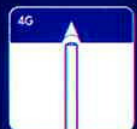
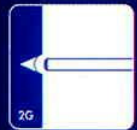




Malaysia's Leader  
In Welding Technology



**A versatile, easy to use general purpose rutile coated electrode formulated to give superior welding characteristics and excellent all-positional capability**

極順焊

**MOX MS6013**

# MOX MS6013 極順焊 TECHNICAL BRIEF

**A versatile, easy to use general purpose rutile coated electrode formulated to give superior welding characteristics and excellent all-positional capability**

## General Description

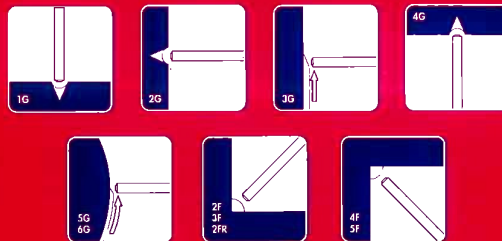
MOX MS6013 is a new generation of versatile and extremely user-friendly welding electrode. The advanced flux formulation contains easily ionised materials that impart superb arc control with medium penetration, as well as consistently depositing high quality weld metal. The electrode's outstanding characteristics are:

- Smooth and steady arc
- Very stable metal transfer
- Fine, and very low spatter
- Low-fume level
- Delightfully easy to release slag, self-lifting in most conditions
- Generates high operator appeal
- Easy and positive arc striking and restriking
- Fine, smoothly rippled deposits
- Outstanding, out-of-position welding performance
- Neatly rippled fillets
- Steady arc even on low open circuit voltage (50V)
- Suitable for both A.C. & D.C.± welding

## Technical Performance

With a coating formulation that is specially designed to generate unmatched ease-of-use with wide welder appeal, MOX MS6013 deposits high X-ray quality weld metal, with mechanical properties meeting Grade 2 shipping body specifications. The electrode is suitable for a wide range of fabrication applications:

- Steel structures - trusses, portal frames, tubed framework
- Sheet and plate metal structures and containers - plating, storage tanks, hoppers, silos, bins
- Field jointing of pipes for water, gas and fluid transmission
- Site joining of H/sheet/pipe piles
- Ship plates and structures
- Light steel frames - grills, ornamental and gate works, furniture
- General workshop welding and maintenance
- Compatible, and suitable for welding steels to:
  - ASTM (e.g. A36)
  - BS EN 10025 (e.g. S275, S275 JR)
  - API Std. 5L (e.g. Grade A, B, A25, X42, X46)
  - BS 4360 (e.g. Grade 40, 43)
  - JIS G3101 (e.g. SS330, SS400, SS490)
  - JIS G3106 (e.g. SS400A, B&C)



## Quality Assurance

MOX MS6013 is manufactured to stringent procedures in an ISO 9002 certified facility, meeting at the same time the high quality level required by international shipping approval bodies (Lloyds, ABS, DNV). Each piece of electrode is explicitly identified by its tradename and AWS classification code.

## Classifications

|               |               |
|---------------|---------------|
| AWS A5.1      | : E 6013      |
| ASME-SFA A5.1 | : E 6013      |
| BS EN 499     | : E 42 O R 12 |
| JIS Z 3211    | : D 4313      |

## Approvals

|              |         |
|--------------|---------|
| LLOYDS (LRS) | Grade 2 |
| ABS          | Grade 2 |
| DNV          | Grade 2 |

## Typical Mechanical Properties of Weld Metal

|                   |                       |
|-------------------|-----------------------|
| Yield Strength    | 487 N/mm <sup>2</sup> |
| Tensile Strength  | 549 N/mm <sup>2</sup> |
| Elongation        | 23%                   |
| Reduction of Area | 57%                   |
| CVN Impact Values | 58J av @ 0°C          |

## Typical Chemical Composition of Weld Metal (%)

|                |       |
|----------------|-------|
| Carbon (C)     | 0.064 |
| Manganese (Mn) | 0.500 |
| Silicon (Si)   | 0.350 |
| Sulphur (S)    | 0.015 |
| Phosphorus (P) | 0.013 |

## TYPICAL OPERATING PARAMETERS

| Size (mm)  | Packing (kg) | RECOMMENDED CURRENT (A) - AC/DC ± |     |     |     |     |     | ARC VOLTAGE (V) |
|------------|--------------|-----------------------------------|-----|-----|-----|-----|-----|-----------------|
|            |              | Range                             | 1G  | 2F  | 3G  | 4G  | 6G  |                 |
| 2.0 x 350  | 4 x 5.0      | 40-55                             | 50  | 50  | 45  | -   | -   | 17-21           |
| 2.6 x 350  | 4 x 5.0      | 60-100                            | 80  | 95  | 75  | 80  | 80  | 17-21           |
| 3.25 x 400 | 4 x 5.0      | 90-130                            | 115 | 125 | 110 | 110 | 110 | 18-22           |
| 4.0 x 400  | 4 x 5.0      | 130-180                           | 155 | 170 | 145 | 150 | 150 | 18-23           |
| 5.0 x 400  | 4 x 5.0      | 170-240                           | 220 | 230 | 210 | -   | -   | 19-24           |

Note: 1) Optimum welding current is also dependant on weld pass number and operator preference.  
2) Welding arc voltage may vary, depending on coating condition and run location.

Manufactured and Distributed by:-



**Malaysian Oxygen Berhad (3928-D)**  
13, Jalan 222,  
46100 Petaling Jaya, Selangor D.E., Malaysia.  
Tel: 03- 755 4233 Fax: 03- 756 6389



# MR70

A high strength, low hydrogen E7018 C-Mn shielded metal-arc welding electrode formulated to achieve optimum mechanical and metallurgical properties – with an added touch of difference in welding appeal.



Malaysia's Leader  
In Welding Technology



**A high strength, low hydrogen E7018 C-Mn shielded metal-arc welding electrode formulated to achieve optimum mechanical and metallurgical properties – with an added touch of difference in welding appeal.**



MR70 represents a new generation of basic coated E7018 carbon-manganese welding electrode with a flux coating formula that not only optimises mechanical properties but promotes a low hydrogen potential in the weld metal.

- The flux coating is designed to exhibit low moisture pick-up characteristics. As such, MR70 is a moisture-resistant, hydrogen controlled electrode suitable in applications where HAZ and/or lamellar tearing may be encountered.
- The electrode gives the welder excellent control – an appeal found lacking in most other low hydrogen welding applications.
- A 110 – 120% nominal electrode efficiency can be obtained as a result of the iron powder additions in the flux coating.
- Depending on cast and alloy steel compositions (e.g. BS 3100, EN type steels), MR70 will deposit crack-free joints in conjunction with preheating levels of 100–350°C.
- MR70 is suitable for the welding of all mild and high strength C-Mn and microalloyed type steels (ASTM A36, A516, A106, A573, A572; BS4360 Grade 40, 43, 50; API Spec 5L X52, X56, X60, X65; JIS 3106 SM41, SM50)
- It is also recommended for heavy duty structures, pipelines, tubular and pressure vessel fabrication work.
- Manufactured to exacting procedures and high quality levels. Internationally approved by shipping classification bodies like LRS, ABS and DnV.
- Recommended for coded type work (e.g AWS D1.1. API 1104, BS 4515 and BS 5135) where stringent specifications are often encountered.
- Packed in hermetically sealed cans.

## Classification

|                |                    |
|----------------|--------------------|
| AWS A5.1: 1981 | E7018              |
| BS 639: 1986   | E5154B (120 26H)   |
| ISO 2560       | E 515 B 120 26 (H) |

## Approvals

|   |
|---|
| American Bureau of Shipping (ABS) Grade 3H, 3Y  |
| Lloyd's Register of Shipping (LRS) Grade 3, 3YH |
| Det Norske Veritas (DnV) Grade 3YHH             |

## Chemical Composition (%)

|                 |       |
|-----------------|-------|
| Carbon (C)      | 0.07  |
| Manganese (Mn)  | 1.02  |
| Silicon (Si)    | 0.50  |
| Sulphur (S)     | 0.011 |
| Phosphorous (P) | 0.014 |

## Mechanical Properties

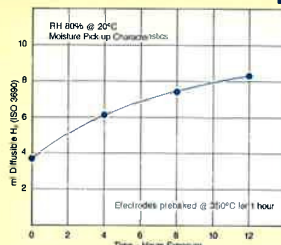
|                       |                       |
|-----------------------|-----------------------|
| Yield Strength        | 414 N/mm <sup>2</sup> |
| Tensile Strength      | 510 N/mm <sup>2</sup> |
| Elongation            | 28%                   |
| Reduction of Area     | 78%                   |
| Impact Strength (CVN) | 117J @ - 20°C         |

## Recommended Redrying Procedures

|                             |   |
|-----------------------------|---|
| 150°C for 2 hours           | General conditioning of electrodes; applicable for restrained joints in 20–40 mm thick mild steel sections.   |
| 250°C for 2 hours           | Suggested for fabrication of pressure vessels and high strength structural steelwork.   |
| 350°C for 1 hour<br>– 450°C | Recommended for critical steel structures (offshore, chemical and gas processing plants) and transmission pipelines where high integrity welding is demanded; welding of hardenable alloy steels. |

To preserve and maintain the low hydrogen characteristics, electrodes after redrying must be stored in a holding oven at 110–150°C to prevent moisture reabsorption.

## Moisture Reabsorption.



## Typical Operating Data

| Size (mm) | Length (mm) | Recommended Currents (A) |     |
|-----------|-------------|--------------------------|-----|
|           |             | Min                      | Max |
| AC or DC+ |             |                          |     |
| 2.6       | 350         | 55                       | 100 |
| 3.25      | 400         | 80                       | 150 |
| 4.0       | 400         | 130                      | 200 |
| 5.0       | 400         | 180                      | 260 |



For all technical enquiries and services please contact:

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Telefax : 03-756 6389

# SATINCROME 308L-16 316L-16

The new standard in stainless steel welding



# SATINCROME 308L-16 – technical brief

The new standard in stainless steel welding



SATINCROME 308L-16 and SATINCROME 316L-16 are developed to set new high standards in manual arc welding of stainless steel. Manufactured to consistent high quality levels, the electrodes are packed in moisture proof re-sealable packs. These rutile coated electrodes deposit weld metal of very low carbon levels – less than 0.03%. This is an important prerequisite for the successful welding and operation of high quality stainless steel structures, vessels and containers.

- SATINCROME – tranquil, soft smooth arc with minimum spatter; easy arc control
- Deposits flat to concave fillet welds
- Good wash-in at edges
- Easy to remove slag, even self detaching
- SATINCROME – welds with a neat, finely rippled weld appearance, A.C. or D.C.
- Good re-strike hot or cold
- Electrodes individually branded
- Moisture proof re-sealable pack

Typical applications:-

- SATINCROME 308L-16: All grades of 18/8 ELC stainless steels including AISI 302, 304, 304L
- SATINCROME 316L-16: 19Cr/12Ni/3Mo type stainless steels including AISI 316, 316L

## Classification

|                    |                 |              |
|--------------------|-----------------|--------------|
| SATINCROME 308L-16 | : AWS A5.4:1981 | E308L-16     |
|                    | BS 2926:1970    | 19.9L.R.     |
| SATINCROME 316L-16 | : AWS A5.4:1981 | E316L-16     |
|                    | BS 2926:1970    | 19.12.3.L.R. |

## Chemical Analysis %

|                 | 308L  | 316L  |
|-----------------|-------|-------|
| Carbon (C)      | 0.025 | 0.025 |
| Chromium (Cr)   | 19.5  | 18.0  |
| Nickel (Ni)     | 9.8   | 11.5  |
| Molybdenum (Mo) | –     | 2.7   |
| Manganese (Mn)  | 1.0   | 1.0   |
| Silicon (Si)    | 0.9   | 0.9   |

## Mechanical Properties

|                     |                   | 308L | 316L |
|---------------------|-------------------|------|------|
| Yield Strength      | N/mm <sup>2</sup> | 430  | 430  |
| Tensile Strength    | N/mm <sup>2</sup> | 610  | 610  |
| Elongation %        |                   | 40   | 40   |
| Reduction of Area % |                   | 50   | 50   |

## Storage and Drying of Electrodes

- Electrodes should be stored in a dry place
- If damp, drying at 150°C for 30 minutes is recommended
- For X-ray quality levels, electrodes should be redried at 250°C for 30 minutes

## Typical Operating Data

| Size (mm) | Length (mm) | Recommended Currents (A) |     |
|-----------|-------------|--------------------------|-----|
|           |             | Min                      | Max |
|           |             | A.C. or D.C.             |     |
| 2.5       | 300         | 40                       | 80  |
| 3.25      | 350         | 75                       | 110 |
| 4.0       | 350         | 100                      | 150 |



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## Tough wear-resisting alloy steel electrode



DUROID 2 is a general purpose wear-resisting alloy steel electrode. The air-hardening chromium-molybdenum (Cr-Mo) alloy steel deposit has high strength and toughness combined with good abrasion resistance. The general characteristics of DUROID 2 are:

- The electrode is smooth running and exhibits excellent metal transfer and slag control
- An electrode suitable for rebuilding of badly worn mild and alloy steel components, and for buffer layers prior to deposition of harder deposits
- Refined and balanced weld metal chemistry giving reliable hardness and crack free deposits
- Deposit hardness: 300 – 350 HV
- A.C./D.C. supply suitable; can be used on low O.C.V. machines (minimum O.C.V. 50)
- Deposit is machinable

For hardfacing, rebuilding or buffering with DUROID 2, the removal of millscale, heavy rust, fatigued or deformed metal, is recommended. Preheat heavy sections or alloy steels in accordance with normal welding practice. This general purpose, metal-enriched coated electrode is suitable for steel components like:

- Tractor idler wheels, rollers and track links
- Surfacing gears, mine rails, shovel pads, pins and clutches
- Rebuilding of shafts, wheel treads and agricultural implements

### Classification

Equivalent to AWRA 1435-A4  
JIS DF2A-350-R  
DIN 8555:E1-350

### Chemical Composition (%)

|                 |      |
|-----------------|------|
| Carbon (C)      | 0.07 |
| Manganese (Mn)  | 0.90 |
| Silicon (Si)    | 0.30 |
| Chromium (Cr)   | 1.70 |
| Molybdenum (Mo) | 0.50 |

### Mechanical Properties

Deposit Hardness: 300 – 350 HV

### Typical Operating Data

| Size (mm) | Length (mm) | Recommended Currents (A) |     |
|-----------|-------------|--------------------------|-----|
|           |             | Min                      | Max |
|           |             | A.C. or D.C.             |     |
| 3.25      | 400         | 100                      | 150 |
| 4.0       | 400         | 140                      | 200 |
| 5.0       | 400         | 170                      | 250 |
| 6.0       | 400         | 240                      | 300 |



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# DUROID 600

Hard martensitic steel electrode  
for wear resistance against severe abrasion  
and moderate impact conditions



Malaysia's Leader  
In Welding Technology





## Hard martensitic steel electrode for wear resistance against severe abrasion and moderate impact conditions



DUROID 600 is an easy-to-use 100% recovery hardfacing alloy electrode. It deposits an air-hardening martensitic steel weld metal that exhibits high resistance to severe abrasive conditions and absorbs moderate impact forces.

- Smooth running rutile electrode exhibiting excellent weld pool and slag control in all positions
- The deliberate alloying in the flux coating results in a high carbon martensitic weld matrix microstructure
- DUROID 600 is recommended where wear due to gouging, high stress grinding, low stress abrasion or erosion is encountered
- It is also used in the reclamation of worn-out parts and extending component life
- Suitable for the hardfacing of mild and alloy steel components
- Deposit hardness: 550 – 650 HV
- Suitable for A.C./D.C. electrical supply. Minimum O.C.V. is 60V. On D.C. electrode negative is preferred to reduce dilution from the parent metal
- The self air-hardening deposit is machinable by grinding only

During hardfacing with DUROID 600 the removal of millscale, heavy rust, fatigued or deformed metal is advisable. For improved weldability and heat affected zone (HAZ) crack resistance, the preheating of heavy sections or low alloy steels to 100°C – 300°C is suggested. Where rebuilding is necessary for a heavily worn component FERROCRAFT 61, MULTICRAFT 7016 or DUROID 2 is recommended before hardfacing the final 1–3 layers with DUROID 600.

DUROID 600 is suitable for the following applications:

- Conveyor feed screws
- Augers
- Buckets
- Grouzers
- Agricultural implements
- Pump housings
- Earth scoops
- Palm oil mill screws
- Earth moving equipment
- Mixing paddles

### Classification

Equivalent to AS2576 : 1855 – A4  
 DIN8555 : E2 – 55  
 JISZ3251 : DF2B – 600R

### Chemical Composition (%)

|                |     |
|----------------|-----|
| Carbon (C)     | 0.7 |
| Manganese (Mn) | 1.1 |
| Silicon (Si)   | 1.0 |
| Chromium (Cr)  | 3.0 |

### Mechanical Properties

Deposit Hardness: 550 – 650HV  
 (53 – 57HRC)

### Typical Operating Data

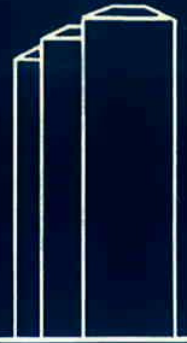
| Size (mm) | Length (mm) | Recommended Currents (A) |     |
|-----------|-------------|--------------------------|-----|
|           |             | Min                      | Max |
|           |             | A.C. or D.C.             |     |
| 3.25      | 400         | 90                       | 130 |
| 4.0       | 400         | 120                      | 170 |
| 5.0       | 400         | 160                      | 210 |



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# CASTWELD 55M

A distinctive graphite coated Ni-Fe alloy electrode specially formulated for the all-positional welding of cast irons: successful arcing with CASTWELD 55M – 'The Black Knight'

黑騎士



The Black Knight

黑騎士



Malaysia's Leader  
In Welding Technology



## A distinctive graphite coated Ni-Fe alloy electrode specially formulated for the all-positional welding of cast irons – successful arcing with 'The BLACK KNIGHT' 黑騎士



Using controlled procedures, CASTWELD 55M ('The Black Knight') contains 55% nickel which promotes the successful welding of cast iron with the following inherent attributes.

- Distinctive black graphite coating
- Soft, quiet arc with a shallow penetration
- Reduces weld metal dilution and formation of brittle phases with its low heat input
- The nickel ferrous alloy easily handles any carbon dilution; offers high resistance to solidification cracking caused by phosphorous and sulphur, especially during the welding of grey cast irons
- Deposits a strong weld metal on low welding current – A.C. and D.C., with good wettability in all positions
- Suitable for the welding of grey, malleable and the higher strength ductile nodular (SG) high duty cast irons
- Also used for welding cast iron to steel, the buttering of cast iron joint faces, surfacing of defects, porosities and cavities

### Classification

|                  |            |
|------------------|------------|
| AWS A5.15 : 1982 | ENiFe – CI |
| DIN 8573 : 1978  | NiFe       |
| JIS Z3252 : 1976 | DFCNiFe    |

### Chemical Composition (%)

|                |      |
|----------------|------|
| Carbon (C)     | 1.8  |
| Silicon (Si)   | 0.6  |
| Manganese (Mn) | 0.6  |
| Nickel (Ni)    | 53.0 |
| Ferrous (Fe)   | 44.0 |

### Mechanical Properties

|                  |                       |
|------------------|-----------------------|
| Yield Strength   | 280 N/mm <sup>2</sup> |
| Tensile Strength | 400 N/mm <sup>2</sup> |
| Hardness         | 160 – 180 HV          |

### Welding Hints On Cast Iron

#### General Preparation

- Casting skin should be removed
- Impregnated oil should be removed by swabbing and light heating (50° – 300°C) to improve wettability and porosity free welds
- Drill holes (2 – 4mm) at crack ends to prevent further propagation
- Bevelled joints should be 70°–90° and the sharp edges rounded

#### Cold/No Preheat Welding

- With CASTWELD 55M, the cast iron can be welded without preheating; the weld metal yields readily and relieve stresses
- Especially useful and efficient for workpieces of relative small size or thickness
- Reduced penetration and weld metal dilution
- Restricts formation of brittle white iron eutectics and extent of heat affected zone
- Use low amps and interrupt welding with short bead lengths (25-50mm)
- Generally employed in arc welding of cast iron

#### Welding With Preheating

- Avoid excessive local heating, apply preheat evenly
  - Dissipates shrinkage stresses and reduces distortion
  - Improves wettability and machinability
  - Reduces incidents of weld porosity
  - Preheating recommendations (for SMAW/ manual arc welding):
- |                          |          |
|--------------------------|----------|
| Grey, Flaky CI           | 300°C    |
| Malleable CI (ferritic)  | RT-150°C |
| Malleable CI (pearlitic) | 300°C    |
| Ductile CI (ferritic)    | RT-150°C |
| Ductile CI (pearlitic)   | 300°C    |

#### Postweld Heat Treatment

- PWHT is to be carried out only with proper equipment (furnace) for close temperature control
- Annealing 3-4hr @ 900°-950°C → 5hr @ 700°C → slow cool to 350°C
- Stress-relieving 1hr @ 590°-620°C → slow cool to 350°C

### Typical Operating Data

| Size (mm)      | Length (mm) | Recommended Currents (A) |     |
|----------------|-------------|--------------------------|-----|
|                |             | Min                      | Max |
| A.C. or D.C. + |             |                          |     |
| 2.5            | 340         | 30                       | 70  |
| 3.25           | 340         | 50                       | 100 |
| 4.0            | 340         | 80                       | 130 |



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