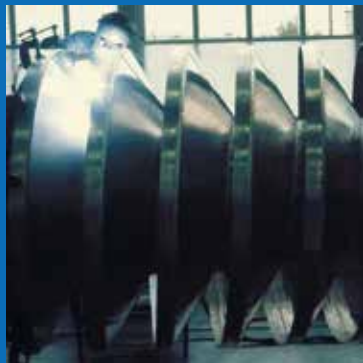




# PRODUCT CATALOGUE

## WELDING CONSUMABLES



03/2014

## NON STOP WELDING & CUTTING

Welders desire their welding electrodes and machines not to let them down while they carry out their art while factories desire their production to be maintained uninterruptedly. Based on this awareness, we have redefined the Welder's Confidence Source in a much larger scope in order to meet requirements of welders.

We have brought a new energy to the world of welding by combining our Magmaweld brand, which we have created based on the inspiration of resemblance between the welding arc and the natural energy source of MAGMA at the core of our planet, with our strong arc technologies of many years. Even though Magmaweld is a young brand, the background of experience and knowledge behind it dates back to 1957. During those years, Oerlikon Kaynak Elektrodları ve Sanayi A.Ş. had started production of coated electrode by the license obtained from the Swiss based Oerlikon Schweisstechnik AG, and without being satisfied with this, it constantly developed new products by means of the R&D unit it had established and eventually put an end to the technological dependence on foreign sources years ago. Our factories today have a full knowledge of formulation and production technologies of all welding consumables like coated electrodes, cored wires and submerged arc welding powders and welding machines technologies, in addition to this they constantly develop and include in our production program ever new products in line with the developments in the welding industry.

Leading the way in many respects in this context in Turkey, our company continues to be the welders' most reliable assistant and manufacturers' trouble-free income source with its new products like the latest Cored Wires and high strength Magma Sepet. All our products are inspected according to international and national standards and many products are certified and periodically inspected by international and national certification bodies like CE, TÜV, DB, CWB, ABS, BV, RINA, DNV, GL, LR, RMR and TL in line with the market requirements. A welder is competent for his duty and welding is an art. Functionality of the electrode and of the welding machine is not to create problems for the welder. While the young Magmaweld works with innovative solutions as an apprentice for the welder in uninterrupted welding, it also fulfils its social responsibilities by means of the year-round welder's courses it opens and by material and training support it provides for many training establishments by making use of the knowledge accumulation and experience of more than half a century of Oerlikon. Magmaweld is a brand offering uninterrupted welding solutions by means of its past experience and by innovative, environment-friendly and energy efficient products. Main target of Magmaweld is to allow welders to have break only when they desire to do so. It is always easy to contact with Magmaweld, Magmaweld products are readily available everywhere, an authority to solve your problems is always available at Magmaweld, you receive affordable and fast after-sale services.



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## MILD STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal					Current Type Polarity Welding Positions	Re-drying information (When necessary)	
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)			
<b>ESR 11</b> AWS/ASME SFA-5.1 E 6013 EN ISO 2560-A E 38 0 RC 11 TS EN ISO 2560-A E 38 0 RC 11 DIN 1913 E 43 22 R(C) 3 TS 563 E 43 22 R(C) 3	<b>RUTILE ELECTRODE FOR ALL POSITIONS.</b>  Especially suitable for welding in sheets steels thinner than 5 mm, galvanized sheets and tubes, primer painted, painted and slightly rusty steels and in production of tanks and boilers, tube installations. Very easily operated in positional welding, including vertically-down. Good gap-bridging. Smooth arc, well suited for tack-welding due to its easy arc striking and restriking 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.	C: 0.08	480	530	27	0°C : 55J			
		Si: 0.45							Mn: 0.60
<b>ESR 13</b> AWS/ASME SFA-5.1 E 6013 EN ISO 2560-A E 42 0 RR 12 TS EN ISO 2560-A E 42 0 RR 12 DIN 1913 E 51 32 RR 8 TS 563 E 51 32 RR 8	<b>GENERAL PURPOSE RUTILE ELECTRODE.</b>  Suitable for joining and repair welding of light steel fabrications, iron works, wrought iron works, agricultural machines, boiler, chassis of vehicles. 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.	C: 0.06	500	560	28	0°C : 55J			
		Si: 0.40							Mn: 0.55
<b>ESR 13M</b> AWS/ASME SFA-5.1 E 6013 EN ISO 2560-A E 35 A R 12 TS EN ISO 2560-A E 35 A R 12 DIN 1913 E 43 21 R 3	<b>GENERAL PURPOSE RUTILE ELECTRODE FOR SHEET STEELS.</b>  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 appearance, easy arc striking and restriking, easy slag removal, silent and balanced arc. Possible to use equally well both with AC and DC.	C: 0.05	470	530	25	+20°C : 60J			
		Si: 0.40							Mn: 0.50
<b>ESR 14</b> AWS/ASME SFA-5.1 E 7014 EN ISO 2560-A E 42 0 RR 12 TS EN ISO 2560-A E 42 0 RR 12 DIN 1913 E 51 32 RR 8	<b>GENERAL PURPOSE RUTILE ELECTRODE WITH HIGH DEPOSITION RATE.</b>  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 and filling 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 restriking. Very smooth welds blending into base metal without undercuts. Slag is completely self-releasing. Possible to use equally well both with AC and DC.	C: 0.08	480	560	28	0°C : 70J			
		Si: 0.40				-20°C : 40J			
		Mn: 0.60							
<b>ESR 30</b> AWS/ASME SFA-5.1 E 6013 EN ISO 2560-A E 38 A RR 12 TS EN ISO 2560-A E 38 A RR 12 DIN 1913 E 43 11 RR 8 TS 563 E 43 11 RR 8	<b>ELECTRODE FOR GALVANIZING TANKS.</b>  Rutile type heavy coated electrode which is especially used in fabrication and repair welds of molten zinc bath tanks 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.	C: 0.02	380	440	25	+20°C : 70J			
		Si: 0.15							Mn: 0.35
<b>ESR 35</b> AWS/ASME SFA-5.1 E 6013 EN ISO 2560 - A E 38 2 RB 12 TS EN ISO 2560 - A E 38 2 RB 12 DIN 1913 E 43 RR (B) 7 TS 563 E 43 RR (B) 7	<b>ELECTRODE FOR WELDING STEELS, SUBSEQUENTLY GALVANIZED AND ENAMELED</b>  Rutile-basic type coated electrode, particularly suitable for welding root passes and positional welding in fabrication of pipes, boilers and tanks. Also suitable for depositing backing-up beads in submerged arc welding. Owing to its low Si-content, weld metal is suited for subsequent galvanizing and enamelling.	C: 0.06	480	530	25	+20°C : 100J			
		Si: 0.20				-20°C : 60J			
		Mn: 0.60							
<b>ESB 40</b> AWS/ASME SFA-5.1 E 7016 EN ISO 2560-A E 42 3 B 42 H10 TS EN ISO 2560-A E 42 3 B 42 H10	<b>ELECTRODE FOR WELDING OF HIGH CARBON STEELS AND CAST IRONS WITH PREHEATING.</b>  Suitable for repair welding on difficult to weld steels and repair welding of steel with unknown composition. Heavy coated basic electrode produce high tensile strength 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.	C: 0.08	500	570	28	-30°C : 100J			
		Si: 0.40							Mn: 1.30

## MILD STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)	
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]			Impact Energy ISO-V(J)
<b>ESB 42</b> AWS/ASME SFA-5.1 E 7016 - H8 EN ISO 2560-A E 42 4 B 22 H10 TS EN ISO 2560-A E 42 4 B 22 H10 DIN 8529 E Y 42 53 Mn B TS 563 E 51 53 B 26 (H)	<b>ELECTRODE FOR WELDING ROOT PASSES ON THIN WALLED TUBES AND PIPES.</b>  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.	C: 0.05	480	550	28	-20°C : 120J		
		Si: 0.45						
		Mn: 1.00						
<b>ESB 44</b> AWS/ASME SFA-5.1 E 7016 - H8 EN ISO 2560-A E 38 2 B 12 H10 TS EN ISO 2560-A E 38 2 B 12 H10 DIN 1913 E 51 43 B (R) 10 TS 563 E 51 43 B 26 (H)	<b>MULTI PURPOSE AC/DC ELECTRODE.</b>  Suitable for fabrication and repair welding of dynamically loaded steel constructions, machines and agricultural equipments, workshop and maintenance welding. Smooth and clean welds, blending into base metal without undercuts. Excellent gap bridging properties. The double covering of this electrode produces a stable, concentrated and directed arc, thus being ideally suited for root pass and positional welding and is suited for AC welding. Welds are of X-ray quality.	C: 0.05	> 380	470 - 600	> 25	-20°C : 70J		
		Si: 0.50				-30°C : 60J		
		Mn: 0.80						
<b>ESB 48</b> AWS/ASME SFA-5.1 E 7018 - H8 EN ISO 2560-A E 42 3 B 42 H10 TS EN ISO 2560-A E 42 3 B 42 H10 DIN 1913 E 51 54 B 10 TS 563 E 51 54 B 10 (H)	<b>BASIC ELECTRODE WITH HIGH MECHANICAL PROPERTIES, SMOOTH AND QUITE ARC.</b>  Suitable for welding fabrication of dynamically loaded steel constructions, bridge, shipbuilding, pipe-line, pressure vessels, tanks, boiler and machines where high toughness is required. Weld metal recovery is approx. 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.	C: 0.07	500	570	26	-30°C : 90J		
		Si: 0.40				-40°C : 80J		
		Mn: 1.00						
<b>ESB 50</b> AWS/ASME SFA-5.1 E 7018 - H8 EN ISO 2560-A E 42 3 B 42 H10 TS EN ISO 2560-A E 42 3 B 42 H10 DIN 1913 E 51 54 B 10 TS 563 E 51 54 B 10 (H)	<b>BASIC ELECTRODE WITH HIGHER MECHANICAL PROPERTIES.</b>  Suitable for welding fabrication of dynamically loaded heavy steel constructions, bridge, shipbuilding, pipe-line, pressure vessels, tanks, boiler and machines where high 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.	C: 0.06	500	570	28	-30°C : 100J		
		Si: 0.40						
		Mn: 1.35						
<b>ESB 52</b> AWS/ASME SFA-5.1 E 7018 - 1 - H4 EN ISO 2560-A E 42 6 B 42 H5 TS EN ISO 2560-A E 42 6 B 42 H5 DIN 8529 E SY 42 76 Mn B TS 563 E 51 55 B 26 (H)	<b>BASIC ELECTRODE WITH HIGH MECHANICAL PROPERTIES AND LOW HYDROGEN CONTENT.</b>  Suitable for welding of heavy steel constructions, bridge, dam, thermal power plants, petrochemical industry, shipbuilding, high strength pipe-lines, pressure vessels, tanks, which are dynamically loaded and require high mechanical properties. The weld metal has a very low hydrogen content and is resistant to ageing. Produces tough and crack-free welded joints, also suite for welding steels having a carbon content of up to 0,6 % and rail joints. Good operating characteristics, also in root pass and positional welding. Very good gap bridging properties. Welds are of X-ray quality.	C: 0.06	500	580	26	-46°C : 90J		
		Si: 0.40				-60°C : 70J		
		Mn: 1.20						
<b>ESH 160R</b> AWS/ASME SFA-5.1 E 7024 EN ISO 2560-A E 42 A RR 73 TS EN ISO 2560-A E 42 A RR 73 DIN 1913 E 51 32 RR 11 160 TS 563 E 51 32 RR 160 11	<b>HEAVY COATED RUTILE ELECTRODE WITH HIGH RECOVERY.</b>  Suitable for welding of large sections and fillets in shipbuilding with it's 165% recovery. Produces very smooth, concave and clean welds, merging into base metal without undercuts. Suitable for welding prepainted plates. Easy arc striking and restriking. Slag is self-releasing in most cases.	C: 0.10	530	560	24	+20°C : 50J		
		Si: 0.85						
		Mn: 1.10						
<b>ESH 180R</b> AWS/ASME SFA-5.1 E 7024 EN ISO 2560-A E 38 A RR 73 TS EN ISO 2560-A E 38 A RR 73 DIN 1913 E 51 11 RR 11 180 TS 563 E 38 0 RR 73	<b>HEAVY COATED RUTILE ELECTRODE WITH HIGH RECOVERY.</b>  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.	C: 0.10	460	530	25	+20°C : 50J		
		Si: 0.55						
		Mn: 1.00						

## MILD STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal					Current Type Polarity Welding Positions	Re-drying information (When necessary)
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>ESC 60</b> AWS/ASME SFA-5.1 E 6010 EN ISO 2560-A E 35 2 C 21 TS EN ISO 2560-A E 35 2 C 21 DIN 1913 E 43 43 C 4 TS 563 E 43 43 C 4	<b>GENERAL PURPOSE CELLULOSIC ELECTRODE.</b>  Medium coated, cellulosic electrode, especially designed for welding of pipes and plates in all positions at low welding currents. Due to it's 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.	C: 0.10	470	530	26	-20°C : 60J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.20						
		Mn: 0.50						
<b>ESC 60P</b> AWS/ASME SFA-5.1 E 6010 EN ISO 2560-A E 35 2 C 21 TS EN ISO 2560-A E 35 2 C 21 DIN 1913 E 43 43 C 4 TS 563 E 43 43 C 4	<b>CELLULOSIC ELECTRODE FOR PIPE WELDING.</b>  Medium coated, cellulosic type electrode, especially designed for easy welding of pipe joints in pipe-line construction. Due to it's high penetration, particularly suitable for root pass and fill passes in vertical down direction. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.	C: 0.13	475	535	23	-20°C : 60J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.30						
		Mn: 0.60						
<b>ESC 70</b> AWS/ASME SFA-5.5 E 7010 - A 1 EN ISO 2560-A E 42 2 Mo C 21 TS EN ISO 2560-A E 42 2 Mo C 21 DIN 1913 E 51 43 C 4 TS 563 E 51 43 C 4	<b>HIGH STRENGTH CELLULOSIC ELECTRODE FOR PIPE WELDING.</b>  Medium coated and Mo(molibdenum) alloyed cellulosic type electrode, suitable for welding high strength, low alloyed steels and pipes in vertical down technique. Due to it's 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 and DCEP (+) is recommended for fill and cap passes in vertical down position.	C: 0.10	475	550	25	-20°C : 70J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.20						
		Mn: 0.50						
		Mo: 0.50						
<b>ESC 70G</b> AWS/ASME SFA-5.5 E 7010 - G EN ISO 2560-A E 42 2 C 21 TS EN ISO 2560-A E 42 2 C 21 DIN 1913 E 51 43 C 4 TS 563 E 51 43 C 4	<b>HIGH STRENGTH CELLULOSIC ELECTRODE FOR PIPE WELDING.</b>  Medium coated and Ni (nickel) alloyed cellulosic type electrode, suitable for welding high strength steels, micro alloyed and low alloyed steels and pipes. Due to it's 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.	C: 0.10	500	560	26	-20°C : 70J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.40						
		Mn: 1.30						
		Ni: 0.30						
<b>ESC 70P</b> AWS/ASME SFA-5.5 E 7010 - P1 EN ISO 2560-A E 42 2 Mo C 21 TS EN ISO 2560-A E 42 2 Mo C 21	<b>HIGH STRENGTH AND LOW ALLOYED CELLULOSIC ELECTRODE FOR PIPE WELDING.</b>  Medium coated and Mo (molibdenum) alloyed cellulosic type electrode, especially designed for easy welding of pipe joints. Suitable for welding high strength steels pipes, micro alloyed and low alloyed steel pipes in pipe-line construction. Due to it's high penetration, it is suitable for root pass and fill passes in the vertical down direction. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.	C: 0.12	570	640	22	-20°C : 50J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.20						
		Mn: 0.50						
		Mo: 0.40						
<b>ESC 80G</b> AWS/ASME SFA-5.5 E 8010 - G EN ISO 2560-A E 42 3 1Ni C 21 TS EN ISO 2560-A E 42 3 1Ni C 21 DIN 1913 E 51 43 C 4 TS 563 E 51 43 C 4	<b>HIGH STRENGTH CELLULOSIC ELECTRODE FOR PIPE WELDING.</b>  Medium coated and Ni (nickel) alloyed cellulosic type electrode for welding high strength and low alloyed steels. Due to it's 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 and DCEP (+) is recommended for fill and cap passes in vertical down position.	C: 0.10	500	570	24	-20°C : 60J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.20						
		Mn: 0.80						
		Ni: 0.90						
<b>ESC 80P</b> AWS/ASME SFA-5.5 E 8010 - G EN ISO 2560-A E 42 3 1Ni C 21 TS EN ISO 2560-A E 42 3 1Ni C 21	<b>HIGH STRENGTH CELLULOSIC ELECTRODE FOR PIPE WELDING.</b>  Medium coated, Ni (nickel) and Mo (molibdenum) alloyed cellulosic type electrode, especially designed for easy welding of pipe joints in pipe-line construction. Due to it's high penetration, it is suitable for root pass and fill passes in the vertical down direction. DCEN (-) is ideal in root passes and DCEP (+) is recommended for fill and cap passes in vertical down position.	C: 0.15	470	560	22	-30°C : 70J	Root Pass.  Fill Pass.  	Don't redry
		Si: 0.40						
		Mn: 0.80						
		Cr: 0.15						
		Ni: 0.80						
Mo: 0.15								

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)		
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]			Impact Energy ISO-V(J)	
<b>EM 140</b>  AWS/ASME SFA-5.5 E 7018 - G H4 EN ISO 2560-A E 42 4 Z B 42 TS EN ISO 2560-A E 42 4 Z B 42 DIN 8529 E Y 38 54 1 Ni Cu B	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.	C: 0.06	530	580	26				
		Si: 0.40						-20°C : 120J	
		Mn: 1.00							-40°C : 70J
		Ni: 1.00							
		Cu: 0.60							
<b>EM 150</b>  AWS/ASME SFA-5.5 E 8018 - C3 EN ISO 2560-A E 46 6 Z 1Ni B 42 TS EN ISO 2560-A E 46 6 Z 1Ni B 42	Heavy coated basic type electrode, suitable for welding steel constructions, off-shore platforms, bridge, machinery, production and in their root pass applications where low alloy high strength steels and fine grained structural steels used. Weld metal is high crack resistance under difficult operating conditions such as dynamic loads and especially low environmental temperatures.	C: 0.06	500	600	24				
		Si: 0.30							
		Mn: 1.10							
		Ni: 1.00							
<b>EM 150W</b>  AWS/ASME SFA-5.5 E 8018 - W2 EN ISO 2560-A E 50 6 Z 1Ni B 42 TS EN ISO 2560-A E 50 6 Z 1Ni B 42 DIN 8529 E Y 42 76 1 Ni B	Heavy coated basic type electrode, designed for welding weathering steels, like COR-TEN steels, high strength steels, particularly copper containing steels which are resistant to atmospheric corrosion. Due to its high crack resistance under difficult operating conditions such as dynamic loads, high and low environmental temperatures, suitable to use in fabrication of steel constructions like bridge, stadium, off-shore platforms. Easy to use in root and fill passes. Welds are of X-ray quality.	C: 0.06	520	580	22				
		Si: 0.50							
		Mn: 1.00							
		Ni: 0.80							
		Cr: 0.50							
<b>EM 160</b>  AWS/ASME SFA-5.5 E 8018 - G EN ISO 2560-A E 50 6 Mn1Ni B 42 TS EN ISO 2560-A E 50 6 Mn1Ni B 42 DIN 8529 E Y 50 76 Mn1Ni B	Basic type heavy coated iron powder electrode for welding low alloy steels, fine grained structural steels and high strength pipes. Due to its high crack resistance under difficult conditions such as dynamic loads and service temperatures between -60°C and + 450°C, it is suitable for use in heavy steel structures, off-shore platform, heavy machinery, pressure vessels, tanks, boiler production, welding and repair jobs of pipes and in their root pass applications. Welds are of X-ray quality.	C: 0.06	560	620	22				
		Si: 0.50							
		Mn: 1.80							
		Ni: 0.90							
<b>EM 165</b>  AWS/ASME SFA-5.5 E 9018 - G - H4 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 EN 757 E 55 5 Mn1NiMo B T 42 H5 DIN 8529 E SY 55 75 Mn1NiMo B H5	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.	C: 0.07	570	650	20				
		Si: 0.40							
		Mn: 1.70							
		Mo: 0.50							
		Ni: 1.00							
<b>EM 170</b>  AWS/ASME SFA-5.5 E 9018 - 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 DIN 8529 E Y 50 75 Mn1Ni B 42 H5	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 extremely high metallurgical purity and very low hydrogen content. Electrode features a stable and concentrated arc, rendering it well-suited for positional welding. Suitable for welding and repair jobs up to X70 oil and gas pipes. Welds are of X-ray quality.	C: 0.08	530	620	21				
		Si: 0.40							
		Mn: 1.50							
		Ni: 0.80							
<b>EM 171</b>  AWS/ASME SFA-5.5 E 8018 - 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 DIN 8529 E SY 42 87 2Ni B H5	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 of X-ray quality.	C: 0.05	550	630	24				
		Si: 0.30							
		Mn: 1.00							
		Ni: 2.30							
		Cu: 0.15							

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)		
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]			Impact Energy ISO-V(J)	
<b>EM 172</b> AWS/ASME SFA-5.5 EN ISO 2560 - A TS EN ISO 2560 - A	E 8018 - C2 E 46 6 3Ni B 42 E 46 6 3Ni B 42	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.	C: 0.08	500	570	22	-60°C : 50J		
			Si: 0.30						
			Mn: 1.00						
			Ni: 3.50						
<b>EM 175</b> AWS/ASME SFA-5.5 EN ISO 18275-A TS EN ISO 18275-A EN 757 DIN 8529	E 10018 - G - H 4 E 69 4 Mn2NiCrMo B 42 H5 E 69 4 Mn2NiCrMo B 42 H5 E 69 4 Mn2NiCrMo B 42 H5 EY 69 75 Mn2NiCrMo B H5	Heavy coated basic type electrode for welding fine grained structural steels which have yield strength up to 690N/mm <sup>2</sup> . (e.g. WELDOX 700 and etc.) Suitable for welding high strength steels used in fabrication of cranes, earthmoving and similar heavy construction equipments. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. Electrode features a stable and concentrated arc. Especially 2,50 mm and 3,25 mm diameter well suited for easy positional welding. Welds are of X-ray quality. If normalizing is required after welding, EM 176 should be used. Producing tough and crack-free welded joints.	C: 0.06	720	800	18	-40°C : 75J		
			Si: 0.40						
			Mn: 1.50						
			Mo: 0.40						
			Ni: 2.00						
Cr: 0.50									
<b>EM 176</b> AWS/ASME SFA-5.5 EN ISO 18275-A TS EN ISO 18275-A EN 757 DIN 8529	E 9018 - G E 62 6 Mn2NiMo B 42 E 62 6 Mn2NiMo B 42 E 62 6 Mn2NiMo B 42 EY 50 75 Mn1Ni B H5	Heavy coated basic type electrode for welding fine grained and low alloy steels which will be subsequently normalized or normalized + tempered after welding. Weld deposit is tough and crack-free and has a low hydrogen content. Especially 2,50 mm and 3,25 mm diameter well suited for easy positional welding. Welds are of X-ray quality.	C: 0.05	630	720	18	-60°C : 50J		
			Si: 0.30						
			Mn: 1.60						
			Mo: 0.40						
Ni: 2.00									
<b>EM 180</b> AWS/ASME SFA-5.5 EN ISO 18275-A TS EN ISO 18275-A EN 757 DIN 8529	E 11018 - G H4 E 69 6 Mn2NiCrMo B 42 H5 E 69 6 Mn2NiCrMo B 42 H5 E 69 6 Mn2NiCrMo B 42 H5 EY 69 75 Mn2NiCrMo B H5	Heavy coated basic type electrode for welding fine-grained and high strength structural steels which have yield strength up to 690N/mm <sup>2</sup> (e.g. WELDOX 700) and tensile strength up to 850 N/mm <sup>2</sup> . Suitable for welding high strength steels used in fabrication of crane, earthmoving equipment, heavy machinery parts. Due to its high toughness, crack resistance even under difficult operating conditions such as dynamic loads, high and low environmental temperatures, it is suitable for use in steel constructions, pressure vessels, tanks, boilers and special fabrications and in their root pass applications with safety. 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 diameter well suited for easy positional welding. Welds are of X-ray quality.	C: 0.06	700	850	18	-60°C : 50J		
			Si: 0.35						
			Mn: 1.60						
			Mo: 0.40						
			Ni: 2.30						
Cr: 0.40									
<b>EM 181</b> AWS/ASME SFA-5.5 EN ISO 18275-A TS EN ISO 18275-A EN 757 DIN 8529	E 11018 - M E 69 5 Mn2NiCrMo B 42 H5 E 69 5 Mn2NiCrMo B 42 H5 E 69 5 Mn2NiCrMo B 42 H5 EY 69 75 Mn2NiCrMo B	Heavy coated basic type electrode for welding low alloy high strength steels, particularly fine grained structural steels. Due to its crack resistance even under difficult operating conditions such as dynamic loads, high and low environmental temperatures, it is suitable for use in steel constructions, pressure vessels, tanks, boilers and special fabrications such as submarines and ships where military specifications are required. It can also be used for root pass applications of these constructions with safety. Weld metal is tough, resistant to cracking and has X-ray quality.	C: 0.06	700	780	23	-50°C : 55J		
			Si: 0.30						
			Mn: 1.60						
			Mo: 0.40						
			Ni: 2.20						
Cr: 0.40									
<b>EM 201</b> AWS/ASME SFA-5.5 EN ISO 3580-A TS EN ISO 3580-A DIN 8529	E 8013 - G E Mo R 12 E Mo R 12 E Mo R 22	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 restriking. 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.	C: 0.08	After Heat Treatment: 620°C 1 Hour					
			Si: 0.30	510	590	25			+20°C : 80J
			Mn: 0.60						
			Mo: 0.50						
<b>EM 202</b> AWS/ASME SFA-5.5 EN ISO 3580-A TS EN ISO 3580-A DIN 8575	E 7018 - A1 H8 E Mo B 42 H10 E Mo B 42 H10 E Mo B 26	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 +500°C. Welds are of X-ray quality. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	C: 0.06	After Heat Treatment: 620°C 1 Hour					
			Si: 0.40	520	570	26			+20°C : 125J
			Mn: 0.80						
			Mo: 0.50						



## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)	
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]			Impact Energy ISO-V(J)
<b>EM 211</b>  AWS/ASME SFA-5.5 E 8013 - G EN ISO 3580-A E CrMo1 R 12 TS EN ISO 3580-A E CrMo1 R 12 DIN 8575 E CrMo1 R 22	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 alternating current (AC). Easy arc striking and restriking. Very smooth welds, blending into base metal without undercuts. For thick sections basic covered EM 212 shall be preferred. Preheating, interpass temperature and post-weld heat treatment shall be done according to base metal used.	C: 0.07	After Heat Treatment: 680°C 1 Hour					
		Si: 0.40	530	610	26	+20°C : 110J		
		Mn: 0.60						
		Mo: 0.50						
		Cr: 1.00						
<b>EM 212</b>  AWS/ASME SFA-5.5 E 8018 - B2 H8 EN ISO 3580-A E CrMo1 B 42 H10 TS EN ISO 3580-A E CrMo1 B 42 H10 DIN 8575 E CrMo1 B 20+	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.	C: 0.07	After Heat Treatment: 680°C 1 Hour					
		Si: 0.50	580	650	24	+20°C : 100J		
		Mn: 0.80						
		Mo: 0.55						
		Cr: 1.25						
<b>EM 222</b>  AWS/ASME SFA-5.5 E 9018 - B3 EN ISO 3580-A E CrMo2 B 42 H10 TS EN ISO 3580-A E CrMo2 B 42 H10 DIN 8575 E CrMo2 B 42 H10	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 temperatures up to 600°C. Generally preferred in thick sections with high mechanical properties and X-Ray quality are necessary. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	C: 0.06	After Heat Treatment: 700°C 1 Hour					
		Si: 0.45	560	640	20	-20°C : 50J		
		Mn: 0.80						
		Mo: 1.00						
		Cr: 2.30						
<b>EM 235</b>  AWS/ASME SFA-5.5 E 8015 - B 6 EN ISO 3580-A E CrMo5 B 42 TS EN ISO 3580-A E CrMo5 B 42 DIN 8575 E CrMo5 B 20	Basic type electrode for welding creep resistant steels. Weld metal matches the composition of steel grade 12CrMo19-5 featuring equal resistance to high-pressure hydrogen attack, creep resistance and creep rupture strength. Typical applications are: petrochemical process plants, hydrocrackers in chemical industries. Suitable to use in pressure vessels and boilers subject to operating temperatures up to 600°C. Preheating, interpass temperature and post weld heat treatment should be done in accordance with base metal to be welded.	C: 0.07	After Heat Treatment: 750°C 1 Hour					
		Si: 0.70	540	600	25	+20°C : 90J		
		Mn: 0.80						
		Mo: 0.60						
		Cr: 5.50						
<b>EM 243</b>  AWS/ASME SFA-5.5 E 12018-G	Basic type electrode for welding cementation steels and 1%Cr, 2.5%Ni 0.7% Mo containing steels and cast steels. Suitable to use in machine building and construction of apparatus, as well as for repair welding of components made of similar steels grades. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	C: 0.04	780	850	18	+20°C : 80J		
		Si: 0.55						
		Mn: 0.60						
		Mo: 0.70						
		Ni: 2.30						
Cr: 1.00								
<b>EM 251</b>	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.	C: 0.08	700	850	15	-		
		Si: 0.80						
		Mn: 0.60						
		Cr: 1.30						
		Ni: 0.05						
		Mo: 0.90						
		Cu: 0.08						
V: 0.55								
<b>EM 253</b>  AWS/ASME SFA-5.5 E 11018-G	Basic type electrode for welding hot work tool steels and cast steels with similar composition, which are subjected to high temperatures up to 550-600°C. Suitable for welding Cr, Mo, V, W containing low alloy steels and hot work tool steels. Also suitable for surfacing and hardfacing on machine parts, forging and drawing dies, shafts which were made of hot work tool steels and similar compositions. Preheating, interpass temperature and post-weld heat treatment should be done in accordance with base metal to be welded.	C: 0.07	760	870	18	+20°C : 45J		
		Si: 0.80						
		Mn: 0.90						
		Mo: 0.65						
		Cr: 3.50						
		V: 0.50						
		W: 0.60						

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)	
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]			Impact Energy ISO-V(J)
<b>EM 255</b> EN ISO 3580 - A TS EN ISO 3580 - A DIN 8575 E CrMoV1 42 H10 E CrMoV1 42 H10 E CrMoV1 B 20+	Basic type, electrode of the Cr-Mo-V type, designed for welding cast steel 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 of base metals.	C: 0.10	After Heat Treatment: 700°C 1 Hour					
		Si: 0.40	550	630	18	+20°C : 50J		
		Mn: 1.00						
		Mo: 1.00						
		Cr: 1.20						
		V: 0.20						
<b>EM 290</b> AWS/ASME SFA-5.5 EN ISO 3580 - A TS EN ISO 3580 - A DIN 8575 ~E 9018 - B9 H8 ~E CrMo9 B 42 H10 ~E CrMo9 B 42 H10 ~E CrMoVNb9 B 20+	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 exchanger 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.	C: 0.12	After Heat Treatment: 760°C 1 Hour					
		Si: 0.40	550	700	17	+20°C : 70J		
		Mn: 0.90						
		Mo: 1.15						
		Ni: 0.15						
		Cr: 9.50						
V: 0.20								
Nb: 0.05								
<b>EM 291</b> AWS/ASME SFA-5.5 EN ISO 3580 - A TS EN ISO 3580 - A E 9018 - B9 H4 E CrMo91 B 42 H5 E CrMo91 B 42 H5	Basic type, covered electrode for welding high temperature creep resistant steels of type 9Cr-1Mo-V-Nb-N with operating temperatures of up to 650°C. Suitable for welding piping and components produced from P91, F91 and T91 steels. Can be used both in thin walled and thick walled pipes and casting successfully.	C: 0.10	After Heat Treatment: 760°C 1 Hour					
		Si: 0.30	≥ 530	620-850	≥ 17	+20°C : ≥70J		
		Mn: 0.70						
		Mo: 1.00						
		Ni: 0.40						
		Cr: 9.00						
V: 0.20								
N: 0.04								
Nb: 0.05								
<b>EM 292</b> AWS/ASME SFA-5.5 EN ISO 3580 - A TS EN ISO 3580 - A E 9018-G E Z CrMoWVNb 9 0.5 2 B 4 2 H5 E Z CrMoWVNb 9 0.5 2 B 4 2 H5	Basic type, covered electrode for welding high temperature creep resistant steels of type 9Cr-0.5Mo-W-V-Nb-N with operating temperatures of up to 650°C. Particularly suitable for welding piping and components produced from P92, F92 and T92 steels, with a post weld heat treatment at 760°C.	C: 0.095	After Heat Treatment: 760°C 1 Hour					
		Si: 0.20	≥ 530	≥ 700	≥ 16	+20°C : ≥50J		
		Mn: 1.10						
		Mo: 0.50						
		Cr: 9.00						
		V: 0.20						
W: 1.70								
Nb: 0.05								
Co: 1.00								
N: 0.04								



**STAINLESS STEELS**

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)	
		Chemical Analysis (%)	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)			
<b>EI 307R</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN Material No.	~E 307 - 16 E 18 8 Mn B 22 E 18 8 Mn R 22 E 18 8 Mn R 22 E 18 8 Mn R 22 1.4370	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 with AC and DC.	C: 0.10	650	40	+20°C : 80J		
			Si: 0.55					
			Mn: 7.00					
			Cr: 19.00					
			Ni: 9.00					
<b>EI 307B</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	~E 307 - 15 E 18 8 Mn B 22 E 18 8 Mn B 22 E 18 8 Mn B 22 E 18 8 Mn B 20 E 18 8 Mn B 20	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 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. Used with DCEP (DC+)	C: 0.07	600	35	+20°C : 70J		
			Si: 0.60					
			Mn: 6.00					
			Cr: 19.50					
			Ni: 9.00					
<b>EIS 307</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	~E 307 - 16 E 18 8 Mn B 53 E 18 8 Mn B 53 E 18 8 Mn B 53 E 18 8 Mn MP B 26 160	High efficiency (160%) electrode for joining dissimilar steels with sections 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 it's low alloy steel core wire and used with DCEP (DC+)	C: 0.08	620	32	+20°C : 70J		
			Si: 1.10					
			Mn: 6.00					
			Cr: 19.00					
			Ni: 9.00					
<b>EI 308L</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 308 L - 16 E 19 9 L R 12 E 19 9 L R 12 E 19 9 L R 12 E 19 9 L R 12 E 19 9 L R 26	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 restriking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.	C: Max 0.03	600	38	+20°C : 70J		
			Si: 0.90					
			Mn: 0.95					
			Cr: 19.50					
			Ni: 10.00					
<b>EI 308Mo</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 308 Mo - 15 E 20 10 3 B 22 E 20 10 3 B 22 E 20 10 3 B 22 E 20 10 3 B 22 E 20 10 3 B 20	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.	C: 0.08	690	40	+20°C : 70J		
			Si: 0.30					
			Mn: 2.40					
			Cr: 19.00					
			Ni: 9.00					
Mo: 2.40								
<b>EIS 308</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 308 - 16 E 19 9 R 53 E 19 9 R 53 E 19 9 R 53 E 19 9 R 53 E 19 9 MPR 26 160	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 and cladding 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.	C: 0.05	600	40	+20°C : 65J		
			Si: 0.80					
			Mn: 0.80					
			Cr: 19.50					
			Ni: 10.00					
<b>EI 309L</b> AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556 DIN Material No.	E 309 L - 16 E 23 12 L R 12 E 23 12 L R 12 E 23 13 L R 12 E 23 13 L R 12 E 23 12 L R 23 1.4332	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 in +300°C. In case of higher temperatures use ENI 422 electrodes. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easy slag removal, easy arc striking and restriking.	C: 0.02	600	35	+20°C : 60J		
			Si: 0.90					
			Mn: 1.00					
			Cr: 23.00					
			Ni: 12.50					

## STAINLESS STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)	
		Chemical Analysis (%)	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)			
<b>EI 309MoL</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556 DIN Material No.	E 309 L Mo - 16 E 23 12 2 L R 12 E 23 12 2 L R 12 E 23 12 2 L R 12 E 23 12 2 L R 23 1.4459	Rutile type stainless steel electrode for joining dissimilar steels (austenitic steels to ferritic steels) and for austenitic claddings. Weld metal consists of austenite with approx. 15% delta-ferrite. Claddings on unalloyed and low-alloy steels are already corrosion resistant in the first layer, due to Mo (molybdenum) content. Higher operating temperature for joints between dissimilar steels is +300°C. In the cases of higher temperatures, use ENI 422 electrodes. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easy slag removal, easy arc striking and restriking.	C: 0.02	600	30	+20°C : 50J		
			Si: 0.90					
			Mn: 0.90					
			Cr: 22.50					
			Ni: 12.50					
			Mo: 2.50					
<b>EIS 309</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 309 - 16 E(22 12) R 53 E(22 12) R 53 E Z 23 12 L R 53 E 22 12 MPR 26 160	Rutile type, high recovery (160%) stainless steel electrode for welding of heat resistant 22 Cr/12 Ni 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 steel. Possible to use equally well both with AC and DC. High current carrying capacity, since core wire is not made of stainless steel.	C: 0.10	600	30	+20°C : 70J		
			Si: 0.90					
			Mn: 0.80					
			Cr: 23.00					
			Ni: 12.00					
<b>EIS 309Mo</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 309 Mo - 16 E Z 23 12 2 LR 53 E Z 23 12 2 LR 53 E Z 23 12 2 LR 53 E 23 13 2 MPR 36 160	Rutile type, high recovery (160%) stainless steel electrode for welding dissimilar steels ferritic to austenitic steels and depositing austenitic stainless claddings. The austenitic weld metal has a delta-ferrite content of approx. 15 %. Claddings on unalloyed steels are already corrosion resistant in the first layer, due to Mo (molybdenum) content. Highest operating temperature for dissimilar steel joints is + 300°C. Possible to use equally well both with AC and DC. Easy arc striking and restriking. 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.	C: 0.06	600	30	+20°C : 50J		
			Si: 0.80					
			Mn: 0.80					
			Cr: 22.50					
			Ni: 13.00					
			Mo: 2.50					
<b>EI 310</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 310 - 16 E 25 20 R 32 E 25 20 R 32 E 25 20 R 32 E 25 20 R 32 E 25 20 R 26	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.	C: 0.10	600	30	+20°C : 70J		
			Si: 0.70					
			Mn: 1.50					
			Cr: 25.00					
			Ni: 20.00					
<b>EI 310B</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 310 - 15 E 25 20 B 12 E 25 20 B 12 E 25 20 B 12 E 25 20 B 12 E 25 20 B 20	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 furnaces and equipments which are 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. Used with DCEP.	C: 0.10	600	33	+20°C : 100J		
			Si: 0.50					
			Mn: 2.00					
			Cr: 25.00					
			Ni: 20.00					
<b>EI 312</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 312 - 16 E 29 9 R 12 E 29 9 R 12 E 29 9 R 12 E 29 9 R 12 E 29 9 R 26	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 with AC and DC. Easy arc striking and restriking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easy slag removal.	C: 0.10	750	25	+20°C : 50J		
			Si: 0.90					
			Mn: 1.10					
			Cr: 29.00					
			Ni: 10.00					
<b>EI 316L</b>  AWS/ASME SFA-5.4 EN ISO 3581-A TS EN ISO 3581-A EN 1600 DIN 8556	E 316 L - 16 E 19 12 3 L R 32 E 19 12 3 L R 32 E 19 12 3 L R 32 E 19 12 3 L R 32 E 19 12 3 L R 26	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 restriking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.	C: 0.03	600	35	+20°C : 70J		
			Si: 0.80					
			Mn: 0.90					
			Cr: 19.00					
			Ni: 12.00					
			Mo: 2.50					

**STAINLESS STEELS**

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)
		Chemical Analysis (%)	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>EI 316LB</b>  AWS/ASME SFA-5.4 E 316 L - 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 DIN 8556 E 19 12 3 LB 20	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 austenitic low carbon 19Cr/12Ni/2-3Mo stainless steels, in chemical, textile, paint, paper industries. Used with DCEP.	C: 0.02	575	32	+20°C : >60J		
		Si: 0.45					
		Mn: 0.80					
		Cr: 18.00					
		Ni: 12.00					
		Mo: 2.80					
<b>EIS 316</b>  AWS/ASME SFA-5.4 E 316 - 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 DIN 8556 E 19 12 2 MPR 26 160	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.	C: 0.07	600	35	+20°C : 65J		
		Si: 0.85					
		Mn: 0.80					
		Cr: 19.00					
		Ni: 12.00					
		Mo: 2.50					
<b>EI 318</b>  AWS/ASME SFA-5.4 E 318 - 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 DIN 8556 E 19 12 3 Nb R 26	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 restriking. Fine-droplet metal transfer, good wash-in of joint sides, easily removable slag.	C: 0.06	600	32	+20°C : 70J		
		Si: 0.90					
		Mn: 0.80					
		Cr: 18.50					
		Ni: 12.00					
		Mo: 2.50					
<b>EI 347</b>  AWS/ASME SFA-5.4 E 347 - 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 DIN 8556 E 19 9 Nb R 26	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 or cast steels. For operating temperatures of 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 restriking. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easily removable slag.	C: 0.04	600	35	+20°C : 70J		
		Si: 0.90					
		Mn: 0.80					
		Cr: 19.00					
		Ni: 10.00					
		Nb: 0.35					
<b>EIS 410</b>  AWS/ASME SFA-5.4 E 410 - 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 DIN 8556 E 13 1 MPB 20+	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.	C: 0.06	730	22	+20°C : 50J		
		Si: 0.50					
		Mn: 0.80					
		Cr: 13.00					
		Ni: 0.70					
<b>EIS 410NiMo</b>  AWS/ASME SFA-5.4 E 410NiMo - 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 DIN 8556 E 13 4 MPB 20+	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.	C: 0.06	850	17	+20°C : 47J		
		Si: 0.75					
		Mn: 0.80					
		Cr: 12.00					
		Ni: 4.00					
		Mo: 0.50					
<b>EI 2209</b>  AWS/ASME SFA-5.4 E 2209 - 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 DIN 8556 E 22 9 3 N L R 26 DIN Material Number 1.4462	Electrode for welding duplex (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 duplex stainless steels to carbon steels. The delta-ferrite content of the as-deposited weld metal amounts to approx. 25 to 35 %. The high-strength and ductile weld metal exhibits good resistance to pitting, crevice corrosion and stress corrosion cracking in chloride-bearing media. For operating Temperatures of up to +250°C. Possible to use equally well both with AC and DC. Fine metal droplet transfer, good fusion of joint faces, finely rippled bead surface, easy arc striking, restriking and slag removal.	C: 0.02	> 750	> 25	+20°C : 50J		
		Si: 0.75					
		Mn: 0.95					
		Cr: 23.00					
		Ni: 9.50			-20°C : >35J		
		Mo: 2.80					
		Nb: 0.15					

## ALUMINUM ALLOYS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	Re-drying information (When necessary)
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]		
<b>EAL 1100</b> AWS/ASME SFA-5.3 E 1100 DIN 1732 EL - Al 99.5 TS 9604 EL - Al 99.5	Electrode with special covering for welding aluminium. 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.  <b>GTA (TIG)-Welding rod :</b> TAL 1100 <b>GMA (MIG)-Welding wire :</b> MAL 1100	Al: 99.5	75	115	26		
<b>EAL 4043</b> AWS/ASME SFA-5.3 E 4043 DIN 1732 EL - Al Si 5 TS 9604 EL - Al Si 5	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.  <b>GTA (TIG)-Welding rod :</b> TAL 4043 <b>GMA (MIG)-Welding wire :</b> MAL 4043	Al: 93.80 Si: 5.20 Fe: 0.80 Cu: 0.20	>40	>120	>8		
<b>EAL 4047</b> DIN 1732 EL-AISI 12 TS 9604 EL-AISI2	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.  <b>GTA (TIG)-Welding rod :</b> TAL 4047 <b>GMA (MIG)-Welding wire :</b> MAL 4047	Al: 87.0 Si: 12.0 Fe: 0.80 Cu: 0.20	165	283	7		

## COPPER ALLOYS

Products Name Standards	Applications and Properties	Typical Properties of Weld Metal				Current Type Polarity Welding Positions	Re-drying information (if needed)	
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]			Hardness
<b>ECU</b> AWS/ASME SFA-5.6 E Cu	Electrode for joining and surfacing of pure copper and alloys. Suitable for surfacing welds on steel, for this application, the initial runs should be welded at the lowest possible amperage or a buffer layer shall be preferred. To obtain the typical mechanical properties, preheat the workpiece to 350°C and maintain this heat throughout the welding operation. Clear and easy to observe molten pool, stable arc. Easy slag removal. Possible to use with DCEP.  <b>GTA (TIG) Welding Rod:</b> TCJ <b>GMA (MIG) Welding Wire:</b> MCU Sn	Cu: 99.0 Other: 1.0	80	200	34	50 HB		
<b>ECU Sn7</b> AWS/ASME SFA-5.6 E CuSn-C DIN 1733 EL-CuSn 7	Electrode for joining and surfacing of pure copper and copper alloys, steel, cast steel, grey cast iron such as piston arms, sprockets, 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.  <b>GMA (MIG) Welding Wire:</b> MCU Sn7	Cu: 92.0 Sn: 7.0 Other: 1.0	130	290	-	110 HB		
<b>ECU AI8</b> AWS/ASME SFA-5.6 E CuAl-A 1 DIN 1733 EL-CuAl8	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.  <b>GMA (MIG) Welding Wire:</b> MCU AI8	Al: 8.00 Mn: 0.50 Fe: 0.50 Cu: Rest	180	420	>20	180 HB		

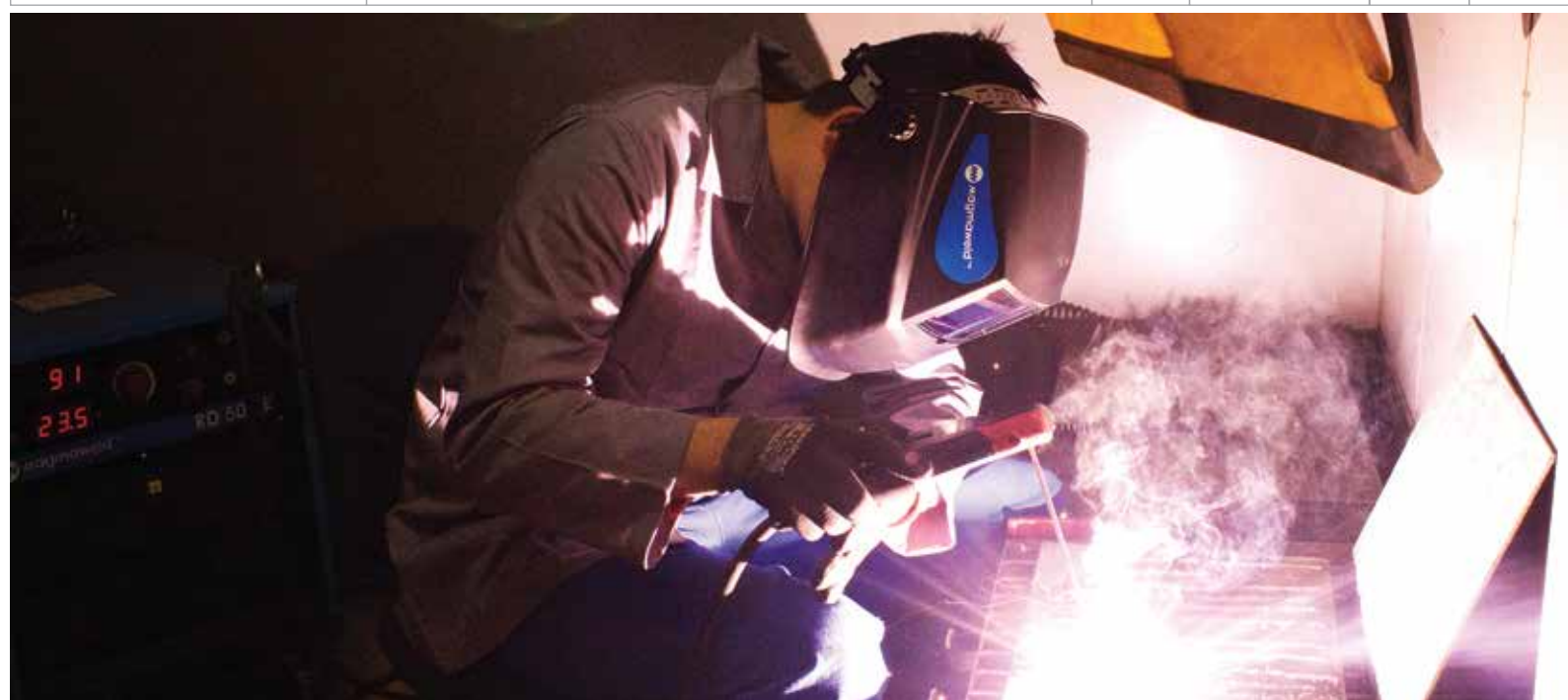
**NICKEL ALLOYS**

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal					Current Type Polarity Welding Positions	Re-drying information (When necessary)		
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)			Hardness	
<b>ENI 420</b> AWS/ASME SFA-5.11 EN ISO 14172 TS EN ISO 14172 DIN 1736 DIN Material Number	E NiCu - 7 E Ni 4060 E Ni 4060 EL - NiCu30Mn 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.	Ni: 65.40	320	500	40	+20°C : 120J	-		
			Cu: 30.00							
			Fe: 1.50							
			C: 0.10							
			Mn: 2.50							
<b>ENI 422</b> AWS/ASME SFA-5.11 EN ISO 14172 TS EN ISO 14172 DIN 1736 DIN Material Number	E NiCrFe - 3 E Ni 6182 E Ni 6182 EL - NiCr15FeMn 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.	Ni: >68.00	> 380	> 620	> 35	+20°C : > 80J	-		
			Fe: 6.00							
			C: <0.04							
			Si: 0.40							
			Mn: 6.00							
			Cr: 16.50							
			Mo: 0.20							
Nb: 2.00										
<b>ENI 424</b> AWS/ASME SFA-5.11 EN ISO 14172 TS EN ISO 14172 DIN 8555	E NiCrMo - 4 E Ni 6275 E Ni 6275 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.	Ni: Rest	520	720	33	-	As Welded 200 HB		
			Fe: 6.50							
			C: 0.02							
			Si: 1.00							
			Mn: 0.50							
			Cr: 15.00							
			Mo: 15.00							
			W: 3.10							
			Co: 1.40							
								After Work Hardening 320-420 HB		



## CAST IRON

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	Re-drying information (When necessary)
		Chemical Analysis (%)	Hardness		
<b>ENI 402 (Ni)</b>  AWS/ASME SFA-5.15 EN ISO 1071 TS EN ISO 1071 DIN 8573  E Ni - CI EC NiCu - B 3 EC Ni - CI 3 E Ni - BG 21	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.	Ni: 98.00  Other: 2.00	~160 HB	 	
<b>ENI 406 (Mo)</b>  AWS/ASME SFA-5.15 EN ISO 1071 TS EN ISO 1071 DIN 8573  E NiCu - B EC NiCu - B 3 EC NiCu - B 3 E NiCu - BG 21	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.	Ni: 64.00  Cu: 32.00  Other: 4.00	~160 HB	 	
<b>ENI 412</b>  AWS/ASME SFA-5.15 EN ISO 1071 TS EN ISO 1071 DIN 8573  E Ni - CI EC Ni - CI 3 EC Ni - CI 3 E Ni - G 22	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.	Ni: 96.00 C: 1.30 Si: 0.80 Mn: 0.40 Fe: 1.80	~175 HB	 	
<b>ENI 416 (NiFe)</b>  AWS/ASME SFA-5.15 EN ISO 1071 TS EN ISO 1071 DIN 8573  E NiFe - CI EC NiFe - CI 3 EC NiFe - CI 3 E NiFe - G 23	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.	Ni: 55.00 C: 1.00 Si: 0.60 Mn: 0.40 Fe: 43.00	~210 HB	 	





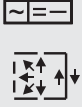
## HARDFACING

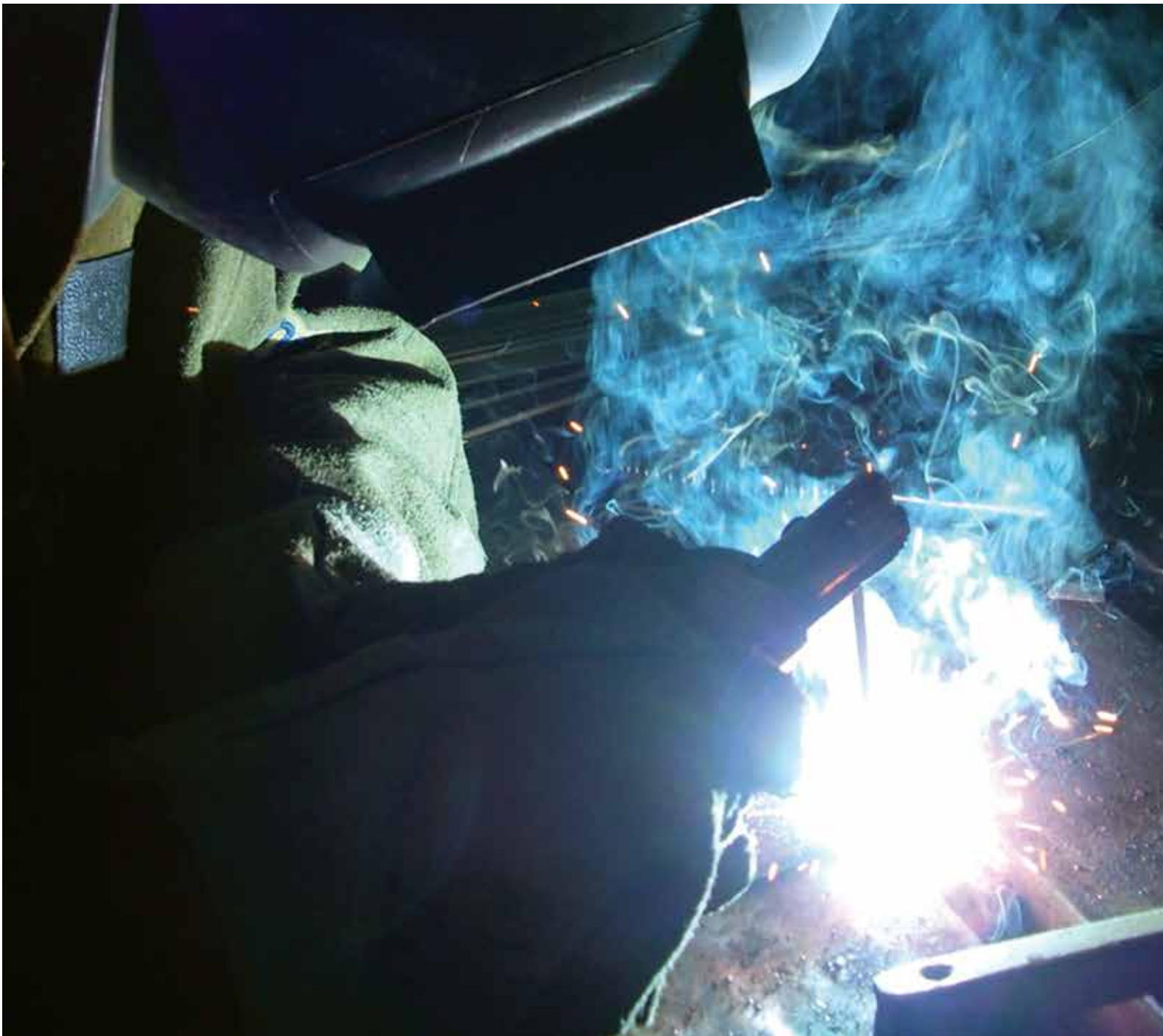
Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	Re-drying information (When necessary)
		Chemical Analysis (%)	Hardness		
<b>EH 245</b> AWS/ASME SFA-5.13 EN 14700 TS EN 14700 DIN 8555 E Fe Mn-A E Fe9 E Fe9 E 7 UM 200 KP	Basic covered, austenitic manganese steel electrode for wear resisting hardfacing deposits. 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.	C: 0.70	As Welded		
		Mn: 12.00	200 HB		
		Ni: 3.00	After Work Hardening		
		Fe: Rest	450 HB		
<b>EH 330</b> 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.	C: 0.10	300 HB		
		Si: 0.70			
		Mn: 0.90			
		Cr: 3.00			
<b>EH 340</b> 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.	C: 0.12	42 HRc		
		Si: 0.80			
		Mn: 0.65			
		Cr: 3.25			
<b>EH 360R</b> 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.	C: 0.40	59 HRc		
		Si: 0.50			
		Mn: 0.30			
		Cr: 7.00			
		V: 0.50			
<b>EH 360B</b> 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.	C: 0.40	59 HRc		
		Si: 0.50			
		Mn: 0.30			
		Cr: 7.00			
		V: 0.50			
<b>EH 380</b> AWS/ASME SFA-5.13 EN 14700 TS EN 14700 DIN 8555 E Fe6 E Fe4 E Fe4 E 4 UM 60 (65) S	Hardfacing electrode for manufacturing and repair welding of turning and planing 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 height). Possible to use with DC, electrode in positive (+) pole and with AC.	C: 1.00	As Welded		
		Si: 1.00			
		Mn: 1.30	57 - 63 HRc		
		Cr: 5.00			
		Mo: 8.00	After Heat Treatment		
		V: 2.50			
		W: 1.90	62 - 66 HRc		
Fe: Rest					
<b>EH 515</b> EN 14700 TS EN 14700 DIN 8555 E Fe14 E Fe14 E 10 UM 60 CR	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.	C: 2.90	60 HRc		
		Cr: 35.00			
		Mn: 1.10			
		Fe: Rest			

## HARDFACING

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	Re-drying information (When necessary)
		Chemical Analysis (%)	Hardness		
<b>EH 526</b> EN 14700 TS EN 14700 DIN 8555 E Fe15 E Fe15 E 10 UM 55 GR	Basic type heavy coated hardfacing electrode with 180% metal recovery. Weld metal deposit is composed of primary and eutectic Cr and Nb carbides in austenitic matrix. Suitable for hardfacing of parts subjected to heavy abrasion with moderate impact or shocks. Particularly used in hardfacing of wear plates in quarry equipment, hammers of gyratory crushers, hammers for refractory materials, clay and basalt, wire guides, meshing gears for trefoil mixers, bucket lips and teeths in earth moving equipments. Wear coefficient of 3 layers deposit with SiO <sub>2</sub> is 1%. The weld metal is machinable only by grinding. Weld with long arc length shall not be welded more than 4 layers. Possible to use with DC, electrode in positive (+) pole and with AC.	C: 4.00	55 HRc	 	 2 Hour
		Cr: 20.00			
		Nb: 6.50			
		Fe: Rest			
<b>EH 528</b> EN 14700 TS EN 14700 DIN 8555 E Fe16 E Fe16 E 10 UM 65 GR	Basic type, high recovery (180%) electrode for depositing primary and eutectic Cr and Nb carbides in austenitic matrix. Suitable for hardfacing of parts subjected to heavy abrasion with moderate impact. Service temperature is max. 450°C. Suitable to use in hardfacing of cement crushers, cement presses and brick conveyor screws, mixer blades, press screws in oil industry, bucket lips and teeths in earth moving equipments. The typical transverse cracks occurring 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 <sub>2</sub> . The weld metal is machinable only by grinding. Weld with long arc length shall not be welded more than 4 layers. Possible to use with both DC and AC.	C: 7.00	62 HRc (1 <sup>st</sup> pass)	 	 2 Hour
		Cr: 24.00	63 HRc (2 <sup>nd</sup> pass)		
		Nb: 7.00	64 HRc (3 <sup>rd</sup> pass)		
		Fe: Rest			
<b>EH 531</b> DIN 8555 E 10 UM 65 GR	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 occurring 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.	C: 4.20	65 HRc	 	 1 Hour
		Si: 1.30			
		Mn: 0.30			
		Cr: 31.00			
		B: 1.20			
Fe: Rest					
<b>EH 540</b> EN 14700 TS EN 14700 DIN 8555 E Fe16 E Fe16 E 10 UM 65 GR	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 occurring 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 <sub>2</sub> . 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 than 4 layers. Possible to use with both DC and AC.	C: 6.00	62 HRc (1 <sup>st</sup> pass)	 	 2 Hour
		Si: 1.00	64 HRc (2 <sup>nd</sup> pass)		
		Cr: 22.00			
		Mo: 6.00	65 HRc (3 <sup>rd</sup> pass)		
		V: 1.00			
		W: 2.00	66 HRc (4 <sup>th</sup> pass)		
Nb: 6.00					
Fe: Rest					
<b>EH 801</b> AWS/ASME SFA-5.13 EN 14700 TS EN 14700 DIN 8555 E Co Cr - C E Co3 E Co3 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 recommended 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.  <b>TIG Welding Rod:</b> TH 801 <b>Gas-Shielded Flux Cored Wire:</b> FCH 801	C: 2.30	55 HRc	 	 1 Hour
		Si: 1.00			
		Mn: 1.00			
		Cr: 32.00			
		W: 13.00			
Co: Rest					
<b>EH 806</b> AWS/ASME SFA-5.13 EN 14700 TS EN 14700 DIN 8555 E Co Cr - A E Co2 E Co2 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.  <b>TIG Welding rod:</b> TH 806 <b>Gas-Shielded Flux Cored Wire:</b> FCH 806	C: 1.00	43 HRc	 	 1 Hour
		Si: 1.00			
		Mn: 1.00			
		Cr: 27.00			
		W: 5.00			
Co: Rest					
<b>EH 812</b> AWS/ASME SFA-5.13 EN 14700 TS EN 14700 DIN 8555 E Co Cr - B E Co3 E Co3 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 floor coverings, roofing, wood, galvanizing baths. Preferred to use with DC, electrode in negative (-) and possible to use with also AC.  <b>TIG Welding Rod:</b> TH 812 <b>Gas-Shielded Flux Cored Wire:</b> FCH 812	C: 1.80	52 HRc	 	 1 Hour
		Si: 1.00			
		Mn: 1.00			
		Cr: 30.00			
		W: 9.00			
Co: Rest					

**CUTTING AND GOUGING**

Products Name Standards	Applications and Properties	Current Type Polarity Welding Positions	Re-drying information (When necessary)
<p><b>ECUT-S</b></p>	<p>Electrode used for cutting, gouging and piercing works. The main advantage of this electrode is suitability both for cutting and also for gouging applications. Resulted surface finish is very clean and smooth. Suitable for demolishing faulty welding places at high speed in all positions and cutting industrial metals, difficult or impossible to cut with oxyacetylene process. E CUT-S should be definitely not left to dry, but should contain certain amount of dampness.</p>		<p>Don't redry.</p>



## MILD STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>OG 1</b> AWS/ASME SFA-5.2 R 45 EN 12536 O I TS 3623 EN 12536 O I DIN 8554 G I	Low carbon steel welding rod for oxy-acetylene welding. It is a general purpose rod for welding low carbon steels and wrought iron with the required tensile strength does not exceed 310 N/mm <sup>2</sup> . 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.	C: 0.08	280	450	20	+20°C : 50J		-
		Si: 0.05						
		Mn: 0.50						
		P: < 0.025						
		S: < 0.025						
<b>OG 2</b> AWS/ASME SFA-5.2 R 60 EN 12536 O II TS 3623 EN 12536 O II DIN 8554 G II	Low carbon steel welding rod, for oxy-acetylene gas welding, containing slightly higher manganese. It is a general purpose welding rod with medium strength, used for welding carbon steels and low alloy steels with tensile strengths up to 410 N/mm <sup>2</sup> . 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.	C: 0.08	300	440	20	+20°C : 50J		-
		Si: 0.05						
		Mn: 1.00						
		P: < 0.025						
		S: < 0.025						
<b>TG 1</b> AWS/ASME SFA-5.18 ER 70 S - 3 EN ISO 636-A W 42 3 W2Si TS EN ISO 636-A W 42 3 W2Si DIN 8559 WSG 1 TS 5618 SG 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.  <b>MAG Welding Wire: MG 1</b>	C: 0.08	460	530	28	-30°C : 80J		I1 (%100 Ar)
		Si: 0.55						
		Mn: 1.20						
		P: < 0.025						
		S: < 0.025						
<b>TG 2</b> AWS/ASME SFA-5.18 ER 70 S - 6 EN ISO 636-A W 46 2 W3Si1 TS EN ISO 636-A W 46 2 W3Si1 DIN 8529 WSG 2 DIN Material Number 1.5125	GTA (TIG) welding rod for unalloyed steels, fine grained steels and pipes. Particularly used in root and cap passes in chemical, petrochemical, water, natural gas pipes joints safely. Suitable also welding of thin metal plates, tanks, boilers and repair welds of them. Thin and homogeneous copper coating increase resistance to rusting.  <b>MAG Welding Wire: MG 2</b>	C: 0.07	480	560	28	-20°C : 90J		I1 (%100 Ar)
		Si: 0.85				-30°C : 70J		
		Mn: 1.45						
		P: < 0.025						
		S: < 0.025						
<b>TG 3</b> AWS/ASME SFA-5.18 ER 70 S - 6 EN ISO 636-A W 46 3 W4Si1 TS EN ISO 636-A W 46 3 W4Si1 DIN 8529 WSG 3 CY 46 43 DIN Material Number 1.5130	GTA (TIG) welding rod for unalloyed steels, fine grained steels and pipes. Provides high mechanical properties. Particularly used in root and cap passes in chemical, petrochemical, water, natural gas pipes joints safely. Suitable also welding of thin metal plates, tanks, boilers and repair welds of them. Thin and homogeneous copper coating increase resistance to rusting.  <b>MAG Welding Wire: MG 3</b>	C: 0.08	490	580	28	-30°C : 80J		I1 (%100 Ar)
		Si: 0.85						
		Mn: 1.70						
		P: < 0.025						
		S: < 0.025						
<b>TG 102</b> AWS/ASME SFA-5.18 ER 70 S - 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 it's titanium (Ti) and aluminium (Al) micro alloy contents, particularly suitable for single pass welding of galvanized, pre-painted, rusty and dirty steels, welding low alloy steels in pipe-lines, boilers and tank construction. Suitable also welding in thin metal plates and repair welds. Thin and homogeneous copper coating increase resistance to rusting.  <b>MAG Welding Wire: MG 102</b>	C: 0.06	> 490	> 570	> 24	-30°C : 60J		I1 (%100 Ar)
		Si: 0.60						
		Mn: 1.20						
		Ti: 0.10						
		Al: 0.07						
		Zr: 0.06						

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)	
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)			
<b>TG 201</b> AWS/ASME SFA-5.28 EN ISO 21952 - A TS EN ISO 21952 - A DIN 8575 DIN Material Number	ER 80 S - G W MoSi W MoSi SG Mo 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.  <b>MAG Welding wire: MG 201</b>	C: 0.08	500	590	25	+20°C : 110J		I1 (%100 Ar)
			Si: 0.60						
			Mn: 1.00						
			Mo: 0.50						
<b>TG 201A</b> AWS/ASME SFA-5.28 EN ISO 21952-A TS EN ISO 21952-A.	ER 80 S - D2 W Z MnMo W Z MnMo	Low alloyed, GTA (TIG) welding rod for Mo-alloyed creep resisting steels, subjected to operating temperatures up to 530°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Particularly used in root and cap pass welding of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.  <b>MAG Welding wire: MG 201A</b>	C: 0.08	520	600	25	+20°C : 110J		I1 (%100 Ar)
			Si: 0.60						
			Mn: 1.80						
			Mo: 0.50						
<b>TG 211</b> AWS/ASME SFA-5.28 EN ISO 21952 - A TS EN ISO 21952 - A DIN 8575 DIN Material Number	ER 80 S - G W CrMo1Si W CrMo1Si SG Cr Mo 1 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.  <b>MAG Welding wire: MG 211</b>	C: 0.08	510	620	24	+20°C : 90J		I1 (%100 Ar)
			Si: 0.60						
			Mn: 1.00						
			Mo: 0.50						
Cr: 1.10									
<b>TG 211A</b> AWS/ASME SFA-5.28 EN ISO 21952-B TS EN ISO 21952-B	ER 80 S - B2 W 55 1CM W 55 1CM	Low alloyed, GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 570°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Particularly used in root and cap pass welding of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.  <b>MAG Welding wire: MG 211A</b>	C: 0.08	As Welded					I1 (%100 Ar)
			Si: 0.60	550	650	20	+20°C : 80J		
			Mn: 0.60	After Heat Treatment: 620°C 2 Hours					
			Mo: 0.50	500	590	24	+20°C : 130J		
			Cr: 1.35						
<b>TG 222</b> AWS/ASME SFA-5.28 EN ISO 21952 - A TS EN ISO 21952 - A DIN 8575 DIN Material Number	ER 90 S - G W CrMo2Si W CrMo2Si SG Cr Mo 2 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.  <b>MAG Welding wire: MG 222</b>	C: 0.05	As Welded					I1 (%100 Ar)
			Si: 0.60	560	660	22	+20°C : 120J		
			Mn: 1.00	After Heat Treatment: 690°C 2 Hours					
			Mo: 1.00	550	650	23	+20°C : 140J		
			Cr: 2.50				-18°C : 120J		
<b>TG 222A</b> AWS/ASME SFA-5.28 EN ISO 21952-B TS EN ISO 21952-B	ER 90S - B3 W 62 2C1M W 62 2C1M	Low alloyed, GTA (TIG) welding rod for Cr-Mo alloyed creep resisting steels, subjected to operating temperatures up to 600°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. Particularly used in root and cap pass welding of steam generators joints, boilers, pressure vessels and pipes, where high X-ray quality is required. Also suitable for welding carbon steel parts subsequently heat treated after welding. Observe directions of pre- and post-weld heat treatment of base metal.  <b>MAG Welding wire: MG 222A</b>	C: 0.08	540	640	22	+20°C : 150J		I1 (%100 Ar)
			Si: 0.50						
			Mn: 0.60						
			Mo: 1.00						
Cr: 2.40				-10°C : 90J					
<b>TG 235</b> AWS/ASME SFA-5.28 EN ISO 21952-A TS EN ISO 21952-A DIN 8575 DIN Material Number	ER 80S - B6 W CrMo5Si W CrMo5Si SG Cr Mo 5 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.	C: 0.05	As Welded					I1 (%100 Ar)
			Si: 0.40	580	700	24	+20°C : 80J		
			Mn: 0.60	After Heat Treatment: 740°C 2 Hours					
			Mo: 0.60	570	690	25	+20°C : 100J		
			Cr: 5.50						

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)	
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)			
<b>TG 295</b> AWS/ASME SFA-5.28 EN ISO 21952-A TS EN ISO 21952-A DIN Material Number	ER 90 S - B 9 W CrMo91 W CrMo91 1.4903	High-alloyed, GTA (TIG) welding rod for creep, oxidation and corrosion resistant Cr-Mo-V-Nb alloyed steels, subjected to operating temperatures in 650°C. Suitable for welding P91 and T91 steels used in steam generators, turbine rotors, boiler, piping in refineries, chemical industry and thermal power generation industry. Observe directions of pre- and post-weld heat treatment of base metal.	As Welded					I1 (%100 Ar)	
			C: 0.10						
			Si: 0.30						
			Mn: 0.80	590	680	22			-30°C : 80J
			Mo: 0.90						+20°C : 120J
			Cr: 9.00	After Heat Treatment: 760°C 2 Hour					
			Ni: 0.50						
			Nb: 0.06	560	700	18			-30°C : 90J
V: 0.20	+20°C : 130J								
Cu: 0.20									

## STAINLESS STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)					
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)							
<b>TI 308L</b> AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 308 L W 19 9 L W 19 9 L SG X2 Cr Ni 19 9 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.  <b>GMA (MIG/MAG)-Welding wire: MI 308 LSi</b>	420	620	36	+20°C : 135J		I1 (%100 Ar)					
									C: <0.03				
									Si: 0.30-0.65				
									Mn: 1.00-2.50				
									Cr: 19.5-22.0				
Ni: 9.0-11.0													
<b>TI 309L</b> AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 309 L W 23 12 L W 23 12 L SG X2 Cr Ni 24 12 1.4332	Austenitic-ferritic wire electrode for GTA (TIG) welding of stainless steels to unalloyed or low-alloyed steels, subject to operating temperatures up to 300°C. Low carbon content increases resistance to intergranular corrosion. Suitable to use also as buffer layer on carbon steel before welding with 308 and 308L to reach 304 and 304L surface layer.  <b>GMA (MIG/MAG)-Welding wire: MI 309 LSi</b>	>400	550-650	>30	+20°C : 47J		I1 (%100 Ar)					
									C: <0.03				
									Si: 0.30-0.65				
									Mn: 1.00-2.50				
									Cr: 23.0-25.0				
Ni: 12.0-14.0													
<b>TI 310</b> AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 310 W 25 20 W 25 20 SG X 12 Cr Ni 25 20 1.4842	Fully austenitic welding rod for (GTA) TIG welding of heat resisting steels, containing approximately 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.  <b>GMA (MIG/MAG)-Welding wire: MI 310</b>	380	630	32	+20°C : 80J		I1 (%100 Ar)					
									C: 0.08-0.15				
									Si: 0.30-0.65				
									Mn: 1.00-2.50				
									Cr: 25.0-28.0				
									Ni: 20.0-22.5				
Mo: 0.75													
<b>TI 316L</b> AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 316 L W 19 12 3 L W 19 12 3 L SG X 2 Cr Ni 19 12 1.4430	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.  <b>GMA (MIG/MAG)-Welding wire: MI 316 LSi</b>	450	620	33	+20°C : 130J		I1 (%100 Ar)					
									C: <0.03				
									Si: 0.30-0.65				
									Mn: 1.00-2.50				
									Cr: 18.0-20.0				
									Ni: 11.0-14.0				
Mo: 2.00-3.00													

## STAINLESS STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>TI 318</b> AWS/ASME SFA-5.9 ER 318 EN ISO 14343-A W 19 12 3 Nb TS EN ISO 14343-A W 19 12 3 Nb DIN 8556 SG X 5 Cr Ni Mo Nb 19 12 DIN Material Number 1.4576	Austenitic stainless steel welding rod for GTA (TIG) welding of unstabilized or stabilized high corrosion resisting Cr-Ni-Mo stainless 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.	C: <0.08	480	640	32	+20°C : 130J		I1 (%100 Ar)
		Si: <0.65						
		Mn: 1.00-2.50						
		Cr: 18.0-20.0						
		Ni: 11.0-14.0						
		Mo: 2.0-3.0						
Nb: <1.0								
<b>TI 347</b> AWS/ASME SFA-5.9 ER 347 EN ISO 14343-A W 19 9 Nb TS EN ISO 14343-A W 19 9 Nb DIN 8556 SG-X5CrNiNb19 9 DIN Material Number 1.4551	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 up to 400°C. Non-scaling up to 800°C, in air and oxidizing combustion gases.  <b>GMA (MIG/MAG)-Welding wire: MI 347</b>	C: <0.08	>350	570-670	>30	+20°C : 65J		I1 (%100 Ar)
		Si: 0.30-0.65						
		Mn: 1.00-2.50						
		Cr: 19.0-21.5						
		Ni: 9.0-11.0						
		Nb: <1.0						

## ALUMINUM ALLOYS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal			Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]		
<b>TAL 1100</b> AWS/ASME SFA-5.10 ER 1100 EN ISO 18273 S AI 1100 TS 6204 EN ISO 18273 S AI 1100 DIN 1732 SG AI 99.5 DIN Material Number 3.0259	Pure aluminium GTA (TIG)-Welding rod of un-alloyed aluminium base metals. It has got good colour matching with base material. High corrosion resistance and excellent electrical conductivity.  <b>Stick electrode: EAL 1100</b> <b>GMA(MIG) - Welding wire: MAL 1100</b>	Al: 99.50	>20	>65	>35		I1 (%100 Ar)
<b>TAL 4043</b> AWS/ASME SFA-5.10 ER 4043 EN ISO 18273 S AI 4043 TS 6204 EN ISO 18273 S AI 4043 DIN 1732 SG AI Si 5 DIN Material Number 3.2245	5% Silicon containing aluminium welding rod for GTA (TIG) welding of aluminium and aluminium alloys. Suitable for brazing aluminium castings containing up to 7% silicon and Al-Mg-Si alloys which are containing < 2% alloying elements.  <b>Stick electrode: EAL 4043</b> <b>GMA(MIG) - Welding wire: MAL 4043</b>	Al: 94.00	>40	>120	>8		I1 (%100 Ar)
		Si: 5.00					
		Fe: 0.40					
		Mg: 0.05					
		Mn: 0.05					
Ti: 0.15							
<b>TAL 4047</b> AWS/ASME SFA-5.10 ER 4047 EN ISO 18273 S AI 4047A TS 6204 EN ISO 18273 S AI 4047A DIN 1732 SG AI Si 12 DIN Material Number 3.2585	Aluminium-Silicon alloy filler metal used both for brazing and TIG welding of aluminium alloys. Suitable for GTA (TIG)-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.  <b>Stick electrode: EAL 4047</b> <b>GMA(MIG) - Welding wire: MAL 4047</b>	Al: 88.00	>60	>130	>5		I1 (%100 Ar)
		Si: 12.00					
		Fe: 0.60					
		Cu: 0.20					
		Mn: 0.15					
<b>TAL 5183</b> AWS/ASME SFA-5.10 ER 5183 EN ISO 18273 S AI 5183 TS 6204 EN ISO 18273 S AI 5183 DIN 1732 SG AI Mg 4.5 Mn DIN Material Number 3.3548	Aluminium alloy welding rod for (TIG) welding of Al-alloys with high tensile strength requirements. Suitable for welding Al-Mg alloys and Al-Mg-Mn alloys.  <b>GMA (MIG)-Welding wire: MAL 5183</b>	Al: Rest	>120	>250	>16		I1 (%100 Ar)
		Si: 0.15					
		Fe: 0.40					
		Mg: 4.30-5.20					
		Mn: 0.50					
		Cr: 0.05					
		Ti: 0.10					

**ALUMINUM ALLOYS**

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal			Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]		
<b>TAL 5356</b> AWS/ASME SFA-5.10 ER 5356 EN ISO 18273 S AI 5356 A TS 6204 EN ISO 18273 S AI 5356 A DIN 1732 SG AI Mg 5 DIN Material Number 3.3556	5% Magnesium containing aluminium welding rod for GTA (TIG) welding of Aluminium - Magnesium (Al-Mg) alloys and Aluminium-Magnesium-Silicon (Al-Mg-Si) alloys. Gives colour match with base metal after anodizing process. Has excellent ductility and very good corrosion resistance especially in sea water.  <b>GMA (MIG)-Welding wire:</b> MAL 5356	Al: Rest	>110	>235	>17		I1 (%100 Ar)
		Mg: 4.50-5.50					
		Mn: 0.05-0.20					
		Cr: 0.05-0.20					
		Ti: 0.06-0.15					

**COPPER ALLOYS**

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Hardness (HB)		
<b>TCU A18</b> AWS/ASME SFA-5.7 ER Cu Al - A1 EN ISO 24373 S Cu 6100 TS EN ISO 24373 S Cu 6100 DIN 1733 SG Cu Al 8 DIN Material Number 2.0921	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 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.  <b>GMA (MIG)-Welding wire :</b> MCU A18	Cu: Rest	200	430	40	100		I1 (%100 Ar)
		Al: 6.00-8.50						
		Mn: <0.50						

**HARDFACING**

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Rod (%)	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Hardness			
<b>TH 801</b> AWS/ASME SFA-5.13 R CoCr - C EN 14700 T Co2 TS EN 14700 T Co3 DIN 8555 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, valve seats, mechanical parts of steam turbines, pump tubing and shafts, mixes blades, wood saws.  <b>Stick electrode :</b> EH 801 <b>FCA-Welding wire :</b> FCH 801	C: 2.30	51-59 HRC		I1 (%100 Ar)	
		Si: 0.80				
		Mn: <1.00				
		Cr: 30.00				
		Ni: <3.00				
		W: 13.00				
		Fe: <3.00				
		Co: Rest				
		Co: Rest				
<b>TH 806</b> AWS/ASME SFA-5.13 R CoCr - A EN 14700 T Co2 TS EN 14700 T Co2 DIN 8555 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.  <b>Stick electrode :</b> EH 806 <b>FCA-Welding wire :</b> FCH 806	C: 1.10	38-48 HRC		I1 (%100 Ar)	
		Si: 1.10				
		Mn: <1.00				
		Cr: 28.00				
		Ni: <3.00				
		W: 4.00				
		Fe: <3.00				
		Co: Rest				
		Co: Rest				
<b>TH 812</b> AWS/ASME SFA-5.21 ERCoCr-B EN 14700 T Co3 TS EN 14700 T Co3 DIN 8555 WSG 20-GO-50-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 tools for cutting paper, cardboard, floor coverings, roofing and wood.  <b>Stick electrode :</b> EH 812 <b>FCA-Welding wire :</b> FCH 812	C: 1.40	44-52 HRC		I1 (%100 Ar)	
		Si: 1.50				
		Mn: <1.00				
		Cr: 29.00				
		Ni: <3.00				
		W: 8.00				
		Fe: <3.00				
		Co: Rest				
		Co: Rest				
<b>TCARBIDE 3000</b> DIN 8555 G 21 UM 65 G	Flexible rod for hard surfacing by 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 (W <sub>2</sub> C, 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 foundry equipment, drilling tricones.	-	Matrix: 40-45 HRC		-	
		-	W <sub>2</sub> C, WC: 3000 HV			



## MILD STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Wire (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)		
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)				
<b>MG 1</b> AWS/ASME SFA-5.18 ER 70 S - 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 TS 5618 SG 1	Unalloyed wire electrode for GMA (MIG/MAG) welding of unalloyed steels by using CO <sub>2</sub> 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-painted steels, welding low alloy 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 conductivity and protects the wire from rusting.  <b>GTA (TIG)-Welding rod : TG 1</b>	C: 0.08	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> ) M24 (Ar+%5-15 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> ) M26 (Ar+%15-25 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )		
		Si: 0.60	425	480	30	-30°C : 100J				
		Mn: 1.20	With C1 Shielding Gas				395	475	30	-30°C : 80J
<b>MG 2</b> AWS/ASME SFA-5.18 ER 70 S - 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 TS 5618 SG 2 CY 42 43 DIN Material Number 1.5125	Unalloyed wire electrode for GMA (MIG/MAG) welding of general structural steels, pipe steels and cast steels using CO <sub>2</sub> or mixed shielding gases, depending on thickness of the 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.  <b>GTA (TIG)-Welding rod: TG 2</b>	C: 0.08	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> ) M24 (Ar+%5-15 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> ) M26 (Ar+%15-25 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )		
		Si: 0.80	430	530	28	-40°C : 55J				
		Mn: 1.45	With C1 Shielding Gas				460	530	29	-30°C : 50J
<b>MG 2A</b> AWS/ASME SFA-5.18 ER 70 S - 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 Material Number 1.5125	Unalloyed wire electrode for GMA (MIG/MAG) welding of steels without spatter or very low level of spatter. Suitable for welding of general structural steels, boiler steels, pipe steels and cast steels. CO <sub>2</sub> or mixed shielding gases can be used depending on the thickness of the base metal. A thin and homogeneous copper coating protects the wires from rusting.	C: 0.08	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> ) M24 (Ar+%5-15 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> ) M26 (Ar+%15-25 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )		
		Si: 0.80	460	550	30	-40°C : 70J				
		Mn: 1.45	With C1 Shielding Gas				440	530	30	-40°C : 60J
<b>MG 3</b> AWS/ASME SFA-5.18 ER 70 S - 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 Material Number 1.5130	Unalloyed wire electrode for GMA (MIG/MAG) welding of general structural steels, pipes and cast steels by using CO <sub>2</sub> 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.  <b>GTA (TIG)-Welding rod: TG 3</b>	C: 0.08	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> ) M24 (Ar+%5-15 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> ) M26 (Ar+%15-25 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )		
		Si: 0.90	470	540	29	-40°C : 55J				
		Mn: 1.65	With C1 Shielding Gas							
<b>MG 3A</b> AWS/ASME SFA-5.18 ER 70 S - 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 Material Number 1.5130	Unalloyed welding electrode for GMA (MIG/MAG) welding of dynamically loaded structures and thick sections of general structural steels, pipes and cast steels. Provides very low level of spatter, and no spatter in spray arc. CO <sub>2</sub> or mixed shielding gases can be used depending on the thickness of the base metal. 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 wires from rusting.	C: 0.08	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> ) M24 (Ar+%5-15 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> ) M26 (Ar+%15-25 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )		
		Si: 0.90	490	550	30	-40°C : 60J				
		Mn: 1.70	With C1 Shielding Gas							
<b>MG 20</b> <b>Non-Copper Coated Wire</b> AWS/ASME SFA-5.18 ER 70 S - 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 Material Number 1.5125	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. CO <sub>2</sub> or mixed shielding gases can be used depending on the thickness of the base metal.	C: 0.08	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> ) M24 (Ar+%5-15 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> ) M26 (Ar+%15-25 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )		
		Si: 0.80	460	550	30	-40°C : 70J				
		Mn: 1.45	With C1 Shielding Gas				440	530	30	-40°C : 60J
<b>MG 102</b> AWS/ASME SFA-5.18 ER 70 S - 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	Micro-alloyed wire electrode for GMA (MIG/MAG) welding of unalloyed and low-alloy steels by using CO <sub>2</sub> or mixed gases. Characterized by a reduced slag formation and smooth welding deposit. Due to it's 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. A thin and homogeneous copper coating increases electrical conductivity and protects the wires from rusting.  <b>GTA (TIG)-Welding rod: TG 102</b>	C: 0.06	With M21 Shielding Gas					C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%5-25 CO <sub>2</sub> )		
		Si: 0.60								
		Mn: 1.20								
		Ti: 0.10								
		Al: 0.07 Zr: 0.06								

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Wire (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>MG 181</b> AWS/ASME SFA-5.28 EN ISO 16834-A TS EN ISO 16834-A ER 100 S - G G Mn3NiCrMo G Mn3NiCrMo	Low alloyed wire electrode for GMA (MAG) welding of fine grained and high strength steels with yield strength of up to 690 N/mm <sup>2</sup> . Especially used in earthmoving, mining equipments, trucks, concrete pumps crane and lift productions. CO <sub>2</sub> or mixed shielding gases can be used depending on the thickness of the base metal.	C: 0.10	700	740	>18		C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%15-25 CO <sub>2</sub> )	
		Si: 0.60						
		Mn: 1.40						
		Mo: 0.20						
		Cr: 0.50						
Ni: 0.60								
<b>MG 201</b> AWS/ASME SFA-5.28 EN ISO 21952 - A TS EN ISO 21952 - A DIN 8575 ER 80 S - G G MoSi G MoSi SG Mo	Low alloyed wire electrode for GMA (MIG/MAG) welding of creep resistant boiler and pipe steels subjected to operating temperatures up to 530°C. MG 201 shall be welded by using mixed gas or CO <sub>2</sub> . Also suitable for joining C-Mn steels to be postweld heat treated. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.  <b>GTA (TIG)-Welding rod: TG 201</b>	C: 0.08	470	570	23	0°C : 50J 	C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%15-25 CO <sub>2</sub> )	
		Si: 0.60						
		Mn: 1.00						
		Mo: 0.50						
<b>MG 201A</b> AWS/ASME SFA-5.28 EN ISO 21952-A TS EN ISO 21952-A ER 80 S - D 2 G Z MnMo G Z MnMo	Low alloyed wire electrode for GMA (MIG/MAG) welding of creep resistant boiler and pipe steels subjected to operating temperatures up to 530°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. MG 201A shall be welded by using mixed gas or CO <sub>2</sub> . 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. A thin and homogeneous copper coating increases electrical conductivity and protects the wire from rusting.  <b>GTA (TIG)-Welding rod: TG 201 A</b>	C: 0.08	520	600	22	-20°C : 50J 	C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%15-25 CO <sub>2</sub> )	
		Si: 0.60						
		Mn: 1.80						
		Mo: 0.50						
<b>MG 211</b> AWS/ASME SFA-5.28 EN ISO 21952-A TS EN ISO 21952-A ER 80S - G G CrMo1Si G CrMo1Si	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. MG 211 shall be welded by using mixed gas. 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. A thin and homogeneous copper coating increases electrical conductivity and protects the wires from rusting.  <b>GTA (TIG)-Welding rod: TG 211</b>	C: 0.08	620	680	21	-20°C : 70J 	C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%15-25 CO <sub>2</sub> )	
		Si: 0.60						
		Mn: 1.00						
		Mo: 0.50						
<b>MG 211A</b> AWS/ASME SFA-5.28 EN ISO 21952-B EN ISO 21952-B TS EN ISO 21952-B TS EN ISO 21952-B ER 80S - B2 G 55C 1CM G 55M 1CM G 55C 1CM G 55M 1CM	Low-alloy wire electrode for GMA (MIG/MAG) welding of Cr-Mo alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 570°C. Contains high level of deoxidizing (Mn and Si) elements to control porosity during welding. MG 211A shall be welded by using mixed gas or CO <sub>2</sub> . 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. A thin and homogeneous copper coating increases electrical conductivity and protects the wires from rusting.  <b>GTA (TIG)-Welding rod: TG 211A</b>	C: 0.08	>470	>550	>19	-20°C : >70J 	C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%15-25 CO <sub>2</sub> )	
		Si: 0.30						
		Mn: 0.60						
		Mo: 0.50						
<b>MG 222</b> AWS/ASME SFA-5.28 AWS/ASME SFA-5.28 EN ISO 21952 - A ER 90 S - G ~ER 90 S - B 3 G Cr Mo 2 Si	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. MG 222 shall be welded by using mixed gas. 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. A thin and homogeneous copper coating increases electrical conductivity and protects the wires from rusting.  <b>GTA (TIG)-Welding rod: TG 222</b>	C: 0.08	550	650	19	-20°C : 50J 	C1 (%100 CO <sub>2</sub> ) M20 (Ar+%5-15 CO <sub>2</sub> ) M21 (Ar+%15-25 CO <sub>2</sub> )	
		Si: 0.65						
		Mn: 1.00						
		Mo: 1.00						
Cr: 2.50								

## STAINLESS STEELS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Wire (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>MI 307Si</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	~ER 307 G 18 8 Mn G 18 8 Mn SG X 15 Cr Ni Mn 18 8 1.4370	C: <0.20  Si: 0.65-1.00  Mn: 4.50-7.50  Cr: 17.0-20.0  Ni: 7.0-10.0	>350	560-660	>40	+20°C : >100J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )
<b>MI 308LSi</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 308 LSi G 19 9 LSi G 19 9 LSi SG X 2 Cr Ni 19 9 1.4316	C: <0.03  Si: 0.65-1.00  Mn: 1.00-2.50  Cr: 19.5-22.0  Ni: 9.0-11.0	>400	580	38	+20°C : >80J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )
<b>MI 309LSi</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 309 LSi G 23 12 LSi G 23 12 LSi SG X 2 Cr Ni 24 12 1.4332	C: <0.03  Si: 0.65-1.00  Mn: 1.00-2.50  Cr: 23.0-25.0  Ni: 12.0-14.0	>400	600	>30	+20°C : >47J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )
<b>MI 310</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 310 G 25 20 G 25 20 SG X 12 Cr Ni 25 20 1.4842	C: 0.08-0.15  Si: 0.30-0.65  Mn: 1.00-2.50  Cr: 25.0-28.0  Ni: 20.0-22.5	360	600	35	+20°C : >70J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )
<b>MI 312</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 312 G 29 9 G 29 9 SG X 10 Cr Ni 30 9 1.4337	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 : >80J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )
<b>MI 316LSi</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 316 L Si G 19 12 3 L Si G 19 12 3 L Si SG X2 Cr Ni Mo 19 12 1.4430	C: <0.03  Si: 0.65-1.00  Mn: 1.00-2.50  Cr: 18.0-20.0  Ni: 11.0-14.0  Mo: 2.00-3.00	390	550	36	+20°C : >65J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )
<b>MI 347</b>  AWS/ASME SFA-5.9 EN ISO 14343-A TS EN ISO 14343-A DIN 8556 DIN Material Number	ER 347 G 19 9 Nb G 19 9 Nb SG X5 Cr Ni Nb 19 9 1.4551	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 : 80J		I1 (%100 Ar) M12 (Ar+%0.5-5 CO <sub>2</sub> ) M13 (Ar+%0.5-3 O <sub>2</sub> ) M14 (Ar+%0.5-5 CO <sub>2</sub> +%0.5-3 O <sub>2</sub> )

## ALUMINUM ALLOYS

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Wire (%)	Typical Properties of All-Weld Metal			Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
			%0.2 Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]		
<b>MAL 1100</b> AWS/ASME SFA-5.10 EN ISO 18273 TS 6204 EN ISO 18273 DIN 1732 DIN Material Number	~ER 1100 S Al 1100 S Al 1100 SG Al 99.5 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 colour match with pure aluminium.  <b>Stick electrode : EAL 1100</b> <b>GTA (TIG)-Welding rod: TAL 1100</b>	Si: < 0.25	> 20	> 65	> 35		I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)
		Fe: < 0.40					
		Al: > 99.35					
<b>MAL 4043</b> AWS/ASME SFA-5.10 EN ISO 18273 TS 6204 EN ISO 18273 DIN 1732 DIN Material Number	ER 4043 S Al 4043 S Al 4043 SG Al Si 5 3.2245  5% Silicon containing aluminium wire electrode for GMA (MIG) welding of aluminium and aluminium alloys. Suitable for welding aluminium castings, containing up to 7% silicon and Al-Mg-Si alloys which are containing < 2% alloying elements.  <b>Stick electrode : EAL 4043</b> <b>GTA (TIG)-Welding rod: TAL 4043</b>	Si: 4.50-6.00	> 40	> 120	> 8		I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)
		Al: Rest					
<b>MAL 4047</b> AWS/ASME SFA-5.10 EN ISO 18273 TS 6204 EN ISO 18273 DIN 1732 DIN Material Number	ER 4047 S Al 4047A S Al 4047A SG Al Si 12 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.  <b>Stick electrode : EAL 4047</b> <b>GTA (TIG)-Welding rod: TAL 4047</b>	Si: 11.00-13.00	> 60	> 130	> 5		I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)
		Al: Rest					
<b>MAL 5183</b> AWS/ASME SFA-5.10 EN ISO 18273 TS 6204 EN ISO 18273 DIN 1732 DIN Material Number	ER 5183 S Al 5183 S Al 5183 SG Al Mg 4.5 Mn 3.3548  Aluminium alloy welding wire for GMA (MIG) welding of Al-alloys with high tensile strength requirements. Suitable for welding Al-Mg alloys and Al-Mg-Mn alloys.  <b>GTA (TIG)-Welding rod: TAL 5183</b>	Mg: 4.30-5.20	> 125	> 275	> 17		I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)
		Mn: 0.50-1.00					
		Cr: 0.05-0.25					
		Al: Rest					
<b>MAL 5356</b> AWS/ASME SFA-5.10 EN ISO 18273 TS 6204 EN ISO 18273 DIN 1732 DIN Material Number	ER 5356 S Al 5356 A S Al 5356 A SG Al Mg 5 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.  <b>GTA (TIG)-Welding rod: TAL 5356</b>	Mg: 4.50-5.50	> 110	> 235	> 17		I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)
		Mn: 0.05-0.20					
		Cr: 0.05-0.20					
		Ti: 0.06-0.15					
		Al: Rest					



**COPPER ALLOYS**

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Welding Wire (%)	Typical Properties of All-Weld Metal				Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)																		
			Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Hardness																				
<b>MCU Sn</b>  AWS/ASME SFA-5.7 EN ISO 24373 TS EN ISO 24373 DIN 1733 DIN Material Number	ER Cu <b>S Cu 1898</b> S Cu 1898 SG Cu Sn 2.1006	Tin alloyed copper wire electrode for GMA (MIG) welding of copper and low alloyed copper alloys. Suitable for welding oxygen-free copper and copper materials subject to high strain. Gives pore-free and easily workable welding seams.  <b>Stick electrode : ECU</b> <b>GTA (TIG)-Welding rod: TCU</b>	Sn: 0.50-1.00  Si: <0.50  Mn: 0.10-0.50  Cu: Rest	100	220	30	60 HB	 I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)																		
									<b>MCU Sn6</b>  AWS/ASME SFA-5.7 EN ISO 24373 TS EN ISO 24373 DIN 1733 DIN Material Number	ER Cu Sn - A <b>S Cu 5180A</b> S Cu 5180A SG Cu Sn 6 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.  <b>Stick electrode : ECU Sn7</b>	Sn: 4.00-7.00  P: 0.01-0.40  Cu: Rest	160	260	25	80 HB	 I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)									
																		<b>MCU AI8</b>  AWS/ASME SFA-5.7 EN ISO 24373 TS EN ISO 24373 DIN 1733 DIN Material Number	ER Cu AI - A 1 <b>S Cu 6100</b> S Cu 6100 SG Cu AI 8 2.0921	8% Aluminium alloyed copper wire electrode for GMA (MIG) welding of copper-aluminum (Cu-AI) 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).  <b>Stick electrode : ECU AI8</b> <b>GTA (TIG)-Welding rod: TCU AI8</b>	Al: 6.00-8.50  Mn: <0.50  Cu: Rest	200	430	40	100 HB	 I1 (%100 Ar) I2 (%100 He) I3 (%0.5-95 He + Ar)



## MILD STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal					Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>FCW 10</b> AWS/ASME SFA-5.20 E70T-1 EN ISO 17632-A T46 2 R C 3 TS EN ISO 17632-A T46 2 R C 3 EN 758	Rutile type flux cored wire for manual and semi-automatic welding of grooves and fillets in flat position with CO <sub>2</sub> gas. Weld beads are bright, smooth, finely rippled and free from spatter. Slag is self releasing in most cases and cleaning is easy in multiple run welding. Suitable to use medium-thickness steels in construction, circumferential welding in truck parts like wheels, hydraulic cylinders.	C: 0.04	500	560	24	-20°C : 60J		C1 (%100 CO <sub>2</sub> )
		Si: 0.20						
		Mn: 1.00						
<b>FCW 11</b> AWS/ASME SFA-5.20 E71T-1 EN ISO 17632-A T46 2 P C 1 TS EN ISO 17632-A T46 2 P C 1 EN 758	Rutile type flux cored wire with fast-freezing slag. Especially designed for production welds 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 rippled pore-free welds blending into base metal without undercut.	C: 0.06	500	560	25	-20°C : 60J		C1 (%100 CO <sub>2</sub> )
		Si: 0.30						
		Mn: 1.20						
<b>FCW 11A</b> AWS/ASME SFA-5.20 E71T-1 EN ISO 17632-A T46 2 P C 1 H5 TS EN ISO 17632-A T46 2 P C 1 H5 EN 758	Rutile type flux cored wire with fast-freezing slag. Especially designed for production welds 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. Electrode of 1.2 mm in diameter is also suitable for vertical-down welding. Low spatter loss, easy slag removal in the fillet and narrow grooves, finely rippled pore-free welds blending into base metal without undercut.	C: 0.06	500	560	25	-20°C : 60J		C1 (%100 CO <sub>2</sub> )
		Si: 0.30						
		Mn: 1.20						
<b>FCW 12</b> 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	Rutile type flux cored wire, especially designed for welding in steel construction, piping, machine fabrication and shipbuilding by using mix shielding gases. 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 rippled pore-free welds blending into base metal without undercut.	C: 0.05	560	630	25	-20°C : 75J		M21 (Ar+%15-25 CO <sub>2</sub> )
		Si: 0.30						
		Mn: 1.20						
<b>FCW 16</b> AWS/ASME SFA-5.20 E71T-1 EN ISO 17632-A T46 2 P C 1 TS EN ISO 17632-A T46 2 P C 1 EN 758	Rutile type flux cored wire for welding in all position with higher mechanical properties. Suitable for welding fine grained structural steels and high strength shipbuilding steels in all position, where low heat input and less deformation are required. Has a stable and quite arc. Good gap-bridging property, low spatter loss, easy slag removal even in narrow grooves. Finely rippled pore-free welds blending into base metal without undercut.	C: 0.03	550	610	25	-20°C : 55J		C1 (%100 CO <sub>2</sub> )
		Si: 0.50						
		Mn: 1.20						
		Ni: 0.40						
<b>FCW 21</b> AWS/ASME SFA-5.20 E71T-1MJ H4 AWS/ASME SFA-5.18 E70C-6M H4 EN ISO 17632-A T46 4 M M 3 H5 TS EN ISO 17632-A T46 4 M M 3 H5 EN 758	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. 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 its easily controllable weld pool in the short-arc range, FCW 21 is well-suited for root-and positional welding and gap bridging.	C: 0.05	500	560	25	-20°C : 80J		M21 (Ar+%15-25 CO <sub>2</sub> )
		Si: 0.60				-40°C : 50J		
		Mn: 1.30						
<b>FCW 30</b> AWS/ASME SFA-5.20 E70T-5 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 EN 758 EN 758	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 layer application on worn parts before hardfacing.	C: 0.02	520	580	28	-20°C : 80J		C1 (%100 CO <sub>2</sub> )  M21 (Ar+%15-25 CO <sub>2</sub> )
		Si: 0.40				-40°C : 60J		
		Mn: 1.20						

## LOW ALLOY STEELS

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal					Current Type Polarity Welding Positions	Tavsiye Edilen Koruyucu Gazlar (EN ISO 14175)
		Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)		
<b>FCW 140</b> AWS/ASME SFA - 5.29 EN 17632-A TS EN 17632-A EN 758 E81T1-Ni1C T46 4 1Ni P C 1 T46 4 1Ni P C 1 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.	C: 0.04	525	600	26	-30°C : 47J		C1 (%100 CO <sub>2</sub> )
		Si: 0.45						
		Mn: 1.10						
		Ni: 0.90						
<b>FCW 150W</b> AWS/ASME SFA - 5.29 EN ISO 17632-B TS EN ISO 17632-B E81T1-W2C T553T1-1C A-NCC1 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 position bridge, stadium, other steel constructions with X-ray quality.	C: 0.02	550	620	22	-20°C : 60J		C1 (%100 CO <sub>2</sub> )
		Si: 0.60						
		Mn: 1.00						
		Cr: 0.60						
		Ni: 0.60						
<b>FCW 181</b> AWS/ASME SFA - 5.28 AWS/ASME SFA - 5.29 E120C-GM H4 E12TG-GM H4	Metal cored wire for welding fine grained structural steels with a yield strength of 690N/mm <sup>2</sup> . Suitable for welding crane, lifting equipments and heavy constructions. Low spatter loss, high deposition rate and slagless fine rippled beads which are free from porosity.	C: 0.05	>700	>780	20	0°C : 50J		M21 (Ar+%15-25 CO <sub>2</sub> )
		Si: 0.45						
		Mn: 1.80						
		Mo: 0.25						
		Cr: 0.35						
		Ni: 1.10						
<b>FCW 201</b> AWS/ASME SFA - 5.29 EN ISO 17634-A TS EN ISO 17634-A E81T1-A1C T MoL P C 1 T MoL P C 1	Flux cored wire designed for welding boiler, pipe steels, steam generators and other equipments, subjected to operating temperatures up to 500°C. Preferred to use where high mechanical properties and X-ray quality are required.	C: 0.03	550	630	20	-20°C : 60J		C1 (%100 CO <sub>2</sub> )
		Si: 0.30						
		Mn: 0.80						
		Mo: 0.50						

## HARDFACING













Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
		Chemical Analysis (%)	Hardness		
<b>FCO 240</b> Open – Arc Flux Cored Hardfacing Wire DIN 8555 MF 8 GF 150/400 KPZ	<b>OPEN-ARC, FLUX CORED WIRE</b> 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 it's very tough and crack resistant weld metal, it is advised for buffer layer applications on crack sensitive heavy parts before hardfacing layers.  <b>Typical applications :</b> Joining and buffer application of wear plates on shovel buckets, joining of shovel dipper handle rack and rebuilding of rails, tramway rails and press rams.	C: 0.10	As Welded		-
		Si: 0.30	160 HB		
		Mn: 6.50	After Work Hardening		
		Cr: 18.00			
		Ni: 8.00			
Fe: Rest	400 HB				
<b>FCO 245</b> Open – Arc Flux Cored Hardfacing Wire EN 14700 TS EN 14700 DIN 8555 T Fe9 T Fe9 MF 7 GF 200/450 KP	<b>OPEN-ARC FLUX CORED WIRE</b> for rebuilding of worn 14% manganese steel parts. Weld metal deposit is austenitic manganese steel, therefore it has got high impact resistance. Weld metal is machinable with carbide tipped tools.  <b>Typical applications :</b> Rebuilding of crusher cylinders, crusher hammers, crusher jaws, cone crusher mantles and cones, shovel bucket teeth and lips.	C: 1.10	As Welded		-
		Si: 0.30	200 HB		
		Mn: 15.00	After Work Hardening		
		Cr: 3.50			
		Ni: 0.40			
Fe: Rest	450 HB				

## HARDFACING

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)	
		Chemical Analysis (%)	Hardness			
<b>FCO 250</b> <b>Open – Arc Flux Cored Hardfacing Wire</b>  EN 14700      T Fe9 TS EN 14700    T Fe9 DIN 8555        MF 7 GF 200/50 KP	Excellent <b>OPEN-ARC FLUX CORED WIRE</b> for the rebuilding and reclamation of heavy parts made of carbon or 14% manganese steels and also for buffer layer prior to hardfacing. Machinable with carbide tipped tools.  <b>Typical applications</b> : 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.	C: 0.40	As Welded		-	
		Si: 0.45				200 HB
		Mn: 16.50	After Work Hardening			
		Cr: 13.00				450 HB
		Fe: Rest				
<b>FCH 330</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b>  EN 14700      T Fe 1 TS EN 14700    T Fe 1 DIN 8555        MSG 1 GF C1 300	Gas shielded, hardfacing flux cored wire which is developed for hardfacing weld metal to resist to metal-to-metal friction (ashesion) and medium degree impacts. As the weld metal has medium degree hardness it can be machined by chip forming. It can be used for buffering layer for hardfacing of high hardness main metals. Generally used in the welding of torque gears, gear wheels, shafts, pallet reels, crane wheels, pulleys, railway rails, crossings and switch points, rollers, caterpillar track, sprockets, track links, gears, shafts, pinion gears in sugar industry, screws in oil industry, winch drums, crane wheels, mine car wheels and sheaves.	C: 0.14	275-325 HB		C1 (%100 CO <sub>2</sub> )	
		Si: 0.40				
		Mn: 1.10				
		Cr: 1.25				
		Fe: Rest				
<b>FCO 330</b> <b>Open – Arc Flux Cored Hardfacing Wire</b>  DIN 8555                      MF 1 GF 300 GP	<b>OPEN-ARC FLUX CORED WIRE</b> which is developed for hardfacing weld metal to resist to metal-to-metal friction (ashesion) and medium degree impacts. As the weld metal has medium degree hardness it can be machined by chip forming. It can be used for buffering layer for hardfacing of high hardness main metals.  <b>Typical applications</b> : Hardfacing of torque gears, gear wheels, shafts, pallet reels, crane wheels, pulleys, railway rails, crossings and switch points, rollers, caterpillar track, sprockets, track links, gears, shafts, pinion gears in sugar industry, screws in oil industry, crane drums and wheels, crane wheels, mine car wheels and sheaves.	C: 0.10	310 HB		-	
		Si: 0.70				
		Mn: 1.50				
		Cr: 0.50				
		Mo: 0.30				
		Ti: 0.95				
		Fe: Rest				
<b>FCH 355</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b>  EN 14700      T Fe3 TS EN 14700    T Fe3 DIN 8555        MSG 6 GF C 1 55 GP	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 tough, free of cracks and therefore resistant to shock and impacts. Weld metal deposit is only machinable by grinding or carbide tipped 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.  <b>Typical applications</b> : Hardfacing of feeding screws, conveyors and machine parts in brick and mining industries	C: 0.45	52-57 HRc		C1 (%100 CO <sub>2</sub> ) M21 (Ar + %15-25 CO <sub>2</sub> )	
		Si: 0.45				
		Mn: 0.90				
		Cr: 5.00				
		Mo: 0.40				
		Fe: Rest				
<b>FCO 356</b> <b>Open – Arc Flux Cored Hardfacing Wire</b>  EN 14700      T Fe8 TS EN 14700    T Fe8 DIN 8555        MF 6 GF 55 G	<b>OPEN-ARC FLUX CORED WIRE</b> which gives martensitic alloy. Designed to resist low stress abrasion with heavy impact and high compressive stresses. Weld metal deposit can be machinable by grinding. Maximum deposit thickness is depends upon application and procedure used.  <b>Typical applications</b> : Hardfacing of cable sheaves, bed knives, steel mill rolls, crane wheels, forging dies.	C: 0.45	55 HRc		-	
		Si: 0.50				
		Mn: 1.50				
		Cr: 5.80				
		Mo: 1.50				
		W: 1.40				
		Fe: Rest				
<b>FCH 360</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b>  EN 14700      T Fe6 TS EN 14700    T Fe6	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 it's hardness at high temperatures, till 600°C. Heat treatment after hardfacing will decrease as-welded hardness. Weld metal can be machined by diamond tools. Weld metal is resistant to cracking and shall not be welded more than 3 pass. A tough buffer layer with FCW 30 is recommended before hardfacing, if base metal has high carbon and low weldability.  <b>Typical applications</b> : Hardfacing hot cut offs, shear blades, dies for pressure casting, scraper blades, conveyors, rollers, crusher rolls and worn parts in agricultural equipments.	C: 0.60	57-62 HRc		C1 (%100 CO <sub>2</sub> ) M21 (Ar + %15-25 CO <sub>2</sub> )	
		Si: 0.70				
		Mn: 1.60				
		Cr: 5.00				
		Mo: 0.40				
Fe: Rest						
<b>FCO 370</b> <b>Open – Arc Flux Cored Hardfacing Wire</b>  EN 14700      T Fe6 TS EN 14700    T Fe6 DIN 8555        MF 6 GF 60 GP	<b>OPEN-ARC FLUX CORED WIRE</b> which gives excellent alloy resistant to heavy impact, gouging and grinding abrasion together with resistant to cracking. Weld metal deposit composed of a hard martensitic matrix and finely dispersed titanium carbides. Weld metal is machinable by grinding. Maximum deposit thickness depends upon application and procedure used.  <b>Typical applications</b> : Hardfacing of crusher cylinders, crusher hammers, agricultural tools, asphalt mixer blades, shovel bucket teeth and lips, bulldozer blades, cane knives and shredders, gyratory crusher mantles, bed knives and anvils in the wood pulp industry.	C: 1.60	57 HRc		-	
		Si: 0.40				
		Mn: 0.90				
		Cr: 6.00				
		Mo: 1.30				
		Ti: 4.70				
		Fe: Rest				



**HARDFACING**

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
		Chemical Analysis (%)	Hardness		
<b>FCH 371</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b> DIN EN 14700      T Z Fe 8	Gas shielded flux cored wire for 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 to impact and abrasion. In the case of thick overlays, it is recommended to weld only the last 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.  <b>Typical applications:</b> Hardfacing of roll type crushers, worm conveyors, scraper blades, dipper teeth etc.	C: 1.20 Si: 1.00 Mn: 1.00 Cr: 6.00 Nb: 7.00 Fe: Rest	57-62 HRc	 	M21 (Ar + %15-25 CO <sub>2</sub> )
<b>FCO 415</b> <b>Open – Arc Flux Cored Hardfacing Wire</b> EN 14700      T Fe7 TS EN 14700    T Fe7 DIN 8555      MF 5 - 40 CPT	<b>OPEN-ARC FLUX CORED WIRE</b> for hardfacing of parts subjected to metal-to-metal wear (adhesion), impact, high temperatures and corrosion. Weld metal contains Cr, Ni, Mo, V and Nb alloys. Slient arc and weld are spatter free. Thin slag is formed on the bead. Provides smooth and machinable surface.  <b>Typical applications :</b> Especially used for hardfacing of continuous casting rollers.	C: 0.12 Si: 0.15 Mn: 0.80 Cr: 12.00 Ni: 4.20 Mo: 0.70 V: 0.20 Nb: 0.15 Fe: Rest	38-42 HRc	 	-
<b>FCO 510</b> <b>Open – Arc Flux Cored Hardfacing Wire</b> DIN 8555      MF 10 GF 60 G	<b>OPEN-ARC FLUX CORED WIRE</b> 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.  <b>Typical applications :</b> Hardfacing in wear plates	C: 2.50 Si: 1.00 Mn: 0.15 Cr: 23.00 Fe: Rest	62 HRc	 	-
<b>FCO 528</b> <b>Open – Arc Flux Cored Hardfacing Wire</b> DIN 8555      MF 10 GF 60 G	<b>OPEN-ARC FLUX CORED WIRE</b> which is designed to give extreme resistance to high stress and gouging abrasion even at higher temperatures, up to 450°C. Weld metal deposit is composed of an austenitic matrix and Cr and Nb complex carbides so, will readily stress relief check crack which is not detrimental to abrasion resistance, but decrease impact resistance. Hardfacing shall not exceed 8 mm in height. Weld metal is machinable by grinding.  <b>Typical applications :</b> Hardfacing of grinders and presses in cement and brick industry, concrete pump seats, bucket teeth and lips on bucket-wheel excavators in coal and phosphate mines, brick and clay mill augers, wear plates and screens in the coal industry, bulldozer blades working in sand.	C: 2.50 Si: 1.50 Mn: 0.25 Cr: 17.00 Nb: 6.00 B: 0.70 Fe: Rest	62 HRc	 	-
<b>FCO 540</b> <b>Open – Arc Flux Cored Hardfacing Wire</b> DIN 8555      MF 10 GF 60 GT	<b>OPEN-ARC FLUX CORED WIRE</b> , designed to resist high stress grinding abrasion and solid erosion at service temperatures up to 600°C. Deposits weld metal which is contains chromium-niobium-molybdenum alloy with addition of tungsten and vanadium. Hardfacing shall not exceed 6 mm in height. Weld metal is machinable by grinding. The deposits will readily stress relief check crack which is not detrimental to abrasion resistance.  <b>Typical applications:</b> Hardfacing wear plates, sinter plant parts, exhaust fan blades in pellet plants, pearlite crushers, bucket teeth and lips on bucket-wheel excavators in phosphate mines, boiler fan blades in sugar cane industry, burden area in blast furnace bells, wear plates in blast furnace belless top charging systems.	C: 2.50 Si: 1.50 Mn: 0.25 Cr: 13.00 Mo: 2.00 V: 1.50 W: 1.00 Nb: 3.00 B: 0.40	62 HRc	 	-
<b>FCH 801</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b> EN 14700      T Co3 TS EN 14700    T Co3 DIN 8555      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.  <b>Typical applications:</b> Hardfacing of plastic extrusion screws, tools to cut paper, cardboard floor coverings, roofing, wood.  <b>Stick electrode:</b> EH 801 <b>GTA (TIG)-Welding rod:</b> TH 801	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)

## HARDFACING

Products Name Standards	Applications and Properties	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions	The recommended shielding gases (EN ISO 14175)
		Chemical Analysis (%)	Hardness		
<b>FCH 806</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b>  EN 14700      T Co2 TS EN 14700    T Co2 DIN 8555        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.  <b>Typical applications:</b> Hardfacing of blades for hot shearing, ingot tong ends, valves and valve seats, nozzles.  <b>Stick electrode:</b> EH 806 <b>GTA (TIG)-Welding rod:</b> TH 806	C: 1.20	42-43 HRc		I1 (%100 Ar)
		Si: 0.80			
		Mn: 0.80			
		Cr: 28.00			
		W: 5.00			
		Fe: 5.50			
		Co: Rest			
<b>FCH 812</b> <b>Gas Shielded Flux Cored Hardfacing Wire</b>  EN 14700      T Co3 TS EN 14700    T Co3 DIN 8555        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.  <b>Typical applications:</b> Hardfacing of plastic extrusion screws, tools to cut paper, cardboard floor coverings, roofing, wood.  <b>Stick electrode:</b> EH 812 <b>GTA (TIG)-Welding rod:</b> TH 812	C: 1.60	45-49 HRc		I1 (%100 Ar)
		Si: 1.00			
		Mn: 1.00			
		Cr: 28.50			
		Ni: 2.00			
		W: 8.50			
		Fe: 3.50			
Co: Rest					



## MILD / LOW ALLOY STEELS

### SUBMERGED ARC WELDING WIRES

Products Name Standards	Applications and Properties	Typical Chemical Analysis of Wire (%)	With Sub Wires Fluxes	Typical Properties of All-Weld Metal					Current Type Polarity Welding Positions
				Chemical Analysis (%)	Yield Strength [N/mm <sup>2</sup> ]	Tensile Strength [N/mm <sup>2</sup> ]	Elongation A5 [%]	Impact Energy ISO-V(J)	
<b>SW 701</b> AWS/ASME SFA-5.17 EL 12 EN ISO 14171-A S1 TS EN ISO 14171-A S1 EN 756 S1 DIN 8557 S1	Solid, submerged arc welding wire suitable for welding general structural steels with a tensile strengths up to 510 N/mm <sup>2</sup> , used in pressure vessel, pipe, shipbuilding and steel constructions. Copper coating increases electrical conductivity and resistance against rusting.	C: 0.07	SF 104	C: 0.05	430	500	22	0°C : 60J	
				Si: 0.30					
				Mn: 0.90					
		Si: 0.05	SF 114	C: 0.04	>440	>500	>22	-20°C : >27J	
				Si: 0.80					
				Mn: 1.30					
Mn: 0.50	SF 304	C: 0.05	440	500	29	0°C : 80J			
		Si: 0.25							
		Mn: 0.90							
<b>SW 702</b> AWS/ASME SFA-5.17 EM 12 EN ISO 14171-A S2 TS EN ISO 14171-A S2 EN 756 S2 DIN 8557 S2	Solid, submerged arc welding wire suitable for welding general structural steels with medium and high tensile strengths, used in pressure vessel, boiler, pipe, shipbuilding and steel constructions. Also suitable to use in combination with SF 325, SF 335 and SF 345 hardfacing fluxes for hardfacing applications. Copper coating increases electrical conductivity and resistance against rusting.	C: 0.08	SF 104	C: 0.05	450	520	28	-20°C : 70J	
				Si: 0.35					
				Mn: 1.15					
		Si: 0.05	SF 114	C: 0.04	>440	>500	>22	0°C : >47J	
				Si: 0.80				-20°C : >27J	
				Mn: 1.45					
Mn: 1.00	SF 304	C: 0.05	430	520	29	-20°C : 110J			
		Si: 0.25							
		Mn: 1.25							
<b>SW 702Si</b> AWS/ASME SFA-5.17 EM12K EN ISO 14171-A S2Si TS EN ISO 14171-A S2Si EN 756 S2Si DIN 8557 S2Si	Solid, submerged arc welding wire suitable for welding general structural steels with medium and high tensile strengths, used in pressure vessel, boiler, pipe, shipbuilding and steel constructions. Higher silicon content improves deoxidation of weld pool. Copper coating increases electrical conductivity and resistance against rusting.	C: 0.08	SF 104	C: 0.06	>450	>530	>26	-20°C : >80J	
				Si: 0.60					
				Mn: 1.30					
		Si: 0.20	SF 304	C: 0.06	>470	>550	>27	-20°C : >80J	
				Si: 0.55					
				Mn: 1.30					
<b>SW 703Si</b> AWS/ASME SFA-5.17 EH 12K EN ISO 14171-A S3Si TS EN ISO 14171-A S3Si EN 756 S3Si DIN 8557 S3Si	Solid, submerged arc welding wire suitable for welding general structural steels with medium and high tensile strengths, used in pressure vessel, boiler, pipe, shipbuilding and steel constructions. Higher manganese and silicon content improves deoxidation of weld pool. Copper coating increases electrical conductivity and resistance against rusting.	C: 0.08-0.15	SF 104	C: 0.06	>470	>540	>26	-20°C : >85J	
				Si: 0.70					
				Mn: 1.65					
		Si: 0.20-0.35	SF 304	C: 0.06	>480	>570	>28	-20°C : >90J	
				Si: 0.65					
				Mn: 1.75					
<b>SW 702Mo</b> AWS/ASME SFA-5.17 EA 2 EN ISO 14171-A S2Mo TS EN ISO 14171-A S2Mo EN 756 S2Mo DIN 8557 S2Mo	Mo-alloyed and solid, submerged arc welding wire suitable for welding general structural steels, low alloyed steels with medium and high tensile strengths, used in pressure vessel, boiler, tanks, pipe and heavy steel constructions. Copper coating increases electrical conductivity and resistance against rusting.	C: 0.09	SF 104	C: 0.05	>460	>560	>26	-20°C : >75J	
				Si: 0.40					
				Mn: 1.20					
		Si: 0.15	SF 114	Mo: 0.50	>480	>550	>22	0°C : >47J	
				C: 0.04				-20°C : >27J	
				Si: 0.85					
		Mn: 1.00	SF 304	Mn: 1.50	>500	>570	>26	-20°C : >65J	
				Mo: 0.45					
				C: 0.05					
		Mo: 0.50	SF 304	Si: 0.35	>500	>570	>26	-30°C : >50J	
				Mn: 1.55					
				Mo: 0.45					



## MILD / LOW ALLOY STEELS - SUBMERGED ARC WELDING FLUXES

Products Name Standards	Applications and Properties	Current Type Polarity Welding Positions
<b>SF 104</b> EN ISO 14174 TS EN ISO 14174 EN 760 S A AB 1 67 AC H10 S A AB 1 67 AC H10 S A AB 1 67 AC H10	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 carrying capacity and good operating characteristics both on AC and DC. 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.	 
<b>SF 114</b> EN ISO 14174 TS EN ISO 14174 S A AR 1 87 AC S A AR 1 87 AC	Rutile type, agglomerated submerged arc welding flux, which is designed for welding at high speeds. Due to additives of Mn and Si make it suitable for carbon steel welding with single or multi-wires at high speeds with excellent bead appearance. Excellent slag removal in fillet and root passes. Mainly used in welding LPG cylinders, small tanks, light boiler works, beams, shipbuilding and thin walled pipes.	 
<b>SF 304</b> EN ISO 14174 TS EN ISO 14174 S A AB 1 68 AC H10 S A AB 1 68 AC H10	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 AC and DC currents. Provides smooth weld beads, good weld bead appearance with high penetration.	 

## HARDFACING

### SUBMERGED ARC HARDFACING FLUX CORED WIRES

Products Name Standards	Applications and Properties	With Sub Wires Fluxes	Typical Properties of All-Weld Metal		Current Type Polarity Welding Positions
			Chemical Analysis (%)	Hardness	
<b>FCS 332</b> EN 14700 TS EN 14700 DIN 8555 T Fe1 T Fe1 UP1 - GF - 300 - P	Flux cored wire for hardfacing in submerged arc welding process with the SHF 100 flux. Suitable for hardfacing of parts subjected to metal-to-metal wear. As the weld metal has medium degree hardness it can be machined by chip forming. Due to its very tough and crack resistant weld metal, it is also used for buffer layer applications, before hardfacing.  <b>Typical applications:</b> Hardfacing of crane wheels, rails, rollers, caterpillar track, sprockets, shafts, winch drums, mine car wheels and sheaves. Optimum welding parameters for 2,80 mm diameter : 400 A and 32 V.	SHF 100	C: 0.05	275-325 HB	 
			Si: 1.00		
			Mn: 2.15		
			Cr: 1.50		
<b>FCS 415</b> EN 14700 TS EN 14700 T Fe7 T Fe7	Flux cored wire for hardfacing of parts subjected to metal-to-metal wear (adhesion), impact, high temperatures and corrosion. SHF 100 is the suitable flux for these hardfacing applications. Weld metal contains Cr, Ni, Mo, V and Nb alloys. Especially designed for hardfacing and renovation of continuous casting rollers. Provides smooth and machinable surface.  <b>Typical applications :</b> Especially used for hardfacing continuous casting rollers and similar rollers operating at high service temperatures. Optimum welding parameters for 2,40 mm diameter : 400 A and 32 V.	SHF 100	C: 0.08	38-42 HRc	 
			Si: 1.10		
			Mn: 0.70		
			Cr: 12.00		
			Ni: 2.50		
			Mo: 0.90		
V: 0.15					
Nb: 0.15					

### SUBMERGED ARC HARDFACING FLUXES

Products Name Standards	Applications and Properties	Current Type Polarity Welding Positions
<b>SHF 100</b> EN ISO 14174 TS EN ISO 14174 EN 760 S A FB 2 55 AC S A FB 2 55 AC S A FB 2 55 AC	Submerged arc welding flux for welding stainless steels and also for hardfacing purposes in combination with special hardfacing flux cored wires.	 
<b>SHF 325</b> EN ISO 14174 TS EN ISO 14174 EN 760 S A CS 3 S A CS 3 S A CS 3 97 C Cr - Mo AC	Agglomerated, alloyed flux used for hardfacing purposes in combination with low alloy SW 702 wire electrode. Suitable for hardfacing of machine gear parts, rails, supports rolls of caterpillars, pulleys, etc. 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.  <b>Hardness : 225 - 300 HB</b>	 
<b>SHF 335</b> EN ISO 14174 TS EN ISO 14174 EN 760 S A CS 3 S A CS 3 S A CS 3 99 C Cr - Mo AC	Agglomerated alloyed flux used for hardfacing purposes in combination with low alloy SW 702 wire electrode. Suitable for hardfacing of couplings, piston rod ends, earth moving equipment, rolls, mills, etc. 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.  <b>Hardness : 325 - 400 HB</b>	 
<b>SHF 345</b> EN ISO 14174 TS EN ISO 14174 EN 760 S A CS 3 S A CS 3 S A CS 3 87 C Cr - Mo AC	Agglomerated, alloyed flux used for hardfacing purposes in combination with low alloy SW 702 wire electrode. Suitable for hardfacing of pinchrolls, sinter crushers etc. 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.  <b>Hardness : 400 - 500 HB</b>	 

## POLARITY

	Direct current: (DC), electrode connected to positive pole
	Direct current: (DC), electrode connected to negative pole
	Direct current: (DC), electrode connected to negative or positive pole
	Alternative current: (AC)
	Direct current (DC) preferred, electrode connected to positive pole; AC

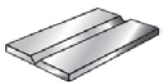
	Direct current (DC) preferred, electrode connected to negative pole; AC
	Direct current (DC) preferred, electrode connected to positive pole; AC
	Alternating current (AC) preferred, electrode connected to positive pole; AC
	Alternating current (AC) preferred, electrode connected to negative pole; AC

## WELDING POSITIONS

	w, h, s, q, hü, ü, f	= All positions
	w, h, s, q, hü, ü	= All positions, vertical-down conditionally
	w, h, s, q, hü, ü	= All positions, except vertical-down
	w, h, s, q	= All positions, except vertical-down and overhead

	w, h	= Flat butt and dilled welds only
	w	= Flat butt welds only
	f	= Vertical-down only

### Butt Welding



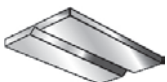
ASME : 1G  
EN : PA



ASME : 2G  
EN : PC

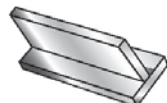


ASME : 3G  
EN : PG (Down)  
PF (Up)

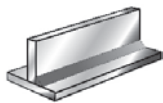


ASME : 4G  
EN : PE

### Fillet Welding



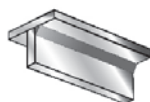
ASME : 1F  
EN : PA



ASME : 2F  
EN : PB



ASME : 3F  
EN : PG (Down)  
PF (Up)



ASME : 4F  
EN : PD

### Pipe Welding



ASME : 1G  
EN : PA



ASME : 2G  
EN : PC

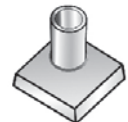


ASME : 5G  
EN : PG (Down)  
PF (Up)

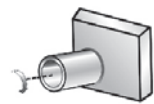


ASME : 6G  
EN : J-L045 (Down)  
H-L045 (Up)

### Pipe Fillet Welding



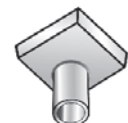
ASME : 2F  
EN : PB



ASME : 2F  
EN : PB



ASME : 5F  
EN : PG (Down)  
PF (Up)



ASME : 4F  
EN : PD

## EN ISO 14175

Short Definition <sup>1</sup>		% Volume					
Group	Code	Oxidizing		Inert		Reductant	Slightly Reactive
		CO <sub>2</sub>	O <sub>2</sub>	Ar	He	H <sub>2</sub>	N <sub>2</sub>
R	1			Rest <sup>2</sup>		> 0 - 15	
	2			Rest <sup>2</sup>		> 15 - 35	
I	1			100			
	2				100		
	3			Rest <sup>2</sup>	> 0 - 15		
M1	1	> 0 - 5		Rest <sup>2</sup>		> 0 - 5	
	2	> 0 - 5		Rest <sup>2</sup>			
	3		> 0 - 3	Rest <sup>2</sup>			
	4	> 5 - 25	> 0 - 3	Rest <sup>2</sup>			
M2	1	> 5 - 25		Rest <sup>2</sup>			
	2		> 3 - 10	Rest <sup>2</sup>			
	3	> 0 - 5	> 3 - 10	Rest <sup>2</sup>			
	4	> 5 - 25	> 0 - 8	Rest <sup>2</sup>			
M3	1	> 25 - 50		Rest <sup>2</sup>			
	2		> 10 - 15	Rest <sup>2</sup>			
	3	> 5 - 50	> 8 - 15	Rest <sup>2</sup>			
C1	1	100					
	2	Rest <sup>2</sup>	> 0 - 30				
F1	1						100
	2					> 0 - 50	Rest

<sup>1</sup> In case of adding the gas that is not in the list, indicates that "S" defined as a special gas mixture. Identification is made as "S + Main Gas Symbol + Main Gas % Rate + Other Gas Mixture Symbol". E.g. Shielding gas EN 439-S M24

<sup>2</sup> Helium gas can be used up to %95 instead of Argon gas. The identification of Helium gas rate is specified parenthetical. (1) >0-33 % Helium, (2) >33-66 % Helium

Gas	Density	Condition
Carbondioxide (CO <sub>2</sub> )	1,84 kg/m <sup>3</sup>	15°C, 1 atm
Argon (Ar)	1,70 kg/m <sup>3</sup>	15°C, 1 atm
Oxygen (O <sub>2</sub> )	1,33 kg/m <sup>3</sup>	15°C, 1 atm
Nitrogen (N <sub>2</sub> )	0,96 kg/m <sup>3</sup>	15°C, 1 atm
Helium (He)	0,16 kg/m <sup>3</sup>	15°C, 1 atm

Shielding Gas Flow Rates in TIG Welding		
Stainless Steel – Mild Steel		
Tungsten Electrode Diameter	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	8.00 - 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

## INNER CARDBOARD BOX



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

## TIN BOX

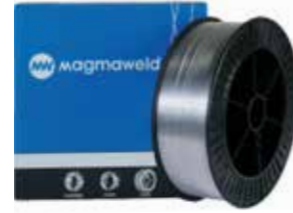


Box Type	Height (mm)	Width (mm)	Length (mm)	Average Weight (kg)
B350T	100	100	355	11.00
T1	93	93	363	9.00

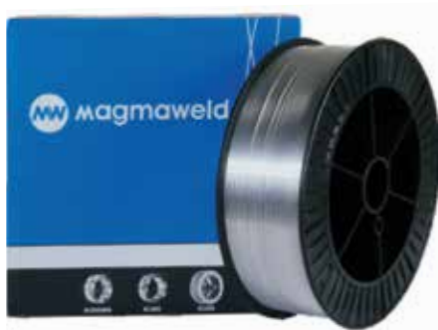
**MIG / MAG AND FLUX CORED WIRES**



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



Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kg)
D200	M2	52	200	5



Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kg)
D300	M3	52	300	15



Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kg)
K300MS	M3	52	300	15



Spool Type	Box Type	Inner Diameter (mm)	Outer Diameter (mm)	Net Weight (kg)
K300	M3	180	300	15



**MIG / MAG AND FLUX CORED WIRES**



Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kg)
DR110	200	500	50



Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kg)
DR500	800	510	250
DR880	1000	600	400

**SAW WIRES & FLUXES**



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



Drum Type	Height (mm)	Outer Diameter (mm)	Net Weight (kg)
DR500	1000	615	200
DR800	1054	1055	400
DR1100	950	660	600
KAFES	1055	1054	500

**TIG & OXY - FUEL GAS WELDING WIRES / BRAZING WIRES**



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

**SAW WIRES & FLUXES**



<b>Kraft Bag</b>
<b>Net Weight (kg)</b>
25

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			✓									✓
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			✓									✓
FCW 12			✓								✓	✓
FCW 16			✓				✓					
FCW 21			✓									✓
FCW 30			✓								✓	✓
FCW 140			✓							✓		

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03/2014

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