20°C: 50			
	After Heat Treatment (720°C 1 Hour)						
	480	600	27	20°C: 150			

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.07 **Si:** 0.80 **Mn:** 7.00 **Cr:** 18.00 **Ni:** 8.00	With M13 Shielding Gas				**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	1.00 1.20 1.60	K300MS
	460	630	39	20°C: 90 -20°C: 60			
C: 0.01 **Si:** 0.70 **Mn:** 1.90 **Cr:** 20.00 **Ni:** 9.50	With M13 Shielding Gas				**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	0.60 0.80 1.00 1.20 1.60	D100 D200 K300MS
	450	570	38	20°C: 100			

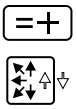
Stainless Steel MIG Welding Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions

MI 309LSi

AWS/ASME SFA - 5.9	**ER309LSi**
EN ISO 14343 - A	**G 23 12 LSi**
TS EN ISO 14343 - A	**G 23 12 LSi**
DIN M. No.	1.4332

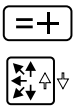
Austenitic-ferritic wire electrode for GMA (MIG/MAG) welding of dissimilar joints of stainless steels to unallyoed or low-alloyed steels, subjected to operating temperatures up to 300°C. Suitable to use also as buffer layer on carbon steel before welding with 308 and 308L to reach 304 and 304L layer. Low carbon content increases resistance to intergranular corrosion.



MI 310

AWS/ASME SFA - 5.9	**ER310**
EN ISO 14343 - A	**G 25 20**
TS EN ISO 14343 - A	**G 25 20**
DIN M. No.	1.4842

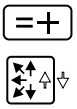
Fully austenitic stainless steel wire electrode for GMA (MIG/MAG) welding of heat resistant steels, containing approx. 25% chromium and 20% nickel, which are used in heat treatment and industrial furnaces and equipments, like cement and steel industries. Also suited for welding heat resistant and scaling resistant ferritic chromium steels, provided that corrosion attack by reducing sulphur-bearing combustion gases is not be expected. Weld metal exhibits good toughness down to -196°C and non-scaling up to 1200°C .



MI 312

AWS/ASME SFA - 5.9	**ER312**
EN ISO 14343 - A	**G 29 9**
TS EN ISO 14343 - A	**G 29 9**
DIN M. No.	1.4337

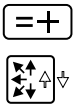
Austenitic-ferritic stainless steel wire electrode for GMA (MIG/MAG) welding of dissimilar steels and and depositing buffer layers on ferritic steels. It features high resistance to cracking and toughness, is therefore suited for joining difficult to weld steels and depositing stress-relaxing buffer layers on crack sensitive base metals. Weld metal is non-scaling up to 1100°C. Especially used in die and tool repair, crack repairs in difficult to weld steels, gear teeth repair and rebuilding, buffer layer application on cutting blades. Suitable also for welding galvanized steel plates.



MI 316LSi

AWS/ASME SFA - 5.9	**ER316LSi**
EN ISO 14343 - A	**G 19 12 3 LSi**
TS EN ISO 14343 - A	**G 19 12 3 LSi**
DIN M. No.	1.4430

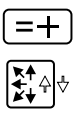
Austenitic stainless steel wire electrode for GMA (MIG) welding of unstabilized or stabilized corrosion resisting Cr-Ni-Mo steels. Resistant to intergranular corrosion up to 400°C. Especially used in welding chemical tanks, pipes and equipments which are used in chemical, petrochemical, paint, textile, paper and shipbuilding industries, etc.



MI 318

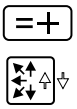
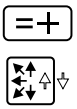
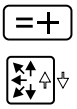
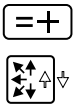
AWS/ASME SFA - 5.9	**ER318**
EN ISO 14343 - A	**G 19 12 3 Nb**
TS EN ISO 14343 - A	**G 19 12 3 Nb**
DIN M. No.	1.4576

This is an austenitic stainless steel welding wire used in gas shielded welding of high corrosion resistant stabilized and unstabilized Cr-Ni-Mo steels. Due to its stabilization with Nb (Niobium), it exhibits resistance to intergranular corrosion up to 400°C. It is particularly used in the welding of tanks, pipes, and equipment in industries such as chemicals, petrochemicals, paints, textiles, paper, ships, and yachts, where acid, alkali, and salt solutions are present.



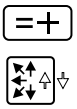
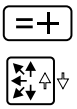
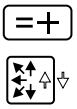
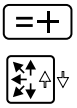
Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.01 **Si:** 0.70 **Mn:** 1.90 **Cr:** 23.50 **Ni:** 13.50	With M13 Shielding Gas 460	600	38	20°C: 100	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	1.00 1.20 1.60	K300MS
C: 0.10 **Si:** 0.40 **Mn:** 1.60 **Cr:** 26.00 **Ni:** 21.00	With M13 Shielding Gas 440	600	38	-20°C: 120	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	0.80 1.00 1.20	K300MS
C: 0.01 **Si:** 0.40 **Mn:** 1.80 **Cr:** 30.00 **Ni:** 9.00	With M13 Shielding Gas 550	740	25	20°C: 80	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	0.80 1.00 1.20 1.60	K300MS
C: 0.02 **Si:** 0.70 **Mn:** 1.90 **Cr:** 18.50 **Ni:** 11.50 **Mo:** 2.50	With M13 Shielding Gas 420	570	42	20°C: 65	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	0.80 1.00 1.20 1.60	D200 K300MS
C: 0.04 **Si:** 0.40 **Mn:** 1.70 **Cr:** 19.50 **Ni:** 11.50 **Mo:** 2.60 **Nb:** 0.70	With M13 Shielding Gas 480	640	32	20°C: 130	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	1.00 1.20	K300MS

Stainless Steel MIG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MI 347 **AWS/ASME SFA - 5.9** **EN ISO 14343 - A** **TS EN ISO 14343 - A** DIN M. No.	 **ER347** **G 19 9 Nb** **G 19 9 Nb** 1.4316	Stabilized austenitic stainless steel wire electrode for GMA (MIG/MAG) welding of unstabilized and stabilized corrosion resistant Cr-Ni steels, used in food, beverage, chemical and pharmacutical industries. Stabilized with Nb (Niobium) and resistant to intergranular corrosion. Weld metal is suitable for operating temperatures of up to 400°C, non-scaling up to 800°C , in air and oxidizing combustion gases.	
MI 385 **AWS/ASME SFA - 5.9** **EN ISO 14343 - A** **TS EN ISO 14343 - A** DIN M. No.	 **ER385** **G 20 25 5 Cu L** **G 20 25 5 Cu L** ~1.4539	Fully-austenitic stainless steel wire electrode for GMA (MIG/MAG) welding of unstabilized or stabilized corrosion resisting Cr-Ni-Mo alloyed stainless steels like 904L/1.4539. Especially used in flue gas desulphurization plants, fertilizer plants, sea water transfer fittings, petrochemical, paper and pulp industries, etc. Due to high Ni, Mo and low C content, weld metal has high resistant to intergranular, pitting, crevice and stress corrosion types in chloride containing solutions, phosphorus-, sulphur-, acetic-, formic acids, sea water.	
MI 410 **AWS/ASME SFA - 5.9** **EN ISO 14343 - A** **TS EN ISO 14343 - A** DIN M. No.	 **ER410** **G 13** **G 13** 1.4006	Martensitic stainless steel wire for GMA (MIG/MAG) welding of martensitic stainless steels, heat resistant steels and cast steels which contain approx. 13% chromium. Suitable for joining and surfacing of gas, water and steam fan, fan blades and fittings subjected to corrosion, erosion and operating temperatures up to 450°C. Depending on type of base metal composition and thickness, preheating between 200 and 300°C, keeping the interpass temperature during welding and tempering between 700 and 750°C after welding are advisable.	
MI 2209 **AWS/ASME SFA - 5.9** **EN ISO 14343 - A** **TS EN ISO 14343 - A** DIN M. No.	 **ER2209** **G 22 9 3 N L** **G 22 9 3 N L** ~1.4462	Dublex (ferritic-austenitic) stainless steel wire electrode for GMA (MIG/MAG) welding of dublex Cr-Ni-Mo stainless steels. Espacially used in welding of acid tanks and pipes, in chemical, petrochemical, paper, shipbuilding and desalination industries. Suitable also for welding dublex stainless steels to carbon steels. The high strength and ductile weld metal exhibits good resisitance to pitting,crevice corrosion and stress corrosion cracking in chloride-bearing media. Suitable for operating temperatures up to 250°C.	

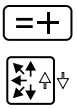
Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.04 **Si:** 0.40 **Mn:** 1.40 **Cr:** 19.50 **Ni:** 9.50 **Nb:** 0.70	With M13 Shielding Gas 430	620	32	20°C: 80	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	0.80 1.00	K300MS
C: 0.01 **Si:** 0.40 **Mn:** 1.80 **Cr:** 20.00 **Ni:** 25.00 **Mo:** 4.25 **Cu:** 1.50	With M12 Shielding Gas 380	550	39	20°C: 90 -196°C: 60	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	1.20	K300MS
C: 0.10 **Si:** 0.30 **Mn:** 0.50 **Cr:** 12.50	With M12 Shielding Gas 450	600	23	0°C: 30 20°C: 60	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	1.00 1.20	K300MS
C: 0.01 **Si:** 0.50 **Mn:** 1.50 **Cr:** 23.50 **Ni:** 8.50 **Mo:** 3.50 **N:** 0.15	With M13 Shielding Gas 580	770	30	-40°C: 90	**I1** (%100 Ar) **M12** (Ar + %0.5-5 CO_2) **M13** (Ar + %0.5-3 O_2) **M14** (Ar + %0.5-5 CO_2 + %0.5-3 O_2)	1.00 1.20	K300MS

Aluminium Alloy MIG Welding Wires

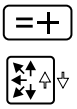
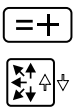
Product Name and Standards		Applications and Properties	Polarity Welding Positions
MAL 1100		Aluminium welding wire electrode for GMA (MIG) welding of pure aluminium base metals. Exhibits high corrosion resistance and has high electrical conductivity. Has color match with pure aluminium base metals.	
AWS/ASME SFA - 5.10	**~ER1100**		
AWS/ASME SFA - 5.10	**ER1070**		
EN ISO 18273	**S Al 1070 (Al99.7)**		
TS 6204 EN ISO 18273	**S Al 1070 (Al99.7)**		
DIN M. No.	3.0259		
MAL 4043		5% Silicon containing aluminium wire electrode for GMA (MIG) welding of aluminium and aluminium alloys. Suitable fore welding aluminium casting, containing up 7% silicon and Al-Mg-Si alloys which are containing up to 2% Magnesium alloying element.	
AWS/ASME SFA - 5.10	**ER4043**		
EN ISO 18273	**S Al 4043 (AlSi5)**		
TS EN ISO 18273	**S Al 4043 (AlSi5)**		
DIN M. No.	3.2245		
MAL 4047		12% Silicon containing aluminium alloy welding wire, for GMA (MIG) welding of aluminium-silicon (Al-Si) and aluminium-silicon-magnesium (Al-Si-Mg) alloy castings, having a Si content of up to 7% alloying elements.	
AWS/ASME SFA - 5.10	**ER4047**		
EN ISO 18273	**S Al 4047A (AlSi12(A))**		
TS EN ISO 18273	**S Al 4047A (AlSi12(A))**		
DIN M. No.	3.2585		
MAL 5183		5% Magnesium and manganese containing aluminium alloy welding wire for GMA (MIG) welding of Al-alloys with high tensile strenght requirements. Suitable for welding Al-Mg alloys and Al-Mg-Mn alloys.	
AWS/ASME SFA - 5.10	**ER5183**		
EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**		
TS EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**		
DIN M. No.	3.3548		
MAL 5356		5% Magnesium containing aluminium welding wire for GMA (MIG) welding of Al-Mg alloys and Al-Mg-Si alloys. Very good corrosion resistance especially in sea water and gives excellent ductility.	
AWS/ASME SFA - 5.10	**ER5356**		
EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**		
TS EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**		
DIN M. No.	3.3556		

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
Al: 99.50	With I1 Shielding Gas				**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.60 2.00	K300MS
	20	65	35	-			
Si: 5.00							
Mn: 0.05	With I1 Shielding Gas				**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	0.80 1.00 1.20 1.60 2.00	K300MS
	80	160	9	-			
Al: 94.95							
Si: 12.00							
	With I1 Shielding Gas				**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.20 1.60	K300MS
	90	190	6	-			
Al: 88.00							
Mg: 4.75							
Mn: 0.60	With I1 Shielding Gas				**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.00 1.20	K300MS
Ti: 0.10	125	270	23	-			
Al: 94.55							
C: 0.04							
Si: 0.40	With I1 Shielding Gas				**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	0.80 1.00 1.20	K300MS
	110	240	26	-			
Mn: 1.40							

Aluminium Alloy MIG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MAL 5556		5% Magnesium containing aluminium welding wire for GMA (MIG) welding of Al-Mg alloys and Al-Mg-Zn alloys. Have a good corrosion resistance especially in sea water and gives excellent ductility.	
AWS/ASME SFA - 5.10	**ER5556**		
EN ISO 18273	**S Al 5556 (AlMg5Mn1Ti(A))**		
TS EN ISO 18273	**S Al 5556 (AlMg5Mn1Ti(A))**		
DIN M. No.	~3.3548		

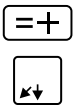
Nickel Alloy MIG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MNI 422		Ni-Cr-Fe alloy is MIG welding wire and gives Ni-20Cr3Mn2,5Nb alloyed weld metal. It is especially used for welding Ni-Cr alloys such as Incoloy 800 with high creep strength, temperature and corrosion resistance, steels containing 5-9% Ni, cryogenic stainless steels used at temperatures as low as -196°C. It is used in the welding of different stainless steels, stainless steels and low alloyed steels and nickel alloys, buffer, plastering passes and coating welds on the surface of steels with low weldability. Welding metal has high crack resistance and corrosion resistance in acid, salt, liquid salt, oxidizing and carburizing atmospheres. In sulphurous atmospheres, weld metal should be used at temperatures lower than 500°C. It has a wide range of applications in chemical, petrochemical, glass, cement industries and repair and maintenance workshops and is generally used in LPG and LNG storage and processing plants, welding of furnace parts, burners, heat treatment equipment, cement kilns, molds, tanks, storage and transportation tanks of liquefied gases.	
AWS/ASME SFA - 5.14	**ERNiCr-3**		
EN ISO 18274 - A	**SNi 6082**		
TS EN ISO 18274 - A	**SNi 6082**		
DIN M. No.	2.4806		
MNI 425		Ni-Cr-Mo alloyed GMA (MIG) welding wire, depositing Ni-22Cr9Mo3,5Nb weld metal. Used for welding of highly corrosion resistant Ni-Cr-Mo alloys, like Alloy 625, 825 and similar alloys. Due to it's good cryogenic toughness down to -196°C, preferred for welding of cyrogenic nickel alloys, e.g. X1NiCrMoCuN25-20-7. In sulphur free atmospheres the weld metal is non-scaling up to 1200°C, in sulphurous atmospheres the weld metal can be used in service temperatures up to 500°C. It is also highly resistant stress corrosion cracking and pitting corrosion in phosphoric acid, organic acids, sea water and polluting environments. Weld metal is insensitive to cracking and very resistant to thermal shocks. Used for joining of dissimilar nickel alloys, joining dissimilar stainless steels, low alloyed steels to stainless steels or to nickel alloys, buffering of difficult to weld steels and repair welding of them.	
AWS/ASME SFA-5.14	**ERNiCrMo-3**		
EN ISO 18274-A	**SNi 6625 (NiCr22Mo9Nb)**		
TS EN ISO 18274-A	**SNi 6625 (NiCr22Mo9Nb)**		
DIN M. No.	2.4831		

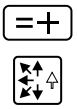
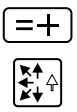
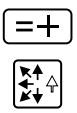
Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
Mg: 4.90							
Mn: 0.65							
Si: 0.05							
Cr: 0.07		With I1 Shielding Gas			**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.00 1.20	K300MS
Cu: 0.01	130	290	28	-			
Ti: 0.01							
Fe: 0.11							
Zn: 0.006							
Al: 94.13							

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.03							
Si: 0.10							
Mn: 3.00							
Cr: 20.00	500	700	40	20°C: 170 -196°C: 160	**I1** (%100 Ar)	1.20	K300MS
Ni: 72.50							
Nb: 2.40							
Ti: 0.30							
Fe: 1.30							
C: 0.01							
Si: 0.05							
Mn: 0.05							
Cr: 22.20							
Ni: 65.00	460	720	40	20°C: 110 -196°C: 100	**I1** (%100 Ar)	1.20	K300MS
Mo: 8.70							
Nb: 3.65							
Ti: 0.20							
Fe: 0.14							

Hardfacing MIG/MAG Welding Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions
MH 361 **EN 14700** **S Fe8** **TS EN 14700** **S Fe8** DIN 8555 MSG 6-GZ-60-GPS DIN M. No. 1.4718	Gas metal arc (MIG/MAG) welding wire especially developed for hardfacing of parts subjected to high metal-to-metal friction, mineral abrasion and moderate impact. Weld metal can retain it's hardness at high temperatures, till 600°C. Weld metal can be grinded and machined by diamond tools. A tough buffer layer with FCW 30 is recommended before hardfacing, if base metal has high carbon and low weldability. Heat treatment after hardfacing will decrease as-welded hardness. **Typical Applications:** Ceramic tile moulds, mixer blades, crushers, earth moving equipments, hot cut-offs, shear blades, dies for pressure casting, scraper blades, conveyors, rollers.	

Copper Alloy MIG Welding Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions
MCU Sn **AWS/ASME SFA - 5.7** **ERCu** **EN ISO 24373** **S Cu 1898 (CuSn1)** **TS EN ISO 24373** **S Cu 1898 (CuSn1)** DIN M. No. 2.1006	Tin alloyed copper wire electrode for GMA (MIG) welding of copper and low alloyed copper alloys. Particularly used in electric and heat conductor parts, which are made of pure copper. Suitable for welding oxygen-free copper and copper materials subject to high strain. Gives pore-free and easily machinable welding seams.	
MCU Sn6 **AWS/ASME SFA - 5.7** **~ERCuSn-A** **EN ISO 24373** **S Cu 5180A (CuSn6P)** **TS EN ISO 24373** **S Cu 5180A (CuSn6P)** DIN M. No. 2.1022	6% Tin alloyed copper wire electrode for GMA (MIG) welding and surfacing of Cu-Sn (4 - 8 % Sn bronze), Cu-Zn (brass), and Cu-Sn-Zn-Pb alloys. Suitable for joining of copper alloys to steels, repair welding of cast bronzes and cladding on cast iron and steels. For large workpieces e.g. thicknesses exceeding 5 mm, a preheat at about 250°C is recommended.	
MCU Al8 **AWS/ASME SFA - 5.7** **ERCuAl-A1** **EN ISO 24373** **S Cu 6100 (CuAl7)** **TS EN ISO 24373** **S Cu 6100 (CuAl7)** DIN M. No. 2.0921	8% Aluminium alloyed copper wire electrode for GMA (MIG) welding of copper-aluminyum (Cu-Al) alloys (aluminium-bronzes). Also suitable for surfacing of parts subjected to metal to metal wear under high compressive stresses or in the presence of corrosive agents (acids, sea water).	

Typical Chemical Analysis of Welding Wire (%)	Hardness (HRc)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.40	With M21 Shielding Gas	**M12** (Ar + %0.5-5 CO_2) **M21** (Ar + %15-25 CO_2)	1.00 1.20	K300MS
Si: 2.40	58			
Mn: 0.35				
Cr: 8.60				
Fe: 88.25				

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)		Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
Si: 0.20	With I1 Shielding Gas					**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.00 1.20 1.60	D300
Mn: 0.20								
Sn: 0.80	100	220	30	60	15-20			
P: 0.01								
Cu: 98.79								
P: 0.20	With I1 Shielding Gas					**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.00 1.20	D300
Sn: 6.50	160	260	20	80	6-7			
Cu: 93.30								
Mn: 0.20	With I1 Shielding Gas					**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	1.00 1.20 1.60	D300
Al: 8.00								
Ni: 0.30	200	430	40	100	7-8			
Cu: 91.50								

Copper Alloy MIG Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
MCU Si3		3% Silicon alloyed copper wire electrode for GMA (MIG) welding of copper(Cu), Cu-Si (silicon bronze), Cu-Zn (brass) and as well as surfacing of unalloyed or medium alloyed steels or cast irons. Due to less Zn burn and corrosion resistant weld metal, suitable for joining of galvanized steels. Resulted Zn burn is less and weld metal is corrosion resistant in galvanized steels. For large workpieces e.g. thicknesses exceeding 5 mm, a preheat at about 250°C is recommended.	 
AWS/ASME SFA - 5.10	**ERCuSi-A**		
EN ISO 24373	**S Cu 6560 (CuSi3Mn1)**		
TS EN ISO 24373	**S Cu 6560 (CuSi3Mn1)**		
DIN M. No.	2.1461		

Typical Chemical Analysis of Welding Wire (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)		Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
Si: 2.90								
Mn: 0.80	With I1 Shielding Gas					**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)	0.80 1.00	D100 D200 D300 Drum
	120	350	40	80	3.5-4			
Cu: 96.30								

FLUX CORED ARC WELDING WIRES

FLUX CORED ARC WELDING WIRES

Unalloyed Steel Flux Cored Welding Wires

Low Alloyed, High Strength and Creep Resistant Steel Flux Cored Welding Wires

Hardfacing Flux Cored Wires

*This standard is no longer valid. Added for informational purposes.

CONTENTS

FLUX CORED ARC WELDING WIRES

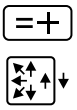
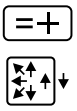
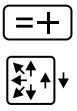
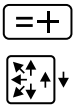
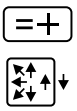
Hardfacing Flux Cored Wires

*This standard is no longer valid. Added for informational purposes.

Hardfacing SAW Wires

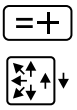
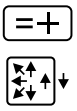
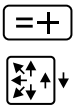
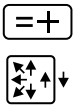
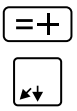
*This standard is no longer valid. Added for informational purposes.

Unalloyed Steel Flux Cored Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCW 11 AWS/ASME SFA - 5.20 EN ISO 17632-A TS EN ISO 17632-A	 E71T-1C T46 2 P C1 1 T46 2 P C1 1	Rutile type flux cored wire with fast-freezing slag. Especially designed for welding with CO_2 (carbondioxide) gas, in shipbuilding and steel construction. Owing to its easily controllable weld pool, electrode is well suited for positional welding with higher currents, resulting in increased deposition rates. Particularly suited for welding in the horizontal-vertical position, e.g. in tank welding. Electrode of 1.20 mm in diameter is also suitable for vertical-down welding. Low spatter loss, easy slag removal, finely ripped pore-free welds blending into base metal without undercut.	
FCW 11A AWS/ASME SFA - 5.20 EN ISO 17632-A TS EN ISO 17632-A	 E71T-1C H4 T46 2 P C1 1 H5 T46 2 P C1 1 H5	Rutile type flux cored wire with fast-freezing slag. Especially designed for welding with CO_2 (carbondioxide) gas, in shipbuilding and steel construction. Owing to its easily controllable weld pool, electrode is well suited for positional welding with higher currents, resulting in increased deposition rates. Its special vacuum packing provides low diffusible hydrojen level in weld metal, in the case of proper handling and storage conditions. Electrode of 1.20 mm in diameter is also suitable for vertical-down welding. Low spatter loss, easy slag removal in the fillet and norrow grooves, finely ripped pore-free welds blending into base metal without undercut.	
FCW 13 AWS/ASME SFA - 5.20 AWS/ASME SFA - 5.20 AWS/ASME SFA - 5.20 EN ISO 17632 - A EN ISO 17632 - A TS EN ISO 17632 - A TS EN ISO 17632 - A	 E71T-1C H4 E71T-9M-H4 E71T-1M H4 T 46 2 P C1 1 H5 T 46 3 P M21 1 H5 T 46 2 P C1 1 H5 T 46 3 P M21 1 H5	Rutile type flux cored wire, designed for welding in steel construction, piping, machine fabrication and shipbuilding by using M21-mix gas and CO_2 shielding gas. Owing to it's easily controllable weld pool and fast freezing slag particularly suited for welding in all position. Welding in all-position is easy with a wide parameter range, especially when using mixed gas. Good gap-bridging property, low spatter loss, easy slag removal even in narrow grooves. Finely ripped pore-free welds blending into base metal without undercut.	
FCW 14 AWS/ASME SFA - 5.20 EN ISO 17632 - A TS EN ISO 17632 - A	 E71T-1C T42 2 P C1 1 T42 2 P C1 1	Rutile type flux cored wire with very fast-freezing slag. Especially designed for welding with CO_2 (carbondioxide) gas, in shipbuilding and steel construction. Suitable to use in lower currents and there is no spatter in 20-24V. Owing to it's very easily controllable weld pool, electrode is well suited for positional welding with higher currents, resulting in increased deposition rates. Particularly suited for welding in the horizontal-vertical position, e.g. in tank welding. Electrode of 1.20 mm in diameter is also suitable for vertical-down welding. Low spatter loss, easy slag removal, finely ripped pore-free welds blending into base metal without undercut.	
FCW 15 AWS/ASME SFA - 5.20 EN ISO 17632 - A TS EN ISO 17632 - A	 E71T-1C-J T 42 4 P C1 1 T 42 4 P C1 1	Rutile type flux cored wire with very fast-freezing slag. Especially designed for welding with CO_2 (carbondioxide) gas, in shipbuilding and steel construction industries. Weld metal has high charpy impact strength and toughness down to -40°C. Owing to it's very easily controllable weld pool, well suited for positional welding at higher currents, resulting in increased deposition rates. 1.20 mm and lower diameter wires are very suitable for vertical-down welding. Low spatter loss, finely ripped pore-free welds blending into base metal without undercut. Slag removal is easy in fillet welds and narrow grooves.	

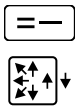
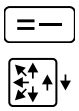
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.04 **Si:** 0.40 **Mn:** 1.50	500	560	25	-20°C: 70	**C1** (%100 CO_2)	1.00 1.20 1.60	D200 (Vacuum) D300 (Vacuum)
C: 0.04 **Si:** 0.40 **Mn:** 1.50	500	560	25	-20°C: 70	**C1** (%100 CO_2)	1.00 1.20	D200 (Vacuum) D300 (Vacuum)
C: 0.06 **Si:** 0.50 **Mn:** 1.15	With C1 Shielding Gas 470	540	28	-30°C: 50 -20C: 100	**M21** (Ar + %15-25 CO_2) **C1** (%100 CO_2)	1.00 1.20 1.60	D200 (Vacuum) D300 (Vacuum)
C: 0.06 **Si:** 0.60 **Mn:** 1.40	With M21 Shielding Gas 530	620	25	-20°C: 100 -30°C: 80			
C: 0.05 **Si:** 0.60 **Mn:** 1.50	520	600	25	-20°C: 70	**C1** (%100 CO_2)	1.20 1.60	D200 (Vacuum) D300 (Vacuum)
C: 0.05 **Si:** 0.30 **Mn:** 1.25	460	530	25	-20°C: 120 -40°C: 70	**C1** (%100 CO_2)	1.20 1.60	D200 (Vacuum) D300 (Vacuum)

Unalloyed Steel Flux Cored Welding Wires

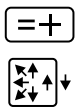
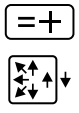
Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCW 15A		Rutile type flux cored wire with very fast-freezing slag. Especially designed for welding with CO_2 (carbondioxide) gas, in shipbuilding and steel construction industries. Weld metal has high charpy impact strength and toughness down to -40°C. Owing to it's very easily controllable weld pool, well suited for positional welding at higher currents, resulting in increased deposition rates. 1.20 mm and lower diameter wires are very suitable for vertical-down welding. Low spatter loss, finely ripped pore-free welds blending into base metal without undercut. Slag removal is easy in fillet welds and narrow grooves.	
AWS/ASME SFA - 5.20	E71T-1C-J H4		
EN ISO 17632 - A	T 42 4 P C1 1 H5		
TS EN ISO 17632 - A	T 42 4 P C1 1 H5		
FCW 16		Rutile type flux cored wire, which has high strength and designed for welding in all position. Suitable for welding fine grained structural steels and high stregth shipbuilding steels in all position, where low heat input and less deformation are required. Has a stable and quite arc. Good gap-bridging property, low spatter loss, easy slag removal even in narrow grooves. Finely ripped pore-free welds blending into base metal without undercut.	
AWS/ASME SFA - 5.20	E71T-1C-J		
AWS/ASME SFA - 5.20	E71T-9C-J		
EN ISO 17632-A	T46 4 P C1 1		
TS EN ISO 17632-A	T46 4 P C1 1		
FCW 17		Rutile type flux cored wire, designed for welding applications which required good toughness values down to -40°C service temperatures, in steel construction, piping, machine fabrication, shipbuilding and especially offshore structures. Used with M21 mix shielding gas. Owing to its easily controllable weld pool and fast freezing slag particularly suited for welding in all position. Good gap-bridging property in thick sections, has low spatter loss, finely ripped pore-free welds blending into base metal without undercut. Easy slag removal even in fillet and narrow grooves.	
AWS/ASME SFA - 5.20	E71T-1MJ		
AWS/ASME SFA - 5.20	E71T-9MJ		
AWS/ASME SFA - 5.20	E71T-12MJ		
AWS/ASME SFA - 5.36	E71T1-M21A4-CS1		
EN ISO 17632-A	T46 4 P M21 1 H5		
TS EN ISO 17632-A	T46 4 P M21 1 H5		
FCW 21		Slagless metal powder cored electrode with outstanding welding properties in the short-arc and spray arc range. Almost spatter-free when welding in the spray-arc range with mixed gas. Good restriking, even with cold wire tip, thus being suitable for robot application. Characteristic features high deposition rate and welding speed, good side wall fusion, finely rippled welds, without undercutting into the base metal, not even on contaminated or corroded metal surfaces. Weldmetal has a little formation of silicates on surface, so that multi-pass welds can be made without cleaning. FCW 21 is well-suited for root-and positional welding and gap bridging, due to it's easily controlable weld pool in the short-arc range.	
AWS/ASME SFA - 5.18	E70C-6M H4		
AWS/ASME SFA - 5.36	E70T15-M20A4-CS1-H4		
EN ISO 17632-A	T46 4 M M21 2 H5		
TS EN ISO 17632-A	T46 4 M M21 2 H5		
FCW 30		Basic type flux cored wire for welding thick steel sections and dynamically loaded structures, where high toughness is required. Provides high mechanical properties and high crack resistant weld metal. Suitable to welding of boiler, tank, pressure vessel, heavy machine production and heavy constructions. Weld are metallurgically clean and are of X-ray quality. Suitable for welding high carbon steels and buffer application on worn parts before hardfacing.	
AWS/ASME SFA-5.20	E70T-5M H4		
AWS/ASME SFA-5.20	E70T-5C H4		
EN ISO 17632-A	T42 4 B M21 3 H5		
TS EN ISO 17632-A	T42 4 B M21 3 H5		
EN ISO 17632-A	T42 4 B C1 3 H5		
TS EN ISO 17632-A	T42 4 B C1 3 H5		

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.05 **Si:** 0.30 **Mn:** 1.25	460	530	25	-20°C: 120 -40°C: 70	**C1** (%100 CO_2)	1.20	D200 (Vacuum) D300 (Vacuum)
C: 0.05 **Si:** 0.30 **Mn:** 1.45 **Ni:** 0.40	510	580	27	-40°C: 70	**C1** (%100 CO_2)	1.00 1.20 1.60	D200 (Vacuum) D300 (Vacuum)
C: 0.05 **Si:** 0.50 **Mn:** 1.40 **Ni:** 0.40	520	580	28	-30°C: 100 -40°C: 80	**M21** (Ar + %15-25 CO_2)	1.20	D200 (Vacuum) D300 (Vacuum)
C: 0.06 **Si:** 0.60 **Mn:** 1.60	500	580	25	-20°C: 100 -40°C: 80	**M21** (Ar + %15-25 CO_2)	1.00 1.20 1.40 1.60	D200 D300 Drum
C: 0.04 **Si:** 0.60 **Mn:** 1.50	With M21 Shielding Gas 510	600	25	-40°C: 90	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.00 1.20 1.60 2.40	D300 (Vacuum)
C: 0.04 **Si:** 0.50 **Mn:** 1.45	With C1 Shielding Gas 450	520	29	-40°C: 100			

Unalloyed Steel Flux Cored Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCO 90 AWS/ASME SFA - 5.20	E71T-GS	Self-shielded (open-arc) flux cored wire, suitable for welding in all position. Used in outdoor welding of construction, iron-works, roof assembly jobs, repair welds in agricultural equipment and vehicles. Suitable for single pass welding in lap and butt joints of thin plates. Has a stable arc, easily controllable weld pool and easy slag removal.	
FCO 91 AWS/ASME SFA - 5.20	E71T-11	Shielded flux cored welding wire that meets all requirements for E71T-11 classification. FCO 91 is suitable for single or multiple pass lap, fillet and butt welding on mild steels. Self-shielded flux cored wire with high build-up ratio that can be used in the top-down position in the filling and cover passes of Cross Country pipelines from API X 42 to X 70 class.Open arc (gas unshielded) flux cored welding wire that allows welding in any position. Used for outdoor construction, roofing and other assembly works, agricultural tools, equipment and repairs on vehicles. It enables single pass welding of thin sheets for overlapping and joining. Stable arc, easy weld pool control and slag removal.	

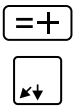
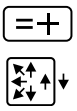
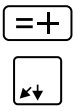
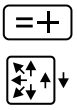
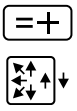
Low Alloyed, High Strength and Creep Resistant Steel Flux Cored Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCW 140 AWS/ASME SFA - 5.29 EN ISO 17632-A TS EN ISO 17632-A	E81T1-Ni1C T46 4 1Ni P C1 1 T46 4 1Ni P C1 1	Rutile type flux cored wire, designed for welding fine grained structural steels. Succesfully used in single and multi-run welding of especially in steel construction, bridge, offshore platform, shipbuilding and pipe laying. Owing to it's easily controllable weld pool and fast freezing slag suited for welding in all position easily. It's metal recovery provides ability of good gap bridging and filling property. Due to it's nickel content, weld metal has high yield and tensile strengths, therefore suitable to use weld fine grained structural steels at operating temperatures down to -40°C. Diffusible hydrogen content is 5 ml per 100 g deposited weld metal, so highly resistant to cold cracking. Has a stable and quite arc with low spatter loss. Has easily removable slag, generally self removed.	
FCW 142 AWS/ASME SFA - 5.29 EN ISO 17632 - A TS EN ISO 17632 - A	E81T1-Ni1M T46 4 1Ni P M21 1 H5 T46 4 1Ni P M21 1 H5	Rutile type flux cored wire, designed for welding fine grained structural steels by using M21 mix shielding gas. Succesfully used in single and multi-run welding in steel construction, bridge, offshore platform, shipbuilding and pipe laying. Owing to it's easily controllable weld pool and fast freezing slag, suited for welding in all position easily. It's metal recovery provides ability of good gap bridging and filling property. Because of nickel alloy, weld metal yield and tensile strength is high and weld metal is proper to use on fine grained steels at operating temperatures 450°C down to -40°C. Diffusible hydrogen content is 5 ml per 100 g deposited weld metal, so highly resistant to cold cracking. Has a stable and quite arc with low spatter loss. Has easily removable slag and generally self removed.	

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.12 **Si:** 0.20 **Mn:** 0.80 **Al:** 1.20	490	600	20	-	-	0.80 0.90 1.00	D100 D200 K300MS
C: 0.1 **Si:** 0.18 **Mn:** 0.80 **Al:** 1.50	515	645	22	-	-	1.20	D300 K300MS

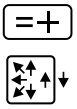
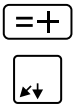
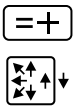
Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.04 **Si:** 0.40 **Mn:** 1.30 **Ni:** 1.00	520	590	25	-40°C: 80	**C1** (%100 CO_2)	1.20 1.60	D200 (Vacuum) D300 (Vacuum)
C: 0.06 **Si:** 0.40 **Mn:** 1.25 **Ni:** 1.00	500	570	28	-40°C: 100	**M21** (Ar + %15-25 CO_2)	1.20	D200 (Vacuum) D300 (Vacuum)

Low Alloyed, High Strength and Creep Resistant Steel Flux Cored Welding Wires

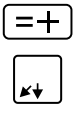
Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCW 142M		Metal cored welding wire with 1%Ni. Has high toughness and notch impact values. at -50°C. Provides very good welding properties in the short-arc and spray arc range. Almost spatter-free when welding in the spray-arc range with mixed gas. Due to it's easily controlable weld pool in the short-arc range, it is well-suited for root pass and gap bridging purposes. Good arc striking, even with cold wire tip, thus being suitable for robotic applications. Provides high deposition rate with high welding speeds. Good side wall fusion, finely rippled welds without undercut. Weld metal has a little silicate formation on surface which makes multi-pass welding easier.	
AWS/ASME SFA - 5.28	E80C-Ni1 H4		
EN ISO 17632 - A	T 46 5 1Ni M M21 3 H5		
TS EN ISO 17632 - A	T 46 5 1Ni M M21 3 H5		
FCW 150W		Rutile type flux cored wire, which is especially designed for welding weathering steels (like COR-TEN steels), high strength and fine grained structural steels. Suitable for welding in steel construction in single and multi-run welding in all position. Owing to it's easily controllable weld pool and fast freezing slag particularly suited for welding in all position. Has a stable and quite arc with low spatter loss.	
AWS/ASME SFA-5.29	E81T1-W2C		
EN ISO 17632-B	T553T1-1C A-NCC1		
TS EN ISO 17632-B	T553T1-1C A-NCC1		
FCW 150WM		Nickel-Copper alloyed, metal-cored wire for single or multilayer welding of corrosion resistant steels with Ar-CO2 shielding gas. Characteristically has high efficiency, good weldability, excellent seam appearance and low spatter losses. Good mechanical properties at low temperatures. This wire is particularly suitable for bridge constructions and chimneys.	
EN ISO 17632 - A	T 46 6 Z M M 1 H5		
FCW 162		Rutile type flux cored wire, designed for welding fine grained structural steels by using M21 shielding gas. Succesfully used in single and multi-pass welding in steel construction, offshore platform, shipbuilding and pipe laying. Provides weld metal with high toughness, down to -50°C. Diffusible hydrogen content is 5 ml per 100 g deposited weld metal, so highly resistant to cold cracking. Has a stable and quite arc with low spatter loss. Has easily removable slag and generally self removing.	
AWS/ASME SFA - 5.29	E91T1 - G M H4		
EN ISO 18276 - A	T 55 5 Mn1.5Ni P M 1 H5		
TS EN ISO 18276 - A	T 55 5 Mn1.5Ni P M 1 H5		
FCW 171		Rutile type flux cored wire, designed for welding fine grained structural steels by using CO_2 shielding gas. Succesfully used in single and multi-pass welding in steel construction, offshore platform, shipbuilding and pipe laying. Provides weld metal with high toughness, down to -60°C. Diffusible hydrogen content is 5 ml per 100 g deposited weld metal, so highly resistant to cold cracking. Has a stable and quite arc with low spatter loss. Has easily removable slag and generally self removing.	
AWS/ASME SFA-5.29	E81T-1 Ni2 C J		
EN ISO 17632 - A	T50 6 2Ni P C1 1 H5		
TS EN ISO 17632 - A	T50 6 2Ni P C1 1 H5		

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.06 **Si:** 0.40 **Mn:** 1.15 **Ni:** 0.90	510	580	25	-50°C: 85	**M21** (Ar + %15-25 CO_2) **M24** (Ar+ 5-15 CO_2+0.5-3 O_2)	1.20	D300 (Vacuum)
C: 0.03 **Si:** 0.55 **Mn:** 1.25 **Cr:** 0.50 **Ni:** 0.65 **Cu:** 0.40	520	580	22	-30°C: 60 -20°C: 80	**C1** (%100 CO_2)	1.00 1.20 1.60	D300 (Vacuum)
C: 0.03 **Si:** 0.34 **Mn:** 1.36 **Ni:** 0.70 **Cu:** 0.46	490	570	26	-50°C: 80 -60°C: 55	**M21** (Ar + %15-25 CO_2)	1.20	D300 (Vacuum)
C: 0.06 **Si:** 0.25 **Mn:** 1.35 **Ni:** 1.50	560	640	24	-50°C: 70 -60°C: 55	**M21** (Ar + %15-25 CO_2)	1.20	D300 (Vacuum)
C: 0.05 **Si:** 0.25 **Mn:** 1.10 **Ni:** 2.30	540	600	24	-50°C: 85 -60°C: 70	**C1** (%100 CO_2)	1.20 1.60	D200 (Vacuum) D300 (Vacuum)

Low Alloyed, High Strength and Creep Resistant Steel Flux Cored Welding Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCW 172		Rutile type flux cored wire, designed for welding fine grained structural steels by using M21 - mix shielding gas. Succesfully used in single and multi-pass welding in steel construction, offshore platform, shipbuilding and pipe laying which need high strength and toughness at low temperatures. Provides weld metal with high toughness, down to -60°C. Diffusible hydrogen content is 5 ml per 100 g deposited weld metal, so highly resistant to cold cracking. Has a stable and quite arc without spatter. Has easily removable slag and generally self removing.	
AWS/ASME SFA-5.29	**E81T-1 Ni2 M J**		
EN ISO 17632 - A	**T50 6 2Ni P M21 1 H5**		
TS EN ISO 17632 - A	**T50 6 2Ni P M21 1 H5**		
FCW 183M		690 N/mm^2 metal-cored welding wire developed for welding fine grained structural steels with yield strength up to 690 N/mm^2. It gives non-porous weld seams with low spatter, high metal deposition rate and uniform seam.	
AWS/ASME SFA - 5.28	**E110C-G H4**		
EN ISO 18276 - A	**T 69 4 Mn2NiCrMo M M21 1 H5**		
TS EN ISO 18276-A	**T 69 4 Mn2NiCrMo M M21 1 H5**		
FCW 201		Flux cored wire designed for welding boiler, pipe steels, steam generators and other equipments, subjected to operating temperatures up to 500°C. Suitable to use in all position welding and preferred to use where high mechanical properties and X-ray quality are required.	
AWS/ASME SFA - 5.29	**E81T1-A1C**		
EN ISO 17634-A	**T MoL P C1 1 H5**		
TS EN ISO 17634-A	**T MoL P C1 1 H5**		
EN ISO 17632 - A	**T 46 A Mo P C1 1 H5**		
TS EN ISO 17632 - A	**T 46 A Mo P C1 1 H5**		

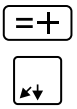
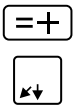
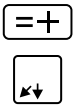
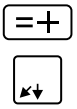
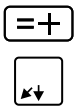
Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCH 240		Gas shielded flux cored wire, providing 18Cr - 8Ni - 7Mn austenitic stainless steel weld metal. Used for buffer layer applications and joining of 14% Manganese steels to high manganese steels, stainless steels and carbon steels. Additionally, it is well-suited for buffer layer application on 14% Mangganese steels. Due to it's high crack resistant weld metal, suitable for joining dissimilar steels, difficult-to-weld steels, armor plates and buffer layer application in crack sensitive large sections before hardfacing. **Typical Applications:** Used for joining wear plates to bucket, joining bucket teeth, joining and surfacing of rails, switch points, crossovers and press arms.	
EN 14700	**T Fe10**		
TS EN 14700	**T Fe10**		
DIN 8555	MF 8-GF-200/400-KPZ		

Typical Chemical Analysis of All-Weld Metal (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.05 **Si:** 0.20 **Mn:** 1.10 **Ni:** 2.20	520	590	26	-50°C: 85 -60°C: 70	**M21** (Ar + %15-25 CO_2)	1.20 1.60	D200 (Vacuum) D300 (Vacuum)
C: 0.035 **Si:** 0.20 **Mn:** 1.55 **Cr:** 0.35 **Ni:** 2.20 **Mo:** 0.35	715	780	17	-40°C: 70	**M21** (Ar + %15-25 CO_2)	1.20	K300MS
C: 0.03 **Si:** 0.35 **Mn:** 1.1 **Mo:** 0.4	530	600	22	20°C: 90	**C1** (%100 CO_2)	1.20 1.60	D300 (Vacuum)

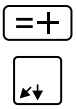
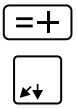
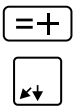
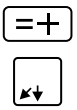
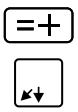
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.04 **Si:** 0.35 **Mn:** 6.50 **Cr:** 18.50 **Ni:** 8.00 **Fe:** 66.50	As Welded 200 HB After Work Hardening 400 HB	**M13** (Ar + %0.5-3 O_2) **M21** (Ar + %15-25 CO_2)	1.60	K300MS

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCO 240 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe10** **T Fe10** MF 8-GF-200/400-KPZ	Open arc flux cored wire, providing 18Cr - 8Ni - 7Mn austenitic stainless steel weld metal. Used for joining 14% Manganese steels and 14% Manganese steels to stainless steels and carbon steels. It is well-suited for buffer layer application on 14% Manganese steels. Due to it's high crack resistant weld metal, suitable for joining dissimilar steels, difficult-to-weld steels, armor plates and buffer layer application in crack sensitive large sections before hardfacing. **Typical Applications:** Used for joining wear plates to bucket, joining bucket teeth, joining and surfacing of rails, switch points, crossovers and press arms.	
FCO 250 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe9** **T Fe9** MF 7-GF-200-KPR	Open-arc flux cored wire for the rebuilding and reclamation of heavy parts, made of carbon steels or 14% Mn steels. Due to it's high crack resistance, it is succesfully used for buffer layer application prior to hardfacing on crack sensitive parts. Weld metal is very resistant to pressure and impact. Machinable with carbide tipped tools. **Typical Applications:** Rebuilding and reclamation of railway rails and crossovers, mill shaft drive end, buffer layer on gyratory crusher mantles, re-pointing of shovel teeth, buffer layer on crawler tractor link prior to overlaying with more abrasion resistance and crack sensitive materials, rebuilding of rollers made of low alloy steels.	
FCH 325 **EN 14700** **TS EN 14700** DIN 8555 DIN 8555	 **T Fe1** **T Fe1** MF 1-GF-250-P MF 1-GF-250-P	Gas shielded flux cored wire, which is developed for hardfacing of parts, subjected to metal-to-metal friction wear (adhesion) and impact. The weld metal has medium hardness and machinable bu chip forming, hardening is possible by flame or by induction hardening. Due to high toughness and high crack resistance, it is also suitable for buffer layer applications. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Suitable for hardfacing rollers, railway rails and crossings, rolling mills, caterpillar track rolls and pads, gears, sprockets, shafts, crane rollers and mine car wheels.	
FCO 330 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe1** **T Fe1** MF 1-GF-300-P	Open-arc flux cored wire which is developed for hardfacing of parts subjected to metal-to-metal friction wear (adhesion) and medium degree impacts. Due to it's very tough and crack resistant weld metal, it is also used for buffer layer applications. As the weld metal has medium degree of hardness it can be machined by chip forming and flame or inductive hardening is possible. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Hardfacing torque gears, gear wheels, shafts, pallet reels, crane wheels, pulleys, railway rails, crossings and switch points, rollers, caterpillar tracks, sprockets, track links, gears, shafts, pinion gears in sugar industry, screws in oil industry, crane drums and wheels, mine car wheels and sheaves.	
FCH 330 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe1** **T Fe1** MF 1-GF-300-P	Gas shielded flux cored wire which is developed for hardfacing of parts subjected to metal-to-metal friction wear (adhesion) and medium degree impacts. Due to it's very tough and crack resistant weld metal, it is also used for buffer layer applications. As the weld metal has medium degree of hardness it can be machined by chip forming and flame or inductive hardening is possible. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Hardfacing torque gears, gear wheels, shafts, pallet reels, crane wheels, pulleys, railway rails, crossings and switch points, rollers, caterpillar tracks, sprockets, track links, gears, shafts, pinion gears in sugar industry, screws in oil industry, crane drums and wheels, mine car wheels and sheaves.	

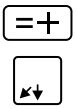
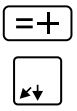
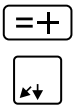
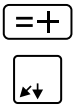
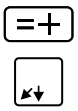
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.15 **Si:** 0.30 **Mn:** 6.50 **Cr:** 18.00 **Ni:** 8.00 **Fe:** 63.00	As Welded 195 HB After Work Hardening 400 HB	-	1.60 2.40 2.80	K300MS / Drum
C: 0.40 **Si:** 0.50 **Mn:** 16.00 **Cr:** 12.00 **Fe:** 71.10	As Welded 200 HB After Work Hardening 450 HB	-	1.60 2.40 2.80	K300MS K435 Drum
C: 0.09 **Si:** 0.60 **Mn:** 1.20 **Cr:** 0.70	250 HB	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS Drum
C: 0.10 **Si:** 0.75 **Mn:** 1.00 **Cr:** 0.55 **Mo:** 0.40 **Fe:** 96.20 **Ti:** 1.00	300 HB	-	1.20 1.60	K300MS K435 Drum
C: 0.20 **Si:** 0.50 **Mn:** 1.30 **Cr:** 1.60 **Fe:** 96.40	300 HB	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS Drum

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCH 335 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe1** **T Fe1** MF 1-GF-350-P	Gas shielded flux cored wire, which is developed for hardfacing of parts, subjected to metal-to-metal friction wear (adhesion) and medium degree impacts. The weld metal is tough and free of cracks and therefore resistant to shocks and impacts. Weld metal is easily machinable by chip forming. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Suitable for hardfacing rollers, railway rails and crossings, rolling mills, caterpillar track rolls and pads, gears, sprockets, shafts, crane rollers and mine car wheels.	
FCH 340 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe1** **T Fe1** MF 1-GF-400-P	Gas shielded flux cored wire, which is developed for hardfacing of parts, subjected to metal-to-metal friction wear (adhesion) and medium to high degree impacts. Weld metal can be machinable by chip forming by means of carbide tiped tools. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Suitable for hardfacing rollers, idlers, gears, sprockets, shafts, crane rollers and mine car wheels.	
FCH 355 **EN 14700** **TS EN 14700** DIN 8555	 **T Z Fe2** **T Z Fe2** MF 1-GF-55-P	Gas shielded, high alloyed, flux cored wire designed for hardfacing deposit with high hardness. Particularly suited for wearing parts subjected to metal to metal wear (adhesion) and high impact. Weld metal is tough, free of cracks and therefore resistant to shock and impacts. Weld metal deposit is only machinable by grinding or carbide tipped tools. If the base metal has high carbon and low weldability, a tough buffer layer with FCW 30 is recommended before hardfacing. Heat treatment after hardfacing will decrease as-welded hardness. **Typical Applications:** Hardfacing of feeding screws, conveyors and machine parts in brick and mining industries.	
FCO 356 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe8** **T Fe8** MF 6-GF-55-PT	Open-arc flux cored wire, which is developed for hardfacing of parts subjected of impact high compressive stresses and metal-to-metal wear. Provides martensitic weld metal with high hardness. Weld metal can be machined by grinding or by diamond cutting bits. It is recommended to apply a buffer layer with FCW 30 on base metals with high carbon and low weldability, before hardfacing. The deposit is heat treatable and forgeable. **Typical Applications:** Suitable for hardfacing of rope and cable sheaves, bed knives, steel mill rollers, crane wheels, forging dies.	
FCH 356 **EN 14700** **TS EN 14700** DIN 8555	 **T Z Fe8** **T Z Fe8** MF 6-GF-55-PT	Gas shielded hardfacing flux cored wire, which is developed for hardfacing of parts, subjected to impact, high compressive stresses and metal-to-metal wear. Provides martensitic weld metal with high hardness. Weld metal can be machined by grinding or by diamond cutting bits. It is recommended to apply a buffer layer with FCW 30 on base metals with high carbon and low weldability, before hardfacing. The deposit is heat treatable and forgeable. **Typical Applications:** Suitable for hardfacing of rope and cable sheaves, bed knives, steel mill rollers, crane wheels, forging dies.	

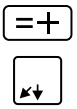
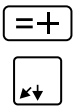
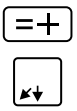
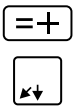
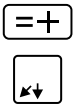
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.20 **Si:** 0.40 **Mn:** 1.30 **Cr:** 2.00 **Mo:** 0.50 **Fe:** 95.60	350 HB	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS Drum
C: 0.20 **Si:** 0.45 **Mn:** 0.25 **Cr:** 2.70 **Mo:** 0.40 **Fe:** 96.00	400 HB	**M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS Drum
C: 0.40 **Si:** 0.75 **Mn:** 0.40 **Cr:** 4.40 **Fe:** 94.05	55 HRc	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60 2.40	K300MS Drum
C: 0.40 **Si:** 0.50 **Mn:** 1.50 **Cr:** 5.70 **Mo:** 1.50 **W:** 1.30 **Ti:** 0.70 **Fe:** 88.40	55 HRc	-	1.60 2.40 2.80	K300MS K435 Drum
C: 0.40 **Si:** 0.60 **Mn:** 1.10 **Cr:** 5.70 **Mo:** 1.40 **W:** 1.30 **Fe:** 88.95	55 HRc	**M13** (Ar + %0.5-3 O_2) **M21** (Ar + %15-25 CO_2) **C1** (%100 CO_2)	1.20 1.60	K300MS Drum

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCH 360 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe8** **T Fe8** MF 6-GF-60-GPT	Gas shielded, high alloyed, flux cored wire designed for hardfacing deposit with high hardness. Especially developed for hardfacing of parts subjected to high metal-to-metal wear and moderate impact. Weld metal can retain its hardness at high temperatures, till 600°C. Weld metal can be grinded and machined by diamond tools. Weld metal is resistant to cracking and shall not be welded more then 3 pass. A tough buffer layer with FCW 30 is recommended before hardfacing, if base metal has high carbon and low weldability. Heat treatment after hardfacing will decrease as-welded hardness. **Typical Applications:** Hardfacing hot cut offs, shear blades, dies for pressure casting, scraper blades, conveyors, rollers, crusher rolls and worn parts in agricultural equipments.	
FCH 360M **EN 14700** **TS EN 14700** DIN 8555	 **T Fe8** **T Fe8** MF 6-GF-60-P	Gas shielded, high alloyed, metal cored wire, designed for hardfacing deposit with high hardness. Especially developed for hardfacing of parts subjected to high metal-to-metal wear and moderate impact. Due to easy weld pool control and lower flow tendency, it is possible to use in different welding positions. Weld metal can retain it's hardness at high temperatures, till 600°C. Heat treatment after hardfacing will decrease as-welded hardness. A tough buffer layer with FCW 30 is recommended before hardfacing, if base metal has high carbon and low weldability. Weld metal can be grinded and machined by diamond tools. **Typical Applications:** Hardfacing hot cut offs, shear blades, dies for pressure casting, scraper blades, conveyors, rollers, crusher rolls and excavator bucket lips and teeth, parts in earth moving equipments worn parts in agricultural equipments.	
FCH 360R **EN 14700** **TS EN 14700** DIN 8555	 **T Fe8** **T Fe8** MF 6-GF-60-GP	High alloy and high hardness flux cored wire, especially used for hardfacing welds of parts subject to high metal-to-metal frictional wear and medium impact. The weld metal has high toughness and crack resistance and is resistant to shocks and impacts. The weld metal maintains its hardness at working temperatures up to 600°C. For high carbon and low weldability materials, a buffer layer with FCW 30 is recommended before hardfacing. Heat treatment reduces the hardness after welding. **Typical Applications:** Hardfacing of hot cutting and stripping blades, die casting molds, separator and shredder blades, conveyors, rollers, crusher rolls, parts of earth-moving machines, bucket lugs and wear parts of agricultural tools.	
FCH 361 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe8** **T Fe8** MF 6-GF-60-GP	Gas shielded, hardfacing flux cored wire especially developed for hardfacing of parts subjected to high metal-to-metal friction, mineral abrasion and moderate impact. Weld metal can retain it's hardness at high temperatures, till 600°C. Weld metal can be grinded and machined by diamond tools. A tough buffer layer with FCW 30 is recommended before hardfacing, if base metal has high carbon and low weldability. Heat treatment after hardfacing will decrease as-welded hardness. **Typical Applications:** Hardfacing of ceramic moulds, mixer blades, crushers, earth moving equipments, hot cut-offs, shear blades, dies for pressure casting, scraper blades, conveyors, rollers.	
FCO 370 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe6** **T Fe6** MF 6-GF-60-GP	Open-arc hardfacing flux cored wire which is resistant to heavy impact, gouging and grinding abrasion together with resistant to cracking. Weld metal deposit composed of a hard martensitic matrix and finely dispersed titanium carbides. Weld metal is machinable by grinding. Maximum deposit thickness depends upon application and procedure used. **Typical Applications:** Hardfacing of crusher cylinders, crusher hammers and mantels, agricultural tools, asphalt mixer blades, shovel bucket teeth and lips, bulldozer blades, cane knives and shredders, gyratory crusher mantles, bed knives and anvil in the wood pulp industry.	

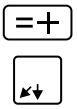
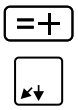
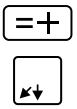
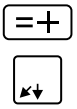
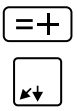
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.60 **Si:** 0.50 **Mn:** 0.20 **Cr:** 5.60 **Mo:** 0.25 **W:** 0.20 **Fe:** 92.65	59 HRc	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60 2.40	K300MS Drum
C: 0.50 **Si:** 1.50 **Mn:** 0.70 **Cr:** 7.50 **Mo:** 0.30	57 HRc	**M21** (Ar + %15-25 CO_2)	1.00 1.20 1.60	K300MS
C: 0.50 **Si:** 0.60 **Mn:** 1.10 **Cr:** 7.20 **Mo:** 0.85	57 HRc	**C1** (%100 CO_2)	1.20 1.60	K300MS
C: 0.45 **Si:** 3.00 **Mn:** 0.70 **Cr:** 9.00 **Fe:** 86.85	59 HRc	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS Drum
C: 1.80 **Si:** 0.60 **Mn:** 1.00 **Cr:** 7.00 **Mo:** 1.30 **V:** 0.15 **Ti:** 6.00 **Fe:** 82.15	58 HRc	-	1.60 2.40 2.80	K300MS K435 Drum

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCH 371 **EN 14700** **TS EN 14700** DIN 8555	 **T Z Fe8** **T Z Fe8** MF 6-GF-60-GP	Gas shielded flux cored wire for hardfacing of parts subjected to high metal to metal wear, abrasion and impact. Weld metal can retain it's hardness at high temperatures. The weld metal is resistant to cracking and highly resistant to impact and abrasion. In the case of thick overlays, it is recommended to use FCW 30 for build-up and buffer layers. The weld deposit contains hard phases in the form carbides. Machining is only possible by grinding or hot chip forming. **Typical Applications:** Hardfacing of roll type crushers, worm conveyors, scraper blades, dipper teeth etc.	
FCH 373 **EN 14700** **TS EN 14700** DIN 8555	 **T Z Fe8** **T Z Fe8** MF 6-GF-60-GP	Gas shielded flux cored wire for hardfacing of parts, subjected to high metal to metal wear, abrasion and impact. Weld metal can retain it's hardness under high temperatures. The weld metal is resistant to cracking and also highly resistant to impact and abrasion. When thick hardfacing is necessary, it is recommended to use FCW 30 for build-up layers. The weld deposit contains hard carbides. Machining is possible only by grinding or hot chip forming. **Typical Applications:** Hardfacing of roll type crushers, worm conveyors, scraper blades, dipper teeth etc.	
FCH 384 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe4** **T Fe4** MF 3-GF-60-ST	It is a hardfacing welding wire used for hardfacing welding of parts exposed to metal-to-metal friction wear, pressure, and impact at high temperatures. The weld metal exhibits high strength, toughness, and heat resistance. Due to its Cr, Mo, W, and V alloying, it retains its hardness and wear resistance at temperatures up to 600°C. It is used on unalloyed steels, in the production of cold and hot cutting tools, and in the welding and surfacing of cutting edges. It provides a stable arc and smooth weld bead. **Typical Applications:** Highly suitable for hardfacing of hot forging die	
FCH 386 **EN 14700** **TS EN 14700** DIN 8555	 **T Z Fe8** **T Z Fe8** MF 3 GF 50 CT	It is used in repair and maintenance welding of parts exposed to high temperature, corrosion, metal-to-metal friction and impact. The weld metal has a high content of Co, Cr, Mo alloys and is used for the wear repair of steels operating at temperatures up to 650°C. It has a stable arc and a smooth weld seam. **Typical Applications:** Continuous casting rolls, rolls, forging dies, forming and punching tools, pumping equipment, punching tools	
FCO 415 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe7** **T Fe7** MF 5-GF-45-C	Open-arc flux cored wire for hardfacing of parts, subjected to metal to metal wear (adhesion), moderate impact, high thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of continuous casting rollers. Ferritic-martensitic weld metal contains Cr, Ni, Mo, V and Nb alloys. Has a very silent arc and provides smooth and easily machinable surface with no spatter. Thin slag is formed on the bead. Provides smooth and machinable surface. **Typical Applications:** Hardfacing of continuous casting rollers and similar rollers operating at high service temperatures.	

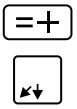
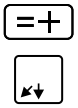
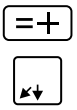
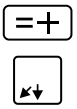
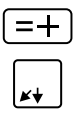
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.90 **Si:** 1.20 **Mn:** 0.35 **Cr:** 5.00 **Nb:** 3.50 **Fe:** 89.05	59 HRc	**M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS Drum
C: 1.35 **Si:** 0.85 **Mn:** 1.10 **Cr:** 7.00 **Ni:** 0.90 **Mo:** 0.25 **Nb:** 9.00 **W:** 0.25 **Fe:** 79.30	58 HRc	**M21** (Ar + %15-25 CO_2)	1.60	K300MS Drum
C: 0.50 **Si:** 1.20 **Mn:** 1.50 **Cr:** 1.80 **Mo:** 0.50 **V:** 0.5 **W:** 11.0 **Co:** 1.60	60 HRc	**M13** (Ar + %0.5-3 O_2) **M21** (Ar + %15-25 CO_2)	1.20 1.60	K300MS
C: 0.10 **Si:** 0.10 **Mn:** 0.45 **Cr:** 8.00 **Mo:** 3.50 **Co:** 13.50	50 HRc	**M13** (Ar + %0.5-3 O_2) **M21** (Ar + %15-25 CO_2)	1.60	K300MS
C: 0.09 **Si:** 0.40 **Mn:** 0.70 **Cr:** 13.00 **Ni:** 4.60 **Mo:** 0.70 **Nb:** 0.15 **V:** 0.20 **Fe:** 80.16	45 HRc	-	1.60 2.40	K300MS K435 Drum

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCO 415N **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** MF 5-GF-400	Open-arc flux cored wire for hardfacing of parts, subjected to metal-to-metal wear (adhesion), moderate impact, high thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of continuous casting rollers. Ferritic-martensitic weld metal contains Cr, Ni, Mo, V, Nb alloys and N-compounds, which increases wear resistance against cavitation and erosion. Has a very silent arc and provides smooth and easily machinable surface with no spatter. Thin slag is formed on the bead. Provides smooth and machinable surface. **Typical Applications:** Hardfacing of continuous casting rollers, similar rollers operating at high service temperatures and turbine blades.	
FCH 415 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe7** **T Fe7** MF 5-GF-45-C	Gas shielded flux cored wire for hardfacing of parts, subjected to metal-to-metal wear (adhesion), moderate impact, creep, thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of continuous casting rollers. Ferritic-martensitic weld metal contains Cr, Ni, Mo, V and Nb alloys. Has a very silent arc and provides smooth and easily machinable surface with no spatter. **Typical Applications:** Hardfacing of continuous casting rollers and similar rollers operating at high service temperatures.	
FCO 430 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** MF-5-GF-250-C	Open arc flux cored wire for surfacing and buffer layer application on parts, subjected to metal-to-metal wear (adhesion), moderate impact, thermal fatigue and corrosion. Especially designed for buffer layer application, in order to reduce dilution and crack suseptibility of new continue casting rollers, at the top part of the line. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Suitable for buffer layer on new continue casting rolls, before hardfacing layers. Also suitable for surfacing of steam turbines, valves and valve seats.	
FCH 430 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** MF-5-GF-200-C	Gas shielded flux cored wire for surfacing and buffer layer application on parts, subjected to metal-to-metal wear (adhesion), moderate impact, thermal fatigue and corrosion. Especially designed for buffer layer application, in order to reduce dilution and crack suseptibility of new continue casting rollers, at the top part of the line. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Suitable for buffer layer on new continue casting rolls, before hardfacing layers. Also suitable for surfacing of steam turbines, valves and valve seats.	
FCO 510 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe14** **~T Fe14** MF 10-GF-60-CGRZ	Open-arc flux cored wire, depositing high chromium alloy designed for resisting high stress grinding abrasion with low impact. Especially used on earth moving equipments contact surfaces with soil and cement raw materials. Weld metal deposit is composed of an austenitic matrix and chromium carbides. Machinable only by grinding. **Typical Applications:** Hardfacing in wear plates, conveyors, bulldozer buckets and teeth.	

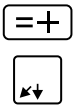
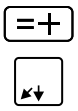
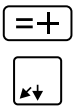
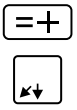
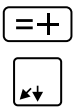
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.03 **Si:** 0.80 **Mn:** 1.10 **Cr:** 14.50 **Ni:** 5.40 **Mo:** 0.58 **N:** 0.12 **Fe:** 77.50	415 HB	-	1.60 2.40 2.80	K300MS
C: 0.09 **Si:** 0.40 **Mn:** 0.70 **Cr:** 13.00 **Ni:** 4.60 **Mo:** 0.70 **Nb:** 0.15 **V:** 0.20 **Fe:** 80.16	45 HRc	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.60 2.40	K300MS Drum
C: 0.02 **Si:** 0.60 **Mn:** 0.60 **Cr:** 17.00 **Fe:** 81.50	230 HB	-	1.60	K300MS
C: 0.02 **Si:** 0.70 **Mn:** 0.70 **Cr:** 17.50 **Fe:** 81.00	210 HB	**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)	1.60 2.40	K300MS
C: 2.50 **Si:** 1.50 **Mn:** 0.15 **Cr:** 23.00 **Fe:** 72.85	60 HRc	-	1.60	K300MS K435 Drum

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCO 511 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe14** **~T Fe14** MF 10-GF-65-GR	Self-shielded flux-cored wire designed for hardfacing parts exposed to severe abrasive wear and low impact. The weld metal has high hardness due to its high chromium carbide content and can only be machined by grinding. Transverse cracks that may occur in the weld bead do not reduce wear resistance. A maximum of three layers is recommended. **Typical Applications:** Hardfacing of wear plates made from carbon steels, low/high alloy steels, or Ni-Hard materials. Suitable for bucket teeth and crusher picks of earth-moving machinery, screw conveyors, mixer fan blades, and crushers.	
FCO 512 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe14** **~T Fe14** MF 10-GF-65-GR	Open-arc flux cored wire, which is developed for hardfacing of parts, subjected to especially high abrasion and low degree of impact. Weld metal has high hardness due to it's high chromium carbide content and machinable only by grinding. Transverse cracks, caused by high hardness level, do not have any negative effect on the abrasion resistance. Recommend to apply as maximum 3 passes. **Typical Applications:** Suitable for hardfacing of wear plates, bucket teeth and crusher parts of heavy costruction equipments, transport augers, mixer fan blades and crushers which are made of carbon steels, low and high alloy steels or Ni-hard materials.	
FCO 514 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe14** **~T Fe14** MF 10-GF-65-GR	Open-arc flux cored wire which is developed for hardfacing of wear plates and parts, subjected to high abrasion and low impact. Weld metal has high hardness due to it's high chromium carbide content and machinable only by grinding. Transverse cracks, caused by high hardness level, do not have any negative effect on the abrasion resistance. **Typical Applications:** Suitable for hardfacing of wear plates, cement conveyor screws, bucket edge and teeth, crusher parts of heavy costruction equipments, catalytic pipes.	
FCO 526 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe14** **~T Fe14** MF 10-GF-60-GR	Open arc flux cored wire, developed for hardfacing of parts and wear plates which are subjected to high abrasive wear and moderate impact. Due to the high Cr-, Nb-, B-carbide content, the weld metal has high hardness and transverse cracks in the weld seam have no negative effect on wear resistance. Maximum 3 layer of hardfacing is recommended and weld metal can only be machined by grinding. **Typical Applications:** Hardfacing of wear plates in quarry equipment, hammers of gyratory crushers, hammers for refractory materials, clay and basalt, bucket lips and teeths in earth moving equipments, conveyors and mixer fan blades.	
FCO 528 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe15** **~T Fe15** MF 10-GF-65-GR	Open-arc flux cored wire which is designed to give extreme resistance to high stress and gouging abrasion and medium impact even at higher temperatures, up to 450°C. Weld metal deposit is composed of an austenitic matrix and Cr and Nb complex carbides so, will readily stress relief check crack which is not detrimental to abrasion resistance, but decrease impact resistance. Hardfacing shall not exceed 8 mm in heigth. Weld metal is machinable by grinding. **Typical Applications:** Hardfacing of grinders and presses in cement and brick industries, concrete pump seats, bucket teeth and lips on bucket-wheel excavators in coal and phosphate mines, brick and clay mill augers, wear plates and screens in the coal industry, bulldozer blades working in sand.	

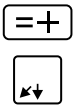
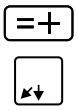
Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 4.80 **Si:** 1.20 **Mn:** 0.60 **Cr:** 24.00	60 HRc	-	2.80	Drum
C: 5.20 **Si:** 1.20 **Mn:** 0.20 **Cr:** 27.00 **Fe:** 66.40	63 HRc	-	1.60 2.80	K300MS K435 Drum
C: 5.30 **Si:** 0.80 **Mn:** 0.25 **Cr:** 27.50 **B:** 0.50 **Fe:** 65.65	62 HRc	-	1.60 2.80	K300MS K435 Drum
C: 4.50 **Si:** 0.80 **Mn:** 0.15 **Cr:** 23.00 **Nb:** 3.00 **B:** 0.35 **Fe:** 68.20	61 HRc	-	1.60	K300MS
C: 5.20 **Si:** 0.90 **Mn:** 0.20 **Cr:** 21.00 **Nb:** 7.00 **Fe:** 65.70	65 HRc	-	1.60 2.40 2.80	K300MS K435 Drum

Hardfacing Flux Cored Wires

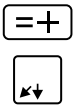
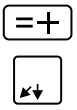
Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCO 531 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe15** **~T Fe15** MF 10-GF-65-G	Open-arc flux cored wire which is designed to give extreme resistance to high stress and gouging abrasion even at higher temperatures, up to 450°C. Weld metal deposit is composed of an austenitic matrix and Cr and Nb complex carbides so, will readily stress relief check crack which is not detrimental to abrasion resistance, but decrease impact resistance. Hardfacing shall not exceed 8 mm in heigth. Weld metal is machinable by grinding. **Typical Applications:** Hardfacing of grinders and presses in cement and brick industry, concrete pump seats, bucket teeth and lips on bucket-wheel excavators in coal and phosphate mines, brick and clay mill augers, wear plates and screens in the coal industry, bulldozer blades working in sand.	
FCO 532 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe15** **~T Fe15** MF 10-GF-65-GR	Hardfacing open-arc flux cored wire which is developed for hardfacing of parts subjected to e specially high gouging abrasion and low degree impact. Weld metal deposit is composed of an austenitic matrix and Cr and Nb complex carbides so, will readily stress relief check crack which is not detrimental to abrasion resistance, but decrease impact resistance. Weld metal has high hardness and excellent wear resistance even in single pass due to In order to have good results, maximum 2 passes shall be welded. **Typical Applications:** Suitable for hardfacing of pumps and mixer parts, conveyer screws, bulldozer blades, shovel bucket, lips and teeths, brick and clay mill augers, wear plates and screens in mineral, stone, sand and coal mines.	
FCO 540 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe16** **T Fe16** MF 10-GF-65-GRZ	Open-arc flux cored wire, designed to resist high stress grinding abrasion and solid erosion at service temperatures up to 600°C. Deposits weld metal which is contains Cr, Nb, Mo alloys with addition of W and V carbides. Hardfacing shall not exceed 6 mm in heigth. Weld metal is machinable by grinding. The deposit will readily stress relief check crack which is not detrimental to abrasion resistance. **Typical Applications:** Hardfacing wear plates, sinter plant parts, exhaust fan blades in pellet plants, pearlite crushers, bucket teeth and lips on bucket-wheel excavators in phosphate mines, boiler fan blades in sugar cane industry, burden area in blast furnace bells, wear plates in blast furnace belless top charging systems.	
FCO 711 **EN 14700** **TS EN 14700**	 **T Z Fe13** **T Z Fe13**	Open arc flux cored wire for hardfacing of parts, exposed to high abrasion by soil, sand, rock and minerals in quarry, mining , agricultural and earthmoving equipments. Specially formulated as Cr-free electrode which eliminates generation of harmful Chromium (VI) fume during welding. Hard and high wear-resistant overlay has low impact resistance so, it is recommended to apply on the parts, where impact does not exist. Apply maximum of 2 layers to prevent spallling. **Typical Applications:** Hardfacing of mixer blades and shafts, impellers, buckets, shovels, agriculturall equipments, augers soil and cement industry.	
FCH 801 **AWS/ASME SFA 5.21** **EN 14700** **TS EN 14700** DIN 8555	 **ERCCoCr-C** **T Co3** **T Co3** MF 20-GF-55-CGTZ	Gas shielded, flux cored hardfacing wire which deposits Co-Cr-W alloy weld metal. Suitable to use in hardfacing of parts subjected to either the single or combined effect of heavy metal-to-metal wear or abrasion, high temperatures (ranging from 500°C to 900°C) and corrosive environments. Due to it's very high toughness and shock resistance, also suitable to use on parts subjected to high impacts and and thermal shocks. **Typical Applications:** Hardfacing of plastic extrusion screws, tools to cut paper, cardboard floor coverings,roofing,wood.	

Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 4.80 **Si:** 1.40 **Mn:** 0.10 **Cr:** 29.00 **B:** 1.00	One Pass 64 HRc	-	1.60	K300MS
C: 5.20 **Si:** 0.90 **Mn:** 0.20 **Cr:** 21.00 **Nb:** 7.00 **B:** 1.00 **Fe:** 64.70	One Pass 65 HRc	-	1.60 2.40 2.80	K300MS K435 Drum
C: 5.00 **Si:** 0.55 **Mn:** 0.20 **Cr:** 22.00 **Mo:** 6.40 **Nb:** 6.00 **V:** 0.70 **W:** 1.60 **Fe:** 57.55	64 HRc	-	2.40 2.80	K300MS K435 Drum
	67 HRc	-	1.60	K300MS
C: 2.50 **Si:** 1.00 **Mn:** 0.50 **Ni:** 2.00 **Cr:** 30.00 **W:** 11.00 **Fe:** 3.50 **Co:** 49.50	55 HRc	**M13** (Ar + %0.5-3 O_2)	1.20 1.60	K300MS

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCH 806 **AWS/ASME SFA 5.21** **EN 14700** **TS EN 14700** DIN 8555	 **ERCCoCr-A** **T Co2** **T Co2** MF 20-GF-40-CTZ	Gas shielded, flux cored hardfacing wire which deposits Co-Cr-W alloy weld metal. Suitable to use in hardfacing of parts subjected to either the single or combined effect of: heavy metal-to-metal wear or abrasion, high temperatures (ranging from 500°C to 900°C) and corrosive environments. Due to it's very high toughness and shock resistance, also suitable to use on parts subjected to high impacts and and thermal shocks. **Typical Applications:** Hardfacing of blades for hot shearing, ingot tong ends, valves and valve seats, nozzles.	
FCH 812 **AWS/ASME SFA 5.21** **EN 14700** **TS EN 14700** DIN 8555	 **ERCCoCr-B** **T Co3** **T Co3** MF 20-GF-45-CTZ	Gas shielded, flux cored hardfacing wire which deposits Co-Cr-W alloy weld metal. Suitable to use in hardfacing of parts subjected to either the single or combined effect of : heavy metal-to-metal wear or abrasion, high temperatures (ranging from 500°C to 900°C) and corrosive environments. Due to it's very high toughness and shock resistance, also suitable to use on parts subjected to high impacts and and thermal shocks. **Typical Applications:** Hardfacing of plastic extrusion screws, plastic, paper and wood cutting tools, saw blades and camshafts.	

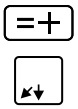
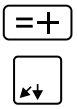
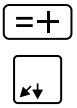
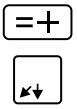
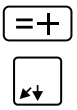
Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCS 335 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe1** **T Fe1** UP 1-GF-350-P	Flux cored wire for submerged arc hardfacing of parts subjected to metal-to-metal friction wear (adhesion) and medium degree impacts. SHF 604 flux is used together with this wire for hardfacing applications. Weld metal is easily machinable by chip forming. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Suitable for hardfacing rollers, railway rails and crossings, rolling mills, caterpillar track rolls and tracks, sprockets, shafts, crane rollers and ilder and mine car wheels.	
FCS 345 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe1** **~T Fe1** UP 1-GF-45-P	Flux cored wire for submerged arc hardfacing of parts subjected to metal-to-metal friction (adhesion) and medium degree impacts. SHF 604 flux is used together with this wire for hardfacing applications. Weld metal is easily machinable by chip forming. Interpass temperature should not exceed 250°C, during welding. **Typical Applications:** Suitable for hardfacing rollers, rolling mills, caterpillar track rolls and tracks, sprockets, shafts, crane rollers and idler and mine car wheels.	

Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 1.20 **Si:** 1.00 **Mn:** 0.80 **Ni:** 2.50 **Cr:** 28.00 **W:** 4.50 **Fe:** 3.50 **Co:** 58.50	42 HRc	**M13** (Ar + %0.5-3 O_2)	1.20 1.60 2.40	K300MS
C: 1.50 **Si:** 1.00 **Mn:** 1.00 **Ni:** 2.50 **Cr:** 30.00 **W:** 8.00 **Fe:** 3.00 **Co:** 53.00	47 HRc	**M13** (Ar + %0.5-3 O_2)	1.20	K300MS

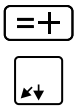
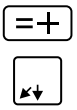
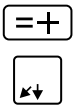
Typical Chemical Analysis of All-Weld Metal (%)	Hardness		Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.90 **Si:** 0.50 **Mn:** 1.50 **Cr:** 2.90 **Mo:** 0.50 **Fe:** 94.51	**SHF 604**	350 HB		2.40 3.20	K435 Drum
C: 0.20 **Si:** 0.70 **Mn:** 1.75 **Cr:** 3.60 **Mo:** 0.60 **Fe:** 93.15	**SHF 604**	450 HB		2.40 3.20	K435 Drum

Hardfacing Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCS 355 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe3** **T Fe3** UP 6-GF-55-P	Flux cored wire for submerged arc hardfacing of parts subjected to low stress abrasion with high compression stress and high impact. SHF 604 flux is the proper flux for hardfacing applications. Due to it's high hardness weld metal is only machinable by grinding or carbide tipped tools. **Typical Applications:** Hardfacing of steel mill rolls, crane wheels, cable sheaves.	
FCS 356 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe3** **T Fe3** UP 6-GF-55-PT	Flux cored wire for submerged arc welding, which is developed for hardfacing of parts subjected of impact high compressive stresses and metal-to-metal wear. Provides martensitic weld metal with high hardness. Weld metal can be machined by grinding or by diamond cutting bits. It is recommended to apply a buffer layer on base metals with high carbon and low weldability, before hardfacing. The deposit is heat treatable and forgeable. **Typical Applications:** Suitable for hardfacing of rope and cable sheaves, bed knives, steel mill rollers, crane wheels, forging dies.	
FCS 415 **EN 14700** **TS EN 14700** DIN 8555	 **T Fe7** **T Fe7** UP 5-GF-40 (45)-C	Flux cored wire for hardfacing of parts subjected to metal-to-metal wear (adhesion), moderate impact, creep, thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of continuous casting rollers. SHF 604 is the suitable flux for these hardfacing applications. Ferritic-martensitic weld metal contains Cr, Ni, Mo, V and Nb alloys. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Hardfacing of continuous casting rollers and similar rollers operating at high service temperatures.	
FCS 417 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** UP 5-GF-45-(50)-C	Flux cored wire for hardfacing of parts subjected to metal-to-metal wear (adhesion), moderate impact, creep, thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of continuous casting rollers, where high hardness is required. SHF 604 is the suitable flux for these hardfacing applications. Ferritic-martensitic weld metal has higher level of hardness with respect to FCS 415 and weld metal contains Cr, Ni, Mo, V and Nb alloys. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Hardfacing of continuous casting rollers and similar rollers operating at high service temperatures.	
FCS 420 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** UP 6-GF-50-C	Flux cored wire for submerged arc hardfacing of parts subjected to metal-to-metal wear (adhesion), moderate impact, thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of continue casting rolls. SHF 604 flux is used together with this wire for hardfacing applications. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Suitable for hardfacing of rolling rolls which are subjected to high operating temparatures and corrosion and rolls working on similar conditions in iron and steel works. Steel mill rollers, continuous casting rollers.	

Typical Chemical Analysis of All-Weld Metal (%)	Hardness	Shielding Gas	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.30 **Si:** 0.90 **Mn:** 0.95 **Cr:** 3.80 **Fe:** 94.05	**SHF 604**	55 HRc	1.60 2.40	K300MS K435 Drum
C: 0.45 **Si:** 0.40 **Mn:** 1.25 **Cr:** 5.80 **Mo:** 1.60 **W:** 1.60 **Fe:** 88.90	**SHF 604**	55 HRc	2.40 2.80 3.20	K435 Drum
C: 0.08 **Si:** 0.70 **Mn:** 1.00 **Cr:** 13.00 **Ni:** 2.70 **Mo:** 1.00 **Nb:** 0.20 **V:** 0.25 **Fe:** 81.07	**SHF 604**	42 HRc	2.40 3.20	K435 Drum
C: 0.12 **Si:** 0.80 **Mn:** 1.10 **Cr:** 13.00 **Ni:** 3.00 **Mo:** 1.00 **Nb:** 0.25 **V:** 0.25 **Fe:** 81.07	**SHF 604**	47 HRc	2.40 3.20	K435 Drum
C: 0.20 **Si:** 0.70 **Mn:** 1.40 **Cr:** 13.00 **Ni:** 0.30 **Nb:** 0.30 **Fe:** 84.10	**SHF 604**	50 HRc	2.40	K435 Drum

Hardfacing SAW Flux Cored Wires

Product Name and Standards		Applications and Properties	Polarity Welding Positions
FCS 421 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** UP 6-GF-50-(55)-C	Flux cored wire for submerged arc hardfacing of parts subjected to metal-to-metal wear (adhesion), moderate impact, thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of rolling rolls. SHF 604 flux is used together with this wire for hardfacing applications. Has higher level of hardness with respect to FCS 420. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Suitable for hardfacing of rolling rolls which are subjected to high operating temparatures and corrosion and rolls working on similar conditions in iron and steel works. Steel mill rollers, continuous casting rollers.	
FCS 423 **EN 14700** **TS EN 14700** DIN 8555	 **~ T Fe 7** **~ T Fe 7** UP 6 GF 50 C	Flux cored wire for submerged arc hardfacing of parts, subjected to metal-to-metal wear (adhesion), moderate impact, thermal fatigue and corrosion at high temperatures. Especially designed for hardfacing and renovation of rolling rolls. SHF 604 flux is used together with this wire for hardfacing applications. It has low crack sensivity combined with high hardness. Provides smooth and easily machinable surface with stringer weld bead or weaving technique. **Typical Applications:** Suitable for hardfacing of rolling rolls which are subjected to high operating temparatures and corrosion and rolls working on similar conditions in iron and steel works. Steel mill rollers, continuous casting rollers.	
FCS 430 **EN 14700** **TS EN 14700** DIN 8555	 **~T Fe7** **~T Fe7** UP 5-GF-200-C	Flux cored wire for submerged arc hardfacing and buffer layer application on parts subjected to metal-to-metal wear (adhesion), moderate impact, thermal fatigue and corrosion at high temperatures. Especially designed to be used as a buffer layer in new continue casting rollers, before hardfacing, in order to reduce dilution and crack suseptibility. SHF 604 is the suitable flux for these hardfacing applications. Provides smooth and easily machinable surface on stringer weld bead or weaving technique. **Typical Applications:** Suitable for buffer layer in new continue casting rolls, before hardfacing layers.	

Typical Chemical Analysis of All-Weld Metal (%)	Welding Flux	Hardness	Diameter (mm)	Packing Weigth (kg) Packing Type
C: 0.25 **Si:** 0.80 **Mn:** 1.30 **Cr:** 13.00 **Ni:** 0.35 **Nb:** 0.30 **Fe:** 84.00	**SHF 604**	52 HRc	1.60 2.40 3.20	K300MS K435 Drum
C: 0.24 **Si:** 0.70 **Mn:** 0.50 **Cr:** 12.50 **Ni:** 3.00 **V:** 0.30 **Nb:** 0.30	**SHF 604**	51 HRc	2.40 3.20	K435 Drum
C: 0.03 **Si:** 0.70 **Mn:** 1.30 **Cr:** 17.00 **Fe:** 80.97	**SHF 604**	200 HB	2.40 3.20	K435 Drum

SUBMERGED ARC WELDING (SAW) WIRES AND FLUXES

CONTENTS

SUBMERGED ARC WELDING (SAW) WIRES AND FLUXES

Unalloyed and Low-Alloyed Steel SAW Wires

Unalloyed and Low-Alloyed Steel SAW Fluxes

Stainless Steel SAW Wires

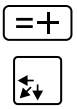
CONTENTS

SUBMERGED ARC WELDING (SAW) WIRES AND FLUXES

Stainless Steel SAW Fluxes

Hardfacing SAW Fluxes

Unalloyed and Low-Alloyed Steel SAW Wires

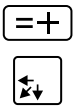
Product Name and Standards	Applications and Properties	Polarity Welding Positions
SW 701 AWS/ASME SFA - 5.17 EL12 EN ISO 14171-A S1 TS EN ISO 14171-A S1	Solid, submerged arc welding wire, suitable for welding general structural steels, used in pressure vessel, pipe, shipbuilding and steel constructions. Copper coating increases electrical conductivity and resistance against rusting.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn
SW 701	0.07	0.03	0.55

Welding Flux	Wire and Flux Combination Standards: AWS/ASME SFA - 5.17, EN ISO 14171-A, TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SF 104	**F6A2-EL12** **S 38 2 AB S1** **S 38 2 AB S1**	**C:** 0.05 **Si:** 0.25 **Mn:** 0.85	410	480	30	-30°C: 50 -20°C: 85 0°C: 90	1.60 2.00 2.40 2.80 3.20 4.00 5.00	15 kg - K300MS (1.60 mm) 25 kg - K435 200 kg - Drum 400 kg - Drum 600 kg - Drum 1000 kg - Drum
SF 113	**F7A2-EL12** **S 38 2 MS/CS S1** **S 38 2 MS/CS S1**	**C:** 0.04 **Si:** 0.45 **Mn:** 1.45	400	500	30	-20°C: 60 0°C: 70		
SF 204	**F6A2-EL12** **S 35 2 AB S1** **S 35 2 AB S1**	**C:** 0.03 **Si:** 0.40 **Mn:** 1.30	410	470	30	-30°C: 30 -20°C: 75		
SF 212	**F7AZ-EL12** **S 42 A AR S1** **S 42 A AR S1**	**C:** 0.05 **Si:** 0.65 **Mn:** 1.10	460	530	28	0°C: 30 20°C: 60		
SF 304	**F6A0-EL12** **S 38 2 AB S1** **S 38 2 AB S1**	**C:** 0.05 **Si:** 0.25 **Mn:** 0.90	420	490	30	-30°C: 60 -20°C: 80 0°C: 100		

Unalloyed and Low-Alloyed Steel SAW Wires

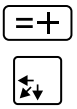
Product Name and Standards	Applications and Properties	Polarity Welding Positions
SW 702 AWS/ASME SFA - 5.17 EM12 EN ISO 14171-A S2 TS EN ISO 14171-A S2	Solid, submerged arc welding wire, suitable for welding general structural steels with medium and high tensile strengths, used in pressure vessel, boiler, pipe, shipbuilding and steel constructions. Also suitable to use in combination with SHF 325, SHF 333, SHF 335 and SHF 345 hardfacing fluxes for hardfacing applications. Copper coating increases electrical conductivity and resistance against rusting.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn
SW 702	0.09	0.08	1.10

Welding Flux	Wire and Flux Combination Standards: AWS/ASME SFA - 5.17, EN ISO 14171-A, TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SF 104	F7A2-EM12 S 42 2 AB S2 S 42 2 AB S2	**C:** 0.05 **Si:** 0.30 **Mn:** 1.10	435	510	28	-30°C: 45 -20°C: 65	1.60 2.00 2.40 3.00 3.20 4.00	15 kg - K300MS (1.60 mm) 25 kg - K435 400 kg - Drum 600 kg - Drum 1000 kg - Drum
SF 113	F7A2-EM12 S 42 2 MS/CS S2 S 42 2 MS/CS S2	**C:** 0.04 **Si:** 0.40 **Mn:** 1.80	400	500	30	-20°C:55 0°C: 65		
SF 124	F7A4-EM12 S 42 2 AB S2 S 42 2 AB S2	**C:** 0.05 **Si:** 0.20 **Mn:** 1.10	430	490	30	-40°C: 40 -20°C: 70		
SF 134	F7A4-EM12 S 42 2 AB S2 S 42 2 AB S2	**C:** 0.05 **Si:** 0.45 **Mn:** 1.45	440	530	30	-40°C: 50 -30°C: 90		
SF 204	F7A2-EM12 S 42 3 AB S2 S 42 3 AB S2	**C:** 0.05 **Si:** 0.40 **Mn:** 1.40	435	510	30	-40°C: 50 -30°C: 70 -20°C: 90		
SF 212	F7AZ-EM12 S 42 A AR S2 S 42 A AR S2	**C:** 0.05 **Si:** 0.70 **Mn:** 1.35	480	560	28	0°C: 30 20°C: 70		
SF 304	F7A4-EM12 S 42 3 AB S2 S 42 3 AB S2	**C:** 0.05 **Si:** 0.25 **Mn:** 1.25	430	500	29	-40°C: 60 -30°C: 75 -20°C: 110		
SF 414	F7A6-EM12 S 38 5 AB S2 S 38 5 AB S2	**C:** 0.06 **Si:** 0.25 **Mn:** 1.40	410	510	30	-50°C: 65 -40°C: 100 -20°C: 120		

Unalloyed and Low-Alloyed Steel SAW Wires

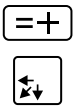
Product Name and Standards	Applications and Properties	Polarity Welding Positions
SW 702Si AWS/ASME SFA - 5.17 EM12K EN ISO 14171-A S2Si TS EN ISO 14171-A S2Si	Solid, submerged arc welding wire suitable for welding general structural steels with medium and high tensile strengths, used in pressure vessel, boiler, pipe, shipbuilding and steel constructions. Higher silicon content improves deoxidation of weld pool. Copper coating increases electrical conductivity and resistance against rusting.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn
SW 702Si	0.09	0.25	1.10

Welding Flux	Wire and Flux Combination Standards: AWS/ASME SFA - 5.17 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SF 104	F7A2-EM12K S 42 2 AB S2Si S 42 2 AB S2Si	C: 0.04 Si: 0.50 Mn: 1.10	425	510	29	-30°C: 40 -20°C: 50 0°C: 80	1.60 2.00 2.40 3.20 4.00	15 kg - K300 (1.60 mm) 25 kg - K435 100 kg - K785 250 kg - Drum 400 kg - Drum 600 kg - Drum 1000 kg - Drum 1000 kg - Bobin
SF 113	F7A2-EM12K S 42 3 MS/CS S2Si S 42 3 MS/CS S2Si	C: 0.04 Si: 0.65 Mn: 1.90	450	550	30	-20°C: 50 0°C: 60		
SF 124	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	C: 0.05 Si: 0.30 Mn: 1.20	435	500	27	-40°C: 50 -30°C: 70 -20°C: 90		
SF 134	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	C: 0.05 Si: 0.60 Mn: 1.60	470	560	29	-40°C: 45 -30°C: 70 -20°C: 90		
SF 204	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	C: 0.06 Si: 0.55 Mn: 1.35	440	530	29	-40°C: 40 -30°C: 70		
SF 212	F7AZ-EM12K S 46 A AR S2Si S 46 A AR S2Si	C: 0.05 Si: 0.80 Mn: 1.40	490	570	28	0°C: 55 20°C: 80		
SF 304	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	C: 0.06 Si: 0.45 Mn: 1.40	460	530	28	-40°C: 50 -30°C: 70 -20°C: 90		
SF 401	F7A6-EM12K S 42 5 FB S2Si S 42 5 FB S2Si	C: 0.06 Si: 0.30 Mn: 1.15	425	520	30	-50°C: 70 -40°C: 90 -30°C: 110		
SF 414	F7A6-EM12K / F7P6-EM12K S 42 5 AB S2Si S 42 5 AB S2Si	C: 0.07 Si: 0.35 Mn: 1.45	420	520	30	-50°C: 70 -40°C: 110 -20°C: 140		

Unalloyed and Low-Alloyed Steel SAW Wires

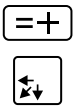
Product Name and Standards	Applications and Properties	Polarity Welding Positions
SW 703Si AWS/ASME SFA - 5.17 EH12K EN ISO 14171-A S3Si TS EN ISO 14171-A S3Si	Solid, submerged arc welding wire suitable for welding general structural steels with medium and high tensile strengths, used in pressure vessel, boiler, pipe, shipbuilding and steel constructions. Higher manganese and silicon content improves deoxidation of weld pool. Copper coating increases electrical conductivity and resistance against rusting.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn
SW 703Si	0.09	0.30	1.65

Welding Flux	Wire and Flux Combination Standards: AWS/ASME SFA - 5.17, EN ISO 14171-A, TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SF 104	F7A5-EH12K S 46 4 AB S3Si S 46 4 AB S3Si	C: 0.06 Si: 0.45 Mn: 1.55	470	550	28	-40°C: 60 -30°C: 75 -20°C: 90	2.00 2.40 3.20 4.00	25 kg - K435 100 kg - K785 550 kg - Drum 1000 kg - Drum
SF 124	F7A4-EH12K S 42 4 AB S3Si S 42 4 AB S3Si	C: 0.06 Si: 0.45 Mn: 1.75	440	550	30	-40°C: 70 -30°C: 90		
SF 134	F7A5-EH12K S 46 4 AB S3Si S 46 4 AB S3Si	C: 0.07 Si: 0.55 Mn: 1.90	475	575	30	-50°C: 50 -40°C: 70 -30°C: 100		
SF 204	F7A4-EH12K S 46 3 AB S3Si S 46 3 AB S3Si	C: 0.06 Si: 0.60 Mn: 1.70	510	610	28	-40°C: 60 -30°C: 100 -20°C: 120		
SF 212	F8AZ-EH12K S 46 A AR S3Si S 46 A AR S3Si	C: 0.05 Si: 0.95 Mn: 1.70	530	610	26	0°C: 40 20°C: 65		
SF 304	F7A4-EH12K S 46 4 AB S3Si S 46 4 AB S3Si	C: 0.06 Si: 0.65 Mn: 1.75	480	540	28	-40°C: 55 -30°C: 80 -20°C: 120		
SF 401	F7A8-EH12K S 46 5 FB S3Si S 46 5 FB S3Si	C: 0.07 Si: 0.30 Mn: 1.60	480	530	28	-50°C: 80 -40°C: 100 -30°C: 120		
SF 414	F7A8-EH12K S 46 5 AB S3Si S 46 5 AB S3Si	C: 0.06 Si: 0.35 Mn: 1.65	470	560	30	-60°C: 50 -50°C: 75 -40°C: 120		

Unalloyed and Low-Alloyed Steel SAW Wires

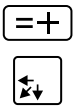
Product Name and Standards	Applications and Properties	Polarity Welding Positions
SW 702Mo AWS/ASME SFA - 5.23 EA2 EN ISO 14171-A S2Mo TS EN ISO 14171-A S2Mo	Mo-alloyed and solid, submerged arc welding wire suitable for welding general structural steels, low alloyed steels with medium and high tensile strengths, used in pressure vessel, boiler, tanks, pipe and heavy steel constructions. Copper coating increases electrical conductivity and resistance against rusting.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Mo
SW 702Mo	0.10	0.15	1.10	0.50

Welding Flux	Wire and Flux Combination Standards: AWS/ASME SFA - 5.23, EN ISO 14171-A, TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SF 104	F8A3-EA2 S 46 2 AB S2Mo S 46 2 AB S2Mo	C: 0.05 Si: 0.40 Mn: 1.10 Mo: 0.50	480	560	26	-20°C: 50 0°C: 65		
SF 113	F8A2-EA2 S 46 2 MS/CS S2Mo S 46 2 MS/CS S2Mo	C: 0.04 Si: 0.50 Mn: 1.65 Mo: 0.45	515	590	28	-20°C: 50 0°C: 60		
SF 124	F8A2-EA2 S 46 2 AB S2Mo S 46 2 AB S2Mo	C: 0.07 Si: 0.25 Mn: 1.25 Mo: 0.40	520	590	26	-30°C: 40 -20°C: 55 0°C: 70		
SF 134	F8A4-EA2 S 46 3 AB S2Mo S 46 3 AB S2Mo	C: 0.05 Si: 0.45 Mn: 1.50 Mo: 0.40	520	640	26	-40°C: 35 -30°C: 55 -20°C: 70		
SF 204	F8A4-EA2 S 46 2 AB S2Mo S 46 2 AB S2Mo	C: 0.06 Si: 0.45 Mn: 1.30 Mo: 0.40	520	610	28	-40°C: 50 -30°C: 60 -20°C: 90	1.60 2.00 2.40 3.20 4.00	15 kg - K300MS (1.60 mm) 25 kg - K435 400 kg - Drum 600 kg - Drum 1000 kg - Coil
SF 212	F8AZ-EA2 S 50 A AR S2Mo S 50 A AR S2Mo	C: 0.05 Si: 0.75 Mn: 1.40 Mo: 0.45	590	670	26	20°C: 50 0°C: 35		
SF 304	F8A4-EA2 S 46 3 AB S2Mo S 46 3 AB S2Mo	C: 0.05 Si: 0.35 Mn: 1.40 Mo: 0.45	510	570	27	-40°C: 50 -30°C: 60 -20°C: 100		
SF 401	F8A5-EA2 S 46 4 FB S2Mo S 46 4 FB S2Mo	C: 0.07 Si: 0.20 Mn: 1.40 Mo: 0.40	500	570	28	-46°C: 50 -40°C: 70 -30°C: 90		
SF 414	F8A5-EA2 S 46 4 AB S2Mo S 46 4 AB S2Mo	C: 0.08 Si: 0.25 Mn: 1.30 Mo: 0.40	510	590	28	-40°C: 70 -30°C: 80 -20°C: 130		

Unalloyed and Low-Alloyed Steel SAW Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions
SW 803 1Ni1/4Mo AWS/ASME SFA - 5.23 ENi5 EN ISO 14171-A S3Ni1Mo0.2	Nickel (Ni) and Molybdenum (Mo) alloyed solid submerged arc welding wire. Used in welding general structural steels and low alloy high tensile strength steels, used in pressure vessel, boiler, off-shore and heavy steel constructions. Copper coating increases electrical conductivity and resistance against rusting.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Ni	Mo
SW 803 1Ni1/4Mo	0.08	0.20	1.40	0.90	0.25

Welding Flux	Wire and Flux Combination Standards: AWS/ASME SFA - 5.23 / EN ISO 14171-A / TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SF 401	F8A8-ENi5 S 50 6 FB S3Ni1Mo0.2 S 50 6 FB S3Ni1Mo0.2	**C:** 0.06 **Si:** 0.30 **Ni:** 0.70 **Mn:** 1.45 **Mo:** 0.20	As Welded: 520	610	24	-60°C: 50	4.00	K435
			After Heat Treatment (620°C 4 Hour): 530	620	28	-46°C: 70		

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 104 EN ISO 14171 S A AB 1 TS EN ISO 14171 S A AB 1	Alumina-basic type, agglomerated submerged arc welding flux, which is designed for butt and fillet welding and for the single- and multi-pass butt welding of mild, medium and high tensile s teels in shipbuilding and steel constructions. Provides good penetration in one-side-welding and two-side-welding processes. Has a high current carriying capacity and good operating characteristics both on alternative and direct currents. Very easy slag removal in fillet and V-groves. Smooth and clean weld beads blending into base metal. Suitable to use in steel construction, shipbuilding, tank, pressure vessel and boiler production.	   350ºC If required 2 Hour

Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 701	F6A2-EL12 S 38 2 AB S1 S 38 2 AB S1	**C:** 0.05 **Si:** 0.25 **Mn:** 0.85	410	480	30	-30°C: 50 -20°C: 85 0°C: 90	25 kg - Kraft Pack
SW 702	F7A2-EM12 S 42 2 AB S2 S 42 2 AB S2	**C:** 0.05 **Si:** 0.30 **Mn:** 1.10	435	510	28	-30°C: 45 -20°C: 65	
SW 702Si	F7A2-EM12K S 42 2 AB S2Si S 42 2 AB S2Si	**C:** 0.05 **Si:** 0.50 **Mn:** 1.10	425	510	29	-30°C: 40 -20°C: 50 0°C: 80	
SW 703Si	F7A5-EH12K S 46 4 AB S3Si S 46 4 AB S3Si	**C:** 0.06 **Si:** 0.45 **Mn:** 1.55	460	550	28	-40°C: 60 -30C: 75 -20°C: 90	
SW 702Mo	F8A3-EA2 S 46 2 AB S2Mo S 46 2 AB S2Mo	**C:** 0.05 **Si:** 0.40 **Mn:** 1.10 **Mo:** 0.50	480	560	26	-20°C: 50 0°C: 65	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 113 EN ISO 14174 S A MS/CS 1 TS EN ISO 14174 S A MS/CS 1	Agglomerated, manganese-silicate type flux for welding general structural steels and pipe steels. Provides sound welds in steels containing low silicon and manganese. Especially suitable for fillet and groove welds in steel contructions, LPG cylinder, pressure vessel production, spirally welding of pipes. Suitable to use at high welding speeds with single and multi-wires. Possible to use both in alternative and direct currents. Good wetting properties blending into the base metal, very easy slag removal in fillet and V-grooves. Provides flat and nice weld profile without undercut.	   If required 2 Hour

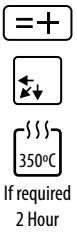
Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 701	F7A2-EL12 S 38 2 MS/CS S1 S 38 2 MS/CS S1	**C:** 0.04 **Si:** 0.45 **Mn:** 1.45	400	500	30	-20°C: 60 0°C: 70	25 kg - Kraft Pack
SW 702	F7A2-EM12 S 42 2 MS/CS S2 S 42 2 MS/CS S2	**C:** 0.04 **Si:** 0.40 **Mn:** 1.80	425	540	30	-20°C: 55 0°C: 65	
SW 702Si	F7A2-EM12K S 42 3 MS/CS S2Si S 42 3 MS/CS S2Si	**C:** 0.04 **Si:** 0.65 **Mn:** 1.90	450	550	30	-20°C: 50 0°C: 60	
SW 702Mo	F8A2-EA2 S 46 2 MS/CS S2Mo S 46 2 MS/CS S2Mo	**C:** 0.04 **Si:** 0.50 **Mn:** 1.65 **Mo:** 0.45	515	590	28	-20°C: 50 0°C: 60	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 124 EN ISO 14174 S A AB 1 TS EN ISO 14174 S A AB 1	Alumina-basic type, agglomerated submerged arc welding flux, which is developed for single- and multi-wire (tandem) welding of butt and fillet joints in shipbuilding, steel constructions, storage tank and machine production. Suitable to use in single and multi pass welding in thick and thin sections. Due to it's metallurgically neutral characteristics, there is low Si and Mn pick-up from flux, it can be safely used in multi-pass applications in thick sections. Has a high current carrying capacity and possible to use both in alternative and direct currents. Provides brigth and very clean weld surface appearence with easy slag removal in fillet joints and narrow V-groves.	   If required 2 Hour

Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 702	F7A4-EM12 S 42 2 AB S2 S 42 2 AB S2	**C:** 0.05 **Si:** 0.20 **Mn:** 1.10	430	490	30	-40°C: 40 -20°C: 70	25 kg - Kraft Pack
SW 702Si	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	**C:** 0.05 **Si:** 0.30 **Mn:** 1.20	435	500	27	-40°C: 50 -30°C: 70 -20°C: 90	
SW 703Si	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	**C:** 0.06 **Si:** 0.45 **Mn:** 1.75	440	550	30	-40°C: 70 -30°C: 90	
SW 702Mo	F8A2-EA2 S 46 2 AB S2Mo S 46 2 AB S2Mo	**C:** 0.07 **Si:** 0.25 **Mn:** 1.25 **Mo:** 0.40	520	610	26	-30°C: 40 -20°C: 55 0°C: 70	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 134 EN ISO 14174 S A AB 1 TS EN ISO 14174 S A AB 1	Alumina-basic type, agglomerated submerged arc welding flux, which is designed for butt and fillet welding and for the single- and multi-pass butt welding of mild, medium and high tensile steels in shipbuilding and steel constructions. Provides smooth and clean weld beads blending into base metal for fine grain structural steels and shipbuilding steels. Has a high current carrying capacity and good operating characteristics both on alternative and direct currents. Used are general structural welding, bridge fabrication, heavy equipment fabrication, and line pipe welding.	 If required 2 Hour

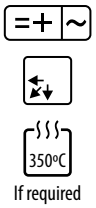
Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 702	F7A4-EM12 S 42 2 AB S2 S 42 2 AB S2	**C:** 0.05 **Si:** 0.45 **Mn:** 1.45	440	530	30	-40°C: 50 -30°C: 90 -20°C: 100	25 kg - Kraft Pack
SW 702Si	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	**C:** 0.05 **Si:** 0.60 **Mn:** 1.60	470	560	29	-40°C: 50 -30°C: 70 -20°C: 90	
SW 703Si	F7A5-EH12K S 46 4 AB S3Si S 46 4 AB S3Si	**C:** 0.07 **Si:** 0.55 **Mn:** 1.90	475	575	30	-50°C: 55 -40°C: 70 -30°C: 100	
SW 702Mo	F8A4-EA2 S 46 3 AB S2Mo S 46 3 AB S2Mo	**C:** 0.05 **Si:** 0.45 **Mn:** 1.50 **Mo:** 0.40	520	640	26	-40°C: 35 -30°C: 55 -20°C: 70	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 204 EN ISO 14174 S A AB 1 TS EN ISO 14174 S A AB 1	Agglomerated semi-basic flux for welding carbon and low alloy steel in single or multipass technique and with single or multi-wire applications. Suitable for use in production of pressure vessel, pipe, boiler, tank, LPG bottles, steel construction and in shipbuilding. The weld metal, produced in combination with corresponding wire electrodes, offers good mechanical properties also at low temperatures. Good slag removal in fillet and groove welds. Possible to use both in alternative and direct currents.	=+ 350°C If required 2 Hour

Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 701	F6A2-EL12 S 35 2 AB S1 S 35 2 AB S1	**C:** 0.03 **Si:** 0.40 **Mn:** 1.30	410	470	30	-30°C: 30 -20°C: 75	25 kg - Kraft Pack
SW 702	F7A2-EM12 S 42 3 AB S2 S 42 3 AB S2	**C:** 0.05 **Si:** 0.40 **Mn:** 1.40	435	510	30	-40°C: 50 -30°C: 70 -20°C: 90	
SW 702Si	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	**C:** 0.06 **Si:** 0.55 **Mn:** 1.35	440	530	29	-40°C: 40 -30°C: 70	
SW 703Si	F7A4-EH12K S 46 3 AB S3Si S 46 3 AB S3Si	**C:** 0.06 **Si:** 0.60 **Mn:** 1.70	510	610	28	-40°C: 60 -30°C: 100 -20°C: 120	
SW 702Mo	F8A4-EA2 S 46 2 AB S2Mo S 46 2 AB S2Mo	**C:** 0.06 **Si:** 0.45 **Mn:** 1.30 **Mo:** 0.40	520	610	28	-40°C: 50 -30°C: 60 -20°C: 90	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 212 EN ISO 14174 S A AR 1 TS EN ISO 14174 S A AR 1	Rutile type, agglomerated submerged arc welding flux, which is designed for welding of at high speeds with excellent bead appearence. Generally used in thin plates in shipbbuilding, pressure vessels, LPG Cylinders, small tanks, boiler, beams, thin walled pipes, tubes and lamp posts. Owing to Mn and Si alloys, make it suitable for carbon steel welding with single or multi-wires, in one and multi passes. Possible to use both in direct and in alternative currents. Slag is generally self releasing and slag removal is very easy in narrow fillet and root passes.	 If required 2 Hour

Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 701	F7AZ-EL12 S 42 A AR S1 S 42 A AR S1	**C:** 0.05 **Si:** 0.65 **Mn:** 1.10	460	530	28	0°C: 30 20°C: 60	25 kg - Kraft Pack
SW 702	F7AZ-EM12 S 42 A AR S2 S 42 A AR S2	**C:** 0.05 **Si:** 0.80 **Mn:** 1.35	480	560	28	0°C: 30 20°C: 70	
SW 702Si	F7AZ-EM12K S 46 A AR S2Si S 46 A AR S2Si	**C:** 0.05 **Si:** 0.80 **Mn:** 1.40	530	610	26	0°C: 55 20°C: 80	
SW 703Si	F8AZ-EH12K S 46 A AR S3Si S 46 A AR S3Si	**C:** 0.05 **Si:** 0.95 **Mn:** 1.70	530	610	26	0°C: 40 20°C: 65	
SW 702Mo	F8AZ- EA2 S 50 A AR S2Mo S 50 A AR S2Mo	**C:** 0.05 **Si:** 0.75 **Mn:** 1.40 **Mo:** 0.45	590	670	26	0°C: 35 20°C: 50	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 304 EN ISO 14174 S A AB 1 TS EN ISO 14174 S A AB 1	Alumina-basic type, agglomerated submerged arc welding flux, developed particularly for spiral and longitudinal welding of pipes. It gives the possibility of high-speed welding in the welding of thin and medium thick pipes by single or multi-wires (tandem/twin). Bead appearence is good. Especially in pipe welding, inner and outher welds are smooth and provide necessary penetration. It has high current carrying capacity and can be used in alternative and direct currents. Provides smooth weld beads, good weld bead appearance with high penetration.	 If required 2 Hour

Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 701	F6A0-EL12 S 38 2 AB S1 S 38 2 AB S1	**C:** 0.05 **Si:** 0.25 **Mn:** 0.90	420	490	30	-30°C: 60 -20°C: 80 0°C: 100	25 kg - Kraft Pack
SW 702	F7A4-EM12 S 42 3 AB S2 S 42 3 AB S2	**C:** 0.05 **Si:** 0.25 **Mn:** 1.25	420	500	29	-40°C: 60 -30°C: 75 -20°C: 110	
SW 702Si	F7A4-EM12K S 42 3 AB S2Si S 42 3 AB S2Si	**C:** 0.06 **Si:** 0.45 **Mn:** 1.40	460	530	28	-40°C: 50 -30°C: 70 -20°C: 90	
SW 703Si	F7A4-EH12K S 46 4 AB S3Si S 46 4 AB S3Si	**C:** 0.06 **Si:** 0.65 **Mn:** 1.75	480	540	28	-40°C: 55 -30°C: 80 -20°C: 120	
SW 702Mo	F8A4-EA2 S 46 3 AB S2Mo S 46 3 AB S2Mo	**C:** 0.05 **Si:** 0.35 **Mn:** 1.40 **Mo:** 0.45	510	570	27	-40°C: 50 -30°C: 60 -20°C: 100	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 401 EN ISO 14174 S A FB 1 TS EN ISO 14174 S A FB 1	Fluoride-basic type, agglomerated submerged arc welding flux with high basicity, it is designed for the welding of high strength fine grained structural steels, cryogenic steels and steels, resistant to ageing. Generally used for the welding of thick sections in the offshore, wind tower, nuclear and pressure vessel industries. Provides very high toughness values at low temperatures, in combination with approved wires. Due to it's high current carrying capacity and good operating characteristics both on alternative and direct currents, possible to use in one side welding and two side welding processes by single or multi-wires (tandem/twin). Owing to it's neutral behaviour, it is advisable to use wire electrodes having higher manganese and silicon content in tandem and multi wire applications. Has high penetration, smooth weld beads with high X-ray quality.	=+ 350°C If required 2 Hour

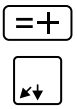
Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 702Si	F7A6-EM12K S 42 5 FB S2Si S 42 5 FB S2Si	**C:** 0.06 **Si:** 0.30 **Mn:** 1.15	425	520	30	-50°C: 70 -40°C: 90 -30°C: 110	25 kg - Kraft Pack
SW 703Si	F7A8-EH12K S 46 5 FB S3Si S 46 5 FB S3Si	**C:** 0.07 **Si:** 0.30 **Mn:** 1.60	480	530	28	-50°C: 80 -40°C: 100 -30°C: 120	
SW 702Mo	F8A5-EA2 S 46 4 FB S2Mo S 46 4 FB S2Mo	**C:** 0.07 **Si:** 0.20 **Mn:** 1.40 **Mo:** 0.40	500	570	28	-46°C: 50 -40°C: 70 -30°C: 90	
SW 803 1Ni1/4Mo	F8A8-ENi5 / F8P6-ENi5 S 50 6 FB S3Ni1Mo0.2 S 50 6 FB S3Ni1Mo0.2	**C:** 0.06 **Si:** 0.30 **Ni:** 0.70 **Mn:** 1.45 **Mo:** 0.20	520	610	24	-60°C: 50 -50°C: 90	

Unalloyed and Low-Alloyed Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SF 414 EN ISO 14174 S A AB 1 TS EN ISO 14174 S A AB 1	Alumina- basic type, agglomerated submerged arc welding flux, which is designed for single or multi pass welding of butt and fillet joints in high strength steels. Especially designed for thick section welding in steel construction, wind tower, boiler and pressure vessel production. Provides high toughness values down to -50°C. Due to it's high current carrying capacity and good operating characteristics both on alternative and direct currents, possible to use in one side welding and two side welding processes by single or multi-wires (tandem/twin). Has high penetration and smooth weld beads with easy slag removal in fillet and V-groves.	   If required 2 Hour

Welding Wire	Wire and Flux Combination Standards AWS/ASME SFA - 5.17 / 5.23 EN ISO 14171-A TS EN ISO 14171A	Typical Chemical Analysis of All-Weld Metal (%)	Typical Mechanical Properties of All-Weld Metal Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
SW 702	F7A6-EM12 S 38 5 AB S2 S 38 5 AB S2	**C:** 0.06 **Si:** 0.25 **Mn:** 1.40	410	510	30	-50°C: 65 -40°C: 100 -20°C: 120	25 kg - Kraft Pack
SW 702Si	F7A6-EM12K / F7P6-EM12K S 42 5 AB S2Si S 42 5 AB S2Si	**C:** 0.07 **Si:** 0.35 **Mn:** 1.45	420	520	30	-50°C: 70 -40°C: 110 -20°C: 140	
SW 703Si	F7A8-EH12K S 46 5 AB S3Si S 46 5 AB S3Si	**C:** 0.06 **Si:** 0.35 **Mn:** 1.65	470	560	30	-60°C: 50 -50°C: 75 -40°C: 120	
SW 702Mo	F8A5-EA2 S 46 4 AB S2Mo S 46 4 AB S2Mo	**C:** 0.08 **Si:** 0.25 **Mn:** 1.30 **Mo:** 0.40	510	590	28	-40°C: 70 -30°C: 80 -20°C: 130	

Stainless Steel SAW Wires

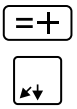
Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SI 307 **AWS/ASME SFA-5.9** ~**ER307** **EN ISO 14343-A** **S 18 8 Mn** **TS EN ISO 14343-A** **S 18 8 Mn** DIN M. No. 1.4370	Austenitic stainless steel welding wire for submerged arc welding of dissimilar steels, difficult to weld steels, armour plates, high manganese steels, rails, crossovers. Suitable also for depositing stress relieving buffer layers on crack sensitive base metals and hardsurfacing, e.g. crane wheels, cutting blades and dies where high degree of pressure and dynamical loads exists. Weld metal is resistant to operating temperatures up to 300°C and non-scalling up to 850°C and also highly corrosion resistant. Used in combination with SIF 501 and SIF 502 submerged arc welding fluxes. Depending on chemical composition of base metal, proper welding procedure, preheating and interpass temperatures shall be applied by also avoiding high admixture of base metal.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Cr	Ni
SI 307	0.02	0.90	5.00	19.00	8.00

Welding Wire	Typical Chemical Analysis of All-Weld Metal (%)		Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SIF 501	**C:** 0.04	**Cr:** 18.50	410	600	42	-60°C: 50 20°C: 70	2.40 3.20	25 kg - K435
	Si: 0.85	**Ni:** 7.00						
	Mn: 5.50							
SIF 502	**C:** 0.04	**Cr:** 18.50	420	610	40	-60°C: 45 20°C: 60		
	Si: 0.90	**Ni:** 8.00						
	Mn: 5.00							

Stainless Steel SAW Wires

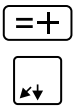
Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SI 308L **AWS/ASME SFA-5.9** **ER308L** **EN ISO 14343-A** **S 19 9 L** **TS EN ISO 14343-A** **S 19 9 L** DIN M. No. 1.4316	Austenitic stainless steel welding wire for submerged arc welding of unstabilized or stabilized corrosion resisting Cr-Ni steels tanks, pipes and equipments, used in food, beverage and pharmaceutical industries. Used in combination with SIF 501 and SIF 502 submerged arc welding fluxes. Weld metal is resistant to intergranular corrosion up to 350°C. Non-scaling up to 800°C, in air or oxidizing combustion gases.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Cr	Ni
SI 308L	0.02	0.40	1.80	20.00	9.50

Welding Wire	Typical Chemical Analysis of All-Weld Metal (%)		Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SIF 501	**C:** 0.02	**Cr:** 18.00	380	530	38	-196°C: 50 -60°C: 70 20°C: 90	2.40 3.20	25 kg - K435
	Si: 0.35	**Ni:** 9.00						
	Mn: 1.60							
SIF 502	**C:** 0.02	**Cr:** 20.00	390	565	36	-196°C: 50 -60°C: 60 20°C: 80		
	Si: 0.65	**Ni:** 9.50						
	Mn: 1.00							

Stainless Steel SAW Wires

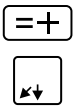
Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SI 309L **AWS/ASME SFA-5.9** **ER309L** **EN ISO 14343-A** **S 23 12 L** **TS EN ISO 14343-A** **S 23 12 L** DIN M. No. 1.4332	Austenitic-ferritic wire electrode for submerged arc welding of stainless steels to unalloyed or low-alloyed steels, subjected to operating temperatures up to 300°C. Used in combination with SIF 501 and SIF 502 submerged arc welding fluxes. Low carbon content increases resistance to intergranular corrosion. Suitable to use also for buffer layer on carbon steel before welding with 308 and 308L to reach 304 and 304L surface layer.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Cr	Ni
SI 309L	0.02	0.40	1.80	24.50	13.50

Welding Flux	Typical Chemical Analysis of All-Weld Metal (%)		Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SIF 501	**C:** 0.02	**Cr:** 20.00	410	560	35	-196°C: 40 -60°C: 60 20°C: 80	2.40 3.20	25 kg - K435
	Si: 0.40	**Ni:** 11.00						
	Mn: 1.75							
SIF 502	**C:** 0.02	**Cr:** 20.50	410	560	34	-196°C: 30 -60°C: 40 20°C: 70		
	Si: 0.75	**Ni:** 11.50						
	Mn: 1.45							

Stainless Steel SAW Wires

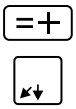
Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SI 316L **AWS/ASME SFA-5.9** **ER316L** **EN ISO 14343-A** **S 19 12 3 L** **TS EN ISO 14343-A** **S 19 12 3 L** DIN M. No. 1.4430	Austenitic stainless steel welding wire for submerged arc welding of unstabilized or stabilized high corrosion resisting Cr-Ni-Mo stainless steels. Used in combination with SIF 501 and SIF 502 submerged arc welding fluxes. Due to it's low carbon content, resistant to intergranular corrosion up to 400°C. Especially used in welding tanks, pipes and equipments which are used in chemical, petrochemical, paint, paper and shipbuilding industries, etc.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Cr	Ni	Mo
SI 316L	0.02	0.40	1.80	18.50	12.00	2.70

Welding Flux	Typical Chemical Analysis of All-Weld Metal (%)		Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SIF 501	**C:** 0.02	**Cr:** 18.00	420	570	38	-196°C: 45 -60°C: 55 20°C: 75	2.40 3.20	25 kg - K435
	Si: 0.35	**Ni:** 10.00						
	Mn: 1.65	**Mo:** 2.50						
SIF 502	**C:** 0.02	**Cr:** 19.00	400	570	34	-196°C: 45 -60°C: 55 20°C: 70		
	Si: 0.70	**Ni:** 11.00						
	Mn: 1.25	**Mo:** 2.70						

Stainless Steel SAW Wires

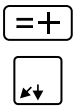
Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SI 347 **AWS/ASME SFA-5.9** **ER347** **EN ISO 14343-A** **S 19 9 Nb** **TS EN ISO 14343-A** **S 19 9 Nb** DIN M. No. 1.4551	Stabilized austenitic stainless steel welding wire for submerged arc welding of unstabilized and stabilized corrosion resisting Cr-Ni steels. Used in combination with SIF 501 and SIF 502 submerged arc welding fluxes. Generally used for welding pipes, tanks and equipments in food, beverage, chemical and pharmaceutical industries. Stabilized with Cb (Nb) and resistant to intergranular corrosion. Weld metal is suitable for operating temperatures of up to 400°C, non-scaling up to 800°C, in air and oxidizing combustion gases.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Cr	Ni	Nb
SI 347	0.04	0.40	1.40	19.50	9.50	0.60

Welding Flux	Typical Chemical Analysis of All-Weld Metal (%)		Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SIF 501	**C:** 0.04	**Cr:** 19.00	460	610	32	-196°C: 45 -60°C: 75 20°C: 90	3.20	25 kg - K435
	Si: 0.35	**Ni:** 8.50						
	Mn: 1.50	**Nb:** 0.30						
SIF 502	**C:** 0.04	**Cr:** 19.50	430	610	26	-196°C: 35 -60°C: 55 20°C: 70		
	Si: 0.65	**Ni:** 9.00						
	Mn: 0.95	**Nb:** 0.35						

Stainless Steel SAW Wires

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SI 2209 **AWS/ASME SFA-5.9** ER2209 **EN ISO 14343-A** S 22 9 3 N L **TS EN ISO 14343-A** S 22 9 3 N L DIN M. No. ~1.4462	Dublex (ferritic-austenitic) stainless steel wire electrode for submerged arc welding of dublex Cr-Ni-Mo stainless steels. Used in combination with SIF 501 and SIF 502 submerged arc welding fluxes. Especially used in welding of acid tanks and pipes, in chemical, petrochemical, paper, shipbuilding and desalination industries. Suitable also for dissimilar welding of dublex stainless steels to carbon steels. High-strength and ductile weld metal exhibits good resistance to pitting, crevice corrosion and stress corrosion cracking in chloride-bearing media.	

Typical Chemical Analysis of Welding Wire (%)

	C	Si	Mn	Cr	Ni	Mo	N
SI 2209	0.02	0.60	1.60	22.50	8.50	3.00	0.15

Welding Flux	Typical Chemical Analysis of All-Weld Metal (%)			Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Diameter and Packing Info. of Welding Wire: Diameter (mm)	Packing Weigth (kg) Packing Type
SIF 501	**C:** 0.02	**Cr:** 22.00	**N:** 0.10	600	770	31	-60°C: 55 20°C: 80	3.20	25 kg - K435
	Si: 0.45	**Ni:** 8.00							
	Mn: 1.70	**Mo:** 2.50							
SIF 502	**C:** 0.02	**Cr:** 22.50	**N:** 0.12	590	760	28	-60°C: 35 20°C: 55		
	Si: 0.75	**Ni:** 8.50							
	Mn: 1.10	**Mo:** 2.50							

Stainless Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SIF 501 **EN ISO 14174** **S A FB 2 DC** **TS EN ISO 14174** **S A FB 2 DC**	Florite-basic type, agglomerated submerged arc welding flux, which is designed for butt and fillet welding stainless steel and corrosion resistance steels. It is also suitable to use in surfacing of stainless steels and unalloyed steels with stainless steel welding wire. Especially used for welding stainless steel storage tanks in chemical tankers, cryogenic tanks and pressure vessels. Provides good welding characteristics and easy slag removal even on medium and thick section welding. Weld bead is very smooth and pore free. Slag is generally self releasing.	   If required 2 Hour

Welding Wire	Typical Chemical Analysis of All-Weld Metal (%)			Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux: Packing Weigth (kg) Packing Type
SI 307	**C:** 0.04	**Cr:** 18.50		410	600	42	-60°C: 50 20°C: 70	25 kg - Kraft Pack
	Si: 0.85	**Ni:** 7.00						
	Mn: 5.50							
SI 308L	**C:** 0.02	**Cr:** 18.00		380	530	38	-196°C: 50 -60°C: 70 20°C: 90	
	Si: 0.35	**Ni:** 9.00						
	Mn: 1.60							
SI 309L	**C:** 0.02	**Cr:** 20.00		410	560	35	-196°C: 40 -60°C: 60 20°C: 80	
	Si: 0.40	**Ni:** 11.00						
	Mn: 1.75							
SI 316L	**C:** 0.02	**Cr:** 18.00		420	570	38	-196°C: 45 -60°C: 55 20°C: 75	
	Si: 0.35	**Ni:** 10.00						
	Mn: 1.65	**Mo:** 2.50						
SI 347	**C:** 0.04	**Cr:** 19.00		460	610	32	-196°C: 45 -60°C: 75 20°C: 90	
	Si: 0.35	**Ni:** 8.50						
	Mn: 1.50	**Nb:** 0.30						
SI 2209	**C:** 0.02	**Cr:** 22.00		600	770	31	-60°C: 55 20°C: 80	
	Si: 0.45	**Ni:** 8.00						
	Mn: 1.70	**Mo:** 2.50	**N:** 0.10					

Stainless Steel SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SIF 502 **EN ISO 14174** S A CS 2 Cr DC **TS EN ISO 14174** S A CS 2 Cr DC	Calcium-silicate type, agglomerated submerged arc welding flux, which is designed for butt and fillet welding stainless steel and corrosion resistance steels. It is also suitable to use in surfacing of stainless steels and unalloyed steels with stainless steel welding wire. Cr alloy content of the flux prevents Cr loss in stainless steel weld bead during welding. Provides good welding characteristics and easy slag removal even on thin section welding.	   If required 2 Hour

Welding Wire	Typical Chemical Analysis of All-Weld Metal (%)			Typical Mechanical Properties of All-Weld Metal: Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO-V (J)	Packing Information of Welding Flux: Packing Weigth (kg) Packing Type
SI 307	**C:** 0.04	**Cr:** 19.00		420	610	40	-60°C: 45 20°C: 60	25 kg - Kraft Pack
	Si: 0.90	**Ni:** 8.00						
	Mn: 5.00							
SI 308L	**C:** 0.02	**Cr:** 20.00		390	565	36	-196°C: 45 -60°C: 60 20°C: 80	
	Si: 0.65	**Ni:** 9.50						
	Mn: 1.00							
SI 309L	**C:** 0.02	**Cr:** 20.50		410	560	34	-196°C: 30 -60°C: 40 20°C: 70	
	Si: 0.75	**Ni:** 11.50						
	Mn: 1.45							
SI 316L	**C:** 0.02	**Cr:** 19.00		400	570	34	-196°C: 45 -60°C: 55 20°C: 70	
	Si: 0.70	**Ni:** 11.00						
	Mn: 1.25	**Mo:** 2.70						
SI 347	**C:** 0.04	**Cr:** 19.50		430	610	26	-196°C: 35 -60°C: 55 20°C: 70	
	Si: 0.65	**Ni:** 9.00						
	Mn: 0.95	**Nb:** 0.35						
SI 2209	**C:** 0.02	**Cr:** 22.50		590	760	28	-60°C: 35 20°C: 55	
	Si: 0.75	**Ni:** 9.00						
	Mn: 1.10	**Mo:** 2.50	**N:** 0.12					

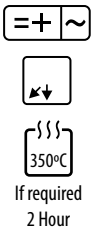
Hardfacing SAW Fluxes

SHF 325

EN ISO 14174 S A CS 3
TS EN ISO 14174 S A CS 3

Alloyed and agglomerated flux, which is designed for submerged arc hardfacing of parts subjected to metal to metal friction wear, moderate impart and low stress mineral abrasion. Provides weld metal with 225-300 HB hardness, when used with SW 702 wire electrode. Possible to use in direct current. Hardness and transfer of alloying elements to the weld metal depens on welding parameters used. For instance, optimum welding parameters for 4.00 mm wire electrode are about 600 A, 32 V, 50 cm/min. welding speed. Gives very smooth and clean weld bead surfaces, slag removal is very easy and generally slag is self releasing.

Typical Applications: Suitable for hardfacing of machine gear parts, rails, supports rolls of caterpillars, pulleys, locomotive wheels, table and support rolls in iron and steel industry.



If required
2 Hour

SHF 333

EN ISO 14174 S A FB 3
TS EN ISO 14174 S A FB 3

Alloyed and agglomerated flux, which is designed for submerged arc hardfacing of parts subjected to metal to metal friction wear, moderate impart and low stress mineral abrasion. Provides weld metal with 300-350 HB hardness, when used with SW 702 wire electrode. Possible to use in direct current. Hardness and transfer of alloying elements to the weld metal depens on welding parameters used. Gives very smooth and clean weld bead surfaces, slag removal is very easy and generally slag is self releasing.

Typical Applications: Hardfacing of track rollers, idlers, couplings, piston rod ends, earth moving equipment, rolls, mills, etc. the alloying effect to the flux depends, to a large degree, on the weld parameters chosen.

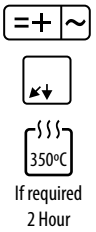
If required
2 Hour

SHF 335

EN ISO 14174 S A CS 3
TS EN ISO 14174 S A CS 3

Alloyed and agglomerated flux, which is designed for submerged arc hardfacing of parts subjected to metal to metal friction wear, moderate impart and low stress mineral abrasion. Provides weld metal with 325-400 HB hardness, when used with SW 702 wire electrode. Possible to use in direct current. Hardness and transfer of alloying elements to the weld metal depens on welding parameters used. Gives very smooth and clean weld bead surfaces, slag removal is very easy and generally slag is self releasing. For example; optimum welding parameters for wire with a diameter of 4mm 600A, 32 V and welding speed 50 cm/min.

Typical Applications: Hardfacing of pinch rollers, table rolls, idlers, couplings, piston rod ends.



If required
2 Hour

SHF 345

EN ISO 14174 S A CS 3
TS EN ISO 14174 S A CS 3

Alloyed and agglomerated flux, which is designed for submerged arc hardfacing of parts subjected to metal to metal friction wear, moderate impart and low stress mineral abrasion. Provides weld metal with 400-475 HB hardness, when used with SW 702 wire electrode. Possible to use in direct current. Hardness and transfer of alloying elements to the weld metal depens on welding parameters used. Gives very smooth and clean weld bead surfaces, slag removal is very easy and generally slag is self releasing. For example; optimum welding parameters for wire with a diameter of 4mm 600A, 32 V and wleding speed 50 cm/min.

Typical Applications: Hardfacing of pinchrolls, sinter crushers etc.

If required
2 Hour

Typical Mechanical Properties of All-Weld Metal (%)	Welding Wire	Hardness	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
C: 0.15			
Si: 0.60			
Mn: 1.50	**SW 702**	225-300 HB 20-32 HRc	25 kg - Kraft Pack
Cr: 1.00			
Mo: 0.25			
C: 0.15			
Si: 1.00			
Mn: 1.30	**SW 702**	300-350 HB 32-35 HRc	25 kg - Kraft Pack
Cr: 2.50			
Mo: 0.45			
C: 0.20			
Si: 0.65			
Mn: 1.50	**SW 702**	325-400 HB 33-40 HRc	25 kg - Kraft Pack
Cr: 2.00			
Mo: 0.45			
C: 0.25			
Si: 0.70			
Mn: 1.70	**SW 702**	400-475 HB 43-49 HRc	25 kg - Kraft Pack
Cr: 3.25			
Mo: 0.40			

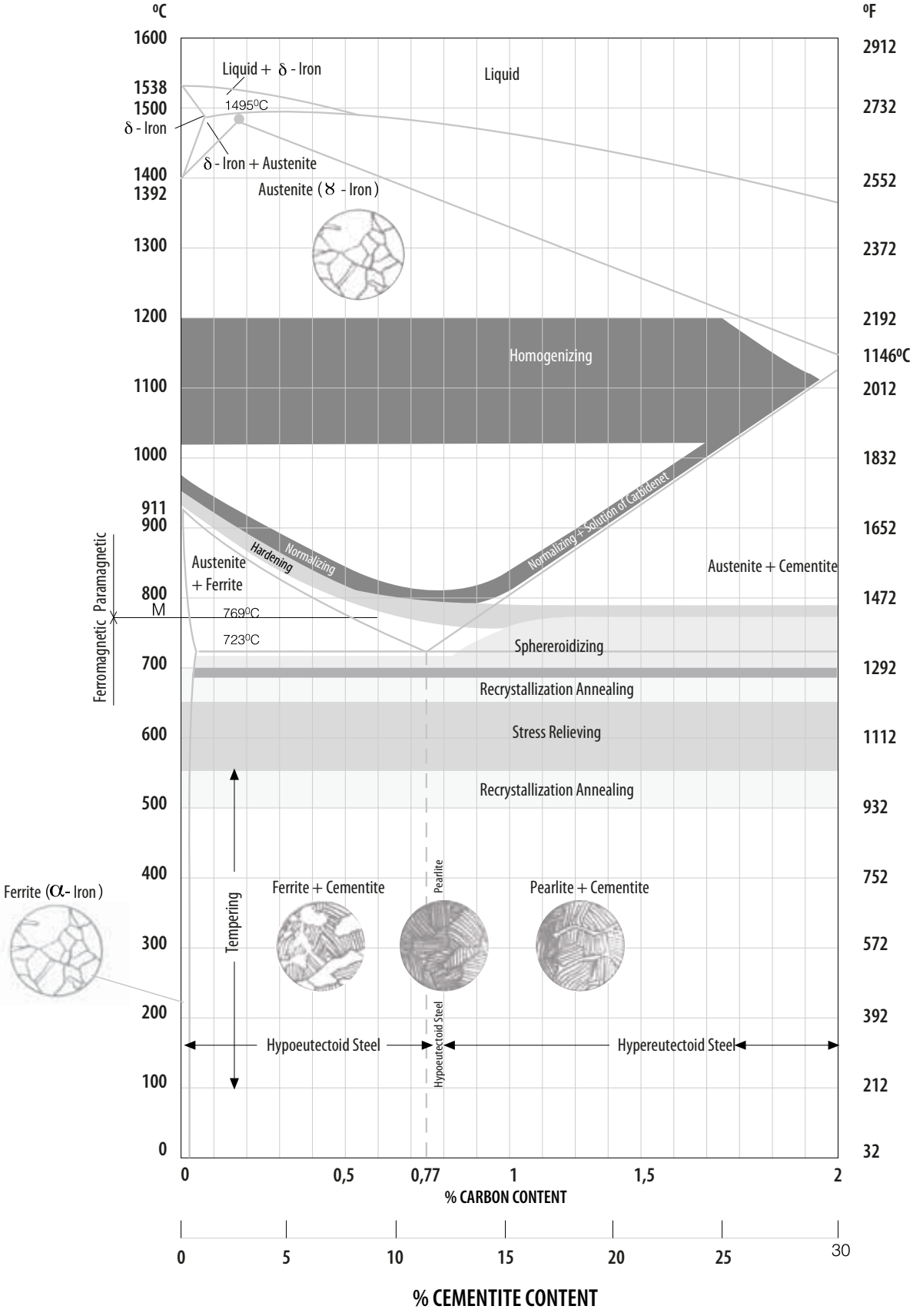
Hardfacing SAW Fluxes

Product Name and Standards	Applications and Properties	Polarity Welding Positions Re-drying Information
SHF 604 **EN ISO 14174** S A AB 1 **TS EN ISO 14174** S A AB 1	Agglomerated and unalloyed (neutral) submerged arc welding flux used for hardfacing purposes. Suitable for hardfacing of continuous casting rolls, table rolls, pinch rolls, drums, wheels and rails in combination with specially designed hardfacing flux cored wires. Possible to use both in alternative and direct currents in stringer bead and ossillation technique. Provides smooth weld bead without porosity and has a very easy slag removal. **Typical Applications:** Hardfacing of continuous casting and pinch rollers, table rools,idlers, crane and train wheels, rails and drums.	   If required 2 Hour

Welding Wire	Typical Chemical Analysis of All-Weld Metal (%)			Hardness	Packing Information of Welding Flux Packing Weigth (kg) Packing Type
FCS 335	**C:** 0.09	**Cr:** 2.90		350 HB	25 kg - Kraft Pack
	Si: 0.50	**Mo:** 0.50			
	Mn: 1.50	**Fe:** 94.51			
FCS 345	**C:** 0.20	**Cr:** 3.60		450 HB	
	Si: 0.70	**Mo:** 0.60			
	Mn: 1.75	**Fe:** 93.15			
FCS 355	**C:** 0.30	**Cr:** 3.80		55 HRc	
	Si: 0.90	**Fe:** 94.05			
	Mn: 0.95				
FCS 356	**C:** 0.45	**Cr:** 5.80	**Fe:** 88.90	55 HRc	
	Si: 0.40	**Mo:** 1.60			
	Mn: 1.25	**W:** 1.60			
FCS 415	**C:** 0.08	**Cr:** 13.00	**Nr:** 0.20	42 HRc	
	Si: 0.70	**Ni:** 2.70	**V:** 0.25		
	Mn: 1.00	**Mo:** 1.00			
FCS 417	**C:** 0.12	**Cr:** 13.00	**Nb:** 0.25	47 HRc	
	Si: 0.80	**Ni:** 3.00	**V:** 0.25		
	Mn: 1.10	**Mo:** 1.00			
FCS 420	**C:** 0.20	**Cr:** 13.00		50 HRc	
	Si: 0.70	**Ni:** 0.30			
	Mn: 1.40	**Nb:** 0.30			
FCS 421	**C:** 0.25	**Cr:** 13.00		53 HRc	
	Si: 0.80	**Ni:** 0.35			
	Mn: 1.30	**Nb:** 0.30			
FCS 423	**C:** 0.24	**Cr:** 12.50	**Nb:** 0.30	51 HRc	
	Si: 0.70	**Ni:** 3.00			
	Mn: 0.50	**V:** 0.30			
FCS 430	**C:** 0.03	**Cr:** 17.00		200 HB	
	Si: 0.70				
	Mn: 1.30				

APPENDIX

IRON-CARBON PHASE DIAGRAM- STEEL SECTION



ANNEALING COLORS

- Yellowish White
- Light Yellow
- Yellow
- Light Yellowish Red
- Reddish Yellow
- Very Reddish Yellow
- Light Red
- Light Cherry Red
- Cherry Red
- Dark Cherry Red
- Dark Red
- Brown Red
- Dark Brown

TEMPER COLORS

- Grey
- Bluish Grey
- Light Blue
- Dark Blue
- Violet
- Red
- Yellowish Brown
- Strow Yellow
- Very Pole Yellow

PROPERTIES OF SOME IMPORTANT METALS

Alloy	Density (gr/cm3)	Melting Point (˚C)	Tensil Strength (N/mm2)
Steel	7.7 - 7.85	1450 - 1520	340 - 1800
Grey Cast Iron	7.1 - 7.3	1150 - 1250	150 - 400
Austenitic Stainless Steels	7.8 - 7.9	1440 - 1460	600 - 800
Mg - Alloys	1.8 - 1.83	590 - 650	180 - 300
Al - Alloys	2.6 - 2.85	570 - 655	100 - 400
Zn - Alloys	5.7 - 7.2	380 - 420	140 - 300
Brass	8.25	900 - 950	250 - 600
Bronze	8.56 - 8.9	880 - 1040	200 - 300

EFFECTS OF ALLOY ELEMENTS ON THE PROPERTIES OF STEELS

Alloying Elements	Si	Mn*	Mn**	Cr	Ni*	Ni**	Al	W	V	Co	Mo	S	P
Hardness		↑	↓↓↓	↑↑	↑	↓↓	–	↑	↑	↑	↑	–	↑
Strength	↑	↑	↑	↑↑	↑	↑	–	↑	↑	↑	↑	–	↑
Yield Point	↑↑	↑	↓	↑↑	↑	↓	–	↑	↑	↑	↑	–	↑
Elongation	↓	~	↓↓↓	↓	~	↑↑↑	–	↓	~	↓	↓	↓	↓
Cross Section	~	~	~	↓	~	↑↑	↓	↓	~	↓	↓	↓	↓
Impact Resistance	↓	~	–	↓	~	↑↑↑	↓	–	↑	↓	↑	↓	↓↓↓
Elasticity	↑↑↑	↑	–	↑	–	–	–	–	↑	–	–	–	–
High Temperature Resist.	↑	~	–	↑	↑	↑↑↑	–	↑↑↑	↑↑	↑↑	↑↑	–	–
Cooling Speed	↓	↓	↓↓	↓↓↓	↓↓	↓↓	–	↓↓	↓	↑↑	↓↓	–	–
Carbide Formation	↓	~	–	↑↑	–	–	–	↑↑	↑↑↑↑	–	↑↑↑	–	–
Wear Resistance	↓↓↓	↓↓	–	↑	↓↓	–	–	↑↑↑	↑↑	↑↑↑	↑↑	–	–
Forging Property	↓	↑	↓↓↓	↓	↓	↓↓↓	↓↓	↓↓	↑	↓	↓	↓↓↓	↓↓↓
Machinability	↓	↓	↓↓↓	–	↓	↓↓↓	–	↓↓	–	~	↑	↑↑↑	↓↓↓
Oxidizing Tendency	↓	~	↓↓	↓↓↓	↓	↓↓	↓↓	↓↓	↓	↓	↑↑	–	↓↓
Corrosion Resistance	–	–	–	↑↑↑	–	↑↑	–	–	↑	–	–	↓	↑↑

* Perlitic Steels
** Austenitic Steels

↑ Increase ↓ Decrease ~ No Change – Not Impontant or Not Known

The preheating temperature and interpass temperatures are important to prevent underbead cracking, hydrogen cracking, porosity, distortion, high hardness in HAZ, weld metal cracking, spalling, or stress failure of the part. Preheating temperature can be calculated by the carbon equivalent, Ceq, of the base metal.

Ceq for low alloy steels with alloy contect :

$C \leq \%0.5$; $Mn \leq \%1.0$; $Cr \leq \%1.0$; $Ni \leq \%3.5$; $Mo \leq \%0.6$; $Cu \leq \%1.0$
$Ceq = \%C + \%Mn/6 + (\%Cr + \%Mo + \%V)/5 + (\%Ni + \%Cu)/15$

Minimum Preheating Temperature (ºC) = $Ceq \times 200 + 20$

Preheating temperature can also be calculated by using below equation, which also take into account the thickness of the base metal :

Preheating Temperature (ºC) = $\sqrt{350 \times Ceq \times (1 + 0{,}005 \times d)} - 0{,}25$

Carbon Equivalent (Ceq)	Preheating Temperature Range (˚C)
Ceq ≤ 0.45	No need under normal conditions
0.46 ≤ Ceq ≤ 0.60	100 - 200
Ceq ≥ 0.60	200 - 350

It is essential that this temperature is obtained and maintained during the welding operation.
Manganese steels, on the other hand, becomes brittle if overheated above 260ºC. Interpass temperatures shall be kept below 260ºC during welding. As the temperature of the workpiece increase, it has to be let cool down before applying futher hardfacing passes. On small parts, high localized heating shall be avoided by using a skip welding technique. Cast irons are extremely crack sensitive. The heat affected zone may be full of cracks even with high preheat temperatures.

Interpass Temperature is the temperature of the surface when welding all layers except first layer. It is just as important and should usually be as the preheat temperature.

Cooling Rate after welding affects wear resistance of some deposits, it is much more important for the control of spalling, cracking and distortion. Therefore a slow cooling rate may be required even if it reduces wear resistance.

Methods of controlling cooling rate include the following:

1.Preheating is the most effective way of slowing the cooling rate.
2.Heat input from welding slows cooling by the raising the temperature of the part.
3.Insulating the hot part immediately after welding with dry sand, lime, glass fibre blanket, etc. slows cooling. This method helps minimize residual cooling stresses, weld cracking and distortion but does not affect wear resistance of most deposits. Large parts pull heat away from the weld more quickly than small parts and they naturally cool the weld faster.

Ceq	Electrode Diameter (mm)	Butt Weld				Filled Weld			
		6	12	25	50	6	12	25	50
0.35	3.25	*	*	*	*	*	*	*	100
	4.00	*	*	*	*	*	*	*	*
	5.00	*	*	*	*	*	*	*	*
0.40	3.25	*	*	*	150	*	*	100	200
	4.00	*	*	*	*	*	*	*	150
	5.00	*	*	*	*	*	*	*	100
0.45	3.25	*	*	150	250	*	100	250	300
	4.00	*	*	100	200	*	*	200	250
	5.00	*	*	*	150	*	*	100	200
0.50	3.25	*	*	250	350	*	150	350	(450)
	4.00	*	*	150	300	*	100	250	400
	5.00	*	*	100	200	*	*	200	350
0.55	3.25	*	150	400	(550)	100	300	(500)	**
	4.00	*	*	300	(450)	*	200	(450)	**
	5.00	*	*	150	350	*	100	350	(600)
0.60	3.25	150	400	**	**	350	**	**	**
	4.00	100	250	**	**	250	(600)	**	**
	5.00	*	100	(500)	(600)	150	300	(600)	**
0.65	3.25	300	**	**	**	**	**	**	**
	4.00	200	350	**	**	**	**	**	**
	5.00	*	150	(600)	**	200	(600)	**	**
0.70	3.25	400	**	**	**	**	**	**	**
	4.00	300	500	**	**	**	**	**	**
	5.00	200	400	**	**	400	(600)	**	**
0.75	5.00	400	500	**	**	(600)	**	**	**

* Preheating is not necessary.
** Necessary preheating temperatures for practical applications is too high.
Preheating Temperature (˚C): Carbon Equivalent (Ceq), depends on material thickness and electrode diameter.

Formulation to calculate the preheating temperature are generally applied to steel which are not post weld heat treated. Those formulation are taking in consideration, the chemical analysis (C, Mn, Cr, Ni, . . .), the thickness of the plate, the heat input, the type of coating, the type of the weldment.

The target is to remain with a ferric structure, to avoid cold crack, due to a martensitic structure saturated of hydrogen generally located in in the heat affected zone. Hardness is generally limited at ~220HB.

For some steel, like ASTM A387 or similar, which require a PWHT at ~680°C preheating temperature, maximum interpass temperature, as well as heating and cooling conditions are generally specified in the engineering specifications. The aim is to have temper martensite after the PWHT. A too high interpass temperature will promote ferrite instead of martensite, and after the final PWHT the weldment will not reach the requested mechanical properties.

In hardfacing, martensitic steel are used when deposit requirement is requested hardness, this requirement is mainly controlled by C and Cr content to reach the level is requested. Because of the quantities of carbide formers is present in the overlay, the majority of C is kept by carbide formation, and the usual formulation to calculate the preheat temperature is no more appropriated.

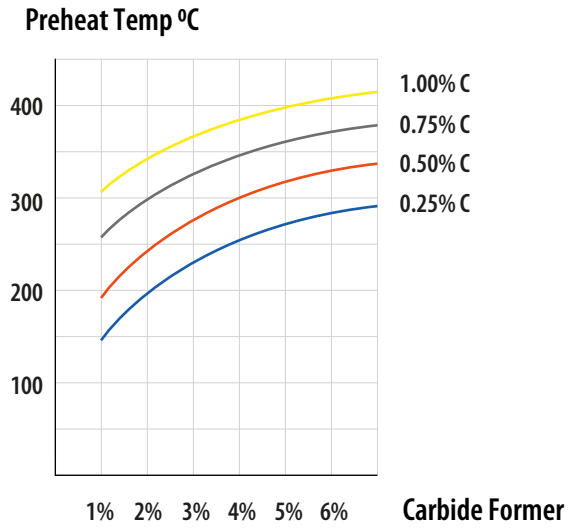


Fig. 1 / Practical Preheating Temperature ºC

Practical preheating temperature are giving by table 1. After welding, the deposit will be followed directly by a post heating at least 300°C during 2-3 H to reduce the hydrogen content. Cooling will be very slow from post heating temperature up to 150°C. The purpose of the slow cooling is to favorize the diffusion of hydrogen, uniformization of the temperature before starting the martensite formation when crossing the Ms point. Soaking time at preheating temperature need to be high enough to have a uniform temperature through the full toughness of the piece.

The best is using the dilatometic curve of the deposit. When overlay is deposited below Ms temp, differential tempering are created in the area of the fusion line of subsequent bead, creating an uneven surface characteristic, thus corrugated surface can appear during machining or during service because of hardness and difference wear resistance

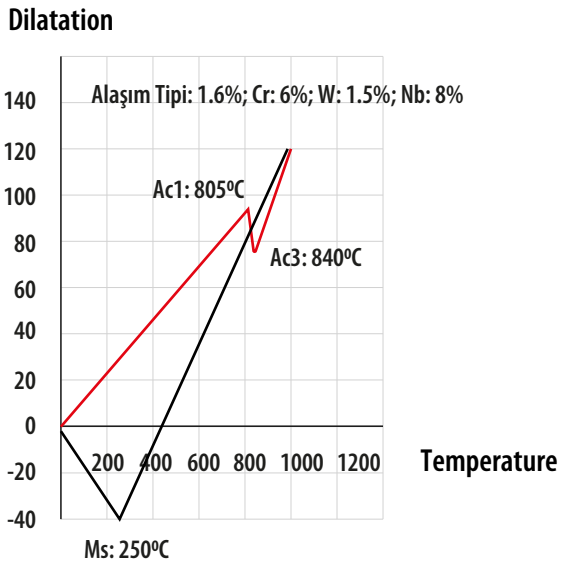


Fig. 2 / Dilatometric Curve

CARBON EQUIVALENT (CE) AND PRE-HEATING TEMPERATURE

The table shows the recommended preheating temperatures for a number of different metals wich willl be hardfaced with given filler metals.

Base Metal / Filler Metal	Plate Thickness (mm)	Steel C_{eq} < 0,3 <180 HB (ºC)	Low Alloy C_{eq} < 0,3 - 0,6 200-300 HB (ºC)	Tool Steel C_{eq} < 0,6 - 0,8 300-400 HB (ºC)	Chromium Steel Cr: 5-12 % 300-500 HB (ºC)	Chromium Steel Cr > 12 % 200-300 HB (ºC)	Stainless Steel 18/8 Cr/Ni approx. 200 HB (ºC)	Manganese Steel %14 mn 250-500 HB (ºC)
Low Alloy 200-300 HB	t ≤ 20	-	100	150	150	100	-	-
	20 < t ≤ 60	-	150	200	250	200	-	-
	t > 60	100	180	250	300	200	-	-
Tool Steel 300-450 HB	t≤20	-	100	180	200	100	-	-
	20 < t ≤ 60	-	125	250	250	200	-	A
	t > 60	125	180	300	350	250	-	A
12 % Cr Steel 300-500 HB	t ≤ 20	-	150	200	200	150	-	X
	20 < t ≤ 60	100	200	275	300	200	150	X
	t > 60	200	150	350	376	250	200	X
Stainless Steel 18/8 Cr/Ni 200 HB	t ≤ 20	-	-	-	-	-	-	-
	20 < t ≤ 60	-	100	125	150	200	-	-
	t > 60	-	150	200	250	200	100	-
14 % Mn Steel 200 HB	t ≤ 20	-	-	-	X	X	-	-
	20 < t ≤ 60	-	-	B-100	X	X	-	-
	t > 60	-	-	B-100	X	X	-	-
Co-Based Type 6 40 HRc	t ≤ 20	100	200	250	200	200	100	X
	20 < t ≤ 60	300	400	B-450	400	350	400	X
	t > 60	400	400	B-500	B-500	400	400	X
Carbide Type 1* 55 HRc	t ≤ 20	-	A	A	A	A-	A	A
	20 < t ≤ 60	-	100	200	B-200	B-200	A	A
	t > 60	A	200	250	B-200	B-200	A	A

*1 : Maximum two layers of weld metal. (Relief cracking is normal)

- : No preheating or preheating < 100ºC.

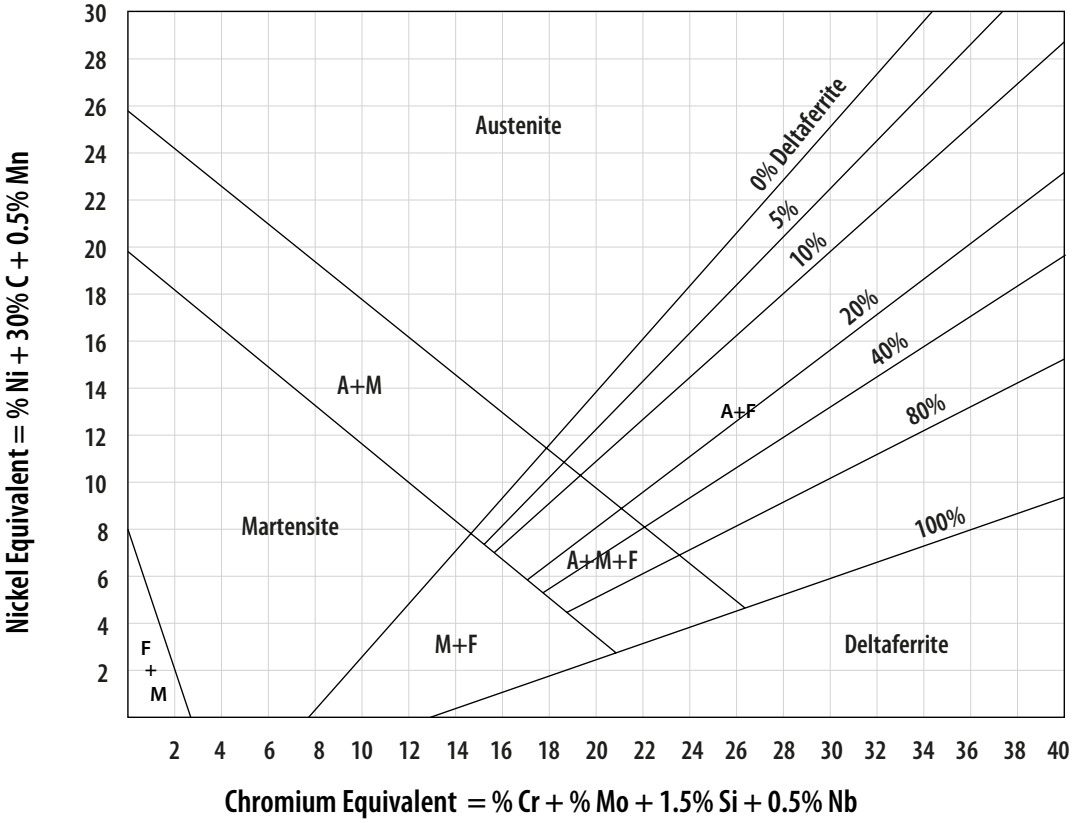
X : Used very rearely or not at all.

A: Preheating when large areas are surfaced.

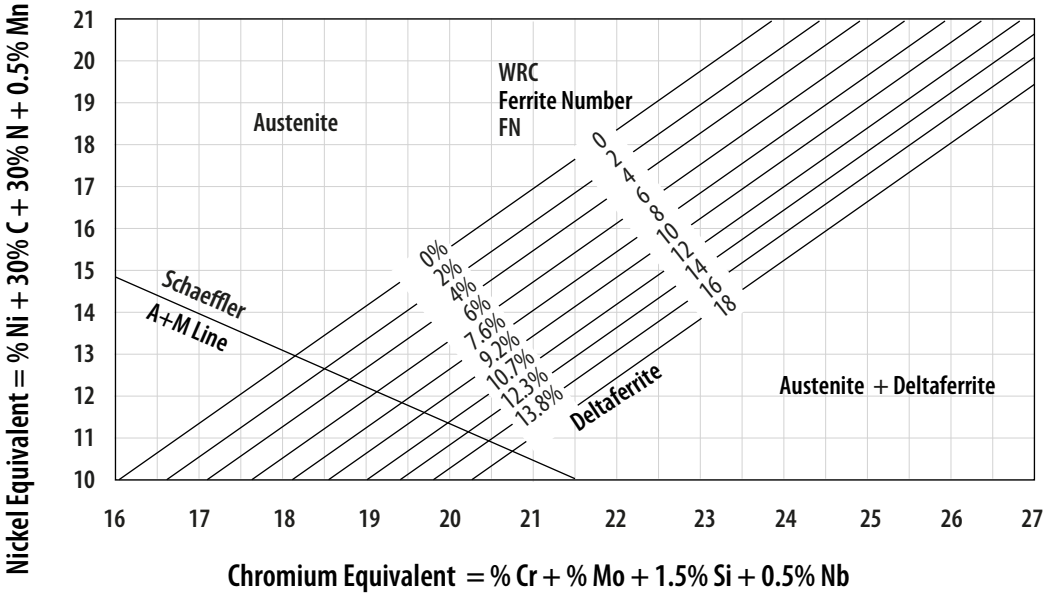
B: To prevent cracking, use a buffer layer of tough stainless weld metal.

SCHAEFFLER DIAGRAM

The upper limits of the alloying elements in stainless steel fort he Schaeffler diagram that is used to determine the microstructure of weld metal: C: % 0.2, Mn: % 4.0, Si: %1.0, Mo: % 3.0, Nb: %1.5



DELONG DIAGRAM



TS EN ISO 14175

Symbol		Components in Nominal Percentage of Volume					
Main Group	Sub Group	Oxidizing		İnert		Reducing	Low Reactivity
		CO_2	O_2	Ar	He	H_2	N_2
I	1			100			
	2				100		
	3			Rest	$0.5 \le He \le 95$		
M1	1	$0.5 \le CO_2 \le 5$		Rest[a]		$0.5 \le H_2 \le 5$	
	2	$0.5 \le CO_2 \le 5$		Rest[a]			
	3		$0.5 \le O_2 \le 3$	Rest[a]			
	4	$0.5 \le CO_2 \le 5$	$0.5 \le O_2 \le 3$	Rest[a]			
M2	0	$5 < CO_2 \le 15$		Rest[a]			
	1	$15 < CO_2 \le 25$		Rest[a]			
	2		$3 < O_2 \le 10$	Rest[a]			
	3	$0.5 \le CO_2 \le 5$	$3 < O_2 \le 10$	Rest[a]			
	4	$5 < CO_2 \le 15$	$0.5 \le O_2 \le 3$	Rest[a]			
	5	$5 < CO_2 \le 15$	$3 < O_2 \le 10$	Rest[a]			
	6	$15 < CO_2 \le 25$	$0.5 \le O_2 \le 3$	Rest[a]			
	7	$15 < CO_2 \le 25$	$3 < O_2 \le 10$	Rest[a]			
M3	1	$25 < CO_2 \le 50$		Rest[a]			
	2		$10 < O_2 \le 15$	Rest[a]			
	3	$25 < CO_2 \le 50$	$2 < O_2 \le 10$	Rest[a]			
	4	$5 < CO_2 \le 25$	$10 < O_2 \le 15$	Rest[a]			
	5	$25 < CO_2 \le 50$	$10 < O_2 \le 15$	Rest[a]			
C	1	100					
	2	Rest	$0.5 \le O_2 \le 30$				
R	1			Rest[a]		$0.5 \le H_2 \le 15$	
	2			Rest[a]		$15 < H_2 \le 50$	
N	1				He		100
	2			Rest[a]	He		$0.5 \le N_2 \le 5$
	3			Rest[a]	He		$5 < N_2 \le 50$
	4			Rest[a]	He	$0.5 \le H_2 \le 10$	$0.5 \le N_2 \le 5$
	5				He	$0.5 \le H_2 \le 50$	Rest
O	1	100					
Z	: Gas mixtures containing components not listed, or mixtures outside the composition ranges listed[b]						

[a] For the purpose of this classification, argon may be subsituted partially or completely by helium[b]

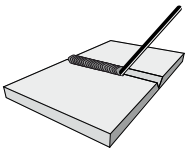
[b] Two gas mixtures with the same Z-classification may not be interchangeable.

Gas	Density	Condition
Carbondioxide (CO_2)	1,84 kg/m^3	15°C, 1 atm
Argon (Ar)	1,70 kg/m^3	15°C, 1 atm
Oxygen (O_2)	1,33 kg/m^3	15°C, 1 atm
Azot (N_2)	0,96 kg/m^3	15°C, 1 atm
Helium (He)	0,16 kg/m^3	15°C, 1 atm

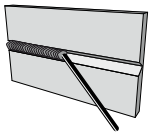
Shielding Gas Flow Rates in TIG Welding		
Stainless Steel - Mild Steel		
Tungsten Electrode Dia.	**Nozzle**	**Gas Flow Rate**
1.60 mm	6.00 - 8.00 mm	7 - 10 lt/min
2.00 mm	6.00 - 8.00 mm	7 - 10 lt/min
2.40 mm	6.00 - 12.00 mm	8 - 12 lt/min
3.20 mm	10.00 - 14.00 mm	10 - 14 lt/min
4.00 mm	10.00 - 14.00 mm	10 - 14 lt/min
Aluminum and Aluminum Alloys		
1.60 mm	8.00 - 12.00 mm	8 - 10 lt/min
2.40 mm	8.00 - 12.00 mm	10 - 12 lt/min
3.20 mm	10.00 - 14.00 mm	12 - 14 lt/min
4.00 mm	12.00 - 14.00 mm	12 - 16 lt/min

WELDING POSITIONS - EN ISO 6947 – ASME SEC. IX

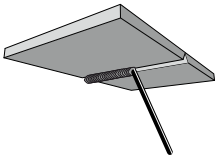
Plate Butt Welding



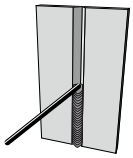
Flat Position
PA / 1G



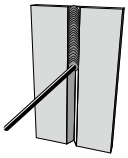
Horizontal Position
PC / 2G



Overhead Position
PE / 4G

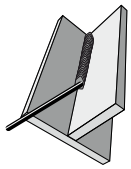


Vertical Up Position
PF / 3G

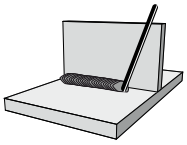


Vertical Down Position
PG / 3G

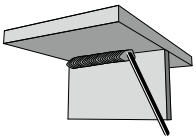
Plate Fillet Welding



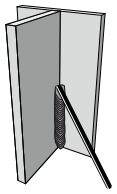
Flat Position
PA / 1F



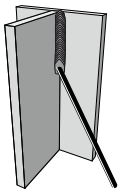
Horizontal Vertical Position
PB / 2F



Horizontal Overhead Position
PD / 4F

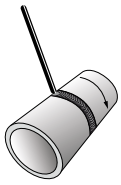


Vertical Up Position
PF / 3F

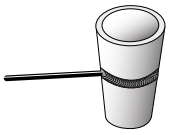


Vertical Down Position
PG / 3F

Pipe Butt Welding



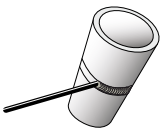
Pipe Rotating
Flat Position
PA / 1G



Pipe Fixed
Horizontal Position
PC / 2G

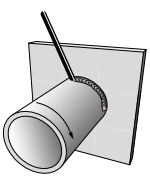
Pipe Fixed
Vertical Up Position
PH / 5G

Pipe Fixed
Vertical Down Position
PJ / 5G

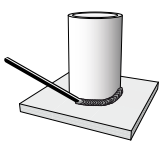


Pipe Fixed as Angle of 45º
Inclined Position Welding Upwards
H-LO45 / 6G

Pipe Fillet Welding

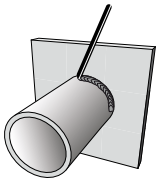


Pipe Rotating
Flat Position
PB / 1FR

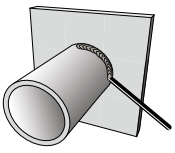


Pipe Fixed
Horizontal Vertical Position
PB / 2F

Pipe Fixed
Horizontal Overhead Position
PDH / 4F

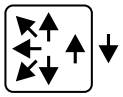


Pipe Fixed
Vertical Up Position
PH / 5F

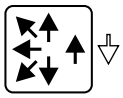


Pipe Fixed
Vertical Down Position
PJ / 5F

Welding Positions



EN ISO 6947 : PA PB PC PD PE PF PG
DIN 8560 : w h q hü ü s f
All Positions



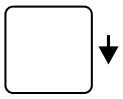
EN ISO 6947 : PA PB PC PD PE PF
DIN 8560 : w h q hü ü s
All Positions, Vertical-Down Conditionally

EN ISO 6947e : PA PB PC PD PE PF
DIN 8560 : w h q hü ü s
All Positions, Except Vertical-Down

EN ISO 6947 : PA PB PC PF
DIN 8560 : w h q s
All Positions, Except Vertical-Down and Overhead

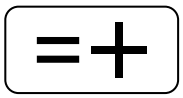
EN ISO 6947 : PA PB
DIN 8560 : w h
Flat Butt and Fillet Welds Only

EN ISO 6947 : PA
DIN 8560 : w
Flat Butt Welds Only

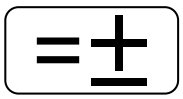


EN ISO 6947 : PG
DIN 8560 : f
Vertical-Down Only

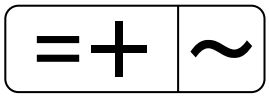
Welding Current and Polarity



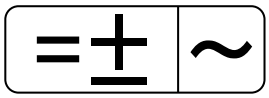
Direct Current: (DC),
Electrode Connected to Positive Pole



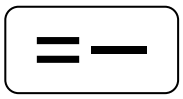
Direct Current: (DC),
Electrode Connected to Negative or Positive Pole



Direct Current: (DC) Preferred,
Electrode Connected to Positive Pole

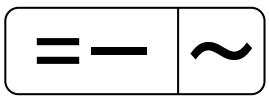


Direct Current: (DC) Preferred,
Electrode Connected to Negative or Positive Pole



Direct Current: (DC) Preferred,
Electrode Connected to Negative Pole

Alterneative Current: (AC)



Direct Current: (DC) Preferred,
Electrode Connected to Negative Pole

HARDNESS CONVERSION TABLE - EN 18265

Tensile Strength (N / mm²)	Hardness			Tensile Strength (N / mm²)	Hardness		
	Vickers (HV)	Brinell (HB)	Rockwell (HRc)		Vickers (HV)	Brinell (HB)	Rockwell (HRc)
320	100	95	-	1155	360	342	36.6
335	105	99.8	-	1190	370	352	37.7
350	110	105	-	1220	380	361	38.8
370	115	109	-	1255	390	371	39.8
385	120	114	-	1290	400	380	40.8
400	125	119	-	1320	410	390	41.8
415	130	124	-	1350	420	399	42.7
430	135	128	-	1385	430	409	43.6
450	140	133	-	1420	440	418	44.5
465	145	138	-	1455	450	428	45.3
480	150	143	-	1485	460	437	46.1
495	155	147	-	1520	470	447	46.9
510	160	152	-	1555	480	456	47.7
530	165	156	-	1595	490	466	48.4
545	170	162	-	1630	500	476	49.1
560	175	166	-	1665	510	485	49.8
575	180	171	-	1700	520	494	50.5
595	185	176	-	1740	530	504	51.1
610	190	181	-	1775	540	513	51.7
625	195	185	-	1810	550	523	52.3
640	200	190	-	1845	560	532	53.0
660	205	195	-	1880	570	542	53.6
675	210	199	-	1920	580	551	54.1
690	215	204	-	1955	590	561	54.7
705	220	209	-	1995	600	570	55.2
720	225	214	-	2030	610	580	55.7
740	230	219	-	2070	620	589	56.3
755	235	223	-	2105	630	599	56.8
770	240	228	20.3	2145	640	608	57.3
785	245	233	21.3	2180	650	618	57.8
800	250	238	22.2	-	660	-	58.3
820	255	242	23.1	-	670	-	58.8
835	260	247	24.0	-	680	-	59.2
850	265	252	24.8	-	690	-	59.7
865	270	257	25.6	-	700	-	60.1
880	275	261	26.4	-	720	-	61.0
900	280	266	27.1	-	740	-	61.8
915	285	271	27.8	-	760	-	62.5
930	290	276	28.5	-	780	-	63.3
950	295	280	29.2	-	800	-	64.0
965	300	285	29.8	-	820	-	64.7
995	310	295	31.0	-	840	-	65.3
1030	320	304	32.2	-	860	-	65.9
1060	330	314	33.3	-	880	-	66.4
1095	340	323	34.4	-	900	-	67.0
1125	350	333	35.5	-	920	-	67.5

METRIC CONVERSION COEFFICIENTS

Properity	To Convert	To	Multiply By
Electrical Force	pound - force	N	4.448222
	kilogram - force	N	9.806650
	N	lbf	0.2248089
Energy, Work, Heat, Impact Energy	foot pound force	J	1.355818
	foot poundal	J	0.04214011
	btu	J	1054.35
	calorie (thermochemical)	J	4.184
	watt-hour	J	3600
Volume	in^3	m^3	0.00001638706
	ft^3	m^3	0.02831685
	yd^3	m^3	0.7645549
	in^3	mm^3	16387.06
	ft^3	mm^3	28316850
	in^3	L	0.01638706
	ft^3	L	28.31685
	gallon	L	3.785412
Travel Speed, Velocity (Linear)	in / min	m / sec	0.0004233333
	ft / dm	m / sec	0.00508
	in / min	mm / sec	0.4233333
	ft / min	mm / sec	5.08
	mil / h	km / h	1.609344
Heat Imput	J / in	J / m	39.37008
	J / m	J / in	0.0254
Force	kilogram - force	N	9.80665
	pound - force	N	4.448222
Fracture Toughness	$ksi \cdot in^{1/2}$	$MN \cdot m^{-3/2}$	1.098855
	$MN \cdot m^{-3/2}$	$ksi \cdot in^{1/2}$	0.910038
Deposition Rate	lb / h	kg / h	0.45(appx.)
	kg / h	lb / h	2.2 (appx.)
Temperature	degree, celsius, t_c	K	$t_K = t_C + 273.15$
	degree, fahrenheit, t_F	K	$t_K = (t_F + 459.67) / 1.8$
	degree, rankine, t_R	K	$t_K = t_R / 1.8$
	degree, fahrenheit, t_F	°C	$t_C = (t_F - 32) / 1.8$
	kelvin, t_K	°C	$t_C = t_K - 273.15$
Thermal Conductivity	cal / [cm • s • °C]	W / [m • K]	418.4
Wire Feeding Speed	mm / sec	in / min	2.362205
Lenght	in	m	0.0254
	in	mm	25.4
	ft	m	0.3048
	ft	mm	304.8
	mm	in	0.03937008
	mm	ft	0.00328084
	yd	m	0.9144
	mil	m	1609.3
Density	pound mass / in^3	kg / m^3	27679.9
	pound mass / ft^3	kg / m^3	16.01846

HARDNESS CONVERSION TABLE - EN 18265

Properity	To Convert	To	Multiply By
Angle	deg	rad	0.01745329
	min	rad	0.0002908882
	sec	rad	0.000004848137
Mass, Weight	pound mass	kg	0.4535924
	metric ton	kg	1000
	ton (short, 2000 lb)	kg	907.1847
	slug	kg	14.5939
Current Density	A / in²	A / mm²	0.001550003
	A / mm²	A / in²	645.16
Flow Rate	ft³ / h	L / min	0.4719475
	gallon / h	L / min	0.0630902
	gallon / min	L / min	3.785412
Area Dimension	in²	m²	0.00064516
	ft²	m²	0.09290304
	yd²	m²	0.8361274
	in²	mm²	645.16
	ft²	mm²	92903.04
	acre	m²	4046.873
	mm²	in²	0.001550003
Pressure (Gas & Liquid)	psi	kPa	6.894757
	lb / ft²	kPa	0.04788026
	N / mm²	kPa	1000
	atmosphere	kPa	101.325
	kPa	psi	0.1450377
	kPa	lb / ft²	20.88548
	kPa	N / mm²	0.001
Pressure (Vacuum)	torr (mm Hg at 0°C)	Pa	133.322
	micron (µm Hg at 0°C)	Pa	0.1333220
	Pa	torr	0.00750064
	Pa	micron	7.50064
	bar	psi	14.50377
Tensile & Yield Strenght	psi	MPa	0.006894757
	ksi	MPa	6.894757
	lb / ft²	MPa	0.00004788026
	N / mm²	MPa	1
	MPa	psi	145.0377
	MPa	lb / ft²	20885.43
	MPa	N / mm²	1
Power	horsepower (550 ft lbf / s)	W	745.6999
	horsepower (electric)	W	746
	btu/min (thermochemical)	W	17.5725
	calorie / min (thermochemical)	W	0.06973333
	foot pound-force / min	W	0.02259697
Power Density	W / in²	W / m²	1550.003
	W / m²	W / in²	0.00064516
Electrical Resistivity	Ω • cm	Ω • m	0.01
	Ω • m	Ω • cm	100

PACKING INFORMATION

STICK ELECTRODES

Inner Cardboard Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
K350MW-1	18	61	352	1
M350 MW	41	62	352	2.50
B350	68	80	352	5.00
B450 MW	62	80	452	6.50
K300 MW	33	62	302	1.75
K350 MW	35	62	352	2.00
K400 MW	30	61	402	2.25
O350 MW	39	82	352	3.50

Vacuum Package

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
K250MW	34	62	252	1.50
K300MW	15	60	302	0.75
K350MW	34	62	352	2.00
M350MW-K	36	61	352	2.50
M400MW-K	34	62	402	2.50
M450MW-K	28	61	452	2.50

Plastic Box

Box Type	Height (mm)	Diameter (mm)	Average Weight (kg)
PS30-1	315	65	2.00
PS35-1	365	65	2.50
PS35-2	365	84	5.00
PS45-2	470	84	6.50

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
PL1-A	20	42	350	0.50
PL2-A	25	65	350	1.00

Tin Box

Box Type	Height (mm)	Diameter (mm)	Average Weight (kg)
T1-A	365	75	2.00

Box Type	Height (mm)	Diameter (mm)	Average Weight (kg)
T3	358	73	4.00 - 5.00

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
T1-S	90	90	355	8.00

HARDNESS CONVERSION TABLE - EN 18265

STICK ELECTRODES

Outer Cardboard Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
KK350MW-1	40	330	375	10.00
MK300P	150	222	325	7.50
MK350MW	92	200	365	15.00
MK350MW-P	75	225	375	7.50
BK350MW	65	258	365	15.00
BK350MW-P	88	272	375	15.00
BK450MW	71	260	465	19.50
KK300MW	110	205	330	15.75
KK350MW	116	205	380	18.00
KK400MW	105	200	430	20.25
0K350MW	88	263	373	21.00

GAS TUNGSTEN (TIG) and OXY-ACETYLENE WELDING RODS

Inner Tube Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
T1000MW-C	25	60	1000	2.00 / 5.00

Box Type	Height (mm)	Diameter (mm)	Average Weight (kg)
T500MW	540	50	1.00 / 2.50
T1000MW	1040	50	2.50 / 5.00

Plastic Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
T1000MW-P	25	60	1005	2.50 / 5.00

Outer Cardboard Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
T500MW	54	206	534	4.00 / 10.00
T1000MW	54	206	1050	10.00 / 20.00
T1000MW-P	55	125	1010	10.00 / 20.00

PACKING INFORMATION

GAS METAL (MIG/MAG) AND FLUX CORED ARC WELDING WIRES

Spools & Boxes

Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kg)
D100	M1	16.5	100	1
D200	M2	52	200	5
D300	M3	52	300	15-20
K300	M3	180	300	15
K300MS	M3	52	300	15-18

Drums

Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kg)
DR60	240	517	60
DR250	830	517	250
DR400	1000	600	400

PACKING INFORMATION

SUBMERGED ARC WELDING (SAW) WIRES

Spools & Boxes

Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kg)
K300MS	M3	52	300	15
K435	M4	300	435	25
K790	M5	550	790	100

Cage & Drums

Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kg)
DR250	830	517	200
DR400	1000	600	400
DR600	950	650	600
Coil	1050	850	1000

SUBMERGED ARC WELDING FLUXES

Bag

Packing Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
Kraft	100	380	560	25

ALPHABETIC PRODUCT INDEX

ALPHABETIC PRODUCT INDEX

APPROVALS AND CERTIFICATES

Product Name	ABS	BV	CE	UKCA	CWB	DB	DNV-GL	HAKC	LR	NK	RINA	RMRS	TL	TSE	TUV
EI 307B	-	-	√	√	-	√	-	-	-	-	-	-	-	√	√
EI 307R	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EI 308L	-	-	√	√	√	-	-	√	-	-	-	-	-	√	√
EI 309L	-	√	√	√	√	√	-	-	-	-	-	-	-	-	√
EI 309MoL	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EI 310	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EI 312	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EI 316L	-	√	√	√	√	-	-	-	-	-	-	-	-	√	√
EI 318	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EI 347	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EIS 307	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
EIS 308	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
EIS 309Mo	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
EIS 410	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
EIS 410NiMo	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
EM 140	-	-	√	√	-	-	-	√	-	-	-	-	-	√	√
EM 150	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
EM 160	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
EM 170	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EM 171	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
EM 176	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 180	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 201	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 202	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 211	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 212	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 222	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 235	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
EM 295	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
ESB 42	-	-	√	√	-	-	-	√	-	-	-	-	-	√	-
ESB 44	-	-	√	√	-	√	-	-	-	-	-	-	-	√	√
ESB 48	√	√	√	√	√	√	-	√	√	√	√	√	√	√	√
ESB 50	√	√	√	√	-	√	-	-	-	-	√	-	√	-	√
ESB 51	-	-	√	√	√	-	-	-	-	-	-	-	-	-	-
ESB 52	√	√	√	√	√	√	-	√	√	-	-	-	√	√	√
ESC 60	-	√	√	√	√	√	-	-	-	-	-	-	-	√	√
ESC 61	-	-	√	√	√	-	-	-	-	-	-	-	-	-	-

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APPROVALS AND CERTIFICATES

Product Name	ABS	BV	CE	UKCA	CWB	DB	DNV-GL	HAKC	LR	NK	RINA	RMRS	TL	TSE	TUV
ESC 70G	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
ESC 80G	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
ESH 160B	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
ESH 160R	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
ESH 180R	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
ESR 11	-	√	√	√	-	√	-	√	-	-	-	-	-	√	√
ESR 13	√	√	√	√	√	√	-	-	-	-	-	-	√	√	√
ESR 14	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
ESR 30	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-
ESR 35	-	-	√	√	-	√	-	-	-	-	-	-	-	-	√
FCO 90	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 11	√	√	√	√	-	√	-	√	√	√	√	√	√	-	√
FCW 11A	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 13	√	√	√	√	√	√	-	-	√	√	√	√	√	-	√
FCW 14	√	√	√	√	-	-	-	-	√	-	-	√	√	-	-
FCW 140	-	-	√	√	-	-	-	√	-	-	√	√	-	-	-
FCW 142	-	-	√	√	-	-	-	√	-	-	-	-	-	-	-
FCW 142M	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 15	-	-	√	√	-	-	-	-	-	-	-	√	-	-	-
FCW 15A	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 16	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 17	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 171	-	-	√	√	-	-	-	-	-	-	-	√	-	-	-
FCW 201	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
FCW 21	√	-	√	√	√	√	-	-	-	-	-	-	-	-	√
FCW 30	-	-	√	√	-	-	-	-	-	-	-	-	√	-	√
MAL 4043	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MAL 5183	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MAL 5356	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MAL 5556	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MG 1	-	-	√	√	√	-	-	-	-	-	-	-	-	-	-
MG 102	-	-	√	√	√	-	-	-	-	-	-	-	-	-	-
MG 150	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MG 182	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MG 183	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MG 2	√	-	√	√	√	√	-	√	-	-	√	√	√	√	√
MG 20	-	-	√	√	-	√	-	-	-	-	-	-	-	√	√

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APPROVALS AND CERTIFICATES

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MG 201	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
MG 3	-	-	√	√	√	√	-	√	-	-	-	-	-	√	√
MI 308LSi	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MI 316LSi	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
MI 318	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
SF 104	√	√	√	√	-	-	-	-	-	√	-	-	√	-	√
SF 113	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
SF 124	-	√	√	√	-	-	-	-	-	-	-	√	-	-	-
SF 204	-	√	√	√	-	-	-	-	-	-	-	-	-	-	-
SF 212	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
SF 304	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
SF 401	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
SW 701	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
SW 702	√	√	√	√	-	-	-	-	-	√	-	√	√	√	√
SW 702Mo	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
SW 702Si	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
SW 703Si	-	-	√	√	-	-	-	-	-	-	-	-	-	√	√
TAL 1100	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TAL 4047	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TAL 5183	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TAL 5356	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TG 1	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
TG 102	-	-	√	√	√	-	-	-	-	-	-	-	-	-	-
TG 150	-	-	√	-	-	-	-	√	-	-	-	-	-	-	-
TG 2	-	√	√	√	√	√	-	-	-	-	-	-	√	-	√
TG 201	-	-	√	√	-	-	-	-	-	-	-	-	-	-	√
TG 222A	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TG 295	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TG 3	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-
TI 2209	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TI 2594	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TI 308L	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TI 309L	-	-	√	-	-	-	-	-	-	-	-	-	√	-	-
TI 310	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
TI 316L	-	√	√	-	-	-	-	-	-	-	-	-	√	-	-
TI 318	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-

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NOTES

Non-Stop Welding Since 1957

Magmaweld is a leading developer and manufacturer of welding solutions since 1957, based in Turkey. The product range includes Stick Electrodes, MIG/MAG and TIG Wires, Flux Cored Wires, Submerged-Arc Wires and Fluxes, Welding Machines, Fume Extraction Systems, Welding Accessories, and Robotic Welding Automation Systems.

With 95% of its product portfolio manufactured in two state-of-the-art facilities located in Manisa, Magmaweld ensures high-quality, locally produced solutions trusted by professionals worldwide.

magmaweld

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