



MWA
Product Guide
2nd Edition



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MAC TRODE E61018 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 strike electrode, which deposits a porosity free weld.

Material to be Welded: Designed for all positional welding of high strength steels. Specifically those with a minimum UTS of 100 ksi. e.g.: AISI 4130, 4140, 8630, BS970 grade 709M40 the old EN19. ASTM A487 grade 4B, 4D and 6A (cast) .

Typical All Weld Metal Chemical Analysis (%)

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

Typical All Weld Metal Mechanical Properties

As Welded	Minimum
Tensile Strength	690 N/mm ²
0.2% Proof Stress	620 N/mm ²
Elongation	18%
Charpy V Notch @ -40°C	27J
HRC (less than)	22

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
60-100	85-140	140-190	200-250	260-300

Related Specification:

AWS A5.5 E10018-D2

Current:

AC/DC DC electrode positive (+/-) AC (OCV 50) min

Storage:

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

MAC TRODE E61018 G

Low hydrogen manual metal arc welding electrode using a silicon free, low nitrogen, high purity C:Mn core 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 e.g. quenched and tempered AISI 4130, 4140, BS970 709M40 (En19) and DIN Cr42 Mo4. For the fabrication of higher strength steels involving a requirement to meet a minimum all weld metal UTS of 690N/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.

Typical All Weld Metal Chemical Analysis (%)

C	Mn	Mo	P	S	Si
0.060	1.53	0.26	0.010	0.010	0.45

Typical All Weld Metal Mechanical Properties

As Welded	
Tensile Strength	750 N/mm ²
0.2% Proof Stress	660 N/mm ²
Elongation	30%
Reduction of Area	65%
Impact Energy @ -50°C	35J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-130	130-180	160-220	250-300

Related Specification:

AWS A5.5 E10018-G

Current:

AC/DC

Storage:

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

MAC TRODE E61118 G

Superior low hydrogen electrode, Ni Cr Mo type AWS E11018-G. If allowed to become damp these electrodes must be redried before using as moisture will cause weld metal cracking*. 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.

Material to be Welded: RQT 701 HY 100 Navy Q2N OS690 cast steel.

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	Ni	P	S	Si
0.051	0.41	1.11	0.49	2.14	0.010	0.012	0.42

Typical All Weld Metal Mechanical Properties

As Welded	Minimum
Tensile Strength	850 N/mm ²
0.2% Proof Stress	800 N/mm ²
Elongation	22%
Reduction of Area	70%
Impact Energy @ -50°C	90J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-130	130-180	160-220	250-300

Related Specification:

AWS A5.5 E11018-G

Current:

AC/DC DC electrode positive (+/-)

Storage:

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

MAC TRODE E61218 G

Low hydrogen manual metal arc welding electrode using a silicon free, low nitrogen, high purity C:Mn 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 22-30 RC is required. The electrode has excellent running characteristics, with easy striking and good slag detachability

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	Ni	P	S	Si
0.10	1.1	1.0	0.6	1.6	0.010	0.010	0.35

Typical All Weld Metal Mechanical Properties

As Welded	
Hardness	>30HRC
Stress Relieved	
Hardness	>25HRC

Sizes Available & Recommended Amperages

3.2mm	4.0mm	5.0mm	6.0mm
110-150	140-200	200-260	250-320

Related Specification:

AWS A5.5 E12018-G

Current:

AC/DC (+)

Storage:

If allowed to become damp, the electrodes should be re-dried for 2 hours at 250°C before use.

MAC TRODE E61418 G

Low hydrogen manual metal arc welding electrode using a silicon free, low nitrogen, high purity C:Mn 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

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	Ni	P	S	Si
0.1	1.5	1.5	1.1	2.3	0.010	0.010	0.35

Typical All Weld Metal Mechanical Properties**As Welded**

Hardness >35HRC

Stress Relieved

Hardness >33HRC

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
60-100	85-140	140-190	200-250	260-340

Related Specification:

AWS A5.5 E14018-G

Current:

AC/DC (+)

Storage:

If allowed to become damp, the electrodes should be re-dried for 2 hours at 250°C before use.

MAC TRODE E61618 G

Manufactured using a high purity, low silicon core wire with a chemically basic, alloy bearing flux. Smooth arc with a low spatter, easy strike and re-strike. May be used in all positions except vertically down, strong stable arc. Fillet welds are convex, weld metal is of bright appearance. Very low levels of hydrogen. Used to best advantage for critical repairs to die blocks which allows the deposit to be machined while still resulting in a tough, impact resistant deposit of around Rock well C 40 hardness.

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	Ni	Si
0.122	1.90	1.33	1.46	3.06	0.38

Physical Properties after PWHT at 600°C Max

Elongation 8-12%

Hardness 38-43HRC

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-140	150-190	200-250	250-300

Related Specification:

AWS A5.5 E16018-G

Current:

DC (+) OR AC (80 min OCV)

Storage:

Re-drying electrodes at 180°C will ensure very low hydrogen levels, e.g. less than 5ml H²/100g as per scale D BS 5135

MAC TRODE E6813 B2

High purity rutile flux coating with specified alloyed additions extruded onto low S-P-Si ferritic core wire. Welding Cr – Mo 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.

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	P	S	Si
0.060	1.10	0.60	0.50	0.025	0.025	0.40

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	720N/mm ²
0.2% Proof Stress	640N/mm ²
Elongation	23%
Reduction of Area	75%
Impact Energy @ 10°C	120J
Hardness	230HV

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-110	100-150	140-210	200-280	250-300

Related Specification:

AWS A5.5 E8013-B2

Current:

DC electrode positive (+) AC (OCV 70)

Storage:

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

MAC TRODE E6818 B2

A superior versatile low hydrogen electrode Ni Cr type. AWS E8018-B2 which uses a silicon free, low nitrogen, high purity C:Mn 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 stream.

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	P	S	Si
0.07	1.25	0.85	0.55	0.007	0.008	0.30

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	715 N/mm ²
0.2% Proof Stress	640 N/mm ²
Elongation	24%
Reduction of Area	75%
Impact Energy @ -10°C	100J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-130	130-180	160-220	250-300

Related Specification:

AWS A5.5 E8018-B2

Current:

DC (+/-)

Storage:

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

MAC TRODE E6818 C3

A low hydrogen, basic flux coated, low alloy electrode. Using a silicon free, low nitrogen, high purity C. Mn 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 is not always possible to apply post weld stress relief heat treatment. High strength levels and good toughness down to -50°C e.g. BS 4360 Grade 43E – 50E – 55L – 55EE – 55EF.

Typical All Weld Metal Chemical Analysis (%)

C	Mn	Mo	Ni	P	S	Si
0.07	1.30	0.55	0.9	0.008	0.007	0.30

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	630 N/mm ²
0.2% Proof Stress	530 N/mm ²
Elongation	27%
Reduction of Area	70%
Impact Energy @ -40°C	120J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
60-100	85-140	140-190	200-250	260-300

Related Specification:
AWS A5.5 E8018-C3

Current:
DC (+/-) AC (OCV 70) min

Storage:

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

MAC TRODE E6818 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. Those steels include BS4360 all grades at 50F. All grades 'plates' to BS1501-225 and all grades 'forgings' to BS1501-224

Typical All Weld Metal Chemical Analysis (%)

C	Fe	Mn	Ni	P	S	Si
0.08	BAL	1.50	0.85	0.015	0.009	0.30

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	580 N/mm ²
0.2% Proof Stress	480 N/mm ²
Elongation	26%
Reduction of Area	75%
Impact Energy @ -50°C	80J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-130	130-180	160-220	250-300

Related Specification:
AWS A5.5 E8018-G

Current:
DC (+/-) AC (OCV 70) min

Storage:

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

MAC TRODE E6818 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 offers a threefold improvement in corrosion resistance compared with plain C Mn 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 C Mn steels in icebreaker vessels and offshore structures. Applications also include architectural structures, bridges and exhaust gas flues.

Microstructure: In the as welded condition the microstructure is ferritic with a high proportion of acicular ferrite for optimum toughness.

Materials to be welded.

Corten A, B1 (B.Steel, US Steel) and other proprietary designations.

BS4360 Grade WR50A to WR50C

ASTM A588 Grades A, B, C, K

DIN 1.8960, 1.8961, 1.8963

Related Specification:

AWS A5.5 E8018-W2 (Generic Corten Type)

Current:

AC/DC+ (OCV 70 volts min)

Storage:

If allowed to become damp the electrodes should be re-baked.

To ensure weld metal hydrogen <5ml/100g, rebake at 300°C – 350°C for 1–2 hours. Do not exceed 420°C

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Cu	Mn	Mo	Ni	P	S	Si
0.06	0.60	0.50	1.00	0.02	0.60	0.015	0.01	0.60

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	610 N/mm ²
0.2% Proof Stress	520 N/mm ²
Elongation	25%
Reduction of Area	65%
Impact Energy @ 0°C	150J
Impact Energy @ -20°C	100J
Impact Energy @ -40°C	70J
Impact Energy @ -60°C	40J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm
70-110	80-140	100-180	140-240

CARBON MANGANESE & LOW ALLOY STEELS

MAC TRODE E6918 B3

MAC TRODE E6918 B3

A superior versatile low hydrogen electrode nickel chromium molybdenum type. AWS E9018-B3 which uses a silicon free, low nitrogen, high purity C:Mn 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.

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	P	S	Si
0.06	2.25	0.85	1.05	0.00	0.008	0.30

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	700 N/mm ²
0.2% Proof Stress	620 N/mm ²
Elongation	19%
Reduction of Area	65%
Impact Energy @ -10°C	80J

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-130	130-180	160-220	250-300

Related Specification:

AWS A5.5 E9018-B3

Current:

DC (+/-) AC (OCV 70) min

Storage:

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

CARBON MANGANESE & LOW ALLOY STEELS

MAC TRODE E6918 G

MAC TRODE E6918 G

This is a low hydrogen electrode using a free, low nitrogen, high purity C:Mn core wire with a concentrically extruded, moisture resistant chemically basic flux with a controlled iron powder addition. It is an easy to use electrode for welding in all positions. Good restriking ability and smooth, easy flowing welds. Pre-heat & interpass temperatures 100°C min. and up to 200°C for thick sections.

Typical All Weld Metal Chemical Analysis (%)

C	Cr	Mn	Mo	Ni	P	S	Si
0.038	0.1	1.05	0.28	0.7	0.01	0.02	0.15

Typical All Weld Metal Mechanical Properties

As Welded	Typical
Tensile Strength	700 N/mm ²
0.2% Proof Stress	620 N/mm ²
Elongation	26%
Reduction of Area	65%
Impact Energy @ -20°C	80 Joules

Sizes Available and Recommended Amperages

2.5mm	3.2mm	4.0mm	5.0mm	6.0mm
70-90	90-130	130-180	160-220	250-300

Related Specification:

AWS E9018-G

Current:

AC/DC (+) AC (OCV 70) min

Storage:

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