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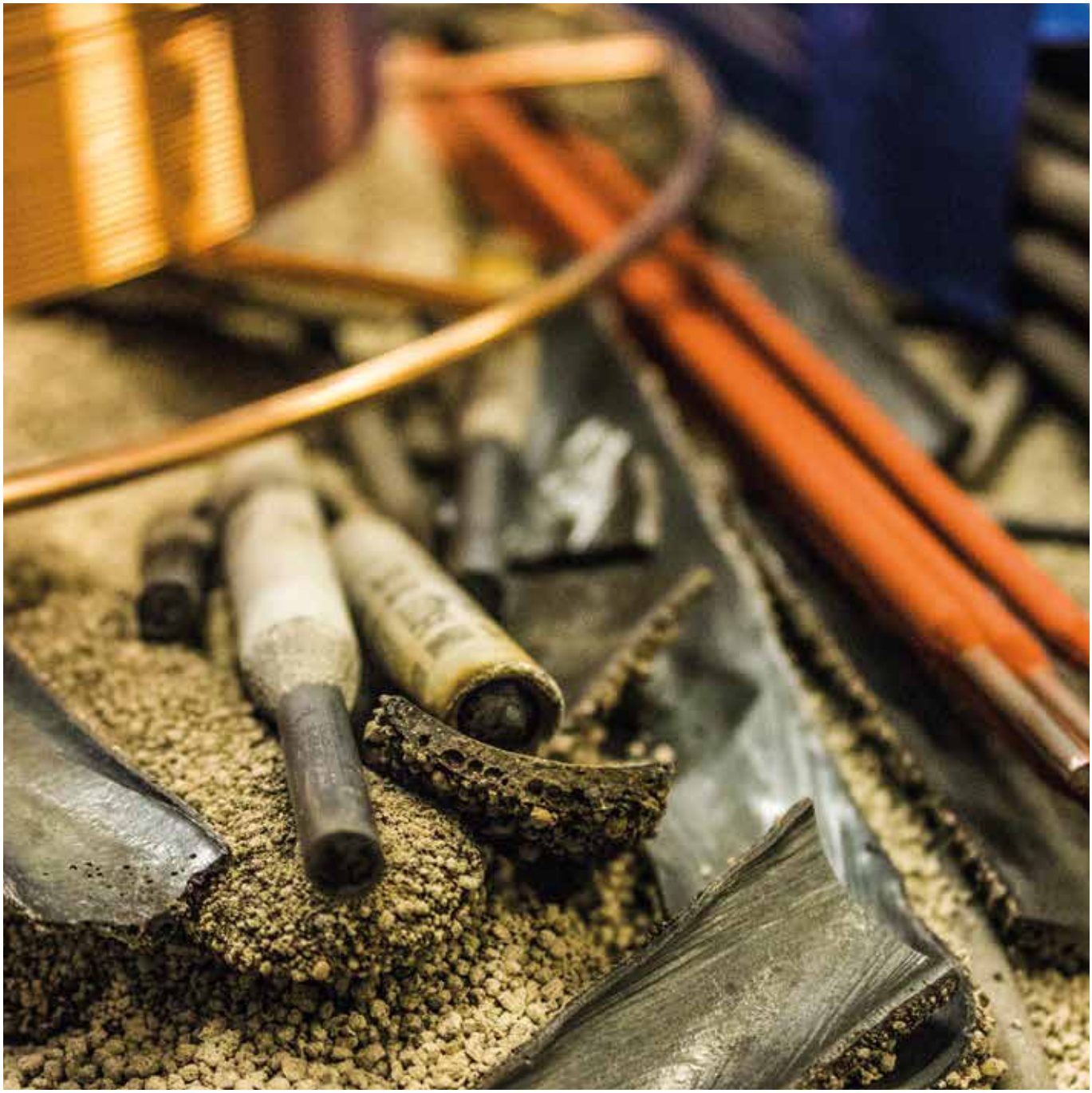

WELDING CONSUMABLES

08 / 2018

+90 538 927 12 62

info@magmaweld.com I +90 444 WELD

WE MANUFACTURE WELDING CONSUMABLES & EQUIPMENT

Magmaweld is a developer and a producer of welding products for most of the welding processes. Oerlikon Kaynak Elektrodları ve Sanayi A.Ş., the oldest company of the group, was established in 1957 in Istanbul/Turkey to produce stick electrodes under license from Oerlikon-Buehrle AG. Later the product portfolio was expanded to include MIG/MAG & TIG Wires, Flux Cored Wires, Submerged-Arc Wires and Fluxes, Welding Machines, Welding Ancillary Products and Automation Systems.

Welding Consumables Factory
Organize Sanayi Bölgesi 2. Kısım - Manisa / TURKEY

Welding Machines and Automation Factory
Organize Sanayi Bölgesi 5. Kısım - Manisa / TURKEY

In the year 2000, in order to reduce costs, to strengthen the leading position in Turkey and turn Magmaweld into a global brand, two old factories in Istanbul were moved to new, state of the art factory in Manisa, situated in the west of Turkey. In 2010 the second factory has been opened also in Manisa to produce high-tech welding equipment as well as to integrate robotic automation systems.

The MAGMAWELD brand came out as an analogy between the molten core of the earth, the MAGMA and the WELDPOOL.

Magmaweld greatly values technical education and has been contributing to the training and education of thousands of welders through regular, free of charge courses since 1961. This service helps to increase consumer awareness and technical competence throughout the industry.

Magmaweld strives for customer satisfaction and process excellence. In order to satisfy customer needs, all questions and remarks about products, training, welding technologies, welding procedures, standards, work safety and automation are processed through the call center at +90 444WELD (4449353) or through live support from www.magmaweld.com where the relevant information is directed to Magmaweld's experts.

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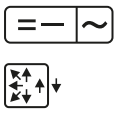
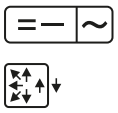
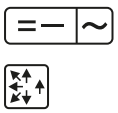
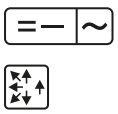
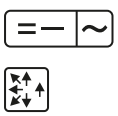
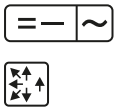
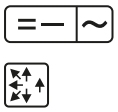
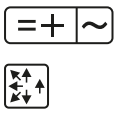
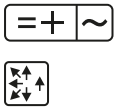
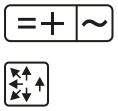
Rutile and Basic Type Stick Electrodes

Products Name and Standards		Applications and Properties
ESR 11		**RUTILE ELECTRODE FOR ALL POSITIONS.** Especially suitable for welding in sheets thinner then 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.
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	
ESR 12		**RUTILE ELECTRODE FOR ALL POSITIONS.** Especially suitable for welding in sheets thinner then 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.
AWS/ASME SFA - 5.1	E6012	
EN ISO 2560 - A	E 38 0 RC 11	
ESR 13		**GENERAL PURPOSE RUTILE ELECTRODE.** Suitable for joining and repair welding of light steel fabrications, iron works, wrougth iron works, agricultural machines, boiler, chassis of vechiles. Suitable for 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.
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	
ESR 13M		**GENERAL PURPOSE RUTILE ELECTRODE FOR SHEET STEELS.** Preferably used for welding light-gauge sheet metal. Suitable for all position except vertical-down. In fillet welds, electrode can be welded with tip lightly dragging on the work. Has excellent bead appearence, easy arc striking and re-striking, easy slag removal, silent and balanced arc. Possible to use equally well both with AC and DC.
AWS/ASME SFA - 5.1	E6013	
EN ISO 2560 - A	E 35 A R 12	
ESR 14		**GENERAL PURPOSE RUTILE ELECTRODE WITH HIGH DEPOSITION RATE.** Preferably used in mild steel fabrication, sheet metal and ornamental iron works on poor fitup 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.
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	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.08 **Si:** 0.45 **Mn:** 0.60	480	550	25	0°C: 55		If required  1 Hour
C: 0.10 **Si:** 0.35 **Mn:** 0.75	480	560	26	0°C: ≥ 47		If required  1 Hour
C: 0.06 **Si:** 0.40 **Mn:** 0.55	500	560	28	0°C: 50		If required  1 Hour
C: 0.05 **Si:** 0.40 **Mn:** 0.50	470	530	25	0°C: 60		If required  1 Hour
C: 0.08 **Si:** 0.40 **Mn:** 0.60	480	560	28	-20°C: 40 0°C: 70		If required  1 Hour

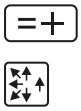
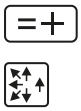
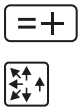
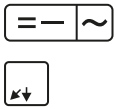
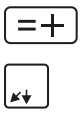
Rutile and Basic Type Stick Electrodes

Products Name and Standards		Applications and Properties
ESR 30		**ELECTRODE FOR GALVANIZING TANKS.** 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.
AWS/ASME SFA - 5.1	E6013	
EN ISO 2560 - A	E 38 A RR 12	
TS EN ISO 2560 - A	E 38 A RR 12	
ESR 35		**ELECTRODE FOR WELDING STEELS. SUBSEQUENTLY GALVANIZED AND ENAEMLED.** 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 submarged arc welding. Owing to its low Si-content, weld metal is suited for subsequent galvanizing and enamelling.
AWS/ASME SFA - 5.1	E6013	
EN ISO 2560 - A	E 38 2 RB 12	
TS EN ISO 2560 - A	E 38 2 RB 12	
ESB 40		**ELECTRODE FOR WELDING OF HIGH CARBON STEELS AND CAST IRONS WITH PREHEATING.** Suitable for repair welding on difficult to weld steels and repair welding of steel with unknown composition. Heavy coated basic electrode produce high tensile strenght weld metal with excellent toughness values makes this electrode suitable for welding restrained structural members and large weld cross sections. Also preferred for buffer layer applications on steels before hardfacing and for welding of cast irons with high preheat.
AWS/ASME SFA - 5.1	E7016	
EN ISO 2560 - A	E 42 3 B 32 H10	
TS EN ISO 2560 - A	E 42 3 B 32 H10	
ESB 42		**ELECTRODE FOR WELDING ROOT PASSES ON THIN WALLED TUBES AND PIPES.** 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. Owing to its double covering, electrode has a stable and concentrated arc. Smooth and clean welds, merging into base metal without undercuts. Good gap bridging properties. Welds are of X-ray quality.
AWS/ASME SFA - 5.1	E7016 H8	
EN ISO 2560 - A	E 42 4 B 12 H10	
TS EN ISO 2560 - A	E 42 4 B 12 H10	
ESB 44		**MULTI PURPOSE AC/DC ELECTRODE.** Suitable for fabrication and repair welding of dynamically loaded steel constructions, machines and agricultural equipments, workshop and maintenence 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.
AWS/ASME SFA - 5.1	E7016 H8	
EN ISO 2560 - A	E 38 2 B 12 H10	
TS EN ISO 2560 - A	E 38 2 B 12 H10	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.02 **Si:** 0.15 **Mn:** 0.35	380	440	25	20°C: 70		If required  1 Hour
C: 0.06 **Si:** 0.20 **Mn:** 0.60	480	530	23	-20°C: 50 0°C: 60 20°C: 100		If required  1 Hour
C: 0.08 **Si:** 0.40 **Mn:** 1.30	500	570	28	-30°C: 100		 2 Hour
C: 0.05 **Si:** 0.45 **Mn:** 1.00	480	550	28	-40°C: 70 -20°C: 120		 2 Hour
C: 0.05 **Si:** 0.50 **Mn:** 0.80	450	550	25	-30°C: 55 -20°C: 70		 2 Hour

Rutile and Basic Type Stick Electrodes

Products Name and Standards		Applications and Properties
ESB 48		**BASIC ELETRODE WITH HIGH MECHANICAL PROPERTIES. SMOOTH AND QUITE ARC.** 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.
AWS/ASME SFA - 5.1	E7018 H8	
EN ISO 2560 - A	E 42 3 B 42 H10	
TS EN ISO 2560 - A	E 42 3 B 42 H10	
ESB 50		**BASIC ELECTRODE WITH HIGHER MECHANICAL PROPERTIES.** 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 -60°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.
AWS/ASME SFA - 5.1	E7018 H8	
EN ISO 2560 - A	E 42 3 B 42 H5	
TS EN ISO 2560 - A	E 42 3 B 42 H5	
ESB 52		**BASIC ELECTRODE WITH HIGH MECHANICAL PROPERTIES AND LOW HYDROGEN CONTENT.** Suitable for welding of steel constructions, bridge, dam, thermal power plants, petrochemical insdustry, shipbuilding, high strenght 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 rail joints. Good operating characteristic, also in root pass and positional welding. Very good gap bridging properties. Welds are of X-ray quality.
AWS/ASME SFA - 5.1	E7018-1 H4R	
EN ISO 2560 - A	E 42 6 B 42 H5	
TS EN ISO 2560 - A	E 42 6 B 42 H5	
CSA W48-14	E4918-1H4	
ESH 160R		**HEAVY COATED RUTILE ELECTRODE WITH HIGH RECOVERY.** 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-relesing in most cases.
AWS/ASME SFA - 5.1	E7024	
EN ISO 2560 - A	E 42 A RR 73	
TS EN ISO 2560 - A	E 42 A RR 73	
ESH 160B		Heavy coated, basic type high efficiency electrode having a weld metal recovery of appx. 165%.
AWS/ASME SFA - 5.1	E7028 H8	
EN ISO 2560 - A	E 38 5 B 73 H10	
TS EN ISO 2560 - A	E 38 5 B 73 H10	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.07 **Si:** 0.40 **Mn:** 1.00	500	570	27	-40°C: 80 -30°C: 90		 2 Hour
C: 0.06 **Si:** 0.40 **Mn:** 1.35	500	570	28	-50°C: 60 -30°C: 100		 2 Hour
C: 0.06 **Si:** 0.40 **Mn:** 1.20	500	560	26	-60°C: 60 -46°C: 90		 2 Hour
C: 0.10 **Si:** 0.85 **Mn:** 1.10	530	560	24	20°C: 50		If required  1 Hour
C: 0.06 **Si:** 0.35 **Mn:** 0.95	> 380	470 - 600	> 20	-50°C: 60 -20°C: 85		 2 Hour

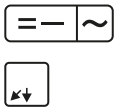
STICK ELECTRODES

Rutile and Basic Type Stick Electrodes

Products Name and Standards		Applications and Properties
ESH 180R		**HEAVY COATED RUTILE ELECTRODE WITH HIGH RECOVERY.** 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. Relatively low current intensities and short burn-off times. Easy arc striking and restriking.
AWS/ASME SFA - 5.1	E7024	
EN ISO 2560 - A	E 38 A RR 73	
TS EN ISO 2560 - A	E 38 A RR 73	

Cellulosic Type Stick Electrodes

Products Name and Standards		Applications and Properties
ESC 60		**GENERAL PURPOSE CELLULOSIC ELECTRODE.** 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.
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	
ESC 61		Medium coated, celllulosic electrode, espacially designed for use in AC as well as 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.
AWS/ASME SFA - 5.1	E6011	
EN ISO 2560 - A	E 35 2 C 21	
ESC 70G		**HIGH STRENGTH CELLULOSIC ELECTRODE FOR PIPE WELDING.** Medium coated and Ni (nickel) alloyed cellulosic type electrode, suitable for welding high strength steels, micro alloyd 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.
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	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.10 **Si:** 0.55 **Mn:** 1.00	460	530	25	20°C: 50		If required  110°C 1 Hour

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.10 **Si:** 0.20 **Mn:** 0.50	470	530	25	-30°C: 40 -20°C: 60	 Root Pass.  Fill Pass. 	-
C: 0.10 **Si:** 0.20 **Mn:** 0.60	470	530	24	-30°C: > 27 -20°C: 50	 Root Pass.  Fill Pass.  	-
C: 0.10 **Si:** 0.40 **Mn:** 1.30 **Ni:** 0.30	500	560	26	-30°C: 60 -20°C: 70	 Root Pass.  Fill Pass. 	-

STICK ELECTRODES

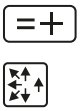
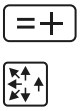
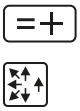
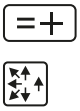
Cellulosic Type Stick Electrodes

Products Name and Standards		Applications and Properties
ESC 80G		**HIGH STRENGTH CELLULOSIC ELECTRODE FOR PIPE WELDING.** Medium coated and Ni (nickel) alloyed cellulosic type electrode for welding high strength and low alloyed steels. 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.
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	

Low Alloy Steels

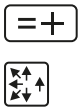
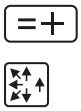
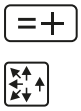
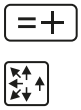
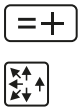
Products Name and Standards		Applications and Properties
EM 140		Basic coated electrode, designed to resist to atmospheric corrosion and to provide high charpy impact energy down to -40°C. Suitable for welding steel constructions like bridge, off-shore platforms which are made of weathering steels and thick sections of them. Especially 2,50 mm and 3,25 mm diameter well suited for positional welding. Welds are of X-ray quality.
AWS/ASME SFA - 5.5	E7018-G H4R	
EN ISO 2560 - A	E 42 4 Z B 42	
TS EN ISO 2560 - A	E 42 4 Z B 42	
EM 150		Heavy coated basic type electrode, suitable for welding steel constructions, off-shore platforms, bridge, machinery, production and in their root pass applications where low 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 enviromental temperatures.
AWS/ASME SFA - 5.5	E8018-C3	
EN ISO 2560 - A	E 46 6 1Ni B 42	
TS EN ISO 2560 - A	E 46 6 1Ni B 42	
EM 150W		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 enviromental 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.
AWS/ASME SFA - 5.5	E8018-W2	
EN ISO 2560 - A	E 50 6 Z 1Ni B 42	
TS EN ISO 2560 - A	E 50 6 Z 1Ni B 42	
EM 160		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 enviromental 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.
AWS/ASME SFA - 5.5	E8018-G	
EN ISO 2560 - A	E 50 6 Mn1Ni B 42	
TS EN ISO 2560 - A	E 50 6 Mn1Ni B 42	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.10 **Si:** 0.20 **Mn:** 0.80 **Ni:** 0.90	500	570	24	-30°C: 50 -20°C: 60	 Root Pass.  Fill Pass. 	-

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.06 **Si:** 0.40 **Mn:** 1.00 **Ni:** 1.00 **Cu:** 0.60	530	580	26	-40°C: 70 -20°C: 120		 2 Hour
C: 0.05 **Si:** 0.25 **Mn:** 0.90 **Ni:** 0.90	480	570	25	-60°C: 50		 2 Hour
C: 0.06 **Si:** 0.50 **Mn:** 1.00 **Cr:** 0.50 **Ni:** 0.80 **Cu:** 0.50	520	580	22	-60°C: 55		 2 Hour
C: 0.06 **Si:** 0.50 **Mn:** 1.80 **Ni:** 0.80	560	620	22	-60°C: 55		 2 Hour

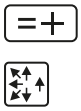
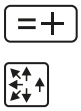
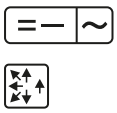
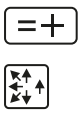
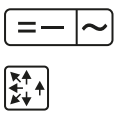
Low Alloy Steels

Products Name and Standards		Applications and Properties
EM 165		Heavy coated basic type electrode for welding low alloy steels, fine grained structural steels, creep resistant 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. Well-suited for positional welding makes it suitable for welding and repair jobs up to X65 oil and gas pipes. Especially 2,50 mm and 3,25 mm diameter well suited for easy positional welding. Welds are of X-ray quality.
AWS/ASME SFA - 5.5	E9018-G H4R	
EN ISO 18275 - A	E 55 5 Mn1NiMo B T 42 H5	
TS EN ISO 18275 - A	E 55 5 Mn1NiMo B T 42 H5	
EM 170		Heavy coated basic type electrode 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. Electrode features a stable and concentrated arc, rendering it well-suited fore positional welding. Suitable for welding and repair jobs up to X70 oil and gas pipes. Weld are of X-ray quality.
AWS/ASME SFA - 5.5	E9018-G H4	
EN ISO 2560 - A	E 50 6 Mn1Ni B 42 H5	
TS EN ISO 2560 - A	E 50 6 Mn1Ni B 42 H5	
EM 171		Heavy coated basic type electrode for welding fine grained structural steels and especially cryogenic steels, subjected to low service temperatures up to -80°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. 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.
AWS/ASME SFA - 5.5	E8018-C1 H4	
EN ISO 2560 - A	E 46 6 2Ni B 42 H5	
TS EN ISO 2560 - A	E 46 6 2Ni B 42 H5	
EM 172		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 -150°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.
AWS/ASME SFA - 5.5	E8018-C2	
EN ISO 2560 - A	E 46 6 3Ni B 42	
TS EN ISO 2560 - A	E 46 6 3Ni B 42	
EM 175		Heavy coated basic type electrode for welding fine grained structural steels which have yield strength up to 690N/mm^2, e.g. WELDOX700 and etc. Suitable fore 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. If normalizing is required after welding, EM 176 should be used. Producing tough and crack-free welded joints.
AWS/ASME SFA - 5.5	E10018-G H4	
EN ISO 18275 - A	E 69 4 Mn2NiCrMo B 42 H5	
TS EN ISO 18275 - A	E 69 4 Mn2NiCrMo B 42 H5	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.07 **Si:** 0.40 **Mn:** 1.70 **Ni:** 1.00 **Mo:** 0.50	570	650	20	-60°C: 55		 2 Hour
C: 0.05 **Si:** 0.40 **Mn:** 1.75 **Ni:** 1.00	560	640	24	-60°C: 55		 2 Hour
C: 0.05 **Si:** 0.30 **Mn:** 1.00 **Ni:** 2.30 **Cu:** 0.15	550	630	24	-60°C: 70		 2 Hour
C: 0.08 **Si:** 0.30 **Mn:** 1.00 **Ni:** 3.50	500	570	22	-60°C: 50		 2 Hour
C: 0.06 **Si:** 0.40 **Mn:** 1.50 **Cr:** 0.50 **Ni:** 2.00 **Mo:** 0.40	720	800	18	-60°C: 60 -40°C: 75		 2 Hour

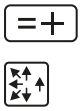
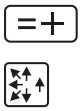
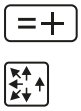
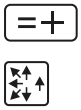
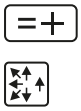
Low Alloy Steels

Products Name and Standards		Applications and Properties
EM 176		Heavy coated basic type electrode for welding fine grained and low ally 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 duited for easy positional welding. Welds are of X-ray quality.
AWS/ASME SFA - 5.5	E9018-G	
EN ISO 18275 - A	E 62 6 Mn2NiMo B 42	
TS EN ISO 18275 - A	E 62 6 Mn2NiMo B 42	
EM 180		Heavy coated basic type electrode for welding fine grained and high strength structural steels which have yield strength up to 690N/mm^2 (e.g. WELDOX700) and tensile strength to 850N/mm^2. Suitable for welding high strength steels used in fabrications 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 ray quality.
AWS/ASME SFA - 5.5	E11018-G H4	
EN ISO 18275 - A	E 69 6 Mn2NiCrMo B 42 H5	
TS EN ISO 18275 - A	E 69 6 Mn2NiCrMo B 42 H5	
EM 201		Rutile type, 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.
AWS/ASME SFA - 5.5	E8013-G	
EN ISO 3580 - A	E Mo R 12	
TS EN ISO 3580 - A	E Mo R 12	
EM 202		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. Welds are of X-ray quality. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.
AWS/ASME SFA - 5.5	E7018-A1 H8	
EN ISO 3580 - A	E Mo B 42 H5	
TS EN ISO 3580 - A	E Mo B 42 H5	
EM 211		Rutile type, 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 alternatig 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.
AWS/ASME SFA - 5.5	E8013-G	
EN ISO 3580 - A	E CrMo1 R 12	
TS EN ISO 3580 - A	E CrMo1 R 12	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.05 **Si:** 0.30 **Mn:** 1.60 **Ni:** 2.00 **Mo:** 0.40	630	720	18	-60°C: 50		 2 Hour
C: 0.06 **Si:** 0.35 **Mn:** 1.60 **Cr:** 0.40 **Ni:** 2.30 **Mo:** 0.40	700	850	18	-60°C: 50		 2 Hour
C: 0.08 **Si:** 0.30 **Mn:** 0.60 **Mo:** 0.50	**After Heat Treatment (620°C 1 Hour)** 510	590	25	20°C: 80		If required  1 Hour
C: 0.06 **Si:** 0.40 **Mn:** 0.80 **Mo:** 0.50	**After Heat Treatment (620°C 1 Hour)** 520	570	26	20°C: 125		 2 Hour
C: 0.07 **Si:** 0.40 **Mn:** 1.60 **Cr:** 1.00 **Mo:** 0.50	**After Heat Treatment (680°C 1 Hour)** 530	610	26	20°C: 110		If required  1 Hour

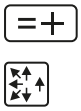
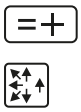
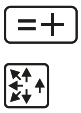
Low Alloy Steels

Products Name and Standards		Applications and Properties
EM 212		Basic type, 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. 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.
AWS/ASME SFA - 5.5	E8018-B2 H4R	
EN ISO 3580 - A	E CrMo1 B 42 H5	
TS EN ISO 3580 - A	E CrMo1 B 42 H5	
EM 222		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 tempetarures up to 600°C. Generally preferred in thick sections with high mechanical properties and X-ray quality necessary. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.
AWS/ASME SFA - 5.5	E9018-B3	
EN ISO 3580 - A	E CrMo2 B 42 H5	
TS EN ISO 3580 - A	E CrMo2 B 42 H5	
EM 235		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 strenght. 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. Preheating, interpass temperature and post weld heat treatment should be done in accordance with base metal to be welded.
AWS/ASME SFA - 5.5	E8015 B6 H4R	
EN ISO 3580 - A	E CrMo5 B 42 H5	
TS EN ISO 3580 - A	E CrMo5 B 42 H5	
EM 243		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.
AWS/ASME SFA - 5.5	E12018-G	
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.

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.06	After Heat Treatment (680°C 1 Hour)					
Si: 0.35	530	610	22	20°C: 140		 2 Hour
Mn: 0.65						
Cr: 1.10						
Mo: 0.50						
C: 0.06	After Heat Treatment (700°C 1 Hour)					
Si: 0.40	550	650	20	20°C: 130		 2 Hour
Mn: 0.65						
Cr: 2.20						
Mo: 1.00						
C: 0.07	After Heat Treatment (700°C 1 Hour)					
Si: 0.30	520	620	20	20°C: 120		 2 Hour
Mn: 0.70						
Cr: 5.00						
Mo: 0.50						
C: 0.04	780	850	18	20°C: 80		 2 Hour
Si: 0.55						
Mn: 0.60						
Cr: 1.00						
Ni: 2.30						
Mo: 0.70						
C: 0.08	700	850	15	-		 2 Hour
Si: 0.80						
Mn: 0.60						
Cr: 1.30						
Ni: 0.05						
Mo: 0.90						
V: 0.55						
Cu: 0.08						

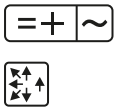
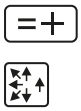
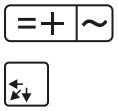
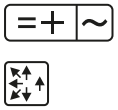
Low Alloy Steels

Products Name and Standards		Applications and Properties
EM 253		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.
AWS/ASME SFA - 5.5	**E11018-G**	
EM 255		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.
EN ISO 3580 - A	**E CrMoV1 B 42 H10**	
TS EN ISO 3580 - A	**E CrMoV1 B 42 H10**	
EM 285		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 pipes fabrication.
AWS/ASME SFA - 5.5	**E8015-B8 H4R**	
A No	5	
F No	4	
EM 290		Basic type, covered electrode for welding high temperature creep resistant steels type 9Cr-1Mo-V-Nb-N steels with operating temperatures of up to 650°C. Suitable for welding heat excharger pipes and components. Electrode is particularly suited for welding thick walled cast steel components, which are subjected to tempering of 8 hours at 740°C.
AWS/ASME SFA - 5.5	**~E9018-B9 H8**	
EN ISO 3580 - A	**~E CrMo9 B 42 H10**	
TS EN ISO 3580 - A	**~E CrMo9 B 42 H10**	
EM 295		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.
AWS/ASME SFA - 5.5	**E9015-B91 H4R**	
A No	A No	
F No	F No	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.07						
Si: 0.80						
Mn: 0.90						
Cr: 3.50	760	870	18	20°C: 45		 2 Hour
Mo: 0.65						
V: 0.50						
W: 0.60						
C: 0.10	**After Heat Treatment (700°C 1 Hour)**					
Si: 0.40						
Mn: 1.00	550	630	18	20°C: 50		 2 Hour
Cr: 1.20						
Mo: 1.00						
V: 0.20						
C: 0.06	**After Heat Treatment (750°C 1 Hour)**					
Si: 0.40						
Mn: 0.70	540	680	19	20°C: 50		 **2 Hour**
Cr: 9.00						
Mo: 1.00						
C: 0.12	**After Heat Treatment (760°C 1 Hour)**					
Si: 0.40						
Mn: 0.90						
Cr: 9.50	550	700	17	20°C: 70		 **2 Hour**
Ni: 0.15						
Mo: 1.15						
V: 0.20						
Nb: 0.05						
C: 0.11	**After Heat Treatment (760°C 2 Hour)**					
Si: 0.20						
Mn: 0.70						
P: <0.01						
S: <0.01						
Cr: 9.00	670	770	18	-		 **2 Hour**
Ni: 0.50						
Mo: 1.00						
V: 0.20						
Nb: 0.04						
N: 0.03						

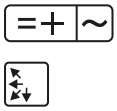
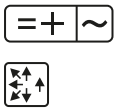
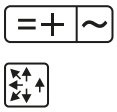
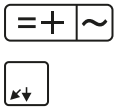
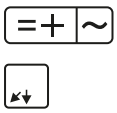
Stainless Steels

Products Name and Standards		Applications and Properties
EI 307R		Rutile coated electrode for joining dissimilar steels and depositing 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 win AC and DC.
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**	
EN 1600	E 18 8 Mn R 12	
DIN M. No.	1.4370	
EI 307B		Basic coated electrode for joining dissimilar steels and depositing 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+)
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**	
EN 1600	E 18 8 Mn B 22	
EIS 307		High efficiency (160 %) electrode for joining dissimilar steels and depositing 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 used with DCEP (DC+)
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**	
EN 1600	E 18 8 Mn R 53	
EI 308L		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.
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**	
EN 1600	E 19 9 L R 12	
EI 308Mo		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.
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**	
EN 1600	E 20 10 3 B 22	

Chemical Analysis (%)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.10	600	39	20°C: 80		 2 Hour
Si: 0.55					
Mn: 7.00					
Cr: 19.00					
Ni: 9.00					
C: 0.07	600	48	20°C: 70		 2 Hour
Si: 0.60					
Mn: 6.00					
Cr: 19.50					
Ni: 9.00					
C: 0.08	620	40	20°C: 70		 2 Hour
Si: 1.10					
Mn: 6.00					
Cr: 19.00					
Ni: 9.00					
C: 0.02	600	40	20°C: 70		 2 Hour
Si: 0.80					
Mn: 0.90					
Cr: 19.50					
Ni: 10.00					
C: 0.08	690	40	20°C: 70		 2 Hour
Si: 0.30					
Mn: 2.40					
Cr: 19.00					
Ni: 9.00					
Mo: 2.40					

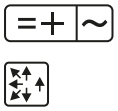
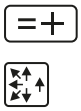
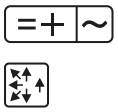
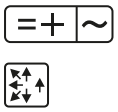
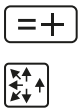
Stainless Steels

Products Name and Standards		Applications and Properties
EIS 308		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.
AWS/ASME SFA - 5.4	**E308-16**	
EN ISO 3581 - A	**E 19 9 R 53**	
TS EN ISO 3581 - A	**E 19 9 R 53**	
EN 1600	E 19 9 R 53	
EI 309L		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. 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.
AWS/ASME SFA - 5.4	**E309L-16**	
EN ISO 3581 - A	**E 23 12 L R 12**	
TS EN ISO 3581 - A	**E 23 12 L R 12**	
EN 1600	E 23 12 L R 12	
DIN M. No.	1.4332	
EI 309MoL		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 (molibdenum) 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.
AWS/ASME SFA - 5.4	**E309LMo-16**	
EN ISO 3581 - A	**E 23 12 2 L R 12**	
TS EN ISO 3581 - A	**E 23 12 2 L R 12**	
EN 1600	E 23 12 2 L R 12	
DIN M. No.	1.4459	
EIS 309		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.
AWS/ASME SFA - 5.4	**E309-16**	
EN ISO 3581 - A	**E (22 12) R 53**	
TS EN ISO 3581 - A	**E (22 12) R 53**	
EN 1600	E Z 23 12 LR 53	
EIS 309Mo		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 (molibdenum) 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.
AWS/ASME SFA - 5.4	**E309Mo-16**	
EN ISO 3581 - A	**E Z 23 12 2 LR 53**	
TS EN ISO 3581 - A	**E Z 23 12 2 LR 53**	
EN 1600	E Z 23 12 2 LR 53	

Chemical Analysis (%)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.05 **Si:** 0.85 **Mn:** 0.80 **Cr:** 19.50 **Ni:** 10.00	580	37	20°C: 65		 2 Hour
C: 0.02 **Si:** 0.90 **Mn:** 1.00 **Cr:** 23.00 **Ni:** 12.50	580	38	20°C: 60		 2 Hour
C: 0.02 **Si:** 0.90 **Mn:** 0.90 **Cr:** 22.50 **Ni:** 12.50 **Mo:** 2.50	680	32	20°C: 50		 2 Hour
C: 0.10 **Si:** 0.90 **Mn:** 0.80 **Cr:** 23.00 **Ni:** 12.00	550	38	20°C: 70		 2 Hour
C: 0.06 **Si:** 0.80 **Mn:** 0.80 **Cr:** 22.50 **Ni:** 13.00 **Mo:** 2.50	580	33	20°C: 50		 2 Hour

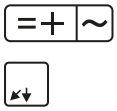
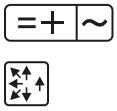
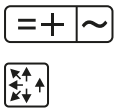
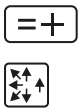
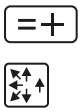
Stainless Steels

Products Name and Standards		Applications and Properties
EI 310		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.
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**	
EN 1600	E 25 20 R 32	
EI 310B		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.
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**	
EN 1600	E 25 20 B 12	
EI 312		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.
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**	
EN 1600	E 29 9 R 12	
EI 316L		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.
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**	
EN 1600	E 19 12 3 L R 32	
EI 316LB		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, inchemical, textile, paint, paper industries. Used with DCEP.
AWS/ASME SFA - 5.4	**E316L-15**	
EN ISO 3581 - A	**E 19 12 3 LB 42**	
TS EN ISO 3581 - A	**E 19 12 3 LB 42**	
EN 1600	E 19 12 3 LB 42	

Chemical Analysis (%)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.10 **Si:** 0.70 **Mn:** 1.50 **Cr:** 25.00 **Ni:** 20.00	600	30	20°C: 70		 2 Hour
C: 0.10 **Si:** 0.50 **Mn:** 2.00 **Cr:** 25.00 **Ni:** 20.00	600	33	20°C: 100		 2 Hour
C: 0.10 **Si:** 0.75 **Mn:** 1.10 **Cr:** 29.00 **Ni:** 10.00	780	24	20°C: 50		 2 Hour
C: 0.03 **Si:** 0.80 **Mn:** 0.90 **Cr:** 19.00 **Ni:** 12.00 **Mo:** 2.50	600	37	20°C: 70		 2 Hour
C: 0.02 **Si:** 0.45 **Mn:** 0.80 **Cr:** 18.00 **Ni:** 12.00 **Mo:** 2.80	575	38	-60°C: >27 20°C: >60		 2 Hour

Stainless Steels

Products Name and Standards		Applications and Properties
EIS 316		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.
AWS/ASME SFA - 5.4	**E316-16**	
EN ISO 3581 - A	**E 19 12 2 R 53**	
TS EN ISO 3581 - A	**E 19 12 2 R 53**	
EN 1600	E 19 12 2 R 53	
EI 318		Rutile type stainless steel electrode for welding stabilized austenitic stainless Cr-Ni-Mo steels and cast steels. For operating temperatures up to +400°C. Suitable for welding of stainless steel 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.
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**	
EN 1600	E 19 12 3 Nb R 32	
EI 347		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.
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**	
EN 1600	E 19 9 Nb R 32	
EIS 410		Basic type stainless steel electrode with high recovery, for welding of stainless and heat resistant chromium steels or cast steels having chromium of approx. 13%. 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.
AWS/ASME SFA - 5.4	**E410-15**	
EN ISO 3581 - A	**E (13) B 42**	
TS EN ISO 3581 - A	**E (13) B 42**	
EN 1600	E Z 13 B 42	
EIS 410NiMo		Basic type stainless steel high recovery electrode, for welding of 12-14% Cr and 3-4% Ni 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, 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.
AWS/ASME SFA - 5.4	**E410NiMo-15**	
EN ISO 3581 - A	**E 13 4 B 42**	
TS EN ISO 3581 - A	**E 13 4 B 42**	
EN 1600	E 13 4 B 42	

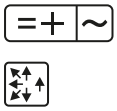
Chemical Analysis (%)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.07	600	35	20°C: 65		 2 Hour
Si: 0.85					
Mn: 0.80					
Cr: 19.00					
Ni: 12.00					
Mo: 2.50					
C: 0.06	600	35	20°C: 70		 2 Hour
Si: 0.90					
Mn: 0.80					
Cr: 18.50					
Ni: 12.00					
Mo: 2.50					
Nb: 0.35					
C: 0.04	600	38	20°C: 70		 2 Hour
Si: 0.90					
Mn: 0.80					
Cr: 19.00					
Ni: 10.00					
Nb: 0.35					
C: 0.06	750	22	20°C: 50		 2 Hour
Si: 0.50					
Mn: 0.80					
Cr: 13.00					
Ni: 0.70					
C: 0.06	850	17	20°C: 47		 2 Hour
Si: 0.50					
Mn: 0.80					
Cr: 12.00					
Ni: 4.00					
Mo: 0.50					

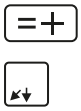
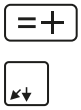
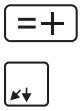
Stainless Steels

Products Name and Standards		Applications and Properties
EI 2209		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-strenght 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.
AWS/ASME SFA - 5.4	**E2209-16**	
EN ISO 3581 - A	**E 22 9 3 N L R 12**	
TS EN ISO 3581 - A	**E 22 9 3 N L R 12**	
EN 1600	E 22 9 3 N L R 12	

Aluminum Alloys

Products Name and Standards		Applications and Properties
EAL 1100		It is the specially coated electrode for pure aluminium welding. It has very good color harmony with base metal. Its corrosion resistance and electrical conductivity are high. The electrode may be welded in the positive (+) pole in DC. The electrode should be held vertical to the work piece and it should be operated with short arc length. Thick plates of more than 10 mm and large work pieces require a pre-annealing between 150-250°C. Since slag residues are corrosive, they must be cleaned after welding. Electrodes can also be used in oxy-acetylene welding. S ince their covers are prone to moisture, they must be stored in a dry environment and the moist electrodes must be used after drying. **TIG Welding Rod:** TAL 1100 **GMA (MIG) - Welding Wire:** MAL 1100
AWS/ASME SFA - 5.3	**E1100**	
TS 9604	**EL-Al99.5**	
DIN 1732	EL-Al99.5	
EAL 4043		Electrode with special covering for welding aluminium-silicon alloys and for joining dissimilar aluminium alloys. Used with DCEP. In welding, hold electrode perpendicularly to workpiece, with a short arc. Wall thickness greater than 10 mm and larger workpieces will require preheating from 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. **TIG Welding Rod: TAL** 4043 **GMA (MIG) - Welding Wire:** MAL 4043
AWS/ASME SFA - 5.3	**E4043**	
TS 9604	**EL-AlSi5**	
DIN 1732	EL-AlSi5	
EAL 4047		Electrode with special covering for welding aluminium-silicon cast alloys. In welding, hold electrode perpendicularly to workpiece, with a short arc. Wall thickness greater than 10 mm and larger workpieces will require preheating from 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. **TIG Welding Rod:** TAL 4047 **GMA (MIG) - Welding Wire:** MAL 4047
TS 9604	**EL-AlSi12**	
DIN 1732	EL-AlSi12	

Chemical Analysis (%)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
C: 0.025	>750	27	-20°C: >35 20°C: >47		 2 Hour
Si: 0.80					
Mn: 0.95					
Cr: 23.00					
Ni: 9.50					
Mo: 2.80					
N: 0.15					

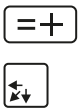
Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Redrying Information
Al: 99.5	75	115	26	-		 2 Hour
Si: 5.20	>40	>120	>8	-		 2 Hour
Cu: 0.20						
Al: 93.80						
Fe: 0.80						
Si: 12.00	165	283	7	-		 2 Hour
Cu: 0.20						
Al: 87.00						
Fe: 0.80						

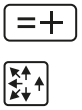
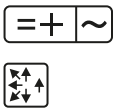
Copper Alloys

Products Name and Standards	Applications and Properties
ECU Sn7 **AWS/ASME SFA - 5.6** **~ECuSn-C** DIN 1733 EL-CuSn7	Electrode for joining and surfacing of pure copper and copper alloys, steel, cast steel, grey cast iron such as piston arms,sprockels,guides, turbine and centrifugal blades, ship screw propellers, motor collectors etc. Suitable for surfacing weld on above materials. 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. Possible to use both with AC and DC. **GMA (MIG) - Welding Wire:** MCU Sn6
ECU Al8 **AWS/ASME SFA - 5.6** **ECuAl-A2** DIN 1733 EL-CuAl9	Electrode depositing 8% Al containing aluminium bronze weld metal. Suitable for welding aluminium bronze base metals. Also widely used for surfacing of components subjected to metal to metal wear even in corrosive environments (acids, sea water,etc.) Used with DCEP. **TIG Welding Rod:** TCU Al8 **GMA (MIG) - Welding Wire:** MCU Al8

Nickel Alloys

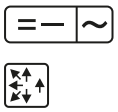
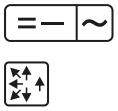
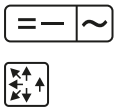
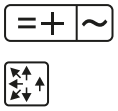
Products Name and Standards	Applications and Properties
ENI 420 **AWS/ASME SFA - 5.11** **ENiCu-7** **EN ISO 14172** **E Ni 4060** **TS EN ISO 14172** **E Ni 4060** DIN M. No. 2.4366	Electrode having monel core wire, designed for joining and surfacing welds of Monel-clad steels. Suitable for joining 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. Possible to use with DCEP.
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. 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. Chemical industries, petrochemical industries, glassworks, civil engineering, repairing and maintenance workshops.
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-Molibdenum 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 in welding hot-work press tools, forge dies, hot-stripping tools, pump rotors, 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 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.

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Hardness (HB)	Current Type Polarity Welding Positions	Redrying Information
Cu: 92.00 **Sn:** 7.00 **Other:** 1.00	130	290	-	110		 2 Hour
Cu: Rest **Al:** 8.00 **Mn:** 0.50 **Fe:** 0.50	180	420	>20	180		 1 Hour

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Hardness (HB)	Current Type Polarity Welding Positions	Redrying Information
C: 0.10 **Mn:** 2.50 **Ni:** 65.40 **Cu:** 30.00 **Fe:** 1.50	320	550	33	20°C: 120	-		 2 Hour
C: <0.04 **Si:** 0.40 **Mn:** 6.00 **Cr:** 16.50 **Ni:** >68.00 **Mo:** 0.20 **Nb:** 2.00 **Fe:** 6.00	>380	>620	>35	-196°C: >65 20°C: >80	-		 2 Hour
Co: 1.40 **C:** 0.02 **Si:** 1.00 **Mn:** 0.50 **Cr:** 15.00 **Ni:** Rest **Mo:** 15.00 **Fe:** 6.50 **W:** 3.10	520	720	33	-	As Welded 200 Work Hardened 375 - 420		 2 Hour

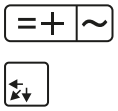
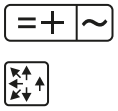
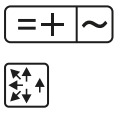
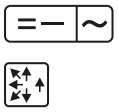
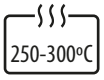
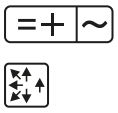
Cast Iron

Products Name and Standards		Applications and Properties
ENI 402 (Ni)		Electrode having a pure nickel core wire for welding cast iron without or with low preheating (max. +300°C). For repair welding of cracked cast iron parts or joining components made of steel, copper or nickel materials to castings. Electrode suited to welding cast iron with lamellar graphite, white and black heart malleable and nodular cast iron. Weld metal is machinable. 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. Preferably used with DCEP but possible to use also with AC.
AWS/ASME SFA - 5.15	ENi-CI	
EN ISO 1071	E C Ni - CI 3	
TS EN ISO 1071	E C Ni - CI 3	
ENI 406 (Mo)		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. Electrode is preferably used for making filler and cover passes of for filling-up shrinkage cavities. Weld metal closely matches colour of base metal. 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.
AWS/ASME SFA - 5.15	ENiCu-B	
EN ISO 1071	E C NiCu-B 3	
TS EN ISO 1071	E C NiCu-B 3	
ENI 412		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.
AWS/ASME SFA - 5.15	ENi-CI	
EN ISO 1071	E C Ni-CI 3	
TS EN ISO 1071	E C Ni-CI 3	
ENI 416 (NiFe)		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.
AWS/ASME SFA - 5.15	ENiFe-CI	
EN ISO 1071	E C NiFe-CI 3	
TS EN ISO 1071	E C NiFe-CI 3	

Chemical Analysis (%)	Hardness (HB)	Current Type Polarity Welding Positions	Redrying Information
Ni: 98.00 **Other:** 2.00	~160		 1 Hour
Ni: 64.00 **Cu:** 32.00 **Other:** 4.00	~160		 1 Hour
C: 1.30 **Si:** 0.80 **Mn:** 0.40 **Ni:** 96.00 **Fe:** 1.80	~175		 1 Hour
C: 1.00 **Si:** 0.60 **Mn:** 0.40 **Ni:** 55.00 **Fe:** 43.00	~210		 1 Hour

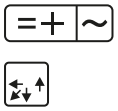
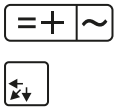
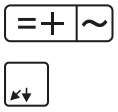
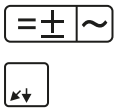
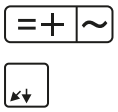
Hardfacing Applications

Products Name and Standards		Applications and Properties
EH 245 **AWS/ASME SFA - 5.13** **EN 14700** **TS EN 14700** DIN 8555	**EFeMn-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. 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.
EH 330 **EN 14700** **TS EN 14700** DIN 8555	**E Fe1** **E Fe1** E 1-UM-300	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.
EH 340 **EN 14700** **TS EN 14700** DIN 8555	**E Fe1** **E Fe1** E 1-UM-400	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.
EH 360R **EN 14700** **TS EN 14700** DIN 8555	**E Fe8** **E Fe8** E 6-UM-60 (65W) T	Thick rutile-covered electrode for depositing tough and wear resisting hardfacing overlays. It is particularly resistant to high meta-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.
EH 360B **EN 14700** **TS EN 14700** DIN 8555	**E Fe8** **E Fe8** E 6-UM-60 (65W) T	Thick basic-covered electrode for depositing tough and wear resisting overlays on structural members subjected to severe wear. It is particularly resistant to high meta-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.

Chemical Analysis (%)	Hardness	Current Type Polarity Welding Positions	Redrying Information
C: 0.70 **Mn:** 12.00 **Ni:** 3.00 **Fe:** Rest	As Welded : 200 HB Work Hardened: 450 HB		 2 Hour
C: 0.10 **Si:** 0.70 **Mn:** 0.90 **Cr:** 3.00 **Fe:** Rest	300 HB		 2 Hour
C: 0.12 **Si:** 0.80 **Mn:** 0.65 **Cr:** 2.75 **Fe:** Rest	42 HRc		 2 Hour
C: 0.40 **Si:** 0.50 **Mn:** 0.30 **Cr:** 7.00 **V:** 0.50 **Fe:** Rest	59 HRc		 2 Hour
C: 0.40 **Si:** 0.50 **Mn:** 0.30 **Cr:** 7.00 **V:** 0.50 **Fe:** Rest	59 HRc		 2 Hour

Hardfacing Applications

Products Name and Standards		Applications and Properties
EH 380		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.
AWS/ASME SFA - 5.13	**EFe6**	
EN 14700	**E Fe4**	
TS EN 14700	**E Fe4**	
DIN 8555	E 4-UM-60 (65) S	
EH 515		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 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 weld beads with flat penetration. Possible to use both with AC and DC.
EN 14700	**E Fe14**	
TS EN 14700	**E Fe14**	
DIN 8555	E 10-UM-60-CR	
EH 528		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 SiO_2. The weld metal is machinable only by grinding. Weld with long arc length shall not be welded more then 2 layers. Possible to use with both DC and AC.
EN 14700	**E Fe16**	
TS EN 14700	**E Fe16**	
DIN 8555	E 10-UM-65-GR	
EH 531		Heavy coated, high recovery (235%) hardfacing electrode, depositing evenly distributed Cr, 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, 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.
DIN 8555	E 10-UM-65-GR	
EH 540		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 shall not be welded more then 4 layers. Possible to use with both DC and AC.
EN 14700	**E Fe16**	
TS EN 14700	**E Fe16**	
DIN 8555	E 10-UM-65-GR	

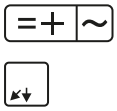
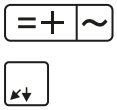
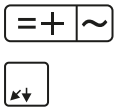
Chemical Analysis (%)	Hardness	Current Type Polarity Welding Positions	Redrying Information
C: 1.00 **Si:** 1.00 **Mn:** 1.300 **Cr:** 5.00 **Mo:** 8.00 **V:** 2.50 **W:** 1.90 **Fe:** Rest	As Welded : 57 - 63 HRc After Heat Treatment: 62 - 66 HRc		 2 Hour
C: 2.90 **Mn:** 1.10 **Cr:** 35.00 **Fe:** Rest	60 HRc		 2 Hour
C: 7.00 **Cr:** 24.00 **Nb:** 7.00 **Fe:** Rest	63 HRc		 2 Hour
C: 4.20 **Si:** 1.30 **Mn:** 0.30 **Cr:** 31.00 **B:** 1.20 **Fe:** Rest	65 HRc (1 Pass)		 2 Hour
C: 6.00 **Si:** 1.00 **Cr:** 22.00 **Mo:** 6.00 **V:** 1.00 **Nb:** 6.00 **W:** 2.00 **Fe:** Rest	62 (1st Pass) HRc 64 (2nd Pass) HRc 65 (3rd Pass) HRc 66 (4th Pass) HRc		 2 Hour

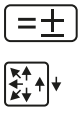
Hardfacing Applications

Products Name and Standards	Applications and Properties
EH 801 **AWS/ASME SFA - 5.13** **ECoCr-C** **EN 14700** **E Co3** **TS EN 14700** **E Co3** DIN 8555 E 20-UM-55-CTZ	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 negative (-) and possible to use with also AC. **TIG Welding Rod:** TH 801 **Gas-Shielded Flux Cored Wire:** FCH 801
EH 806 **AWS/ASME SFA - 5.13** **ECoCr-A** **EN 14700** **E Co2** **TS EN 14700** **E Co2** DIN 8555 E 20-UM-45-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 negative (-) and possible to use with also AC. **TIG Welding Rod:** TH 806 **Gas-Shielded Flux Cored Wire:** FCH 806
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 negative (-) and possible to use with also AC. **TIG Welding Rod:** TH 812 **Gas-Shielded Flux Cored Wire:** FCH 812

Cutting and Gouging

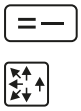
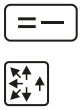
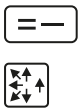
Products Name and Standards	Applications and Properties
E CUT - S	Electrode especially used for all cutting, gouging, bevelling and piercing purposes. Particularly suitable for cutting industrial metals like steels, cast irons, non-ferrous metals and also metals which are difficult or impossible to cut with oxyacetylene process. Resulted surface finish is very clean and smooth. Suitable ECUT-S should be definetely not left to dry, but should contain certain amount of dampness. Possible to use in DCEN or DCEP. DCEN provides higher metal removal speed.

Chemical Analysis (%)	Hardness	Current Type Polarity Welding Positions	Redrying Information
Co: Rest **C:** 2.30 **Si:** 1.00 **Mn:** 1.00 **Cr:** 32.00 **W:** 13.00	55 HRc		 1 Hour
Co: Rest **C:** 1.00 **Si:** 1.00 **Mn:** 1.00 **Cr:** 27.00 **W:** 5.00	43 HRc		 1 Hour
Co: Rest **C:** 1.80 **Si:** 1.00 **Mn:** 1.00 **Cr:** 30.00 **W:** 9.00	52 HRc		 1 Hour

Chemical Analysis (%)	Hardness	Current Type Polarity Welding Positions	Redrying Information
-	-		-

Mild Steels

Products Name and Standards		Applications and Properties
OG 1		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.
AWS/ASME SFA - 5.2	**R45**	
EN 12536	**O I**	
TS 3623 EN 12536	**O I**	
OG 2		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.
AWS/ASME SFA - 5.2	**R 60**	
EN 12536	**O II**	
TS 3623 EN 12536	**O II**	
TG 1		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. **MAG Welding Wire:** MG 1
AWS/ASME SFA - 5.18	**ER70S-3**	
EN ISO 636 - A	**W 42 3 W2Si**	
TS EN ISO 636 - A	**W 42 3 W2Si**	
TG 2		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. **MAG Welding Wire:** MG 2
AWS/ASME SFA - 5.18	**ER70S-6**	
EN ISO 636 - A	**W 46 2 W3Si1**	
TS EN ISO 636 - A	**W 46 2 W3Si1**	
DIN M. No.	1.5125	
TG 3		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. **MAG Welding Wire:** MG 3
AWS/ASME SFA - 5.18	**ER70S-6**	
EN ISO 636 - A	**W 46 3 W4Si1**	
TS EN ISO 636 - A	**W 46 3 W4Si1**	
DIN M. No.	1.5130	

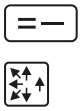
Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.08 **Si:** 0.05 **Mn:** 0.50 **P:** <0.025 **S:** <0.025	280	450	20	20°C: 50		-
C: 0.08 **Si:** 0.05 **Mn:** 1.00 **P:** <0.025 **S:** <0.025	300	440	20	20°C: 50		-
C: 0.08 **Si:** 0.55 **Mn:** 1.20 **P:** <0.025 **S:** <0.025	460	530	28	30°C: 40		I1 (%100 Ar)
C: 0.07 **Si:** 0.85 **Mn:** 1.45 **P:** <0.025 **S:** <0.025	480	560	28	-30°C: 70 -20°C: 90		I1 (%100 Ar)
C: 0.08 **Si:** 0.85 **Mn:** 1.70 **P:** <0.025 **S:** <0.025	490	580	28	-30°C: 50		I1 (%100 Ar)

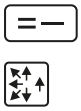
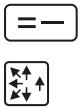
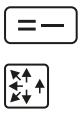
Mild Steels

Products Name and Standards	Applications and Properties
TG 102 **AWS/ASME SFA - 5.18** **ER70S-2** **EN ISO 636 - A** **W 42 2 W2Ti** **TS EN ISO 636 - A** **W 42 2 W2Ti**	Micro-alloyed, GTA (TIG) welding rod for unalloyed steels. Due to its 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. **MAG Welding Wire:** MG 102

Low Alloy Steels

Products Name and Standards	Applications and Properties
TG 150 **AWS/ASME SFA - 5.28** **ER80S-Ni1** **EN ISO 636 - A** **W 46 6 W3Ni1** **TS EN ISO 636 - A** **W 46 6 W3Ni1**	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 root and fill passes of pipes, boilers, tanks and also valves, pumps which are made of cast or forged steels. **MAG Welding Wire:** MG 150
TG 171 **AWS/ASME SFA - 5.28** **ER80S-Ni2** **EN ISO 636 - A** **W2Ni2** **TS EN ISO 636 - A** **W2Ni2**	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.
TG 201 **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	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. **MAG Welding Wire:** MG 201

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.06 **Si:** 0.60 **Mn:** 1.20 **Zr:** 0.06 **Al:** 0.07 **Ti:** 0.10	> 490	> 570	> 24	-30°C: 50		I1 (%100 Ar)

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.09 **Si:** 0.50 **Mn:** 1.05 **Ni:** 0.90	≥470	≥550	≥20	-60°C: ≥47 20°C: ≥100		I1 (%100 Ar)
C: 0.09 **Si:** 0.52 **Mn:** 1.10 **Ni:** 2.45	≥470	≥550	≥20	-90°C: ≥47 20°C: ≥200		I1 (%100 Ar)
C: 0.08 **Si:** 0.60 **Mn:** 1.00 **Mo:** 0.50	500	590	25	-20°C: 60 20°C: 110		I1 (%100 Ar)

Low Alloy Steels

Products Name and Standards	Applications and Properties

TG 201A

AWS/ASME SFA - 5.28	**ER80S-D2**
EN ISO 21952 - A	**W Z MnMo**
TS EN ISO 21952 - A	**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.

MAG Welding Wire: MG 201A

TG 211

AWS/ASME SFA - 5.28	**ER80S-G**
EN ISO 21952 - A	**W CrMo1Si**
TS EN ISO 21952 - A	**W CrMo1Si**
DIN M. No.	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.

MAG Welding Wire: MG 211

TG 211A

AWS/ASME SFA - 5.28	**ER80S-B2**
EN ISO 21952 - B	**W 55 1CM**
TS EN ISO 21952 - B	**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.

MAG Welding Wire: MG 211A

TG 222

AWS/ASME SFA - 5.28	**ER90S-G**
EN ISO 21952 - A	**W CrMo2Si**
TS EN ISO 21952 - A	**W CrMo2Si**
DIN M. No.	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.

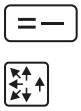
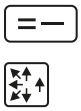
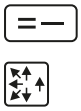
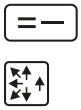
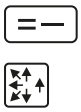
MAG Welding Wire: MG 222

TG 222A

AWS/ASME SFA - 5.28	**ER90S-B3**
EN ISO 21952 - B	**W 62 2C1M**
TS EN ISO 21952 - B	**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.

MAG Welding Wire: MG 222 A

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.08 **Si:** 0.60 **Mn:** 1.80 **Mo:** 0.50	520	600	25	-30°C: 65 20°C: 110		I1 (%100 Ar)
C: 0.08 **Si:** 0.60 **Mn:** 1.00 **Cr:** 1.10 **Mo:** 0.50	510	620	24	-20°C: 60 20°C: 90		I1 (%100 Ar)
C: 0.08 **Si:** 0.60 **Mn:** 0.60 **Cr:** 1.35 **Mo:** 0.50	**As Welded** 550	650	20	20°C: 80		I1 (%100 Ar)
	After Heat Treatment (620°C 2 Hour) 500	590	24	20°C: 130		
C: 0.05 **Si:** 0.60 **Mn:** 1.00 **Cr:** 2.50 **Mo:** 1.00	**As Welded** 560	660	22	-18°C: 100 20°C: 120		I1 (%100 Ar)
	After Heat Treatment (690°C 2 Hour) 550	650	23	-18°C: 120 20°C: 140		
C: 0.08 **Si:** 0.50 **Mn:** 0.60 **Cr:** 2.40 **Mo:** 1.00	**After Heat Treatment (690°C 2 Hour)** 540	640	22	-10°C: 90 20°C: 150		I1 (%100 Ar)

TIG and OXY GAS RODS (GTAW)

Low Alloy Steels

Products Name and Standards	Applications and Properties
TG 235 **AWS/ASME SFA - 5.28** **ER80S-B6** **EN ISO 21952 - A** **W CrMo5Si** **TS EN ISO 21952 - A** **W CrMo5Si** DIN M. No. 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. By its high steam, 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 295 **AWS/ASME SFA - 5.28** **ER90S-B9** **EN ISO 21952 - A** **W CrMo91** **TS EN ISO 21952 - A** **W CrMo91** DIN M. No. 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. Observe directions of pre- and post-weld heat treatment of base metal.

Stainless Steels

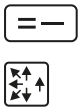
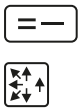
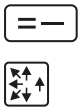
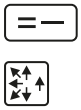
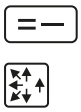
Products Name and Standards	Applications and Properties
TI 307Si **AWS/ASME SFA - 5.9** **~ER307** **EN ISO 14343 - A** **W 18 8 Mn** **TS EN ISO 14343 - A** **W 18 8 Mn** DIN M. No. 1.4370	Austenitic stainless steel wire rod for GTA (TIG) welding of dissimilar steels, difficult to weld steels, armour 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. **Stick Electrodes:** EI 307R, EI 307B, EIS 307 **GMA (MIG/MAG) - Welding Wire:** MI 307Si
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 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. **GMA (MIG/MAG) - Welding Wire:** MI 308 LSİ

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.05	**As Welded**					
Si: 0.40	580	700	24	20°C: 100		I1 (%100 Ar)
Mn: 0.60						
Cr: 5.50	**After Heat Treatment (740°C 2 Hour)**					
Mo: 0.60	570	690	25	20°C: 80		
C: 0.10	**As Welded**					
Si: 0.30						
Mn: 0.80	590	680	22	-30°C: 80 20°C: 120		I1 (%100 Ar)
Cr: 9.00						
Ni: 0.50	**After Heat Treatment (760°C 2 Hour)**					
Mo: 0.90						
V: 0.20						
Cu: 0.20	560	700	18	-30°C: 90 20°C: 130		
Nb: 0.06						

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: ≤0.20						
Si: ≤1.20						
Mn: 5.00 - 8.00	>350	600	40	20°C: 90		-
Cr: 17.00 - 20.00						
Ni: 7.00 - 20.00						
C: <0.03						
Si: 0.30 - 0.65						
Mn: 1.00 - 2.50	420	620	36	20°C: 135		I1 (%100 Ar)
Cr: 19.50 - 22.50						
Ni: 9.00 - 11.00						

Stainless Steels

Products Name and Standards		Applications and Properties
TI 309L		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. **GMA (MIG/MAG) - Welding Wire:** MI 309 LSİ
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	
TI 310		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. **GMA (MIG/MAG) - Welding Wire:** MI 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	
TI 312		Austenitic-ferritic stainless steel wire electrode for TIG 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. **Stick Electrodes:** EI 312 **GMA (MIG/MAG) - Welding Wire:** MI 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	
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 its 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. **GMA (MIG/MAG) - Welding Wire:** MI 316LSİ
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 chemical tanks, pipes and equipments which are used in chemical and petrochemical 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	

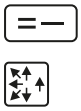
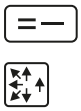
Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: <0.03 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 23.00 - 25.00 **Ni:** 12.00 - 14.00	>400	550 - 650	>30	20°C: 47		I1 (%100 Ar)
C: 0.08 - 0.15 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 25.00 - 28.00 **Ni:** 20.00 - 22.50 **Mo: 0**.75	380	630	32	20°C: 80		I1 (%100 Ar)
C: ≤0.15 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 28.00 - 32.00 **Ni:** 8.00 - 10.50	550	700	20	20°C: 50		I1 (%100 Ar)
C: <0.03 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 18.00 - 20.00 **Ni:** 11.00 - 14.00 **Mo:** 2.00 - 3.00	450	620	33	20°C: 130		I1 (%100 Ar)
C: <0.08 **Si:** <0.65 **Mn:** 1.00 - 2.50 **Cr:** 18.00 - 20.00 **Ni:** 11.00 - 14.00 **Mo:** 2.00 - 3.00 **Nb:** <1.00	480	640	32	20°C: 130		I1 (%100 Ar)

Stainless Steels

Products Name and Standards		Applications and Properties
TI 347		Stabilized austenitic stainless steel welding rod for GTA (TIG) welding of unstabilized and stabilized corrosion resisting Cr-Ni steels, used 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. **Stick Electrodes:** EI 347 **GMA (MIG/MAG) - Welding Wire:** MI 347
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 2209		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. **Stick Electrodes:** EI 2209 **GMA (MIG/MAG) - Welding Wire:** MI 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	

Aluminum Alloys

Products Name and Standards		Applications and Properties
TAL 1100		Pure aluminium GTA(TIG) welding of unalloyed aluminium base metals. It has got good colour matching with base material. High corrosion resistance and excellent electrical conductivity. **Stick Electrodes:** EAL 1100 **GMA (MIG/MAG) - Welding Wire:** MAL 1100
AWS/ASME SFA - 5.10	**ER1100**	
EN ISO 18273	**S Al 1100 (Al99.0Cu)**	
TS 6204 EN ISO 18273	**S Al 1100 (Al99.0Cu)**	
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 < 2 % alloying elements. **Stick Electrodes:** EAL 4043 **GMA (MIG/MAG) - Welding Wire:** MAL 4043
AWS/ASME SFA - 5.10	**ER4043**	
EN ISO 18273	**S Al 4043 (AlSi5)**	
TS 6204 EN ISO 18273	**S Al 4043 (AlSi5)**	
DIN M. No.	3.2245	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: <0.08	>350	570 - 670	>30	20°C: 65		I1 (%100 Ar)
Si: 0.30 - 0.65						
Mn: 1.00 - 2.50						
Cr: 19.00 - 21.50						
Ni: 9.00 - 11.00						
Nb: <1.00						
C: ≤0.03	≥480	≥680	≥22	-40°C: ≥3 20°C: ≥50		I1 (%100 Ar)
Si: ≤0.90						
Mn: 0.50 - 2.00						
Cr: 21.50 - 23.50						
Ni: 7.50 - 9.50						
Mo: 2.50 - 3.50						

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
Al: 99.50	>20	>65	>35	-		I1 (%100 Ar)
Mg: 0.05	>40	>120	>18	-		I1 (%100 Ar)
Si: 5.00						
Mn: 0.05						
Al: 94.00						
Fe: 0.40						
Ti: 0.15						

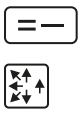
Aluminum Alloys

Products Name and Standards		Applications and Properties
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. **Stick Electrodes:** EAL 4047 **GMA (MIG/MAG) - Welding Wire:** MAL 4047
AWS/ASME SFA - 5.10	**ER4047**	
EN ISO 18273	**S Al 4047A (AlSi12(A))**	
TS 6204 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. **GMA (MIG/MAG) - Welding Wire:** MAL 5183
AWS/ASME SFA - 5.10	**ER5183**	
EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**	
TS 6204 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. **GMA (MIG/MAG) - Welding Wire:** MAL 5356
AWS/ASME SFA - 5.10	**ER5356**	
EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**	
TS 6204 EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**	
DIN M. No.	3.3556	

Copper Alloys

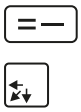
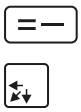
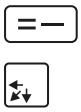
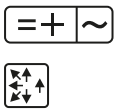
Products Name and Standards		Applications and Properties
TCU Al8		Aluminium bronze welding rod for GTA (TIG) welding of aluminium bronzes, high strength brass, steel, gray cast iron used in machine building and in the chemical industry, as well as in shipbuilding. Alloy showing resistance to corrosion 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-ups on ship propellers, skid rails, bearing surfaces, bearings, valves, slide gates, fittings. **Stick Electrodes:** ECU Al8 **GMA (MIG/MAG) - Welding Wire:** MCU Al8
AWS/ASME SFA - 5.07	**ERCuAl-A1**	
EN ISO 24373	**S Cu 6100 (CuAl8)**	
TS EN ISO 24373	**S Cu 6100 (CuAl8)**	
DIN M. No.	2.0921	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Current Type Polarity Welding Positions	Shielding Gas
Si: 12.00 **Mn:** 0.15 **Cu:** 0.20 **Al:** 88.00 **Fe:** 0.60	>60	>130	>5		I1 (%100 Ar)
Mg: 4.30 - 5.20 **Si:** 0.15 **Mn:** 0.50 **Cr:** 0.05 **Al:** Rest **Fe:** 0.40 **Ti:** 0.10	>120	>250	>16		I1 (%100 Ar)
Mg: 4.50 - 5.00 **Mn:** 0.05 - 0.20 **Cr:** 0.05 - 0.20 **Al:** Rest **Ti:** 0.06 - 0.15	>110	>235	>17		I1 (%100 Ar)

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Hardness (HB)	Current Type Polarity Welding Positions	Shielding Gas
Mn: <0.50 **Cu:** Rest **Al:** 6.00 - 8.50	200	430	40	100		I1 (%100 Ar)

Hardfacing Applications

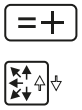
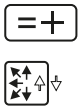
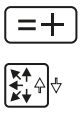
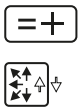
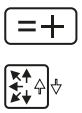
Products Name and Standards		Applications and Properties
TH 801 **AWS/ASME SFA - 5.21** **EN 14700** **TS EN 14700** DIN 8555	**ERCoCr-C** **T Co3** **T Co3** WSG 20 GO 55 CTZ	Co-Cr-W alloy GTA (TIG) welding rod for hardfacing applications. Weld metal has got high resistance to metal-to-metal wear, corrosion and high temperatures from 500°C to 900°C. Resistant to low and medium level of mechanical and thermal shocks, due to its high hardness. Widely used for hard surfacing 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. **Stick Electrodes:** EH 801 **Gas-Shielded Flux Cored Wire:** FCH 801
TH 806 **AWS/ASME SFA - 5.21** **EN 14700** **TS EN 14700** DIN 8555	**ERCoCr-A** **T Co2** **T Co2** WSG 20 GO 45 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 hard surfacing of hot shearing blades, ingot tong ends, valves and valve seats, nozzles and glass dies. **Stick Electrodes:** EH 806 **Gas-Shielded Flux Cored Wire:** FCH 806
TH 812 **AWS/ASME SFA - 5.21** **EN 14700** **TS EN 14700** DIN 8555	**ERCoCr-B** **T Co3** **T Co3** E 10-UM-65-GR	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 hard surfacing of tools for cutting and machining of paper, cardboard, floor coverings, roofing and wood, extrusion screws, glass dies. **Stick Electrodes:** EH 812 **Gas-Shielded Flux Cored Wire:** FCH 812
T CARBIDE 3000 DIN 8555	G21 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.

Typical Chemical Analysis of Welding Rod (%)	Hardness (HRc)	Current Type Polarity Welding Positions	Shielding Gas
Co: Rest **C:** 2.30 **Si:** 0.80 **Mn:** <1.00 **Cr:** 30.00 **Ni:** <3.00 **Fe:** <3.00 **W:** 13.00	51 - 59		I1 (%100 Ar)
Co: Rest **C:** 1.10 **Si:** 1.10 **Mn:** <1.00 **Cr:** 28.00 **Ni:** <3.00 **Fe:** <3.00 **W:** 4.00	38 - 48		I1 (%100 Ar)
Co: Rest **C:** 1.40 **Si:** 1.50 **Mn:** <1.00 **Cr:** 29.00 **Ni:** <3.00 **Fe:** <3.00 **W:** 8.00	44 - 52		I1 (%100 Ar)
-	**Matris (HRC):** 40 - 45 **W^2C, WC (HV):** 2350		 1 Hour

MIG/MAG (GMAW) WIRES

Mild Steels

Products Name and Standards		Applications and Properties
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 in thin metal plates and repair welds. A thin and homogeneous copper coating increases electrical conducvitiy and protects the wire from using. **TIG Welding Rod:** TG 1
AWS/ASME SFA - 5.18	**ER70S-3**	
EN ISO 14341 - A	**G 38 3 M21 G 2Si**	
EN ISO 14341 - A	**G 38 3 C1 G 2Si**	
TS EN ISO 14341 - A	**G 38 3 M21 G 2Si**	
TS EN ISO 14341 - A	**G 38 3 C1 G 2Si**	
DIN 8559	SG 1	
DIN M. No.	1.5112	
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 **TIG Welding Rod:** TG 2
AWS/ASME SFA - 5.18	**ER70S-6**	
EN ISO 14341 - A	**G 42 4 M21 G 3Si1**	
EN ISO 14341 - A	**G 42 3 C1 G 3Si1**	
TS EN ISO 14341 - A	**G 42 4 M21 G 3Si1**	
TS EN ISO 14341 - A	**G 42 3 C1 G 3Si1**	
DIN 8559	SG 2 CY 42 43	
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. **TIG Welding Rod:** TG 3
AWS/ASME SFA - 5.18	**ER70S-6**	
EN ISO 14341 - A	**G 46 4 M21 G 4Si1**	
EN ISO 14341 - A	**G 46 4 C1 G 4Si1**	
TS EN ISO 14341 - A	**G 46 4 M21 G 4Si1**	
TS EN ISO 14341 - A	**G 46 4 C1 G 4Si1**	
DIN 8559	SG 3 CY 46 43	
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 G 3Si1**	
EN ISO 14341 - A	**G 42 4 C1 G 3Si1**	
TS EN ISO 14341 - A	**G 42 4 M21 G 3Si1**	
TS EN ISO 14341 - A	**G 42 4 C1 G 3Si1**	
DIN 8559	SG 2 CY 42 43	
TS 5618	SG 2 CY 42 43	
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 G 4Si1**	
EN ISO 14341 - A	**G 46 4 C1 G 4Si1**	
TS EN ISO 14341 - A	**G 46 4 M21 G 4Si1**	
TS EN ISO 14341 - A	**G 46 4 C1 G 4Si1**	
DIN 8559	SG 3 CY 46 43	
TS 5618	SG 3 CY 46 43	
DIN M. No.	1.5130	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.08 **Si:** 0.60 **Mn:** 1.20	**With M21 Shielding Gas** 425	480	30	-30°C: 100		**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)
	With C1 Shielding Gas 395	475	30	-30°C: 80		
C: 0.08 **Si:** 0.80 **Mn:** 1.45	**With M21 Shielding Gas** 430	530	28	-40°C: 55		**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)
	With C1 Shielding Gas 460	530	29	-30°C: 50		
C: 0.08 **Si:** 0.90 **Mn:** 1.65	470	540	29	-40°C: 55		**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)
C: 0.08 **Si:** 0.80 **Mn:** 1.45	**With M21 Shielding Gas** 460	550	30	-40°C: 70		**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)
	With C1 Shielding Gas 440	530	30	-40°C: 60		
C: 0.08 **Si:** 0.90 **Mn:** 1.65	**With C1 Shielding Gas** 470	540	29	-40°C: 55		**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)

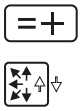
MIG/MAG (GMAW) WIRES

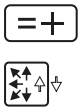
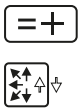
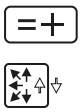
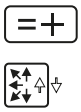
Mild Steels

Products Name and Standards		Applications and Properties
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. **TIG Welding Rod:** TG 102
AWS/ASME SFA - 5.18	ER70S-2	
EN ISO 14341 - A	G 42 3 M21 G 2Ti	
EN ISO 14341 - A	G 42 3 C1 G 2Ti	
TS EN ISO 14341 - A	G 42 3 M21 G 2Ti	
TS EN ISO 14341 - A	G 42 3 C1 G 2Ti	

Low Alloy Steels

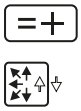
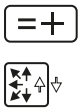
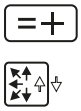
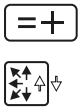
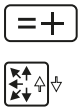
Products Name and Standards		Applications and Properties
MG 150		Low alloyed wire electrode for GMA (MIG/MAG) welding of steels, which are subjected to operating temperatures down to -60°C. Weld metal has high strength and high toughness. Suitable to use in petrochemical, chemical, oil/gas industries and off-shore platforms, especially welding of pipes, boilers, tanks and valves, pumps which are made of cast or forged steels. **TIG Welding Rod:** TG 150
AWS/ASME SFA - 5.28	ER80S-Ni1	
EN ISO 14341 - A	G 46 6 M21 3Ni1	
TS EN ISO 14341 - A	G 46 6 M21 3Ni1	
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	
MG 183		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.
AWS/ASME SFA - 5.28	ER100S-G	
EN ISO 16834 - A	G 69 4 M21 Mn3Ni1CrMo	
TS EN ISO 16834 - A	G 69 4 M21 Mn3Ni1CrMo	
MG 192		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.
AWS/ASME SFA - 5.28	ER120S-G	
EN ISO 16834 - A	G 89 6 M21 Mn4Ni2CrMo	
TS EN ISO 16834 - A	G 89 6 M21 Mn4Ni2CrMo	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.06 **Si:** 0.60 **Mn:** 1.20 **Zr:** 0.06 **Al:** 0.07 **Ti:** 0.10	460	530	25	-30°C: 60		**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.09 **Si:** 0.50 **Mn:** 1.05 **Ni:** 0.90	≥470	≥550	≥24	-60°C: ≥47 20°C: ≥80		**M21** (Ar + %15-25 CO_2)
C: 0.09 **Si:** 0.55 **Mn:** 1.67 **Cr:** 0.25 **Ni:** 1.52 **Mo:** 0.50 **Ti:** 0.07	≥690	≥770	≥17	-60°C: ≥47 20°C: ≥100		**M21** (Ar + %15-25 CO_2)
C: 0.09 **Si:** 0.52 **Mn:** 1.57 **Cr:** 0.30 **Ni:** 1.40 **Mo:** 0.25 **V:** 0.09	≥690	≥790	≥16	-60°C: ≥47 20°C: ≥80		**M21** (Ar + %15-25 CO_2)
C: 0.09 **Si:** 0.80 **Mn:** 1.80 **Cr:** 0.30 **Ni:** 2.20 **Mo:** 0.55	≥960	≥1040	≥15	-60°C: ≥47 20°C: ≥70		**M21** (Ar + %15-25 CO_2)

Low Alloy Steels

Products Name and Standards		Applications and Properties
MG 201		Low alloyed wire electrode for GMA (MIG/MAG) welding of creep resistant boiler and pipe steels subjected to operating temperatures up to 530°C. Also suitable for joining C-Mn steels to 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. **TIG Welding Rod:** TG 201
AWS/ASME SFA - 5.28	ER70S-A1	
EN ISO 21952 - A	G MoSi	
TS EN ISO 21952 - A	G MoSi	
MG 201A		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. **TIG Welding Rod:** TG 201A
AWS/ASME SFA - 5.28	ER80S-D2	
EN ISO 21952 - A	G Z MnMo	
TS EN ISO 21952 - A	G Z MnMo	
MG 211		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. **TIG Welding Rod:** TG 211
AWS/ASME SFA - 5.28	ER80S-G	
EN ISO 21952 - A	G CrMo1Si	
TS EN ISO 21952 - A	G CrMo1Si	
MG 211A		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. 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. **TIG Welding Rod:** TG 211A
AWS/ASME SFA - 5.28	ER80S-B2	
EN ISO 21952 - B	G 55C 1CM	
EN ISO 21952 - B	G 55M 1CM	
TS EN ISO 21952 - B	G 55C 1CM	
TS EN ISO 21952 - B	G 55M 1CM	
MG 222		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. **TIG Welding Rod:** TG 222
AWS/ASME SFA - 5.28	ER90S-G	
AWS/ASME SFA - 5.28	~ER90S-B3	
EN ISO 21952 - A	G CrMo2Si	

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.08 **Si:** 0.60 **Mn:** 1.00 **Mo:** 0.50	470	570	23	0°C: 50		**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)
C: 0.08 **Si:** 0.60 **Mn:** 1.80 **Mo:** 0.50	520	600	22	-20°C: 50		**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)
C: 0.08 **Si:** 0.60 **Mn:** 1.00 **Cr:** 1.10 **Mo:** 0.50	620	680	21	-20°C: 70		**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)
C: 0.08 **Si:** 0.30 **Mn:** 0.60 **Cr:** 1.35 **Mo:** 0.50	>470	>550	>19	-20°C: 70		**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)
C: 0.08 **Si:** 0.65 **Mn:** 1.00 **Cr:** 2.50 **Mo:** 1.00	550	650	19	-20°C: 50		**C1** (%100 CO_2) **M20** (Ar + %5-15 CO_2) **M21** (Ar + %15-25 CO_2)

Stainless Steels

Products Name and Standards	Applications and Properties

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 hard surfacing jobs, e.g. crane wheel surfacing 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. Observe welding procedures, preheating temperature and avoid high admixture of base metal.

Stick Electrodes: EI 307R, EI 307B, EIS 307
TIG Welding Rod: TI 307Si

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.

Stick Electrodes: EI 308L
TIG Welding Rod: TI 308L

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.

Stick Electrodes: EI 309L
TIG Welding Rod: TI 309L

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.

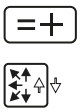
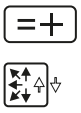
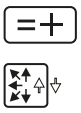
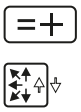
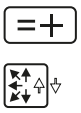
Stick Electrodes: EI 310, EI 310B
TIG Welding Rod: TI 310

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.

Stick Electrodes: EI 312
TIG Welding Rod: TI 312

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: ≤0.20 **Si:** ≤1.20 **Mn:** 5.00 - 8.00 **Cr:** 17.00 - 20.00 **Ni:** 7.00 - 10.00	>350	560 - 600	>40	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)
C: <0.03 **Si:** 0.65 - 1.00 **Mn:** 1.00 - 2.50 **Cr:** 19.50 - 22.00 **Ni:** 9.00 - 11.00	>400	580	38	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)
C: <0.03 **Si:** 0.65 - 1.00 **Mn:** 1.00 - 2.50 **Cr:** 23.00 - 25.00 **Ni:** 12.00 - 14.00	>400	600	>30	20°C: >47		**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)
C: 0.08 - 0.15 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 25.00 - 28.00 **Ni:** 20.00 - 22.50	360	600	35	20°C: >70		**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)
C: <0.15 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 28.00 - 32.00 **Ni:** 8.00 - 10.50	550	750	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)

MIG/MAG (GMAW) WIRES

Stainless Steels

Products Name and Standards	Applications and Properties

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.

Stick Electrode: EI 316L, EI 316LB
TIG Welding Rod: TI 316L

MI 347

AWS/ASME SFA - 5.9	**ER347**
EN ISO 14343 - A	**G 19 9 Nb**
TS EN ISO 14343 - A	**G 19 9 Nb**
DIN M. No.	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.

Stick Electrode: EI 347
TIG Welding Rod: TI 347

MI 2209

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

Stick Electrode: EI 2209
TIG Welding Rod: TI 2209

Aluminum Alloys

Products Name and Standards	Applications and Properties

MAL 1100

AWS/ASME SFA - 5.10	**ER1100**
EN ISO 18273	**S Al 1100 (Al99.0Cu)**
TS 6204 EN ISO 18273	**S Al 1100 (Al99.0Cu)**
DIN M. No.	3.0259

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.

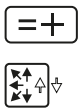
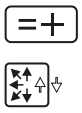
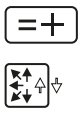
Stick Electrode: EAL 1100
TIG Welding Rod: TAL 1100

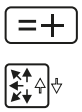
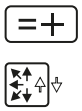
MAL 4043

AWS/ASME SFA - 5.10	**ER4043**
EN ISO 18273	**S Al 4043 (AlSi5)**
TS 6204 EN ISO 18273	**S Al 4043 (AlSi5)**
DIN M. No.	3.2245

5% Siliconcontaining 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 <2% alloying elements

Stick Electrode: EAL 4043
TIG Welding Rod: TAL 4043

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: < 0.03 **Si:** 0.65 - 1.00 **Mn:** 1.00 - 2.50 **Cr:** 18.00 - 20.00 **Ni:** 11.00 - 14.00 **Mo:** 2.00 - 3.00	390	550	36	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)
C: < 0.08 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 19.00 - 21.50 **Ni:** 9.00 - 11.00 **Nb:** <1.00	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)
C: ≤0.03 **Si:** ≤0.90 **Mn:** 0.50 - 2.00 **Cr:** 21.50 - 23.50 **Ni:** 7.50 - 9.50 **Mo:** 2.50 - 3.50	≥480	≥680	≥22	-40°C: ≥32 20°C: ≥50		**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)

Typical Chemical Analysis of Welding Wire (%)	% 0.2 Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Current Type Polarity Welding Positions	Shielding Gas
Si: <0.25 **Al:** >99.35 **Fe:** <0.40	>20	>65	>35		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)
Si: 4.50 - 6.00 **Al:** Rest	>40	>120	>8		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)

Aluminum Alloys

Products Name and Standards	Applications and Properties

MAL 4047

AWS/ASME SFA - 5.10	**ER4047**
EN ISO 18273	**S Al 4047A (AlSi12(A))**
TS 6204 EN ISO 18273	**S Al 4047A (AlSi12(A))**
DIN M. No.	3.2585

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 >7 % alloying elements.

StickElectrode: EAL 4047
TIG Welding Rod: TAL 4047

MAL 5183

AWS/ASME SFA - 5.10	**ER5183**
EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**
TS 6204 EN ISO 18273	**S Al 5183 (AlMg4.5Mn0.7(A))**
DIN M. No.	3.3548

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.

TIG Welding Rod: TAL 5183

MAL 5356

AWS/ASME SFA - 5.10	**ER5356**
EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**
TS 6204 EN ISO 18273	**S Al 5356 (AlMg5Cr(A))**
DIN M. No.	3.3556

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.

TIG Welding Rod: TAL 5356

Copper Alloys

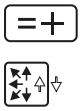
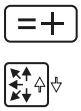
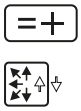
Products Name and Standards	Applications and Properties

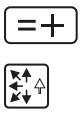
MCU Sn

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.

StickElectrode: ECU

Typical Chemical Analysis of Welding Wire (%)	% 0.2 Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation A5 (%)	Current Type Polarity Welding Positions	Shielding Gas
Si: 11.00 - 13.00 **Al:** Rest	>60	>130	>5		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)
Mg: 4.30 - 5.20 **Mn:** 0.50 - 1.00 **Cr:** 0.05 - 0.25 **Al:** Rest	>125	>275	>17		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)
Mg: 4.50 - 5.50 **Mn:** 0.05 - 0.20 **Cr:** 0.05 - 0.20 **Ti:** 0.06 - 0.15 **Al:** Rest	>110	>235	>17		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)

Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation A5 (%)	Hardness (HB)	Current Type Polarity Welding Positions	Shielding Gas
Si: < 0.50 **Mn:** 0.10 - 0.50 **Sn:** 0.50 - 1.00 **Cu:** Rest	100	220	30	60		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)

Copper Alloys

Products Name and Standards	Applications and Properties

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.

StickElectrode: ECU Sn7

MCU Al8

AWS/ASME SFA - 5.7	**ERCuAl-A1**
EN ISO 24373	**S Cu 6100 (CuAl8)**
TS EN ISO 24373	**S Cu 6100 (CuAl8)**
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).

StickElectrode: ECU Al8
TIG Welding Rod: TCU Al8

MCU Si3

AWS/ASME SFA - 5.7	**ERCuSi-A**
EN ISO 24373	**S Cu 6560 (CuSi3Mn1)**
TS EN ISO 24373	**S Cu 6560 (CuSi3Mn1)**
DIN M. No.	2.1461

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.

Hardfacing Applications

Products Name and Standards	Applications and Properties

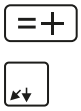
MH 361

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 wear 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 moulds, mixer blades, crushers, earth moving equipments, hot cut-offs, shear blades, dies for pressure casting, scraper blades, conveyors, rollers, crusher rolls and worn parts.

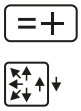
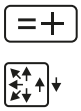
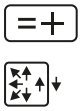
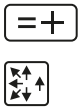
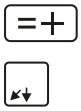
Typical Chemical Analysis of Welding Rod (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Hardness (HB)	Current Type Polarity Welding Positions	Shielding Gas
P: 0.01 - 0.40 **Sn:** 4.00 - 7.00 **Cu:** Rest	160	260	25	80		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)
Mn: <0.50 **Al:** 6.00 - 8.50 **Cu:** Rest	200	430	40	100		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)
Si: 2.80 - 4.00 **Mn:** 0.50 - 1.50 **Cu:** Rest	120	350	40	80		**I1** (%100 Ar) **I2** (%100 He) **I3** (Ar + %0.5-95 He)

Typical Chemical Analysis of Welding Rod (%)	Hardness	Current Type Polarity Welding Positions	Shielding Gas
C: 0.45 **Si:** 3.00 **Mn:** 0.40 **Cr:** 9.50 **Fe:** Rest	57 - 62 HRc		**M12** (Ar + %0.5-5 CO2) **M21** (Ar + %15-25 CO2)

FLUX CORED WIRES (FCAW)

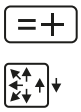
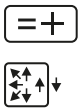
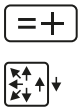
Mild Steels

Products Name and Standards		Applications and Properties
FCW 11		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 1.2 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.
AWS/ASME SFA - 5.20	**E71T-1C**	
EN ISO 17632-A	**T46 2 P C 1**	
TS EN ISO 17632-A	**T46 2 P C 1**	
FCW 11A		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. It's 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.
AWS/ASME SFA - 5.20	**E71T-1C H4**	
EN ISO 17632-A	**T46 2 P C 1 H5**	
TS EN ISO 17632-A	**T46 2 P C 1 H5**	
FCW 12		Rutile type flux cored wire, especially designed for welding in steel construction, piping, machine fabrication and shipbuilding by using 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, 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	**E71T1-M**	
EN ISO 17632-A	**T46 2 P M 1**	
TS EN ISO 17632-A	**T46 2 P M 1**	
EN 758	T46 2 P M 1	
FCW 20		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. Little formation of silicates on weld surface, so that multi-pass welds can be made without cleaning. Due to it's easily controlable weld pool in the short-arc range, FCW 20 is well-suited for root-and positional welding and gap bridging.
AWS/ASME SFA - 5.18	**E70C-GM H4**	
EN ISO 17632-A	**T46 3 M M 2 H5**	
TS EN ISO 17632-A	**T46 3 M M 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. FCW 30 is also suitable for welding high carbon steels and buffer application on worn parts before hardfacing.
AWS/ASME SFA - 5.20	**E70T-5C H4**	
AWS/ASME SFA - 5.20	**E70T-5M H4**	
EN ISO 17632-A	**T42 4 B M 3 H5**	
EN ISO 17632-A	**T42 4 B C 3 H5**	
TS EN ISO 17632-A	**T42 4 B M 3 H5**	
TS EN ISO 17632-A	**T42 4 B C 3 H5**	

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: 0.06 **Si:** 0.40 **Mn:** 1.40	500	560	25	-20°C: 60		**C1** (%100 CO_2)
C: 0.06 **Si:** 0.40 **Mn:** 1.40	500	560	25	-20°C: 60		**C1** (%100 CO_2)
C: 0.05 **Si:** 0.30 **Mn:** 1.20	520	590	25	-20°C: 75		**M21** (Ar + %15-25 CO_2)
C: 0.05 **Si:** 0.60 **Mn:** 1.30	500	560	25	-30°C: 50		**M21** (Ar + %15-25 CO_2)
C: 0.02 **Si:** 0.40 **Mn:** 1.20	520	580	28	-40°C: 60 -20°C: 80		**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)

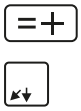
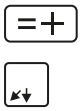
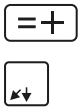
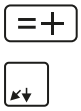
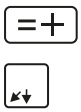
Low Alloy Steels

Products Name and Standards	Applications and Properties
FCW 140 AWS/ASME SFA - 5.29 E81T1-Ni1C EN ISO 17632-A T46 4 1Ni P C 1 TS EN ISO 17632-A T46 4 1Ni P C 1	Rutile type flux cored wire with fast freezing slag. Especially designed for welding 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.
FCW 150W AWS/ASME SFA-5.29 E81T1-W2C EN ISO 17632-B T553T1-1C A-NCC1 TS EN ISO 17632-B T553T1-1C A-NCC1	Rutile type flux cored wire especially designed for welding weathering (COR-TEN) steels and where atmospheric corrosion and high mechanical properties are required. Suitable for welding in all positions with high X-ray quality in steel constructions like bridge, stadium, other steel constructions.
FCW 201 AWS/ASME SFA - 5.29 E81T1-A1C EN ISO 17634-A T MoL P C 1 H5 TS EN ISO 17634-A T MoL P C 1 H5	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.

Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions	Shielding Gas
C: ≤0.12 **Si:** ≤0.80 **Mn:** ≤1.40 **Ni:** 0.80 - 1.10	≥500	600 - 680	≥20	-40°C: ≥20		**C1** (%100 CO_2)
C: 0.02 **Si:** 0.60 **Mn:** 1.00 **Cr:** 0.60 **Ni:** 0.60 **Cu:** 0.40	550	620	22	-30°C: >27 -20°C: 60		**C1** (%100 CO_2)
C: 0.05 **Si:** 0.25 **Mn:** 1.00 **Mo:** 0.50	530	600	22	-20°C: 55		**C1** (%100 CO_2)

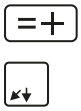
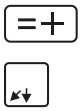
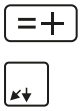
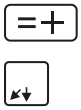
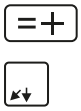
Hardfacing Applications

Products Name and Standards		Applications and Properties
FCO 240		Open-arc flux cored wire giving a 18Cr-8Ni-7Mn type austenitic stainless steel deposit. Used as a buffer layer on all steels and also for joining dissimilar steels. Due to its very tough and crack resistant weld metal, it is advised for buffer layer applications on crack sensitive heavy parts before hardfacing layers. **Typical Applications:** Joining and buffer applications of wear plates on shovel buckets, joining of shovel dipper handle rack and rebuilding of rails, tramway rails and press rams.
DIN 8555	MF 8 GF 150/400 KPZ	
FCO 250		Excellent open-arc flux cored wire for the rebuilding and reclamation of heavy parts made of carbon or 14% Mn steels and also for buffer layer 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.
EN 14700	**T Fe9**	
TS EN 14700	**T Fe9**	
DIN 8555	MF 7 GF 200/450 KP	
FCH 330		Gas shielded flux cored wire which is developed for hardfacing of parts subjected to metal-to-metal friction (ashesion) and medium degree impacts. Due to its very tough and crack resistant weld metal, it is also used for buffer layer applications. As the weld metal has medium degree 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.
EN 14700	**T Fe1**	
TS EN 14700	**T Fe1**	
DIN 8555	MSG 1 GF C1 300	
FCH 355		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 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.
EN 14700	**T Fe3**	
TS EN 14700	**T Fe3**	
FCH 360		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.
EN 14700	**T Z Fe8**	
TS EN 14700	**T Z Fe8**	

Chemical Analysis (%)	Hardness	Current Type Polarity Welding Positions	Shielding Gas
C: 0.10 **Si:** 0.30 **Mn:** 6.50 **Cr:** 18.00 **Ni:** 8.00 **Fe:** Rest	**As Welded** 160 HB **After Work Hardening** 400 HB		-
C: 0.40 **Si:** 0.45 **Mn:** 16.50 **Cr:** 13.00 **Fe:** Kalan	**As Welded** 200 HB **After Work Hardening** 450 HB		-
C: 0.14 **Si:** 0.40 **Mn:** 1.10 **Cr:** 1.25 **Fe:** Rest	275 - 325 HB		**C1** (%100 CO_2)
C: 0.35 **Si:** 0.50 **Mn:** 0.75 **Cr:** 5.50 **Mo:** 0.45	55 HRc		**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)
C: 0.60 **Si:** 0.70 **Mn:** 1.60 **Cr:** 5.00 **Mo:** 0.40 **Fe:** Rest	57 - 62 HRc		**C1** (%100 CO_2) **M21** (Ar + %15-25 CO_2)

Hardfacing Applications

Products Name and Standards		Applications and Properties
FCH 371 **EN 14700**	**T Z Fe8**	Gas shielded flux cored wire fore hardfacing of parts subjected to high metal to metal wear, abrasion and impact. Weld metal can retain its hardness under high temperatures. The weld metal is crack resistant and highly resistant and highly resistant to impact and abrasion. In the case of thick overlays, it is recommended to weld only the las two overlays with FCH 371 and 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.
FCO 510 DIN 8555	MF 10 GF 60 G	Open-arc flux cored wire, depositing high chromium alloy designed for resisting high stress grinding abrasion with low impact. Weld metal deposit is composed of an austenitic matrix and chromium carbides. Machinable only by grinding. **Typical Applications:** Hardfacing in wear plates.
FCH 801 **EN 14700** **TS EN 14700** DIN 8555	**T Co3** **T Co3** MF 20 GF 55 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 its very high toughness and shock resistance extends its use for service conditions involving mechanical impacts and thermal shocks. Pure argon (I1) shall be used as shielding gas. **Typical Applications:** Hardfacing of plastic extrusion screws, tools to cut paper, cardboard floor coverings, roofing,wood. **Stick Electrodes:** EH 801 **TIG Welding Rod:** TH 801
FCH 806 **EN 14700** **TS EN 14700** DIN 8555	**T Co2** **T Co2** 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 its very higher toughness and shock resistance extends its use for service conditions involving mechanical impacts and thermal shocks. Pure argon (I1) shall be used as shielding gas. **Typical Applications:** Hardfacing of blades for hot shearing, ingot tong ends, valves and valve seats, nozzles. **Stick Electrodes:** EH 806 **TIG Welding Rod:** TH 806
FCH 812 **EN 14700** **TS EN 14700** DIN 8555	**T Co3** **T Co3** MF 20 GF 50 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 its very higher toughness and shock resistance extends its use for service conditions involving mechanical impacts and thermal shocks. Pure argon (I1) shall be used as shielding gas. **Stick Electrodes:** EH 812 **TIG Welding Rod:** TH 812

Chemical Analysis (%)	Hardness	Current Type Polarity Welding Positions	Shielding Gas
C: 0.90 **Si:** 1.20 **Mn:** 0.35 **Cr:** 5.00 **Nb:** 3.50 **Fe:** Rest	57 - 62 HRc		**M21** (Ar + %15-25 CO_2)
C: 2.50 **Si:** 1.00 **Mn:** 0.15 **Cr:** 23.00 **Fe:** Rest	62 HRc		-
C: 2.50 **Si:** 1.00 **Mn:** 1.00 **Cr:** 28.00 **Ni:** 2.00 **W:** 11.50 **Fe:** 3.50 **Co:** Rest	51 - 55 HRc		**I1** (%100 Ar)
C: 1.20 **Si: 0.80** **Mn:** 0.80 **Cr:** 28.00 **W:** 5.00 **Fe:** 5.50 **Co:** Rest	42 - 43 HRc		**I1** (%100 Ar)
C: 1.60 **Si:** 1.00 **Mn:** 1.00 **Cr:** 28.50 **Ni:** 2.00 **Fe:** 3.50 **W:** 8.50 **Co:** Rest	45 - 49 HRc		**I1** (%100 Ar)

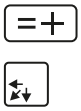
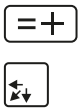
Submerged Arc Welding Wires and Fluxes for Mild and Low Alloy Steels

Products Name and Standards		Applications and Properties
SW 701		Solid, submerged arc welding wire suitable for welding general structural steels with a tensile strengths up to 510 N/mm^2, used in pressure vessel, pipe, shipbuilding and steel constructions. Copper coating increases electrical conductivity and resistance against rusting.
AWS/ASME SFA - 5.17	EL 12	
EN ISO 14171-A	S1	
TS EN ISO 14171-A	S1	
SW 702		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 335 and SHF 345 hardfacing fluxes for hardfacing applications. Copper coating increases electrical conductivity and resistance against rusting.
AWS/ASME SFA - 5.17	EM 12	
EN ISO 14171-A	S2	
TS EN ISO 14171-A	S2	
SW 702Si		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.
AWS/ASME SFA - 5.17	EM12K	
EN ISO 14171-A	S2Si	
TS EN ISO 14171-A	S2Si	
SW 703Si		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.
AWS/ASME SFA - 5.17	EH 12K	
EN ISO 14171-A	S3Si	
TS EN ISO 14171-A	S3Si	
SW 702Mo		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.
AWS/ASME SFA - 5.23	EA 2	
EN ISO 14171-A	S2Mo	
TS EN ISO 14171-A	S2Mo	

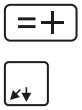
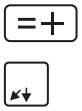
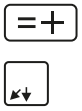
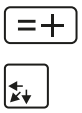
Typical Chemical Analysis of Welding Rod (%)	With SAW Fluxes	Chemical Analysis (%)	Yield Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions
C: 0.07 **Si:** 0.05 **Mn:** 0.50	**SF 104**	**C:** 0.05 **Si:** 0.30 **Mn:** 0.90	410	480	30	-30°C: 50 -20°C: 85 0°C: 90	=+
	SF 304	**C:** 0.05 **Si:** 0.25 **Mn:** 0.90	400	470	30	-30°C: 50 -20°C: 70 0°C: 90	
C: 0.08 **Si:** 0.05 **Mn:** 1.00	**SF 104**	**C:** 0.05 **Si:** 0.35 **Mn:** 1.15	430	510	28	-30°C: 45 -20°C: 65	=+
	SF 304	**C:** 0.05 **Si:** 0.25 **Mn:** 1.25	430	510	29	-40°C: 60 -30°C: 75 -20°C: 110	
C: 0.08 **Si:** 0.20 **Mn:** 1.00	**SF 104**	**C:** 0.06 **Si:** 0.60 **Mn:** 1.30	450	520	29	-30°C:40 -20°C: 50 0°C: 80	=+
	SF 304	**C:** 0.06 **Si:** 0.55 **Mn:** 1.30	450	520	27	-40°C: 50 -30°C: 70 -20°C: 90	
C: 0.08 - 0.15 **Si:** 0.20 - 0.35 **Mn:** 1.40 - 1.80	**SF 104**	**C:** 0.06 **Si:** 0.70 **Mn:** 1.65	470	540	28	-40°C: 60 -20°C: 90	=+
	SF 304	**C:** 0.06 **Si:** 0.65 **Mn:** 1.75	470	540	28	-50°C: 40 -40°C: 55 -30°C: 80 -20°C: 120	
C: 0.09 **Si:** 0.15 **Mn:** 1.00 **Mo:** 0.50	**SF 104**	**C:** 0.05 **Si:** 0.40 **Mn:** 1.20 **Mo:** 0.50	480	560	26	-20°C: 50	=+
	SF 304	**C:** 0.05 **Si:** 0.35 **Mn:** 1.55 **Mo:** 0.45	510	570	26	-40°C: 50 -30°C: 60 -20°C: 100	

Submerged Arc Welding Wires and Fluxes for Mild and Low Alloy Steels

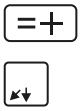
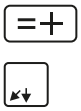
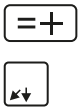
Products Name and Standards		Applications and Properties
SF 104		Alumina-basic type, agglomerated submerged arc welding flux, which is designed for butt and fillet welding and for the single- and multi-pass butt welding of mild, medium and high tensile steels in shipbuilding and steel constructions. Provides 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.
EN ISO 14174	S A AB 1	
TS EN ISO 14174	S A AB 1	
SF 304		Alumina-basic type, agglomerated submerged arc welding flux, developed particularly for spiral and longitudinal welding of pipes. It gives the opportunity of high-speed welding in the welding of thin and medium thick pipes by single or multi-wires (tandem/twin). 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.
EN ISO 14174	S A AB 1	
TS EN ISO 14174	S A AB 1	

With SAW Wire	Chemical Analysis (%)	Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation A5 (%)	Impact Energy ISO - V (J)	Current Type Polarity Welding Positions
SW 701	**C:** 0.05 **Si:** 0.30 **Mn:** 0.90	410	480	30	-30°C: 50 -20°C: 85 0°C: 90	
SW 702	**C:** 0.05 **Si:** 0.35 **Mn:** 1.15	430	510	28	-30°C: 45 -20°C: 65	
SW 702Si	**C:** 0.06 **Si:** 0.60 **Mn:** 1.30	450	520	29	-30°C: 40 -20°C: 50 0°C: 80	
SW 703Si	**C:** 0.06 **Si:** 0.70 **Mn:** 1.65	470	540	28	-40°C: 60 -20°C: 90	
SW 702Mo	**C:** 0.05 **Mo:** 0.50 **Si:** 0.40 **Mn:** 1.20	480	560	26	-20°C: 50	
SW 701	**C:** 0.05 **Si:** 0.25 **Mn:** 0.90	400	470	30	-30°C: 50 -20°C: 70 0°C: 90	
SW 702	**C:** 0.05 **Si:** 0.25 **Mn:** 1.25	430	510	29	-40°C: 60 -30°C: 75 -20°C: 110	
SW 702Si	**C:** 0.06 **Si:** 0.55 **Mn:** 1.30	450	520	27	-40°C: 50 -30°C: 70 -20°C: 90	
SW 703Si	**C:** 0.06 **Si:** 0.65 **Mn:** 1.75	470	540	28	-50°C: 40 -30°C: 80 -40°C: 55 -20°C: 120	
SW 702Mo	**C:** 0.05 **Mo:** 0.45 **Si:** 0.35 **Mn:** 1.55	510	570	26	-40°C: 50 -30°C: 60 -20°C: 100	

Submerged Arc Welding Wires and Fluxes for Stainless Steels

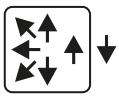
Products Name and Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Current Type Polarity Welding Positions
SI 308L **AWS/ASME SFA-5.9** **ER 308L** **EN ISO 14343-A** **S 19 9 L** **TS EN ISO 14343-A** **S 19 9 L** DIN M. No. 1.4316	Austenitic stainless steel welding 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. SI 308L is used in combination with SF 500 submerged arc welding flux. Resistant to intergranular corrosion up to 350°C. Non-scaling up to 800°C, in air or oxidizing combustion gases.	**C:** <0.03 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 19.50 - 21.00 **Ni:** 9.00 - 11.00	
SI 309L **AWS/ASME SFA-5.9** **ER 309L** **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. SI 309L is used in combination with SF 500 submerged arc welding flux. 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.	**C:** <0.03 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 23.00 - 25.00 **Ni:** 12.00 - 14.00	
SI 316L **AWS/ASME SFA-5.9** **ER 316L** **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. SI 316L is used in combination with SF 500 submerged arc welding flux. 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.	**C:** >0.03 **Si:** 0.30 - 0.65 **Mn:** 1.00 - 2.50 **Cr:** 18.00 - 20.00 **Ni:** 12.00 - 14.00 **Mo:** 2.50 - 3.00	
SI 2209 **AWS/ASME SFA-5.9** **ER 2209** **EN ISO 14343-A** **S 22 9 3 NL** **TS EN ISO 14343-A** **S 22 9 3 NL** DIN M. No. ~1.4462	Dublex (ferritic-austenitic) stainless steel wire electrode for submerged arc welding of dublex Cr-Ni-Mo stainless steels. SI 2209 is used in combination with SF 500 submerged arc welding flux. 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. High-strength and ductile weld metal exhibits good resistance to pitting, crevice corrosion and stress corrosion cracking in chloride-bearing media.	**C:** <0.03 **Si:** <0.90 **Mn:** 0.50 - 2.00 **Cr:** 21.50 - 23.50 **Ni:** 7.50 - 9.50 **Mo:** 2.50 - 3.50 **N:** 0.10 - 0.20	

Submerged Arc Welding Fluxes for Hardfacing Applications

Products Name and Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Hardness	Current Type Polarity Welding Positions
SHF 325 EN ISO 14174 S A CS3 TS EN ISO 14174 S A CS3	Agglomerated, alloyed flux used for hardfacing purposes in combination with SW 702 wire electrode. Suitable for hardfacing of machine gear parts, rails, supports rolls of caterpillars, pulleys, etc. Possible to use both in alternative and direct currents. The alloying effect of the flux depends, to a large degree, on the welding parameters chosen. For instance, optimum welding parameters for 4.00 mm wire electrode are about 600 A, 32 V, 50 cm/min. welding speed.	**Wire: SW 702** **C:** 0.10 **Si:** 0.75 **Mn:** 1.10 **Cr:** 0.90 **Mo:** 0.20	225-300HB	
SHF 335 EN ISO 14174 S A CS3 TS EN ISO 14174 S A CS3	Agglomerated and alloyed flux used for hardfacing purposes in combination with SW 701 wire electrode. Suitable for hardfacing of 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. For instance, optimum welding parameters for 4.00 mm wire electrod are about 600 A, 32 V, 500 cm/min. welding speed.	**Wire: SW 702** **C:** 0.10 **Si:** 0.80 **Mn:** 1.30 **Cr:** 1.50 **Mo:** 0.20	325-400HB	
SHF 345 EN ISO 14174 S A CS3 TS EN ISO 14174 S A CS3	Agglomerated, alloyed flux used for hardfacing purposes in combination with SW 702 wire electrode. Suitable for hardfacing of pinchrolls, sinter crushers etc. Possible to use both in alternative and direct currents. The alloying effect of the flux depends, to a large degree, on the weld parameters chosen. For instance, optimum welding parameters for 4.00 mm wire electrode are about 600 A, 32 V, 50 cm/min. welding speed.	**Wire: SW 702** **C:** 0.15 **Si:** 0.70 **Mn:** 1.00 **Cr:** 2.00 **Mo:** 0.20	400-475HB	

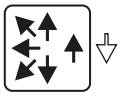
SYMBOLS and SHIELDING GAS

Welding Current and Polarity



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

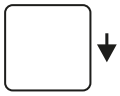
DIN 8560 : w h
EN ISO 6947' : PA PB
Flat Butt and Dilled Welds Only



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

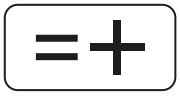
DIN 8560 : w
EN ISO 6947 : PA
Flat Butt Welds Only

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

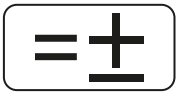


DIN 8560 : f
EN ISO 6947 : PG
Vertical-Down Only

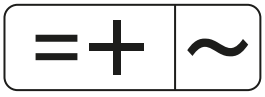
DIN 8560 : w h q s
EN ISO 6947 : PA PB PC PF
All Positions, Except Vertical-Down and Overhead



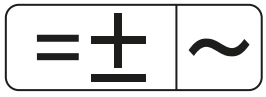
Direct Current: (DC),
Electrode Connected to Positive Pole



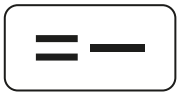
Direct Current: (DC),
Electrode Connected to Negative or Positive Pole



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

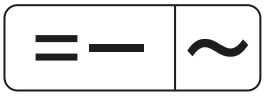


Direct Current: (DC) Preferred,
Electrode Connected to Negative or Positive Pole



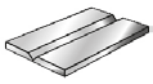
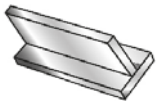
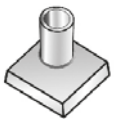
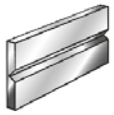
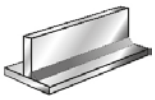
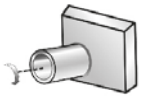
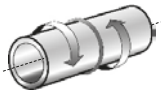
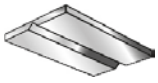
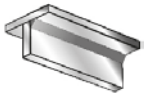
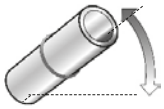
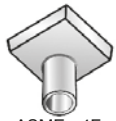
Direct Current: (DC) Preferred,
Electrode Connected to Negative Pole

Alterneative Current: (AC)



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

Welding Positions

Butt Welding	Fillet Welding	Pipe Welding	Pipe Fillet Welding
 ASME : 1G EN : PA	 ASME : 1F EN : PA	 ASME : 1G EN : PA	 ASME : 2F EN : PB
 ASME : 2G EN : PC	 ASME : 2F EN : PB	 ASME : 2G EN : PC	 ASME : 2F EN : PB
 ASME : 3G EN : PG (Down) PF (Up)	 ASME : 3F EN : PG (Down) PF (Up)	 ASME : 5G EN : PG (Down) PF (Up)	 ASME : 5F EN : PG (Down) PF (Up)
 ASME : 4G EN : PE	 ASME : 4F EN : PD	 ASME : 6G EN : J-L045 (Down) H-L045 (Up)	 ASME : 4F EN : PD

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

PACKAGING INFORMATION / APPROVALS and CERTIFICATIONS

PACKAGING INFORMATION

Inner Cardboard Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kgs)
M300	41	62	302	2.25
M350 MW	44	65	359	2.50
B350	64	81	355	5.00
B450 MW	65	82	457	6.50
K300 MW	38	64	310	1.75
K350 MW	38	64	310	2.00
K400 MW	34	65	409	2.25
O350 MW	42	84	358	3.50

Outer Cardboard Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kgs)
MK300P	150	222	325	7,50
MK350	70	275	365	15.00
MK350P	150	222	370	7.50
BK350	68	260	365	15.00
BK350P	91	270	370	15.00
BK450	71	260	465	19,5
KK300	116	215	330	15.75
KK350	116	215	380	18.00
KK400	110	205	430	20.25
OK350	86	175	375	21.00

Plastic Box

Box Type	Height (mm)	Width (mm)	Average Weight (kgs)
PS35-1	360	700	2.50
PS35-2	360	870	4.50
PS45-2	470	870	6.50

PACKAGING INFORMATION

Tin Box

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kgs)
B350T	100	100	355	11.00
T1	93	93	363	9.00

TIG & OXY - Fuel Fas Welding Wire / Brazing Wires

Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kgs)
T 500 MW	40	60	540	1 & 2.50
T 1000 MW	40	60	1040	5

MIG / MAG and Flux Cored Wires

Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kgs)
DR110	200	500	60
DR500	800	510	250
DR880	1000	600	400

PACKAGING INFORMATION

MIG / MAG and Flux Cored Wires

Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kgs)
D100	M1	16.5	100	1

MIG / MAG and Flux Cored Wires

Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kgs)
D200	M2	52	200	5
D300	M3	52	300	15
D300	M3	52	300	20
K300MS	M3	52	300	15
K300	M3	180	300	15

SAW Welding Wire

Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kgs)
K435	M4	300	345	25
K570	M5	570	760	100

PACKAGING INFORMATION

SAW Welding Wire

Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kgs)
DR500	830	517	200
DR800	1000	600	400
DR1100	950	660	600
OCTABIN COIL	1350	720	1000

SAW Welding Flux

Packing Type	Net Weight (kgs)
Kraft	25

APPROVALS and CERTIFICATIONS

PRODUCTS NAME	ABS	BV	CE	CWB	DB	DNV	GL	HAKC	LR	RINA	TL	TUV
ESR 11		√	√		√							√
ESR 13	√	√	√	√	√						√	√
ESR 13 M			√									√
ESR 35			√		√							√
ESB 44			√		√	√						√
ESB 48	√	√	√	√	√	√	√		√	√	√	√
ESB 50	√	√	√		√		√			√	√	√
ESB 52	√	√	√	√	√	√	√	√	√			√
ESH 180 R		√	√									
EM 201			√									
EM 202			√									
EM 211			√									
EM 212			√									
EM 222			√									
EM 290			√									√
ESC 60	√	√	√	√	√							√
ESC 61			√	√								
EI 307B			√		√							√
EI 307R			√									
EI 308 L			√									√
EI 309 L		√	√		√							√
EI 312			√									√
EI 316 L		√	√									√
EI 318			√									√
EI 347			√									√
TG 2		√	√	√		√	√					√
TG 102			√	√								
TG 201			√									√
TI 309 L							√					
TI 316 L		√	√				√					
MG 1			√									
MG 2	√		√	√	√	√	√	√		√	√	√
MG 3			√		√	√	√					√
MG 20			√		√			√				√
MG 102			√	√								
MG 201			√									√
FCW 11	√	√	√		√	√	√	√	√	√	√	√
FCW 11A			√									

* You can visit our **www.magmaweld.com** website for our current approvals and certificates.
* Oerlikon A.S. reserves the right to modify its products without prior notice.

APPROVALS and CERTIFICATIONS

PRODUCTS NAME	ABS	BV	CE	CWB	DB	DNV	GL	HAKC	LR	RINA	TL	TUV
FCW 12			√						√		√	
FCW 16			√				√					
FCW 21			√									√
FCW 30			√								√	√
FCW 140			√							√		
FCW 181												√
SF 104 - SW 701			√									√
SF 104 - SW 702	√	√	√			√					√	√
SF 104 - SW 702Si			√									√
SF 104 - SW 703Si			√									√
SF 104 - SW 702Mo			√									√
SF 204 - SW 702Mo			√									

* You can visit our **www.magmaweld.com** website for our current approvals and certificates.
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NOTE

WE MANUFACTURE WELDING CONSUMABLES & EQUIPMENT SINCE 1957

Magmaweld is a developer and a producer of welding products for most of the welding processes. Oerlikon Kaynak Elektrodları ve Sanayi A.Ş., the oldest company of the group, was established in 1957 in Istanbul/Turkey to produce stick electrodes under license from Oerlikon-Buehrle AG. Later the product portfolio was expanded to include MIG/MAG & TIG Wires, Flux Cored Wires, Submerged-Arc Wires and Fluxes, Welding Machines, Welding Ancillary Products and Automation Systems.

The MAGMAWELD brand came out as an analogy between the molten core of the earth, the MAGMA and the WELDPOOL.

"Magmaweld products are being used by welders in more than 70 COUNTRIES"

www.magmaweld.com **info@magmaweld.com** **+90 444 93 53**

Organize Sanayi Bölgesi, 5. Kısım 45030 Manisa / Türkiye