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Rutile Electrodes for Welding Non-Alloy Steels

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AMA 1303C	13
AMA 1531	14
AMA 2000	15
AMA 2000A	16
AMA 23AK	17
AMA MK 14	18
AMA PL	19

Standards

AWS/ASME SFA – 5.1

E 7014

Applications and Properties:

High metal recovery rutile electrode, due to iron powder. Suitable for welding AC and DC. Easy removal and smooth bead appearance.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.09	0.45	0.35	<0.02	<0.02

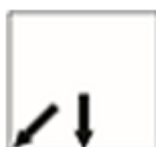
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C
>490	>400	>20	>70



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
4	350	150 – 190
5	450	180 – 280



Materials:

DIN Standard St 37-2 to St 52-2; St 37.0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GS-38; GS-52

EN Standard S235JR to E295; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH

ASTM Standard ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; 50; 55; A607 Gr.45; 50; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50

Redrying: if necessary 1 hour at 100°C – 120°C

Standards	
AWS/ASME SFA – 5.1	E 6019
EN 499	E 38 0 RC 11

Applications and Properties:

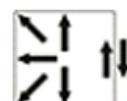
Rutile electrode with suitable penetration and mechanical properties. This electrode use for thick section steel fabrication. Easy arc striking and weld ability in all position are some property of this electrode.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	0.5	0.25	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V -18°C
400 - 550	>360	>22	>27



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 – 85
3.25	350	90 – 130
4.0	350	135 – 160
5.0	450	160 – 210



Materials:

DIN Standard	St 37-2 to St 44-2; St 37-0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GS-38; GS-52
EN Standard	S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH
ASTM Standard	ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50 API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Standards	
AWS/ASME SFA – 5.1	E 6013
DIN 1913	E 43 43 RR (B) 7
EN 499	E 38 2 RB 12
ISO 2560	E 38 2 RB 12

Applications and Properties:

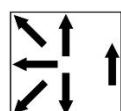
Rutile-Basic electrode is suitable for welding structural steels. Having a slow Si-content, Weld metal is particularly suited for subsequent galvanizing.

Weld metal analysis in % (typical values):		
C	Si	Mn
0.08	0.2	0.6

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C -20°C
470-600	>380	>20	100 70



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	70 – 90
3.25	350	100 – 150
4.0	350	140 – 190
5.0	450	220 – 260



Materials:

DIN Standard St 37-2 to St 44-2; St 37-0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; WSTE 380;GS-38;GS52.

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH, P255NH – P355NH

ASTM Standard ASTM A36 a.A53 Gr. all; A106 Gr. A, B; C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Standards	
AWS/ASME SFA – 5.1	E 6013
DIN 1913	E 43 22 R (C) 3
EN 499	E 380 RC 11
ISO 2560	E 380 RC 11

Applications and Properties:

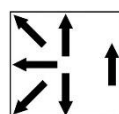
Rutile covered electrode for welding general structural steels, shipbuilding, pressure vessels, pipe steels, with easy arc striking and restriking, very smooth and finely, ripple weld base blend into base metal without undercut.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	0.50	0.40	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C
450 - 550	>360	>22	>60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 – 85
3.25	350	90 – 130
4.0	350	135 – 160
5.0	450	160 – 210
6.0	450	210–250



Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; GS-38; GS-45

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH

ASTM Standard ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Approval: LRS

Standards	
AWS/ASME SFA – 5.1	E 6013
DIN 1913	E 51 22 RR 6
EN 499	E 420 RR12
ISO 2560	E 380 RR 11

Applications and Properties:

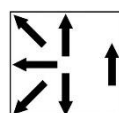
Thick-coated rutile type electrode is suitable for light section iron and steel fabrication, regular bead appearance of butt and fillet welds, absence of undercutting and self-detaching slag.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	0.60	0.45	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C 0°C	
>450	>360	>22	>60	>50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	70 – 100
3.25	450	110 – 140
4.0	450	140 – 190
5.0	450	160 – 220



Materials:

DIN Standard St 37-2 to St 44-2; St 37-0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GS-38; GS-45

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH

ASTM Standard ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Standards	
AWS/ASME SFA – 5.1	E 6013
DIN 1913	E 43 22 R (C) 3
EN 499	E 380 RC 11
ISO 2560	E 380 RC 11

Applications and Properties:

Rutile-Cellulosic type for general assembly works; also on lighter sheets. Highly Suitable for sheet metal containers, storage vessels and tanks. Excellent all-position weld ability including vertical-up and down. Ideal for fillet welding in the vertical-down position.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	0.50	0.30	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C 0°C	
450 – 550	>360	>22	>60	>50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 – 85
3.25	350	90 – 130
4.0	350	130 – 180
5.0	450	180 – 240



Materials:

DIN Standard St 37-2 to St 44-2; St 37-0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GS-38; GS-52

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH.

ASTM Standard ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50
API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Standards	
AWS/ASME SFA – 5.1	E 6013
DIN 1913	E 43 33 R (C) 3
ISO 2560	E 380 RC 11

Applications and Properties:

Medium coated rutile-electrode, suitable for welding of mild steel application. Easy arc striking, weld ability in all position, easy detachable slag & clean without undercut are some properties of this electrode.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	0.6	0.45	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C 0°C	
450 – 570	>360	>22	>60	>50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 - 85
3.25	350	90 - 140
4.0	350	130 - 180
5.0	450	180 - 240



Materials:

DIN Standard	St 37-2 to St 44-2; St 37-0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GS-38; GS-52
EN Standard	S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH
ASTM Standard	ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50. API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Standards	
AWS/ASME SFA – 5.1	E 6013
DIN 1913	E 43 22 R (C) 3
ISO 2560	E 380 RC 11

Applications and Properties:

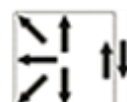
Rutile-Cellulosic electrode, suitable for welding of the small diameter gas pipes in vertical down position. Good penetration easy striking and restriking, smooth bead appearance without undercut and low spatter are some properties of this electrode.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.07	0.40	0.35	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C
450 – 550	>360	>22	>60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	50 - 85



Materials:

DIN Standard St 37-2 to St 44-2; St 37-0 to St 52-0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8

EN Standard L360NB; L290MB to L360MB; P235G1TH; P255G1TH;

ASTM Standard ASTM A36 a.A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B, A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr.45; A668 Gr. A, B, A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50
API 5 L Gr. B, X42-X46

Redrying: if necessary 1 hour at 100°C – 120°C

Alkaline Electrodes for Welding Non-Alloy Steels

AMA 1007 F.....	21
AMA 1177 F.....	23
AMA 1184F.....	25
AMA 1230F.....	27
AMA 1235F.....	29
AMA 1239F.....	30
AMA 1280M	32
AMA 1439F.....	34

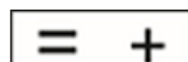
Standards	
AWS/ASME SFA – 5.1	E 7016 – H8
DIN 8529	E Y 42 55 Mn B H5
EN 499	E 42 5 B 41 H5

Applications and Properties:

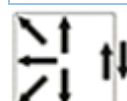
Multi-purpose electrode for assembly work, workshop & repair welding; also approved for rail joint welding. Smooth and clean weld blending into base metal without undercut. Good gap bridging properties. The electrode has a stable and concentrated arc and good suitability for AC welding. It is especially suited for root pass and positional welding. Welds are of X-ray quality.

Weld metal analysis in % (typical values):		
C	Mn	Si
0.08	1.3	0.45

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C -51°C
500 - 640	>420	>22	180 80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 90
3.25	350 - 450	90 - 140
4.0	350 - 450	135 - 190
5.0	350 - 450	190 - 260
6.0	350 - 450	300 - 380



Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to ST 52.0; St 37.4 to ST 52.4 ; StE 210.7 to StE 360.7; StE 210.7 TM toStE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL.

ASTM Standard A27 a.A36 Gr.all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr.A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55; A570

Gr.30, 33, 36, 40, 45; A 572 Gr.42, 50; A606 Gr. all; A607 Gr.45; A656 Gr.50, 60;
A668 Gr. A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr.1, 2; A935 Gr.45; A936
Gr.50. API 5 L Gr. B, X42-X56

Redrying: required at 300°C – 350°C for 2 hours

Standards	
AWS/ASME SFA – 5.1	E 7018 –1–H4
DIN 8529	E SY 42 76 Mn B
EN 499	E 42 6 B 42 H 5

Applications and Properties:

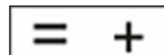
This electrode is suitable for producing crack-free and tough welding joints and also for welding steels having a carbon content of up to 0.6%. The weld metal has very low hydrogen content and is resistant to ageing. Approved for rail joint welding; Good gap bridging properties. The electrode has a stable and concentrated arc is therefore well suited for positional welding. Welds are of X-ray quality. CTOD-tested for offshore application.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.06	1.50	0.30	<0.02	<0.02

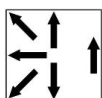
Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C -60°C	Heat Treatment
500 - 640	>420	>22	180 70	AW
500 - 640	>420	>22	160 60	SR

AW= as-welded

SR= Stress – relieved 15 hrs. /580 c



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 140
4.0	450	140 - 185
5.0	450	180 - 240
6.0	450	250 - 330



Materials:

DIN Standard

St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360,7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52.

EN Standard

S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N - S355N; P255NH to P355NH; S255NL to S355NL.

ASTM Standard A27 a.A36 Gr.all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr.A, B, C; A299 Gr.A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55; A570 Gr.30, 33, 36, 40, 45; A572 Gr.42, 50; A606 Gr.all; A607 Gr.45; A656 Gr.50, 60; A668 Gr.A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr.1, 2; A935 Gr.45; A936 Gr.50. API 5 L Gr. B, X42-X56

Redrying: required on 300°C to 350°C for 2 hours

Approvals: LR, GL, DNV, BV

Standards	
AWS/ASME SFA – 5.1	E 7016-1-H8
DIN 8529	E Y 42 67 Mn B H5
EN 499	E 42 6 B 42 H5

Applications and Properties:

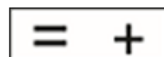
Multi – purpose electrode for assembly work, workshop & repair welding; also approved for rail joint welding. Smooth and clean weld blending into base metal without undercut. Good gap bridging properties. The electrode has a stable and concentrated arc and good suitability for AC welding. It is especially suited for root pass and positional welding. Welds are of X-ray quality.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.06	1.50	0.30	<0.02	<0.02

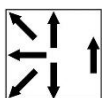
Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C -60°C	Heat Treatment
500 - 640	>420	>22	200 80	AW
500 - 640	>420	>22	170 60	SR

AW= as-welded

SR= Stress – relieved 15 hrs. /580 c



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350	90 - 140
4.0	350 - 450	140-185
5.0	350 - 450	180-240



Materials:

DIN Standard	St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360,7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52
EN Standard	S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL

ASTM Standard A27 a.A36 Gr.all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr.A, B, C; A299 Gr.A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55; A570 Gr.30, 33, 36, 40, 45; A572 Gr.42, 50; A606 Gr.all; A607 Gr.45; A656 Gr.50, 60; A668 Gr.A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr.1, 2; A935 Gr.45; A936 Gr.50.
API 5 L Gr. B, X42-X56

Redrying: required at 300°C to 350°C for 2 hrs

Approval: DNV

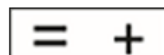
Standards	
AWS/ASME SFA-5.1	E 7018 - H8
DIN 1913	E 51 54 B 10
EN 499	E 42 3 B 42 H 10
ISO 2560	E 423 B 42 H 10

Applications and Properties:

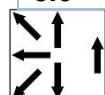
Electrode for producing crack-free and tough welding joints; weld metal recovery is approx. 115%. Smooth and clean welds blending into base metal without undercut. Good gap bridging properties, Welds are X-ray quality. Suitable for depositing layers on steels having higher carbon content (up to 0.4).

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.07	1.2	0.55	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO -V	
			+20°C	-30°C
500 - 640	>420	>22	140	90



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	100 - 140
4.0	450	140 - 190
5.0	450	190 - 250
6.0	450	260 - 340



Materials:

DIN Standard	St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to ST 52.0; St 37.4 to ST 52.4; StE 210.7 to StE 360,7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52
EN Standard	S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL
ASTM Standard	A27 a. A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55;

A570 Gr.30, 33, 36, 40, 45; A572 Gr.42, 50; A606 Gr. all; A607 Gr.45; A656 Gr.50, 60; A668 Gr. A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr.50. API 5 L Gr. B, X42 - X56

Redrying: required at 300°C to 350°C for 2 hours.

Approval: LR, GL, BV, DNV

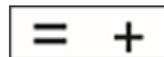
Standards	
AWS/ASME SFA-5.1	E 7018-H4
DIN 1913	E 51 55 B5
ISO 2560	E 42 5 B 42 H5

Applications and Properties:

Electrode for producing crack-free and tough welding joints; weld metal recovery is approx 115%. The electrode has good arc ability. Welds are X-ray quality .Suitable of welding steels having up to 0.4% C.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	1.40	0.50	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J)	
			ISO -V +20°C	-30°C
500 - 620	>400	>22	140	120



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	90 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to ST 52.0; St 37.4 to ST 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; STE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL

ASTM Standard A27 a. A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr.55; A570 Gr.30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50. API 5 L Gr. B, X42-X56

Redrying: required at 300°C to 350°C for 2 hours.

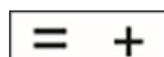
Standards	
AWS/ASME SFA-5.1	E 7018-H8
DIN 1913	E 51 54 B 10
ISO 2560	E 42 4 B 42 H 10

Applications and Properties:

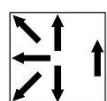
Electrode for producing crack – free and tough welding joint, Weld metal recovery is approx. 115%. Smooth and clean welds blending into base metal without undercut. Good gap bridging properties. Welds are X-ray quality. Suitable for depositing layers on steels having higher carbon content (up to 0.4).

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	1.3	0.65	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V +20°C -30°C	
500 - 610	>420	>22	120	80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	100 - 140
4.0	450	140 - 190
5.0	450	190 - 250
6.0	450	260 - 340



Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to ST 52.0; St 37.4 to ST 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL.

ASTM Standard A27 a.A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr.A, B, C; A299 Gr.A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55; A570 Gr.30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr.45; A656 Gr.50, 60;

A668 Gr.A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr.1, 2; A935 Gr.45; A936 Gr.50.
API 5 L Gr. B, X42-X56

Redrying: required at 300°C to 350°C for 2 hrs.

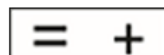
Standards	
AWS/ASME SFA-5.1	E 7018-H8
DIN 1913	E 51 54 B H10
EN 499	E 42 3 B 42 H 10
ISO 2560	E 423 B 42 H 10

Applications and Properties:

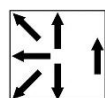
Electrode for producing crack-free and tough welding joints; weld metal recovery is approx. 115%. Smooth and clean welds blending into base metal without undercut. Good gap bridging properties, Welds are X-ray quality. Suitable for depositing layers on steels having higher carbon content (up to .4). Owing to its double covering (up to 3.25mm), the electrode shows a stable and concentrate arc.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.07	1.10	0.50	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO -V +20°C -30°C	
500 - 610	>420	>22	150	70



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	100 - 140
4.0	450	140 - 190
5.0	450	190 - 250
6.0	450	260 - 340



Materials:

DIN Standard	St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to ST 52.0; St 37.4 to ST 52,4; StE 210.7 to StE 360,7; StE 210.7 TM toStE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52
EN Standard	S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL

ASTM Standard A27 a.A36 Gr.all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr.A, B, C; A299 Gr.A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55; A570 Gr.30, 33, 36, 40, 45; A572 Gr.42, 50; A606 Gr.all; A607 Gr.45; A656 Gr.50, 60; A668 Gr.A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr.1, 2; A935 Gr.45; A936 Gr.50. API 5 L Gr. B, X42-X56

Redrying: required at 300°C to 350°C for 2 hours.

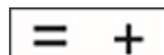
Standards	
AWS/ASME SFA-5.1	E 7018-H8
DIN 1913	E 51 54 B 10
EN 499	E 42 3 B42 H10
ISO 2560	E 42 3 B 42 H 10

Applications and Properties:

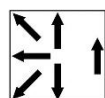
This basic electrode has good tensile strength and high toughness; this electrode is recommended according to the requirements of the Iranian Building Welding Code, as well as in accordance with the standard for the welding of structures under seismic loads (AWS D1.8) for the welding of structures under dynamic stress conditions (earthquakes).

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.08	1.3	0.4	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO -V -30°C
500 - 610	>420	>22	80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	100 - 140
4.0	450	140 - 190
5.0	450	190 - 250
6.0	450	260 - 340



Materials:

DIN Standard	St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to ST 52.0; St 37.4 to ST 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; 17mn 4; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38; GS-52
EN Standard	S235JR to E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL.



ASTM Standard A27 a.A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr.A, B, C; A299 Gr.A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr.55; A570 Gr.30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr.45; A656 Gr.50, 60; A668 Gr.A, B; A907 Gr.30, 33, 36, 40; A841; A851 Gr.1, 2; A935 Gr.45; A936 Gr.50. API 5 L Gr. B, X42-X56

Redrying: required at 300°C to 350°C for 2 hours.

High Replacement Electrodes for Welding Non-Alloy Steels

AMA 1118K	37
AMA 1617K	38

Standards	
AWS/ASME SFA-5.1	E 7024
DIN 1913	E 51 22 RR 11 160
EN 499	E 380 RR 53

Applications and Properties:

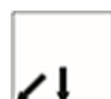
High-efficiency electrode having a weld metal recovery of approx. 155%. It is suitable for welding long fillet welds of small throat thickness. Easy arc striking and restriking, smooth welds blending into base metal without undercut, Slag partly self-releasing.

Weld metal analysis in % (typical values):		
C	Mn	Si
0.08	0.8	0.4

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO -V +20°C
470 - 600	>400	>22	100



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	140 - 160
4.0	450	180 - 230
5.0	450	260 - 340



Materials:

DIN Standard	St 37-2 to St 50-2; HI; HII; 17 Mn 4; St 37-3 to St 52-3; StE 285 to StE 355; GS-38; GS-52
EN Standard	S235JR to E295; P235GH; P265GH; P295GH; S235J2G3 to S355J2G3; S255N to S355N;
ASTM Standard	ASTM A36 Gr. all; A283 Gr. A, B, C, D; A 285 Gr. A, B, C; A366; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50

Redrying: if necessary 1 hour at 100°C - 120°C

Approval: LRS

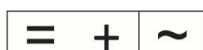
Standards	
AWS/ASME SFA-5.1	E 7028-H8
DIN 1913	E 51 54 B (R) 12 160
EN 499	E 38 5 B 73 H10

Applications and Properties:

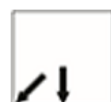
High-efficiency electrode having a weld metal recovery of approx. 165%. Preferably used for welding fillets. Weld metal is crack-free and very tough. Smooth and clean welds blending into base metal without undercut. Suitable for welding primer painted component. Slag is easily removable. Welds are of X-ray quality.

Weld metal analysis in % (typical values):		
C	Mn	Si
0.08	1.15	0.55

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO -V +20°C -30°C
490 - 600	>400	>22	150 80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	130 - 170
4.0	450	160 - 220
5.0	450	220 - 320



Materials:

DIN Standard	St 37-2 to St 50-2; Hl; Hll; 17mn 4; St 37-3 to St 52-3; StE 285 to StE 355; GS-38; GS-52; WStE 255- WStE 355
EN Standard	S235JR to E295; P235GH; P265GH; P295GH; S235J2G3 to S355J2G3; S255N-S355N; P255NH-P355NH.
ASTM Standard	ASTM A36 Gr. all; A283 Gr. A, B, C, D; A 285 Gr. A, B, C; A366; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50.

Redrying: required at 300°C to 350°C for 2 hours.

Cellulose Electrodes

AMA 1047P	41
AMA 1048P	42
AMA 1049P	43

Standards

AWS/ASME SFA-5.1

E 7010-A1

Applications and Properties:

Cellulosic electrode for welding of pipelines using the vertical down technique. It is suitable for welding root passes, hot passes, filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.10	0.5	0.15	0.50	<0.02	<0.02

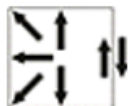
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO -V +20°C
500 - 600	>400	>22	>80



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 80
3.25	350	80 - 120
4.0	350	110 - 140
5.0	350	140 - 200



Materials:

DIN Standard	St 37.0 to St 52.0; St 37-3 to St 52-3; St 37.4 to St 52.4; St 35.8 to St 45.8; HI; HII; StE 210.7 to StE 415.7; StE 290.7 TM to StE 415.7 TM. Root pass up to StE 555.7 TM
EN Standard	S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH; Root pass up to L555MB.
ASTM Standard	API Spec. 5 L: A, B, X42, X46, X52, X56, X60.

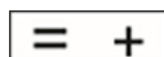
Standards	
AWS/ASME SFA-5.1	E 6010
DIN 1913	E 4343 C4
EN 499	E 35 2 C 21

Applications and Properties:

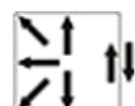
Medium-coated Cellulosic electrode for welding vertical-down in pipeline and storage tank construction. Suitable for root and filler passes in pipeline application. Due to its arc intensity, it can be used in the vertical-down position without difficulty.

Weld metal analysis in % (typical values):				
C	Mn	Si	S	P
0.12	0.5	0.15	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V	
			+20°C	-30°C
>430	>415	>22	80	>27



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 80
3.25	350	90 - 120
4.0	350	110 - 140
5.0	350	140 - 220



Materials:

DIN Standard St 37.0 to St 52.0; St 37-3 to St 52-3; St 37.4 to St 52.4; St 35.8 to St 45.8; HI; HII; StE 210.7 to StE 415.7; StE 290.7 TM to StE 415.7 TM. Root pass up to StE 555.7 TM

EN Standard S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH; Root pass up to L555NB, L555MB.

ASTM Standard API Spec. 5 L: A, B, X42, X46, X52 Root pass up to X80

Approval: LRS

Standards

AWS/ASME SFA – 5.5

E 7010 G

Applications and Properties:

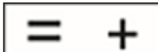
Cellulosic electrode is used for welding of pipes using the vertical down technique. It is also suitable for welding root passes, hot passes, filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.11	0.5	0.12	0.25	<0.02	<0.02

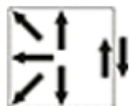
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy (J) ISO –V -10°C
>500	>415	>22	>27



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 80
3.25	350	80 - 120
4.0	350	110 - 140
5.0	350	140 - 200



Materials:

DIN Standard St 37.0 to St 52.0; St 37-3 to St 52-3; St 37.4 to St 52.4; St 35.8 to St 45.8; HII; StE 210.7 to StE 415.7; StE 290.7 TM to StE 415.7 TM. Root pass up to StE 480.7 TM

EN Standard S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH; Root pass up to L480MB.

ASTM Standard API Spec. 5 L: A, B, X42, X46, X52.

*Preheat and interpass temperature is selected according to grade and thickness of pipe.

Standards

AWS/ASME SFA – 5.5

E 8010-G

Applications and Properties:

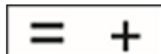
Cellulosic electrode is appropriate for welding of large diameter and high strength pipes using the vertical down technique. It is suitable for welding hot, filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Ni	Mo	S	P
0.12	0.7	0.13	0.5	0.25	<0.02	<0.02

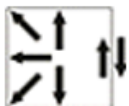
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy (J) ISO –V -10°C
>550	>460	>19	>27



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 80
3.25	350	80 - 120
4.0	350	110 - 140
5.0	350	140 - 200



Materials:

DIN Standard ST34.7 to ST60.7; StE 210.7 to STE 415.7; StE 415.7 TM to StE 480.7 TM. Root pass up to StE 480.7 TM

EN Standard L415NB to L485NB, L415MB to L485MB

ASTM Standard API Spec. 5 L: X52, X56, X60, X70.

*Preheat and interpass temperature is selected according to grade and thickness of pipe.

Cellulose Electrodes for Welding Oil and Gas Pipes

AMA 1049P1	46
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Standards

AWS/ASME SFA – 5.5

E 7010–P1

Applications and Properties:

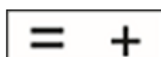
Cellulosic electrode for welding of large diameter and high strength pipes using the vertical down technique. It is suitable for welding root passes, hot passes, filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.1	0.5	0.1	0.27	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy (J) ISO –V -30°C
>500	>400	>22	>27



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 80
3.25	350	80 - 120
4.0	350	110 - 140
5.0	350	140 - 200



Materials:

DIN Standard St 37.0 to St 52.0; St 37-3 to St 52-3; St 37.4 to St 52.4; St 35.8 to St 45.8; HI; HII; StE 210.7 to StE 415.7; StE 290.7 TM to StE 415.7 TM. Root pass up to StE 555.7 TM

EN Standard S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH; Root pass up to L555NB, L555MB.

API Standard API Spec. 5 L: A, B, X42, X46, X52.

Standards

AWS/ASME SFA – 5.5

E 8010–P1

Applications and Properties:

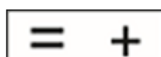
Cellulosic electrode for welding of large diameter and high strength pipes using the vertical down technique. It is suitable for welding root passes filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Ni	Mo	S	P
0.11	0.7	0.1	0.65	0.25	<0.02	<0.02

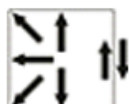
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy (J) ISO –V -30°C
>550	>460	>19	>27



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 80
3.25	350	80 - 120
4.0	350	110 - 140
5.0	350	140 - 200



Materials:

DIN Standard STE 415.7 to STE 485.7; StE 415.7 TM to StE 480.7 TM

EN Standard L415NB to L485NB, L415MB to L485MB

API Standard API Spec. 5 L: A, B, X42, X46, X52, X56, X60, X70.

*This electrode covers E8010-G properties.

*Preheat and interpass temperature is selected according to grade and thickness of pipe.

Special Welding Electrodes for Stainless and Heat-Resistant Steels

AMA 1071R	48
AMA 1072D	49
AMA 1312J	50
AMA 1337JA	51
AMA 1338JB	52
AMA 1339JA	53
AMA 1340JA	54
AMA 1367MR	55
AMA 1460JA	56
AMA 1460JB	57
AMA 1461JA	58
AMA 1461JB	59
AMA 1464Cb	60
AMA 1464JA	60
AMA 1464JB	62
AMA 1465J	63
AMA 1468J	64
AMA 1474JB7	65
AMA 1474MO	66
AMA 1507JA	67
AMA 1508JC	68
AMA 1509JC	69
AMA 1510JC6	70
AMA 1511JC6	71
AMA 1560JA	72
AMA 1803J	73

Standards	
AWS/ASME SFA – 5.4	~ E 410-15
DIN 8556	E 13 1 B20+
Comparable No. of material	1.4018
prEN 1600	E Z 13 1 B 22

Applications and Properties:

Electrode for welding of stainless and heat resistance chromium steels or cast steels having a chromium, content of up to 13%. It is used for corrosion and abrasion resistance surfacing welds (contact surfaces of gas, water and steam fittings) subjected to operation temperatures up to 450°C. Depending on type of base metal and wall thickness, preheating and enter pass temperatures from 100°C to 400°C and tempering at 650°C to 750°C, are advisable. Weld is non-scaling up to 850°C.

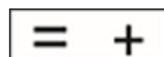
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.06	0.60	0.20	13	1

Mechanical Properties of all-weld metal: (single values are typical values)				
Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Hardness (HB)
AW	1050	900	5	350
T	700	550	20	50*

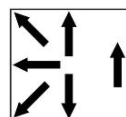
AW: as-welded

T: tempered 8 hours. At 680°C, Furnace cooling.

*Impact energy (j) at +20°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 80
3.25	350	85 - 120
4.0	350	110 - 160
5.0	350	150 - 190



Materials:

DIN EN standard 1.4000 X6Cr 13; 1.4002 X6CrAl13; 1.4006 X10Cr13 G-X12Cr 13; 1.4008 G-XCrNi 13; 1.4021 X20Cr 13; 1.4024 X15Cr 13; 1.4027 G-X20Cr 14

Other Standard AISI 410, 420

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 410Ni Mo-15
DIN 8556	E 13 4 B20+
prEN 1600	E 13 4 B 42

Applications and Properties:

Basic electrode is suitable for welding of Cr-Ni martensitic stainless steels. In welding of plates with higher than 10 mm thickness, the maximum preheat temperature is 150°C. After welding, post weld heat treatment shall be applied.

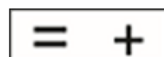
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.04	0.60	0.20	12.5	4.5	0.5

Mechanical Properties of all-weld metal: (single values are typical values)				
Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
T₁	850	650	20	70
T₂	850	650	20	70
N+T	850	650	20	70

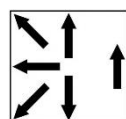
T1: Tempered 8 hours, at 580°C, Furnace cooling.

T2: Tempered 5 hours, at 610°C, Air cooling.

N+T: Normalized 1 hour at 1020°C, Air cooling + tempered 15 hours at 610°C, Furnace cooling.



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 80
3.25	300	85 - 120
4.0	350	110 - 160
5.0	450	150 - 190



Materials:

DIN EN standard 1.4313 X5CrNi 13 4 G -X5CrNi 13 4; 1.4407 G-X5CrNiMo 13 4; 1.4413 X3CrNiMo 13 4; 1.4414 G-X4CrNiMo 13 4

Other Standard ACI Gr.CA 6 NM, S41500

Redrying: required at 300°C to 350°C for 2 hours.

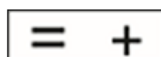
Standards	
AWS/ASME SFA – 5.4	~ E 310–15 (mod.)
Comparable No. of material	1.4842
DIN 8556	E 25 20 B 20+
prEN 1600	E 25 20 B 42

Applications and Properties:

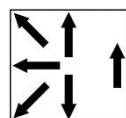
Electrode for welding of heat resistance chromium and chromium-nickel steels or cast steels. Fully austenitic metal, non-scaling up to +1200°C. Weld metal is not resistance to sulphurous combustion gases.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.10	3	0.5	25	20

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
600	400	35	100



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	65 - 80
3.25	300	90 - 120
4.0	350	115 - 150
5.0	350	160 - 210



Materials:

DIN EN Standard 1.4745 G-X40CrSi 23; 1.4823 G-X40CrNiSi 27 4; 1.4832 G-X25CrNiSi 20 14; 1.4833 X7CrNi 23 14; 1.4841 X15CrNiSi 25 20; 1.4845 X12CrNi 25 21; 1.4828 X15CrNiSi 20 12; 1.4840 G-X15CrNi 25 20; 1.4846 G-X40CrNi 25 21; 1.4826 G-X40CrNiSi 22 9; 1.4713 X10CrAl7; 1.4724 X10CrAl 13; 1.4742 X10CrAl 18; 1.4762 X10CrAl 25; 1.4710 G-X30CrSi 6; 1.4740 G-X40CrSi 17.

Other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Redrying: required at 300°C to 350°C for 2 hours.

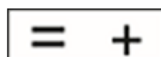
Standards	
AWS/ASME SFA – 5.4	E 308 L–15
Comparable No.of material	1.4316
DIN 8556	E 19 9L B 20+
prEN 1600	E 19 9L B 42

Applications and Properties:

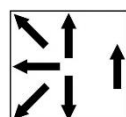
Basic electrode for welding of austenitic stainless Cr-Ni-steels having an extra low carbon content, as well as for temperatures up to +350°C; non-scaling up to +800°C. The electrode has a stable arc.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.025	1	0.4	19	10

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-60°C
580	400	38	75	>50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4306 X2CrNi 19 11 G–X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G–X10CrNi 18 8; 1.4541 X6CrNiTi 18 10; 1.4546 X5CrNiNb 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G–X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr. B8C o.D.

Redrying: required at 300°C to 350°C for 2 hours.

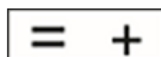
Standards	
AWS/ASME SFA – 5.4	E 316 L–15
Comparable No.of material	1.4430
DIN 8556	E 19 12 3L B20+
prEN 1600	E19 12 3L B42

Applications and Properties:

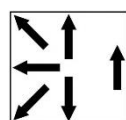
Basic electrode for welding of austenitic stainless Cr-Ni-Mo steels having an extra low carbon content, as well as for temperatures up to +400°C. This electrode has a stable arc.

Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.025	1	0.4	18.5	11.5	2.7

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-60°C
600	420	35	75	>50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X5CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435 X2CrNiMo 18 14 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X10CrNiMoNb 18 12.

Other Standard S31653; AISI 316L; 316Ti; 316Cb

Redrying: required at 300°C to 350°C for 2 hours.

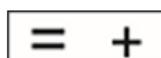
Standards	
AWS/ASME SFA – 5.4	E 309 L-15
Comparable No.of material	1.4332
DIN 8556	E 2312 L B 20+
preEN 1600	E 2312 L B 42

Applications and Properties:

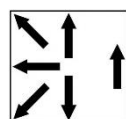
Basic electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C; at higher temperature AMA 1604G electrode shall be used. The electrode has a stable arc.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.025	1	0.5	24	13

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-60°C
600	400	34	75	>50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	350	90 - 120
4.0	350	100 - 160
5.0	350	140 - 210



Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	E 347–15
DIN 8556	E 19 9 Nb B 20+
EN 1600	E 19 9 Nb B 42
Comparable No. of material	1.4551

Applications and Properties:

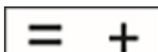
Basic electrode for welding of stabilized austenitic stainless Cr-Ni-steels and cast steels, as well as for stainless or heat resistant.

Non-scaling up to +800°C.

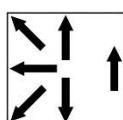
The electrode has a stable arc.

Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Nb
0.04	1.5	0.6	20	10	0.6

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-60°C
660	420	35	70	>40



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4	350	100 - 140
5	350	140 - 210



Materials:

DIN EN standard 1.4550 X6CrNiNb 18 10; 1.4541 X6CrNiTi 18 10; 1.4552 G-X5CrNiNb 18 9; 1.4301 X5CrNi 18 10; 1.4312 G-X10CrNi 18 8; 1.4546 X5CrNiNb 18 10; 1.4311 X2CrNiN 18 10; 1.4306 X2CrNi 19 11; 1.4303 X5CrNi 18 12; 1.4308 G - X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7.

Other Standard AISI 347, 321, 302, 304, 304L, 304LN; ASTM A296Gr.CF 8 C; A157 Gr. C9; A320 Gr.B8C

Redrying: required at 300°C to 350°C for 2 hours.

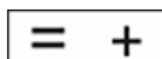
Standards	
DIN 8556	E Z 16 6 Mo B20+
EN 1600	E Z 16 6 Mo B 42

Applications and Properties:

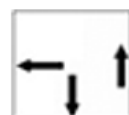
Basic electrode for welding chromium steels resistance to heat and corrosion and for surfacing of corrosion resistance parts (i.e. Steam, Gas and water valves). Heat will be determined according to the steel grade.

Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
<0.07	<0.8	<0.5	15.5 – 17.5	5.5 – 6.5	0.35

Mechanical Properties of all-weld metal: (single values are typical values)		
>760	>540	>15



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 80
3.25	300 - 350	80 - 110
4.0	350	110 - 140
5.0	350	140 - 180



Materials:

DIN EN standard 1.4405 G-X5CrNiMo 16 5; 1.4418 X4CrNiMo 16 5

Other Standard ASTM A312 Gr.(TP) 316LN; A240 Gr.316LN

Redrying: required at 300°C to 350°C for 2 hours.

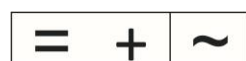
Standards	
AWS/ASME SFA – 5.4	E 308 L–16
Comparable No. of material	1.4316
DIN 8556	E 19 9 R 26
prEN 1600	E 19 9L R 12

Applications and Properties:

Electrode for welding of austenitic stainless Cr-Ni-Steels having an extra low carbon content, as well as for temperatures up to +350°C; non-scaling up to +800°C. Fine-droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

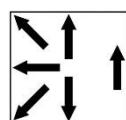
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.025	0.8	0.9	19	10

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
580	400	35	65



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4306 X2CrNi 19 11 G–X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G-X10CrNi 18 8; 1.4541 X6CrNiTi 18 10; 1.4546 X5CrNiNb 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 1 7 7; 1.4319 X5CrNi 17 8

Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr.B8C

Redrying: required at 330°C to 380°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	E 308 L–16
Comparable No. of material	1.4430
DIN 8556	E 19 12 3 L R 26
prEN 1600	E 19 12 3 L R 12

Applications and Properties:

Electrode for welding of austenitic stainless Cr-Ni-Mo-steels or cast steels having and extra low carbon content. Suitable for operating temperatures up to +400°C. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

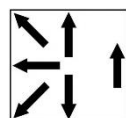
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.025	0.8	0.9	18.5	12	2.7

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
600	420	33	60



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X5CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435 X2CrNiMo 18 14 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X10CrNiMoNb 18 12

Other Standard S31653; AISI 316L; 316Ti; 316Cb

Redrying: required at 330°C to 380°C for 2 hours.

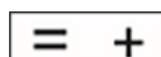
Standards	
AWS/ASME SFA – 5.4	E 347–16
Comparable No. of material	1.4551
DIN 8556	E 19 9 Nb R 26
prEN 1600	E 19 9 Nb R 12

Applications and Properties:

Electrode for welding of stabilized austenitic stainless Cr-Ni-steels and cast steels, as well as for stainless or heat resistant non-scaling up to +800°C fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

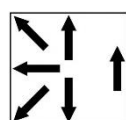
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Nb
0.04	1.5	0.6	20	9.2	0.6

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
660	420	35	70



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard	1.4301 X5CrNi 18 10; 1.4541 X6CrNiTi 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X5CrNi 18 12; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7;
Other Standard	AISI 347, 321, 302, 304, 304L, 304LN; ASTM A296Gr.CF 8 C; A157 Gr. C9; A320 Gr.B8C

Redrying: required at 300°C to 350°C for 2 hrs

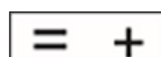
Standards	
AWS/ASME SFA – 5.4	E 318 –16
Comparable No. of material	1.4576
DIN 8556	E 19 12 3 Nb R 26
prEN 1600	E19 12 3 Nb R 12

Applications and Properties:

Electrode for welding of stabilized austenitic stainless Cr-Ni-steels and cast steels, as well as for stainless or heat resistant non-scaling up to +800°C fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

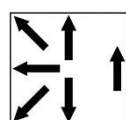
Weld metal analysis in % (typical values):						
C	Mn	Si	Cr	Ni	Mo	Nb
0.04	1.5	0.6	18.5	11.5	2.6	0.5

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
660	480	35	60



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X6CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X10CrNiMoNb 18 12

Other Standard AISI 316L, 316Ti, 316Cb

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	E 309 Cb–16
DIN 8556	E 2312 Nb R 26
EN 1600	E 23 12 Nb R 12

Applications and Properties:

This electrode is suitable for joining of dissimilar steels (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal resistant to grain boundary corrosion.

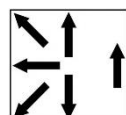
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Cb (Nb)
0.07	0.8	0.9	24	13	0.8

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
620	430	30	60



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	350	90 - 120
4.0	350	100 - 160
5.0	350	140 - 210



Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 19 10

Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

Redrying: required at 330°C to 380°C for 2 hours.

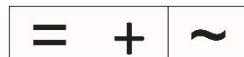
Standards	
AWS/ASME SFA – 5.4	E 309 L–16
Comparable No. of material	1.4332
DIN 8556	E 23 12 L R 26
EN 1600	E 23 12 LR 12

Applications and Properties:

Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C, at higher temperature AMA 1604G electrode shall be used. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

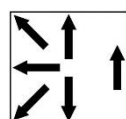
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.025	0.70	0.9	24	13

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
600	400	30	60



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	350	90 - 120
4.0	350	100 - 160
5.0	350	140 - 210



Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

Redrying: required at 330°C to 380°C for 2 hours.

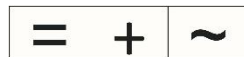
Standards	
AWS/ASME SFA – 5.4	E 309 MoL–16
Comparable No. of material	1.4459
DIN 8556	E 23 13 2 L R 26
prEN 1600	E 23 12 2 L R 12

Applications and Properties:

Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C; at higher temperature AMA 1604G electrode shall be used. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

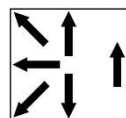
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.025	0.7	0.9	22.5	13.5	2.6

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
640	420	30	50



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	300 - 350	90 - 120
4.0	350	100 - 160
5.0	350	140 - 210



Materials:

DIN EN standard	1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2; 1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X6CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435 X2CrNiMo 18 14 3; 1.4436 X5CrNiMo 17 13 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4573 X10CrNiMoTi 18 12; 1.4580 X6CrNiMoNb 17 12 2 G-X10CrNiMoNb 18 10
Other Standard	ASTM/ACI A240/A312/A351: (TP) 316L; CF-3M; (TP) 316L; (TP) 316LN; (TP) 316; 316Ti; 316Cb

Redrying: required at 330°C to 380°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	E 312–16
DIN 8556	E 29 9 R 26
EN 1600	E 29 9 R 12

Applications and Properties:

Austenitic-ferritic electrode containing 25-30% ferrite. Due to crack resistance of its weld metal, it is an appropriate electrode for welding hard to weld steels and joining of different steels like super alloys and non-alloyed steels. Good weld ability in all positions, recommended for welding hard to weld alloyed or non-alloyed steels, carbon steels, super alloyed steels, tool steels, spring steels, rail steels, hard Mn steels.

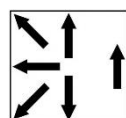
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.12	1.0	0.8	29	9

Mechanical Properties of all-weld metal: (single values are typical values)		
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)
740 - 840	>500	>22



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	55 - 85
3.25	300	80 - 120
4.0	350	110 - 150
5.0	350	140 - 210



Redrying: required at 330°C to 380°C for 2 Hours.

Standards	
AWS/ASME SFA – 5.4	~E 312–16
Comparable No.of material	1.4337
prEN 1600	E 29 9 R 12

Applications and Properties:

Electrode for joining of dissimilar steels and for surfacing purposes. The weld metal consists of ferritic-austenitic Cr-Ni-steel with a delta ferrite content of approximately 50% and non-scaling up to 1100°C. It features high resistance to cracking and is therefore indicated for difficult to weld steels and depositing stress-relaxing buffer layers on crack sensitive base metals. It is suitable for welding galvanized steels. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

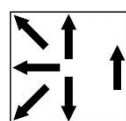
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.1	0.9	0.6	29	9

Mechanical Properties of all-weld metal: (single values are typical values)		
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)
750	450	20



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	55 - 85
3.25	300	80 - 120
4.0	350	110 - 150
5.0	350	140 - 210



Materials:

Dissimilar steels (unalloyed to austenitic steels), difficult to weld steels (e.g. heat treatable and tool steels),

High manganese steels, wear resistant overlays and repair.

Redrying: required at 330°C to 380°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 309 L-17
Comparable No.of material	1.4332
DIN 8556	E 23 12 L R 23
prEN 1600	E 23 12 L R 12

Applications and Properties:

Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C; at higher temperature 1604G electrode shall be used. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

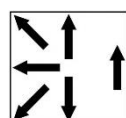
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.025	0.70	0.9	24	13

Mechanical Properties of all-weld metal: (single values are typical values)			
600	400	30	60



OCV>50V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	300 - 350	90 - 120
4.0	350	100 - 160
5.0	350	140 - 210



Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

Redrying: required at 350°C to 400°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 309 MoL-17
Comparable No.of material	1.4332
DIN 8556	E 23 12 2L R 23
prEN 1600	E 23 12 2 L R 12

Applications and Properties:

Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C; at higher temperature 1604G electrode shall be used. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

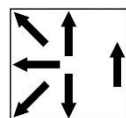
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.025	0.70	0.9	24	13	2.6

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
640	420	30	50



OCV>50V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	300 - 350	90 - 120
4.0	350	100 - 160
5.0	350	140 - 210



Materials:

DIN EN standard	1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2; 1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X6CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435 X2CrNiMo 18 14 3; 1.4436 X5CrNiMo 17 13 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4573 X10CrNiMoTi 18 12; 1.4580 X6CrNiMoNb 17 12 2 G-X10CrNiMoNb 18 10
Other Standard	ASTM/ACI A240/A312/A351: (TP) 316L; CF-3M; (TP) 316L; (TP) 316LN; (TP) 316; 316Ti; 316Cb

Redrying: required at 350°C to 400°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	E 310–16
DIN 8556	E 25 20 R 26

Applications and Properties:

Rutile electrode for welding of heat resistant chromium and chromium-nickel steels or cast steels. Non-scaling up to 1050°C. Suitable for welding of annealing furnaces and boilers. If weld thickness is high, we recommend you use AMA 1312J electrode.

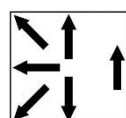
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.12	<0.9	1.20	26	20

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
540 - 650	>300	>30	>70



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	50 - 80
3.25	300 or 350	90 - 120
4.0	350	110 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4745 G-X40CrSi 23; 1.4823 G-X40CrNiSi 27 4; 1.4832 G-X25CrNiSi 20 14; 1.4833 X7CrNi 23 14; 1.4841 X15CrNiSi 25 20; 1.4845 X12CrNi 25 21; 1.4828 X15CrNiSi 20 12; 1.4840 G-X15CrNi 25 20; 1.4846 G-X40CrNi 25 21; 1.4826 G-X40CrNiSi 22 9; 1.4713 X10CrAl7; 1.4724 X10CrAl 13; 1.4742 X10CrAl 18; 1.4762 X10CrAl 25; 1.4710 G-X30CrSi 6; 1.4740 G-X40CrSi 17.

Other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Redrying: required at 330°C to 380°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 308 L-17
Comparable No. of material	1.4316
DIN 8556	E 19 9 L R 23
prEN 1600	E 19 9L R 12

Applications and Properties:

Electrode for welding of austenitic stainless Cr-Ni-Steels having an extra low carbon content, as well as for temperatures up to +350°C; non-scaling up to +800°C. Fine-droplet metal transfer, good wash-in of joint sides, finely- rippled bead surface, easily removable slag. Easy arc striking and restriking.

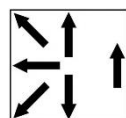
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.025	0.8	0.9	19	10

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
580	400	35	65



OCV>50V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4306 X2CrNi 19 11 G-X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G-X10CrNi 18 8; 1.4541 X6CrNiTi 18 10; 1.4546 X5CrNiNb 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 1 7 7; 1.4319 X5CrNi 17 8

Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr.B8C

Redrying: required at 350°C to 400°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 316 L-17
Comparable No. of material	1.4430
DIN 8556	E 19 12 3 L R 23
prEN 1600	E 19 12 3 L R 12

Applications and Properties:

Electrode for welding of austenitic stainless Cr-Ni-Mo-steels or cast steels having and extra low carbon content. Suitable for operating temperatures up to +400°C. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

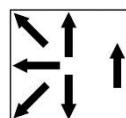
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.025	0.8	0.9	18.5	12	2.7

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
600	420	33	60



OCV>50V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X5CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435 X2CrNiMo 18 14 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X10CrNiMoNb 18 12

Other Standard S31653; AISI 316L; 316Ti; 316Cb

Redrying: required at 350°C to 400°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 347–17
Comparable No. of material	1.4551
DIN 8556	E 19 9 Nb R 23
prEN 1600	E 19 9 Nb R 12

Applications and Properties:

Electrode for welding of stabilized austenitic stainless Cr-Ni-steels and cast steels, as well as for stainless or heat resistant non-scaling up to +800°C. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag, easy arc striking and restriking.

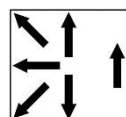
Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Nb
0.025	0.8	0.9	19	10	0.4

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
620	420	33	60



OCV>50V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard	1.4301 X5CrNi 18 10; 1.4541 X6CrNiTi 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X5CrNi 18 12; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 17 8
Other Standard	AISI 347; 321; 302; 304; 304L; 304LN; ASTM A296 Gr.CF 8 C; A157 Gr.C9; A320 Gr.B8C

Redrying: required at 350°C to 400°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	~ E 318–17
Comparable No. of material	1.4576
DIN 8556	E 19 12 3 Nb R 23
prEN 1600	E 19 12 3 Nb R 12

Applications and Properties:

Electrode for welding of stabilized austenitic stainless Cr-Ni-Mo steels or cast steels. Suitable for operating temperatures up to +400°C. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled beat surface, easily removable slag. Easy arc striking and restriking.

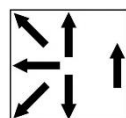
Weld metal analysis in % (typical values):						
C	Mn	Si	Cr	Ni	Mo	Nb
0.025	0.8	0.9	18.5	12	2.7	0.4

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
630	450	30	60



OCV>50V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4401 X5CrNiMo 17 122; 1.4406 X2CrNiMoN 17 122; 1.4408 G-X6CrNiMo 1810; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4571 X6CrNiMo Ti 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X 10CrNiMoNb 18 12

Other Standard AISI 316L, 316Ti, 316Cb

Redrying: required at 350°C to 400°C for 2 hours.

Standards	
AWS/ASME SFA – 5.4	E 308 H–16
DIN 8556	E 19 9 R 26
EN 1600	E 19 9 H R 42

Applications and Properties:

Electrode for welding of austenitic stainless Cr-Ni-steels or cast steel having a high carbon content. Fine-droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

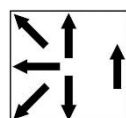
Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.06	0.8	0.9	19	10

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
580	400	35	60



OCV>70V

Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	45 - 80
3.25	300 - 350	70 - 120
4.0	350	100 - 150
5.0	350	140 - 210



Materials:

DIN EN standard 1.4948 X6CrNi 18 11; 1.4878 X12CrNiTi 18 9

Other Standard AISI 304, 304H, 321H, 347H

Redrying: required at 330°C to 380°C for 2 hours.

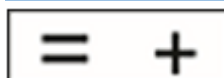
Standards	
AWS/ASME SFA – 5.4	~E 307–15 (mod.)
DIN 8556	E 18 8 Mn B 20+
Comparable No. of material	Comparable No. of material
prEN 1600	E 18 8 Mn B 42

Applications and Properties:

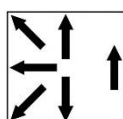
Electrode for welding of dissimilar steels and for surfacing purposes. The weld metal consists of austenitic Cr-Ni-steel with possible small amounts of delta-ferrite; it is non-scaling up to 850°C. It features high resistance to cracking and is therefore indicated for difficult-to-weld steels and depositing stress-relaxing buffer layers on crack sensitive base metal or beneath hard-facing deposits. Highest temperature of dissimilar steel joints is +300°C; at higher temperatures AMA 1604G electrode shall be used. Weld metal will work harden.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Ni
0.12	6	0.4	19	9

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-60°C
650	400	35	100	60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	65 - 70
3.25	300	95 - 120
4.0	350	110 - 160
5.0	350	150 - 190



Materials:

Dissimilar steels (unalloyed to austenitic steels), difficult to weld steels (e.g. heat treatable and tool steels), high manganese steels.

Redrying: required at 300°C for 2 hours.

Electrodes for Welding Nickel Alloys

AMA 1604G	75
AMA 1609G	76
AMA 1611G	77
AMA 1615G	78
AMA 1709G	79

Standards	
AWS/ASME SFA – 5.11	~ E NiCrFe–3
DIN 1736	EL–NiCr 15 FeMn
Material number	2.4648

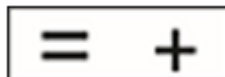
Applications and Properties:

Basic-covered electrode with 65% Ni and 15% Cr for the welding of:

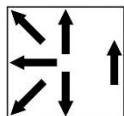
- Heat and corrosion resistant nickel alloys, e.g. NiCr 15Fe (2.4816), LC–NiCr15Fe (2.4817), NiCr20Ti (2.4951), NiCr23Fe (2.4851), creep resistant up to 800°C.
- Various nickel alloys and joining them to other steels.
- Cryogenic nickel steels, e.g. 12Ni19 (1.5680), X8Ni9 (1.5662), good cryogenic properties down to -196°C.
- Ferritic steels to austenitic steels for operating temperatures above 300°C e.g. creep resistant CrMo-steels to austenitic steel.

Weld metal analysis in % (typical values):								
C	Mn	Si	Cr	Ni	Nb	Fe	S	P
0.02	7.5	0.3	15	rest	2	7.5	<0.01	<0.015

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-196°C
630	370	38	100	80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	65 - 85
3.25	300	90 - 110
4.0	350	110 - 150
5.0	350	130 - 180



Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA – 5.11	~ E NiCrFe-2
DIN 1736	EL-NiCr 15 FeNb
Material number	2.4805

Applications and Properties:

Basic-covered electrode with 69% Ni and 16% Cr and 8% Fe for the welding of:

-Heat and corrosion resistant nickel alloys, e.g. NiCr 15Fe(2.4816), LC-NiCr15Fe(2.4817), or for joining these alloys to unalloyed, low alloy and high-alloy steels; good cryogenic properties down to -196°C; heat resistant up to +800° C, and austenitic steels to ferritic steels for operation temperatures above 300° C.

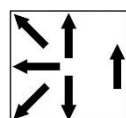
-Owing to high toughness properties and resistance to cracking, it is well suited for joining difficult-to-weld steels and for repair welding.

Weld metal analysis in % (typical values):									
C	Si	Mn	Cr	Ni	Mo	Nb	Fe	S	P
0.04	0.3	2	16	rest	1.4	1.8	8.5	≤0.015	≤0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-196°C
640	360	40	85	75



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 - 85
3.25	350	80 - 110
4.0	350	100 - 140



Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA – 5.11	~E NiCrMo–3
DIN 1736	EL–NiCr 20 Mo9 Nb
Material number	2.4621

Applications and Properties:

Basic-covered electrode with 63% Ni and 22% Cr and 9% Mo for the welding of:

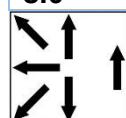
- Highly corrosion resistant nickel-chromium-molybdenum-alloys, e.g.: NiCr22Mo9Nb (2.4856), NiCr21Mo (2.4858), NiCr22Mo6Cu (2.4618).
- Austenitic steels of highest corrosion resistance, e.g.: 1.4529 (X1NiCrMoCuN25206), 1.4547 (X1CrNiMoCuN20-18-7)
- Cryogenic nickel-alloyed steels, e.g.: X8Ni9 (1.5662)

Weld metal analysis in % (typical values):									
C	Si	Mn	Cr	Ni	Mo	Nb	Fe	S	P
0.03	0.4	0.6	22	rest	9	3.3	3	<0.01	<0.015

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-196°C
780	520	35	80	50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	50 - 70
3.25	300	70 - 95
4.0	350	90 - 120
5.0	350	120 - 160



Redrying: required at 300°C to 350°C for 2 hours.

Standards

AWS/ASME SFA – 5.11

ENiCrMo–6

Applications and Properties:

Basic electrode for welding of Ni-base alloys. This electrode is specially used for welding of 5% Ni and 9% Ni steels for low temperature operation. The electrode can be welded with AC current to avoid the arc below. It is recommended to use arc length as short as possible.

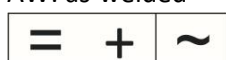
Weld metal analysis in % (typical values):

C	Si	Mn	Cr	Ni	Mo	W	Nb	Fe
0.08	0.3	3.7	13	rest	6	1.3	1.5	8.6

Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -196°C	Heat treatment
700	>420	35	90 70	AW

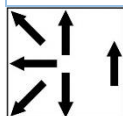
AW: as-welded



OCV>70V

Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	70 - 95
3.25	300 - 350	100 - 150
4	350	140 - 180
5	350	180 - 230



Materials:

DIN Standard X 8 Ni 9

Other Standard ASTM A353 Gr. K81340; A522 Gr. I, II; A553 Gr.K81340

Redrying: required at 390°C to 350°C for 2 hours.

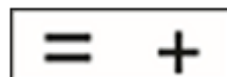
Standards	
AWS/ASME SFA – 5.11	ENiCu–7
DIN 1736	EL–NiCu30Mn

Applications and Properties:

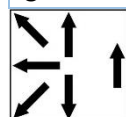
Basic electrode for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. It is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. Excellent corrosion resistance to chloride induced stress corrosion cracking and a wide range of marine and chemical requirements. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Weld metal analysis in % (typical values):						
C	Mn	Si	Ti	Fe	Cu	Ni
0.04	3.5	0.7	0.6	2.3	rest	65

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
>480	>300	>30	100



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 80
3.25	300 - 350	90 - 120
4	350	110 - 150
5	350	140 - 200



Materials:

DIN Standard NiCu30Fe (2.4360), NiCu30Al (2.4375)

Other Standard Alloy 400, ASTM B 127, B 165

Redrying: required at 300°C for 2 hours.

Welding Electrodes for Creep Resistant Steels

AMA 1087R3	81
AMA 1181NC.....	82
AMA 1245N.....	83
AMA 1261N.....	84
AMA 1263N.....	85
AMA 1264N.....	86
AMA 1366N2.....	87
AMA 13794VN.....	88
AMA 1410N.....	89
AMA 1419N.....	90
AMA 1426N.....	91

Standards	
AWS/ASME SFA-5.4	E 505-15-H8
AWS/ASME SFA-5.5	E 8018-B8-H8
DIN 8575	E CrMo 9 B 20+
EN 1599	E CrMo 9B 42 H10

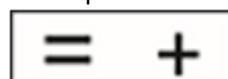
Applications and Properties:

Electrode for welding of boilers, pressure vessels subjected to operating temperatures up to 600°C. Typical applications are: petrochemical process plant, hydro crackers in chemical industries.

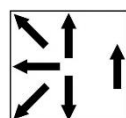
Weld metal analysis in % (typical values):						
C	Mn	Si	Cr	Mo	S	P
0.07	0.85	0.3	9.5	1	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C	Heat treatment
620 - 750	>500	20	80	T

T: tempered 1 hrs. at 760°C, air cooling.



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	350	90 - 130
4.0	350	140 - 180
5.0	450	170 - 230



Materials:

DIN Standard X12 CrMo 91, X7CrMo 91, G-X12 CrMo 10 1

Other Standard A217 Gr. C12; A 234 Gr. WP9; A335 Gr.P9

Redrying: required at 300°C to 350°C for 2 hours.

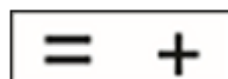
Standards	
AWS/ASME SFA-5.5	E 7016-A1-H4
E Mo B 20+	E Mo B 20+
EN 1599	E Mo B 4 2 H5

Applications and Properties:

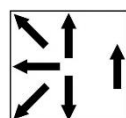
Basic electrode is suitable for boiler tanks subjected to operating temperature up to 500°C. Its weld metal contains Molybdenum has a good mechanical properties.

Weld metal analysis in % (typical values):					
C	Mn	Si	Mo	S	P
0.08	0.9 Max	0.4	0.5	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation 5*d (%)	Impact energy(j) ISO – V +20°C -20°C
>510	>390	25	120 60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 90
3.25	350 - 450	90 - 140
4.0	350 - 450	140 - 190
5.0	450	190 - 250



Materials:

DIN Standard	St 37-3 to St 52-3; St 37-2 to St 60-2; ST 35.8 to St 45.8; StE 320.7 to StE 415.7; StE 255 to StE 500; 17 Mn 4; 19Mn 5; 15Mo3; TStE 255 to TStE 500.
EN Standard	S355J2G3; E295; E335; P255G1TH; L320 to L415NB; L320MB to L415MBM; S255N to S500N; P295GH; P310GH; 16Mo3; 15NiCuMoNb5, 20MnMoNi4-5; 17MnMoV6-4; S255NH to S500NH; S255NL to S500NL.
ASTM Standard	A204 Gr.A, B, C; A217 Gr.WC1; A213 Gr.T2; A355 Gr.P1; A182M Gr.F1; A204M Gr.A, B, C; A250 Gr.T1 API Spec. 5 L: X 52, X 56, X 60.

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA-5.5	E 9018-B3-H8
DIN 8575	E CrMo 2 B 20+
prEN 1599	E CrMo 1 B 32 H 10

Applications and Properties:

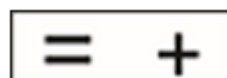
Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to +600°C. Welds are of X-ray quality. Preheating, inter-pass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Mo
0.06	0.80	0.50	2.40	1.00

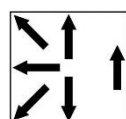
Mechanical Properties of all-weld metal:(single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(J) ISO – V +20°C	Heat treatment
570 – 670	>440	>22	100	T
500 – 600	>350	>24	140	N+T

T: Tempered 0.5 h at 700°C, air cooling

N+T: Normalized + Tempered 0.5 h at 920°C, air cooling + 0.5 h at 750°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	50 - 85
3.25	450	85 - 130
4.0	450	90 - 180
5.0	450	150 - 240



Materials:

DIN Standard 10CrMo 9 10, 10 CrSiMo V 7, 24 CrMo 10; GS- 12 CrMo 9 10, GS-19 CrMo 9 10

EN Standard 10CrMo9-10, 10 CrSiMoV 7; G17CrMo9-10

ASTM Standard A335 Gr. P22; A217 Gr.WC 9

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA-5.5	E 7018-A1-H8
DIN 8575	E Mo B 20+
prEN 1599	E Mo B 42 H 10

Applications and Properties:

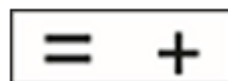
Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to +550°C. Welds are of X-ray quality.

Preheating, inter-pass temperature and post-weld heat treatment in accordance with base metal to be welded.

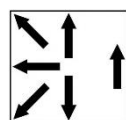
Weld metal analysis in % (typical values):			
C	Mn	Si	Mo
0.06	0.80	0.50	0.50

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C	Heat treatment
520 - 650	>470	>22	160	T

T: Tempered 1 hour at 620°C, air cooling



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	90 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard	St 37-3 to St 52-3; St 37-2 to St 60-2; St 35.8 to St 45.8; StE 320.7 to StE 415.7; StE 255 to StE 500; 17 Mn 4; 19 Mn 5; 15 Mo 3; TStE 255 to TStE 500.
EN Standard	S355J2G3; E295; E355; P255G1TH; L320 to L415NB; L320MB to L415MBM; S255N to S500N; P295GH; P310GH; 16Mo3; 15NiCuMoNb5, 20MnMoNi4-5; 17MnMoV6-4; S255NH to S500NH; S255NL to S500NL.
ASTM Standard	A204 Gr.A, B, C; A217 Gr.WC1; A213 Gr.T2; A355 Gr.P1; A182M Gr.F1; A204M Gr.A, B, C; A250 Gr.T1 API Spec. 5 L : X52, X56, X60

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA-5.5	E 8018-B2-H8
DIN 8575	E 8018-B2-H8
prEN 1599	E CrMo 1 B 42 H 10

Applications and Properties:

Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to +570°C. Welds are of X-ray quality.

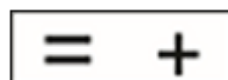
Preheating, interpass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Mo
0.06	0.80	0.40	1.00	0.50

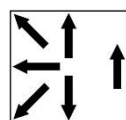
Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation 5*d (%)	Impact energy(j) ISO – V +20°C	Heat treatment
560 – 660	>490	>22	120	T
450 – 550	>300	>26	150	N+T

T: Tempered 0.5 hour at 700°C, air cooling

N+T: Normalized + Tempered 0.5 hour at 920°C, air cooling + 0.5 hour at 700°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 85
3.25	450	100 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard 13CrMo 44, 15 CrMo 5, 16 CrMo 44, 25 CrMo 4, 24 CrMo 5, GS – 22 CrMo 54, GS- 17 CrMo 55

EN Standard 13CrMo 4-5, 15 CrMo 5, 42 CrMo 4, 16 CrMoV 4, 25 CrMo 4, 24 CrMo 5, G22 CrMo 5-4, G17 CrMo 5-5

ASTM Standard A193 Gr. B7; A355 Gr.P11 a. P12; A217 Gr. WC6.

Redrying: required at 300°C to 350°C for 2 hours.

Standards	
AWS/ASME SFA-5.5	E 8018-B3L
DIN 8575	E CrMo 2 B 20+
prEN 1599	E CrMo 2 B 42 H 10

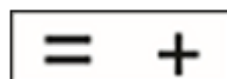
Applications and Properties:

Basic electrode with low carbon weld metal, suitable for creep resistant and Hydrogen resistant steels (boiler, vessels and pipes) up to working temperature of 600°C. Its weld metal is tough and resistant to work embrittlement.

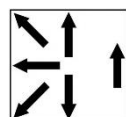
Weld metal analysis in % (typical values):						
C	Mn	Si	P	S	Cr	Mo
<0.05	0.7	0.3	<0.02	<0.02	2.3	1

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C	Heat treatment
>550	>460	>17	120	T

T: Tempered 1 hour at 790°C, furnace cooling to 300°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 90
3.25	450	100 - 140
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard 10CrMo9 10; 10CrSiMoV7; G17CrMo9; GS-12CrMo 9 10

ASTM Standard A181 Gr. F22; A217 Gr.WC9; A335 Gr.P22; A336 Gr.F22.

Redrying: required at 300°C to 350°C for 2 hours

Standards	
AWS/ASME SFA-5.4	E 502-15-H8
AWS/ASME SFA-5.5	E 8018-B6-H8
DIN 8575	E CrMo 5 B 20+
prEN 1599	E Z CrMo 5 B 42 H 10

Applications and Properties:

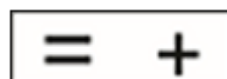
Electrode for welding of boilers, pressure vessels subjected to operating temperature up to 600°C. Weld metal matches the composition of steel grade 12CrMo195 featuring equal resistance to high-pressure hydrogen attack; creep resistance and creep rupture strength. Typical applications are petrochemical process plants, Hydro crackers in chemical industries.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cr	Mo
0.06	0.9	0.30	5	0.50

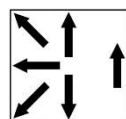
Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C	Heat treatment
600 – 700	>500	18	100	T
650 – 750	>580	17	120	N+T

T: Tempered 1 hour at 760°C, air cooling

N+ T: Normalized + tempered 0.5 h at 960°C, air cooling +2 hours at 710°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	350	85 - 130
4.0	350	140 - 180
5.0	450	180 - 230



Materials:

DIN Standard X12CrMo5; GX12CrMo5

ASTM Standard A182 Gr.F5, A 199 Gr.T5, A213 Gr.T5, A217 Gr.C5, A335 Gr.P5, A336 C1.F5, A369 Gr.FP5, A387 Gr.5.

Redrying: required at 300°C to 350°C for 2 Hours.

Standards

AWS/ASME SFA-5.5

E 8018-G-H8

Applications and Properties:

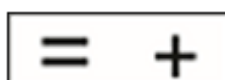
Basic electrode with low carbon weld metal, suitable for resistant and hydrogen resistant steels (boilers, vessels and pipes), up to working temp of 600°C. Its weld metal is tough and resistant to work embrittlement.

Weld metal analysis in % (typical values):

C	Mn	Si	P	S	Cr	Mo	V
0.05 – 0.12	<0.9	<0.4	<0.02	<0.02	1 – 1.5	0.4 – 0.65	0.1 – 0.35

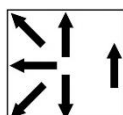
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V +20°C
>540	>440	>17	>100



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 85
3.25	450	100 - 135
4.0	450	140 - 185
5.0	450	180 - 220



Materials:

DIN Standard	13CrMo 4 5, 25 CrMo 4, 14 CrMo 4 5, 16MnCr 5, ST37.3-ST52.3; STE 290.7-STE 415.7
EN Standard	S235J2G3; S355J2G3; L290NB- L415NB; L290MB; P235GH
ASTM Standard	A182 Gr. F12-1; A213 Gr.T12; A250 Gr.T12; A355 Gr.P12; A387 Gr. 11, 12; A506 Gr.4130; A507 Gr.4130; A513 Gr.4130; A519 Gr. 4130; A752 Gr.4130; A866 Gr.4130.

Redrying: required at 300°C to 350°C for 2 hours

Standards	
AWS/ASME SFA-5.5	E 80 16-B2-H8
DIN 8575	E CrMo 1 B 20+
prEN 1599	E CrMo1 B 42 H10

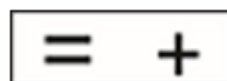
Applications and Properties:

Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to +570°C. Welds are of X-ray quality.

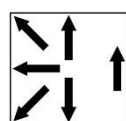
Preheating, inter pass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):						
C	Mn	Si	Cr	Mo	S	P
0.08	0.85	0.3	1	0.5	<0.008	<0.019

Mechanical Properties of all-weld metal:			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V +20°C
692	632	30	150



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 85
3.25	450	100 - 135
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard	13CrMo 44, 15 CrMo 5, 16 CrMo 4, 25 CrMo 6 ; 24 CrMo 5, GS- 22 CrMo 54, GS – 17 CrMo 55
EN Standard	13CrMo 4-5, 15 CrMo 5, 42 CrMo 4, 16 CrMoV 4, 25 CrMo 4, 24 CrMo 5, G22 CrMo 5-4, G17 CrMo 5-5
ASTM Standard	A193 Gr.B7; A335 Gr.P11 a. P12; A217 Gr. WC6

Redrying: required at 300°C to 350°C for 2 hours.

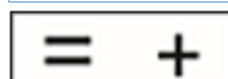
Standards	
AWS/ASME SFA-5.5	E 80 18-B2L-H8
DIN 8575	E CrMo 1 B 20+
EN 1599	E CrMo 1 B 42 H10

Applications and Properties:

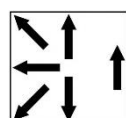
Basic electrode with low carbon weld metal , suitable for welding creep resistant steels (pressure vessels, boilers and pipes) up to 570°C. Heat treatment will be based on the base metal.

Weld metal analysis in % (typical values):				
C	Si	Mn	Cr	Mo
<0.05	0.45	0.80	1.1	0.45

Mechanical Properties of all-weld metal:				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V +20°C	Heat treatment
≥550	≥460	22	150	1 h at 690°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 85
3.25	450	100 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard 13CrMo 44, 15 CrMo 5, 16 CrMo 44, 22 CrMo 44, 24 CrMo 5, GS- 22 CrMo 54, GS – 17 CrMo 55

EN Standard 13CrMo 4-5, 15 CrMo 5, 42 CrMo 4, 16 CrMoV 4, 25 CrMo 4, 24 CrMo 5, G22 CrMo 5-4, G17 CrMo 5-5

ASTM Standard A193 Gr.B7; A335 Gr.P11 a. P12; A217 Gr. WC6

Redrying: required at 300°C to 350°C for 2 hours.

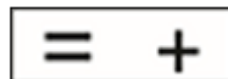
Standards	
AWS/ASME SFA-5.5	E 90 18– B3L–H8
DIN 8575	E CrMo 2 B 20+
EN 1599	E CrMo 2 B 42 H10

Applications and Properties:

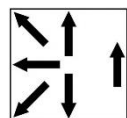
Basic electrode with low carbon weld metal, suitable for creep resistant and Hydrogen resistant steels (boiler, vessels and pipes) up to working temperature of 600°C. It's weld metal is tough and resistant to work embrittlement.

Weld metal analysis in % (typical values):						
C	Mn	Si	S	P	Cr	Mo
≤0.05	0.7	0.3	≤0.02	≤0.02	2.3	1

Mechanical Properties of all-weld metal:				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V +20°C	Heat treatment
≥ 620	≥530	≥17	150	1 h at 690°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 90
3.25	450	85 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard 10CrMo 9 10, 10 CrSiMo V 7, 24 CrMo 10; GS- 12 CrMo 9 10, GS – 19 CrMo 9 10

EN Standard 10CrMo 9 10, 10 CrSiMo V 7; G17 CrMo 9 10

ASTM Standard A355 Gr. P22; A217 Gr.WC9.

Redrying: required at 300°C to 350°C for 2 hours.

Welding Electrodes for Fine-Grained Structural Steels

AMA 1024N	93
AMA 1188N	94
AMA 1282N	95
AMA 1284N	96
AMA 1285N	97
AMA 1286N	98
AMA 1292N	99
AMA 1301N	100
AMA 1385NC	101
AMA 1398N	102
AMA 1414N	103
AMA 1415N	104
AMA 1416N	105
AMA 1417N	106
AMA 1418N	107
AMA 1420N	108
AMA 1422N	109
AMA 1424N	110
AMA 1428NC	111
AMA 1432N	112
AMA 1433NA	113
AMA 1437B	114

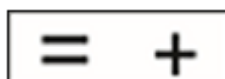
Standards	
AWS/ASME SFA-5.5	E 12018-G-H4
DIN 8575	E-Y-7955 Mn 2 Ni 1 CrMo B H5
EN 499	E 89 4 Mn 2 Ni 1 Cr Mo B 42 H5

Applications and Properties:

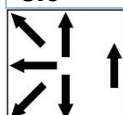
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.06	1.60	0.50	0.70	2.40	0.50

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C - 40°C
980 - 1080	>890	>14	70 60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 135
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard STE 690; STE 890

EN Standard S690; S890

Redrying: required at 300°C to 350°C for 2 hours

Standards

AWS/ASME SFA-5.5	E 8018-G-H4
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Applications and Properties:

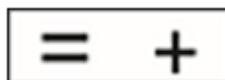
Basic electrode for production of crack free and tough welded joints. Weld metal is of high metallurgical purity with very low hydrogen content. Easy releasable slag and good bead profile.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.08	1.5	0.45	0.15	<0.02	<0.02

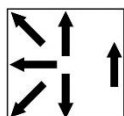
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C 30°C
550 - 650	>460	>22	- >120 >50



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	90 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; HI; HII; 17 mn 4; STE 255 to STE 355; 17 MnMoV 6 4; 15 NiCuMoNb5S

EN Standard S235JR- E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; P235GH; P265GH; P295GH; S255N to S355N

ASTM Standard A302 Gr.A, B; A517 Gr.A, B, C, E, F, H, J, K, M, P

Redrying: required at 300°C to 350°C for 2 hours.

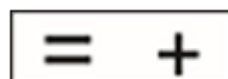
Standards	
AWS/ASME SFA-5.5	E 8018-G-H4
DIN 8529	E Y 5076 Mn 1 Ni B H5
EN 499	E 50 6 Mn 1 Ni B 42 H5

Applications and Properties:

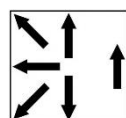
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):			
C	Mn	Si	Ni
0.06	1.6	0.50	0.5

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -60°C
590 - 690	>510	>23	200 60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 135
4.0	450	140 - 180
5.0	450	190 - 240



Materials:

DIN Standard	StE 420 to StE 500; St 37-3 to St 52-3; WStE 420 to WStE 500; TStE 255 to TStE 500; StE 240.7 TM to StE 445.7 TM; StE 210.7 to StE 445.7; EStE 255 to EStE 460.
EN Standard	S255N to S355N; S235J2G3 to S355J2G3; P255NH to P500NH; S255NL to S500NL; L245MB to L450MB; L210-L450NB; E295 to E335; P355 NL 1 to P460NL1; S380N to S460N; P355NH to P460NH; S380NL to S460NL; S255NL1 to S420NL1.
ASTM Standard	A516 Gr.65, A572 Gr.55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3, A678 Gr. A-D.

Redrying: required at 300°C to 350°C for 2 hours

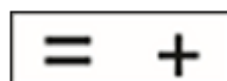
Standards	
AWS/ASME SFA-5.5	E 8018-G-H4
DIN 8529	E Y 5076 Mn 1 Ni B H5
EN 499	E 50 6 Mn 1 Ni B 42 H5

Applications and Properties:

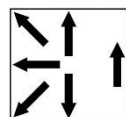
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical pure having very low hydrogen content. The electrode has a stable and concentrated arc, thus being well-suited for positional welding. Welds are of X-ray quality.

Weld metal analysis in % (typical values):			
C	Mn	Si	Ni
0.07	1.6	0.4	0.9

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -60°C
590 - 690	>510	>24	200 80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 135
4.0	450	140 - 180
5.0	450	190 - 240



Materials:

DIN Standard	StE 420 to StE 500; St 37-3 to St 52-3; WStE 420 to WStE 500; TStE 255 to TStE 500; StE 240.7 TM to StE 445.7 TM; StE 210.7 to StE 445.7; EStE 255 to EStE 460.
EN Standard	S255N to S355N; S235J2G3 to S355J2G3; P255NH to P500NH; S255NL to S500NL; L245MB to L450MB; L210-L450NB; E295 to E335; P355 NL 1 to P460NL1; S380N to S460N; P355NH to P460NH; S380NL to 460NL; S255NL1 to S420NL1.0NH.
ASTM Standard	A516 Gr.65, A572 Gr.55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3, A678 Gr. A-D.

Redrying: required at 300°C to 350°C for 2 hours

Standards	
AWS/ASME SFA-5.5	E 9018-D1-H4 E 9018-G-H4
DIN 8529	E Y 5554 MnMo B H5
EN 499	E 55 3 MnMo B 4 2 H5

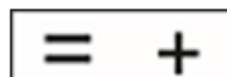
Applications and Properties:

Basic Electrode for producing crack-free and tough welded joints in low temperatures. Weld metal is of high metallurgical purity with very low hydrogen content. Easy releasable slag and good bead profile.

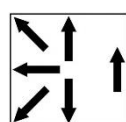
Weld metal analysis in % (typical values):					
C	Mn	Si	Mo	S	P
0.07	1.7	0.45	0.4	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)					
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V +20°C -40°C		Heat treatment
620 - 780	>540	>20	>120	>40	-
620 - 760	>540	>20	>120	>40	T

T: Tempered 1 hour at 620°C, air cooling



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	450	90 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard	St 50-2 to St 70-2; 15Mo3; 19Mn5; StE 380 to StE 500; WStE 420 to WStE 500;
EN Standard	E295 to E360; 16Mo3; P310GH; 17 MnMoV6-4, 15NiCuMoNb5S, 380N to S500N; P380NH to S460NH.
ASTM Standard	A255 Gr. C; A302 Gr. A-D; A514; A517 Gr. A, B, C, E, F, H, J, K, M, P.

Redrying: required at 300°C to 350°C for 2 hours

Preheating, inter pass temperature and post weld heat treatment in accordance with base metal to be welded.

Standards

AWS/ASME SFA-5.5

E 9018-D1-H4

Applications and Properties:

Basic Electrode for producing crack-free and tough welded joints in low temperatures. Weld metal is of high metallurgical purity with very low hydrogen content. Easy releasable slag and good bead profile.

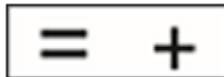
Weld metal analysis in % (typical values):

C	Mn	Si	Mo	Ni	S	P
0.07	1.7	0.45	0.35	0.5	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)

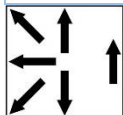
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V			Heat treatment
			+20°C	-40°C	-51°C	
630 - 780	>550	>22	>130	>50	>40	-
630 - 760	>550	>22	>130	>50	>40	T

T: Tempered 1 hour at 620°C, air cooling



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 90
3.25	350	90 - 130
4.0	450	140 - 180
5.0	450	190 - 230



Materials:

DIN Standard STE 355 to STE 500; TStE 355 to TStE 500; 17MnMoV 6 4; 17MnNi 4;

EN Standard S380N; S500N; P380NL to S500NL.

ASTM Standard A517 Gr. A, B, C, E, F, H, J, K, M, P. A225 Gr. C; A633 Gr. E; A572 Gr. 65

Redrying: required at 300°C to 350°C for 2 hours

Preheating, inter pass temperature and post weld heat treatment in accordance with base metal to be welded.

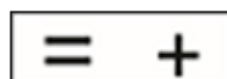
Standards	
AWS/ASME SFA-5.5	E 10018-G-H4
DIN 8529	E Y 6975 Mn 2 NiCrMo B H5
EN 499	E 69 6 Mn2 NiCrMo B 4 2 H5

Applications and Properties:

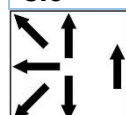
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality. If normalizing is required after welding 1292N shall be used.

Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.06	1.50	0.50	0.40	2.10	0.40

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-60°C
780 - 940	>700	>17	120	55



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350	90 - 140
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard ESTE 620; ESTE 690

EN Standard S500N, S500NH, S460NL

ASTM Standard A255 Gr. C; A514 and A517 Gr. A, B, C, E, F, H, J, K, M, P; A656; A678 Gr. C

Redrying: required at 300°C to 350°C for 2 hours

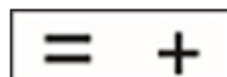
Standards	
AWS/ASME SFA-5.5	E 7018-G
DIN 8529	E Y 38 65 1 Ni Cu B
EN 499	E 38 5 Z B 42

Applications and Properties:

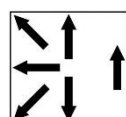
Electrode depositing a weld metal resistant to atmospheric corrosion for welding similar “weathering” steels. The weld metal features good toughness feature properties, thus being suitable for welding thicker section. Welds are of X-ray quality.

Weld metal analysis in % (typical values):				
C	Mn	Si	Cu	Ni
0.06	1.00	0.4	0.45	1.00

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C 40°C
500 - 600	>380	>25	- 200 80



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350	90 - 140
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard	St 37-2 to St 60-2; St 52-3 Cu 3; WStE 37-2;
EN Standard	S235JR, S235JRW. S355JRW, S355J2G3 Cu.
ASTM Standard	ASTM A36, A283 Gr. B, C

Redrying: required at 300°C to 350°C for 2 hours

Standards	
AWS/ASME SFA-5.5	E 9018-G-H4
DIN 8529	E SY 55 76 Mn 1 Ni Mo B H5
EN 499	E 55 6 Mn 1 NiMo B 4 2 H5

Applications and Properties:

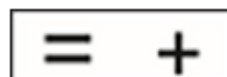
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):				
C	Mn	Si	Ni	Mo
0.05	1.50	0.30	1.2	0.35

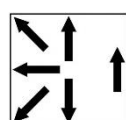
Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -60°C	Heat treatment
630 - 720	>560	>20	160 70	AW
620 - 720	>550	>20	150 55	SR

AW: as-welded

SR: Stress – Relieved 15 hours. /580°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 140
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard STE 420 to STE 500; WSTE 355 to WSTE 500; TSTE 420 to TSTE 500; 17MnMoV 6 4; 15NiCuMoNb 5; 20MnMoNi 4 5; .

EN Standard S420N to S500N; S355NL to S500NL; P355NL1 to P640NL1; P355NH to P500NH.

ASTM Standard ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P. A225 Gr. C; A633 Gr. E; A572 Gr. 65

Redrying: required at 300°C to 350°C for 2 hours

Standards	
AWS/ASME SFA-5.5	E 7018-G-H4
DIN 8529	E SY 42 761 Ni B H5
EN 499	E 46 61 Ni B 42 H5

Applications and Properties:

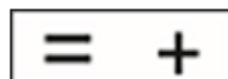
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. The electrode has a stable and concentrated arc, thus being well-suited for positional welding. Welds are of X-ray quality. CTOD-tested for offshore application.

Weld metal analysis in % (typical values):					
C	Mn	Si	Ni	S	P
0.06	1.20	0.30	0.95	<0.015	<0.015

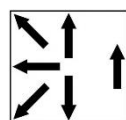
Mechanical Properties of all-weld metal: (single values are typical values)					
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(J) ISO – V +20°C -60°C		Heat treatment
530 - 680	>460	>22	190	70	AW
500 - 640	>420	>25	190	60	SR

AW: As Welded

SR: Stress – Relieved 15 hours. /580°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 140
4.0	450	140 - 185
5.0	450	180 - 250



Materials:

DIN Standard St 33 to St 52.3; St 50.2 to St 70.2; H?; H??; 17 Mo 4; 19 Mn 5; StE 210.7 to StE 415.7; StE 285 to StE 460; WStE 255 to WStE 460; EStE 255 to EStE 460; GS-38 to GS-52.

EN Standard S235J2GS to S355J2G3; L210 to L415; E295 to E360; P235GH; P265GH; P295GH; P355GH.

ASTM Standard A131 Gr.A, B, C; AH32 to EH40; A517 Gr.A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65.

Redrying: required at 300°C to 350°C for 2 hours

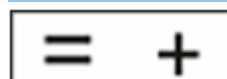
Standards	
AWS/ASME SFA-5.5	E 7018-C2L-H4
DIN 8529	E Y 4297 3 Ni B H5

Applications and Properties:

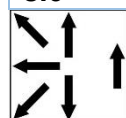
Electrode for producing crack-free and tough welded joints in bellow temperature. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):					
C	Mn	Si	Ni	S	P
0.05	0.7	0.4	3.2	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V +20°C -60°C -101°C
531	447	29	>180 >100 >27



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350 - 450	90 - 140
4.0	350 - 450	140 - 185
5.0	450	180 - 250



Materials:

DIN Standard STE 285 to STE 420; 10Ni14; TSTE 225 to TSTE 380; 11 MnNi 5 3; 13 MnNi 6 3; 15 NiMn 6

EN Standard 12Ni 14; S275 to S420; P275 – P420; S275Nto S420N; S275NL to S420NL; S355, S420; L360, L415, L445.

ASTM Standard A633 Gr. E; A572 Gr. 65; A203 Gr. D; A333 Gr. 3; A334 Gr. 3.

Redrying: required at 300°C to 350°C for 2 hours

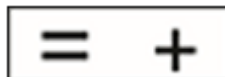
Standards	
AWS/ASME SFA-5.5	E 9016-G-H4
DIN 8529	ESY 55 76 Mn 1 NiMo B H5
EN 499	E 55 6 Mn1NiMo B T 4 2 H5

Applications and Properties:

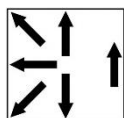
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):						
C	Mn	Si	Ni	Mo	S	P
0.09	1.6	0.35	0.9	0.6	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A (%)	Impact energy(j) ISO – V -40°C -50°C
630 - 720	>560	>20	60 40



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350	90 - 140
4.0	350	140 - 185
5.0	350	180 - 240



Materials:

DIN Standard StE 355 to StE 500; WStE 355 to WStE 500; EStE 355 to EStE 500; StE 480.7 TM to StE 550.7 TM; TStE 420 to TStE 550; 17 MnMoV 6 4; 15 NiCuMoNb 5; 20 MnMoNi 4 5; 13 MnNiMo 5 4

EN Standard L485MB, L555MB; S355N to S500N; P355N to P500N; S355NL to S500NL; P355NL1 to P460NL1; P355NH to P500NH.

ASTM Standard A508 Cl.2; A533 Cl.1; A678 Gr, A, B; A516 Gr.55; A662 Gr.A, B, C.

Redrying: required at 300°C to 350°C for 2 hours

Standards

AWS/ASME SFA-5.5

E 8018-W

Applications and Properties:

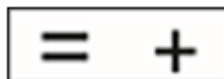
Basic electrode with a weld metal resistant to atmospheric corrosion and having good mechanical properties, easy releasable slag and good bead profile.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P	Cu	Cr	Ni
0.06	0.9	0.4	≤0.02	≤0.02	0.5	0.47	0.47

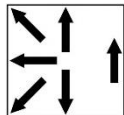
Mechanical Properties of all-weld metal:(single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -18°C
≥550	>460	≥19	80



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 95
3.25	450	90 - 140
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard St 37-2 to St 60-2; St 52-3 Cu 3; WStE 37-2

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr.B, C

Redrying: required at 300°C to 350°C for 2 hours

Standards

AWS/ASME SFA-5.5

E 8018-G

Applications and Properties:

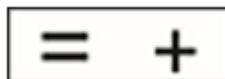
Basic electrode with a weld metal resistant to atmospheric corrosion and having good mechanical properties, easy releasable slag and good bead profile.

Weld metal analysis in % (typical values):

C	Mn	Si	Ni	Cu	S	P
0.08	1.3	0.35	0.8	0.4	<0.02	<0.02

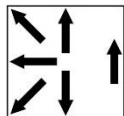
Mechanical Properties of all-weld metal: (single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V		
			-20°C	-40°C	-50°C
560 - 640	>460	>28	125	90	60



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 135
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard St 37-2 to St 60-2; St 52-3 Cu 3; WStE 37-2

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr.B, C

Redrying: required at 300°C to 350°C for 2 hours

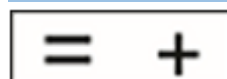
Standards	
AWS/ASME SFA-5.5	E 8018-C2-H4
DIN 8529	E Y 46873Ni B H5

Applications and Properties:

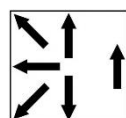
Basic electrode for producing crack-free and tough welded joints in bellow temperature. Weld metal is extremely metallurgical purity having very low hydrogen content.

Weld metal analysis in % (typical values):					
C	Mn	Si	Ni	S	P
0.06	1	0.3	3	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -73°C
560 - 640	>460	24	50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350 - 450	90 - 140
4.0	350 - 450	140 - 185
5.0	450	180 - 250



Materials:

DIN Standard STE 285 to STE 420; 10Ni14; TSTE 225 to TSTE 380; 11 MnNi 5 3; 13 MnNi 6 3; 15 NiMn 6

EN Standard 12Ni14; P275 to P460; S275N to S460N; S275NL to S460NL; S355, S420; L360, L415, L445.

ASTM Standard A633 Gr. E; A572 Gr. 65; A203 Gr. D; A333 Gr. 3; A334 Gr. 3

Redrying: required at 300°C to 350°C for 2 hours

Standards	
AWS/ASME SFA-5.5	E 8018-C1-H4
DIN 8529	E SY 42 87 2 Ni B H5
EN 499	E 46 62 Ni B 42 H5

Applications and Properties:

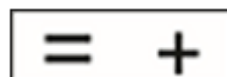
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):						
C	Mn	Si	S	P	Cu	Ni
0.05	1.1	0.3	<0.02	<0.02	<0.09	2.4

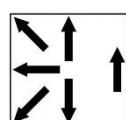
Mechanical Properties of all-weld metal: (single values are typical values)					
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -73°C		Heat treatment
550 – 700	>480	>22	170	100	AW
520 - 640	>420	>20	170	80	SR

AW: As Welded

SR: Stress-Relieved 15 hrs. /580°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350 - 450	90 - 130
4.0	350 - 450	140 - 185
5.0	450	180 - 245



Materials:

DIN Standard TStE 355 to TStE 460; EStE 355 to EStE 460; EStE 255 to STE 460; TStE 355 to TStE 460; WStE 355 to WStE 460

EN Standard 12Ni14; 14Ni6; 10Ni14; 13MnNi6 3; P355NL1 to P460NL1; S255N to S460N; S355NH to S460NH; S255NL to S460NL; S255NL1 to S380NL1.

ASTM Standard A633 Gr.E; A572 Gr.65; A203 Gr.D; A333 and A334 Gr. 3; A350 Gr. LF3

Redrying: required at 300°C to 350°C for 2 hours

Approval: LRS, GL

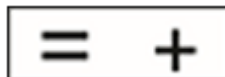
Standards	
AWS/ASME SFA-5.5	E 8018-C3-H4
DIN 8529	E SY 4676 1 Ni B H5
EN 499	E 46 5 1 Ni B 42 H5

Applications and Properties:

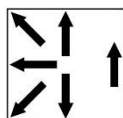
Low hydrogen basic electrode with crack resist and high toughness is suitable for fine grain and high strength steels. It has slow arc and low spatter and its slag is easy removable.

Weld metal analysis in % (typical values):					
C	Mn	Si	Ni	S	P
0.12	1.2	0.4	1	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			+20°C	-40°C
550 - 700	>470	22	>140	70



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350 - 450	90 - 130
4.0	350 - 450	140 - 180
5.0	450	180 - 240



Materials:

DIN Standard StE 420 to StE 500; St 37-3 to St 52-3; WStE 420 to WStE 500; TStE 255 to TStE 500; StE 240.7 TM to StE 445.7 TM; StE 210.7 to StE 445.7; EStE 255 to EStE 460.

EN Standard S255N to S355N; S235J2G3 to S355J2G3; P255NH to P500NH; S255NL to S500NL; L245MB to L450MB; L210-L450NB; E295 to E335; P355 NL 1 to P460NL1; S380N to S460N; P355NH to P460NH; S380NL to S460NL; S255NL1 to S420NL1.

ASTM Standard A516 Gr.65, A572 Gr.55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3. A678 Gr. A-D.

Redrying: required at 300°C to 350°C for 2 hours

Approval: LRS, GL

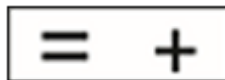
Standards	
AWS/ASME SFA-5.5	E 7018-C3L-H4
DIN 8529	E Y 4276 1 Ni B H5
EN 499	E 46 5 1 Ni B 42 H5

Applications and Properties:

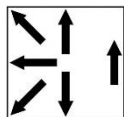
Low hydrogen basic electrode with crack resist and high toughness is suitable for fine grain structural steels. It has slow arc and low spatter and its slag is easy removable.

Weld metal analysis in % (typical values):					
C	Mn	Si	Ni	S	P
0.06	1	0.3	1	≤0.02	≤0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -51°C
520	460	26	60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	350 - 450	90 - 130
4.0	350 - 450	140 - 180
5.0	450	180 - 240



Materials:

DIN Standard	StE 255 to StE 460; St 37-3 to St 52-3; WStE 420 to WStE 460; TStE 255 to TStE 460; StE 240.7 TM to StE 445.7 TM; StE 210.7 to StE 445.7; EStE 255 to EStE 460.
EN Standard	S235J2G3 to S355J2G3; P255NH to P460NH; S255NL to S460NL; L245MB to L450MB; L210-L450NB; E295 to E335; P355 NL 1 to P460NL1; S380N to S460N; P355NH to P460NH; S380NL to 460NL; S255NL1 to S420NL1.
ASTM Standard	A516 Gr.65, A572 Gr.55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3, A678 Gr. A-D.

Redrying: required at 300°C to 350°C for 2 hours

Standards

AWS/ASME SFA-5.5

E 9018 M-H4

Applications and Properties:

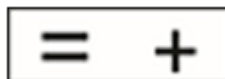
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):

C	Mn	Si	Ni	Cr	Mo	S	P
0.05	1.1	0.4	1.6	0.1	0.3	0.02	0.02

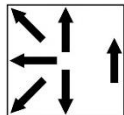
Mechanical Properties of all-weld metal:(single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(J) ISO – V -51°C
650	550	29	84



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 135
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard STE 420 to STE 500; WSTE 355 to WSTE 500; TSTE 420 to TSTE 500; 17MnMoV 6 4; 17MnMoV 64; 15NiCuMoNb 5; 20MnMoNi 4 5;

EN Standard S420N to S500N; S355NL to S500NL; P355NL1 to P460NL1; P355NH to P500NH; P420N to P500N

ASTM Standard ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P. A225 Gr. C; A633 Gr. E; A572 Gr. 65

Redrying: required at 300°C to 350°C for 2 hours

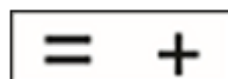
Standards	
AWS/ASME SFA-5.5	E 11018-M-H4
DIN 8529	E Y 69 75 Mn 2 NiCrMo B H5
EN 499	E 69 5 Mn2NiCrMo B 4 2 H5

Applications and Properties:

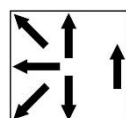
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):					
C	Mn	Si	Cr	Ni	Mo
0.06	1.80	0.50	0.35	2.20	0.40

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -60°C
800 - 960	>700	>16	120 60



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 92
3.25	450	90 - 135
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard TStE 620 V, TStE 690 V; EStE 620 V, EStE 690 V

EN Standard S620 QL – S690 QL; S620 QL1, S690 QL1

Redrying: required at 300°C to 350°C for 2 hours

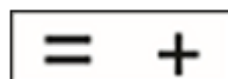
Standards	
AWS/ASME SFA-5.5	E 12018 M-H4
DIN 8529	E Y 6955 Mn2Ni1CrMo B H5
EN 499	E 69 5 Mn2NiCrMo B 4 2 H5

Applications and Properties:

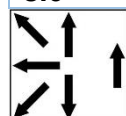
Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (typical values):							
C	Mn	Si	Ni	Cr	Mo	S	P
0.063	1.5	0.35	2.3	0.45	0.47	<0.02	<0.02

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -51°C
877	770	22	50



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 135
4.0	450	140 - 185
5.0	450	180 - 240



Materials:

DIN Standard 28NiCrMo5 5; 24CrMoV5 5; 21CrMoV51 1; TStE 620 V, TStE 690 V; EStE 620 V, EStE 690 V

EN Standard S620 QL – S690 QL; S620 QL1, S690 QL1

Redrying: required at 300°C to 350°C for 2 hours

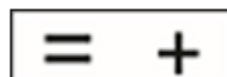
Standards	
AWS/ASME SFA-5.5	E 7016-G-H8
DIN 8529	E SY 42 761Ni B
EN 499	E 46 6 1Ni B 42 H5

Applications and Properties:

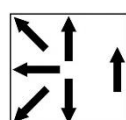
Basic electrode with tough weld metal is suitable for carbon steels up to 0.4%, due to low hydrogen content with is crack resistant. Low spatter and undercut and good X-ray are some properties of this electrode.

Weld metal analysis in % (typical values):					
C	Mn	Si	S	P	Ni
0.07	1.4	0.4	<0.02	<0.02	0.85

Mechanical Properties of all-weld metal: (single values are typical values)				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V -30°C	Heat treatment
540 - 620	>460	>22	>100	-
530 - 600	>450	>25	>100	570 C/1 h



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	60 - 90
3.25	350	90 - 140
4.0	350	135 - 190
5.0	350	190 - 260



Materials:

DIN Standard	St 33 to St 52.3; St 50.2 to St 70.2; Hl; Hll; 17Mo4; 19Mn5; StE 210.7 to StE 415.7; StE 285 to StE 460; WStE 255 to WStE 460; EStE 255 to EStE 460; GS-38-GS-52. .
EN Standard	S235J2GS to S355J2G3; L210 to L415; E295 to E360; P235GH; P265GH; P295GH; P355GH.
ASTM Standard	A131 Gr.A, B, C; AH32 to EH40; A517 Gr.A, B, C, E, F, H, J, K, M, P; A255 Gr. C; A633 Gr. E; A572 Gr. 65.

Redrying: required at 300°C to 350°C for 2 hours

Cast Iron Welding Electrodes

AMA 1012G	116
AMA 1094Mo	117
AMA 1094Ni	118
AMA 1094NiFe	119

Standards

AWS/ASME SFA-5.15

EST

Applications and Properties:

Half-basic type electrode with mild steel core for welding cast iron. Weld deposit is non-Machin able, applicable as a whole for cast iron parts, repair of casting defects, joining of cast iron to steel arc.

Suitable for: Cast iron parts, repair of casting defects, joining of cast iron to steels.

Mechanical properties of all-weld metal: (typical values)

Tensile strength of the weld deposit is in equal to base material but almost higher



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
3.25	350	90 - 120
4.0	350	110 - 140



Caution:

The electrode must be welded with short arc as much as possible. But notice that it does not contact with the work piece, for it will stick. The following points must be observed while welding with this electrode:

1. The work piece must be clean from oil or there impurities
2. Only beads of 25 to 35 mm length should be welded
3. Just after welding, welding deposit should be pinned in order to balance the internal stress
4. The work piece temperature should never be upper than hand burning temperature

Standards	
AWS/ASME SFA-5.15	E NiCu-B
DIN 8573	E NiCu BG 22

Applications and Properties:

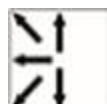
Electrode having a pure nickel core wire, designed for the welding of cast iron without or with low preheats (up to 300°C max). If possible, iron admixture should be kept low, thus using it preferably for filler and cover passes or for filling metal closely matches color or base metal. Easy arc striking, stable arc, finely-rippled bead surface. Weld metal is Machin able. Weld short beads.

Weld metal analysis in % (typical values):			
C	Ni	Cu	Fe
0.5	Base	30	4

Mechanical Properties of all-weld metal:(single values are typical values)			
Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Brinell hardness HB 10/3000
400	220	15	150



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	50 - 80
3.25	350	80 - 110
4.0	350	110 - 150



Materials: cast iron with lamellar graphite white and black heart malleable cast iron nodular cast iron.

Standards	
AWS/ASME SFA-5.15	E Ni-CI
DIN 8573	E Ni BG-22

Applications and Properties:

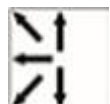
Electrode having a pure nickel core wire, designed for the welding of cast iron without or with low preheats (up to 300 C max). For repairing cracked or worn casting or joining cast iron parts to components made of steel, copper and nickel materials. Easy arc striking, stable arc, finely-rippled bead surface. Weld metal is Machin able. Weld short beads (approx. 30 to 50 mm long). For reducing weld residual stresses hammer peen welds before cooling.

Weld metal analysis in % (typical values):		
C	Ni	Fe
0.5	Base	2

Mechanical Properties of all-weld metal:(single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Brinell hardness HB 10/3000
400	200	5	140



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	50 - 80
3.25	350	80 - 110
4.0	350	110 - 150



Materials: cast iron with lamellar graphite, white and black heart malleable cast iron, nodular cast iron.

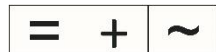
Standards	
AWS/ASME SFA-5.15	E NiFe-CI
DIN 8573	E NiFe-1 BG-22

Applications and Properties:

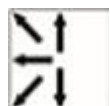
Electrode having a pure nickel core wire, designed for the welding of cast iron without or with low preheats (up to 300°C max). The weld metal has a low coefficient thermal expansion and therefore little shrinkage. It feature higher strength properties than pure nickel weld metal and therefore preferred for joining nodular cast iron, white and black heart malleable cast iron and austenitic nodular cast iron or for joining these materials to components made of steel, copper and nickel materials. Easy arc striking, stable arc, finely-rippled bead surface are some properties of this electrode. Weld metal is Machin able. Weld short beads.

Weld metal analysis in % (typical values):		
C	Ni	Fe
0.5	53	Rest

Mechanical Properties of all-weld metal: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Brinell hardness HB 10/3000
450	300	10	170



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	250	60 - 90
3.25	300	90 - 110
4.0	350	130 - 170



Materials: nodular cast iron, white and black heart malleable cast iron, austenitic nodular cast iron, joining of cast iron to steel.

Hard Coating Electrodes

AMA 1105V	121
AMA 1600V	122
AMA 1602V	123
AMA 1621V3	123
AMA 1622V	125
AMA 1623V	126
AMA 1639V	127
AMA 1760V	128

Standards	
AWS/ASME SFA-5.15	E Fe 6
DIN 8555	E 4-UM-60-65-S

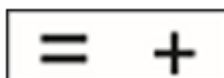
Applications and Properties:

Rutile type electrode with coating for manufacturing and repairing high speed cutting tools.

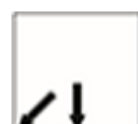
Weld metal analysis in % (typical values):						
C	Mn	Si	Cr	Mo	V	W
0.9	0.50	0.50	4.20	8.50	0.90	1.10

Weld metal analysis in % (typical values):		
HRC Hardness		
As - Welded	After prescribed heat treatment (a)	After annealing (b)
50 - 64	62 - 66	25 - 30

Heat treatment			
Hardening: Quenching temperature	Quenching agent Oil, dry air, hot bath	Tempering: Twice one hour (air cooling)	Annealing (oven cooling)
1180°C -1240°C	450°C - 500°C	Up to 510°C - 540°C	2-4 hour at 820 - 850°C



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	70 – 100
3.25	350	100 – 150
4.0	350	130 – 180



Materials: manufacturing and repairing of cutting tools, e.g. for turning, planning, milling, reaming, drills, etc.

Caution:

In order obtain optimum results, deposit three layers one on top of the other. Before welding, preheat the work piece up to 600°C-700°C and maintain this temperature during welding. Weld at the lowest possible.

Do not weld the AMA 1105V electrode if the coating is damaged.

Standards

DIN 8555

E 6-UM-60

Applications and Properties:

Thick basic-covered electrode for depositing tough and wear resistant overlays on components subject to severe wear the weld metal is crack-free and without porosity and resistant to impact and shocks. It can be machined only by grinding. A tough buffer layer (with 1803 J electrodes) is only required with very crack sensitive steels. It is possible to deposit a large number of layers without the need of intermediate buffer layers to prevent cracking.

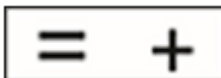
Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	V
0.50	0.3	0.4	7.0	0.50	0.50

Mechanical Properties of all-weld metal: (single values are typical values)

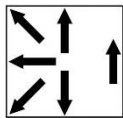
Hardness as-welding (HV 30)

670-770 (57 - 62 HRC)



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	70 - 90
3.25	450	100 - 135
4.0	450	140 - 180
5.0	450	190 - 240
6.0	450	250 - 300



Suitable for:

Excavator parts, bucket edges, bucket teethes, drilling 1 bits, coal planes, conveyor screws, polygon edges, crusher jaws and cones.

Redrying: required at 300°C to 350°C for 2 hours.

Standards

DIN 8555

E 10-UM-60R

Applications and Properties:

Thick Rutile-covered high-alloy electrode depositing a weld metal of hypereutectic chromium hard metal composition. It is suitable for highly wear resistant overlays subject to abrasion by mineral particles. The typical transverse cracks make such a hard weld metal not detrimental to abrasion resistance. However, the weld metal is not suitable for application where impact and shock conditions prevail. It is Machinable only by grinding. On difficult-to-weld steels a buffer layer with AMA 1803J is necessary. 1602V produces extremely smooth weld beads with flat penetration. Metal recovery is approximately 160%.

Weld metal analysis in % (typical values):

C

Cr

4.3

35

Mechanical Properties of all-weld metal: (single values are typical values)

Hardness as-welding (HV)

680 – 770 (58-62 HRC)



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	120 - 140
4.0	450	170 - 190
5.0	450	220 - 250



Materials:

Wearing parts subject to mineral abrasion such as conveyor screws, mixer blades, concrete pumps, stirring and agitator parts, milling parts, excavator bucket edges, cool planes, centrifugal shovels, and parts in petro-chemistry industries also, wearing parts subject to corrosion at elevated temperatures.

Redrying: required at 300°C to 350°C for 2 hours

Standards

DIN 8555

E 10 –UM–60 R

Applications and Properties:

Thick rutile-covered high-alloy electrode depositing a weld metal of chromium hard metal composition. It is suitable for highly wear resistant overlays subject to abrasion. However, the weld metal is not suitable for application where impact and shock conditions prevail.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo
3.3	1.5	1.7	28	0.4

Mechanical Properties of all-weld metal: (single values are typical values)

Hardness as-welding

58 - 62 HRC



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	120 - 140
4.0	450	170 - 190
5.0	450	220 - 250



Materials: wearing parts subject to mineral abrasion such as sugar rolls.

Redrying: required at 300°C to 350°C for 2 hours.

The typical transverse cracks occurring such a hard weld metal are not detrimental to abrasion resistance.

Standards

DIN 8555

E1-UM-400

Applications and Properties:

Thick basic-covered electrode for depositing highly wear resistant overlays. The weld metal can only be machined using sintered hard metal tipped tools. It is particularly resistant to impact and shock. A tough buffer layer (with 1803J electrodes) is only required with crack sensitive steels. It is possible to deposit even a large number of layers without the need of intermediate buffer layers. 1622V can be easily welded in all positions except vertical-down.

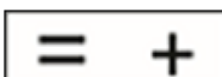
Weld metal analysis in % (typical values):

C	Mn	Si	Cr
0.20	0.40	0.50	2.8

Mechanical Properties of all-weld metal: (single values are typical values)

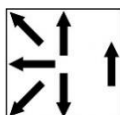
Hardness as-welding

37 - 42 HRC



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	105 - 135
4.0	450	120 - 180
5.0	450	170 - 240



Materials:

Rebuilding of rails, rails crossing and switch pointer, wear parts such as dredger parts, polygon edges, bearing surface, striking tools, dies, tires, wheel flanges, slide surface subjected to heavy wear, reconditioning of lower dies and punches, etc.

Redrying: required at 300°C to 350°C for 2 hours.

Standards

DIN 8555

E6-UM-60

Applications and Properties:

Basic electrode for repairing of molds especially 1.2080 cutting mold. This electrode can be used with or without buffer layer for 1.2080 steel. Before welding, 1.2080 steel shall be preheat at 350°C-400°C.

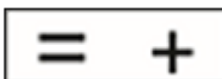
Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	W	V
0.5	0.40	0.9	6.5	0.45	1.3	0.6

Mechanical Properties of all-weld metal: (single values are typical values)

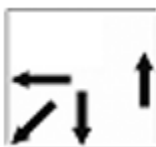
Hardness as-welding

57 - 62 HRC



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	70 - 100
3.25	350 - 450	100 - 140
4.0	350 - 450	140 - 180



Materials: for repair of cutting molds.

Redrying: required at 300°C to 350°C for 2 hours.

Standards

DIN 8555

E6-UM-55-GP

Applications and Properties:

Rutile-covered electrode is suitable for depositing hard facing overlays on components subject by metal to metal. The weld metal is resistant to impact and high compressive stresses. It is weld able by AC (OCV 70V) and DC+ in the flat and vertical up position.

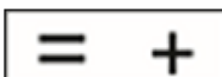
Weld metal analysis in % (typical values):

C	Mn	Si	Cr
0.50	0.60	1.90	9.50

Mechanical Properties of all-weld metal: (single values are typical values)

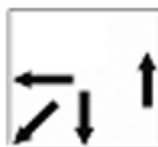
Hardness as-welding

54 HRC



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
2.5	350	65 - 95
3.25	450	90 - 140
4.0	450	125 - 190



Materials: crusher hammers, gear wheels, bucket wheels, bucket teeth and lips, mixers, dredge part, moulds repairing.

Redrying: required at 300°C 2 hours.

Standards

DIN 8555

E 7-UM-200KP

Applications and Properties:

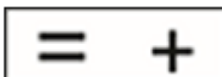
Basic-covered austenitic manganese steels electrode for wear resistant hard facing application. Since the weld metal will adopt high hardness by cold working, it is particularly suited to be used on components subjected to wear by heavy impact and shock. The work piece is sown if necessary. In the case of large work pieces must not become too hot and during welding and should be allowed to cool manganese steel, such as jaw plate for crushers, it is advisable to weld them in a water bath. High current densities and wide weave beads must be avoided. When building up various layers, it is good practice to deposit an intermediate buffer layer with AMA 1803J weld metal. In joint welding of austenitic manganese steel, it is preferable to use AMA 1803J electrode.

Weld metal analysis in % (typical values):

C	Mn	Si
1.20	13.0	0.70

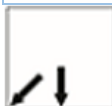
Mechanical Properties of all-weld metal: (single values are typical values)

Hardness as-welding: approx	Hardness after work hardening: approx.
~ 200 HB	~ 400 - 500 HB



Welding Parameters

Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	110 - 135
4.0	450	140 - 175
5.0	450	180 - 230



Materials: hard facing and repair welding of wear resisting parts made of austenitic manganese steels, Such as: jaws plates for crushers, crusher cones, pulverizing hammers, beating arm, etc.

Redrying: required at 300°C to 350°C for 2 hours.

Aluminum and Bronze Electrodes

AMA 1075A	130
AMA 1075SP.....	131
AMA 1328G.....	132

Standards	
DIN 1732	EL–Al 99.5
No. of Material	3.0259
AWS/ASME SFA–5.3	E 1100

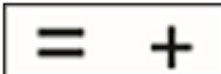
Applications and Properties:

Electrode with special covering for the welding of aluminum silicon alloys and for joining dissimilar aluminum alloys. The electrode should be held perpendicularly to the work-piece and a short arc length maintained.

Plates thicker than 10 mm and larger work-pieces require preheating in the range of 150°C to 250°C. Since slag residues arc corrosive, that must be completely removed from the welded bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, the electrode must be stored in an absolutely dry location, or redried if required.

Weld metal analysis in % (typical values):	
Al	Other
Min 99.5	Max 0.5

Mechanical Properties of all-weld metal: (single values are typical values)		
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)
80	30	30



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 - 90
3.25	350	80 - 110
4.0	350	110 - 150



Materials: commercially pure aluminum e.g. Al 99.5 to Al 99, DIN 1721 Aluminum alloys, such as AL 99.9 Mg 0.5 AlRMg 0.5, AlRMg 0.5, DIN 1725.

Redrying: 110°C to 120°C for 2 hours

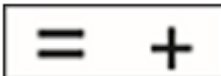
Standards	
DIN 1732	EL-ALSi 5
No. of Material	3.2245
AWS/ASME SFA-5.3	E-4043

Applications and Properties:

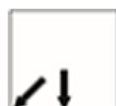
Electrode with special covering for the welding of aluminum silicon alloys and for joining dissimilar aluminum alloys. The electrode should be held perpendicularly to the work piece and a short arc length maintained. Plates thicker than 10 mm and larger work pieces require preheating in the range of 150°C to 250°C. Since slag residues arc corrosive, the must be completely removed from the welded bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, the electrode must be stored in an absolutely dry location, or redried if required.

Weld metal analysis in % (typical values):		
Al	Si	Fe
Base	5	0.3

Mechanical Properties of all-weld metal: (single values are typical values)		
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)
160	90	15



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2.5	300	60 - 90
3.25	350	80 - 110
4.0	350	110 - 150



Materials: AlMgSi and AlMg -alloys up to 2.5% Mg, AlMnCu, AlSi cast cast alloys.

Redrying: at 110°C to 120°C for 2 hours

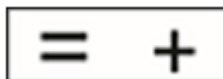
Standards	
DIN 1733	EL-CuSn 7
AWS/ASME SFA - 5.6	E Cu Sn-C

Applications and Properties:

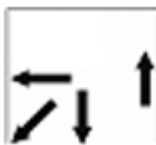
Thin-bronze electrode for joining welding and hard facing on copper and copper alloys. Also suitable, for hard facing of copper on steels, cast steel and grey cast iron. Particularly suitable for surfacing welds on bronze bearing in machine-building. Smooth running and good weld ability.

Weld metal analysis in % (typical values):			
Cu	Sn	Mn	P
91	7.5	0.4	0.3

Mechanical Properties of all-weld metal: (single values are typical values)	
Tensile Strength (N/mm ²)	Vickers hardness Hv 30
~ 300 – 350	~ 70 - 100



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
2	250	40 - 70
2.5	350	70 - 120
3.25	350	130 - 180
4.0	450	160 - 200



Materials:

Caution: The lowest possible current must be set when applying the root pass during hard surfacing of ferrous materials, so as to reduce the possibility of impurities in the bronze weld metal through the melting of the base material to a minimum. The current setting should be slightly increased for the subsequent passes. The arc has to be applied in circular fashion in order to ensure slow cooling process of the weld pool, i.e., the arc must repeatedly recover the weld pool. Preheating the work piece can be of advantage. Joint welding is carried out with high currents. The included angle should be 90C if possible. When butt welding ensure adequate air gap. Due to the good heat conductivity of copper and its alloys. The weld zone must be preheated to 100-300C depending on the degree of heat dissipation.

Thin-bronze materials, red brass and copper. Hard facing of copper on steel, cast steel and grey cast Iron.

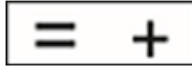
Redrying: required at 300°C for 2 hrs.

Cutting electrode and groove

AMA 1006Y.....	134
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Applications and Properties:

Electrode with special coating for cutting, gouging and piercing of steel and grey cast iron is very useful in repair and demolition.



Welding Parameters		
Diameter (mm)	Length (mm)	Amperage (A)
3.25	450	160 - 200
4.0	450	200 - 280
5.0	450	280 - 350

Suitable for:

All steels (particularly for stainless and manganese steels which cannot be cut by the oxyacetylene process), also for cast iron, copper and its alloys etc.

SAW-fluxes

Fluxes for Submerged Arc welding of General Struct	136
Fluxes for Submerged Arc welding of Austenitic STA	169
Fluxes for Wear Resistant and Hardsurfacing applic	174
Saw Backing Flux	177

Fluxes for Submerged Arc Welding of General Struct

AMA OP123	136
AMA OP132	139
AMA AP380	141
AMA AP3803	143
AMA AP440	143
AMA OP119	145
AMA OP120TT	147
AMA OP121TT	150
AMA OP122	153
AMA OP129	156
AMA OP139	159
AMA OP155	160
AMA OP176	162
AMA OP181	163
AMA OP185	165
AMA UNIVERSAL	167

Standards	
EN 760	SA AB 1 67 AC
DIN 32 522	B AB 1 67 AC 10 M
AWS/ASME	F7AO-EL12 F7AO-EM12 F7AO-EM12K F7PO-EM12K

Application and properties:

Agglomerated aluminate-basic type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels. AMA-OP123 produces slight silicon and mean manganese pick-up. Owing to its metallurgical behavior, it can be used with 50-11, 50-12, 50-14 wire electrodes. It is suited to be used in twin-wire and multi-wire welding, as well as in welding from both sides in one pass, e.g. in the production of large diameter pipes. With this process variant, the use of molybdenum alloyed wire electrodes for increased toughness values is advisable. An outstanding feature of AMA-OP123 flux is its high current carrying capacity. Unless there are limitation imposed by base metal quality, this feature of the flux can be of benefit when slag can be easily removed in all cases, the slag being short, i.e. girth seams of small diameter work pieces can be welded without the danger of the slag running off. On account of its low bulk density, flux consumption is low.

AMA-OP123 can be used on either DC (positive) or AC up to 1000A.

Damp flux shall be redried by baking at 300°C – 350°C

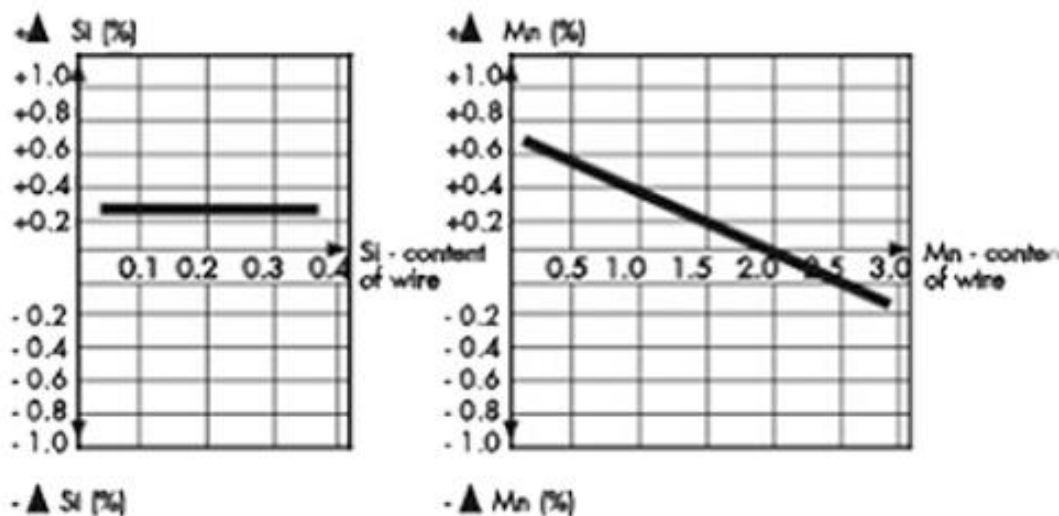
Grain size in accordance with DIN 32 522:2-20.

Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
20%	20%	45%	10%

Basicity to boniszewskii: ~1.0

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):

With Wire Electrode		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.05-0.08	0.2-0.4	0.7-1.1	-
50-12	S2	0.05-0.08	0.2-0.4	1.2-1.6	-
50-14	S2Mo	0.05-0.08	0.2-0.4	1.2-1.6	0.5

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo=5d %	Impact energy(j) ISO – V		
					20°C	±0°C	-20°C
50-11	As Welded	420-520	> 360	> 24	>90	>50	>35
50-12	As Welded	500-600	> 400	> 22	>90	>50	>35
50-14	As Welded	600-700	> 450	> 18	>65	>50	>35

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St 37-2, USt 37-2, RSt 37-2	50-11	50-12,50-14
St37-2, St44-2, St44-3, St52-3	50-12	50-12,50-14
Pipe Steels	With wire electrode	With wire electrode
StE210.7, StE240.7	50-11	50-12,50-14
StE 290.7 , StE 320.7, StE360.7	50-12	50-12,50-14
St37, St37.4, St35.8	50-11	50-12,50-14
St 44, St 44.4, St 45.8	50-12	50-12,50-14
St 52, St 52.4	50-12	50-12,50-14
X42	50-11	50-12,50-14
X46, X52, X56	50-12	50-12,50-14
X60, X65, X70	50-14	50-12,50-14
Boiler Plates	With wire electrode	With wire electrode
H I, H II	50-11	50-12,50-14
17Mn 4, 19Mn 5	50-12	50-12,50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, WStE 255	50-11	50-12,50-14
StE 285, WStE 285	50-12	50-12,50-14
StE 315, WStE 315	50-12	50-12,50-14
StE 355, WStE 355	50-12	50-12,50-14
StE 380, WStE 380	50-12	50-12,50-14
StE 420, WStE 420	50-11,50-14	50-12,50-14

For welding from both sides in one pass, especially in multi-wire welding 50-14 wire electrode should be used because of the fine-grain formation caused by molybdenum.

Standards	
EN 760	SA AB 1 67 AC H5
DIN 32 522	B AB 1 67 AC 12 MHP5
AWS/ASME	F8A4-EA2 F7P5-EM13K F7A4-EM12 F8P4-EA2 F8A5-EH12K F7A4-EM12K F7P6-EH12K F7P5-EM12K F7A5-EM13K

Application and Properties:

Agglomerated aluminate-basic type flux for welding of pipe steels according to DIN 17172 and API 5L steels up to X70. Weld metal hardness is less than 240HV and resistant to sour gas environment. AMA OP132 produces a slight silicon and manganese pick-up. Weld metal toughness in low temperature is very good. When using this flux with S2MoTiB or S3MoTiB wire, the toughness of weld metal will be increased. It is suitable for longitudinal welding of sour gas and oil pipes and spiral pipes at high speed welding with single and multi-wire (up to 5 wires) welding system. The weld bead is of uniform profile, good wetting without undercut. The slag detachment is excellent. AMA OP132 can be used on either DC (positive) or AC up to 1200A on a single wire.

Damp flux shall be redried by baking at 300°C – 350°C

Grain size in according with Din 32 522:3-18.

Main Constituents:

SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
20%	25%	35%	15%

Basicity to boniszewski: ~1.5

All weld metal analysis (typical values):					
Welding Wire		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.06	0.15	0.8	-
50-12	S2	0.06	0.20	1.3	-
50-14	S2Mo	0.05	0.20	1.3	0.47
50-18	S4	0.06	0.30	1.8	-

Mechanical properties of all-weld metal (typical values):					
With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V ±0°C -20°C -40°C -60°C
50-11	As Welded	470	360	26.5	200 80 - -
50-12	As Welded	520	420	28	- 160 120 -
50-14	As Welded	580	495	23	- 110 60 -
50-18	As Welded	580	480	26	- 105 65 50

Mechanical properties of all-weld metal (typical values):
X70 Plates – Weld from both sides in one pass.

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j)			
					ISO – V 0°C -20°C -30°C -40°C			
50-12	As Welded	>440	>330	-	90	80	65	50
50-14	As Welded	>600	>500	-	>100	>70	>50	-

Standards			
DIN EN 760	SA AB 1 67 AC H5		
DIN 32 522	B AB 1 67 AC 12MHP5		
AWS/ASME	F7P6-EH12K	F7P5-EM13K	F7P5-EM12K
	F7A4-EM12	F8A4-EA2	
	F8A5-EH12K	F7A5-EM13K	F7A4-EM12K
		F8P5-EA2	

Application and Properties:

Agglomerated aluminate-basic type flux for welding of medium tensile and pipe steels up to X70 grade. AP380 produces a slight silicon and manganese pick-up.

Owing to its metallurgical behavior, it can be used with S2Mo and S3Mo wire electrodes. The flux is suitable for longitudinal and spiral welding of pipes.

It has a high current carrying capacity and as such is suitable for fillet and butt-welding applications especially for weld in heavy section steels work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds.

The slag detachment is good and in most cases is self-lifting.

AP380 can be used on either. DC+ or AC up to 1200 A on a single wire.

Damp flux shall be redried by baking at 300°C – 350°C

Grain size in accordance with DIN 32 522:2-18.

Main Constituents:			
SiO₂+TiO₂	CaO+MgO	Al₂O₃+Mno	CaF₂
20%	25%	35%	15%

Basicity to boniszewski: ~1.5

All weld metal analysis (typical values):					
Welding Wire		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.06	0.15	0.8	-
50-12	S2	0.06	0.2	1.3	-
50-14	S2Mo	0.05	0.2	1.2	0.5
50-18	S4	0.09	0.3	1.8	-

Mechanical properties of all-weld metal (typical values):						
With Wire Electrode	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V -20°C -40°C -60°C		
50-11	470	360	26	120	60	-
50-12	510	420	28	140	90	-
50-14	580	490	25	90	45	-
50-18	580	480	26	105	65	50

Mechanical properties of all-weld metal (typical values):
X70 Plates – Weld from both sides in one pass.

With Wire Electrode	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j)		
				ISO – V		
				20°C	-40°C	-60°C
50-12	470	>390	-	80	70	50
50-14	590	>485	-	70	50	-

Standards	
EN 760	SA AB 1 67 AC H5
DIN 32 522	B AB 1 67 AC 12MHP5
AWS/ASME	F7A2-EA2 F7A2-EM12 F7P2-EA2 F7A2-EM12K F8A4-EH12K

Application and Properties:

Agglomerated aluminate-basic type flux for welding of mild and medium steels and for pipe steels up to X70 Grade; AP380-3 produces a slight silicon and manganese pick-up. Owing to its metallurgical behavior, it can be used with S2Mo and S3Mo wire electrodes. It is suitable for longitudinal and spiral welding system. The flux has a high current carrying capacity and as such is suitable for fillet and butt welding applications especially for weld in heavy section steels work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds. The slag detachment is good and in most cases is self-lifting.

AMA AP380-3 can be used on either DC+ or AC up to 1200A on a single wire.

Damp flux shall be re-dried by baking at 300°C-350°C

Grain size in according with DIN 32 522:2-18.

Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +Mno	CaF ₂
25%	25%	35%	13%

Basicity as to boniszewski: ~1.3

All weld metal analysis (typical values):					
Welding Wire		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-14	S2Mo	0.06	0.25	1.3	0.5

Mechanical properties of all-weld metal (typical values):					
With Wire electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V -20°C -30°C
50-14	As Welded	580	490	23	70 50

Mechanical properties of welded joint (typical values): X70 Plates–Weld from both sides in one pass					
With Wire electrode		Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V -10°C
50-14	Four wire	>600	>500	-	110

Standards	
EN 760	SA AB 1 67 AC H5
DIN 32 522	B AB 1 67 AC 12MHP5
AWS/ASME	F7A5-EM13K F7P6-EH12K F7A4-EM12K F7A4-EM12 F7P5-EM13K F8A5-EH12K F7P5-EM12K F8A4-EA2 F8P5-EA2

Application and Properties:

Agglomerated aluminate-basic type flux for welding of medium tensile steels and pipe steel up X70 Grade. AMA-AP440 produces a slight silicon and manganese pick-up. It is suitable to be used in high speeds welding with single or multi wire and tandem welding systems. The flux has a high current carrying capacity and as such is suitable for fillet and butt welding applications especially for welds in heavy section steels work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds. The slag detachment is good and in most cases is self-lifting. AMA-AP440 is used with a range of low alloy wires including AMA 50-14, AMA 50-57 for the seam welding of pipes where low temperature impact toughness properties are required. This flux can be used for welding of super gas pipe with S2MoTiB or S3MoTiB wires. AMA-AP440 can be used on either DC (positive) or AC up to approximately 1200A. Damp flux shall be redried by baking at 300°C – 350°C. Grain size according to DIN 32 522:3-18.

Main Constituents:			
SiO₂+TiO₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
20%	25%	35%	15%

Basicity as to boniszewski: ~1.5

Mechanical properties of all – weld metal (typical values):					
Welding Wire		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-12	S2	0.06	0.2	1.3	-
50-14	S2Mo	0.06	0.2	1.35	0.5

All – weld metal analysis (typical values):				
With Wire electrode	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V -20°C -40°C
50-12	515	420	28	130 80
50-14	580	490	27	110 60

Mechanical properties of welded joint (typical values): X70 plates–weld from both sides in one pass				
With Wire electrode	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V -20°C -30°C
50-14	590	495	-	90 70

Standards	
EN 760	SA CS 1 98 AC
DIN 32 522	B CS 1 98 AC 12 M
AWS/ASME	F6AO-EL12 F7A2-EM12 F7P2-EM12

Application and Properties:

Agglomerated Calcium-Silicate type flux for welding general structural steels, pressure vessel steels, pipe steels as well as fine grain structural steels.

It causes a relatively high silicon pick-up and when using wire electrodes 50-11, 50-12, 50-15, also a manganese pick-up. The neutral point for manganese is suited at approximately 2.5%, thus the flux being able to be used with low manganese electrode wires. AMA-OP119 is particularly suited for twin-wire, tandem and multi-wire welding at relatively high speed. It is likewise suited for welding from both sides in one pass. For increased weld metal toughness, wire electrodes containing molybdenum 50-14 should be preferably used. AMA-OP119 can be used on either DC or AC up to approximately 1200A (in single wire welding).

Slag removal is easy. The resulting slag is short, i.e., girth seams on work pieces having a small diameter can be welded without the danger of the slag running off.

Damp flux shall be re-dried by baking at 300°C – 350°C

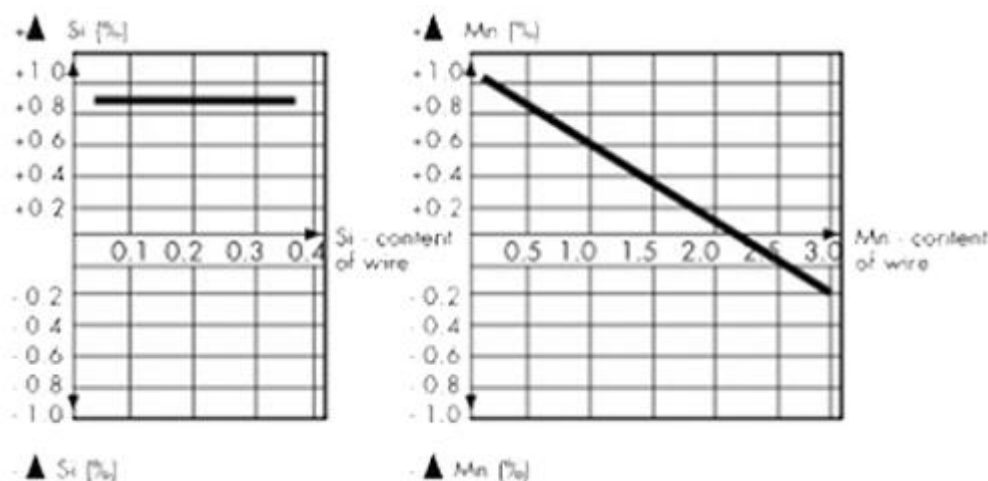
Grain size in accordance with DIN 32 522:2-20

Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
40%	25%	25%	10%

Basicity to boniszewskii: ~1.0

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):					
With Wire Electrode		Weight %			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.04-0.08	0.7-1.1	1.1-1.4	-
50-12	S2	0.04-0.08	0.7-1.1	1.5-1.8	-
50-14	S2Mo	0.04-0.08	0.7-1.1	1.5-1.8	0.5

Mechanical properties of all-weld metal (typical values):

With Wire electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V 20°C ±0°C -20°C
50-11	As Welded	460-560	> 360	> 24	>90 >50 >30
50-12	As Welded	530-630	> 400	> 24	>90 >50 >35
50-14	As Welded	600-700	> 480	> 20	>65 >50 >35

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St 37-2, USt 37-2, RSt 37-2	50-11	50-11,50-14
St37-3, St44-2, St44-3, St52-3	50-12	50-11,50-14
Pipe Steels	With wire electrode	With wire electrode
StE 210.7, StE 240.7, StE 290.7	50-11	50-12,50-14
StE 320.7, StE 360.7	50-12	50-12,50-14
St 37, St 37.4, St 45.8	50-11	50-12,50-14
St 44, St 44.4, St 37.8	50-12	50-12,50-14
St 52, St 52.4	50-12	50-12,50-14
X42	50-11	50-12,50-14
X46, X52, X56	50-12	50-12,50-14
X60, X65, X70	50-14	50-12,50-14
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-12,50-14
17 Mn 4, 19 Mn 5	50-12	50-12,50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE255, WStE255	50-12	50-12,50-14
StE285, WStE285	50-12	50-12,50-14
StE315, WStE315	50-12	50-12,50-14
StE355, WStE355	50-12	50-12,50-14

For welding from both side in one pass, especially in multi -wire welding 50-14 wire electrode should be used because of the fine – grain formation caused by molybdenum.

Aproval: LRS, GL

Standards	
EN 760	SA FB 1 66 AC H5
DIN 32 522	B FB 1 66 AC 10MHP5
AWS/ASME	F8A2-EB2 F9A8-EF1 F8A8-EH12K F7A5-EM12 F8P2-EB2 F8P8-EF1 F8P8-EH12K F7A5-EM12K F7A5- EM13K F8A8-EA4 F8A8-EH14 F7P5-EM12K F7P5-EM13K F8P8- EA4 F8P8-EH14 F8A4-EA2 F8P5- EA2

Application and Properties:

Agglomerated fluoride-basic type flux for welding general structural steels pressure vessels, pipe steels, as well as fine grain structural steels. Owing to the manganese pick-up caused by AMA-OP120TT, low manganese wire electrodes will find an extended field of application. AMA-OP120TT is outstanding for tandem, multi-wire and twin-wire welding. It delivers a weld metal featuring excellent toughness properties and crack resistance.

AMA-OP120TT can be used on either DC (positive) or AC up to approximately 1000A.

Damp flux shall be redried by baking at 300°C-350°C

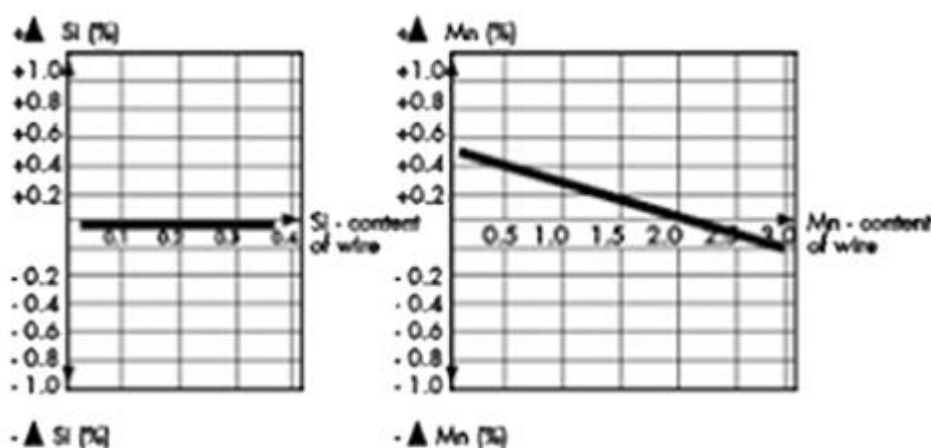
Grain size according to DIN 32 522:2-20

Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
15%	35%	20%	30%

Basicity to boniszewskii: ~3.1

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):							
With Wire Electrode		Weight %					
AMA Trade Name	DIN/EN	C	Si	Mn	Mo	Cr	Ni
50-11	S1	0.04-0.08	0.10-0.25	0.7-1.0	-	-	-
50-12	S2	0.04-0.08	0.20-0.40	1.0-1.4	-	-	-

50-15	S3	0.04-0.08	0.20-0.40	1.4-1.7	-	-	-
50-14	S2Mo	0.04-0.08	0.20-0.40	1.0-1.4	0.5	-	-
50-22	S2crMo1	0.04-0.08	0.20-0.40	1.0-1.4	0.5	1	-
50-24	S2Ni1	0.04-0.08	0.25-0.50	1.3-1.6	-	-	1.0

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V				
					20°C	±0°C	-20°C	-40°C	-60°C
50-11	As Welded	440-540	> 360	> 25	>150	>120	>90	-	-
50-12	As Welded	500-600	> 420	> 24	>160	>130	>100	>70	-
50-15	As Welded	550-650	> 450	> 24	>160	>130	>100	>70	-
50-14	As Welded	600-700	> 500	> 22	>130	>90	70	>40	-
50-22	Tempered(1)	570-670	> 500	> 22	>200	>150	-	-	-
50-22	norm + Temp (2)	430-530	> 310	> 28	-	>200	-	-	-
50-24	As Welded	540-640	> 470	> 25	-	>140	>100	>70	>50

1) Tempered: 700-720°C

2) Norm+temp: 920°C/air + 700-720°C

Application:

Materials	Multi pass joint welding
Pipe Steels	With wire electrode
StE 255, WStE 255	50-11
StE 285, WStE 285	50-11
StE 315, WStE 315	50-11
StE 355, WStE 355	50-11,50-12
StE 420, WStE 420	50-15,50-24
StE 460, WStE 460	50-15,50-24
StE 500, WStE 500	50-15,50-24
TStE 255, EStE 255	50-12
TStE 285, EStE 285	50-12
TStE 315, EStE 315	50-12
TStE 355, EStE 355	50-12
TStE 380, EStE 380	50-15,50-24
TStE 420, EStE 420	50-15,50-24
St37-2, Ust37-2	50-11
RSt 37-2	50-11
St44-2, St44-3	50-11
St 52.3	50-11,50-12
pipe steels	With wire electrode
StE 210.7 , StE 240.7	50-11
StE 290.7	50-11
StE 360.7	50-11,50-12

St 37.0, St 37.4, St 35.8	50-11
St 44.0, St 44.4, St 45.8	50-11
St 52.0, St 52.4	50-11, 50-12
Boiler plates steels	With wire electrode
H I, H II, 17M4	50-11
19MN5	50-11, 50-12
Creep resistant steels	With wire electrode
15 Mo 3	50-14
13 CrMo 44	50-22

Adjust for fine plate

Approval: LRS

Standards	
EN 760	SA FB 1 55 AC H5
DIN 32 522	B FB 1 55 AC 10MHP5
AWS/ASME	F8A8-EA4 F8A8-EF1 F8A8-EH12K F7A5-EM12 F8P8-EA4 F8A2-EB2 F7P8-EH12K F7A5-EM12K F8P2-EB2 F8A8-EH14 F8A4-EA2 F7A6-EM13K F9A8-EF1 F7P5-EA2 F7P6-EM13K

Application and Properties:

Agglomerated fluoride-basic type flux, preferably used for high strength fine grain structural steels, as well as cryogenic steels and steels resistant to ageing. Owing its neutral behavior as regards pick-up and burn-out of silicon and manganese, wire electrodes having higher percentages of Si and Mn (e.g. 50-27, 50-57) should be used.

AMA-OP121TT is particularly suited for tandem and multi-wire welding. On the strength of COD tests made with, 50-57 wire electrodes, this flux is suitable to be employed for welding offshore components. The weld metal produced in combination with corresponding wire electrodes, meets high toughness requirements at cryogenic temperatures.

AMA-OP121TT produces a short slag, i.e. girth seams of components having a small diameter can be welded without the danger of the slag running off. It produces uniform welds without undercut.

AMA-OP121TT can be used on either DC (positive) or AC up to approximately 1000A.

Damp flux shall be redried by baking at 300°C – 350°C

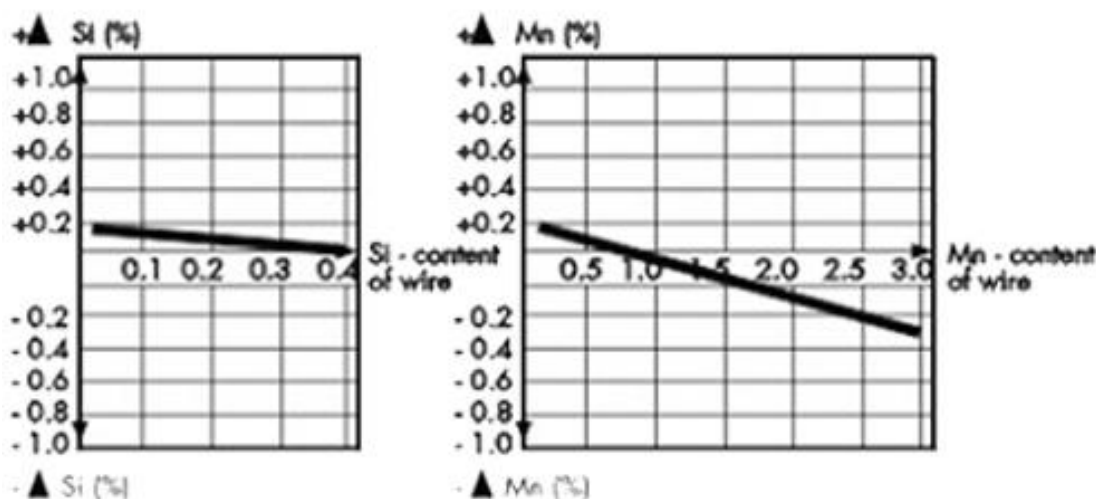
Grain size according to DIN 32 522:2-20

Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
15%	40%	20%	25%

Basicity to boniszewskii: ~3.1

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



With Wire Electrode		Weight %					
AMA Trade Name	DIN/EN	C	Si	Mn	Mo	Cr	Ni
50-12	S2	0.05-0.08	0.15-0.25	0.7-1.0	-	-	-
50-15	S3	0.05-0.08	0.15-0.25	1.0-1.4	-	-	-
50-57	EH12K	0.05-0.08	0.20-0.40	1.4-1.9	-	-	-
50-14	S2Mo	0.05-0.08	0.15-0.25	0.7-1.0	0.5	-	-
50-17	S3Mo	0.05-0.08	0.15-0.25	1.0-1.4	0.5	-	-
50-22	S2crMo1	0.05-0.08	0.20-0.30	0.7-1.0	0.5	1	-
50-23	S2crMo2	0.05-0.08	0.20-0.30	0.5-0.8	1.0	2.2	-
50-24	S2Ni1	0.05-0.08	0.25-0.40	1.0-1.3	-	-	1.0
50-25	S2Ni2	0.05-0.08	0.20-0.30	0.7-1.0	-	-	2.0
50-21	S3Ni1Mo	0.05-0.08	0.20-0.40	1.3-1.6	-0.5	-	1.0

Mechanical properties of all-weld metal (typical values):

Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %
50-12	As Welded	450-550	> 360	> 28
50-15	As Welded	530-630	> 430	> 25
50-57	As Welded	540-640	> 450	> 24
50-14	As Welded	580-680	> 500	> 20
50-17	Tempered(1)	600-700	> 530	> 18
50-22	Tempered(1)	530-630	> 380	> 24
50-22	Norm+Temp(2)	430-530	> 310	> 30
50-23	Tempered(3)	550-650	> 450	> 22
50-23	Norm+Temp(4)	520-620	> 400	> 22
50-24	As Welded	500-600	> 420	> 24
50-24	Stress relived	480-580	> 380	> 26
50-25	As Welded	550-650	> 450	> 24
50-25	Stress relived	500-600	> 430	> 26
50-21	As Welded	650-750	> 540	> 20
50-21	Stress relived	630-730	> 540	> 22

Wire Electrode	Heat Treatment	Impact energy (Joule) ISO -V 20°C			±0°C	-20°C
		-40°C	-60°C	-80°C		
50-12	As Welded	>180	>160	>100	-	-
50-15	As Welded	>180	>160	>100	>35	-
50-57	As Welded	>200	>180	>140	>100	>70
50-14	As Welded	>140	>120	>100	>70	>50
50-17	As - Welded	>140	>120	>100	>70	>50
50-22	Tempered(1)	>200	>150	-	-	-
50-22	Norm+Temp(2)	>200	>200	-	-	-
50-23	Tempered(3)	>140	>100	-	-	-
50-23	Norm+Temp(4)	>140	>90	-	-	-
50-24	As Welded	>150	>130	>100	>70	>50
50-24	Stress relived	>170	>140	>110	>90	>70
50-25	As Welded	>160	>140	>120	>100	>70
50-25	Stress relived	160	>140	>120	>90	>70
50-21	As Welded	>150	>120	>90	>70	>50
50-21	Stress relived	160	>140	>120	>90	>70

1) Tempered: 700°C - 720°C

- 2) Norm+temp: 920°C/air + 700°C -720°C
- 3) Tempered: 730°C -750°C
- 4) Norm+temp: 940°C/air + 730°C -750°C

Application:	
Materials	Multi pass joint welding
Fine grain structural steels	With wire electrode
StE 255, WStE 255	50-12,50-15
StE 285, WStE 285	50-12,50-15
StE 315, WStE 315	50-12,50-15
StE 355, WStE 355	50-12,50-15
StE 380, WStE 380	50-15,50-57
StE 420, WStE 420	50-15,50-57
StE 460, WStE 460	50-57
StE 500, WStE 500	50-24(1),50-21(2)
TStE 255, EStE 255	50-24,50-15,50-57(3)
TStE 285, EStE 285	50-24,50-15,50-57(3)
TStE 315, EStE 315	50-24,50-15,50-57(3)
TStE 355, EStE 355	50-24,50-15,50-57(3)
TStE 380, EStE 380	50-24,50-15,50-57(3)
TStE 420, EStE 420	50-24,50-15,50-57(3)
TStE 460, EStE 460	50-57
TStE 500, EStE 500	50-57(1),50-21(2)
Creep resistant steels	With wire electrode
15 Mo3	50-14,50-17
13 Cr Mo44	50-22
10 Cr Mo9 10	50-23
Cryogenic Steels	With wire electrode
10 Ni 14(4)	50-25
TTSt 35 N, TTSt 35 V	50-25
TTSt 41 N, TTSt 41 V	50-25
Non-ageing steels	-
ASt 35, ASt 41	50-15
ASt 45, ASt 52	50-15

- 1) Only thinner plates
- 2) Also for stress-relived condition
- 3) Observe minimum temperature of -40°C
- 4) Lowest service temperature -80°C

Approval: LRS

Standards	
EN 760	SA FB 1 65 AC HP 5
DIN 32 522	B FB 1 65 AC 12MHP 5
AWS/ASME	F7P2-EA2 F7A5-EH12K F6A2-EM12 F7P5-EH12K F6A2-EM12K F7A2-EA2 F7A2-EM13K

Application and Properties:

Agglomerated fluoride-basic type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels.

As regards silicon, AMA-OP122 will produce a slight pick-up, whereas it is relatively neutral as to manganese, which requires the use of wire electrodes having higher manganese content, as for instance 50-12, 50-15. AMA-OP122 is also suitable to be used for twin wire, tandem and multi wire welding, as well as for welding from both sides in one pass, as is the case in fabrication large diameter pipes. For improved toughness values, it is advisable to use molybdenum alloyed wire electrodes. AMA-OP122 exhibits high current carrying capacity and is therefore suitable for depositing large fillet weld sections. Slag removal is excellent. Owing to its low bulk density, consumption is also low. On account of its special production mode, moisture pick-up of the flux and hydrogen content of the weld metal are low.

AMA-OP122 can be used on either DC (positive) or AC up to 1200A.

Damp flux shall be redried by baking at 300°C – 350°C

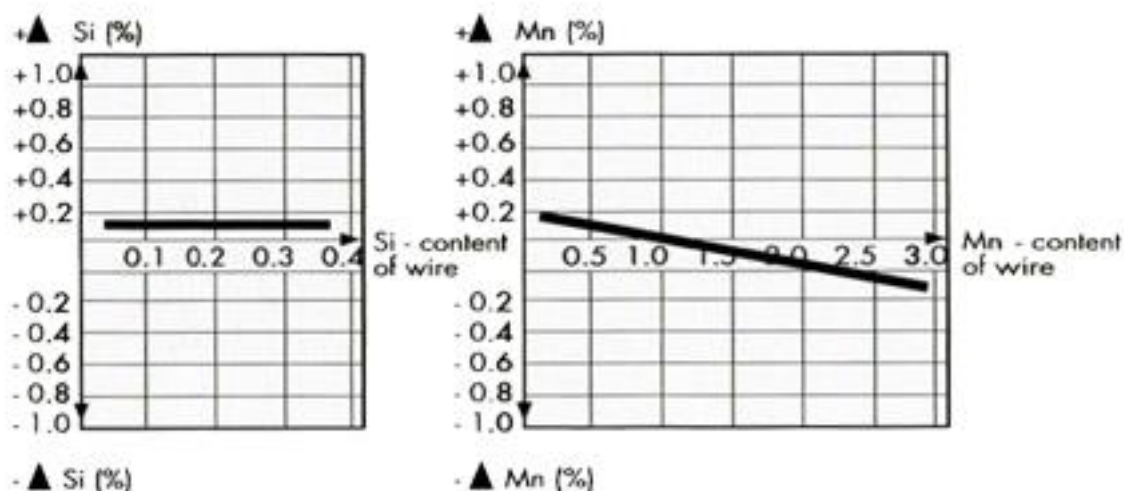
Grain size according to DIN 32 522:2-20

Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
20%	30%	25%	20%

Basicity to boniszewskii: ~1.7

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):

With Wire Electrode		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-12	S2	0.04-0.08	0.1-0.2	0.8-1.2	-
50-14	S2MO	0.04-0.08	0.1-0.2	0.8-1.2	0.5
50-15	S3	0.04-0.08	0.15-0.25	1.3-1.6	-

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V 20°C ±0°C -20°C -40°C -60°C
50-12	As Welded	450-550	> 360	> 24	>150 >110 >90 >50 -
50-14	As Welded	510-620	> 430	> 20	>90 >70 >40 - -
50-15	As Welded	500-600	> 400	> 24	>160 >130 >100 >70 >30

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2, Ust37-2, RSt37-3	50-12	50-12, 50-14
St37-3, St44-2, St44-3	50-12	50-12, 50-14
St52-3	50-12, 50-15	50-12, 50-14
Pipe steels	With wire electrode	With wire electrode
StE 210.7, StE 240.7, StE 290.7	50-12	50-12, 50-14
StE 320.7, StE 360.7, StE 385.7	50-15	50-12, 50-14
StE 415.7, StE 445.7, StE 480.7	50-14	50-14
St 37, St37.4, St 35.8	50-12	50-12, 50-14
St 44, St 44.4, St 45.8	50-12	50-12, 50-14
St 52, St 52.4	50-12	50-12, 50-14
X42	50-14	50-14
X46, X52, X56	50-14	50-14
X60, X65, X70	50-14	50-14
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-12	50-12, 50-14
17 Mn 4	50-12	50-12, 50-14
19 Mn 5	50-12	50-12, 50-14
15 Mo 3	50-14	50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE255, WStE255	50-12	50-12, 50-14
StE285, WStE285	50-12	50-12, 50-14
StE315, WStE315	50-12	50-12, 50-14
StE355, WStE355	50-12	50-12, 50-14
StE380, WStE380	50-15	50-12, 50-14

StE420, WStE420	50-14	50-14
TStE255, TStE285	50-15	-
TStE315, TStEE355	50-15	-
TStE380	50-15	-

Welding from both sides in one pass, especially in multi wire welding, 50-14 Mo wire electrode should be used because of the fine grain formation caused by molybdenum.

Approval: LRS, GL

Standards	
EN 760	SA CS 1 77AC
DIN 32 522	B CS 1 77 AC 10 M
AWS/ASME	F7P2-EM12 F6A0-EL12 F7A2-EM12

Application and Properties:

Agglomerated Calcium-Silicate type flux for welding general structural steels, pressure vessel steels, pipe steels as well as fine grain structural steels. It produces a mean silicon pick-up and when used with wire electrodes, 50-14, 50-15, 50-11, and 50-12 also a manganese pick-up. The neutral point for manganese is at approximately 2%. AMA OP 129 can therefore be combined with wire electrodes having a low manganese content.

It is particularly for twin-wire, tandem and multi-wire at high speeds. AMA OP 129 is likewise suited for welding from both sides in one pass. For increased weld metal toughness, wire electrode containing molybdenum 50-14 should be preferably used. AMA OP 129 can be used on either DC or AC up to 1000A (in single wire welding).

Slag removal is easy. The resulting slag is short, i.e., girth seams on work pieces having a small diameter can be welded without the danger of the slag running off.

Damp flux shall be redried by baking at 300°C – 350°C

Grain size in according to DIN 32 522:2-20

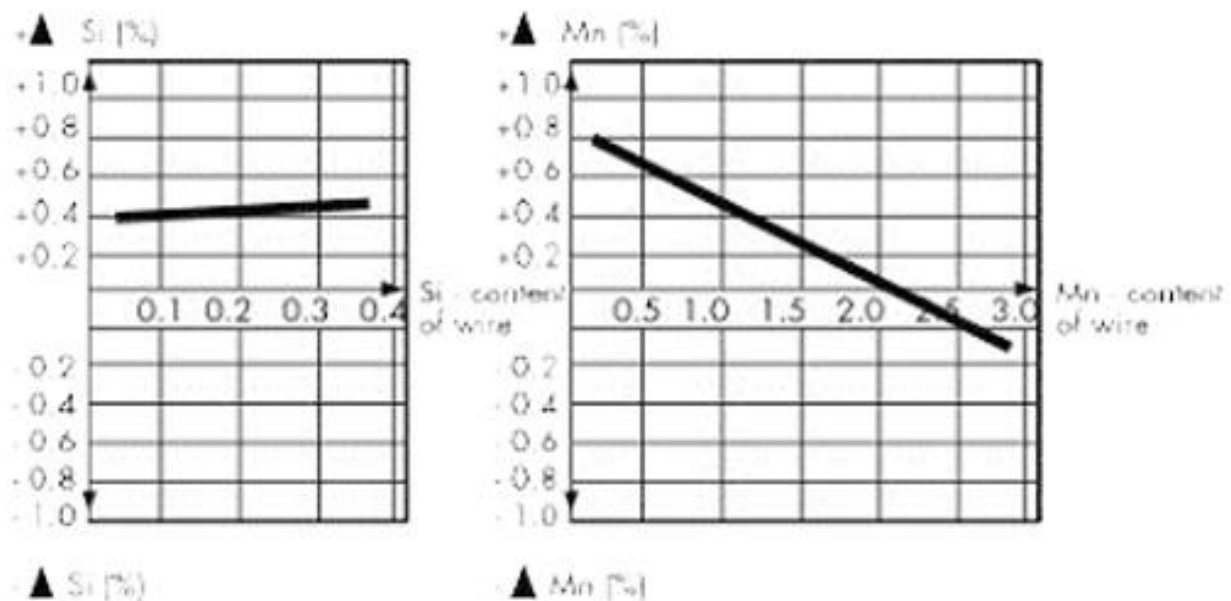
Main Constituents:			
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
40%	20%	25%	10%

Basicity to boniszewskii: ~1.0

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy

Content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):

With Wire Electrode		Weight %			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.04-0.08	0.3-0.7	0.8-1.3	-
50-12	S2	0.04-0.08	0.3-0.7	1.1-1.7	-
50-15	S3	0.04-0.08	0.3-0.7	1.3-1.9	-
50-14	S2Mo	0.04-0.08	0.3-0.7	1.1-1.7	0.5

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N /mm²)	Yield Strength (N /mm²)	Elongation Lo=5d %	Impact energy(j) ISO – V 20°C ±0°C -20°C -40°C		
					20°C	±0°C	-40°C
50-11	As Welded	420-500	> 360	> 24	>100 -	>60	>30
50-12	As Welded	520-620	> 400	> 24	>100 -	>80	>50
50-15	As Welded	550-650	> 460	> 24	>130 >50	>100	>70
50-14	As Welded	600-700	> 480	> 20	>90 -	>50	>35

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St 37-2, USt 37-2, RSt 37-2	50-11	50-11,50-12
St37-2, St44-2, St44-3, St52-3	50-11	50-11,50-12
Pipe Steels	With wire electrode	With wire electrode
StE210.7, StE240.7 , St290.7	50-11	50-12,50-14
StE 320.7, StE 360.7	50-12	50-12,50-14
St 35.0, St 35.4, St 35.8	50-11	50-12,50-14
St 45, St 45.4, St 45.8	50-12	50-12,50-14
St 52, St 52.4	50-12	50-12,50-14
X42	50-11	50-12,50-14
X46, X52, X56	50-12	50-12,50-14
X60, X65, X70	50-14	50-12,50-14
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-12,50-14
17Mn 4, 19Mn 5	50-12	50-12,50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, WStE 255 TStE 255***	50-12*	50-12,50-14
StE 285, WStE 285 TStE 285***	50-12*	50-12,50-14
StE 315, WStE 315 TStE 315***	50-12*	50-12,50-14

StE 355, WStE 355 TStE 355***	50-12*, 50-15**	50-12, 50-14
StE 420, WStE 420 TStE 420***	50-15**	50-12
StE 460, WStE 460 TStE 460***	50-15**	50-12

For welding from both side in one pass, especially in multi-wire welding 50-14 wire electrode should be used because of the fine-grain formation caused by molybdenum.

* At service temperatures down to -20°C

** At service temperatures down to -40°C

Standards	
DIN EN 760	SA AB 1 67 AC H5
DIN 32 522	B AB 1 67 AC 12 MHP5
AWS/ASME	F8P5-EA2 F7P5-EM13K F7A4-EM12 F8A5-EH12K F7A4-EM12K F7P6-EH12K F7P5-EM12K F8A4-EA2 F7A5-EM13K

Application and Properties:

Agglomerated aluminate-basic type flux for welding of medium tensile steels and pipe steel up X70 Grade. AMA-OP139 produces a slight silicon and manganese pick-up. Owing to its metallurgical behavior, it can be used with AMA 50-14 and AMA 50-18 wire electrodes. It is suitable to be used in high speeds welding with single or multi wire and tandem welding systems. The flux has a high current carrying capacity and as such is suitable for fillet and butt-welding applications especially for welds in heavy section steel work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds. The slag detachment is good and in most cases is self-lifting. AMA-OP139 is used with a range of low alloy wires including AMA 50-14, AMA 50-57 for the seam welding of pipes where low temperature impact toughness properties are required.

AMA-OP139 can be used on either DC (positive) or AC up to approximately 1200A.

Damp flux shall be redried by baking at 300 – 350 °C

Grain size according to DIN 32 522:3-18

Main Constituents:			
SiO₂+TiO₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
20%	25%	35%	15%

Basicity to boniszewski: ~1.5

All weld metal analysis (typical values):					
With Wire Electrode		Weight %			
	DIN/EN	C	Si	Mn	Mo
50-12	S2	0.06	0.20	1.3	-
50-14	S2Mo	0.06	0.3	1.3	0.45
50-18	S4	0.06	0.30	1.8	-

Mechanical properties of all-weld metal (typical values):						
With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V +20°C -40°C - 60°C	
50-12	As Welded	495	390	31	120	60 -
50-14	As Welded	585	500	25	100	50 -
50-18	As Welded	580	480	26	105	60 40

Standards	
EN 760	SA MS 1 89AC
DIN 32 522	B MS 1 89 AC 8 SKM
AWS/ASME	F7A0-EL12 F7A0-EM12

Application and Properties:

Agglomerated Manganese-Silicate type flux for high-speed welding. It is preferably used for welding thin plates at speeds higher than 2.5 meter/min. Welding properties arc outstanding on either AC or DC up to 800A.

AMA OP155 is Suitable for Welding tube-web-tube joints on finned tubes. Exhibiting slag removal. It is likewise suited for tandem and multi-wire welding.

AMA OP155 produce high Manganese pick-up which decreases with increasing Manganese content of the wire electrode.

Damp flux shall be redried by baking at 300°C – 350°C

Grain size in according to DIN 32 522:2-20

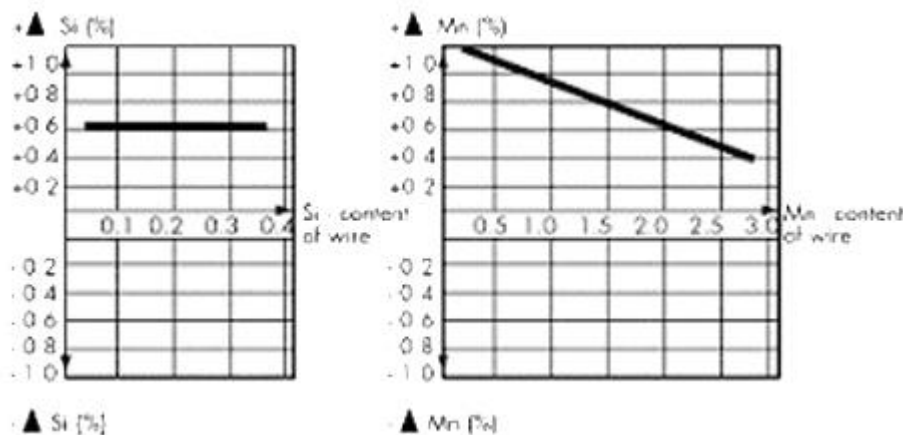
Main Constituents:		
SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO
45%	10%	40%

Basicity according to boniszewskii: ~0.8

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy

Content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):						
With Wire Electrode		Weight %				
AMA Trade Name	DIN/EN	C	Si	Mn	Mo	Cr
50-11	S1	0.03-0.07	0.4-0.8	1.4-1.8	-	-
50-12	S2	0.03-0.07	0.4-0.8	1.8-2.3	-	-
50-14	S2Mo	0.03-0.07	0.4-0.8	1.8-2.3	0.5	-
50-22	S2crMo1	0.03-0.07	0.4-0.8	1.8-2.3	0.5	1

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V		
					20°C	±0°C	-
50-11	As Welded	500-600	> 400	> 22	>90	>60	>35

Mechanical properties of Welded joints (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Impact energy(j) ISO – V	
				20°C	±0°C
50-12**	As Welded	>510	> 360	>50	>30
50-14**	As Welded	>510	> 360	>50	>30
50-22***	As Welded	>440	> 300	>40	-
50-14**	Stress relived	>510	> 360	>50	>30
50-22***	Stress relived	>440	> 300	>50	-

Stress relived at 15hrs/700C

*Transverse flat tensile specimen

**StE 36 12 mm, welded from both sides in one pass

***13Cr Mo 44, 15 mm, welded from both sides in one pass

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St 37-2, USt 37-2, RSt 37-2	50-11	50-11,50-12
St 44-2, St 44-3, St 52-3	50-11	50-11,50-12
Pipe Steels	With wire electrode	With wire electrode
StE 210.7, StE 240.7, StE 290.7	50-11	50-11,50-12
StE 320.7, StE 360.7	50-12	50-11,50-12
St 35.0, St 37.4, St 35.8	50-11	50-11,50-12
St 44, St 44.4, St 45.8	50-11	50-11,50-12
St 52, St 52.4	50-11	50-11,50-12
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-11,50-12
17 Mn 4, 19 Mn 5	50-11	50-11,50-12
15 Mo 3	-	50-14
13 Cr Mo 44	-	50-22

Standards	
DIN EN 760	SA MS 1 88AC H5
AWS/ASME	F7A2-EM12k F7p0-EM12K

Application and Properties:

Agglomerated Manganese-Silicate type flux for high-speed welding of butt and fillet welds. The high silicon and manganese transfer from the flux to weld metal alloys to use the AMA-OP176 flux with low or medium manganese wire electrodes like 50-11, 50-12, 50-14.

Owing to its good weld ability AMA-OP176 can be used in welding from both sides in one pass, e.g. in longitudinal welding of large diameter pipes and in thin walled spiral pipes. AMA OP 176 can be used on either DC (positive) or AC current.

Damp flux shall be redried by baking at 300°C – 350°C

Grain size in according to DIN 32 522:3-20

Main Constituents:			
SiO₂+TiO₂	CaO+MgO	Al ₂ O ₃ +Mno	CaF ₂
40%	25%	20%	10%

Basicity as to boniszewskii: ~0.8

All -Weld metal analysis (typical values):					
With Wire Electrode		Weight %			
AMA Trade Name	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.03	0.6	1.2	-
50-12	S2	0.06	0.7	1.5	-

Mechanical properties of all-weld metal (typical values):						
With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j)	
					ISO – V	
					+20°C	±0°C -20°C -30°C
50-12	As Welded	530	> 410	28	125	100 58 48

Standards	
EN 760	SA AR 1 88 AC
DIN 32 522	B AR 1 88 AC 10 SKM
AWS/ASME	F7AZ-EL12 F7AZ-EM12 F7PZ-EM12 F7AZ-EM12K

Application and Properties:

Agglomerated Aluminate-rutile type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels having yield strength of up to 355N/mm². AMA OP 181 produces a high silicon and manganese pick up and can therefore be used with 50-11, 50-12, electrode wires.

It is particularly suited for high-speed welding applying the twin-wire process as well as in tandem and multi-wire welding. Owing to its metallurgical behavior AMA OP 181 can be preferably used for welding from both sides in one pass, e.g. IN longitudinal welding of large-diameter pipes and thin-walled spiral pipes.

A further field of application is the welding of tube-web-tube points or finned tubes. On account of easy slag removal, AMA OP 181 preferably used in filled welding.

It can be used on either DC or AC up to 1000A.

Damp flux shall be redried by baking at 300°C – 350°C

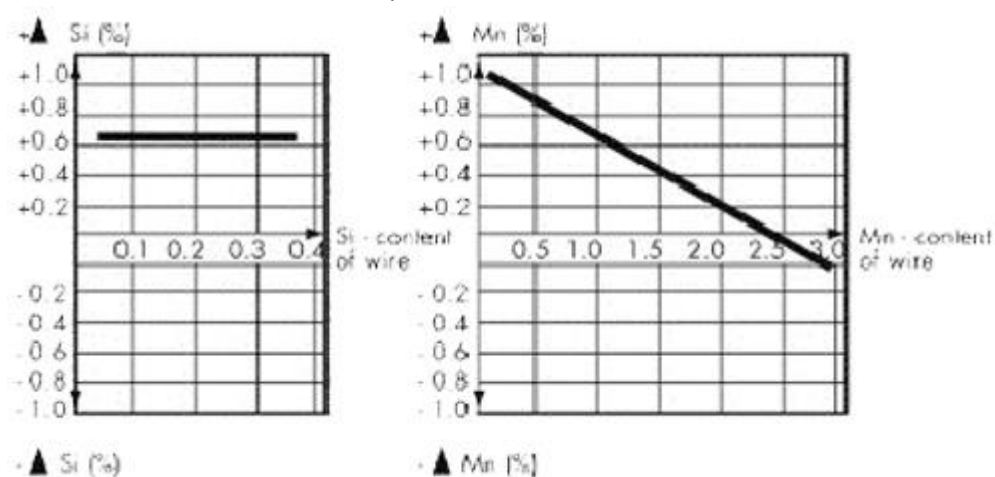
Grain size in accordance with DIN 32 522:2-16

Main Constituents:		
SiO ₂ +TiO ₂	Al ₂ O ₃	CaF ₂
30%	50%	10%

Basicity to boniszewskii: ~0.4

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):

With Wire Electrode		Weight %			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.03-0.08	0.6-0.9	1.1-1.5	-
50-12	S2	0.04-0.08	0.6-0.9	1.3-1.7	-
50-14	S2Mo	0.04-0.08	0.6-0.9	1.3-1.7	0.5

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V +20°C
50-11	As Welded	520-620	≥ 420	≥ 22	≥ 50
50-12	As Welded	560-660	≥ 450	≥ 22	≥ 50
50-14	As Welded	610-710	≥ 490	≥ 18	≥ 50

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St 37-2, USt 37-2, RSt 37-2	50-11,50-12	50-12
St 44-2, St 44-3	50-11,50-12	50-12
St 52-3**	50-12	50-12
Pipe Steels	With wire electrode	With wire electrode
StE 210.7, StE 240.7, StE 290.7	50-11	50-12
StE 320.7, StE 360.7	50-12	50-12
St 37, St 37.4, St 35.8	50-11	50-12
St 44, St 44.4, St 45.8	50-11	50-12
St 52, St 52.4	50-12	50-12
Boiler Plates	With wire electrode	With wire electrode
H I, H II	50-11,50-12	50-11,50-12
17 Mn 4, 19 Mn 5	50-12	50-11,50-12
15 Mo 3	50-14	50-14
13 Cr Mo 44*	50-22	50-22
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, StE 355**	50-11,50-12	50-12

*Only for fillet welds or tube-web-tube welding on finned tubes.

**At service temperatures down to +0°C

Standards	
DIN EN 760	SA AR 1 88 AC
DIN 32 522	B AR 1 88 AC 10 SKM
AWS/ASME	F7AZ-EL12 F7AZ-EM12 F7PZ-EM12 F7AZ-EM12K

Application and Properties:

Agglomerated Aluminate-rutile type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels having a yield strength of up to 355N/mm². AMA OP 185 produces a high, silicon and manganese pick-up and can therefore be used with 50-11, 50-12 wire electrodes.

It is particularly suited for high-speed welding applying the twin-wire process, as well as for tandem and multi-wire welding. Owing to its metallurgical behavior; AMA OP 185 can be advantageously used for welding from both sides in one pass. It is outstanding for welding tube-web-tube joints or finned tubes.

On account of easy slag removal, AMA OP 185 is preferably used in fillet welding.

The weld metal produced with this flux is not susceptible to porosity when welding on surfaces contaminated by rust, scale etc. The flux has a low bulk density with correspondingly low consumption.

AMA OP 185 can be used on either DC or AC up to 1000A.

Damp flux shall be redried by baking at 300°C – 350°C

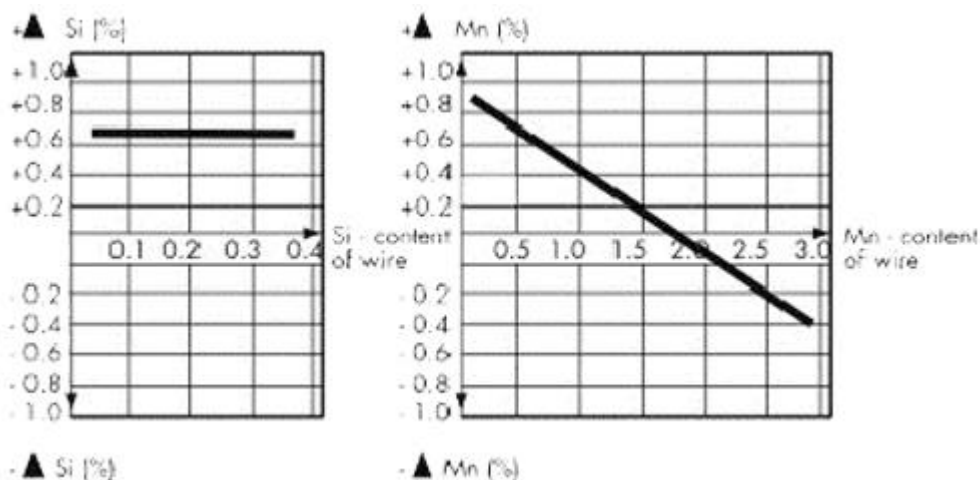
Grain size in accordance with DIN 32 522:2-20

Main Constituents:		
SiO₂+TiO₂	Al₂O₃	CaF₂
30%	55%	5%

Basicity to boniszewskii: ~0.5

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part



All -Weld metal analysis (typical values):

With Wire Electrode		Weight %				
AMA Trade Name	DIN/EN	C	Si	Mn	Mo	Cr
50-11	S1	0.04-0.08	0.5-0.8	1.2-1.6	-	-
50-12	S2	0.04-0.08	0.5-0.8	1.4-1.8	-	-
50-14	S2Mo	0.04-0.08	0.5-0.8	1.4-1.8	0.5	-
50-22	S2crMo1	0.05-0.10	0.5-0.8	1.4-1.8	0.5	1

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo=5d %	Impact energy(j) ISO – V +20°C
50-11	As Welded	500-600	> 400	> 24	> 50
50-12	As Welded	530-630	> 420	> 22	> 50
50-14	As Welded	580-680	> 440	> 20	> 50

**Mechanical properties of welded joints (typical values):
13 Cr Mo 44, 10 mm Welded From both sides in one pass.**

With Wire Electrode	Heat Treatment	*Tensile Strength (N/mm²)	*Yield Strength (N/mm²)	Impact energy (Joule) ISO –V +20°C
50-22	As Welded	> 440	> 300	> 70
50-22	Stress relived	> 440	> 300	> 80

Stress relived 15 hrs/700C

*Transverse flat tensile specimen

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St 37-2, USt 37-2, RSt 37-2	50-11,50-12	50-12
St 44-2, St 44-3	50-11,50-12	50-12
St 52-3**	50-12	50-12
Pipe Steels	With wire electrode	With wire electrode
StE 210.7, StE 240.7, StE 290.7	50-11	50-12
StE 320.7, StE 360.7	50-12	50-12
St 37, St 37.4, St 35.8	50-11	50-12
St 44, St 44.4, St 45.8	50-11	50-12
St 52, St 52.4	50-12	-
Boiler Plates	With wire electrode	With wire electrode
H I, H II	50-11,50-12	50-11,50-12
17 Mn 4, 19 Mn 5	50-12	50-11,50-12
15 Mo 3	50-14	50-14
13 Cr Mo 44*	-	50-22
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, StE 355**	50-11,50-12	50-12

*Only for fillet welds or tube-web-tube welding on finned tubes.

**At service temperatures down to +0°C

Standards	
DIN EN 760	SA AR 1 97 AC
DIN 32 522	B AR 1 97 AC 10 SKM
AWS/ASME	F7AZ-EL12 F7AZ-EM12 F7PZ-EM12 F7AZ-EM12K

Application and Properties:

Agglomerated aluminate-rutile type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels having a yield strength up to 355N/mm². AMA UNIVERSAL produces a relatively high silicon pick-up. When using 50-11, 50-12 wire electrodes, also a manganese is suited at approximately 1.3%. The flux can therefore be used with low manganese wire electrodes. AMA UNIVERSAL is particularly suited for twin-wire, tandem and multi-wire welding at higher speeds and advantageous in welding from both sides in one pass, e.g. thin-walled spiral pipes. For increased weld metal toughness, molybdenum alloyed wire electrodes (50-14) should be used with AMA-UNIVERSAL flux. It is especially suited for welding tube-web-tube joints or finned tubes.

Owing easy slag removal, it is also well suited for fillet welding. The weld metal produced is relatively insensitive to porosity when welding on plates contaminated by rust, scale etc. AMA UNIVERSAL can be used on either DC (positive) or AC up to approximately 900A (in single wire welding).

Damp flux shall be redried by baking at 300°C – 350°C

Grain size in accordance with DIN 32 522:2-16*.

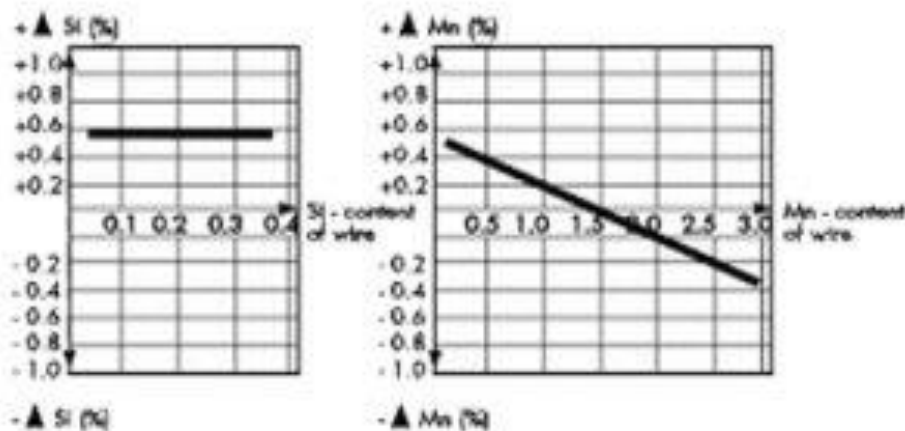
Grain size in accordance with DIN 32 522:2

Main Constituents:		
SiO₂+TiO₂	Al₂O₃	CaF₂
30%	55%	5%

Basicity to boniszewskii: ~0.4

Metallurgical behavior:

Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values):

With Wire Electrode		Weight %				
AMA Trade Name	DIN/EN	C	Si	Mn	Mo	Cr
50-11	S1	0.04-0.08	0.5-0.8	0.9-1.3	-	-
50-12	S2	0.04-0.08	0.5-0.8	1.2-1.6	-	-
50-14	S2Mo	0.04-0.08	0.5-0.8	1.2-1.6	0.5	-
50-22	S2crMo1	0.04-0.08	0.5-0.8	1.2-1.6	0.5	1

Mechanical properties of all-weld metal (typical values):

With Wire Electrode	Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V +20°C
50-11	As Welded	450-550	> 360	> 22	> 60
50-12	As Welded	500-600	> 400	> 22	> 50
50-14	As Welded	580-680	> 450	> 18	> 50

Mechanical properties of welded joints (typical values):

13 Cr Mo 44, 10 mm Welded From both sides in one pass.

With Wire Electrode	Heat Treatment	*Tensile Strength (N/mm ²)	*Yield Strength (N/mm ²)	Impact energy (Joule) ISO –V +20°C
50-22	As Welded	> 440	> 300	> 40
50-22	**Stress relived	> 440	> 300	> 50

*Transverse flat tensile specimen

**Stress relived 15 hrs/700C

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2, Ust37-2, RSt37-2	50-11	50-11,50-12
St44-2, St44-3, St52-3**	50-11	50-11,50-12
Pipe Steels	With wire electrode	With wire electrode
StE210.7, StE240.7, StE290.7**	50-11	50-11,50-12
StE 320.7 , StE 360.7**	50-12	50-11,50-12
St37, St37.4, St35.8	50-11	50-11,50-12
St44, St44.4, St45.8	50-11	50-11,50-12
St52, St52.4*	50-11,50-12	50-11,50-12
Boiler Plates	With wire electrode	With wire electrode
H I, H II*	50-11	50-11,50-12
17 Mn 4, 19 Mn 5**	50-12	50-11,50-12
15 Mo 3**	50-14	50-14
13 Cr Mo 44*	-	50-22

*Only for fillet welds or tube-web-tube welding on finned tubes.

**At service temperatures down to +20°C

Fluxes for Submerged Arc welding of Austenitic STA

AMA AP720	170
AMA OP71Cr	172

Standards	
DIN 32 522	B FB 6 55455 AC 8 MHP 5
EN 760	SA FB 2 55 AC

Application and Properties:

Special agglomerated fluoride-basic type flux for welding austenitic stainless steels in combination with wire electrode according to DIN 8556. As to carbon content of the weld metal, AMA-AP720 is strictly neutral, so that, using suitable wire electrodes steels having extra low carbon content can be safely welded. It has no chromium compensation which is of importance if certain ferrite content in the weld deposit must be observed. Its metallurgical behavior as regards silicon and Manganese burn off will take place when using wire electrodes having a high Manganese content. AMA-AP720 is designed for welding thick sections. It is a hydrogen controlled flux deposition low hydrogen weld metal.

AMA-AP720 is particularly suited to be used in tandem and multi-wire welding.

It produces smooth and finely rippled weld beads merging into the base metal without undercut.

AMA AP 720 can be used on DC (positive) or AC up to 800C.

Damp flux shall be redried by backing at 300 350 c.

Grain size according to DIN 32 522:2-20.

Main Constituents:			
SiO₂ + TiO₂	CaO + MgO	Al₂O₃ + MnO	CaF₂
15%	40%	20%	25%

Basicity as to boniszewskii: ~2.7

All -Weld metal analysis (typical values):							
With Wire electrode		Weight - %					
AMA Trade Name	DIN/EN	C	Cr	Ni	Mo	Nb	N
30-51	ER308L	<0.03	>18	>9	-	-	-
30-52	ER347	<0.07	>18	>9	-	>8×C	-
30-53	ER316L	<0.03	>18	>10	2.5	-	-
30-54	ER318	<0.07	>18	>10	2.5	>8×C	-
30-56		<0.03	20	16	3.0	-	0.15
30-55		<0.03	23	9	3.0	-	0.15
30-57		<0.15	22	12	-	-	-
30-58		<0.03	21	>60	9.0	-3.5	-

Mechanical properties of all-weld metal (typical values):					
With Wire Electrode	Proof stress %0.2 (N/mm ²)	Proof stress %0.1 (N/mm ²)	Tensile Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V +20°C
30 – 51	> 320	> 350	> 550	> 35	> 75
30 – 52	> 350	> 370	> 575	> 30	> 65
30 – 53	> 320	> 350	> 550	> 30	> 75
30 – 54	> 350	> 370	> 600	> 30	> 65
30 – 56	> 380	> 410	> 600	> 30	> 120
30 – 55	> 450	> 500	> 650	> 25	> 100
30 – 57	> 320	> 350	> 650	> 30	> 75
30 – 58	> 400	> 420	> 680	> 30	> 75

Application: Welding of austenitic stainless Cr Ni steel, particularly thick sections.

Materials	Material-No	With wire electrode	Material-No
X 2 Cr Ni 1911	1.4306	30 - 51	1.4316
X 5 Cr Ni 1810	1.4301	30 - 51	1.4316
X 6 Cr Ni Ti 1810	1.4541	30 - 52	1.4551
X 5 Cr Ni Nb 189	1.4543	30 - 52	1.4551
X 6 Cr Ni Nb 1810	1.4550	30 - 52	1.4551
X 12 Cr Ni Ti 189	1.4878	30 - 52	1.4551
X 2 Cr Ni Mo 17132	1.4404	30 - 53	1.4430
X 2 Cr Ni Mo 18142	1.4435	30 - 53	1.4430
X 5 Cr Ni Mo 17122	1.4401	30 - 53	1.4430
X 6 Cr Ni Mo Ti 17122	1.4571	30 - 54	1.4576
X 10 Cr Ni Mo Ti 1812	1.4573	30 - 54	1.4576
X 6 Cr Ni Mo Nb 17122	1.4580	30 - 54	1.4576
X 10 Cr Ni Mo Nb 1812	1.4583	30 - 54	1.4576
X 2 Cr Ni Mo N 22 5	1.4462	30 - 55	~1.4462
X 15 Cr Ni Si N 20 12	1.4828	30 - 57	1.4829
X 12 Cr Ni Ti N 18 9	1.4878	30 - 57	1.4828
X 2 Cr Ni 18 9	1.4306	30 - 56*	1.4455
X 5 Cr Ni 18 10	1.4301	30 - 56*	1.4455
X 6 Cr Ni Ti 18 10	1.4541	30 - 56*	1.4455
X 5 Cr Ni Nb 18 9	1.4543	30 - 56*	1.4455
X 6 Cr Ni Nb 18 19	1.4550	30 - 56*	1.4455
X 12 Cr Ni Ti 18 9	1.4878	30 - 56*	1.4455
X 2 Cr Ni Mo 17 13 2	1.4404	30 - 56*	1.4455
X 2 Cr Ni Mo 18 14 2	1.4435	30 - 56*	1.4455
X 5 Cr Ni Mo 17 12 2	1.4401	30 - 56*	1.4455
X 6 Cr Ni Mo Ti 17 12 2	1.4571	30 - 56*	1.4455
X 10 Cr Ni Ti Mo 18 12	1.4573	30 - 56*	1.4455
X 6 Cr Ni Mo Nb 17 12 2	1.4580	30 - 56*	1.4455
X 10 Cr Ni Mo Nb 18 12	1.4583	30 - 56*	1.4455

*If weld metal is required to be fully austenitic

Materials	Material-No	With wire electrode	Material-No
X 8 Ni 9	1.5662	30 - 56	1.4455
10 Ni 14	1.5637	30 - 56	1.4455
12 Ni 19	1.5680	30 - 56	1.4455

AMA AP 720 + 30 -56 is outstanding for joining unalloyed and low alloy steels to high alloy steels.

Standards	
DIN 32 522	B FB 5 63745 DC 8 K
EN 760	SA FB 2 63 DC

Application and Properties:

Special agglomerated fluoride-basic type flux of extra low carbon quantity for welding austenitic stainless and heat resistant steels in combination with wire electrode according to DIN 8556.

Owing to its metallurgical behavior In terms of carbon, AMA-OP71Cr is suited for welding extra low carbon steels. It contains chromium-bearing substances counteracting chromium burn-off.

AMA-OP71Cr is characterized by causing a mean silicon pick-up and a slight manganese burn-off. It produces smooth and finely rippled weld beads merging into the base metal without undercut.

Owing to excellent slag removal, AMA-OP71Cr is well suited for fillet welding.

AMA-OP71Cr can be used on DC+ up to 800C.

Damp flux shall be re-dried by baking at 300°C – 350°C

Grain size according to DIN 32 522:2-20

Main Constituents:			
SiO₂ + TiO₂	CaO + MgO	Al₂O₃ + MnO	CaF₂
30%	30%	10%	25%

Basicity to boniszewskii: ~1.6

All -Weld metal analysis (typical values):						
With Wire Electrode		Weight %				
AMA Trade Name	DIN/EN	C	Cr	Ni	Mo	Nb
30-51	ER308L	<0.03	>18	>9	-	-
30-52	ER347	<0.07	>18	>9	-	>8×C
30-53	ER316L	<0.03	>18	>10	2.5	-
30-54	ER318	<0.07	>18	>10	2.5	>8×C

Mechanical properties of all-weld metal (typical values):					
With Wire Electrode	Proof stress %0.2 (N/mm ²)	Proof stress %0.1 (N/mm ²)	Tensile Strength (N/mm ²)	Elongation Lo=5d %	Impact energy(j) ISO – V +20°C
30 – 51	> 550	> 350	> 320	> 35	> 75
30 – 52	> 575	> 370	> 350	> 30	> 65
30 – 53	> 550	> 350	> 320	> 30	> 75
30 – 54	> 600	> 370	> 350	> 30	> 65

Application: joint welding of austenitic stainless Cr Ni steels, preferably for thinner plates:			
Materials	Material-No	With wire electrode	Material-No
X 2 Cr Ni 1911	1.4306	30 - 51	1.4316
X 5 Cr Ni 1810	1.4301	30 - 51	1.4316
X 6 Cr Ni Ti 1810	1.4541	30 - 52	1.4551
X 5 Cr Ni Nb 189	1.4543	30 - 52	1.4551
X 6 Cr Ni Nb 1810	1.4550	30 - 52	1.4551

X 12 Cr Ni Ti 189	1.4878	30 - 52	1.4551
X 2 Cr Ni Mo 17132	1.4404	30 - 53	1.4430
X 2 Cr Ni Mo 18143	1.4435	30 - 53	1.4430
X 5 Cr Ni Mo 17122	1.4401	30 - 53	1.4430
X 6 Cr Ni Mo Ti 17122	1.4571	30 - 54	1.4576
X 10 Cr Ni Mo Ti 1812	1.4573	30 - 54	1.4576
X 6 Cr Ni Mo Nb 17122	1.4580	30 - 54	1.4576
X 10 Cr Ni Mo Nb 1812	1.4583	30 - 54	1.4576

Fluxes for Wear Resistant and Hardsurfacing applic

AMA OP250A	175
AMA OP350A	176

Standards	
DIN 32 522	B CS 3 97 CCrMo AC8
EN 760	S A CS 3 97 AC

Application and Properties:

Agglomerated alloy-bearing type flux for hard surfacing purposes, to be used in combination with 50-11 wire electrode. The alloying effect of the flux depends to a large degree on the welding parameters chosen.

Optimum parameters for a 4 mm dia. Wire electrode are 600A/32V/50cm/min.

AMA OP 250 A is suitable to be used on either DC or AC.

All -Weld metal analysis (typical values):						
With Wire Electrode		Weight %				
AMA Trade Name	DIN/EN	C	Si	Mn	Cr	Mo
50-11	S1	0.15	0.5	1.5	1.5	0.2

Mechanical properties of all-weld metal (typical values):		
With Wire Electrode		Hardness HB 30*
50-11	S1	250 - 350

*As to DIN 8555, sheet2, fig.2

Application: Hard surfacing of machine parts, driving gears, rails, support, rolls of caterpillars, etc.

Standards	
EN 760	SA CS 3 97 AC
DIN 32 522	B CS 3 97 CCrMo AC 8

Application and Properties:

Agglomerated alloy-bearing type flux for hard surfacing purposes, to be used in combination with 50-11, 50-22 wire electrodes. The alloying effect of the flux depends to a large degree on the welding parameters chosen. Optimum parameters for a 4 mm dia. Wire electrode are 600A/32V/50cm/min. welding speed. AMA-OP350 A is suitable to be used on either DC or AC. Damp flux shall be redried by baking at 300°C.

All -Weld metal analysis (typical values):						
With Wire Electrode		Weight %				
	DIN/EN	C	Si	Mn	Cr	Mo
50-11	S1	0.25	0.5	1.7	3	0.4
50-22	S2crMo1	0.25	0.8	1.8	3.5	0.7

Mechanical properties of all-weld metal (typical values):	
With Wire Electrode	Hardness HB 30*
50-11	350 - 450
50-22	460 - 540

*As to DIN 8555, sheet2, fig.2

Application: Hard surfacing of machine parts, driving gears, rails, support, rolls of caterpillars, etc.

Saw Backing Flux

AMA OP10U	178
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Standards

DIN/EN 760

~ ACS 1

Application and Properties:

AMA OP10 U is an agglomerated flux for use as the backing medium in the single-sided submerged arc welding process.

For single-sided welding the backing flux is spread as thin layer of a few millimeters in thickness in a copper backing bar which is pressed against the underside of the weld joint. After welding the slag detaches easily and the root of the weld exhibits a uniform profile. AMA-OP10U is suitable for use with single, tandem and multi-wire submerged arc welding processes. The optimized fine grain size in combination with the flux chemistry of AMA OP 10 U ensures that the weld profile is straight, with clean weld toes and a smooth cosmetically acceptable surface.

Damp flux shall be redried by baking at 300°C-350°C

Main Constituents:

SiO₂ + TiO₂	CaO + MgO	Al₂O₃ + MnO	CaF₂
32%	53%	5%	7%

Packing:

Polyethylene plastic sacks of 25 kg weight.

SAW-Wires

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Non Alloy Powder Coated Welds

Mn	Si	C	AWS/ASME SFA5.17	DIN EN 756	Ama ID code
0/5	0/15>	0/1	-	S1	50-11
1	0/15>	0/1	-	S2	50-12
1	0/2	0/1	-	S2Si	50-13
1/5	0/15	0/1	-	S3	50-15
1/35	0/25	0/1	-	S3Si	50-16
1/8<	0/15>	0/13	-	S4	50-18
0/5	0/1>	0/1	EL12	-	50-51
1	0/1>	0/1	EM12	-	50-52
1	0/18	0/11	EM12K	-	50-53
1/3	0/27	0/12	EM13K	-	50-56
1/75	0/35	0/12	EH12K	-	50-57
1/85	0/1>	0/12	EH14	-	50-61

Low Alloy Subwoofer Wires

Ni	Cr	Mo	Mn	Si	C	AWS/ASME SFA 5.23	DINEN 756	Ama ID code
—	—	0/5	1	0/15	0/1	-	S2Mo	50-14
—	—	0/5	1/5	0/15	0/1	-	S3Mo	50-17
—	—	0/5	2	0/12	0/1	-	S4Mo	50-19
1	—	0/6	1/7	0/15	0/12	-	S3Ni1Mo	50-21
—	1/2	0/5	1	0/2	0/12	-	S2CrMo1	50-22
—	2/5	1	0/5	0/2	0/12	-	S1CrMo2	*50-23
1	—	—	1/3	0/25	0/1	-	S2Ni1	*50-24
2/2	—	—	1	0/15	0/1	-	S2Ni2	*50-25
—	—	0/5	0/95	0/15	0/1	EA 1	-	50-54
—	—	0/5	1/1	0/15	0/12	EA 2	-	50-55
—	—	0/5	1/75	0/15	0/11	EA 3	-	50-58
—	—	0/5	1/5	0/15	0/1	EA 4	-	50-59
—	1	0/5	1	0/2	0/12	EB 2	-	50-62
—	2/4	1	0/5	0/2	0/12	EB 3	-	50-63
1	—	0/5	1/6	0/2	0/1	EF 1	-	50-64
1	—	0/5	1/8	0/2	0/12	EF 3	-	50-65
0/78	0/26	0/35 :Cu	0/95	0/3	0/1	E G	-	50-66

Stainless Steel Alloy Powder Welds

Nb	Ni	Cr	Mo	Mn	Si	C	AWS/ASME SFA5.9	DIN 8556	Ama ID code
–	9	19	–	1/5	0/4	0/025>	ER308L	UPX2CrNi 199	30-51
12 C°<	9	19	–	1/5	0/4	0/05>	ER347	UPX5CrNiNb 199	30-52
–	12	19	2/5	1/5	0/4	0/025	ER316L	UPX2CrNiMo 1912	30-53
12 C°<	12	19	2/5	1/5	0/4	0/05>	ER318	UPX2CrNiMo 1912	30-54

GMAW Wires

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MIG/MAG Welding Wires for C-Mn Steels Welding

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Standards		
AWS/ASME	SFA-5.18	E R70S-3

Applications and Properties:

Low alloy wire electrode is suitable for MAG-Welding of general structural steels and pipe steels using CO₂-or mixed shielding gas, e.g. Ar with 5-25% CO₂.

Analysis of wire electrode% (typical values):				
C	Si	Mn	P	S
0.06 – 0.15	0.45 – 0.75	0.9 – 1.4	≤ 0.025	≤0.025

Mechanical Properties of all-weld metal using CO ₂ shielding gas: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -18°C
500 - 640	>420	>22	>50

Materials:

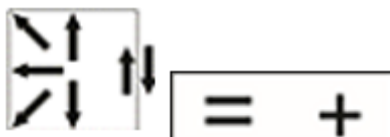
DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0. St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; HI; HII; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; STE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360; P235T1 to P355T1; P235G1TH; L210; L290MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27a. A36 Gr. all; A 214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr.60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

Delivery:

Copper coating & wound wire – reel on:

Weight: 15kg

Diameter: 0.8 – 2 mm



Standards		
AWS/ASME	SFA-5.18	E R70S-4

Applications and Properties:

Low alloy wire electrode for MAG-Welding of general structural steels and pipe steels using CO₂-or mixed shielding gas, e.g. Ar with 5-25% CO₂.

Analysis of wire electrode% (typical values):				
C	Si	Mn	P	S
0.07 – 0.15	0.65 – 0.85	1 – 1.5	≤0.025	≤0.025

Mechanical Properties of all-weld metal using CO ₂ shielding gas: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -30°C
500 - 640	>420	>22	>40

Material:

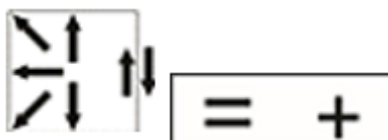
DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0. St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; STE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360; P235T1 to P355T1; P235G1TH; L210; L290MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27a. A36 Gr. all; A 214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

Delivery:

Copper coating & wound wire – reel on:

Weight: 15kg

Diameter: 0.8 – 2 mm



Standards		
AWS/ASME	SFA-5.18	E R70S-6

Applications and Properties:

Low alloy wire electrode for MAG-Welding of general structural steels and pipe steels using CO₂-or mixed shielding gas, e.g. Ar with 5-25% CO₂.

Analysis of wire electrode% (typical values):				
C	Si	Mn	P	S
0.06 – 0.15	0.8 – 1.15	1.4 – 1.85	≤0.025	≤0.025

Mechanical Properties of all-weld metal using CO ₂ shielding gas: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -29°C
500 - 640	>420	>22	>50

Material:

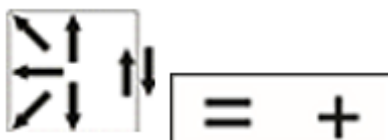
DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0. St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; STE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360; P235T1 to P355T1; P235G1TH; L210; L290MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27a. A36 Gr. all; A 214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

Delivery:

Copper coating & wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 2 mm



Standards	
DIN 8559	SG 2
Material No	1.5125
EN 440	G3 Si1

Applications and Properties:

Low alloy wire electrode for MAG – Welding of general structural steels and pip steels using CO₂ – or mixed shielding gas, e.g. .Ar with 5-25% CO₂.

Analysis of wire electrode% (typical values):				
C	Si	Mn	P	S
0.06 – 0.12	0.7 - 1	>1.3 – 1.6	≤0.025	≤0.025

Chemical composition of all-weld metal produced with CO ₂ shielding gas:				
C	Si	Mn	P	S
0.05 – 0.1	0.5 – 0.8	0.7 – 1	≤0.025	≤0.025

Mechanical Properties of all-weld metal using CO ₂ shielding gas: (single values are typical values)			
Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy(j) ISO – V -30°C
500 - 640	>420	>22	>50

Material:

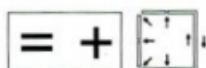
DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0. St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; HI; HII; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; STE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360; P235T1 to P355T1; P235G1TH; L210; L290MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM Standard	ASTM A27a. A36 Gr. all; A 214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

Delivery:

Copper coating & wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 2 mm



Standards	
DIN 8559	SG 3
Material No	1.5130
EN 440	G4 Si 1

Applications and Properties:

Low alloy wire electrode for MAG- Welding of general structural steels and pipe steels using CO₂ – or mixed shielding gas, e.g. . Ar with 5-25% CO₂.

Analysis of wire electrode% (typical values):				
C	Si	Mn	P	S
0.06 – 0.13	0.8 – 1.2	>1.6 – 1.9	≤0.025	≤0.025

Chemical composition of all-weld metal produced with CO ₂ shielding gas:				
C	Si	Mn	P	S
0.05 – 0.1	0.6 – 0.9	1-1.5	≤0.025	≤0.025

Mechanical Properties of all-weld metal using CO ₂ shielding gas: (single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V -30°C
530 - 680	>460	>22	>60

Material:

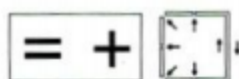
DIN Standard	St 37-2 to St 60-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; STE 255 to StE 355; WStE 255 to WStE 355; TStE 255 to TStE 355; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360; P235T1 to P355T1; P235G1TH; P255G1TH; P235GH; P310GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S420N; P255NH to P420NH; S235JRS1 to S235J4S
ASTM Standard	ASTM A27a. A36 Gr. all; A106 Gr. A, B; A 214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A556 Gr. B2A; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

Delivery:

Copper coating & wound wire – reel on:

Weight: 15 kg.

Diameter: 0.8 – 2 mm



Low Alloy MIG/MAG Welding Wires

AMA 80-11M	220
AMA 80-12 M	221
AMA 80-14 M	222
AMA 80-15 M	223
AMA 80-16 M	224
AMA 80-17 M	225
AMA 80-18 M	226

Standards

AWS/ASME SFA-5.28

ER 80S-B2

Applications and Properties:

Medium-alloyed wire for MIG/MAG welding of Cr Mo-alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 550°C.

This wire shall be welded using mixed shielding gas. Observe direction as to preweld heat treatment of materials.

Analysis of wire electrode% (typical values):

C	Si	Mn	Cr	Mo
0.1	0.4	0.6	1.3	0.5

Shielding gas: DIN EN 439-M2 1 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V 25°C	Heat Treatment
600 - 700	>500	>21	>80	T
480 - 560	>350	>25	>80	N+T

T = Heat treatment 30 min at 720°C, furnace cooling to 300°C.

N + T = Norm + Treatment 30 min at 930°C, air cooling + 30 min at 720°C, furnace cooling to 300°C.

Material:

DIN Standard 13CrMo44; 15CrMo5; 16CrMo44; 25CrMo4; 24CrMo5; GS-22CrMo54; GS-17CrMo55

EN Standard 13CrMo4-5; 15CrMo5; 42CrMo4; 16CrMoV4; 25CrMo4; 24CrMo5; G22CrMo5-4; G17CrMo5-5

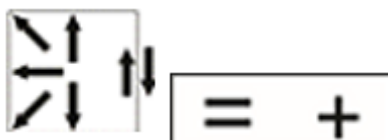
ASTM Standard A193 Gr. B7; A335 Gr. P11 a. P12; A217 Gr. WC6

Delivery: Only Copper coating, wound wire – reel on:

Weight: 15 kg

Diameter: 1-2 mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.28

ER 80S-G ER80S-Ni1

Applications and Properties:

Medium-alloyed wire is suitable for MIG/MAG welding of atmospheric corrosion resistant steels and structural steels. Weld metal have good toughness and mechanical properties.

This wire can be use with Co2 or Ar-Co2 mixed gases.

Analysis of wire electrode% (typical values):

C	Mn	Si	Ni
0.07	1.1	0.7	0.8

Shielding gas: DIN EN 439-M2 1 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V	
			-40°C	-46°C
620	530	24	60	50

Material:

DIN Standard St 37-2 to St 60-2; St 52-3 Cu 3; WTSt 37-2

EN Standard S235JR; S235JRW; S355JRW; S355J2G3 Cu

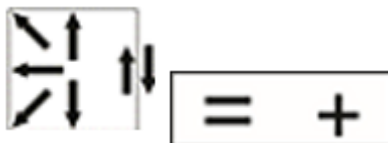
ASTM Standard ASTM A36, A283 Gr. B, C

Delivery: only Copper coating wound wire – reel on:

Weight: 15 kg

Diameter: 1-2 mm

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.28	ER 70S-A1 (ER 80S-G)
DIN 8575	SGMo

Applications and Properties:

This wire suitable for welding of boilers, pipes and steels having 0.5 percent Mo subjected to operating temperature up to 550°C.

Analysis of wire electrode% (typical values):					
C	Si	Mn	P	S	Mo
0.1	0.6	1.1	0.016	0.01	0.5

Shielding gas: DIN EN 439-M2 1 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal:			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V 25°C
520 - 620	>430	>22	>80

Material:

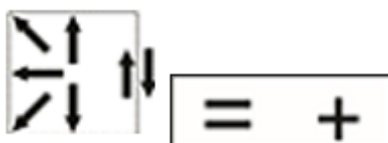
DIN Standard	St 37-3 to St 52-3; St 37-2 to St 60-2; St 35.8 to St 45.8; StE 320.7 to StE 415.7; StE 255 to StE 500; 17Mn4; 19Mn5; 15Mo3; TStE 255 to TStE 500
EN Standard	S355J2G3; E295; E335; P255G1TH; L320 to L415NB; L320MB to L415MBM; S255N to S500N; P295GH; P310GH; 16Mo3; 15NiCuMoNb5; 20MnMoNi4-5; 17MnMoV6-4; S255NH to S500NH; S255NL to S500NL
ASTM Standard	A204 Gr. A, B, C; A 217 Gr. WC1; A213 Gr. T2; A355 Gr. P1; A182M Gr. F1; A204M Gr. A, B, C; A250 Gr. T1

Delivery: Only Copper coating, wound wire – reel on:

Weight: 15 kg

Diameter: 1-2 mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.28

ER 100S-G

Applications and Properties:

Medium-alloyed wire electrode for MIG/MAG welding of high strength fine grain structural steels. The wire is suited for joint welding in boiler, pressure vessel, pipeline, and crane construction. Wire features good ductility and crack resistance in spite of its high strength.

Analysis of wire electrode% (typical values):

C	Si	Mn	Ni	Cr	V	Mo
0.1	0.6	1.6	1.4	0.3	0.05	0.25

Shielding gas: DIN EN 439-M2 1 (15-25% CO₂, Balance Ar)

DIN EN 439-C1 (100% CO₂)

Mechanical properties of all-weld metal: Shielding gas: M21

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -40°C	Heat Treatment
750 - 880	>650	>16	>80 >47	AW

AW: as – welded

Material:

DIN Standard StE 550 to StE 690; EStE 620; EStE690; 20MnMoNi5 5

EN Standard S380N to S500N; S380NL to S500NL; S500NC to S550NC

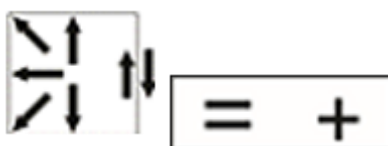
ASTM Standard ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65

Delivery: Only Copper coating, wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.28

ER 80S-B6

Applications and Properties:

GMAW solid wire for welding of plate and tube alloyed steels which to contain 5% Cr and 0.5% Mo, particularly for application in oil refineries and petrochemical industries. Weld metal ability of service in hot hydrogen conditions.

Preferably used for the base metal X12CrMo5 approved in long-term condition up to +650°C service temperature.

Analysis of wire electrode% (typical values):

C	Si	Mn	Cr	Mo
0.06	0.25	0.45	5.1	0.5

Shielding gas: DIN EN 439-M21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal: Shielding gas: M21

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Heat Treatment
550 - 700	>460	>22	T

T: Heat treatment 1 h at 745C, furnace cooling to 300°C

Material:

DIN Standard X12CrMo5; GX12CrMo5

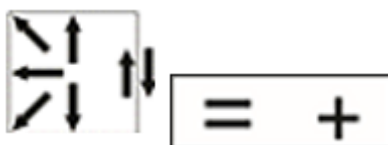
ASTM Standard A182 Gr. F5; A199 Gr. T5; A213 Gr. T5; A217 Gr. C5; A335 Gr. P5; A336 C1.F5; A369 Gr. FP5; A387 Gr. 5

Delivery: Only Copper coating, wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.28	ER 90S-B3
DIN 8575	SG CrMo 2

Applications and Properties:

GMAW solid wire for Cr-Mo low alloyed boiler, plate and tube steels as well as in oil refineries. Preferably used for the base metal 10CrMo910 approved in long-term condition up to +600°C service temperature.

Also for similar alloyed quenched and tempered steels and case hardening steels. The deposit is noted for its good mechanical properties and cracking resistance.

Analysis of wire electrode% (typical values):				
C	Si	Mn	Cr	Mo
0.1	0.5	0.7	2.4	1

Shielding gas: DIN EN 439-M2 1 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal: Shielding gas: M21				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C	Heat Treatment
570 - 700	>440	>20	130	T

T: Heat treatment 1 h at 745°C, furnace cooling to 300°C

Material:

DIN Standard 10CrMo9 10; 10CrSiMoV7; G17CrMo 910

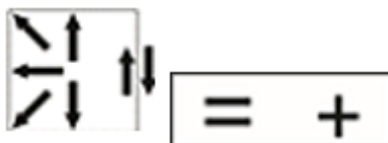
ASTM Standard ASTM A335 Gr. P22; A217 Gr. WC 9

Delivery: Only Copper coating, wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.28	ER 80S-Ni2
DIN EN 440	G2 Ni2

Applications and Properties:

GMAW wire for high quality welds in the construction of storage tanks and piping systems for cryogenic applications. The weld deposit is noted for its particularly good low temperature properties.

Analysis of wire electrode% (typical values):					
C	Si	Mn	Ni	S	P
0.08	0.5	1.2	2.3	<0.02	<0.02

Shielding gas: DIN EN 439-M2 1 (15-25% CO₂, Balance Ar)

DIN EN 439-C1 (100% CO₂)

Mechanical properties of all-weld metal: Shielding gas: M21				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V -60°C	Heat Treatment
550 - 700	>460	>22	>47	T

Material:

DIN Standard TStE 355 to TStE 460; EStE 355 to EStE 460; StE 255 to StE 460; WStE 355 to WStE 460

EN Standard 12Ni14; 14Ni6; 10Ni14; 13MnNi 6 3; P355NL1 to P460NL1; P355NL2 to P460NL2; S255N to S460N; S355NH to S460NH; S255NL to S460NL; S255NL1 to S380NL1

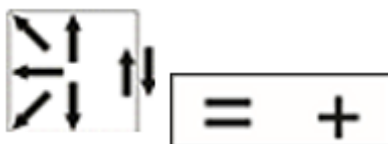
ASTM Standard A633 Gr. E; A572 Gr. 65; A203 Gr. D; A333 and A334 Gr. 3; A350 Gr. LF3

Delivery: Only Copper coating, wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request



Stainless steel MIG/MAG Welding Wire

AMA 30-11M	199
AMA 30-12M	200
AMA 30-13M	201
AMA 30-14M	202
AMA 30-15M	203
AMA 30-16M	204
AMA 30-17M	205
AMA 30-18M	206
AMA 30-19M	207
AMA 30-21M	208

Standards

AWS/ASME SFA-5.9

ER 308 L

Applications and Properties:

Austenitic stainless wire electrode in extra low carbon quantity is suitable for MIG/MAG welding of unstabilized corrosion resistant Cr Ni steels. It's resistant to intergranular corrosion up to 350°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
≤0.03	0.3 – 0.65	19.5 - 22	1 – 2.5	9 - 11

Shielding gas: DIN EN 439-M13 (0 – 3% O₂, Balance Ar)

DIN EN 439-M12 (0 – 5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>320	>35	>80

Material:

DIN Standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G-X10CrNi 18 8; 1.4541 X6CrNiTi 18-10; 1.4546 X5CrNiNb 18-10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

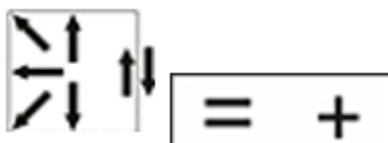
Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr. B8C

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 308 LSi

Applications and Properties:

Austenitic stainless wire electrode in extra low carbon quantity for MIG/MAG welding of unstabilized corrosion resistant CrNi steels. Resistant to intergranular corrosion up to 350°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
≤0.03	0.65 - 1	19.5 - 22	1 – 2.5	9 - 11

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>320	>35	>80

Material:

DIN Standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G-X10CrNi 18 8; 1.4541 X6CrNiTi 18-10; 1.4546 X5CrNiNb 18-10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

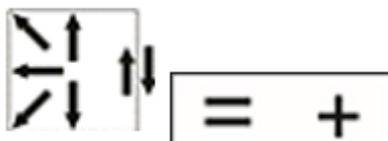
Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr. B8C

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 316 L

Applications and Properties:

Austenitic stainless wire electrode in extra low carbon quantity for MIG/MAG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni	Mo
≤0.03	0.3 – 0.65	18 - 20	1 – 2.5	11 - 14	2 - 3

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>320	>30	>80

Material:

DIN Standard 1.4401 X5CrNiMo17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10;
1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X5CrNiMo
18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435
X2CrNiMo 18 14 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2;
1.4583 X10CrNiMoNb 18 12

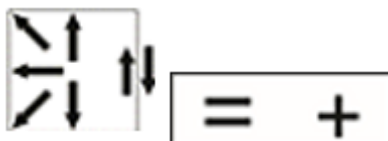
Other Standard S31653; AISI 316L, 316Ti; 316Cb

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 316 L Si

Applications and Properties:

Austenitic stainless wire electrode in extra low carbon quantity for MIG/MAG welding of unstabilized corrosion resistant Cr Ni Mo steels.

Resistant to intergranular corrosion up to 400°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni	Mo
≤0.03	0.65 - 1	18 - 20	1 – 2.5	11 - 14	2 - 3

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>320	>30	>80

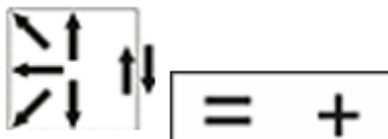
Material:

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 347

Applications and Properties:

Stabilized austenitic stainless steels wire electrode for MIG/MAG welding of unstabilized and stabilized corrosion resistant Cr Ni steels.

Resistant to intergranular corrosion up to 400°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Ni	Nb
≤0.08	0.3 – 0.65	19 – 21.5	9 - 11	≥10 × C

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>350	>30	>65

Material:

DIN Standard 1.4301 X5CrNi 18 10; 1.4541 X6CrNiTi 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X5CrNi 18 12; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

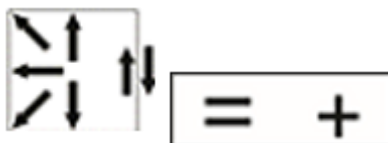
Other Standard AISI 347; 321; 302; 304; 304L; 304LN; ASTM A296 Gr. CF 8 C; A157 Gr. C9; A320 Gr. B8C

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 347 Si

Applications and Properties:

Stabilized austenitic stainless steels wire electrode for MIG/MAG welding of unstabilized and stabilized corrosion resistant Cr Ni steels.

Resistant to intergranular corrosion up to 400°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Ni	Nb
≤0.08	0.65 - 1	19 – 21.5	9 - 11	≥10 × C

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>350	>30	>65

Material:

DIN Standard 1.4301 X5CrNi 18 10; 1.4541 X6CrNiTi 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X5CrNi 18 12; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

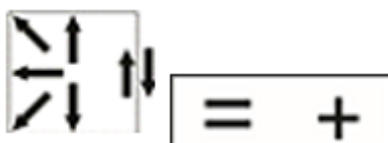
Other Standard AISI 347; 321; 302; 304; 304L; 304LN; ASTM A296 Gr. CF 8 C; A157 Gr. C9; A320 Gr. B8C

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 309 L

Applications and Properties:

Austenitic–ferritic wire electrode for MIG/MAG welding of high alloy steels to unalloyed or low alloy steels. Highest operating temperature is 300°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
≤0.03	0.3 – 0.65	23 - 25	1 – 2.5	12 - 14

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>400	>30	>47

Material:

DIN Standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

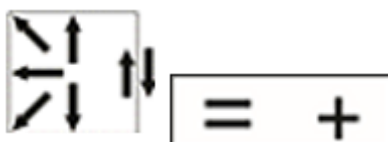
Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 309 L Si

Applications and Properties:

Austenitic–ferritic wire electrode is suitable for MIG/MAG welding of high alloy steels to unalloyed or low alloy steels. Highest operating temperature is 300°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
≤0.03	0.65 - 1	23 - 25	1 – 2.5	12 - 14

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥520	>400	>30	>47

Material:

DIN Standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

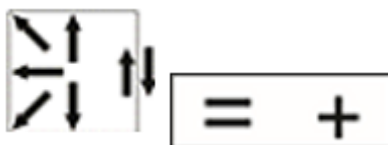
Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 310

Applications and Properties:

Fully austenitic stainless wire electrode for MIG/MAG welding of heat resistant steels, containing 25% Cr and 20% Ni. Likewise suited for welding heat and scaling resistant ferritic chromium steels unless corrosion attack by reducing sulphur-bearing combustion gases is to be expected. Non-scaling up to 1200°C. Weld metal exhibits good toughness down to -196°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
0.08 – 0.15	0.3 – 0.65	25 - 28	1 – 2.5	20 – 22.5

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥550	>300	>30	>70

Material:

DIN Standard 1.4745 G-X40CrSi 23; 1.4823 G-X40CrNiSi 27 4; 1.4832 G-X25CrNiSi 20 14;
1.4833 X7CrNi 23 14; 1.4841 X15CrNiSi 25 20; 1.4845 X12CrNi 25 21; 1.4828
X15CrNiSi 20 12; 1.4840 G-X15CrNi 25 20; 1.4846 G-X40CrNi 25 21; 1.4826 G-
X40CrNiSi 22 9; 1.4713 X10CrAl 7; 1.4724 X10CrAl 13; 1.4742 X10CrAl 18;
1.4762 X10CrAl 25; 1.4710 G-X30CrSi 6; 1.4740 G-X40CrSi 17

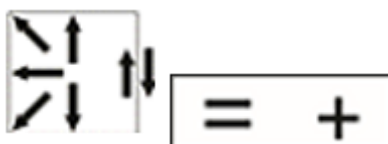
Other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.9

ER 318

Applications and Properties:

Stabilized austenitic stainless wire electrode for MIG/MAG welding of stabilized or unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400°C.

Analysis of wire electrode% (typical values):

C	Cr	Si	Ni	Mo	Nb
≤0.08	18 - 20	0.3 – 0.65	11 - 14	2 - 3	≥8 × C

Shielding gas: DIN EN 439-M13 (0-3% O₂, Balance Ar)

DIN EN 439-M12 (0-5% CO₂, Balance Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d %	Impact energy(j) ISO – V 25°C
≥550	>350	>25	>65

Material:

DIN Standard 1.4401 X5CrNiMo17 12 2; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X6CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X10CrNiMoNb 18 12

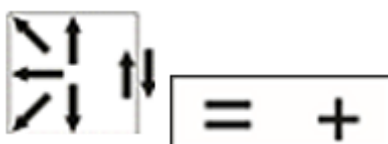
Other Standard S31653; AISI 316L, 316Ti; 316Cb

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Nicle base MIG/MAG Welding Wires

AMA 90-11M	210
AMA 90-12M	211
AMA 90-13M	212

Standards

AWS/ASME SFA-5.14

ERNiCr – 3

Applications and Properties:

GMAW solid wire for 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 is for service temperatures above +300°C or for applications where a post weld heat treatment is required. Suitable for pressure vessel fabrication for the service temperature range -196°C to +550°C, otherwise resistant to scaling up to +1200°C. Not susceptible to embitterment. Resistant to thermal shocks, corrosion resistant, fully austenitic. Low coefficient of thermal expansion. (Between C-steels and austenitic CrNi (Mo) steel)

Weld metal Analysis in% (typical values):

C	Mn	Ni	Cr	Nb+Ta
<0.05	3	Rest	20.5	3.5

Shielding gas: DIN EN 439-I1 (100% Ar)

DIN EN 439-I3 (Ar + He)

Mechanical properties of all-weld metal (shielding gas : I1)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -196°C	Heat Treatment
>640	>400	>35	160 80	AW

AW: As welded

Material:

DIN Standard 2.4816 NiCr 15 Fe; 2.4817 LC-NiCr 15 Fe; X8Ni9

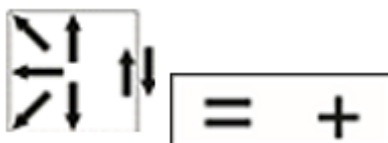
Other Standard Alloy 600, Alloy 600 L

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.14

ERNiCrMo – 3

Applications and Properties:

GMAW solid wire for high-quality joint welding of nickel-base alloys like Inconel 625 and Incoloy 825 as well as of CrNiMo stainless steels with high Mo-content. Additionally it is recommended for high temperature or creep resisting, heat resisting and cryogenic materials, joining of dissimilar steels.

Can be used for pressure vessel fabrication for service temperatures in the -196°C to +550°C range, otherwise up to scaling resistance limit of +1200°C. Due to the weld metal embrittlement between +600 -850°C, this temperature range should be avoided. Highly resistant to hot cracking. Extremely resistant to stress corrosion cracking and pitting. Resistant to thermal shocks, fully austenitic. Low coefficient of thermal expansion (between C steels and austenitic CrNi(Mo) steel)

Analysis of wire electrode% (typical values):

C	Ni	Mo	Fe	Cr	Na+Ta
0.03	rest	9	1	22	3.2

Shielding gas: DIN EN 439-I1 (100% Argon)

DIN EN 439-I3 (Ar + He)

Mechanical properties of all-weld metal: (Single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(J) ISO – V +20°C -196°C	Heat Treatment
>740	>500	>35	100 80	AW

AW: As welded

Material:

DIN Standard 2.4856 NiCr 22 Mo 9 Nb; 2.4858 NiCr 21Mo; 2.4816 NiCr 15 Fe; 1.4583 X10CrNiMoNb 18 12; 1.4876 X10NiCrAlTi 32 20 H; 1.4876 X10NiCrAlTi 32 20; 1.4529 X1NiCrMoCuN 25 20 7; X2 CrNiMoCuN 20 18 6; 2.4641 NiCr 21 Mo 6 Cu; 1.5662 X8Ni9; 1.4529 X1NiCrMoCuN 25 20 6; 1.4547 X1CrNiMoCu N20 18 7

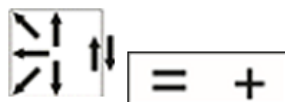
Other Standard ASTM A553 Gr. Alloy 600, Alloy 625, Alloy 800, 9% Ni-Steels

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.14	ERNiCu – 7
DIN 1736	SG-NiCu30MnTi

Applications and Properties:

GMAW solid wire for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. It is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. Excellent corrosion resistance to chloride induced stress corrosion cracking and a wide range of marine and chemical requirements. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Analysis of wire electrode% (typical values):						
C	Mn	Si	Ti	Ni	Cu	Fe
0.05	3.7	0.1	2.3	rest	28	0.9

Shielding gas: DIN EN 439-I1 (100% Argon)

DIN EN 439-M11 (0-5% Co2, balance Ar)

Mechanical properties of all-weld metal: (Single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
>500	>300	>35	150

Material:

DIN Standard NiCu30Fe (2.4360); NiCu30Al (2.4375)

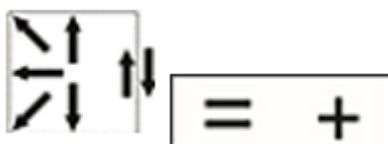
Other Standard Alloy 400, ASTM B 127, B 165

Delivery: Only wound wire – reel on:

Weight: 15 kg

Diameter: 0.8 – 1.6 mm

Note: other weight & sizes are produced upon customers' request



GTAW-Wires

TIG Wires for C-Mn Steels Welding	214
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TIG Wires for C-Mn Steels Welding

AMA 40-13T	215
AMA 40-14T	216
AMA 40-16T	217
AMA 40-18T	218

Standards

AWS/ASME SFA-5.18

ER70S – 3

Applications and Properties:

Low alloy wire electrode for TIG – Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of wire electrode% (typical values):

C	Si	Mn	P	S
0.06 – 0.15	0.45 – 0.75	0.9 – 1.4	≤0.025	≤0.025

Mechanical properties of all – weld metal using Ar shielding gas: (signal value are typical value)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -18°C
500 - 640	>420	>22	>100

Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1; P235G1TH; L210; L290 MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

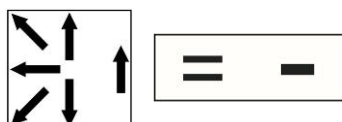
Delivery:

Welding rods, Copper coated:

Weight: 5 or 10 kg

Diameter: 1 – 4 mm

Length: 1000 mm



Standards

AWS/ASME SFA-5.18

ER 70S – 4

Applications and Properties:

Low alloy wire electrode for TIG -Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of wire electrode% (typical values):

C	Si	Mn	P	S
0.07 – 0.15	0.65 – 0.85	1 – 1.5	≤0.025	≤0.025

Mechanical properties of all – weld metal using Ar shielding gas: (signal value are typical value)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -29°C
500 - 640	>420	>22	>100

Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1; P235G1TH; L210; L290 MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

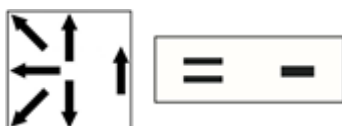
Delivery:

Welding rods, Copper coated:

Weight: 5 or 10 kg

Diameter: 1 – 4 mm

Length: 1000 mm



Standards

AWS/ASME SFA-5.18

ER 70S – 6

Applications and Properties:

Low alloy wire electrode for TIG -Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of wire electrode% (typical values):

C	Si	Mn	P	S
0.06 – 0.15	>0.8 – 1.15	>1.4 – 1.85	≤0.025	≤0.025

Mechanical properties of all – weld metal using Ar shielding gas: (signal value are typical value)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V -29°C
500 - 640	>420	>22	>120

Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1; P235G1TH; L210; L290 MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

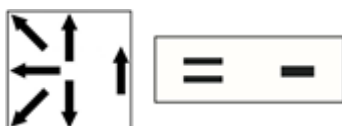
Delivery:

Welding rods, Copper coated:

Weight: 5 or 10 kg

Diameter: 1 – 4 mm

Length: 1000 mm



Standards	
DIN 8559	WSG 2
Material No	1.5125
DIN EN 1668	W 3 Si 1

Applications and Properties:

Low alloy wire electrode for TIG – Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of wire electrode% (typical values):				
C	Si	Mn	P	S
0.06 – 0.12	>0.7 - 1	>1.3 – 1.6	≤0.025	≤0.025

Mechanical properties of all – weld metal using Ar shielding gas: (signal value are typical value)			
Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy(j) ISO – V -30°C
500 - 640	>420	>22	>100

Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; Hl; Hll; 17Mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; StE 255 to StE 355; WStE 255 to WStE 380; TStE 255 to TStE 355 ; TT ST 35 N; GS-38 ; GS-52
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1; P235G1TH; L210; L290 MB; P255G1TH; P235GH; P265GH; P295GH; P310GH; P255NH; S235JRS1 to S235J4S; S355G1S to S355G3S; S255N to S355N; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X42, X46, X52, X56, X60

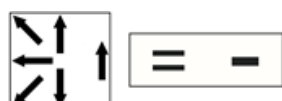
Delivery:

Welding rods, Copper coated:

Weight: 5 or 10 kg

Diameter: 1 – 4 mm

Length: 1000 mm



Low Alloy TIG Welding Wires

AMA 80-11T	220
AMA 80-12T	221
AMA 80-14T	222
AMA 80-15T	223
AMA 80-16T	224
AMA 80-17T	225
AMA 80-18T	226

Standards

AWS/ASME SFA-5.28

ER 80S-B2

Applications and Properties:

Medium-alloyed welding rod for TIG-Welding of Cr Mo-alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 550°C.

Analysis of wire electrode% (typical values):

C	Si	Mn	Cr	Mo
0.1	0.4	0.6	1.3	0.5

Shielding gas: 100% Argon

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A4 (%)	Impact energy(j) ISO – V 25°C	Heat Treatment
600 - 700	>500	>21	>95	T
480 - 560	>350	>25	>110	N+T

T = Treatment 30 min at 720°C, furnace cooling to 300°C

N + T = Norm + Treatment 30 min at 930°C, air cooling + 30 min at 720°C, furnace cooling to 300°C

Material:

DIN Standard 13CrMo 44; 15CrMo 5; 16CrMo 44; 25CrMo 4; 24CrMo 5; GS-22CrMo 54; GS-17CrMo 55

EN Standard 13CrMo4-5; 15CrMo5; 42CrMo4; 16CrMoV4; 25CrMo4; 24CrMo5; G22CrMo5-4; G17CrMo5-5

ASTM Standard A193 Gr. B7; A335 Gr. P11 a. P12; A217 Gr. WC6

Delivery:

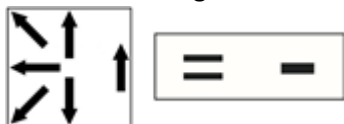
Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.28

ER 80S-G
ER 80S-Ni1

Applications and Properties:

Medium-alloyed wire for TIG welding of atmospheric corrosion resistant steels and structural steels. Weld metal have good toughness and mechanical properties.

Analysis of wire electrode% (typical values):

C	Mn	Si	Ni
0.07	1.1	0.7	0.9

Shielding gas: 100% Argon

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V	
			-40°C	-51°C
>560	>470	25	70	50

Material:

DIN Standard St 37-2 to St 60-2; St 52-3 Cu 3; WTSt 37-2

EN Standard S235JR; S235JRW; S355JRW; S355J2G3 Cu

ASTM Standard ASTM A36; A283 Gr. B, C

Delivery:

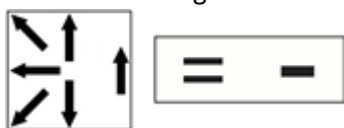
Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.28	ER 70S-A1 (ER 80S-G)
DIN 8575	SGMo

Applications and Properties:

This wire suitable for welding of boilers, pipes and steels having 0.5 percent Mo subjected to operating temperature up to 550°C.

Analysis of wire electrode% (typical values):					
C	Si	Mn	P	S	Mo
0.1	0.6	1.1	0.016	0.01	0.5

Shielding gas: 100% Argon

Mechanical properties of all-weld metal:			
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V 25°C
570 - 670	>470	>22	>80

Material:

DIN Standard	St 37-3 to St 52-3; St 37-2 to St 60-2; St 35.8 to St 45.8; StE 320.7 to StE 415.7; StE 255 to StE 500; 17Mn4; 19Mn5; 15Mo3; TStE 255 to TStE 500
EN Standard	S355J2G3; E295; E335; P255G1TH; L320 to L415NB; L320MB to L415MBM; S255N to S500N; P295GH; P310GH; 16Mo3; 15NiCuMoNb5; 20MnMoNi4-5; 17MnMoV6-4; S255NH to S500NH; S255NL to S500NL
ASTM Standard	A204 Gr. A, B, C; A217 Gr. WC1; A213 Gr. T2; A355 Gr. P1; A182M Gr. F1; A204M Gr. A, B, C; A250 Gr. T1

Delivery:

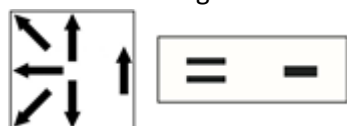
Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.28

ER 100S-G

Applications and Properties:

Medium-alloyed rod electrode for TIG welding of high strength fine grain structural steels. The wire is suited for joint welding in boiler, pressure vessel, pipeline, and crane construction. Wire features good ductility and crack resistance in spite of its high strength.

Analysis of wire electrode% (typical values):

C	Si	Mn	Ni	Cr	V	Mo
0.1	0.6	1.6	1.4	0.3	0.05	0.25

Shielding gas: DIN EN 439-I1 (100% Ar)

Mechanical properties of all-weld metal: Shielding gas: I1

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -50°C	Heat Treatment
780 - 900	>670	>17	>80 >47	AW

Material:

DIN Standard StE 550 to StE 690; EStE 620; EStE 690; 20MnMoNi5 5

EN Standard S380N to S500N; S380NL to S500NL; S500NC to S550 NC

ASTM Standard ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65

Delivery:

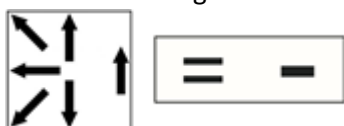
Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.28

ER 80S-B6

Applications and Properties:

GTAW rod for welding of plate and tube alloyed steels which to contain 5% Cr and 0.5% Mo, particularly for application in oil refineries and petrochemical industries. Weld metal ability of service in hot hydrogen conditions.

Preferably used for the base metal X12CrMo5 approved in long-term condition up to +650°C service temperature.

Analysis of wire electrode% (typical values):

C	Si	Mn	Cr	Mo
0.06	0.25	0.45	5.1	0.5

Shielding gas: DIN EN 439-I1 (100% Ar)

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Heat Treatment
550 - 700	>460	>22	T

T = Heat treatment 1 hour at 745°C, furnace cooling to 300°C

Material:

DIN Standard X12CrMo5; GX12CrMo5

ASTM Standard A182 Gr. F5; A199 Gr. T5; A213 Gr. T5; A217 Gr. C5; A335 Gr. P5; A336 C1.F5; A369 Gr. FP5; A387 Gr. 5

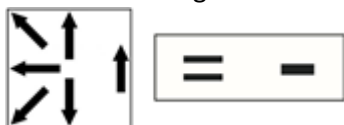
Delivery:

Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.28	ER 90S-B3
DIN EN 8575	SG CrMo 2

Applications and Properties:

GTAW rod for Cr-Mo low alloyed boiler, plate and tube steels as well as in oil refineries. Preferably used for the base metal 10CrMo910 approved in long-term condition up to +600°C service temperature.

Also for similar alloyed quenched and tempered steels and case hardening steels. The deposit is noted for its good mechanical properties and cracking resistance.

Analysis of wire electrode% (typical values):				
C	Si	Mn	Cr	Mo
0.1	0.5	0.7	2.4	1

Shielding gas: DIN EN 439-I1 (100% Ar)

Mechanical properties of all-weld metal:				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C	Heat Treatment
580 - 700	>450	>20	150	T

T = Heat treatment 1 hour at 745°C, furnace cooling to 300°C

Material:

DIN Standard 10CrMo9 10; 10CrSiMoV7; G17CrMo 910

ASTM Standard ASTM A335 Gr. P22; A217 Gr. WC9

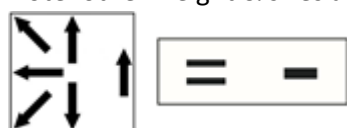
Delivery:

Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA-5.28	ER 80S-Ni2
DIN EN 1668	W2 Ni2

Applications and Properties:

Welding rod for high quality welds in the construction of storage tanks and piping systems for cryogenic applications. The weld deposit is noted for its particularly good low temperature properties.

Analysis of wire electrode% (typical values):					
C	Si	Mn	Ni	S	P
0.08	0.5	1.2	2.3	<0.02	<0.02

Shielding gas: DIN EN 439-I1 (100% Ar)

Mechanical properties of all-weld metal:				
Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V -60°C	Heat Treatment
570 - 700	>480	>22	>47	T

T = Heat treatment 1 hour at 620°C, furnace cooling to 300°C

Material:

DIN Standard	TStE 355 to TStE 460; EStE 355 to EStE 460; StE 255 to StE 460; WStE 355 to WStE 460
EN Standard	12Ni14; 14Ni6; 10Ni14; 13MnNi 6 3; P355NL1 to P460NL1; P355NL2 to P460NL2; S255N to S460N; S355NH to S460NH; S255NL to S460NL; S255NL1 to S380NL1
ASTM Standard	A633 Gr. E; A572 Gr. 65; A203 Gr. D; A333 and A334 Gr. 3; A350 Gr. LF3

Delivery:

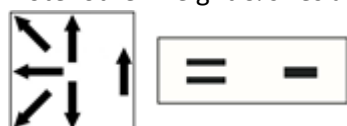
Copper coating, welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Stainless Steel TIG Welding Wires

AMA 30-11T	228
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AMA 30-19T	236
AMA 30-21T	237

Standards

AWS/ASME SFA-5.9

ER 308 L

Applications and Properties:

Austenitic stainless steels welding rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 350°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
≤0.03	0.3 – 0.65	19.5 - 22	1 – 2.5	9 - 11

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>320	>35	>80

Material:

DIN Standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G-X10CrNi 18 8; 1.4541 X6CrNiTi 18-10; 1.4546 X5CrNiNb 18-10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr. B8C

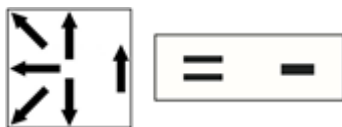
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 308

Applications and Properties:

Austenitic stainless steels welding rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 350°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni
≤0.03	0.65 - 1	19.5 - 22	1 – 2.5	9 - 11

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>320	>35	>80

Material:

DIN Standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9; 1.4301 X5CrNi 18 10; 1.4311 X2CrNiN 18 10; 1.4312 G-X10CrNi 18 8; 1.4541 X6CrNiTi 18-10; 1.4546 X5CrNiNb 18-10; 1.4550 X6CrNiNb 18 10; 1.4303 X4CrNi 18 12; 1.4306 X2CrNi 19 11; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

Other Standard AISI 304, 304L, 304LN, 302, 321, 347; ASTM A157 Gr. C9; A320 Gr. B8C

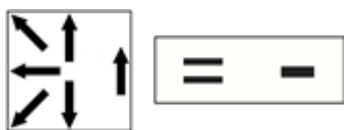
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 316 L

Applications and Properties:

Austenitic stainless welding wire rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni	Mo
≤0.03	0.3 – 0.65	18 - 20	1 – 2.5	11 - 14	2 - 3

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>320	>30	>80

Material:

DIN Standard 1.4401 X5CrNiMo17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10;
1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X5CrNiMo
18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435
X2CrNiMo 18 14 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2;
1.4583 X10CrNiMoNb 18 12

Other Standard S31653; AISI 316L, 316Ti; 316Cb

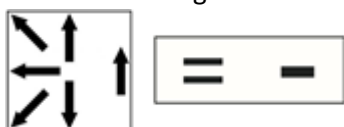
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 316 L Si

Applications and Properties:

Austenitic stainless welding wire rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400°C.

Analysis of wire electrode% (typical values):

C	Si	Cr	Mn	Ni	Mo
≤0.03	0.65 - 1	18 - 20	1 – 2.5	11 - 14	2 - 3

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>320	>30	>80

Material:

DIN Standard 1.4401 X5CrNiMo17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10;
1.4429 X2CrNiMoN 17 13 3; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X5CrNiMo
18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4435
X2CrNiMo 18 14 3; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2;
1.4583 X10CrNiMoNb 18 12

Other Standard S31653; AISI 316L, 316Ti; 316Cb

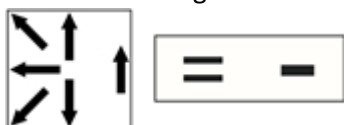
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 347

Applications and Properties:

Stabilized austenitic stainless welding rod for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 400°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Ni	Nb
≤0.08	0.3 – 0.65	19 – 21.5	9 - 11	≥10 × C

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>350	>30	>65

Material:

DIN Standard 1.4301 X5CrNi 18 10; 1.4541 X6CrNiTi 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X5CrNi 18 12; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7

Other Standard AISI 347; 321; 302; 304; 304L; 304LN; ASTM A296 Gr. CF 8 C; A157 Gr. C9; A320 Gr. B8C

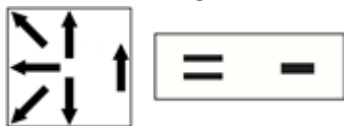
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 347 Si

Applications and Properties:

Stabilized austenitic stainless welding rod for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 400°C, non-scaling up to 800°C if subjected to air or oxidizing combustion gases.

Analysis of wire electrode% (typical values):

C	Si	Cr	Ni	Nb
≤0.08	0.65 - 1	19 – 21.5	9 - 11	≥10 × C

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>350	>30	>65

Material:

DIN Standard	1.4301 X5CrNi 18 10; 1.4541 X6CrNiTi 18 10; 1.4550 X6CrNiNb 18 10; 1.4303 X5CrNi 18 12; 1.4308 G-X6CrNi 18 9; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi 18 7
Other Standard	AISI 347; 321; 302; 304; 304L; 304LN; ASTM A296 Gr. CF 8 C; A157 Gr. C9; A320 Gr. B8C

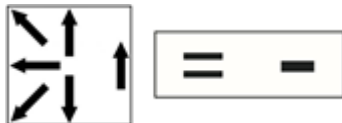
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 309 L

Applications and Properties:

Austenitic-ferritic welding rod for TIG welding of high alloy steels to unalloyed steels. Highest operating temperature is 300°C.

Wire analysis:

C	Si	Cr	Mn	Ni
≤0.030	0.30 – 0.65	23 - 25	1 – 2.5	12 - 14

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>400	>30	>47

Material:

DIN Standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

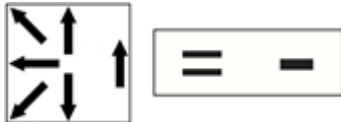
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 309 L Si

Applications and Properties:

Austenitic-ferritic welding rod for TIG welding of high alloy steels to unalloyed steels. Highest operating temperature is 300°C.

Wire analysis:

C	Si	Cr	Mn	Ni
≤0.030	0.65 - 1	23 - 25	1 – 2.5	12 - 14

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥520	>400	>30	>47

Material:

DIN Standard 1.4406 X2CrNiMoN 17 12 2; 1.4401 X5CrNiMo 17 12 2; 1.4404 X2CrNiMo 17 13 2 G-X2CrNiMoN 18 10; 1.4311 X2CrNiN 18 10

Other Standard ASTM/ACI A240/A312/A351: (TP) 304LN; (TP) 304L; CF-3; (TP) 304

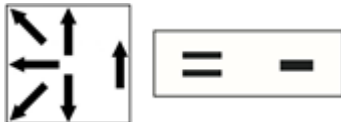
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 310

Applications and Properties:

Fully austenitic stainless steels welding rod for TIG welding of heat resistant steels, containing 25% Cr and 20% Ni. Likewise suited for welding heat and scaling resistant ferritic chromium steels unless corrosion attack by reducing sulphur-bearing combustion gases is to be expected. Non-scaling up to 1200°C. Weld metal exhibits good toughness down to -196°C.

Analysis of wire electrode % (typical value):

C	Si	Cr	Mn	Ni
0.08 – 0.15	0.3 – 0.65	25 - 28	1 – 2.5	20 – 22.5

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥550	>300	>30	>70

Material:

DIN Standard 1.4745 G-X40CrSi 23; 1.4823 G-X40CrNiSi 27 4; 1.4832 G-X25CrNiSi 20 14; 1.4833 X7CrNi 23 14; 1.4841 X15CrNiSi 25 20; 1.4845 X12CrNi 25 21; 1.4828 X15CrNiSi 20 12; 1.4840 G-X15CrNi 25 20; 1.4846 G-X40CrNi 25 21; 1.4826 G-X40CrNiSi 22 9; 1.4713 X10CrAl 7; 1.4724 X10CrAl 13; 1.4742 X10CrAl 18; 1.4762 X10CrAl 25; 1.4710 G-X30CrSi 6; 1.4740 G-X40CrSi 17

Other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

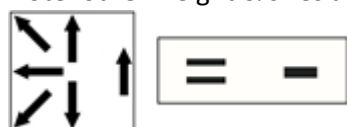
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA-5.9

ER 318

Applications and Properties:

Stabilized austenitic stainless welding rod for TIG welding of stabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400°C.

Analysis of wire electrode % (typical value):

C	Cr	Si	Ni	Mo	Nb
≤0.08	18 - 20	0.3 – 0.65	11 - 14	2 - 3	≥8 × C

Shielding gas: 100% Ar.

Mechanical properties of all-weld metal:

Tensile Strength (N/mm ²)	Proof Stress 0.2% (N/mm ²)	Elongation Lo = 4d%	Impact energy(j) ISO – V +25°C
≥550	>350	>25	>65

Material:

DIN Standard 1.4401 X5CrNiMo17 12 2; 1.4406 X2CrNiMoN 17 12 2; 1.4408 G-X6CrNiMo 18 10; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10; 1.4571 X6CrNiMoTi 17 12 2; 1.4580 X6CrNiMoNb 17 12 2; 1.4583 X10CrNiMoNb 18 12

Other Standard AISI 316L, 316Ti, 316Cb

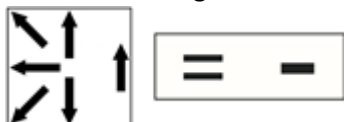
Delivery: welding rods

Weight: 5 kg.

Diameter: 1 – 4 mm.

Length: 1000mm

Note: other weight & sizes are produced upon customers' request



Nickel Base Alloy Wire Welds

AMA 90-11T	239
AMA 90-12T	240
AMA 90-13T	241

Standards

AWS/ASME SFA-5.14

ERNiCr – 3

Applications and Properties:

GTAW Rod for 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 is for service temperatures above +300°C or for applications where a post weld heat treatment is required. Suitable for pressure vessel fabrication for the service temperature range -196°C to +550°C, otherwise resistant to scaling up to +1200°C. Not susceptible to embrittlement. Resistant to thermal shocks, corrosion resistant, fully austenitic. Low coefficient of thermal expansion.

Analysis of wire electrode % (typical value):

C	Mn	Ni	Cr	Nb+Ta
<0.05	3	rest	20.5	3.5

Shielding gas: DIN EN 439-I1 (100% Argon)

DIN EN 439-I3 (Ar + He)

Mechanical properties of all-weld metal: (Single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C -196°C	Heat Treatment
>650	>400	>35	150 90	As Welded

Material:

DIN Standard 2.4816 Ni Cr 15 Fe; 2.4817 LC-NiCr 15 Fe; X8Ni9

Other Standard Alloy 600, Alloy 600 L

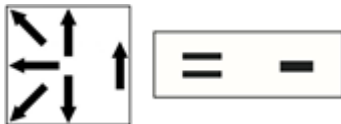
Delivery: welding rods

Weight: 5kg

Diameter: 1.6 – 3.2 mm

Length: 1000mm

Note: other weight & sizes are produced upon customers' request.



Standards

AWS/ASME SFA-5.14

ERNiCrMo-3

Applications and Properties:

TIG welding rod for high-quality joint welding of nickel-base alloys like Inconel 625 and Incoloy 825 as well as of CrNiMo stainless steels with high Mo-content. Additionally it is recommended for high temperature or creep resisting, heat resisting and cryogenic materials, joining of dissimilar steels.

This wire can be used for pressure vessel fabrication for service temperatures in the -196°C to +550°C range, otherwise up to scaling resistance limit of +1200°C. Highly resistant to hot cracking. Extremely resistant to stress corrosion cracking and pitting. Resistant to thermal shocks, fully austenitic.

Weld metal analysis in % (typical value):

C	Ni	Mo	Fe	Cr	Nb+Ta
0.03	rest	9	1	22	3.2

Shielding gas: DIN EN 439-I1 (100% Argon)

DIN EN 439-I3 (Ar + He)

Mechanical properties of all-weld metal: (Single values are typical values)

Tensile Strength (N/mm ²)	Yield Strength (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V		Heat Treatment
			+20°C	-196°C	
>740	>500	>35	110	100	As Welded

Material:

DIN Standard 2.4856 NiCr 22 Mo 9 Nb; 2.4858 NiCr 21 Mo; 2.4816 NiCr 15 Fe; 1.4583 X10CrNiMoNb 18 12; 1.4876 X10NiCrAlTi 32 20 H; 1.4876 X10NiCrAlTi 32 20; 1.4529 X1NiCrMoCuN 25 20 7; X2CrNiMoCuN 20 18 6; 2.4641 NiCr 21 Mo 6 Cu; 1.5662 X8Ni9; 1.4529 X 1 NiCrMoCuN 25 20 6; 1.4547 X 1 CrNiMoCu N20 18 7

Other Standard ASTM A553 Gr. 1; Alloy 600, Alloy 625, Alloy 800, 9% Ni-steels

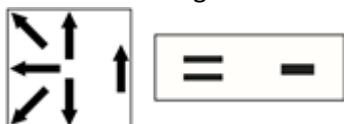
Delivery: welding rods

Weight: 5kg

Diameter: 1.6 – 3.2 mm

Length: 1000mm

Note: other weight & sizes are produced upon customers' request.



Standards	
AWS/ASME SFA-5.14	ERNiCu -7
DIN 1736	SG-NiCu30MnTi

Applications and Properties:

Welding rods for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. It is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. Excellent corrosion resistance to chloride induced stress corrosion cracking and a wide range of marine and chemical requirements. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Weld metal analysis in % (typical value):						
C	Mn	Si	Ti	Ni	Cu	Fe
0.05	3.7	0.1	2.3	rest	28	0.9

Shielding gas: DIN EN 439-I1 (100% Argon)

Mechanical properties of all-weld metal: (Single values are typical values)			
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation A5 (%)	Impact energy(j) ISO – V +20°C
>500	>300	>35	150

Material:

DIN Standard NiCu30Fe (2.4360); NiCu30Al (2.4375)

Other Standard Alloy 400, ASTM B 127, B 165

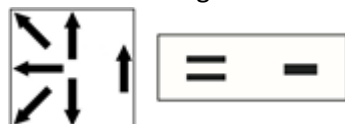
Delivery: welding rods

Weight: 5kg

Diameter: 1.6 – 3.2 mm

Length: 1000mm

Note: other weight & sizes are produced upon customers' request.



flux-cored-arc-welding

AMA 200F.....	243
AMA 205F.....	244
AMA 210M	245
AMA 300M	246
AMA 305M	247
AMA 310M	248
AMA 315M	249
AMA MC56.....	250

Standards	
AWS/ASME SFA 5.20	E71 T1 MJ
EN 758	T 42 3 PM 1 H5

Applications and Properties:

Flux cored wire can be used in all position. Weld metal has a good -20°C. The weld metal has a very good wetting of beads (fatigue resistance). This wire has a high deposition in vertical up position.

All weld metal analysis (typical value) %:			
Gas	C	Mn	Si
M21	0.05	1.4	0.5

Mechanical properties of all-weld metal (Typical):						
Heat Treatment	Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation Lo = 5d%	Impact energy(j) ISO – V		
				0°C	-20°C	-40°C
M21	580	515	27	115	90	50
C1 (co2)	545	475	28	105	80	-

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

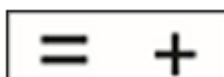
DIN EN 439 C1 (100% CO₂)

Main application:

Shipyards, for general use

Delivery: coil in diameter: 1, 1.2, 1.4, 1.6 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA 5.20	E71 T5 for 1.2 mm E70 T5 for 1.6 mm
EN 758	T 42 5 B M 1 H5 T 42 5 B C 1 H5

Applications and Properties:

Basic cored wire is appropriate for down hand and vertical up welding. The weld metal has a good impact at – 40°C.

All weld metal analysis (typical value) %:			
Gas	C	Mn	Si
M21	0.06	1.5	0.6

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal (Typical):				
Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation Lo = 5d%	Impact energy(j) ISO – V 0°C -40°C	Heat Treatment
575	475	27	120 80	AW
545	440	27	125 85	SR

AW: As Welded

SR: Heat treatment at 580°C for 2 hour. The heating and cooling speed is 50°C/h

Main application:

Shipyards, railroad rolling, structures requirement, pressure vessels

Delivery: coil in diameter: 1.2, 1.6 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA 5.18

E70 C 6M H4

Applications and Properties:

Metal cored wire, suitable for welding in all position. The weld metal has good mechanical properties at -40°C. This wire can be used in root pass with back penetration. It can be used for automatic multi-run welding.

All weld metal analysis (typical value) %:

Gas	C	Mn	Si
M21	0.04	1.7	0.5

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal (Typical):

Tensile Strength (N/mm ²)	Yield Strength 0.2% (N/mm ²)	Elongation Lo = 5d%	Impact energy(j) ISO – V -20°C -40°C	Heat Treatment
580	480	28	105 80	AW
540	450	28	100 75	SR

AW: As Welded

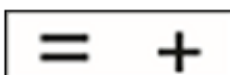
SR: Heat treatment at 620°C for 2 hour. The heating and cooling speed is 50°C/h

Main application:

Shipbuilding, pipe work, building and structures, pressure vessels

Delivery: coil in diameter: 1, 1.2, 1.4, 1.6, 2.4 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA 5.29	E80C-G
EN 758	T 46 6 Mn 1 Ni 1 MMH5

Applications and Properties:

Metal cored wire containing nickel. Suitable for welding in all position weld metal has high mechanical characteristics. It can be used for root pass with back penetration and automatic multi-run welding.

All weld metal analysis (typical value) %:				
Gas	C	Mn	Si	Ni
M21	0.04	1.7	0.5	0.9

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal (Typical):				
Yield Strength 0.2% (N/mm ²)	Tensile Strength (N/mm ²)	Elongation Lo = 5d%	Impact energy(j) ISO – V -40°C -60°C	Heat Treatment
530	600	27	80 60	AW
450	560	27	80 45	SR

AW: As Welded

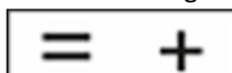
SR: Heat treatment at 580°C for 2 hour. The heating and cooling speed is 50°C/h

Main application:

Off-shore work, pipe work, pressure vessels, shipbuilding

Delivery: coil in diameter: 1.2, 1.6 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards

AWS/ASME SFA 5.29

E80C-B2

Applications and Properties:

Metal cored wire for chromium molybdenum steels. The weld metal has resistant to creep. This wire is suitable for welding in all position and root pass with back penetration.

All weld metal analysis (typical value) %:

Gas	C	Mn	Si	Cr	Mo
M21	0.05	0.7	0.6	1.25	0.5

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal (Single values are typical values)

Yield Strength 0.2% (N/mm ²)	Tensile Strength (N/mm ²)	Elongation Lo = 5d%	Impact energy(j) ISO – V 0°C -20°C	Heat Treatment
480	580	23	90 60	SR

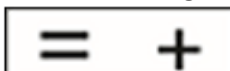
SR: Heat treatment at 700°C for 1 hour. The heating and cooling speed is 50°C/h

Main application:

Sheet metal work, petroleum chemistry, chemistry, incinerators, heat exchangers

Delivery: coil in diameter: 1.2, 1.6 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA 5.29	E90C-K3
EN 12535	T55 5 1.5NiMo MM1-H5

Applications and Properties:

Metal cored wire. It is suitable for welding in all positions. The weld metal has a very high resistance to cracking and high mechanical characteristics. It can be used for root pass with back penetration.

All weld metal analysis (typical value) %:					
Gas	C	Mn	Si	Ni	Mo
M21	0.09	1.3	0.4	1.7	0.35

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal (Single values are typical values)				
Yield Strength 0.2% (N/mm²)	Tensile Strength (N/mm²)	Elongation Lo = 5d%	Impact energy(j) ISO – V -50°C	Heat Treatment
590	690	19	70	AW

AW: As welded

Main application:

High yield strength steels, force piping, mobile lifting equipment, turbines, armaments

Delivery: coil in diameter: 1.2, 1.6 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards	
AWS/ASME SFA 5.29	E110C-K3
AWS/ASME SFA 5.28	E100 C G M H4
EN 12535	T69 5 Mn2NiMo MM1-H5

Applications and Properties:

Metal cored wire, for welding in all position. The weld metal has a very high resistance to cracking and high mechanical characteristics. It can be used for root pass with back penetration.

All weld metal analysis (typical value) %:					
Gas	C	Mn	Si	Ni	Mo
M21	0.07	1.8	0.6	2.4	0.65

Shielding gas: DIN EN 439 M 21 (15-25% CO₂, Balance Ar)

Mechanical properties of all-weld metal (Single values are typical values)				
Yield Strength 0.2% (N/mm²)	Tensile Strength (N/mm²)	Elongation Lo = 5d%	Impact energy(j) ISO – V -50°C	Heat Treatment
740	840	17	60	AW

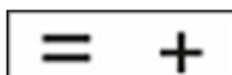
AW: As welded

Main application:

High yield strength steel, force piping, mobile lifting equipment, turbines, armaments

Delivery: coil in diameter: 1.2, 1.6 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request



Standards

DIN 8555

MSG 6-55

Applications and Properties:

Medium-alloy tubular cored electrode of basic type designed for tough and wear resistant hard facing deposits on parts subjected to heavy wear. Weld metal is tough and free from cracks and therefore resistant to shock and impact. Machining is only feasibly by grinding. A buffer layer with AMA FC31 is only required in case of difficult-to-weld base metal.

All weld metal analysis (typical value) %:

C	Si	Mn	Cr	Mo
0.35	0.5	1.5	5.2	0.6

Mechanical properties of all-weld metal (typical values):

Hardness as – welded : 52 – 57 RC

Values apply to the use of CO2 shielding gas

Shielding: CO2 and mixed gas M21 (5-25% CO2, Balance Ar) acc to EN 439

Consumption:

≤1.6mm 12-15 L/min

≥2.0mm 15-20 L/min

Main application:

Excavator parts, scraper blades, dipper teeth, worm conveyors, beaters crusher jaws, crusher cones, etc.

Delivery: coil in diameter: 1.4, 1.6, 2, 2.4 mm & weight 15 kg

Note: other weight & sizes are produced upon customers' request

