

MWA

PRODUCT GUIDE

—
3rd Edition



WELCOME...

Welcome to the third edition of the MWA product catalogue.

In this catalogue, you will find everything you need from our products, story and the support services we offer.

Our product guide is designed not only for you to find what you need, but also for you to help your customers achieve the results they want, using the best quality electrodes manufactured in the UK.

OUR STORY

We have been manufacturing top quality welding electrodes since 1974 and are the only UK manufacturer of specialised, exotic and maintenance & repair alloys (commonly known as M&R).

We are a British manufacturer with premises based in Cannock, Staffordshire, England, UK. MWA partner with distributors worldwide and always continue to provide welding solutions to every type of industry.

MWA are continuously developing into various industries such as:

- Automotive
- Chemical
- Forging
- Foundry
- Oil
- Quarry
- Steel

Our range of MWA welding electrodes are high quality and are distributed throughout the world. With over 200 products available, all problems and applications can be met. We stock a huge product range including aluminium, bronzes, carbon manganese and low alloys, cast irons, cutting & gouging, hard facing, mild and low alloy steels, mild and low carbon manganese, nickel alloys, special steels, stainless steels and tool & die.

Look at our **Other Services**, where you can find out more about our private branded electrodes.

MWA offer full technical support, with advice from metallurgists and welding engineers, ensuring all problems can be resolved. Take a look at our **Technical Support** section for more information.

If you have any questions about our products, please head to our **Contact** page where you will find details to get in touch with us.

OTHER SERVICES

Customised Electrodes

Our development team of Chemists and Metallurgists are willing to look at manufacturing bespoke electrodes to suit your needs given feasibility of production and demand. If you require an electrode that is no longer available, please contact us.

Private Branding

MWA continue to offer own branded products to our customers at no extra cost.

A wide range of packaging solutions are available to suit, including unprinted electrodes, AWS printed electrodes and even unique product name printed electrodes can be purchased. Labelling can be as simple or as detailed as you require. We design and print all our labels in house to customers needs.

There are a variety of product box colours and pack sizes to choose from. Please ask us about your options.

Labelling can take two forms:

- Standard text – this comes at no extra charge.
- Own logo/badge – A set up charge to cover artwork etc. This is an ideal opportunity to ringfence your business from your competitors.

Technical Support

MWA offer full technical support, with advice from metallurgists and welding engineers, ensuring all problems can be resolved.

Our qualified metallurgists enable us to formulate all types of electrodes, and using our own, on site, spectrometer we are able to analyse and certify all welding electrodes. We have recently re-developed our Nickel Alloy range for welding Inconels, Monels, Hastelloys & Nimonics within the nuclear, chemical, and petrochemical.

Vac-Pac

In 2019 we started to offer some of our products in 2kg Vac-Pac sleeves. This coincided with the reformulation of some of our flux systems, together with the VP this will offer, particularly site workers even greater confidence in the MWA brand. Labelling on the VP will remain unaffected.

THE ONLY UK MANUFACTURER OF MAINTENANCE & REPAIR ELECTRODES.



CONTACT US

Sales

Our Customer Sales Team is available Monday to Friday 6:30 am – 6 pm

Telephone: +44 (0) 01782 566 553

Email: sales@weldfastuk.co.uk

Website

More information can be found on our website. www.mwa-international.com

Marketing support

To sign up to our company email updates and promotions, please email 'OPT IN' to marketing@weldfastuk.co.uk

SHAUN GODBEHERE

EXPORT MANAGER AND CONSUMABLES SPECIALIST

Shaun has been in the welding industry since 1989, for all of that period he has been associated with specialised welding electrodes and wires having worked for a UK manufacturer in MWA, now part of the Weldfast group. His experience both in the UK and overseas is vital in understanding both our customer requirements as a distributor and local market conditions.



MATTHEW NIXON

GENERAL MANAGER WELDFAST/MWA

Matt has been at MWA since 2018 and is constantly seeking to improve production techniques and performance of the MWA range. His full knowledge of specifications and quality procedures is second to none and is the key member of team MWA to ensure customer satisfaction from placing of orders through to delivery of the product to your door.

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MAC ALUM E95

AWS A5.3: E4043

Aluminium 4/5% silicon type electrode suitable for the welding of commercially pure aluminium and similar alloys except those which contain magnesium or zinc as main alloying elements. Rapid deposition rate, good penetration, excellent weldability and slag control. The special chemically active mineral coating enables easy removal of surface oxides during welding, ensuring results of high quality. Welding commercially pure aluminium where a slightly higher tensile is required and for higher strength alloys of similar composition. Suitable for welding the wrought alloys H9, H20 and H30. The electrodes are unsuitable for welding alloys with high magnesium such as the 5% Mg type.

CURRENT :

DC(+).

MECHANICAL PROPERTIES

Tensile Strength	100 N/mm ²
0.2% Proof Stress	50 N/mm ²
Elongation	20%

CHEMICAL COMPOSITION

Al	Si	Fe
94.50	4.00	0.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	80-110	110-150	150-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **110°C** before use.

MAC ALUM E97

AWS A5.3: E4047

Aluminium 10/12% silicon type electrode for welding wrought and cast aluminium alloys of similar composition. Rapid deposition rate, good penetration characteristics, excellent stability, weldability and slag control. The special chemically active mineral coating enables easy removal of surface oxides during welding ensuring results of high quality. Suitable for slag over slag welding. Welding wrought alloys N4, H9, H10, H20, H30 and cast alloys LM6, LM8, LM9, LM13 and LM20. Used extensively for repair of casting defects such as surface voids where slag over slag techniques may be employed.

CURRENT :

DC(+).

MECHANICAL PROPERTIES	
Tensile Strength	180 N/mm ²
0.2% Proof Stress	80 N/mm ²
Elongation	5%

CHEMICAL COMPOSITION		
Al	Si	Fe
88.50	11.00	0.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	80-110	110-150	150-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **110°C** before use.



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MAC BRONZE E808

AWS A5.6: ECuSn-C

A versatile coated electrode which deposits a tough overlay of fully deoxidised bronze. Designed for joining and overlaying steels, cast irons, malleable iron, bronzes, brass and copper based metals. Due to the high thermal conductivity of copper alloys, pre-heating is advisable particularly if heavy sections are involved. The electrode is recommended for overlaying and building up bearing surfaces, bushes, impellor blades, valve seats etc.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	300 N/mm ²
0.2% Proof Stress	140 N/mm ²
Elongation	20%
Hardness	110 HB

CHEMICAL COMPOSITION

Mn	Cu	Sn	P	Fe
0.80	Balance	7.00	0.10	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-80	80-130	130-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC BRONZE E809

AWS A5.6: ECuSn-A

Superior coated tough bronze electrode for joining and overlaying steels, cast irons, malleable irons, bronzes and copper based metals. Due to the high thermal conductivity of copper and copper alloys, pre-heating is advisable in certain instances particularly where heavy sections are involved. Highly recommended for bearing surfaces and for wear facing against sea water corrosion.

CURRENT :

DC(+).

MECHANICAL PROPERTIES	
Tensile Strength	420 N/mm ²
0.2% Proof Stress	250 N/mm ²
Elongation	24%
Hardness	65 - 75 HB

CHEMICAL COMPOSITION		
Cu	Sn	P
Balance	5.00	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
50-75	80-120	120-175

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC BRONZE E810

AWS A5.6: ECuAl-A2

An electrode designed for joining and overlaying aluminium bronze and for corrosion and wear resistant deposits on steel and cast irons. The weld metal deposits will produce good friction and corrosion resistance. Ideal for bearing surfaces, shafts, guides, slides, gear teeth and any wear application involving metal to metal friction.

CURRENT :

DC(+).

MECHANICAL PROPERTIES	
Tensile Strength	530 N/mm ²
0.2% Proof Stress	240 N/mm ²
Elongation	27%

CHEMICAL COMPOSITION				
Mn	Cu	Al	Fe	
0.80	Balance	8.00	0.40	

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	
60-80	80-120	130-180	

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **130°C** before use.





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MAC TRODE E6813-B2

AWS A5.5: E8013-B2

High purity rutile flux coating with specified alloyed additions extruded onto low S, P and Si ferritic core wire. Welding CrMo steels of similar alloy levels when freedom from weld imperfections such as undercut is of equal importance to metallurgical properties, e.g. root runs, fillet welds.

CURRENT :

DC (-) or AC (OCV: 50V min).

MECHANICAL PROPERTIES	
Tensile Strength	610 N/mm ²
0.2% Proof Stress	530 N/mm ²
Elongation	23%
Reduction of Area	75%
Impact Energy +20°C	60 J

CHEMICAL COMPOSITION						
C	Si	Cr	Mn	P	S	Mo
0.06	0.30	1.20	0.80	0.02	0.015	0.40

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-95	100-140	130-160	140-180	160-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E6815-B6

AWS A5.5: E8015-B6

Basic metal powder type made on high purity low carbon core wire. Moisture resistant coating gives very low weld metal hydrogen levels. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	610 N/mm ²
0.2% Proof Stress	500 N/mm ²
Elongation	25%
Reduction of Area	69%
Impact Energy +20°C	150 J

CHEMICAL COMPOSITION								
C	Si	Cu	Cr	Mn	P	S	Ni	Mo
0.06	0.40	0.05	5.00	0.80	0.015	0.01	0.20	0.55

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	170-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E6816-B2

AWS A5.5: E8016-B2

Mac Trode E6816-B2 is a low hydrogen type for welding of 1.25% Cr 0.5% Mo steel used for super-heater tubes, steam pipes, heaters of boilers for thermoelectric power plant and equipments oil refining industries.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	650 N/mm ²
0.2% Proof Stress	570 N/mm ²
Elongation	26%
Impact Energy +0°C	60 J

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo	Ni	P	S
0.06	0.45	0.65	1.30	0.50	0.03	0.014	0.012

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-80	80-120	100-160	140-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E6816-G

AWS A5.5: E8016-G

A basic all position offshore electrode with a max. 1% Ni. Thin coated electrode, easy weld pool control with excellent mechanical properties (impact down to -60°C).

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	650 N/mm ²
0.2% Proof Stress	570 N/mm ²
Elongation	24%
Reduction of Area	75%
Impact Energy -40°C	95 J

CHEMICAL COMPOSITION					
C	Mn	Si	P	S	Ni
0.07	1.70	0.50	0.02	0.005	0.90

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
65-90	80-145	120-190	175-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6818-B2

AWS A5.5: E8018-B2

A superior versatile low hydrogen electrode NiCr type. This Electrode which uses a silicon free, low nitrogen, high purity CMn core wire with a moisture resistant chemically basic flux with a controlled iron powder addition. Recommended for resistance to hydrogen attack up to 330°C and corrosive effects of processing high S crude oil up to 450°C and for prolonged elevated temperature service up to 550°C with reasonable degree of corrosion resistance in superheated steam.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	640 N/mm ²
0.2% Proof Stress	570 N/mm ²
Elongation	25%
Reduction of Area	70%
Impact Energy +20°C	160 J

CHEMICAL COMPOSITION									
C	Si	Cu	Cr	Nb	Mn	P	S	Ni	Mo
0.07	0.50	<0.10	1.25	0.01	0.80	0.02	0.01	0.10	0.55

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	170-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC TRODE E6818-C1

AWS A5.5: E8018-C1

Fully positional, basic coated, low hydrogen electrode depositing 2% Ni weld metal, exceptionally clean metal of radiographic quality with excellent de-slag and welder appeal. The addition of iron powder gives a recovery of around 120%.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	570 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	30%
Impact Energy -59°C	121 J

CHEMICAL COMPOSITION					
C	Si	Mn	P	S	Ni
0.07	0.30	0.80	0.008	0.007	2.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-100	110-145	135-180	160-220	220-300

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6818-C2

AWS A5.5: E8018-C2

3.5% Ni alloyed steel electrode with basic flux, metal powder type coating on low carbon mild steel core wire. Recovery is approximately 120% with respect to core wire, 65% with respect to whole electrode. Moisture resistant coating giving very low weld metal hydrogen levels.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	620 N/mm ²
0.2% Proof Stress	540 N/mm ²
Elongation	>22%
Impact Energy -60°C	100 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Ni
0.05	0.30	0.50	0.02	0.01	3.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	120-200	140-220

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **300°C** before use.

MAC TRODE E6818-C3

AWS A5.5: E8018-C3

A low hydrogen, basic flux coated electrode. Using a silicon free, low nitrogen, high purity carbon manganese core wire with an extruded moisture resistant chemically basic flux with a controlled iron powder addition. For welding thick sections of ferritic steels when it's not always possible to apply post weld stress relief heat treatment. High strength levels and good toughness down to -50°C.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	630 N/mm ²
0.2% Proof Stress	530 N/mm ²
Elongation	27%
Reduction of Area	70%
Impact Energy +10°C	120 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Ni	Mo	Cr	V
0.07	0.30	1.00	0.008	0.007	0.90	0.10	0.05	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	170-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC TRODE E6818-G

AWS A5.5: E8018-G

A low hydrogen, basic flux coated, low alloy electrode. Using a silicon free, low nitrogen core wire. Suitable for welding all grades of structural steels with a specified minimum yield strength of 460 N/mm². However, it is of special value when the steel/weld metal also needs guaranteed toughness properties at -50°C.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	610 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	30%
Reduction of Area	75%
Impact Energy -40°C	100 J

CHEMICAL COMPOSITION

Si	Mn	P	S	Ni	Cr	Mo	V	Cu
0.30	1.50	0.015	0.009	0.88	0.15	0.07	0.12	0.19

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-90	90-130	130-180	160-220	250-300

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6818-W2

AWS A5.5: E8018-W2

A low hydrogen electrode, with a high recovery of 120%, on a low carbon mild steel core wire with an extruded moisture resistant chemically basic flux which has a controlled iron powder addition. The moisture resistant coating gives a very low weld metal hydrogen level. This electrode is mainly used for weathering steels containing a similar controlled addition and is claimed to offer a three fold improvement in corrosion resistance compared with plain CMn steels. The weld metal also resists preferential corrosion in seawater, particularly in arctic waters high in oxygen and salinity and has applications for welding micro-alloyed and CMn steels in icebreaker vessels and offshore structures. Applications also include architectural structures, bridges and exhaust gas flues. Used for welding Corten.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	610 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	25%
Reduction of Area	65%
Impact Energy -40°C	70 J

CHEMICAL COMPOSITION							
C	Si	Mn	P	S	Cr	Ni	Cu
0.06	0.60	1.00	0.02	0.01	0.60	0.60	0.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
70-100	80-140	100-180	140-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6915-B9

AWS A5.5: E9015-B9

MMA electrode – Basic metal powder type made on high purity steel core wire manufactured to the requirements of AWS A5.5 E9015-B9 and BS EN ISO 3580-B. Recovery is approx 120% with respect to core wire, 65% with respect to whole electrode. Moisture resistant coatings giving very low weld metal hydrogen levels.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	710 N/mm ²
0.2% Proof Stress	590 N/mm ²
Elongation	22%
Reduction of Area	63%
Impact Energy +20°C	75 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	N	Al
0.10	0.25	0.60	0.008	0.008	9.00	1.00	0.30	0.05	0.04	0.20	0.05	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC TRODE E6916-B9

AWS A5.5: E9016-B9

Mac Trode E6916-B9 is designed to weld equivalent 'type T91' T92CrMo steels modified with small additions of niobium and vanadium to give improved long term creep properties. These consumables are specifically intended for high integrity structural service at elevated temperature so the minor alloy additions responsible for its creep strength are kept above the minimum considered necessary to ensure satisfactory performance. In this case, weldments will be weakest in the softened (intercritical) HAZ region of parent material, as indicated by so-called 'type IV' failure in transverse weld creep tests.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	675 N/mm ²
0.2% Proof Stress	590 N/mm ²
Elongation	20%
Impact Energy +18°C	56 J

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo	Ni	Cu	Nb	V	N	Al	S	P
0.10	0.15	0.60	8.90	1.00	0.40	0.10	0.07	0.20	0.05	0.02	0.005	0.005

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-80	90-120	110-160	140-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E6916-G

AWS A5.5: E9016-G

MMA electrode with a low hydrogen basic flux on a high purity mild steel core wire. Moisture resistant coating ensures very low weld metal hydrogen levels. Provides minimum strength of 620MPa (90ksi) in the as-welded and stress-relieved condition. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (-) or AC (OCV: 60V min).

MECHANICAL PROPERTIES

Tensile Strength	670 N/mm ²
0.2% Proof Stress	600 N/mm ²
Elongation	28%
Impact Energy -50°C	> 100 J

CHEMICAL COMPOSITION

C	Mn	Ni	P	S	Si	Mo
0.05	1.50	0.85	0.01	0.008	0.35	0.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use

MAC TRODE E6918-B3

AWS A5.5: E9018-B3

A superior versatile low hydrogen electrode nickel chromium molybdenum type. This uses a silicon free, low nitrogen, high purity carbon manganese core wire with a moisture resistant, chemically basic flux with a controlled iron powder addition. Smooth arc low spatter, easy strike and restrike. Recommended for prolonged elevated temperatures up to 600°C associated with steam generated power plants, e.g. turbines, casting, valve bodies, boiler super heaters and pipes.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	670 N/mm ²
0.2% Proof Stress	570 N/mm ²
Elongation	22%
Reduction of Area	65%
Impact Energy +20°C	140 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb
0.06	0.30	0.85	0.007	0.008	2.30	1.05	0.10	0.10	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC TRODE E6918-B9

AWS A5.5: E9018-B9

Mac Trode E6918-B9 is designed to weld equivalent 'type T91' T92CrMo steels modified with small additions of niobium and Vanadium to give improved long term creep properties. These consumables are specifically intended for high integrity structural service at elevated temperature so the minor alloy additions responsible for its creep strength are kept above the minimum considered necessary to ensure satisfactory performance. In this case, weldments will be weakest in the softened (intercritical) HAZ region of parent material, as indicated by so-called 'type IV' failure in transverse weld creep tests.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	675 N/mm ²
0.2% Proof Stress	590 N/mm ²
Elongation	20%
Impact Energy +27°C	30 J

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo	Cu	Nb	V	N	Al
0.10	0.20	0.60	9.00	1.10	<0.01	0.05	0.25	0.04	0.001

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
65-85	100-130	140-180	180-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **400°C** before use.

MAC TRODE E6918-D1

AWS A5.5: E9018-D1

MMA electrode with a basic flux coating on high purity mild steel core wire. Moisture resistant coating provides very low weld metal hydrogen levels. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	670 N/mm ²
0.2% Proof Stress	605 N/mm ²
Elongation	25%
Reduction of Area	50%
Impact Energy -90°C	90 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.07	1.50	0.40	0.01	0.015	0.15	0.15	0.35	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-90	90-130	130-180	160-220	250-300

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **300°C** before use.

MAC TRODE E6918-G

AWS A5.5: E9018-G

MMA electrode with low hydrogen basic flux coating on high purity mild steel core wire. Moisture resistant coating ensures very low weld metal hydrogen levels. Recovery is about 115% with respect to the core wire, 65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	800 N/mm ²
0.2% Proof Stress	745 N/mm ²
Elongation	20%
Impact Energy +20°C	60 J

CHEMICAL COMPOSITION

C	Mn	Cr	P	S	Si	Mo	V
0.08	0.85	1.10	0.012	0.012	0.30	1.10	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E61018-D2

AWS A5.5: E10018-D2

Basic flux coated, low hydrogen, high strength ferritic, low alloy electrode giving a metal recovery of some 120% with respect to the weight core wire. Easy to use, easy to strike electrode which deposits a porosity free weld. Designed for all positional welding of high strength steels.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

	min	620°C PWHT	645°C PWHT
Tensile Strength	690 N/mm ²	750 N/mm ²	680 N/mm ²
0.2% Proof Stress	620 N/mm ²	690 N/mm ²	590 N/mm ²
Elongation	16%	26%	28%
Hardness		250 HV	230 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Ni	Mo
0.12	1.75	0.50	0.009	0.018	0.70	0.35

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC TRODE E61018-G

AWS A5.5: E10018-G

Low hydrogen manual metal arc welding electrode using a silicon free, low nitrogen, high purity carbon manganese wire with a concentrically extruded, moisture resistant chemically basic flux with a controlled iron powder addition. For welding ferrite high strength low alloy (HSLA) steels. For the fabrication of higher strength steels involving a requirement to meet a minimum all weld metal UTS of 690 N/mm² (100 ksi) with butt weld in stress relieved condition. For offshore oil well-head process pipework and fittings, these nickel free electrodes satisfy NACE MR-01-75 requirements intended to ensure resistance to sulphide induced stress corrosion cracking combined with good sub-zero notch toughness.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	750 N/mm ²
0.2% Proof Stress	660 N/mm ²
Elongation	23%
Reduction of Area	65%
Impact Energy -50°C	70 J

CHEMICAL COMPOSITION									
C	Mn	Si	S	P	Ni	Mo	Cr	V	Cu
0.05	1.50	0.45	0.009	0.018	2.00	0.35	0.10	0.10	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use

MAC TRODE E61116-G

AWS A5.5: E11016-G

Mac Trode E61116-G is a ultra low hydrogen type electrode with high resistance to moisture absorption. Weld metal shows excellent toughness at around -80°C. It can be used with confidence for welding extremely thick plates such as racks of offshore structures since extremely low diffusible hydrogen content in weld metal assures satisfactory crack resistance.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	860 N/mm ²
0.2% Proof Stress	760 N/mm ²
Elongation	22%
Impact Energy -80°C	90 J

CHEMICAL COMPOSITION							
C	Si	Mn	P	S	Ni	Cr	Mo
0.07	0.70	1.40	0.01	<0.01	1.90	0.30	0.45

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-100	90-130	110-170	160-230	210-270

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use. Kept at **100°C - 150°C** and taken out only as needed.

MAC TRODE E61118-G

AWS A5.3: E11018-G

Superior low hydrogen electrode, NiCr Mo type AWS E11018-G. These electrodes must not be used if the electrodes have become damp before being re-dried. Smooth arc, low spatter easy strike and restrike. When requirements are specified for high strength steels in specific sub-zero toughness such as in the North Sea offshore and submarine fabrication work the electrode offers excellent properties. Materials to be welded RQT 701 HY 100 Navy Q2N OS690 cast steel.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	900 N/mm ²
0.2% Proof Stress	840 N/mm ²
Elongation	22%
Reduction of Area	50%
Impact Energy -50°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	Mo	Ni	Cr	P	S
0.06	1.40	0.25	0.50	2.20	0.20	0.018	0.018

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-100	90-130	110-170	160-230	210-270

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E61118-M

AWS A5.5: E11018-M

All positional, basic coated, low hydrogen electrode depositing exceptionally clean metal of radiographic quality with excellent de-slag and welder appeal. The addition of iron powder gives a recovery of around 110%. Excellent impact values at sub-zero temperatures. Widely used for the welding of steels with a tensile strength of 750-850 N/mm², such as RQT600, RQT701, HY80, HY100, NAXTRA 70 and T1.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	820 N/mm ²
0.2% Proof Stress	730 N/mm ²
Elongation	23%
Reduction of Area	65%
Impact Energy -50°C	80 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Ni	Mo	Cr	V
0.05	1.40	0.40	0.01	0.01	1.90	0.40	0.20	0.02

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-240	180-260

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E61218-G

AWS A5.5: E12018-G

Low hydrogen MMA welding electrode using a silicon free, low nitrogen, high purity carbon manganese wire with a concentrically extruded, moisture resistant, chemically basic flux with a controlled iron powder addition. Specially designed for the repair of hot working dies, where a final hardness in the region of 22-30 RC is required. The electrode has excellent running characteristics with easy striking and good slag detachability.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	930 N/mm ²
0.2% Proof Stress	790 N/mm ²
Elongation	20%
Impact Energy -60°C	52 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo
0.06	0.40	1.60	0.015	0.015	0.75	2.40	0.60

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm	6.00mm
90-130	130-180	160-220	230-280

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E61218-M

AWS A5.5: E 12018-M

Fully positional, basic coated, low hydrogen electrode. Exceptional mechanical properties with a nominal recovery of 110%. Excellent de-slag, re-strike and general welder appeal. Used for HY80, HY100 and other high yield alloy steels where the weld metal properties must match those of the parent material after normalising followed by quenching and tempering.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	900 N/mm ²
0.2% Proof Stress	810 N/mm ²
Elongation	19%
Impact Energy -51°C	32 J

CHEMICAL COMPOSITION

C	Mn	Si	Cr	Ni	Mo	P	S
0.05	1.60	0.40	0.60	2.10	0.40	0.02	0.013

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-90	90-140	130-180	160-220	230-280

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E61418-G

Low hydrogen manual metal arc welding electrode using a silicon free, low nitrogen, high purity CMn core wire with a concentrically extruded, moisture resistant chemically basic flux with a controlled iron powder addition. Specially developed for the repair of hot working dies, where a final hardness in the region of 30–35 RC is required. The electrode has excellent running characteristics, with easy striking and good slag detachability.

CURRENT :

DC(+).

MECHANICAL PROPERTIES

Tensile Strength	1050 N/mm ²
0.2% Proof Stress	910 N/mm ²
Elongation	12%
Impact Energy -40°C	25 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Mo	Cr	Ni
0.08	0.30	1.30	0.015	0.015	1.10	0.70	3.70

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm	6.00mm
90–130	130–180	160–220	230–280

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use.

MAC TRODE E61418-M

Basic coated electrode producing high-strength and tough welded joints. Weld deposit is of extremely high metallurgical purity and very low hydrogen content. Despite the very high yield strength, the weld metal has good elongation and Charpy toughness. Welds are of x-ray quality.

CURRENT :

DC(+).

MECHANICAL PROPERTIES

Tensile Strength	1050 N/mm ²
0.2% Proof Stress	≥ 950 N/mm ²
Elongation	≥ 15%
Impact Energy -40°C	≥ 27 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Mo	Cr	Ni
0.08	0.30	1.30	≤ 0.01	≤ 0.01	1.10	0.70	3.70

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
65-95	90-135	140-185	180-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **350°C** before use

MAC TRODE RAIL ROD

AWS A5.5: E12016-G

High recovery (115%) low hydrogen electrode for the welding of rails. Due to the excellent resistance to compressive loading, this electrode is ideal for the welding of rail steels. Low and medium carbon rail steels. Minimal slag formation permits a slag over slag technique. Ideally, pre-heat to 200-250°C and maintain an inter pass temperature of around 400°C.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	900 N/mm ²
0.2% Proof Stress	700 N/mm ²
Elongation	17%
Impact Energy -20°C	18 - 48 J
Hardness	280 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo
0.09	1.00	0.50	0.008	0.012	2.30	0.20	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm	6.00mm
90-150	120-200	180-260	230-350

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.





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<u>52</u>	<u>MAC CAST E409</u>
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MAC CAST E405

AWS A5.15: ENi-CI

Superior high quality, fully machinable nickel electrode for joining and building up on cast irons. Builds up quickly and produces sound fully machinable deposits. Minimum base metal dilution. No undercut. For hot and cold welding of cast irons and for joining or building up on malleable iron, steels and copper or one to another. Ideal for foundry reclamation.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	340 N/mm ²
Elongation	15%
Hardness	170 Bn

CHEMICAL COMPOSITION

C	Si	Mn	S	Fe	Ni	Cu	Al
0.25	0.15	0.24	<0.01	1.10	Balance	<0.01	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
30-75	70-100	100-150	120-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **150°C** before use.

MAC CAST E406

AWS A5.15: ENi-CI

High quality general purpose nickel electrode designed for economical joining and surfacing of cast iron. Positive arc, fast build-up, easy slag detachability and fully machinable porosity free welds. May be used for hot or cold welding of cast irons and for surfacing and building up on malleable irons. It is suitable for joining mild steel to cast iron and is ideal for maintenance repair sound welds are required.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	415 N/mm ²
Elongation	15%
Hardness	180 Bn

CHEMICAL COMPOSITION

C	Si	Mn	S	Fe	Ni	Cu	Al
0.25	0.15	0.24	<0.01	1.10	Balance	<0.01	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-80	80-100	120-170	170-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **150°C** before use.

MAC CAST E407

AWS A5.15: ENiFe-CI

High strength nickel iron machinable electrode for joining and building up on cast irons. Low amperage, smooth arc, minimum spatter and high resistance to cracking. Due to bi-metallic core wire, this product gives excellent current carrying capacity which will prevent overheating. For the repair of grey, S.G., nodular or ductile irons where higher strength is required, also suitable for the joining of cast iron to mild steel.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	450 N/mm ²
Elongation	20%
Hardness	180 Bn

CHEMICAL COMPOSITION

C	Si	Mn	S	Fe	Ni	Cu	Al
0.90	0.20	0.20	<0.01	42.00	Balance	0.20	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
40-70	70-110	110-150	130-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **150°C** before use.

MAC CAST E407S

AWS A5.15: ENiFe-CI (Special)

Manufactured on a pure nickel core wire with an extruded basic flux containing both graphite and a high metallurgical grade or iron powder. Welds with a soft stable arc and ensures a metal recovery of 160% with respect to core wire. Designed for welding all grades of cast iron to steel. The advanced deoxidisation system ensures the maximum combination of weld strength, ductility and machinability. The design principle of the electrode prevents overheating and provides great resistance to porosity.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES	
Tensile Strength	410 N/mm ²
0.2% Proof Stress	230 N/mm ²
Elongation	15%
HV10	240

CHEMICAL COMPOSITION							
C	Si	Mn	S	Fe	Ni	Cu	Al
0.90	0.60	1.10	0.01	42.00	Balance	0.20	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
70-100	100-130	140-190	180-220

Storage:

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **150°C** before use.

MAC CAST E409

AWS A5.15: ENi-CI (Special Non-Conductive)

Fully machinable nickel based electrode with specially developed non-conductive coating for welding most cast irons. Specially designed for use where awkward and confined spaces cause arcing difficulties. May be used for hot or cold welding of most types of cast iron.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	400 N/mm ²
Elongation	15%
Hardness	180 Bn

CHEMICAL COMPOSITION

C	Si	Mn	S	Fe	Ni	Cu	Al
0.24	0.16	0.91	<0.01	1.00	Balance	<0.01	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-80	90-110	110-140	140-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **150°C** before use.

MAC CAST E410

(Cast Iron Special)

Non-machinable electrode for cast iron repairs. Can be used on dirty and contaminated castings or any cast iron repair where machinability is unimportant. For best results, castings should be preheated (maintained during welding) and slowly cooled to prevent possibility of cracking. Excellent colour match, will rust.

CURRENT :

DC (+) or AC (OCV: 50V min).

CHEMICAL COMPOSITION

C	Ni	Si	Fe
3.00-3.50	1.00-1.50	0.60	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-80	90-110	110-140	140-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **150°C** before use.

MAC CAST E411

Basic low hydrogen steel electrode alloyed with nickel for build-up of grey cast iron. This is ideal for a buffer layer of cast iron before hard facing.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Hardness (HRC)	25-35
Hardness (HRB)	300-350

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Ni	Fe
<0.10	0.50	11.00	4.50	13.00	Balance

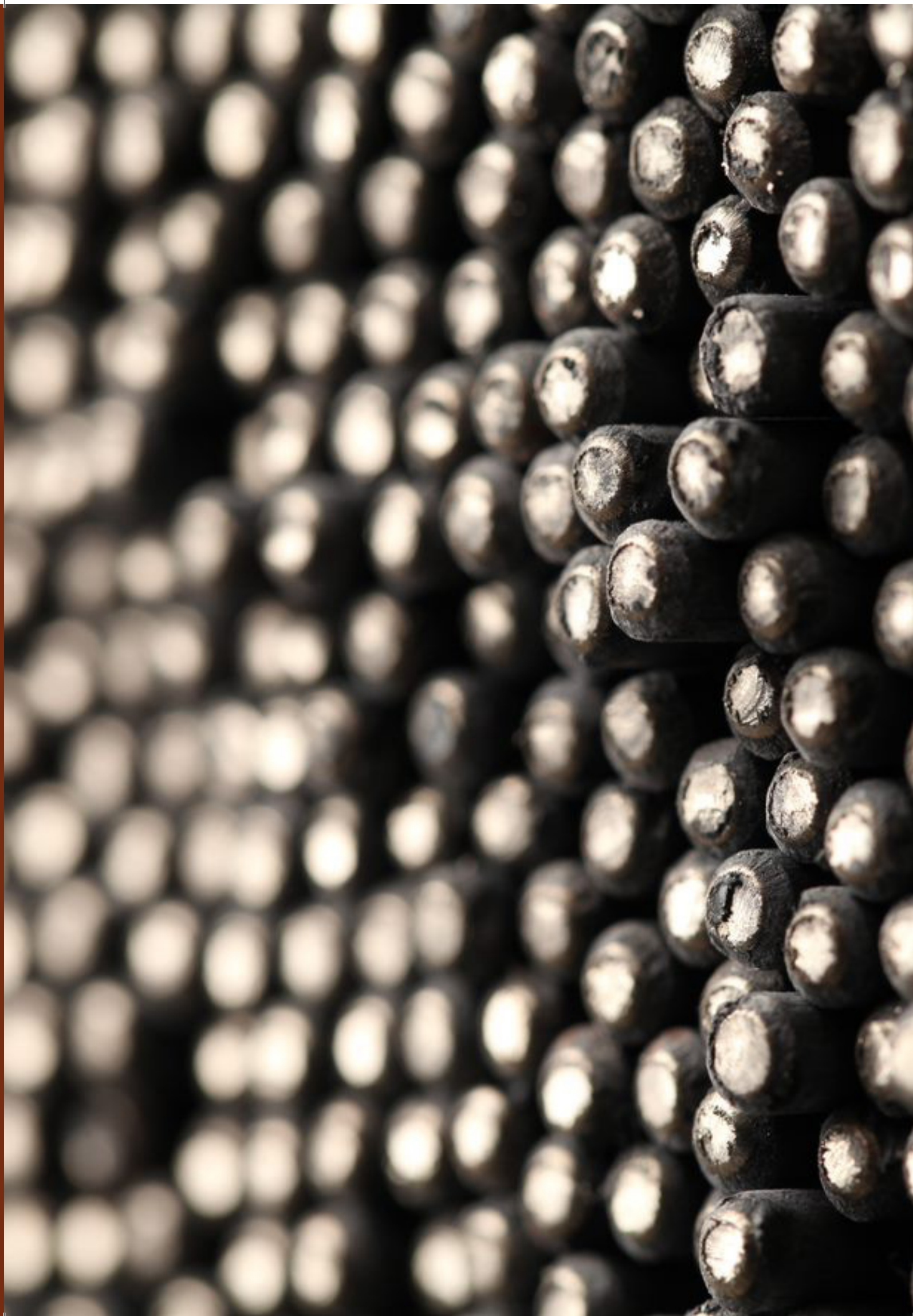
ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	100-140	140-190	180-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **300°C** before use.





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MAC HICA E3071

GRADE 1

AWS A5.13: ECoCr-C

Cobalt based electrode designed on a fully alloyed core wire to combat all four elements of wear, i.e. heat, impact, corrosion and abrasion. Most suitable of cobalt range where abrasion is the most predominant of the four elements of wear. Excellent for rebuilding corners with minimum base metal dilution. Has ability to overlay extensive areas without cracking. Will retain hardness at high temperatures. Welds are non-machinable. Recommended for use in the iron and steel industries or any industry where heat, corrosion and abrasion occur concurrently.

CURRENT :

DC (±) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Typical As Welded Hardness	Temperature °C				
	+20	+400	+600	+800	+900
Vickers (HV)	600	480	-	270	-
Rockwell	56	48	-	26	-

CHEMICAL COMPOSITION

C	Cr	Ni	Mn	Mo	W	Fe	Co	Si
2.00	30.00	2.80	<1.00	<1.00	13.00	4.00	Balance	1.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-115	90-130	100-150	130-180

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC HICA E3072

GRADE 6

AWS A5.13: ECoCr-A

Cobalt based electrode designed on a fully alloyed core wire to combat all four elements of wear, i.e. heat, impact, corrosion and abrasion. High impact properties. Most suitable of cobalt range where impact is the most predominant of the four elements of wear. Excellent for rebuilding corners with minimum base metal dilution. Has ability to overlay extensive areas without cracking. Will retain hardness at high temperatures. The welds are machinable. Recommended for use in iron and steel industries. Suitable for use on shear blades, dies, punches and all applications where good resistance to heat, impact, corrosion and abrasion is required.

CURRENT :

DC (±) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Typical As Welded Hardness	Temperature °C				
	+20	+400	+600	+800	+900
Vickers (HV)	350-450	320	280	230	200
Rockwell	35-45	32	28	22	-

CHEMICAL COMPOSITION

C	Cr	Ni	Mn	W	Fe	Co	Mo	Si
1.30	29.00	2.00	0.40	5.00	2.00	Balance	0.20	1.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-115	90-130	100-150	130-180	180-230

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC HICA E3073

GRADE 12

AWS A5.13: ECoCr-B

Cobalt based electrode made on a fully alloyed core wire designed to combat all four elements of wear, i.e. heat, impact, corrosion and abrasion. The electrode provides optimum impact and abrasion resistant properties while retaining hardness at elevated temperatures. Excellent for rebuilding corners with minimum base metal dilution. Has ability to overlay extensive areas without cracking. Will retain hardness at high temperatures. Welds are non-machinable. Suitable for use in industries where severe impact and abrasion occurs.

CURRENT :

DC (±) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Typical As Welded Hardness	Temperature °C				
	+20	+200	+400	+600	+800
Vickers (HV)	545	420	380	360	-
Rockwell	51	42	39	37	-

CHEMICAL COMPOSITION

C	Cr	Ni	Mn	Mo	W	Fe	Co	Si
1.00	27.00	3.00	<1.00	<1.00	8.00	4.00	Balance	1.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-115	90-130	100-150	130-180	180-230

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC HICA E3074

GRADE 21 MOD

AWS A5.13: ECoCr-E (MOD)

High recovery chrome/cobalt/iron based electrode designed to combat all four elements of wear, i.e. heat, impact, corrosion and abrasion, but with the emphasis on impact properties. Has ability to overlay extensive areas without cracking. Will retain hardness at high temperatures. The welds are machinable and will work harden under impact. Designed initially as a forging material for either repairs or sinking. Suitable for use on shear blades and dies, and all applications where good resistance to heat, impact, corrosion and abrasion is required. Due to its excellent impact properties and refined grain structure it is ideally suited to clipping tools and forging punches.

CURRENT :

DC (±) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Typical As Welded Hardness	Temperature °C				
	+20	+200	+400	+600	+800
Vickers (HV)	330	-	210	170	110
Rockwell	33	-	21	17	11

CHEMICAL COMPOSITION

C	Cr	Ni	Mo	Fe	Co	Si
0.10	22.00	1.30	4.80	14.30	Balance	1.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-115	90-130	100-150	130-180	180-230

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC HICA E3075

GRADE 21

AWS A5.13: ECoCr-E

This electrode is also known as alloy 21. The flux is a rutile type made on a fully alloyed core wire. Cobalt based electrode designed on a fully alloyed core wire to combat all four elements of wear, i.e. heat, impact, corrosion and abrasion. Most suitable of cobalt range where toughness is the most predominant of the four elements of wear. Excellent for rebuilding corners with minimum base metal dilution. Has ability to overlay extensive areas without cracking. Designed specifically for use as a forging die material. Because of its low carbon content, the electrode has excellent resistance to thermal and mechanical shock. The electrode deposits a high alloyed cobalt base weld metal with 0.3% carbon. Welds are machinable. The suggested usage's are in iron and steel industries or any industry where heat, corrosion and abrasion occur concurrently, for such items as steel mill rolls, valves seat inlays, hot working dies and tools, hot shearing blades, tongs etc.

CURRENT :

DC (±) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Typical As Welded Hardness	Temperature °C				
	+20	+200	+400	+600	+800
Vickers (HV)	330	-	210	170	110
Rockwell	33	-	21	17	11

CHEMICAL COMPOSITION

C	Cr	Ni	Mn	Mo	W	Nb	Fe	Co	Si
0.20	27.00	2.00	0.40	5.00	<0.50	<1.00	2.00	Balance	0.80

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-115	90-130	100-150	130-180	180-230

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC HICA E3075 HR

GRADE 21 HIGH RECOVERY

AWS A5.13: ECoCr-E

Commonly referred to as G21, however the addition of complex metal powders to the rutile flux raises the recovery rate of this electrode to approximately 170%. This alloy also has a reduced carbon content and as such is the most resistant of all the cobalt alloys to cracking at high temperatures. Predominantly used in the forging industry for the repair of hot working tools and dies, alternative uses would be for repairs to valve seats in the chemical industry where corrosion resistance is paramount. Welds are machinable.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile as welded hardness

As Deposited 30 HRC

Post Work Hardening 45 HRB

CHEMICAL COMPOSITION

C	Cr	Ni	Mo	Fe	Co
0.30	31.00	4.50	5.50	3.00	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-115	90-130	100-150	130-180

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC HICA E3076

GRADE 25

Cobalt based electrode designed on a fully alloyed core wire. It is resistant to wear, galling and corrosion, retaining these properties at high temperatures. This electrode has exceptional fatigue resistance. Useful for tools working hot steel. Also resistant to thermal cracking, hot metal on metal wear, and surface fatigue. The welds are machinable. Recommended for use in iron and steel industries. Suitable for use on piercing points, forming tools, extrusion dies, and furnace hardware, and all applications where a combination of metal-on-metal wear, thermal fatigue and hot corrosion resistance is required.

CURRENT :

DC (+) or AC (OCV: 70V min).

CHEMICAL COMPOSITION

C	Mn	Si	Fe	W	Cr	Ni	S	Co
0.10	1.50	0.40	2.00	15.00	20.00	10.00	0.02	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-75	90-120	110-150

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.





Contents

68	MAC GROOVE E71
69	MAC GROOVE E72
70	MAC STUD E73
71	MAC CUT E74

MAC GROOVE E71

An electrode specially designed for cutting, gouging and piercing operations on all metals without the use of air or oxygen. Easy to use with little skill required. Operates at lower current and produces less fume than would normally be expected from an electrode of this type. Metal surfaces are seared by the force of the arc leaving them clean and ready for subsequent welding operations. Smooth and even grooves are easily produced. Applications include, grooving, cutting, gouging and piercing operations on all metals including those, which would normally present difficulties by machining. These include hardenable steels, armour plate, hard weld overlays, cast iron and stainless steels. The electrodes are ideal for back gouging of butt welded seams and almost indispensable for the preparation of cast irons prior to welding repair.

CURRENT :

DC (+) or AC (OCV: 70V min).

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	80-110	110-150	150-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **110°C** before use.

MAC GROOVE E72

An electrode specially designed for cutting, gouging and piercing operations on all metals without the use of air or oxygen. Easy to use with little skill required. Operates at lower current and produces less fume than would normally be expected from an electrode of this type. Metal surfaces are seared by the force of the arc leaving them clean and ready for subsequent welding operations. Smooth and even grooves are easily produced. Applications include, grooving, cutting, gouging and piercing operations on all metals including those, which would normally present difficulties by machining. These include hardenable steels, armour plate, hard weld overlays, cast iron and stainless steels. The electrodes are ideal for back gouging of butt welded seams and almost indispensable for the preparation of cast irons prior to welding repair. This electrode is made in 5.00mm only in 450mm lengths to allow longer operations of cutting/gouging and piercing.

CURRENT :

DC (+) or AC (OCV: 70V min).

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

5.00mm

150-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **110°C** before use.

MAC STUD E73

Extruded flux coated MMA electrode made on high alloy duplex; micro structured, high tensile, non-heat treatable (hence non-softening alloyed core wire). The electrode can maintain a continuous arc when slag over slag welding while restricting the flow of the molten metal. These physical welding characteristics make the electrode ideal for the removal of threaded bolt when the bolt head has sheared at or just below the surface.

Broken Bolt Removal Procedure

Selecting the appropriate diameter electrode, e.g. approximately 50% of the stud's diameter. Make short continuous build up welds. During the breaks in welding, remove slag and check circumference of build-up is within the diameter of the stud. Repeat weld procedure until build up is 5 – 8mm above component surface. File two opposite flats on weld deposit and remove broken stud (unscrew) with the use of mole grips.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	850 N/mm ²
0.2% Proof Stress	780 N/mm ²
Elongation	22%
Vickers	290 HV

CHEMICAL COMPOSITION

C	Si	Cr	Mn	Ni	S	P	Ti	V	N
0.04	1.25	29.00	0.99	12.00	0.01	0.01	0.07	0.15	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-90	75-130	120-180	160-220

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC CUT E74

Flux coated electrode for cutting all metals using standard MMA equipment. Will cut all steels including stainless, also non ferrous cast irons and nickel based alloys.

CURRENT :

DC (+) or AC (OCV: 70V min).

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
80-110	90-150	130-180	150-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **110°C** before use.



Contents

<u>74</u>	<u>MAC HARD E301</u>
<u>75</u>	<u>MAC HARD E304</u>
<u>76</u>	<u>MAC HARD E305</u>
<u>77</u>	<u>MAC HARD E306</u>
<u>78</u>	<u>MAC HARD E307</u>
<u>79</u>	<u>MAC HARD E308</u>
<u>80</u>	<u>MAC HARD E335T</u>
<u>81</u>	<u>MAC TUNGSTEN E375</u>

MAC HARD E301

Hard facing electrode designed for applications where high resistance to impact is the main requirement. The electrode is all positional and has a metal recovery rate of 100%. Welds can be softened by heat treatment at 720°C - 750°C, machined and subsequently re-hardened by oil or water quenching. Used for the hard facing of crusher jaws, dredger tumbler plates, punches, shears, guillotine blades, tractor idler wheels, roller and track links. Also suitable for depositing buffer layers and for building up multi-layer deposits on badly work components.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES			
	1 st Layer	2 nd Layer	3 rd Layer
Rockwell C (HRC)	-	-	39-42
Vickers (HV)	-	-	380-410
Brinell (HB)	-	-	360-390

CHEMICAL COMPOSITION					
C	Mn	Si	Cr	Mo	Fe
0.30	0.20	0.20	3.00	0.10	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
80-110	90-140	110-180	160-220	190-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **250°C** before use.

MAC HARD E304

The electrode is designed to deposit wear resistant overlays on all ferrous metals where high resistance to impact and abrasion is required. The electrode is all positional with a metal recovery rate of 100%. The welds are non-machinable in the as welded state but can be softened by heat treatment at temperatures of 720°C - 750°C. After machining the welds can be rehardened by oil or water quenching.

CURRENT :

DC (+) or AC (OCV: 45V min).

MECHANICAL PROPERTIES			
	1 st Layer	2 nd Layer	3 rd Layer
Rockwell C (HRC)	55-60	-	60-63
Vickers (HV)	600-700	-	700-760

CHEMICAL COMPOSITION									
C	Mn	Cr	Si	Mo	V	W	Nb	Fe	Ti
0.70	<1.00	8.00	0.40	<1.00	<1.00	<1.00	<1.00	Balance	0.02

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
80-110	90-140	110-180	160-220	190-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **250°C** before use.

MAC HARD E305

The weld deposit resists against metal to metal wear, corrosion and high temperatures. Therefore the electrode is used for overlay and build up of machinery parts and tools subject to impact, compression and wear, used at operating temperatures up to 650°C. The deposit is resistant to thermal shock and can be machined with tungsten carbide tipped tools. Rutile-basic coated electrode with a stable arc, regular drop transfer and a smooth deposit. For building up dies, for hot working tools, for moulds, continuous driving rolls, mandrels, forming tools etc.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Hardness obtained after tempering for 2 x 2 hours.

	400°C	510°C	540°C	570°C	600°C
Rockwell C (HRC)	50	51	54	52	51

CHEMICAL COMPOSITION

C	Mn	Ni	Cr	P	S	Si	Mo	W	V	Nb	Co	Fe
0.15	0.60	1.00	14.50	0.025	0.01	0.60	2.30	1.00	0.10	1.00	13.00	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-70	80-100	120-140

Storage:

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC HARD E306

Hard facing electrode designed for applications on ferrous metals involving friction and severe abrasion, also where certain heat and corrosive conditions apply. The electrode is of the rutile chromium carbide all positional type and has a metal recovery rate of 150%. Ideal for foundry sand mill blades, impellor worms, screws, etc., also bucket edges and digger teeth in conjunction with Mac Trode E630 being used as a buttering layer.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES			
	1 st Layer	2 nd Layer	3 rd Layer
Rockwell C (HRC)	48-54	56-62	60-66
Vickers (HV)	475-575	675-750	700-850

CHEMICAL COMPOSITION						
C	Mn	Si	Cr	Ni	Mo	Fe
4.00	1.00	1.00	34.00	2.00	3.00	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
3.25mm	4.00mm	5.00mm
100-160	130-200	200-260

Storage:

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **250°C** before use.

MAC HARD E307

Mac Hard E307 is a high chromium, hard facing electrode made on a mild steel core wire. The chemically basic flux also contains other significant carbide formers than chromium, e.g. tungsten, niobium, molybdenum and vanadium. This ensures a microstructure of complex carbides capable of withstanding not only severe abrasion but also resistance to oxidation and stress at elevated temperatures. Typical applications occur in the earth moving and cement industries also in the iron and steel industries on furnace parts – fire grate bars etc.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Rockwell C (HRC)	62-66
Vickers (HV)	750-850

As welded, guidance values only. Actual hardness depends on base material, number of layers, cooling rate and welding conditions.

CHEMICAL COMPOSITION

C	Mn	Si	Cr	B	Mo+Nb+V+W	Fe
5.00	<1.00	1.00	28.00	<1.00	12.00	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm
110-150	140-200	190-250

Storage:

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **250°C** before use.

MAC HARD E308

Hard facing electrode designed specifically for applications on ferrous metals where rapid deposition is required, especially where dot formation is required with little or no deslagging involved. The electrode is designed to produce spatter type deposition in the vertical welding position but will also give conventional bead deposit in the downhand welding position. Designed purposefully for the sugar cane industry for hard facing sugar cane crushing rolls welding in the vertical position whilst the rolls are being slowly revolved. The deposit is in the form of a spray spatter and results in even dot formation of a highly abrasive resistant coating. Also ideal for may wear applications in quarrying and earth moving where severe abrasion is encountered.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

On Cast Iron	66 HRC
On Steel	61-62 HRC

CHEMICAL COMPOSITION

C	Cr
4.20	32.00

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm
100-130	130-170	170-250

Storage:

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **250°C** before use.

MAC HARD E335T

Superior highly alloyed all positional tubular flux coated electrode for hard facing where extreme abrasion is involved. Alloy content 40% minimum. Moisture resistant.

Smooth easy to use electrode with high deposition rate at low amps (employing higher amps than necessary will result in greater burn off and dilution of the alloy content, and poorer wear life). Low slag formation allows multi-layer welding without need to de-slag between runs – 4kg/hr. Surface cracking in certain instances may occur, but in practice will assist in the wear performance. The surface cracking has no detriment whatsoever.

The highly abrasive resistant deposits find numerous applications on quarrying and mining machinery and equipment, in brickworks and extensive applications on crushing equipment and on earth moving and agricultural machinery.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

	Single Layer	Multi Layer
Rockwell C	50-60	59-62

CHEMICAL COMPOSITION

C	Mn	Cr	Mo	V	B
4.00	4.00	27.00	4.00	1.00	0.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

6.00mm	8.00mm	11.00mm
90-145	140-190	190-260

MAC TUNGSTEN E375

A tubular flux coated electrode designed to give maximum abrasion resistance, depositing tungsten carbide particles held in a tough steel matrix. Operates at low amperage with little spatter and produces smooth porosity free welds. By using a weaving technique, large areas of smooth weld overlay can be achieved. Recommended current range should not be exceeded otherwise the wear resisting properties will be destroyed. The welds are non-machinable.

Recommended where severe abrasion coupled with low impact occurs. Ideal for foundry sand mill blades and slingers, pan scrapers, rock drills, pug mill knives, cement blades, conveyor screws, dredger teeth, gravel pumps and numerous other similar applications.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Rockwell C	72 HRC
Steel matrix	1800 VPN

CHEMICAL COMPOSITION	
W	Cr
52.00	12.70

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS	
	6.00mm
	90-145



Contents

84	E6013LF
85	MAC FINE STEEL
86	MAC NIL SIL
87	MAC SUPER STEEL
88	MAC SUPER STEEL VDH

E6013LF

AWS A5.1: E6013

High quality, all-positional mild steel electrode. Easy to use employing touch or conventional welding techniques. Designed for joining light or heavy mild steel sections, highly suitable for use in confined spaces. Improved formulation featured with 30% decrease of welding fume and better anti-moisture performance.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	491 N/mm ²
0.2% Proof Stress	398 N/mm ²
Elongation	26%
Impact Value -20°C	81 J

CHEMICAL COMPOSITION

C	Mn	P	S	Si	Ni	Cr	Mo	V
0.08	0.43	0.026	0.021	0.21	0.04	0.011	0.007	0.009

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-110	80-140	100-180	140-220

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC FINE STEEL

AWS A5.1: E6013

High quality, all-positional mild steel electrode. Easy to use employing touch or conventional welding techniques. Designed for joining light or heavy mild steel sections, highly suitable for use in confined spaces.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	550 N/mm ²
0.2% Proof Stress	530 N/mm ²
Hardness	180

CHEMICAL COMPOSITION

C	Mn	Si	Ni	Cr	Mo	V
0.06	0.45	0.65	0.04	0.03	0.01	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-45	50-70	60-90	75-120	100-150	130-210	170-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **100°C** before use.

MAC NIL SIL

AWS A5.1: E6013 (Nearest)

Manufactured using a silicon free mild steel core wire and a highly chemically acid type (but non-corrosive) extruded flux coating. Welds with a strong forceful arc leaving a minimum of slag. The minimum silicon in the metal, combined with its overall purity, ensures the weld metal has excellent resistance to both corrosion and erosion by molten zinc at temperatures of 450–500°C. Thus, it is suitable for welding and repairing fabricated galvanising containers constructed from high purity iron.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	450 N/mm ²
0.2% Proof Stress	370 N/mm ²
Elongation	30%
Reduction of Area	60%

CHEMICAL COMPOSITION

C	Mn	Si	Ni	Cr	Mo	V
0.02	0.50	0.04	0.04	0.01	0.05	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70–110	80–140	100–180	140–220

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **100°C** before use.

MAC SUPER STEEL

AWS A5.1: E6013

Superior all positional mild steel electrode for joining light and heavy gauge steel sections. May be used with conventional or touch welding techniques and are particularly suitable where welding has to be carried out in confined or awkward places. Welds are ductile and of a high radiographic quality.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	550 N/mm ²
0.2% Proof Stress	530 N/mm ²
Hardness	180

CHEMICAL COMPOSITION

C	Mn	Si	Ni	Cr	Mo	V
0.06	0.45	0.65	0.04	0.03	0.01	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-45	50-70	60-90	75-120	100-150	130-210	170-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **100°C** before use.

MAC SUPER STEEL VDH

AWS A5.1: E6013

All positional superior electrode for joining light and heavy gauge mild steel. Due to its characteristics, this electrode is suited to applications in confined and awkward spaces involving positional vertical down welding.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	450 N/mm ²
0.2% Proof Stress	370 N/mm ²
Hardness	180

CHEMICAL COMPOSITION

C	Mn	Si	Ni	Cr	Mo	V
0.06	0.45	0.65	0.04	0.03	0.01	0.01

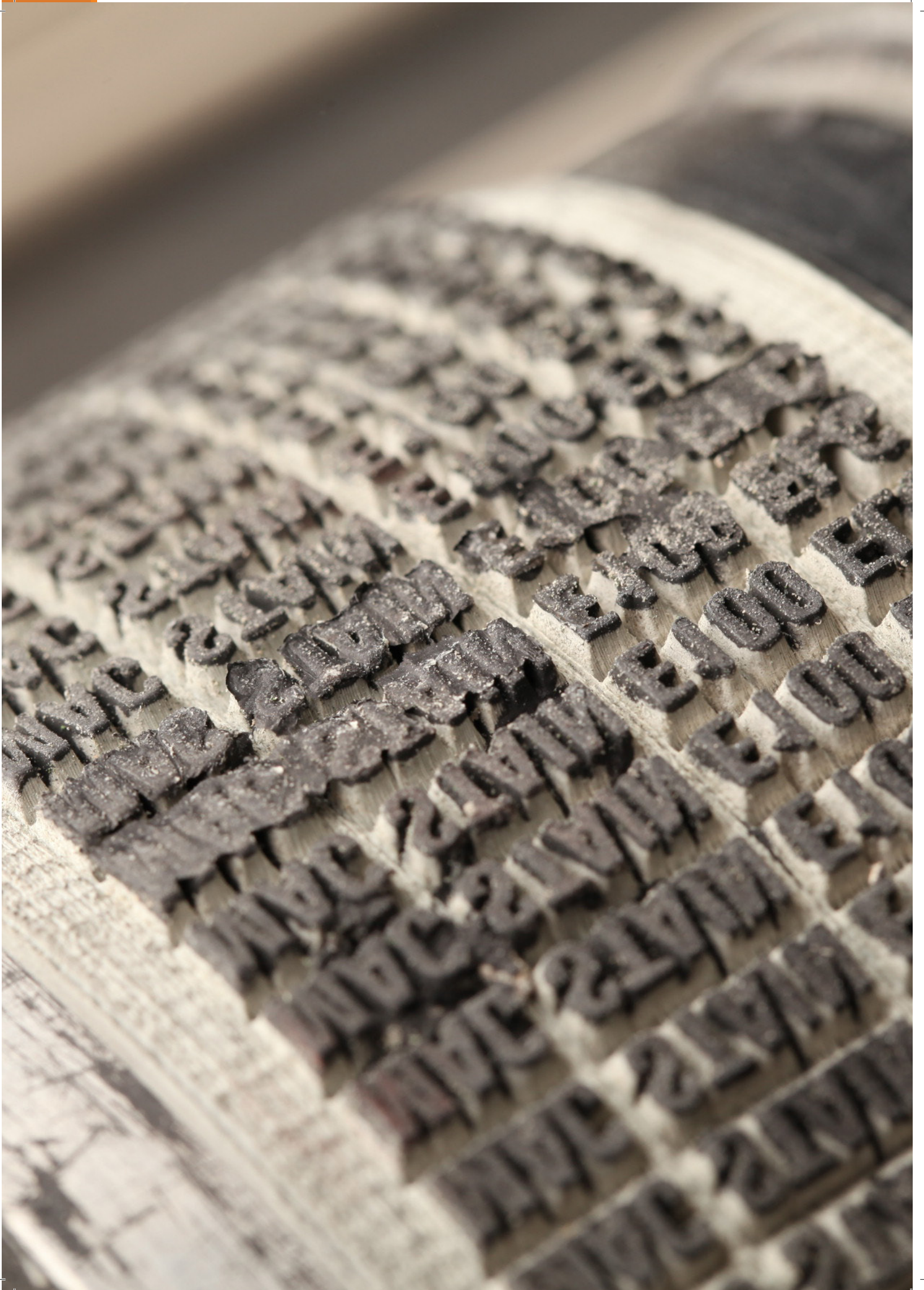
ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	75-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **100°C** before use.





Contents

92	MAC TRODE E6716
93	MAC TRODE E6718
94	MAC TRODE E6718-A1
95	MAC TRODE E6718-G
96	MAC TRODE E6718-M
97	MAC TRODE E6724
98	MAC TRODE E6728

MAC TRODE E6716

AWS A5.1: E7016

Manual metal arc welding electrode with a silicon free CMn core wire with a concentrically extruded chemically basic flux coating which has been so modified to provide good weldability on poor quality AC welding sets. Materials to be welded are mild and medium carbon manganese steels up to 15mm thick with a UTS of 500 N/mm² max.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	560 N/mm ²
0.2% Proof Stress	500 N/mm ²
Elongation	25%
Reduction of Area	70%
Impact Energy -30°C	27 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Ni	Cr	Mo	V
0.08	0.60	0.65	0.021	0.022	0.14	0.09	0.11	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-200	170-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6718

AWS A5.1: E7018

High quality superior all positional low hydrogen manual metal arc welding electrode using a silicon free, low nitrogen, high purity carbon manganese core wire with concentrically extruded, moisture resistant chemically basic flux with a controlled iron powder addition, to provide 120% metal recovery. Welds are of smooth appearance, ductile and of high radiographic quality. For welding mild and medium tensile steels where low hydrogen levels and crack resistant weld metal are required. The electrodes are particularly suitable for welding heavy sections subject to high levels of resistance and for welding problem steels with high sulphur content. Recommended for unalloyed carbon manganese ferritic steels with high sub-zero toughness requirements.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES	
Tensile Strength	560 N/mm ²
0.2% Proof Stress	500 N/mm ²
Elongation	27%
Impact Energy -30°C	100 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Ni	Cr	Mo	V
0.08	0.95	0.30	0.011	0.015	0.12	0.08	0.15	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-200	170-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.



MAC TRODE E6718-A1

AWS A5.5: E7018-A1

E6718-A1 is an iron powder, low hydrogen electrode designed for welding low alloy, high tensile steel of 450 N/mm² minimum yield strength and containing 0.5 Mo. This electrode offers the welder high deposition efficiency and produces a weld deposit with fine bead appearance, easy removal of slag, low spatter and medium penetration. Weld metal solidifies rather rapidly, making this electrode suitable for out of position welding.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	550 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	27%
Impact Energy 0°C	80 J

CHEMICAL COMPOSITION

C	Mn	Si	Mo	P	S
0.06	0.70	0.40	0.50	0.012	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	100-140	140-180	190-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6718-G

AWS A5.5: E7018-G

Fully positional, basic coated, low hydrogen electrode depositing exceptionally clean metal of radiographic quality with excellent de-slag and re-strike. The addition of iron powder gives a recovery of around 120%. It is suitable for offshore constructions in steel. Good impact values down to -60°C. Can be used for the welding of weathering steels, such as Corten A and Corten B. Excellent weldability on both AC and DC.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	650 N/mm ²
0.2% Proof Stress	560 N/mm ²
Elongation	27%
Impact Energy -60°C	52 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Ni	Cr	Mo	V
0.08	1.60	0.30	0.011	0.015	0.90	0.08	0.03	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-200	170-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6718-M

AWS A5.1: E7018-M

Mac Trode E6718-M is a low hydrogen, iron powder all-position electrode specially formulated to meet the more stringent requirements of Military Specification MIL-E0022200/10 for mechanical properties, low coating moisture, and diffusible hydrogen content. E6718-M is intended for welding carbon steels, as well as high tensile steels, such as Grade HT of MIL-S-16113 and MIL-S-22698. It is also used for attachment welds to HY-80 and HY-100.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	550 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	30%
Impact Energy -29°C	225 J

CHEMICAL COMPOSITION

C	Mn	Si	Mo	P	S
0.06	0.70	0.40	0.50	0.012	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-100	90-160	130-220	200-300

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6724

AWS A5.1: E7024

High quality mild steel iron powder electrode with recovery rate of 170%-180% with respect to the weight of the core wire. Designed specifically for mild steel heavy fabrications where downhand (@V' preparation) welding involves large volume deposits to be laid using single or multipass techniques. Easy to use electrode employing either conventional to touch welding techniques. Heavy mild steel fabrication where extended runs are involved demanding large volume of weld metal deposits in the shortest possible time. Can be used for either fillet or butt joints. Mild and medium carbon-manganese steels up to 15mm thick with a UTS of 500 N/mm² max.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES	
Tensile Strength	540 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	28%
Impact Energy -20°C	50 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Ni	Cr	Mo	V
0.06	0.80	0.30	0.005	0.02	0.14	0.09	0.11	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-200	170-240

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6728

AWS A5.1: E7028

High quality mild steel iron powder electrode with recovery rate of 150%. Designed specifically for mild steel heavy fabrications where downhand, ('V' preparation) welding involves large volume deposits to be laid using single or multipass techniques. Very easy slag detachability – self releasing. Ideal for heavy mild steel fabrications where extended runs are involved demanding large volumes of weld metal deposits in the shortest possible time. Can be used for either fillet or butt joints.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	550 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	29%
Impact Energy -20°C	130 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Ni	Cr	Mo	V
0.08	1.10	0.45	0.011	0.009	0.17	0.09	0.13	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	80-140	100-180	140-200	170-240

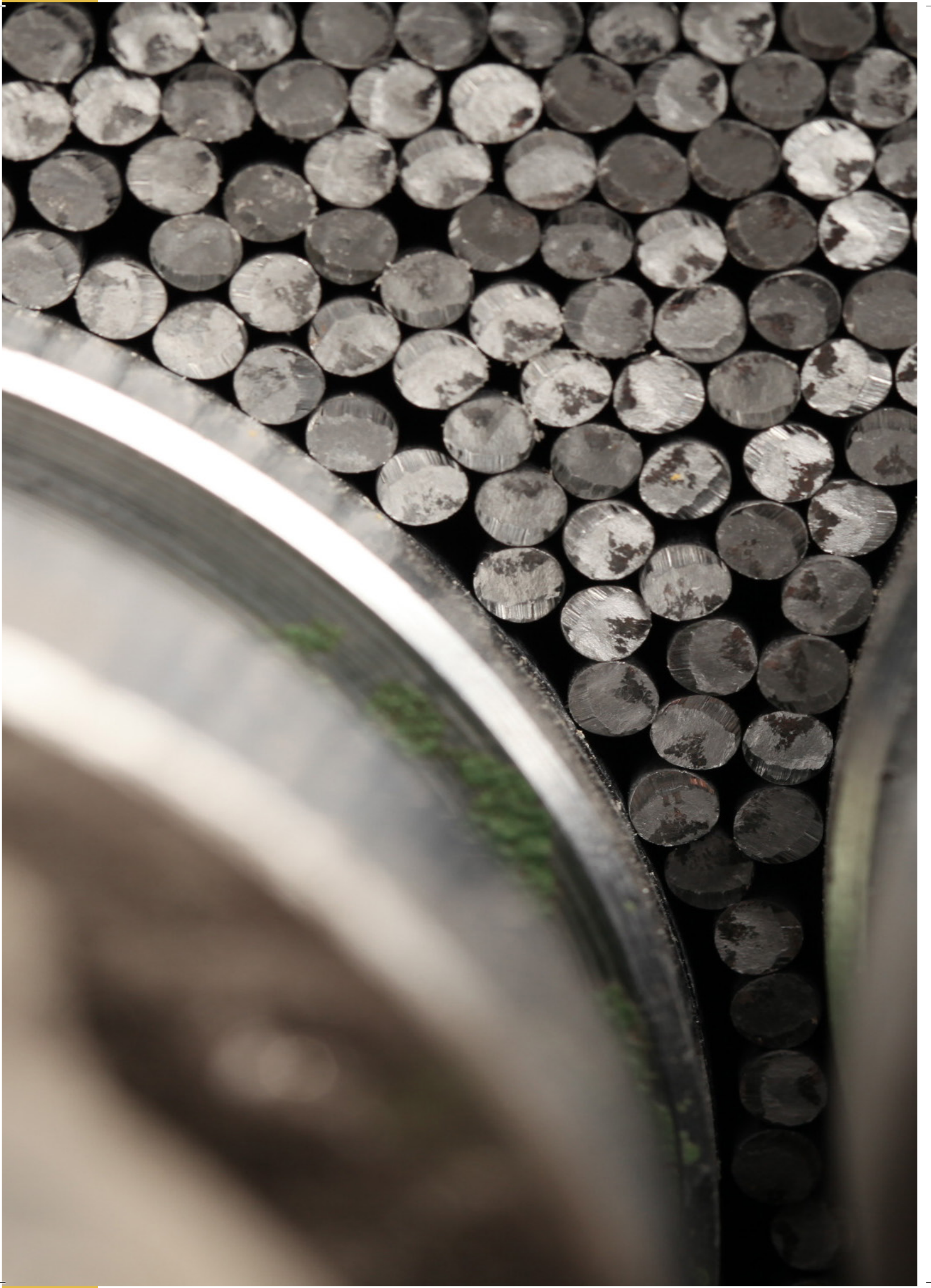
Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.



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MAC NICRO E200

AWS A5.11: ENi-1

Manual metal arc electrode with a chemically basic flux coating. A superior electrode for joining and overlaying nickel and nickel alloys such as Inco 200 and 201; or nickel and nickel alloys to carbon steels especially where carbon migration is susceptible during high temperature service conditions. For operations such as evaporators, condensers, treatment of certain dry gases, chlorinating plants and for service involved in the treatment of organochlorine products. This electrode will cover a wide range of applications but is particularly suitable for site welding when TIG welding cannot be used.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	440 N/mm ²
0.2% Proof Stress	300 N/mm ²
Elongation	22%
Reduction of Area	40%
Impact Energy -30°C	160 J

CHEMICAL COMPOSITION									
C	Mn	Fe	Si	P	S	Cu	Ni	Al	Ti
0.02	0.40	<0.10	0.10	0.02	0.01	0.20	Balance	<0.10	3.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
50-70	70-110	90-140

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC NICRO E201

AWS A5.11: ENiCrFe-1

Manual metal arc welding electrode using a solid predominantly alloyed core wire with a concentrically extruded flux coating. Easy to use electrode with a porosity free weld deposit. A superior electrode for welding nickel alloys similar to Incoloy 800, 825 and Incoloy DS, and for joining these to stainless and creep resisting CrMo steels.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	650 N/mm ²
0.2% Proof Stress	400 N/mm ²
Elongation	38%
Reduction of Area	38%
Impact Energy -196°C	100 J

CHEMICAL COMPOSITION									
C	Si	Mn	P	S	Cr	Fe	Ni	Nb	Cu
0.05	0.50	2.90	0.01	0.01	16.30	7.80	Balance	2.40	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
60-80	70-110	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC NICRO E202

AWS A5.11: ENiCrFe-2

Manual metal arc welding electrode using a solid predominantly alloyed core wire with a concentrically extruded flux coating. A superior electrode for welding nickel alloys similar to Incoloy 800, Incoloy DS, Brightray and similar to stainless steels and CrMo creep steels. For welding 3% - 5% and 9% nickel steels for semi and full cryogenic applications and for welding high temperature cast alloys such as HK40.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	710 N/mm ²
0.2% Proof Stress	430 N/mm ²
Elongation	44%
Reduction of Area	50%
Impact Energy -196°C	110 J
Hardness	210 HV

CHEMICAL COMPOSITION									
C	Mn	Fe	Si	Ni	Cr	Nb	Mo	P	S
0.01	2.30	4.00	0.30	Balance	14.40	1.70	1.10	0.01	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
50-70	70-110	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E203

AWS A5.11: ENiCrFe-3

Superior electrode for joining and overlaying almost any nickel chrome alloy for service in both cryogenic and high temperature conditions, with the emphasis on the cryogenic side. For welding Inconel 600 and 601 type alloys, Incoloy 800 and 800H, involved in temperatures up to 540°C and for dissimilar applications such as Incoloy 600 and 800HT to carbon or stainless steels; nickel 200 or monel 400 and nimonic 75. Also suitable for welding 3%, 5% nickel semi cryogenic steels and 9% nickel steels for full cryogenic conditions: Used extensively in the nuclear, chemical and petrochemical industries.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	660 N/mm ²
0.2% Proof Stress	390 N/mm ²
Elongation	40%
Reduction of Area	38%
Impact Energy -196°C	100 J
Hardness	190 HV

CHEMICAL COMPOSITION								
C	Si	Mn	P	S	Cr	Fe	Ni	Nb
0.05	0.50	9.30	0.01	0.01	16.30	7.80	Balance	1.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.



MAC NICRO E203 MOD

AWS A5.11: ENiCrFe-3 (mod)

Basic electrode for high-grade welding of nickel-base alloys, high-temperature and creep resisting steels, heat resisting and cryogenic materials, low-alloyed problem steels and dissimilar joints. Ferritic-austenitic joints for service temperatures above +300 °C or for applications where a post weld heat treatment is required. Suitable in pressure vessel fabrication for -196 °C to +650 °C, otherwise up to the scaling resistance temperature of +1200 °C (S-free atmosphere). Insusceptible to embrittlement, highly resistant to hot cracking, furthermore, C-diffusion at high temperature or during heat treatment of dissimilar joints is largely reduced. Thermal shock resistant, stainless, fully austenitic, low coefficient of thermal expansion between the coefficient values of C-steel and austenitic CrNi (Mo)-steel. Excellent welding characteristics in all positions except vertical-down, easy slag removal, high resistance to porosity, absence of undercuts, high degree of purity. Electrode and weld metal meet highest quality requirements.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	680 N/mm ²
0.2% Proof Stress	420 N/mm ²
Elongation	40%
Impact Energy -196°C	80 J

CHEMICAL COMPOSITION

C	Si	Mn	Mo	Co	Cr	Fe	Ni	Nb
0.025	0.40	5.00	1.50	<0.08	19.00	3.00	Balance	2.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
40-70	70-110	90-125	120-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E203B

AWS A5.11: ENiCrFe-3 (Basic)

Designed on a highly alloyed core wire with a high purity chemically basic flux to facilitate all positional welding including on site applications. A versatile electrode with superior welding characteristics for welding almost any nickel chrome alloy for service in both cryogenic and high temperature conditions, with the emphasis on the cryogenic side. For joining and overlaying Inconel 600 and 601 type alloys, Incoloy 800 and 800H, involved in temperature up to 540°C and for dissimilar applications such as Incoloy 600 and 800H to carbon or stainless steels, nickel 200 or monel 400 and nimonic 75. Also suitable for welding 3%, 5% nickel semi cryogenic steels and 9% nickel steels for full cryogenic conditions. Used extensively in the nuclear, chemical and petrochemical industries.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	660 N/mm ²
0.2% Proof Stress	390 N/mm ²
Elongation	40%
Reduction of Area	38%
Impact Energy -196°C	80 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Fe	Ni	Nb	Ti
0.02	0.60	7.50	0.01	0.011	15.00	7.00	Balance	1.50	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	70-110	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.



MAC NICRO E204

AWS A5.11: ENiCrFe-7

Nickel base MMA electrode designed for welding matching base materials, and for surfacing CMn and low alloy steels. Special basic flux coating on a nickel alloy core wire optimised for DC+ welding in all positions including pipework in the ASME 5G/6G positions. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	660 N/mm ²
0.2% Proof Stress	430 N/mm ²
Elongation	40%
Reduction of Area	45%
Impact Energy -50°C	>50 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Fe	Ni	Nb	Mo
0.04	0.30	3.60	0.007	0.005	29.00	8.50	Balance	1.60	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	70-110	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC NICRO E206

AWS A5.15: ENiCu-B

Nickel copper alloy electrode depositing a monel weld metal for welding of cast irons. The weld metal bonds easily and strongly with the cast iron. Ideal for repairing defects in foundry cast iron castings, repairing of cracks, broken parts of cast iron, etc.

CURRENT :

DC (+) or AC (OCV:70V min).

MECHANICAL PROPERTIES	
Tensile Strength	275 N/mm ²
Elongation	8%

CHEMICAL COMPOSITION					
C	Si	Mn	Ni	Fe	Cu
0.04	0.60	1.00	64.00	3.50	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
55-85	75-115	95-155

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **180°C** before use.

MAC NICRO E207

AWS A5.11: ENiCu-7

Manufactured using a high purity nickel based copper alloyed core wire with a chemically basic flux coating, containing extra deoxidants to eliminate from the weld metal gases such as nitrogen. Designed to be used with conventional welding techniques, the strong arc encourages full penetration while the basic slag and deoxidisation system ensures the metallurgical integrity of the deposited weld metal. For welding wrought and cast alloys of similar composition. Proprietary alloys include:- Inco, Monel 400, Monel R405, VDM NICORROS & NICORROS 5. Used to special advantage on site fabrication work when joint geometry and/or weather conditions make the use of inert gas welding processes impractical.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	510 N/mm ²
0.2% Proof Stress	300 N/mm ²
Elongation	40%
Reduction of Area	40%
Impact Energy -30°C	110 J
Hardness	170 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Ni	Cu	Fe	Al	Ti
0.08	3.50	1.10	0.005	0.01	Balance	29.50	0.90	0.03	0.09

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	70-120	90-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC Nicro E210

AWS A5.11: ENiCrFe-15

These electrodes have a higher chromium content which improves resistance to stress-corrosion cracking in the nuclear, pure water environment. They provide excellent operability for groove and fillet welding in the downhand position and the smaller diameter electrodes are also suitable for all position welding.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	660 N/mm ²
0.2% Proof Stress	390 N/mm ²
Elongation	40%
Reduction of Area	38%
Impact Energy -196°C	100 J
Hardness	190 HV

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Fe	Ni	Nb
0.03	0.30	2.50	0.01	0.005	26.80	2.60	Balance	2.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use

MAC NICRO E211

AWS A5.11: ENiCrMo-1

Manual metal arc welding electrode using a solid predominantly alloyed core wire with a concentrically extruded flux coating. Easy to strike electrode with a porosity free weld deposit. A nickel chrome molybdenum electrode for the welding of alloys similar to Hastalloy B type and for joining and overlaying where severe corrosion is encountered, such as valve seats in the chemical industry.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	800 N/mm ²
0.2% Proof Stress	580 N/mm ²
Elongation	30%

CHEMICAL COMPOSITION

C	Mn	Fe	P	S	Si	Ni	Cr	Mo	Cu
0.04	1.20	15.90	<0.01	0.007	0.80	Balance	21.00	6.70	1.60

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	120-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC Nicro E212

AWS A5.11: ENiCrMo-2

A versatile electrode with superior welding characteristics for joining and overlaying a whole range of nickel chrome alloys where cryogenic and high temperature conditions are involved; with the emphasis on the high temperature side. Exhibits excellent strength at temperatures up to 1100°C. Specifically for the welding of Inconel 601 and 625, Incoloy 800, 801 and 825. Can also be used for welding low alloy ferritic steels such as 3% and 9% nickel steels (for cryogenic applications) super austenitics, and for transitional welds between any of the aforementioned alloys. Can be used in almost any combination where alloys are chosen for their ability to withstand very severe mechanical stress, oxidation corrosion, and extreme operating temperatures.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	680 N/mm ²
Elongation	25%

CHEMICAL COMPOSITION

C	Mn	Fe	P	S	Si	Ni	Cr	Mo	Cu	Co	W
0.10	0.60	19.00	0.02	0.015	0.50	Balance	22.00	9.10	0.10	0.90	0.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	120-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC NICRO E213

AWS A5.11: ENiCrMo-3

A versatile electrode with superior welding characteristics for joining and overlaying a whole range of nickel chrome alloys where cryogenic and high temperature conditions are involved; with the emphasis on the high temperature side. Exhibits excellent strength at temperatures up to 1100°C. Specifically for the welding of Inconel 601 and 625, Incoloy 800, 801 and 825. Can also be used for welding low alloy ferritic steels such as 3% and 9% nickel steels (for cryogenic applications) super austenitics, and for transitional welds between any of the aforementioned alloys. Can be used in almost any combination where alloys are chosen for their ability to withstand very severe mechanical stress, oxidation corrosion, and extreme operating temperatures.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	810 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	30%
Impact Energy -196°C	> 28 J

CHEMICAL COMPOSITION

C	Mn	Fe	P	S	Si	Ni	Cr	Nb	Mo	Cu
0.05	0.70	1.70	0.009	0.005	0.50	Balance	21.00	3.60	9.00	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	120-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC NICRO E213B

AWS A5.11: ENiCrMo-3 (Basic)

Manufactured on a predominantly alloyed core wire with a unique lime/rutile extruded flux coating designed to impart excellent weldability for this type of complex alloy in all positional welding situations. Designed for welding nickel alloys such as Inconel 601 and Inconel 800 and 801. It is also suitable for super austenitics with high molybdenum levels such as Avesta 904L and 254 S Mo. Also suited for welding 9% nickel steels subject to cryogenic services. May also be used for welds between nickel chrome molybdenum steels.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	810 N/mm ²
0.2% Proof Stress	440 N/mm ²
Elongation	41%
Impact Energy -196°C	80 J

CHEMICAL COMPOSITION										
C	Mn	Fe	P	S	Si	Ni	Cr	Nb	Mo	Cu
0.04	0.60	1.50	0.003	0.01	0.50	Balance	21.00	3.40	9.00	0.09

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.



MAC NICRO E214

AWS A5.11: ENiCrMo-4

Manual metal arc welding electrode using a solid predominantly alloyed core wire with a concentrically extruded flux coating. Easy strike electrode with a porosity free weld deposit. A superior electrode with exceptional welding characteristics for joining and overlaying heat and corrosion resistant wrought and cast nickel chrome alloys such as Hastelloy C276 and Hastelloy C where a low carbon content, coupled with improved alloying in the weld is required.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	740 N/mm ²
0.2% Proof Stress	550 N/mm ²
Elongation	30%
Impact Energy -196°C	55 J

CHEMICAL COMPOSITION

C	Mn	Fe	P	S	Si	Cu	Ni	Cr	Mo	W
0.02	0.30	5.50	<0.01	0.006	0.20	0.01	Balance	16.00	15.50	3.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC NICRO E215

AWS A5.11: ENiCrMo-5

Highly alloyed versatile nickel based electrode specially formulated to withstand elevated temperatures coupled with resistance to corrosion and thermal shock. Smooth arc, low spatter loss and good slag detachability. The weld metal possesses excellent resistance to corrosion. Work hardens under impact and is fully machinable. For welding Hastalloy C, and due to excellent heat resistance and ability to work harden under impact, the electrodes are recommended for use in the drop forging industry for protection of dies. Widely used in the chemical industry where high resistance to corrosion is required, particularly for applications involving wet chlorine gas and other strongly oxidising media. The electrode also finds wide usage in the fabrication of furnace and heat treatment equipment.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	750 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	17%

CHEMICAL COMPOSITION

C	Mn	Fe	Si	Ni	Cr	Mo	W	P	S	Cu
0.05	0.90	5.50	0.50	Balance	15.50	16.40	3.50	0.01	0.008	0.03

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC Nicro E215HR

AWS A5.11: ENiCrMo-5 (Special)

Manual metal arc welding electrode manufactured on a pure nickel core wire with a concentrically extruded flux with a chemically semi basic coating, containing both alloying elements and deoxidants. Metal recovery is 160% with respect to its core wire. For welding Hastelloy C, due to excellent heat resistance and the ability to work harden under impact, the electrode is recommended for use in the drop forging industry for protection of dies. Widely used in the chemical industry where high resistance to corrosion is required, particularly for applications involving wet chlorine gas and other strongly oxidising media. The electrode also finds wide usage in the fabrication of furnace and heat treatment equipment. Suitable for welding such materials as Hastelloy C and ASTM B3341 and B366 UNS No. 10002. Also suitable for welding NiCrMo alloys to stainless. Welding the clad side (NiCrMo). Clad steels to both austenitic and ferritic materials. Ideal for build-ups.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	720 N/mm ²
0.2% Proof Stress	490 N/mm ²

CHEMICAL COMPOSITION

C	Mn	Fe	Si	Ni	Cr	Mo	W	P	S	Co
0.04	0.60	5.00	0.50	Balance	15.50	16.00	4.00	0.015	0.01	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC Nicro E217

AWS A5.11: ENiCrMo-7

MMA electrode manufactured on a pure nickel core wire with a chemically neutral, alloy bearing, high purity, concentrically extruded flux coating. Metal recovery is 140% with respect to the size of the core wire. Designed for welding Ni Cr Mo base materials such as ASTM B574, B575 and UNS N06455 to itself as well as steel and related cladding operations.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	500 N/mm ²
0.2% Proof Stress	310 N/mm ²
Elongation	43%

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Ti	Fe	Co	Mo
0.01	0.10	0.90	0.01	0.001	16.40	Balance	0.20	0.50	0.70	14.70

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-110	100-150	130-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC Nicro E218

AWS A5.4: E385-16

Extruded flux coated MMA electrode manufactured on a high purity nickel, chromium core wire. Mac Nicro E218 is designed to weld a number of proprietary alloys of the 20Cr, 25Ni, 4.5Mo, Cu types which provide excellent resistance to corrosion by both organic and inorganic acids excluding attack by concentrated nitric acid. Such steels normally used in the form of plate, pipe and tubing include Uddelholm 904L, Sandvik 2RK65, Avesta 254SLX, Uranus B6 and B6M and APV Paralloy 5NLC. Mac Nicro E218 is also suited for welding copper free versions of these steels. Most of these steels are used in the manufacture of plant manufacturing fertilisers and resistance to crevice corrosion and chloride initiated stress corrosion cracking.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	630 N/mm ²
0.2% Proof Stress	410 N/mm ²
Elongation	40%
Reduction of Area	50%
Impact Energy -196°C	50 J

CHEMICAL COMPOSITION

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	N
0.03	2.00	0.018	0.02	0.35	25.00	21.00	4.50	1.80	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	70-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC NICRO E220Nb

AWS A5.11: ENiCr-4

Manufactured using a nickel based, chrome alloyed, iron free core wire. The alloy design necessitates the use of a chemically basic flux with a high coating ratio. The electrode is best suited to downhand and HV welding, while the smaller diameter may be used positionally. Easy to strike electrode producing porosity free deposit and good slag detachability. Suitable for welding materials; INCO IN-657, IN-671, IN-560. ASTM A560 Grade 50Cr-50Ni-Cb. PARALLOY N50W. DURALOY 50/50Cb. DIN 2.4678, 2.4680, 2.4813.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	930 N/mm ²
0.2% Proof Stress	680 N/mm ²
Hardness	340 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Nb	Fe	Cu
0.08	1.10	0.50	0.005	0.007	50.00	Balance	1.70	0.60	0.03

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E221

AWS A5.11: ENiCrCoMo-1

High purity nickel chromium core wire, with extruded fully basic flux with low hydrogen levels. Designed for welding nickel, chromium, cobalt, molybdenum based materials that are covered by the UNS No. 617 material code. The weld composition ensures optimum strength and resistance to oxidation between 815°C - 1200°C.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	780 N/mm ²
0.2% Proof Stress	510 N/mm ²
Elongation	43%
Reduction of Area	40%
Impact Energy +20°C	70 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Ni	Cr	Co	Mo	Fe	Cu
0.08	0.60	0.40	0.004	<0.01	Balance	23.00	12.90	8.70	1.80	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	70-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E222Mn

25.35Mn Type

Extruded flux coated MMA electrode manufactured on a nearly matching core wire. The chemically basic flux, with a moisture resistant coating, gives a sound porosity free deposit with a recovery rate of approximately 120% with respect to the core wire. The electrode is designed to match the composition of Paralloy CR39W and Lloyds Termalloy T57 and the deposited weld metal will be free from any micro-cracking. This alloy was developed from 800 type alloys with increased chromium and nickel contents and exhibits improved carburisation and oxidation resistance. It is used at temperatures up to 1100°C and is resistant to severe thermal shock and fatigue. Welding applications include centrifugal cast pyrolysis coils, reformer tubes, return bends and tees for the petrochemical industry.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	750 N/mm ²
0.2% Proof Stress	560 N/mm ²
Elongation	15%
Reduction of Area	15%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Nb	Cu
0.08	3.40	0.30	0.010	0.01	26.00	Balance	0.40	1.00	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E222Nb

25.35Nb Type

MMA electrode with a basic-rutile flux covering on a high alloy core wire. Moisture resistant coating giving sound, porosity-free deposits. Sizes above 3.2mm are not recommended for positional welding. Recovery MMA electrode with basic flux coating made on nearly matching core wire. The electrode is optimised for DC+ welding in all positions including fixed pipework in ASME 5G/6G positions. Moisture resistant coating giving sound porosity-free deposits. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	660 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	34%
Reduction of Area	42%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Nb	Cu
0.12	3.50	0.50	0.01	0.01	26.00	Balance	0.20	0.80	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	75-120	100-155

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC Nicro E224Mn

21.33Mn Type

Extruded flux coated MMA electrode manufactured on a closely matching core wire. The chemically basic flux ensures the metallurgical integrity of the fully austenitic weld metal and low residuals of non-metallic impurities. It may be used to weld similarly alloyed base materials such as Inconel 800 and 800H where the higher than normal manganese in the weld will significantly reduce the incidence of solidification cracking on heavily restrained weldments. Proprietary alloys that may be welded include Lloyds T52, Firth Vickers Vicro 8 and Paralloy Cr32W.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	620 N/mm ²
0.2% Proof Stress	410 N/mm ²
Elongation	35%

CHEMICAL COMPOSITION

C	Mn	Si	Ni	Fe	Cr	Nb
0.14	4.50	0.50	33.00	Balance	21.00	1.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E224Nb

21.33Nb Type

Manufactured on a predominantly alloyed core wire with a concentrically extruded chemically basic flux coating. Mainly used for welding muffles and radiant tubes, heat treatment trays and baskets, reformer furnace outlet manifolds, ethylene plant transfer lines and many aspects of the nuclear engineering industry. The electrode provides resistance to corrosion, thermal fatigues and shock at temperatures up to 1000°C. This electrode has been designed to match the composition and properties of type 800 alloys in the wrought and cast form.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	600 N/mm ²
0.2% Proof Stress	390 N/mm ²
Elongation	38%

CHEMICAL COMPOSITION

C	Mn	Si	P	S	Ni	Mo	Cr	Nb	Cu
0.10	2.50	0.30	0.015	0.007	32.00	0.40	21.00	1.30	0.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E225Nb

35.45Nb Type

Extruded flux coated MMA electrode manufactured on a nickel, chromium alloyed core wire. The chemically basic, medium alloyed flux coating provides a metal recovery of some 137% with respect to the core wire but still permits positional welding characteristics. The electrode is designed to weld cast alloys such as Paralloy H46M, Lloyds T75 MA, T80 and ET 45. The design emphasis of these materials and the matching electrode is to ensure optimum resistance to carbonisation and oxidation and temperature up to 1150°C typical hardness HV 260/280.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	740 N/mm ²
0.2% Proof Stress	560 N/mm ²
Elongation	6%
Hardness	270 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Nb	Mo	Ti
0.45	0.90	1.20	0.005	<0.01	36.00	Balance	0.90	0.10	0.06

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E225W

MMA electrode with a basic rutile flux covering on a high purity alloy core wire. Moisture resistance coating giving sound, porosity free deposits. Sizes above 3.2mm are not recommended for positional welding. Optimised for DC+ welding in all positions including fixed pipework in ASME 5G/6G positions. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	840 N/mm ²
0.2% Proof Stress	610 N/mm ²
Elongation	8%
Hardness	265 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Co	W	Mo	Fe
0.50	0.60	0.50	0.008	0.01	25.00	35.00	14.00	4.60	0.05	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC Nicro E227

AWS A5.4: E320LR-16

Mac Nicro E227 is designed to weld both cast and wrought alloys such as carpenter 20Cb-3 and similar materials with increased nickel levels, this higher nickel level improves resistance to stress corrosion cracking in chloride environments and reduces corrosion rates in the presence of sulphuric acids. Mac Nicro E227 may also be used to weld leaner nickel alloys of the 20.29.3 Cu Nb classification. The risk of weld metal micro fissuring is eliminated by a relatively low silicon level and a high manganese to silicon ratio plus low sulphur and phosphorus levels.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	530 N/mm ²
0.2% Proof Stress	345 N/mm ²
Elongation	36%
Reduction of Area	37%
Impact Energy -20°C	117 J

CHEMICAL COMPOSITION									
C	Si	Mn	P	S	Cr	Cu	Ni	Mo	Nb
0.02	0.25	2.10	0.010	0.005	20.00	3.50	33.50	2.50	0.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
60-90	70-110	90-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC NICRO E228

Extruded flux coated manual metal arc electrode that produces a precipitation hardening nickel based alloy with controlled levels of chromium, molybdenum, niobium and iron. Materials to be welded are similarly alloyed based materials where high resistance to oxidation is needed combined with good creep strength e.g. SAE-AMS 5589 5590 5596 5597 5662 5663 5664.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Hardness (as deposited)	220 - 240 HV
Hardness (post age hardening)	390 - 420 HV

CHEMICAL COMPOSITION

C	Mn	P	S	Fe	Ni	Cr	Mo	Cu	Nb	Ti + Al
0.05	0.50	0.007	0.008	11.00	Balance	18.10	2.80	0.03	5.40	0.40

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	100-150	140-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC Nicro E230

AWS A5.4: E383-16

Extruded flux coated MMA electrode, manufactured on a high purity NiCr core wire. Mac Nicro E230 is designed to weld austenitic stainless steels which are prone to hot cracking. Good resistance to corrosion. For overlay and joining to both stabilised and non-stabilised austenitic steels containing copper and molybdenum.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	550 N/mm ²
0.2% Proof Stress	360 N/mm ²
Elongation	30%
Impact Energy +20°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	P	S	Ni	Cr	Mo	Cu
0.03	1.70	0.80	0.01	0.01	36.20	28.40	4.10	1.40

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-80	70-110	100-140

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC NICRO E231

Manual metal arc electrode with a modified low siliceous – medium lime rutile flux coating manufactured on a low carbon fully austenitic core wire which is slightly over alloyed with respect to chrome and nickel. Molybdenum, copper, nitrogen and niobium are added via the flux coating. The E 20.18.6.Cu LR (high recovery) variant is made in 4.00mm only with a modified coating factor to achieve increased deposition rates, close to that achievable with a 5.00mm electrode. The electrode is designed for welding those materials which display resistance to corrosion against sulphuric, phosphoric and other inorganic and organic acids, such fully austenitic stainless steels normally contain molybdenum and copper additions.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	630 N/mm ²
0.2% Proof Stress	450 N/mm ²
Elongation	37%
Reduction of Area	35%

CHEMICAL COMPOSITION

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Nb	N
0.02	0.90	0.02	0.02	0.40	20.00	23.00	6.20	0.60	0.30	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	70-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC Nicro E233

AWS A5.11: ENiCrMo-10

Basic flux covered electrode with exceptional operability optimised for DC+ welding in all positions including fixed pipework qualified in the ASME 5G/6G positions. It is equally suitable for general fabrication welds. Special basic flux covering on matching high purity nickel alloy core wire to give clean and homogenous weld metal. Very low levels of carbon and silicon minimise the occurrence of deleterious precipitates in the as-welded condition.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	760 N/mm ²
0.2% Proof Stress	510 N/mm ²
Elongation	36%
Impact Energy -196°C	45 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	W	V	Fe
0.01	0.50	0.20	0.008	0.008	21.00	Balance	14.00	3.00	0.05	4.00

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-80	70-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC NICRO E233H

Key Features:

- Designed to match similar high carbon cast alloys.
- High amount of carbon to provide excellent hot strength and oxidation resistance at 950 – 1250°C.
- High amount of nickel gives the alloy superior resistance to carbonisation and sulphuration.

Some applications of usage are furnace parts, calcining muffles, hot abrasion and pyrolysis coils.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	780 N/mm ²
0.2% Proof Stress	590 N/mm ²
Elongation	6%
Hardness (HV)	270

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Fe	W
0.05	1.00	0.70	0.006	0.01	28.00	51.00	Balance	5.00

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-80	70-110	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E234

AWS A5.11: ENiCrMo-13

MMA electrode with special basic flux covering a high purity NiCrMo core wire to give clean weld metal. Very low levels of carbon and silicon minimise the occurrence of deleterious precipitates in the as-welded condition. The special flux coating provides exceptional operability, optimised for DC+ welding in all positions including fixed pipework in the ASME 5G/6G positions. The electrode is qually suitable for general fabrication welds.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	750 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	32%
Impact Energy -50°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Fe
0.01	0.50	0.20	0.006	0.01	23.00	Balance	15.50	0.01	1.00

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-80	70-110	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E235

AWS A5.11: ENiCrMo-14

It is designed to match the nickel base alloy known as alloy 686. It is also used for surfacing of steels. The weld metal has exceptional resistance to pitting, crevice and general corrosion. It is also suitable to overmatch 625, C276, C4, C22 and 59 alloys. This alloy also provides a tough Nb-free weld metal for dissimilar welds in superaustenitic and super duplex stainless steel or combinations of these with Ni base alloys.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	760 N/mm ²
Elongation	35%
Hardness	95 HRB

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	W	Fe
0.01	0.10	0.20	0.011	0.004	21.70	Balance	16.30	3.90	<0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-80	70-110	100-150

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC NICRO E23718

AWS A5.4: E330-16

Fully austenitic heat resisting electrode with a rutile coating made on a high alloy core wire designed to weld 18/37 type alloys. Smooth stable arc, low spatter loss, easy releasing slag and smooth porosity free welds. The electrode is designed to match 18/37 type alloy fully austenitic high alloy resisting steels, which will retain a good mechanical strength up to temperatures of 1050°C to 1100°C. Ideal for use in the heat treatment industries and high temperature process plants such as furnace roller, furnace fittings and headers, heat treatment trays and containers, moulds, hearth plates, retorts and radiant tubes.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	760 N/mm ²
0.2% Proof Stress	510 N/mm ²
Elongation	12%
Reduction of Area	15%

CHEMICAL COMPOSITION

C	Mn	P	S	Si	Ni	Cr	Mo	Cu
0.23	1.50	0.020	0.015	0.40	36.00	16.50	0.40	0.11

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-95	80-120	110-160

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.



Contents

140	MAC TRODE E64W
141	MAC TRODE E66
142	MAC TRODE E66S
143	MAC TRODE E66V
144	MAC TRODE E606
145	MAC TRODE E616
146	MAC TRODE E630
147	MAC TRODE E630S
148	MAC TRODE E631
149	MAC TRODE E6130
150	MAC TRODE E6410 (-15)
151	MAC TRODE E6410 (-16)
152	MAC TRODE E6410HR
153	MAC TRODE E6410NM
154	MAC TRODE E6412
155	MAC TRODE E6430
156	MAC TRODE E6502
157	MAC TRODE E6505
158	MAC TRODE E6509W
159	MAC TRODE E6630

MAC TRODE E64W

AWS A5.4: E 309W (Special)

High quality austenitic stainless steel rutile coated electrode, depositing 23% Cr, 12% Ni, 2% W weld metal to resist corrosion, heat and friction. Tungsten in the weld metal produces high strength, scale and general wear resistance at temperatures up to 1100°C. For joining and overlaying various steels especially heat resistant steels, HR Crown 1 type – primarily furnace applications and particularly suitable for repairs to mandrels used in hot forming of tubular components.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	605 N/mm ²
0.2% Proof Stress	465 N/mm ²
Elongation	35%
Impact Energy +20°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo
0.06	4.00	0.80	0.016	0.02	19.00	10.30	0.60

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
50-80	70-120	100-150	130-200	150-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC TRODE E66

AWS A5.4: E312-17

Superior specially designed high strength austenitic type electrode of duplex structure. Can be used for overlaying and joining dissimilar steels to one another, high and low carbon steels, spring steels, tool and die steels, cast steels, ferritic to austenitic steels and steels of unknown composition. High resistance to cracking coupled with good wear, heat, impact and corrosion resistance. Therefore this electrode has uses in practically every type of industry resulting in one of the most universally used electrodes for problem and unknown steels.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	830 N/mm ²
0.2% Proof Stress	700 N/mm ²
Elongation	26%
Hardness	280 HV

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.10	0.9	0.9	0.021	0.008	29.6	9.3	0.64	0.02

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-35	30-45	60-90	75-120	100-150	130-210	160-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **200°C** before use.

MAC TRODE E66S

AWS A5.4: E312-26

High strength rutile coated synthetic electrode for joining and overlaying dissimilar steels. Economical high recovery electrode produces a 29/9 type stainless steel weld deposit. Positive smooth arc, easy slag removal and builds up rapidly. Can be used in all positions. Ideal for buttering layers or overlaying steels to combat heat, friction and impact, where economy is of the utmost importance. Covers large areas quickly. Will join stainless to carbon steels and steels of unknown quantity.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	605 N/mm ²
0.2% Proof Stress	465 N/mm ²
Elongation	35%
Impact Energy +20°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo
0.06	4.00	0.80	0.016	0.02	19.00	10.30	0.60

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
50-80	70-120	100-150	130-200	150-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC TRODE E66V

AWS A5.4: E312-17 (Mod)

Superior high strength austenitic type electrode of duplex structure for joining and overlaying all steels. This variation of Mac Trode E66 is designed specifically to overcome difficult deslagging problems on high manganese tool steels and for inclined vertical down welding and root runs on certain thick sections. Has high resistance to cracking. Wear, heat, impact and corrosion resistant. Used for overlaying and joining dissimilar steels to one another, high and low carbon steels, spring steels, tool and die steels, cast steels, ferritic to austenitic steels and steels of unknown composition.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	605 N/mm ²
0.2% Proof Stress	465 N/mm ²
Elongation	35%
Impact Energy +20°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo
0.06	4.00	0.80	0.016	0.02	19.00	10.30	0.60

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
50-80	70-120	100-150	130-200	150-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC TRODE E606

AWS A5.4: E312-17

Specially designed high strength austenitic type electrode of duplex structure. All purpose low amperage electrode. Easy to use with smooth arc, low spatter and even bead formulation. Can be used for overlaying and joining dissimilar steels to one another, high and low carbon steels, spring steels, tool and die steels, cast steels, and steels of unknown composition. High resistance to cracking coupled with good wear, heat, impact and corrosion resistance.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	830 N/mm ²
0.2% Proof Stress	700 N/mm ²
Elongation	26%
Hardness	280 HV

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.10	0.70	0.90	0.03	0.009	29.70	9.10	0.60	0.02

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-35	30-45	60-90	75-120	100-150	130-210	160-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **200°C** before use.

MAC TRODE E616

AWS A5.4: E312-17

Superior specially designed high strength austenitic type electrode of duplex structure. All purpose low amperage electrode. Easy to use with smooth arc, low spatter and even bead formation. Can be used for overlaying and joining dissimilar steels to one another, high and low carbon steels, spring steels, tool and die steels, cast steels, ferritic to austenitic steels and steels of unknown composition. High resistance to cracking coupled with good wear, heat, impact and corrosion resistance. Therefore this electrode has uses in practically every type of industry resulting in one of the most universally used electrodes for problem and unknown steels.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	830 N/mm ²
0.2% Proof Stress	700 N/mm ²
Elongation	26%
Hardness	280 HV

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.10	0.90	0.90	0.021	0.008	29.60	9.30	0.64	0.02

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-35	30-45	60-90	75-120	100-150	130-210	160-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **200°C** before use.



MAC TRODE E630

AWS A5.4: E307-17

Tough high strength, fully austenitic electrode, designed to resist heat and impact. Fully machinable. Weld deposit will work harden under impact and retain properties at high temperatures. Easy to use in all positions producing sound welds, good build-up characteristics and good slag detachability. For joining or overlaying mild and alloy steels, spring steels, heat resisting steels, ideal for the repair of drop forging dies. Suitable for use as a buffer layer prior to hard surfacing of manganese steel, and may be used for welding manganese steel rails or similar applications involving friction, impact or corrosion.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	605 N/mm ²
0.2% Proof Stress	465 N/mm ²
Elongation	35%
Impact Energy +20°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.06	4.00	0.80	0.016	0.02	19.00	10.30	0.60	0.02

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
50-80	70-120	100-150	130-200	150-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC TRODE E630S

AWS A5.4: E307-26

Tough high strength, synthetic austenitic electrode designed to resist heat and impact. Fully machinable, with a recovery rate of 150% with respect to core wire. Easy to use in all positions producing sound welds, good build-up characteristics and good slag detachability. Weld deposit will work harden under impact and retain properties at high temperatures. For joining and overlaying mild and alloy steels, spring steels and heat resisting steels. Suitable for use as a buffer layer prior to hard surfacing of manganese steel and may be used for welding manganese steel rails or similar applications involving friction, impact or corrosion.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	640 N/mm ²
0.2% Proof Stress	450 N/mm ²
Elongation	40%
Impact Energy +20°C	85 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.10	3.80	0.55	0.016	0.021	20.00	9.80	0.90	0.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
60-100	80-140	120-170	150-240	170-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC TRODE E631

This electrode has a basic lime rutile flux coating and is alloyed to deposit a martensitic precipitation hardening Cr-Ni-Mo-Cu weld metal. Excellent weldability combined with good slag detachability. The smaller diameters, e.g. 2.50 & 3.25 can be used in all positions. Designed to weld Firth Vickers 520 an alloy 450 (USA). The corrosion resistance of the weld is similar to 304 stainless but its yield strength is 3 times greater. The weld is slightly under alloyed compared to FV 520 to compensate for the faster cooling rates of the weld metal to castings but responds in an identical manner to PWHT as FV 520.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES		
	AGED	OVER AGED
Tensile Strength	1230 N/mm ²	980 N/mm ²
0.2% Proof Stress	1110 N/mm ²	890 N/mm ²
Elongation	-	16%
Reduction of Area	30%	37%
Hardness	420 HV	345 HV

CHEMICAL COMPOSITION									
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb
0.03	0.70	0.30	0.01	0.015	14.20	5.10	1.50	1.60	0.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
50-80	70-120	100-150	130-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E6130

High recovery rutile type electrode for welding, surfacing and building up manganese steel components. Weld deposits have excellent impact resistance and rapid work hardening properties. For applications where a hard surface, resistant to wear under heavy impact and battering is required. For weld reclamation of crushers, railway frogs and crossings and for reclamation of defective manganese steel castings. For welding manganese steels to each other or to mild and low alloy steels. Cool between runs on thick sections to prevent surface fissuring.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES		
	As welded	Work Hardened
Rockwell:	22-24 HRC	48-50 HRC

CHEMICAL COMPOSITION								
C	Mn	Si	Cr	Mo	Ni	V	Ti	Fe
0.80	13.00	0.60	0.20	1.00	<1.00	<1.00	<1.00	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS				
2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
60-90	80-140	100-180	140-240	180-280

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC TRODE E6410 (-15)

AWS A5.4: E410-15

Chemically basic coated low hydrogen electrode manufactured on a high purity mild steel core wire. Easy to strike electrode with good slag control, which produces porosity free weld deposits. Recommended for welding cast 410 martensitic stainless steel.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	660 N/mm ²
0.2% Proof Stress	470 N/mm ²
Elongation	26%
Reduction of Area	68%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.04	0.70	0.30	0.01	0.021	13.00	0.50	0.30	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-100	80-140	120-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E6410 (-16)

AWS A5.4: E410-16

High quality low hydrogen type electrode specially designed for welding 12% Cr martensitic steel which air hardens to produce high strength. (For increased toughness use E6410NM). Easy to strike and restrike, smooth flowing electrode with low spatter and excellent slag detachability. Welds are of a smooth flat appearance. For joining and the repair of wrought and cast steels subject to corrosion and oxidation. If post weld heat treatment is not possible then an austenitic type stainless steel electrode should be used.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	610 N/mm ²
0.2% Proof Stress	455 N/mm ²
Elongation	36%

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.06	0.30	0.70	<0.01	<0.01	12.50	<0.01	0.20	0.07

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
70-110	90-140	120-180

Storage:

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **350°C** before use.

MAC TRODE E6410HR

AWS A5.4: E410-26

Basic flux coated low hydrogen electrode made on a mild steel core wire with iron powder and alloying elements added to the flux to provide a martensitic weld metal containing a normal 12% Cr with smaller levels of Ni and Mo. Mac Trode E6410-25 electrodes are designed for welding 410 (12Cr) martensitic stainless steels such as ASTM 410, 403, cast A487 grade CA15 BS410 S21 (EN56A) 410C21 and 403 C21. Such materials and weld metal are heat resistant up to 580°C and display reasonable creep resistance up to 550°C. Metal recovery is some 120% with respect to the core wire and 3.25mm electrodes may be used for positional welding.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	520 N/mm ²
0.2% Proof Stress	270 N/mm ²
Elongation	36%
Reduction of Area	52%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.06	0.50	0.30	0.01	0.015	11.50	0.42	0.20	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-100	80-140	120-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E6410NM

AWS A5.4: E410NiMo-16

High quality superior low hydrogen type electrode for welding high strength martensitic corrosion resistant stainless steel. Has moisture resistant rutile flux coating with a recovery rate of approximately 130%. Easy to strike and restrike, smooth flowing electrode with low spatter and excellent slag detachability. Welds are of a smooth flat appearance. For welding high strength corrosion resistant martensitic stainless and cast steels which have superior sulphide-induced SCC hydro-cavitation properties (when compared with plain 12% Cr steels).

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	610 N/mm ²
0.2% Proof Stress	455 N/mm ²
Elongation	36%
Impact Energy +20°C	45 J

CHEMICAL COMPOSITION								
C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.06	0.30	0.80	0.02	0.03	11.90	4.60	0.64	<0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
70-110	90-140	120-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **250°C** before use.

MAC TRODE E6412

Manufactured using a low carbon, high purity ferritic core wire with a rutile metal powder flux containing chromium as the main alloying element. Both weldability and weld metal appearance are excellent, allowing contact welding with low spatter levels and readily detachable slag. A specially designed electrode for welding wrought alloys such as ASTM A176, A276 and A446, which contain a nominal 25% Cr and possesses similar resistance to oxidation in sulphurous reducing conditions up to 1100°C. The electrode may be used to weld similar alloyed cast materials and applications including, furnace parts, oil burners and flue stack liners.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	560 N/mm ²
0.2% Proof Stress	400 N/mm ²
Elongation	17%

CHEMICAL COMPOSITION

C	Mn	Si	Cr	S	Ni	P	Fe
0.05	0.40	0.60	28.00	0.01	0.10	0.012	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
60-90	80-140	100-180	140-240	180-280

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC TRODE E6430

AWS A5.4: E430-16

MMA type welding electrode manufactured on a pure low carbon core wire with a recovery rate of 130% with respect to the core wire. This electrode has a moisture resistant coating giving very low weld metal hydrogen levels. It has good scaling resistance in air up to 820°C and low corrosion rate in sulphur bearing gases e.g. in H₂/H₂S mixtures some 5 to 10 times better than 12% Cr steels at 300°C-500°C. Mac Trode E6430 is immune to hydrogen attack at high temperatures and will resist stress corrosion cracking in boiling chloride, nitrate and alkali solutions. Used in the cast and wrought form in industries such as chemical, petrochemical and steam generating industries. It is also suitable for welding Cr Si Al steels with up to 18% Cr, used for furnace parts and exhaust ducting.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	520 N/mm ²
0.2% Proof Stress	360 N/mm ²
Elongation	24%
Reduction of Area	50%

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.08	0.30	0.40	0.02	0.01	17.00	0.10	0.05	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	75-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TRODE E6502

AWS A5.5: E8018-B6

Low hydrogen manual metal arc electrode using a silicon free, low nitrogen CMn core wire with a moisture resistant, chemically basic flux with a controlled iron powder addition. All positional electrode with good slag control. Easy to strike electrode which produces porosity free weld deposits. Exhibits good crack resistance and excellent resistance to oxidation at temperatures up to 650°C. For assembly welding of creep resistant steels with 5% Cr, 0.5% Mo and closely related grades. Used for pipe welds in the petrochemical industry.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	620 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	21%
Impact Energy +20°C	90 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb
0.04	0.45	0.50	0.02	0.025	5.00	0.50	0.03	0.02	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-110	90-140	120-170	140-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **TWO HOURS** at **300°C** before use.

MAC TRODE E6505

AWS A5.5: E8015-B8

A low hydrogen manual metal arc electrode using a silicon free, low nitrogen CMn core wire with a moisture resistant chemically basic flux with a controlled iron powder addition. All positional electrode with good slag control. Exhibits good crack resistance. Mac Trode E6505 is designed specifically for welding a range of 9% Cr Mo forged and cast steels, for use in the fabrication and repair of pressure vessels.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	700 N/mm ²
0.2% Proof Stress	610 N/mm ²
Elongation	22%
Reduction of Area	70%
Impact Energy +20°C	90 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Cr	Ni	Mo	V
0.06	0.70	0.50	0.015	0.011	9.10	0.25	1.00	0.03

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-100	80-140	120-170	160-220

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.



MAC TRODE E6509W

A modified 9% chromium molybdenum type known as E911 low hydrogen electrode using a free, low nitrogen, high purity carbon and manganese core wire with a concentrically extruded, moisture resistant chemically basic flux to ensure very low weld metal hydrogen. Easy to strike electrode with good slag control, which produces porosity free weld deposits. The addition of 1% tungsten gives increased creep strength at elevated temperatures over P91 types.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	760 N/mm ²
0.2% Proof Stress	620 N/mm ²
Elongation	19%
Impact Energy +20°C	60 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Ni	Fe	W	Nb
0.10	0.30	0.90	0.01	0.008	9.50	1.00	0.60	Balance	1.00	0.06

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-90	80-120	110-150	140-190

Storage :

If allowed to become damp the electrodes should be re-dried before use.

Redry at **250 - 300°C 1-2 hours** to ensure H₂ <10ml/100g

300 - 350°C 1-2 hours to ensure H₂ <5ml/100g

Maximum of 3 cycles at 420°C or 10 hours in total.

MAC TRODE E6630

AWS A5.4: E630-16

Low hydrogen manual metal arc electrode using a silicon free, low carbon, high purity, C:Mn core wire with a concentrically extruded, moisture resistant rutile flux, with a recovery rate of approximately 130% with respect to core wire. Easy strike electrode which produces porosity free weld deposits.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

	As welded
Tensile Strength	1035 N/mm ²
0.2% Proof Stress	635 N/mm ²
Elongation	10%
Reduction of Area	24%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Cu	Mo	Nb + Ta
0.03	0.70	0.40	0.01	0.01	16.20	4.60	3.40	0.07	0.22

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-100	80-140	120-170

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.



Contents

162	MAC STAIN E100 (-15)
163	MAC STAIN E100 (-17)
164	MAC STAIN E100 ELC (-15)
165	MAC STAIN E100 ELC (-16)
166	MAC STAIN E100 ELC (-17)
167	MAC STAIN E100 ELC NF
168	MAC STAIN E100H (-15)
169	MAC STAIN E100H (-16)
170	MAC STAIN E100L CF
171	MAC STAIN E100 UREA
172	MAC STAIN E101 (-15)
173	MAC STAIN E101 (-16)
174	MAC STAIN E101CF (-15)
175	MAC STAIN E101CF (-16)
176	MAC STAIN E101 ELC (-15)
177	MAC STAIN E101 ELC (-16)
178	MAC STAIN E101 ELC (-17)
179	MAC STAIN E101Mo
180	MAC STAIN E102 (-15)
181	MAC STAIN E102 (-16)
182	MAC STAIN E102 (-17)
183	MAC STAIN E102 EHC
184	MAC STAIN E102Mo
185	MAC STAIN E103CF
186	MAC STAIN E103L (-15)
187	MAC STAIN E103L (-16)
188	MAC STAIN E103L (-17)
189	MAC STAIN E103Mo
190	MAC STAIN E104
191	MAC STAIN E105
192	MAC STAIN E107
193	MAC STAIN E108 (-15)
194	MAC STAIN E108 (-17)
195	MAC STAIN E120
196	MAC STAIN E120Cu
197	MAC STAIN E122 (-15)
198	MAC STAIN E122 (-16)
199	MAC STAIN E124 (-15)
200	MAC STAIN E124 (-16)
201	MAC STAIN E125 (-15)
202	MAC STAIN E125 (16)

MAC STAIN E 100 (-15)

AWS A5.4: E318-15

Basic coated for welding 19/12/3 chrome, nickel, molybdenum stainless steels, subject to heat and to resist certain acids and corrosive liquids. Suitable for applications where good resistance to general corrosion and pitting is required. Due to niobium stabilisation the weld deposit has good resistance to intergranular corrosion, and is suitable for applications involving high temperatures up to 400°C. Extensive applications are found in chemical and drug processing plants, food, petroleum, and allied industries.

CURRENT :

DC (±)

MECHANICAL PROPERTIES

Tensile Strength	630 N/mm ²
0.2% Proof Stress	500 N/mm ²
Elongation	36%
Impact Energy +20°C	65 J

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Ni	Mo	Nb
0.025	0.40	1.50	18.00	11.00	2.70	0.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-35	30-45	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E100 (-17)

AWS A5.4: E318-17

High quality rutile type niobium stabilised stainless steel electrode for welding 19/12/3 chrome, nickel, molybdenum stainless steels, subject to heat and to resist certain acids and corrosive liquids. Suitable for applications where good resistance to general corrosion and pitting is required. Due to niobium stabilisation the weld deposit has good resistance to intergranular corrosion, and is suitable for applications involving high temperatures up to 600°C. Extensive applications are found in chemical and drug processing plants, food, petroleum, and allied industries.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	630 N/mm ²
0.2% Proof Stress	500 N/mm ²
Elongation	36%
Impact Energy +20°C	65 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Nb & Ta
0.03	0.80	1.10	0.024	0.012	19.40	11.60	2.70	0.17	0.40

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-35	30-45	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E 100 ELC (- 15)

AWS A5.4: E316L-15

MMA electrode designed and manufactured to give high moisture resistance using a basic flux system and high purity corewire. It is particularly suited to the most demanding vertical and overhead welding applications including fixed pipework in the ASME 5G/6G position. Under site conditions it is tolerant to adverse wind and drafts. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	600 N/mm ²
0.2% Proof Stress	470 N/mm ²
Elongation	37%
Impact Energy +20°C	80 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	FN
<0.03	0.30	1.20	0.02	0.01	19.00	12.00	2.60	<0.10	6

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E 100 ELC (-16)

AWS A5.4: E316L-16

High quality rutile low carbon stainless steel electrode depositing weld metal of the 19% Cr, 12% Ni, 3% Mo type for corrosion resistance. Suitable for use in all positions except vertical down, high acid resistance. Extra low carbon. Wide usage in textile, pulp and paper, rayon and chemical industries. May be used for overlaying carbon and low alloy steels to provide corrosion and acid resistance. Suitable for general service at temperatures up to 500°C and for acid resistance up to 350°C. The electrode is suitable for welding steels of AISI 316L, 316 and 317 types.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES	
Tensile Strength	600 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	42%
Impact Energy +20°C	70 J

CHEMICAL COMPOSITION								
C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.02	0.60	1.00	0.027	0.018	19.10	12.20	2.70	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS					
1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-45	50-70	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E100 ELC (17)

AWS A5.4: E316L-17

High quality rutile low carbon stainless steel electrode depositing weld metal of the 19% Cr, 12% Ni, 3% Mo type for corrosion resistance. Suitable for use in all positions except vertical down, high acid resistance. Extra low carbon. Wide usage in textile, pulp and paper, rayon and chemical industries. May be used for overlaying carbon and low alloy steels to provide corrosion and acid resistance. Suitable for general service at temperatures up to 500°C and for acid resistance up to 350°C. The electrode is suitable for welding steels of AISI 316L, 316 and 317 types.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	600 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	42%
Impact Energy +20°C	70 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.02	0.60	0.60	0.027	0.018	19.10	12.20	2.70	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-45	50-70	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E100 ELC NF

AWS A5.4: E316LMn-16

Rutile (low silica) flux on a high purity core wire. Special control of residuals coupled with a high manganese content ensures freedom from microfissuring. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	610 N/mm ²
0.2% Proof Stress	430 N/mm ²
Elongation	38%
Impact Energy -196°C	54 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	N
<0.03	0.40	3.00	0.02	0.01	18.00	16.00	2.80	<0.10	0.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E100H (-15)

AWS A5.4: E316H-15

A manual metal arc electrode manufactured on an austenitic core wire with a fully chemically extruded basic flux. The electrodes are suited for all positional welding and have great resistance to porosity, even for site welding. Mac Stain E100H is intended for welding 316 stainless steels, used for elevated strength and oxidation resistance for typical applications arising in the power generator industry. Such steels and E316H-16 electrodes have a controlled carbon content of 0.04 to 0.08%

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	580 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	36%
Reduction of Area	70%
Impact Energy +20°C	70 J
Hardness	210 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.06	1.30	0.40	0.01	0.02	18.00	12.00	2.30	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-35	30-45	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E100H (-16)

AWS A5.4: E316H-16

A manual metal arc electrode manufactured on an austenitic core wire with a fully chemically extruded basic flux. The electrodes are suited for all positional welding and have great resistance to porosity, even for site welding. Mac Stain E100H is intended for welding 316 stainless steels, used for elevated strength and oxidation resistance for typical applications arising in the power generator industry. Such steels and E316H-16 electrodes have a controlled carbon content of 0.04 to 0.08%

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	580 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	36%
Reduction of Area	70%
Impact Energy +20°C	70 J
Hardness	210 HV

CHEMICAL COMPOSITION

C	Si	Mn	S	P	Cr	Ni	Mo	Cu
0.06	1.30	0.40	0.01	0.02	18.00	12.00	2.30	0.20

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-35	30-45	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E100L CF

AWS A5.4: E316L-16

A special rutile flux coated 316L electrode on a high purity 308L core wire. Versatile downhand and positional capability, E100L CF has a controlled composition and ferrite content designed for cryogenic service requiring >0.38mm lateral expansion at minus 130-196°C. Also suitable for unusual occasions when 316L is specified for service up to 550°C and corrosion conditions preclude the use of 316H. Recovery is about 110% with respect to core wire, 65% with respect to the whole electrode.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	595 N/mm ²
0.2% Proof Stress	440 N/mm ²
Elongation	43%
Reduction of Area	48%
Impact Energy +20°C	70 J
Hardness	230 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
<0.03	1.00	0.60	0.01	0.02	18.00	12.00	2.20	<0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-155	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E100 UREA

Special

A nil ferrite, non-magnetic fully austenitic E316L alloy used in the marine and offshore industry. Also withstands attack by nitric acid. Basic coating gives ability for positional welding giving high strength and corrosion resistance at cryogenic temperatures.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	580 N/mm ²
0.2% Proof Stress	420 N/mm ²
Elongation	36%
Impact Energy -196°C	50 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	N
0.02	0.60	3.50	0.02	0.015	18.50	16.00	3.00	0.15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-140	130-160

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC STAIN E101 (-15)

AWS A5.4: E347-15

MMA electrode with a basic carbonate-fluoride flux on a high purity stainless steel core wire. Designed to give good moisture resistance and hence freedom from weld porosity. This electrode is particularly suited to positional welding of fixed pipework qualified in the ASME 5G/6G position and is tolerant to adverse wind and draughts under site conditions. Compared with rutile types, the basic flux gives a more convex fillet bead profile and although the slag does not self-lift, it is easily removed and gives welds of exceptional appearance and quality. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	650 N/mm ²
Elongation	40%
Reduction of Area	52%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Nb & Ta	Cu
0.05	1.20	0.30	0.01	0.02	19.00	9.50	0.05	0.62	0.07

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-160	130-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101 (-16)

AWS A5.4: E347-16

High quality rutile type, niobium stabilised stainless steel electrode for welding and overlaying 19% Cr, 9% Ni austenitic stainless steels subject to temperatures up to 600°C. Ideal for use on pressure vessels, food and process plant, domestic stainless steel equipment etc. Steels for which the electrode is recommended are as follows:

- AISI Type 321 (EN58 B and C) titanium stabilised.
- AISI Type 347 (EN58 F and G) niobium stabilised.
- AISI Type 302 (EN58 A) unstabilised.
- AISI Type 304 (EN58 E) unstabilised

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	650 N/mm ²
0.2% Proof Stress	500 N/mm ²
Elongation	52%
Impact Energy +20°C	70 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Nb & Ta
0.03	0.90	1.20	0.03	0.01	20.50	10.20	0.30	0.15	0.35

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-35	30-45	60-90	75-120	100-150	130-210	160-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101CF (-15)

AWS A5.4: E308H-15

MMA electrode with basic carbonate-fluoride flux on matching core wire. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode. Mac Stain E101CF(-15) is particularly suited to positional welding, including fixed pipework qualified in the ASME 6G position, in materials thickness from 3mm up to the heaviest sections.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	650 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	41%
Reduction of Area	48%
Impact Energy +20°C	100 J

CHEMICAL COMPOSITION									
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN
0.05	1.00	0.40	0.01	0.02	18.50	9.50	0.10	0.05	3

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-160	130-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101CF (-16)

AWS A5.4: E308H-16

Manufactured on a matching alloyed core wire with a high rutile based flux coating. The electrode has a stable but soft arc and fluid slag ensures short arc characteristics used for all positional pipework welding which ensures weld metal integrity and smooth weld beads. It is not recommended for contact welding as slag is fluid and the soft arc does not lend itself to long arc lengths. The electrode is designed for welding controlled carbon 18% Cr, 10% Ni stainless steels, particularly pipework operating between 400–815°C, such applications arise in the petrochemical industries.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	610 N/mm ²
0.2% Proof Stress	435 N/mm ²
Elongation	45%
Reduction of Area	35%
Impact Energy +20°C	80 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.06	1.20	0.40	0.01	0.02	19.50	9.50	0.08	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60–90	70–120	110–160	130–190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101 ELC (-15)

AWS A5.4: E308L-15

MMA electrode – designed and manufactured to give high moisture resistance using a basic flux system and high purity core wire. It is particularly suited to the most demanding vertical and overhead welding applications including fixed pipework in the ASME 5G/6G position. Under site conditions it is tolerant to adverse wind and drafts. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	600 N/mm ²
0.2% Proof Stress	440 N/mm ²
Elongation	44%
Impact Energy -196°C	35-50 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	FN
0.03	0.30	1.20	0.015	0.01	19.00	10.00	0.10	<0.10	6

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-155	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101 ELC (-16)

AWS A5.4: E308L-16

MMA electrode – rutile flux coated 308L electrode on high purity core wire. This has all the benefits of an advanced rutile flux design – this includes optimum versatility for downhand welding with high cosmetic finish and weld metal integrity; and all-positional welding with the 2.5/3.2mm electrodes including fixed pipework. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	590 N/mm ²
0.2% Proof Stress	450 N/mm ²
Elongation	45%
Impact Energy -100°C	35 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	FN
<0.03	0.60	1.00	0.02	0.01	19.00	9.50	0.10	0.10	6

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-155	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101 ELC (-17)

AWS A5.4: E308L-17

High quality rutile type stainless steel electrode for welding low carbon 19% Cr, 9% Ni stainless steel. The extra low carbon content provides improved corrosion resistance and notch toughness at low temperatures. Wide usage in the pressure vessel, process plant, dairy and food industries, also suitable for cryogenic applications where high notch toughness at sub-zero temperatures is required. Although the electrode is primarily for welding steels of the AISI 304L and 308L types, it may also be used for welding the higher carbon types 304 and 308. In applications where the operating temperature does not exceed 400°C the electrode may also be used for welding type 347 steels.65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	560 N/mm ²
0.2% Proof Stress	430 N/mm ²
Elongation	40%
Impact Energy +20°C	70 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.02	0.60	0.60	0.03	0.02	19.10	10.20	0.04	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-35	30-45	60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E101Mo

AWS A5.4: E308Mo-16

High quality lime rutile low silica stainless steel welding electrode for welding 19% Cr, 9% Ni 3% Mo stainless steels. The electrode has good strike and restrike characteristics and is suitable in all positions. Designed for welding hardenable high strength ferritics such as armour plate and ferritic materials in Q and T condition containing 0.4 C and alloyed with Ni Cr Mo & V steels for which the electrode is recommended for welding ferritics on a maintenance basis.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	740 N/mm ²
0.2% Proof Stress	>520 N/mm ²
Elongation	>40%
Reduction of Area	>25%
Impact Energy +20°C	>55 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.06	2.10	0.50	0.02	0.021	19.60	10.10	2.70	0.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm
25-35	30-45	60-90	75-120	100-150	170-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E 102 (-15)

AWS A5.4: E310-15

MMA electrode with basic carbonate-fluoride flux on high purity core wire. Low silicon and high manganese levels are desirable to ensure freedom from microfissuring. The electrode is particularly suited to positional welding, including fixed pipework in the ASME 5G/6G positions. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	615 N/mm ²
0.2% Proof Stress	435 N/mm ²
Elongation	36%
Impact Energy +20°C	105 J

CHEMICAL COMPOSITION								
C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.10	0.40	3.80	0.018	0.008	26.00	21.00	0.20	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
2.50mm	3.25mm	4.00mm
60-90	75-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E102 (-16)

AWS A5.4: E310-16

Fully austenitic stainless steel electrode with a rutile coating designed to weld 25/20 chromium, nickel heat-resisting steels. Specially designed for welding austenitic heat resistant stainless steels such as AISI Type 310 and Firth Vickers Immaculate 5. The weld deposit provides good heat resistance up to 1400°C in air, up to approx. 650°C in oxidising sulphurous atmospheres. The electrodes are also suitable for welding stainless to carbon or low alloy steels, and recommended for foundry heat treatment trays and bins, foundry thermocouple units and many furnace elements.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	575 N/mm ²
0.2% Proof Stress	400 N/mm ²
Elongation	35%
Impact Energy +20°C	80 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.18	0.40	2.30	0.02	0.01	27.10	21.90	0.12	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	75-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E102 (-17)

AWS A5.4: E310-17

Fully austenitic stainless steel electrode with a rutile coating designed to weld 25/20 chromium, nickel heat-resisting steels. Specially designed for welding austenitic heat resistant stainless steels such as AISI Type 310 and Firth Vickers Immaculate 5. The weld deposit provides good heat resistance up to 1400°C in air, up to approx. 650°C in oxidising sulphurous atmospheres. The electrodes are also suitable for welding stainless to carbon or low alloy steels, and recommended for foundry heat treatment trays and bins, foundry thermocouple units and many furnace elements.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	575 N/mm ²
0.2% Proof Stress	400 N/mm ²
Elongation	35%
Impact Energy +20°C	80 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.18	0.40	2.30	0.02	0.01	27.10	21.90	0.12	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	75-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E102 EHC

AWS A5.4: E310H-15

Manufactured on a high purity, fully alloyed core wire with a chemically basic flux coating. The purity of the weld deposit is further enhanced by incorporating with the flux ultra-fine metal alloys in the same ratio as they are present in the core wire, this ensures low levels of residuals; tin (Sn < 0.01) and lead (Pb < 0.01). Recovery is approximately 120% in respect to core wire. This electrode is designed to weld similar alloyed castings that are covered by the following specifications: ASTM A297 HK, A351 and A608 HK 40. DIN 1.4848 and 1.4847. Proprietary alloys include Paramount H20, Thermoalloy 47 and Cronite HR6.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	760 N/mm ²
0.2% Proof Stress	570 N/mm ²
Elongation	20%
Reduction of Area	25%
Hardness	230 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.39	1.80	0.40	0.01	0.01	26.00	21.00	0.10	0.01

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-160	130-190

Storage:

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E102Mo

AWS A5.4: E310Mo-16

Mac Stain E102Mo electrodes are primarily intended for welding the clad side of 316, 316L and 317 clad steels as well as other grades of molybdenum bearing stainless steels. Used for the resurfacing of digesters in the paper industry.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	540 N/mm ²
0.2% Proof Stress	380 N/mm ²
Elongation	35%
Impact Energy +20°C	70 J

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Ni	Mo
0.09	0.44	2.25	26.00	20.70	2.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm
60-90	75-120	100-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E 103CF

AWS A5.4: E309H-16

MMA electrode with a rutile flux coating on high purity core wire. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	605 N/mm ²
0.2% Proof Stress	460 N/mm ²
Elongation	34%
Reduction of Area	30%
Hardness	210 HV

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN
0.08	1.50	0.30	0.01	0.02	22.70	12.80	0.10	0.10	5

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E103L (-15)

AWS A5.4: E309L-15

MMA electrode designed and manufactured to give high moisture resistance using a basic flux system and high purity core wire. It is particularly suited to the most demanding vertical and overhead welding applications including fixed pipework in the ASME 5G/6G position. Under site conditions it is tolerant to adverse wind and drafts. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	630 N/mm ²
0.2% Proof Stress	490 N/mm ²
Elongation	36%
Impact Energy +20°C	75 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	FN
0.03	0.30	1.20	0.02	0.01	23.50	13.00	0.10	0.10	15

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	75-120	100-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E103L (-16)

AWS A5.4: E309L-16

General purpose stainless steel electrode of 23/12 type designed for joining dissimilar stainless steels, of the most common types, to one another. Primarily designed for fabrication applications where tolerance to dilution is exploited in joining 410, 304, 321, 316 to mild and low alloy steels for brackets, stiffeners etc. Also employed as a buffer layer on mild steels and used on clad plate applications extensively. Similar cast and wrought steels can also be welded if the service conditions are below 400°C. Has found its main usage in welding Cromweld CR12 for transportation construction.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	595 N/mm ²
0.2% Proof Stress	495 N/mm ²
Elongation	40%
Impact Energy -20°C	45 J
Hardness	230 HV

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.02	0.60	0.70	0.02	0.01	24.00	13.30	0.09	0.04

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-35	30-45	60-90	75-120	100-150	130-210	160-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E103L (-17)

AWS A5.4: E309L-17

General purpose stainless steel electrode of 23/12 type designed for joining dissimilar stainless steels, of the most common types, to one another. Primarily designed for fabrication applications where tolerance to dilution is exploited in joining 410, 304, 321, 316 to mild and low alloy steels for brackets, stiffeners etc. Also employed as a buffer layer on mild steels and used on clad plate applications extensively. Similar cast and wrought steels can also be welded if the service conditions are below 400°C. Has found its main usage in welding Cromweld CR12 for transportation construction.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	595 N/mm ²
0.2% Proof Stress	495 N/mm ²
Elongation	40%
Impact Energy -20°C	45 J
Hardness	230 HV

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.02	0.60	0.70	0.02	0.01	24.00	13.30	0.09	0.04

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
25-35	30-45	60-90	75-120	100-150	130-210	160-230

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E 103Mo

AWS A5.4: E309LMo-16

General purpose stainless steel electrode of 23/12/3 type designed for joining dissimilar stainless steels, of the most common types, to one another. Primarily designed for maintenance applications where various types of stainless steels intermediate in composition between 18/8 and 23/12 chrome nickel, are used and where the need for one electrode, to accommodate all applications on a general basis, is required. Most common types of stainless steel can be welded with this electrode, without the loss of properties.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	680 N/mm ²
0.2% Proof Stress	510 N/mm ²
Elongation	35%
Reduction of Area	40%
Impact Energy +20°C	50 J
Hardness	220 HV

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.03	1.40	0.60	0.01	0.02	23.00	13.00	2.50	0.03

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-200

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E104

AWS A5.4: E309Mo-26

High recovery alloyed rutile flux coated electrode that deposits a duplex stainless steel weld deposit. The moisture resistant coating ensures freedom from porosity. Welds with a stable arc and may be used slag over slag. The quick freezing slag allows greater control over the molten weld metal. This electrode may be used on thick sections of problem steels but specifically designed for welding galvanised steel. Such welds are free from porosity and of excellent appearance and positive resistance to atmospheric corrosion similar to the base material itself.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	680 N/mm ²
0.2% Proof Stress	510 N/mm ²
Elongation	37%
Reduction of Area	40%
Impact Energy +20°C	50 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.02	0.80	0.60	0.01	0.02	23.50	12.50	2.50	0.05

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

1.60mm	2.00mm	2.50mm	3.25mm	4.00mm
35-50	40-70	60-90	70-120	110-150

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E 105

AWS A5.4: E317-17

Manufactured using a high purity ferritic core wire with an alloyed flux whose slag and de-oxidation system ensures full alloying with no trace segregation of any one element. Ideal electrode for contact welding and segregation of any one element. Ideal electrode for contact welding and mitred fillets joints and deposits smooth even weld appearance for extra efficiency and deposits a weld metal recovery rate of 180%. The electrode is designed to weld ASTM 317 and similar austenitic alloys in which the high Mo content provides extra resistance to pitting in high chloride environments.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	620 N/mm ²
0.2% Proof Stress	470 N/mm ²
Elongation	38%
Reduction of Area	45%
Impact Energy +20°C	55 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.07	1.20	0.60	0.01	0.02	19.00	13.00	3.80	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm
70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E107

An extruded flux coated manual metal arc electrode manufactured on an alloyed core wire giving a nominal 22Cr, 10Ni deposit micro alloyed with rare earth minerals. Special rutile – alumina – silicate fluxes formulation that ensures ease of welding with easy arc strike and re-striking and smooth weld seams and readily detachable slag. Designed for applications and alloys that need good resistance to oxidation up to 1100°C e.g. furnace parts – flues – exhausts combustion nozzles. Materials to be welded include – ASTM/UNS S30815, Avesta 253 (Proprietary) EN10095 – 1.4835 and 1.4893 plus 1.4891.

CURRENT :

DC (+) or AC (OCV: 50V min).

MECHANICAL PROPERTIES

Tensile Strength	710 N/mm ²
0.2% Proof Stress	560 N/mm ²
Elongation	40%
Reduction of Area	50%

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	N
0.06	0.70	1.60	0.011	0.025	15.50	9.00	0.18

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

3.25mm	4.00mm	5.00mm
70-120	90-140	140-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E108 (-15)

AWS A5.4: E16.8.2-15

A specially designed composition where molybdenum % is reduced to form a hybrid alloy between 308H and 316H, operates in temperatures up to 800°C. Gives a very high resistance to thermal embrittlement. Creep ductility is enhanced at temperatures above 650°C. Used mainly in power generation and chemical process industries on applications such as, steam turbines, catalytic crackers, transfer piping and furnace accessories.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	640 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	35%
Reduction of Area	50%
Impact Energy -100°C	60 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.08	1.60	0.25	0.008	0.02	16.00	8.50	1.90	<0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E108 (-17)

AWS A5.4: E16.8.2-17

A specially designed composition where molybdenum % is reduced to form a hybrid alloy between 308H and 316H, operates in temperatures up to 800°C. Gives a very high resistance to thermal embrittlement. Creep ductility is enhanced at temperatures above 650°C. Used mainly in power generation and chemical process industries on applications such as, steam turbines, catalytic crackers, transfer piping and furnace accessories.

CURRENT :

DC (+) or AC (OCV: 55V min).

MECHANICAL PROPERTIES

Tensile Strength	>620 N/mm ²
0.2% Proof Stress	>410 N/mm ²
Elongation	41%
Reduction of Area	45%
Impact Energy +20°C	>70 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.05	1.30	0.40	0.01	0.01	15.50	8.20	1.60	0.30

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E120

Special

Designed on a highly alloyed core wire with a high purity lime rutile flux coating that deposits high chromium duplex weld metal with excellent resistance to corrosion and erosion. After water quenching from 1100°C the microstructure is 30-40% delta ferrite – balance austenite. Mac Stain E120 is designed to weld alloys in cast condition which are then solution heat treated at 1100°C and then air or water quenched. These alloys include AISI 329, DIN 1.4460 and 1.4582 and proprietary alloys such as Firth Vickers FMN, Weir Materials Zeron 25, Sandvik 10RE51 and 3RE60.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES	
Tensile Strength	800 N/mm ²
Elongation	38%
Reduction of Area	45%
Impact Energy -50°C	35 J

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Cr	Ni	Mo	Cu
0.02	1.10	0.40	0.02	0.019	25.00	7.00	3.50	0.18

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.



MAC STAIN E 120Cu

AWS A5.4: E2553-16

Designed on a highly alloyed core wire with a high purity lime rutile flux coating that deposits high chromium duplex weld metal with excellent resistance to corrosion and erosion. Designed to weld alloys in cast condition such as ASTM A351, A744, CD4MCu, UNS 93370, ASTM A240, BS3146, ANE 21. Proprietary alloys include Uranus 55 and Ferralium. After welding, the weldmet is water or air quenched from 1100°C and this solution heat treatment ensures both weld and casting have similar microstructures e.g. austenite with 30 to 40% delta ferrite.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	940 N/mm ²
0.2% Proof Stress	780 N/mm ²
Elongation	18%
Reduction of Area	25%
Impact Energy +20°C	35 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
0.03	1.20	0.40	0.02	0.02	26.00	7.80	3.50	2.00	0.21

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **200°C** before use.

MAC STAIN E122 (-15)

AWS A5.4: E2209-15

Designed on a highly alloyed core wire with a high purity chemically basic flux to facilitate all positional welding including on site welding. The weld metal as deposited has a duplex microstructure of the deposited weld contains 30 to 50 % delta ferrite – balance austenite which provides excellent resistance to corrosion and erosion. Mac Stain E122B is designed to weld the following alloys when no subsequent solution heat treatment is applied to the weldment, ASTM A182 Grade F51, UNS 53 1803, DIN 1.4462, BSC Hyresist 22/5, Sandvik SAF 2205, Avesta 2205, Valourec VS22.

CURRENT :

DC (+).

MECHANICAL PROPERTIES	
Tensile Strength	850 N/mm ²
0.2% Proof Stress	670 N/mm ²
Elongation	27%
Reduction of Area	40%
Impact Energy -50°C	40 J

CHEMICAL COMPOSITION									
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
0.02	1.00	0.50	0.013	0.015	23.00	9.00	3.10	0.10	0.18

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.



MAC STAIN E122 (-16)

AWS A5.4: E2209-16

Designed on a highly alloyed core wire with a high purity lime/rutile flux coating that deposits high chromium duplex weld metal with excellent resistance to corrosion and erosion. The weld metal microstructure contains 30 to 50 % delta ferrite – balance austenite. This electrode has a very stable arc, low spatter, easy strike and restrike, good slag detachability and porosity free smooth welds. Mac Stain E122 is designed to weld the following alloys when no subsequent solution heat treatment is applied to the weldment. ASTM A182 Grade F51, UNS 53 1803, DIN 1.4462, BSC Hysist 22/5, Sandvik SAF 2209, Avesta 2209, Valourec VS22.

CURRENT :

DC (+) or AC (OCV: 70V min).

MECHANICAL PROPERTIES

Tensile Strength	840 N/mm ²
0.2% Proof Stress	670 N/mm ²
Elongation	26%
Reduction of Area	40%
Impact Energy -50°C	36 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
0.02	1.00	0.50	0.013	0.015	23.00	9.00	3.10	0.10	0.18

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	110-150	130-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E124 (-15)

AWS A5.4: E2595-15

Basic coated all-positional MMA electrode for welding super duplex alloys for service in the as-welded condition. This electrode is overmatching with respect to nickel content to achieve correct austenite-ferrite microstructural phase balance. It is designed for the most demanding vertical and overhead welding positions such as fixed pipework qualified in the ASME 6G position. Moisture resistant flux technology. Recovery is about 105% with respect to core wire, 65% with respect to whole electrode.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	910 N/mm ²
0.2% Proof Stress	690 N/mm ²
Elongation	25%
Reduction of Area	45%
Impact Energy -20°C	46 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	W	Cu	N
0.02	0.60	0.40	0.015	0.02	25.00	9.50	3.50	0.70	0.80	0.22

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	100-160	140-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E124 (-16)

AWS A5.4: E2595-16

Designed on a highly alloyed core wire with a high purity lime/rutile flux coating that deposits high chromium duplex weld metal with excellent resistance to corrosion and erosion. The microstructure of the as deposited weld contains 30 to 50 % delta ferrite – balance austenite.

Mac Stain E124(-16) is designed to weld the following alloys when no subsequent solution heat treatment is applied to the weldment. UNS S32760 (wrought) and UNS J99380 (cast) and Weir Materials Zeron 100 (proprietary brand). Weir metals main areas of application for these materials is when a good combination of high strength and resistance to seawater corrosion is needed.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

Tensile Strength	910 N/mm ²
0.2% Proof Stress	690 N/mm ²
Elongation	25%
Reduction of Area	45%
Impact Energy -20°C	46 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	W	Cu	N
0.02	0.60	0.40	0.015	0.02	25.00	9.50	3.50	0.70	0.80	0.22

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
60-90	70-120	100-160	140-180

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E125 (-15)

AWS A5.4: E2594-15

Designed on an alloyed core wire with a special basic flux which deposits a super duplex weld metal system to give optimum all-positional welding. The electrode is designed for all positional welding of super duplex alloys subject to service in the as welded condition. The weld has a matching microstructure to the base alloy by virtue of an increased nickel content eg; microstructure of weld and base metal austenite with 40 to 60 Ferrite. The materials and applications it is suitable for are 25% chrome super duplex alloys.

CURRENT :

DC (+).

MECHANICAL PROPERTIES

Tensile Strength	870 N/mm ²
0.2% Proof Stress	700 N/mm ²
Elongation	28%
Reduction of Area	45%
Impact Energy +20°C	85 J

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.03	0.50	1.30	0.018	0.008	24.60	9.10	3.80	0.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-75	70-95	100-150	130-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.

MAC STAIN E125 (-16)

AWS A5.4: E2594-16

Designed on an alloyed core wire with a rutile flux which deposits a super duplex weld metal system to give optimum all-positional welding. The electrode is designed for all positional welding of super duplex alloys subject to service in the as welded condition. The weld has a matching microstructure to the base alloy by virtue of an increased nickel content e.g. microstructure of weld and base metal austenite with 40 to 60 ferrites. The materials and applications it is suitable for are 25% chrome super duplex alloys conforming to ASTM A182 F53, UNS S32760, BS EN 1088-2, X2 Cr Ni Mo, N25-7-4.

CURRENT :

DC (+) or AC (OCV: 55V min).

MECHANICAL PROPERTIES

Tensile Strength	890 N/mm ²
0.2% Proof Stress	750 N/mm ²
Elongation	26%
Reduction of Area	35%
Impact Energy -20°C	28 J

CHEMICAL COMPOSITION

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W
0.03	1.00	0.80	0.011	0.021	25.00	9.50	4.00	0.12	0.24	0.07

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-75	70-95	100-150	130-190

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **250°C** before use.





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<u>207</u>	<u>MAC TOOL E3043 (-G3)</u>
<u>208</u>	<u>MAC TOOL E3044 (-G4)</u>
<u>209</u>	<u>MAC HSS E3062</u>
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MAC TOOL E3042 (-G2)

Manufactured on a high purity ferritic core wire with an alloy bearing concentrically extruded basic flux. It is used for both the maintenance and manufacture of components and tools subjected to impact and abrasion at temperatures up to 550°C. Such applications include dies, hot & cold shear blades, hammers, sewage and guillotine blades.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

	As welded
Rockwell C	55 HRC

CHEMICAL COMPOSITION

C	Mn	Si	Mo	Cr	Fe
0.35	1.30	0.50	2.50	7.00	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-110	90-150	110-190	150-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC TOOL E3043 (-G3)

A low hydrogen manual metal arc electrode manufactured on a high purity ferritic core wire with an alloy bearing basic flux. Excellent all positional characteristics gives good control of the molten weld pool. Used for hot working tool steels subject to elevated temperature, impact and abrasion such as forging dies, shear blades etc. Retains these properties at temperatures up to 550°C. Readily machinable with good quality carbide tools.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

As welded	
Rockwell C	48 HRC

CHEMICAL COMPOSITION

C	Mn	Si	Mo	Cr	Fe
0.30	0.60	0.50	4.40	4.80	Balance

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-110	90-150	110-190	150-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC TOOL E3044 (-G4)

Manufactured on a high purity ferritic core wire with an alloy bearing chemically basic concentrically extruded flux. All positional welding characteristics with excellent control of the molten welding pool. Used to special advantage for the repair of hot working dies by single or multi layer build ups, or surfacing rollers or hot shear blades. When machining tungsten carbide tools are used to obtain the best profile. Excellent resistance to impact and abrasion up to 550°C combined with the ability of the deposit to be machined make it an exceptionally versatile alloy. Pre-Heat 200°C to 300°C. Slow cool after welding. Readily machinable with carbide tools.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

	As welded
Rockwell C	40 HRC

CHEMICAL COMPOSITION

C	Cr	Ni	Mn	Mo	W	V	Nb	Fe	Co	Si
0.20	6.00	1.00	1.00	3.00	1.00	<1.00	3.00	Balance	1.00	0.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
50-70	80-110	140-170	170-210

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC HSS E3062

AWS A5.13: EFe5-B

Hard facing electrode, designed to deposit high quality high speed steel on mild or low alloy steels, having a metal recovery rate of 115%. Tough and highly crack resistant deposits, retaining hardness at temperatures up to 620°C. Deposits can be annealed and re-hardened by oil quenching. Highly recommended for the fabrication of blanking and piercing dies, knife blade edges, shear blades, lathe tools, boring tools, milling cutters, broaching tools, drills, hot working dies etc. ideal for the building up of edges on small components.

CURRENT :

DC (+) or AC (OCV: 60V min).

MECHANICAL PROPERTIES		
	HRC	HV
As Welded	62	750
Annealed 800°C + FC	<25	<270
Tempered 550°C/2 + AC	60-65	700-850

CHEMICAL COMPOSITION								
C	Mn	Si	S	P	Cr	Mo	W	V
0.60	0.50	0.40	0.01	0.02	4.00	8.00	1.70	1.10

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS			
2.50mm	3.25mm	4.00mm	5.00mm
60-100	90-150	120-210	160-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TOOL E3064

A low hydrogen, iron powder basic flux coated electrode. Designed for special hardfacing applications involving heavy impact loading combined with abrasion. This electrode is ideally suited for forging dies because of its very tough deposit. It is an H13 type product. Pre-heat and dilution may effect hardness on first two layers but not on subsequent layers. On heavy build-ups use Mac Trode E630 on 15% manganese steels.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES			
	1 st Layer	2 nd Layer	3 rd Layer
Rockwell C (HRC)	53-55	56-69	57-60
Vickers (HV)	560-600	620-680	640-680

CHEMICAL COMPOSITION					
C	Mn	Si	Cr	Mo	V
0.45	0.70	0.50	6.50	0.60	0.80

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
3.25mm	4.00mm	5.00mm
90-150	110-190	150-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **180°C** before use.

MAC TOOL E3065

A low hydrogen, iron powder basic flux coated electrode for hard facing applications involving a combination of both impact and abrasion. Easy to use, giving sound porosity free welds. Ideally suited for use in the forging industry.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES			
	1 st Layer	2 nd Layer	3 rd Layer
Rockwell C (HRC)	55-60	60-62	60-63
Vickers (HV)	600-700	700-730	700-760

CHEMICAL COMPOSITION									
C	Cr	Mn	Mo	W	V	Nb	Fe	Si	Ti
0.60	8.00	1.00	1.00	1.00	<1.00	<1.00	Balance	<1.00	<1.00

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS		
3.25mm	4.00mm	5.00mm
90-150	110-190	150-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **150°C** before use.

MAC TOOL E3067

Extruded flux coated MMA electrode manufactured on a high purity nickel core wire with a complex alloyed chemically neutral flux coating. Metal recovery is some 150% with respect to the core wire. The alloy be described as a nickel based Cr, Co, Mo, Al and Ti alloyed material that exhibits excellent (precipitation) hardening characteristics. Mac Tool E3067 deposits weld metal with excellent high temperature strength and toughness stability while retaining excellent resistance to oxidation and creep. The alloy is exceptionally valuable on hot working tools, in the drop forging industry, notably the repair of GFM hammers. As with all complex nickel based alloys, welding procedures and post weld cooling rates within the 200°C min and 400°C max interpass temperatures, should be adhered to. The weld procedure should be designed to favour a maximum fineness of dendritic structure to reduce micro fissuring and liquidation cracking. The use of minimum amperages consistent with good weldability is one criteria that greatly assists this objective. Flat and HV positions recommended.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

As Welded	
Rockwell C	-

CHEMICAL COMPOSITION

C	Mn	Si	Cr	Mo	W	Co	Fe	Ti + Al
0.04	0.20	1.20	18.00	7.20	1.40	8.40	6.50	3.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-110	90-150	110-190	150-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TOOL E3068

Extruded flux coated MMA electrode manufactured on a ferritic core wire with a complex alloyed chemically neutral flux coating. The alloy bearing chemically basic flux ensures excellent welding characteristics and metal recovery is some 125% with respect to the core wire. As the weld is a modified stainless it has excellent resistance to oxidation up to 1000°C and good wear resistance up to 600°C even under certain corrosive conditions. As welded the hardness of 52 – 56 HRC results, if the weld has to be machined it may be so annealed at 830°C and then re-hardened by air or oil cooling from 960°C to 1000°C. Although it may be used to weld medium carbon variants of AISI 410 it is intended to be used as a surfacing alloy as it attains a high hardness even under conditions of slow cooling, when welding large dies and tools, it is mainly air hardening.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

As Welded	
Rockwell C	52-56

CHEMICAL COMPOSITION

C	Cr	Ni	Mo
0.20	12.50	2.20	2.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm	6.00mm
70-110	90-150	110-190	150-250	240-300

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.

MAC TOOL E3069

Extruded flux coated MMA electrode manufactured on a high purity nickel core wire with a complex alloyed chemically neutral flux coating. Metal recovery is some 150% with respect to the core wire. Mac Tool E3069 is a nickel based Cr Co Mo alloyed precipitation hardening alloy for welding to similarly alloyed based materials used for high temperature applications e.g. to weld AMS 5706, 5707, 5708, 5709, 5544, 5586 or ASTM 637.

CURRENT :

DC (+) or AC (OCV: 80V min).

MECHANICAL PROPERTIES

	As Welded
Rockwell C	35-45

CHEMICAL COMPOSITION

Cr	Mo	Co	Ti + Al
20.00	4.50	14.00	4.50

ELECTRODE SIZES AVAILABLE & RECOMMENDED AMPS

2.50mm	3.25mm	4.00mm	5.00mm
70-110	90-150	110-190	150-250

Storage :

If allowed to become damp, the electrodes should be re-dried for **ONE HOUR** at **300°C** before use.







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