



Spec No
KAI-S- 01



Date
07.01.2017



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"MANGALAM" M.S., F.S, S.S. Welding Electrodes and Mig Wires

REFERENCE: AWS / SA5.1 IS 814

Type of Electrodes: M.S. Electrodes

1. 16013X , E6013 , ER4211X

Application : All position medium coated rutile electrode with excellent usability characteristics for producing radiographic quality welds. Can be used for pipes & tubes up to 12 mm thickness

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon : 0.08 Max Manganese : 0.4 – 0.6 Silicon : 0.20 Sulphur :0.03 Max Phosphorous :0.03 Max	Yield Strength : 420N/mm ² Ultimate Tensile : 490N/mm ² Elongation : 25 % CVN Impact Strength : 60J at 0° C	2.50 x 350	AC/DC (+/-)	80-110	125	1500
		3.15 x 350	AC/DC (+/-)	90-130	90	1080
		4.00 x 450	AC/DC (+/-)	140-190	60	720
		5.00 x 450	AC/DC (+/-)	170-230	40	480

1.2. HIGH TIDE® 6013 E6013 ER4211X

Application : All position medium coated rutile electrode with excellent usability characteristics for producing radiographic quality welds. Can be used for pipes & tubes up to 12 mm thickness

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon : 0.08 Max Manganese : 0.4 – 0.6 Silicon : 0.20 Sulphur :0.03 Max Phosphorous :0.03 Max	Yield Strength : 420N/mm ² Ultimate Tensile : 490N/mm ² Elongation : 25 % CVN Impact Strength : 60J at 0° C	2.50 x 350	AC/DC (+/-)	80-110	125	1500
		3.15 x 350	AC/DC (+/-)	90-130	90	1080
		4.00 x 450	AC/DC (+/-)	140-190	60	720
		5.00 x 450	AC/DC (+/-)	170-230	40	480

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"MANGALAM" M.S., F.S, S.S. Welding Electrodes and Mig Wires

1.3.E7016 EB5426H3X

Application : E7016 EB5426H3X Basic coated low hydrogen iron powder all position electrodes for giving radiographic quality for joints subjected to resistant. Suitable for pipe welding application. Metal Recovery Around 100%.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
Carbon : 0.07 Max Manganese : 1.20 Silicon : 0.30 Sulphur :0.02 Max Phosphorous :0.02 Max	Yield Strength : 420N/mm ² Ultimate Tensile : 550N/mm ² Elongation : 26 % CVN Impact Strength : 60J at (-) 30° C	2.50 x 350	AC/DC (+)	60-90	150	600
		3.15 x 350	AC/DC (+)	110-130	100	400
		4.00 x 450	AC/DC (+)	140-180	70	340
		5.00 x 450	AC/DC (+)	190-250	45	180

1.4. E7018 EB5426H3JX

Application : Basic Coated low hydrogen iron powder all position electrode for giving radiographic quality welds subjected to resistant. Resists hot & cold cracking. Weld is strong ductile & though. Suitable for components subjected to dynamic loading. Can be used for pressure parts particularly in thermal plants Metal recovery 115%.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
Carbon : 0.07 Max Manganese : 1.30 Silicon : 0.30 Sulphur :0.02 Max Phosphorous :0.02 Max	Yield Strength : 480N/mm ² Ultimate Tensile :550N/mm ² Elongation : 27 % CVN Impact Strength : 80J at (-)30° C	2.50 x 350/450	AC/DC (+)	80-100	150	600
		3.15 x 350/450	AC/DC (+)	110-130	100	400
		4.00 x 450	AC/DC (+)	150-200	70	280
		5.00 x 450	AC/DC (+)	190-250	45	180

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"MANGALAM" M.S., F.S, S.S. Welding Electrodes and Mig Wires

1.5. E7018-1 EB5629H3JX

Application : Basic Coated low hydrogen iron powder all position electrode for giving radiographic quality welds resistant hot & cold cracking. Welds is strong, ductile & tough down to 45oc. Suitable for components subjected to dynamic loading & pressure parts.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon : 0.10 Max Manganese : 1.40 Silicon : 0.50 Sulphur :0.03 Max Phosphorous :0.03 Max	Yield Strength : 490N/mm ² Ultimate Tensile :550N/mm ² Elongation : 27 % CVN Impact Strength : 80J at (-) 45° C	2.50 x 350	AC/DC (+)	80-100	150	600
		3.15 x 450	AC/DC (+)	100-135	100	400
		4.00 x 450	AC/DC (+)	140-180	70	280
		5.00 x 450	AC/DC (+)	180-250	45	180

1.6. MANGALAM ®SUPREME 6013XX E6013ER4121X

Application : A heavy coated all position rutile electrodes for depositing heavier welds. Would be useful for application where slower cooling rates are required.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon : 0.07 Max Manganese : 0.35 Silicon : 0.25 Sulphur :0.03 Max Phosphorous :0.03 Max	Yield Strength : 430N/mm ² Ultimate Tensile :500N/mm ² Elongation : 24 % CVN Impact Strength : 60J at (+) 27° C	2.50 x 350	AC/DC (+)	80-100	150	600
		3.15 x 450	AC/DC (+)	100-135	100	400
		4.00 x 450	AC/DC (+)	140-180	70	280
		5.00 x 450	AC/DC (+)	180-250	45	180

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"MANGALAM" M.S., F.S, S.S. Welding Electrodes and Mig Wires

1.7. MANGALAM® VD 6013 E6013 ER4211X

Application : A rutile coated all position electrode particularly designed for vertical down welding. Ideally suited for fillet welds in vertical down position and Tee Joints.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
Carbon : 0.07 Max Manganese : 1.20 Silicon : 0.30 Sulphur :0.02 Max Phosphorous :0.02 Max	Yield Strength : 480N/mm ² Ultimate Tensile :550N/mm ² Elongation : 27 % CVN Impact Strength : 60J at (+) 27° C	2.50 x 350	AC/DC (+)	80-110	125	1500
		3.15 x 350	AC/DC (+)	90-130	90	1080
		4.00 x 450	AC/DC (+)	140-190	60	780
		5.00 x 450	AC/DC (+)	170-230	40	480

1.8. MANGALAM ®CUTRODE

Application : Used for cutting/ Piercing Steel Plate. Gives a forceful arc that shears base material.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
		3.15 x 350 /450	AC/DC (+)	160-180	90	1080

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"MANGALAM" M.S., F.S, S.S. Welding Electrodes and Mig Wires

2. Hard Facing Electrodes

2.1. MANGALAM ® HF 250 R

Application : Shaft, Journals, Gear Teeth

Feature : Rutile Electrode giving machinable deposit with hardness 250 VPN Gives moderate abrasion.

Welding Chemistry %	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
C 0.02 -0.03 SI 0.05-0.80 MN 0.08- 1.20	3.20 X 350	AC/DC (-)	100-140	130	520
	4.00 X 450	AC/DC (-)	140-180	85	340
	5.00 X 450	AC/DC (-)	180-220	55	220

2.2 MANGALAM ® HF 350 R

Application : Similar application requiring higher hardness.

Feature : Rutile Electrode giving machinable deposit with special Tools, hardness 350 VPN Gives medium resistance abrasion

Welding Chemistry %	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
C 0.15 -0.25 SI 0.50-0.80 MN 3.00- 3.50 CR 0.30-0.70	2.50 X 350	AC/DC (-)	70-90	225	1500
	3.20 X 350	AC/DC (-)	100-140	130	1080
	4.00 X 450	AC/DC (-)	140-180	85	780
	5.00 X 450	AC/DC (-)	180-220	55	220

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"MANGALAM" M.S., F.S, S.S. Welding Electrodes and Mig Wires

2.3 MANGALAM ® HF 650 R

Application : Crusher jaws, Bucket Teeth, Pulveriser Hammer Cement Mill, cane cutting Knives & Hammer

Feature : Rutile Electrode giving non machinable deposit which can be finished by grinding only hardness by 650 VPN. Gives heavy resistance to abrasion.

Welding Chemistry %	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
C : 0.40 -0.65 SI : 0.20-0.070 MN : 0.20-0.70 CR : 6.00-7.00	2.50 X 350	AC/DC (-)	70-90	225	900
	3.20 X 350	AC/DC (-)	100-140	130	520
	4.00 X 450	AC/DC (-)	140-180	85	340
	5.00 X 450	AC/DC (-)	180-220	55	220

2.4 MANGALAM ®HF 250 LH

Application : Similar application requiring higher hardness.

Feature : Basic low hydrogen electrode giving machinable deposit .Hardness 250 VPN Gives moderate resistance to abrasion

Welding Chemistry %	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
C : 0.02 -0.03 SI :0.05-0.08 MN :0.08- 1.20	3.20 X 350	AC/DC (+)	100-140	135	520
	4.00 X 450	AC/DC (+)	140-180	85	340
	5.00 X 450	AC/DC (+)	180-220	55	220

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2.5 MANGALAM ®HF 350 LH

Application : Similar application requiring higher hardness.

Feature : Basic low hydrogen electrode giving machinable with special tool hardness 350 VPN gives crack free deposit, gives medium resistance to abrasion.

Welding Chemistry %	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
C 0.15 -0.25 SI 0.50-0.80 MN 3.00- 3.50 CR 0.30-0.70	2.50 X 350	AC/DC (-)	70-90	225	900
	3.20 X 350	AC/DC (-)	100-140	130	520
	4.00 X 450	AC/DC (-)	140-180	85	340
	5.00 X 450	AC/DC (-)	180-220	55	220

2.6 MANGALAM ®HF 650 LH

Application : Crusher jaw, Bucket Teeth, Rock crusher Hammer, Ploughs, Cane Cutting knives, & Hammers, Cement mill Hammers..

Feature : Basic low hydrogen electrode giving deposit which can be finished by grinding only gives crack free deposit .Hardness 650 VPN,Gives heavy resistance to abrasion.

Welding Chemistry %	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
C 0.40 -0.60 SI 0.50-0.80 MN 0.60-1.20 CR 6.00-7.00	2.50 X 350	AC/DC (-)	70-90	225	900
	3.20 X 350	AC/DC (-)	100-140	130	520
	4.00 X 450	AC/DC (-)	140-180	85	340
	5.00 X 450	AC/DC (-)	180-220	55	220

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2.7 MANGALAM ® ROLLER FACING ELECTRODES

Application : Sugar mill Rusher Teeth

Feature : Basic used to roughen sugar mill roll crusher teeth, both dry and wet arcing are possible. Ensuring bagdss sticks to the teeth improving juice AC/DC

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
		4X 450	AC/DC (-)			

3. Stainless steel Electrodes

3.1 MANGALAM® 308-16 E308-16

Application : Rutile type electrode for welding of AISI 301, 302, 305 & 308 Stainless Steel. Weld metal has excellent resistance to cracking and good toughness.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon 0.07 Max Manganese 1.30 Max Silicon 0.40 Max Chromium 20.0 Max Nickel 0.03 Max	Ultimate Tensile :640N/mm ² Elongation : 35 %	2.00 x 300	AC/DC (+)	35-45	210	1050
		2.50 x 350	AC/DC (+)	45-85	110	550
		3.15 x 350	AC/DC (+)	8-115	70	350
		4.00 x 350	AC/DC (+)	100-140	50	250
		5.00 x 350	AC/DC (+)	140-180	30	150

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3.2 MANGALAM® 308L-16 E308L-16

Application : Rutile type extra low carbon electrode for welding of AISI 304L, 308L, 321 & 347 Stainless steel. Weld metal has good ductility & resistant to cracking & oxidation.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon 0.07 Max Manganese 1.30 Max Silicon 0.40 Max Chromium 20.0 Max Nickel 0.03 Max	Ultimate Tensile :600N/mm ² Elongation : 35 %	2.50 X 350	AC/DC(+)	45-85	110	550
		3.150 X 350	AC/DC(+)	8-115	70	350
		4.00 X 450	AC/DC(+)	100-140	50	250
		5.00 X 450	AC/DC(+)	140-180	30	150

3.3 MANGALAM® 309-16 E309-16

Application : Rutile type electrode for welding of AISI 309 Stainless Steel. Ideal for dissimilar metal welding and cladding.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per carton)
Carbon 0.06 Max Manganese 1.70 Max Silicon 0.50 Max Chromium 25.0 Max Nickel 12.00 Max	Ultimate Tensile :600N/mm ² Elongation : 35 %	2.50 X 350	AC/DC(+)	45-85	110	550
		3.150 X 350	AC/DC(+)	8-115	70	350
		4.00 X 450	AC/DC(+)	100-140	50	250
		5.00 X 450	AC/DC(+)	140-180	30	150

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3.4 MANGALAM® 309L-16 E309-16

Application : Rutile type electrode for welding of AISI 309L Stainless Steel has got excellent resistance to intergranular corrosion. Used as Buffer layer before depositing 410 & 430 weld metal.

Welding Chemistry %	Mechanical Properties	Size	Current Amp	Current Amp	Pieces (per Pack)	Pieces (Per cartoon)
Carbon 0.04 Max Manganese 1.80 Max Silicon 0.50 Max Chromium 25.0 Max Nickel 12.00 Max	Ultimate Tensile :570N/mm ² Elongation : 40 %	2.50 X 350	AC/DC(+)	50-70	110	550
		3.150 X 350	AC/DC(+)	70-100	70	350
		4.00 X 450	AC/DC(+)	100-140	50	250
		5.00 X 450	AC/DC(+)	140-180	30	150

4: MIG Wire

Application : MANGALAM MIG Wire is Double Deoxidized Copper Coated Carbon Steel MIG Filter Wire for MIG/MAG welding of Carbon steels, General & Structural Engineering. It has a Uniform copper coating, smooth feeding, stable arc and minimum spatter under optimum welding conditions. Normally recommended with CO₂ shielding, can be used with Ar-CO₂ mixtures also. The higher content of deoxidizers makes this wire suitable for applications where dirt, rust or mill-scale is present. WELDING POSITIONS-F,H,V-up, V-down, OH SHIELDING GAS-Co₂

Sr. no	Classification	Weld metal chemistry %	Mechanical Properties			Wire Chemistry
			Properties	100% Co ₂	80/20 Ar Co ₂	
1	AWS A /SFA 5.18 ER 70S-6	Wide application in automotive industries and mining equipment, railway	UTS YS	550	550-600	C – 0.08 Mn – 1.50
2	IS 649 1996 S4-C 504		Elongation (L=xd) CVN	450 22%	480- 520 24 Min	

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3	Din 8559 SG-2	wagons and coaches etc. Also suitable for welding pipe pressure vessels LPG Cylinders ,pre engineering building and structural steel components	Impact at 30° C- 20° C	50-80 30-50	80-120 60-90	Si- 0.80 S- 0.016 p- 0.020 Cu-0.58
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Current Condition			Packing Data
Size (mm)	Current condition	volt	
0.8	70-220	18-24 V	Size – 0.8 mm -12.5 Kg Size 1.2mm – 15 Kg
1.00	100-275	20-18 V	
1.2	150-300	24-30 V	
1.6	200-400	24-30 V	

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