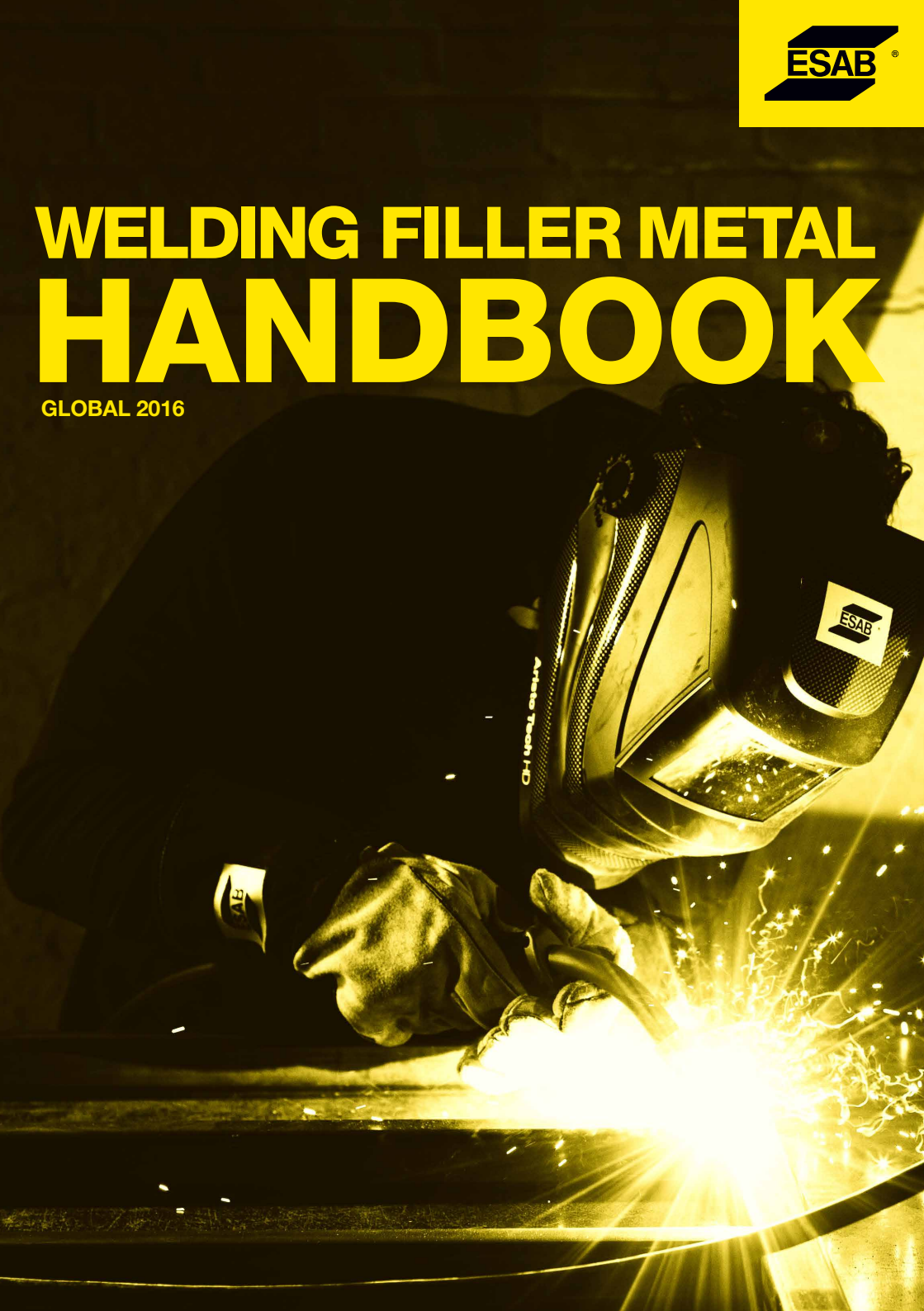
WELDING FILLER METAL HANDBOOK

GLOBAL 2016



COVERED (STICK) ELECTRODES (SMAW)....1-1

MIG/MAG WIRES (GMAW)....2-1

TIG RODS (GTAW)....3-1

CORED WIRE (FCAW) (MCAW)....4-1

SUBMERGED ARC WIRES
AND FLUXES (SAW)....5-1

PACKAGING AND SPOOL TYPES....6-1

STORAGE AND HANDLING....7-1

QUICK GUIDE FOR SELECTION OF WELDING CONSUMABLES....8-1

FILARC CERAMIC WELD METAL SUPPORTS....9-1

GENERAL INFORMATION AND TABLES....10-1

Covered (Stick) Electrodes (SMAW)



MILD STEEL ELECTRODES **1-5**
OK 43.32 1-5
OK 46.00 1-6
OK 46.16 1-8
OK 46.30 1-9
OK 46.44 1-10
OK 48.04 1-11
OK 48.05 1-12
OK 48.15 1-13
OK 48.60 1-14
OK 50.40 1-15
OK 53.05 1-16
OK 53.16 Spezial 1-17
OK 53.70 1-18
FILARC 27P 1-19
FILARC 35 1-20
FILARC 48 1-21
OK Femax 33.60 1-22
OK Femax 33.80 1-23
OK Femax 38.65 1-24
OK Femax 39.50 1-25
Pipeweld 6010 Plus 1-26

LOW HYDROGEN/LOW ALLOY ELECTRODES **1-27**
Pipeweld 90DH 1-27
Pipeweld 100DH 1-28
OK 73.15 1-29
OK 76.16 1-30

LOW HYDROGEN ELECTRODES **1-31**
FILARC 56S 1-31
OK 48.00 1-32
OK 48.50 1-34
OK 53.68 1-35
OK 55.00 1-36
Pipeweld 7016 1-37
Pipeweld 80DH 1-38

LOW ALLOY ELECTRODES **1-39**
FILARC 75S 1-39
FILARC 76S 1-40
FILARC 88S 1-41
FILARC 98S 1-42
FILARC 118 1-43
OK 48.08 1-44
OK 73.08 1-45
OK 73.68 1-46
OK 73.79 1-47
OK 74.46 1-48
OK 74.86 Tensitrode 1-49
OK 74.70 1-50
OK 74.78 1-51
OK 75.75 1-52
OK 76.18 1-53
OK 76.26 1-54
OK 76.28 1-55
OK 76.35 1-56
OK 76.98 1-57
OK 78.16 1-58
Pipeweld 10018 1-59
Pipeweld 7010 Plus 1-60
Pipeweld 8010 Plus 1-61
Pipeweld 8016 1-62
Pipeweld 8018 1-63
Pipeweld 9010 Plus 1-64

STAINLESS STEEL ELECTRODES 1-65
OK 61.20 1-65
OK 61.25 1-66
OK 61.30 1-67
OK 61.35 1-68
OK 61.35 Cryo 1-69
OK 61.50 1-70
OK 61.80 1-71
OK 61.81 1-72
OK 61.85 1-74
OK 61.86 1-75
OK 63.20 1-76
OK 63.30 1-77
OK 63.34 1-78
OK 63.35 1-79
OK 63.41 1-80
OK 63.80 1-81
OK 63.85 1-82
OK 62.53 1-83
OK 64.30 1-84
OK 67.13 1-85
OK 67.15 1-86
OK 67.43 1-87
OK 67.45 1-88
OK 67.50 1-89
OK 67.53 1-90
OK 67.55 1-91
OK 67.60 1-92
OK 67.70 1-93
OK 67.71 1-94
OK 67.75 1-95
OK 310Mo-L 1-96
OK 68.15 1-97
OK 68.17 1-98
OK 68.25 1-99
OK 68.53 1-100
OK 68.55 1-101
OK 68.81 1-102
OK 68.82 1-103
OK 69.25 1-104
OK 69.33 1-105

NICKEL ELECTRODES 1-106
OK Ni-1 1-106
OK NiCu 1 1-107
OK NiCu-7 1-108
OK NiCrFe-2 1-109
OK NiCrFe-3 1-110
OK NiCrMo-3 1-111
OK NiCrMo-5 1-112
OK NiCrMo-13 1-113
OK 92.55 1-114

HARDFACING ELECTRODES 1-115
OK GPC 1-115
OK 13Mn 1-116
OK 14MnNi 1-117
OK Tooltrode 50 1-118
OK Tooltrode 60 1-119
OK Weartrode 30 1-120
OK Weartrode 30 HD 1-121
OK Weartrode 35 1-122
OK Weartrode 40 1-123

OK Weartrode 45 1-124
OK Weartrode 50 1-125
OK Weartrode 50 T 1-126
OK Weartrode 55 1-127
OK Weartrode 55 HD 1-128
OK Weartrode 60 1-129
OK Weartrode 60 T 1-130
OK Weartrode 62 1-131
OK Weartrode 65 T 1-132

REPAIR AND MAINTENANCE 1-133

ALUMINIUM ALLOYS 1-133
OK AlMn1 1-133
OK AlSi5 1-134
OK AlSi12 1-135

CAST IRON ALLOYS 1-136
OK Ni-CI 1-136
OK NiFe-CI-A 1-137
OK NiFe-CI 1-138

COPPER ALLOYS 1-139
OK 94.25 1-139
OK 94.35 1-140

OK 43.32



Easy-to-weld rutile type electrode for welding in the flat position. The good flowing properties of the weld metal give a good finish to the weld beads on both butt and fillet welds. Good slag detachability. The stable arc, even at low welding currents, makes the electrode very suitable for sheet metal welding.

Classifications:	SFA/AWS A5.1:E6013, EN ISO 2560-A:E 42 0 RR 12
Approvals:	CE EN 13479, ABS 2, DNV 2, BV 1, GL 1, RS 2, DB 10.039.36, LR 1, VdTÜV 00621

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon Steel
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	460 MPa	520 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	60 J
As welded	-10 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	0.5	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	50-60 A	23 V	0.54	167	36 s	0.6 kg/h
2.5 x 350 mm	50-110 A	25 V	0.54	88	46 s	0.9 kg/h
3.2 x 350 mm	80-150 A	26 V	0.57	51	57 s	1.3 kg/h
3.2 x 450 mm	80-140 A	26 V	0.54	40.5	74 s	1.3 kg/h
4.0 x 350 mm	120-210 A	25 V	0.52	35	63 s	1.6 kg/h
4.0 x 450 mm	120-210 A	27 V	0.54	27	76 s	1.9 kg/h
5.0 x 450 mm	170-290 A	26 V	0.56	17	87 s	2.5 kg/h
6.0 x 450 mm	230-370 A	30,6 V	0,52	12,4	105 s	2,8 kg/h

OK 46.00



OK 46.00 is the best, all-round, rutile electrode and it is relatively insensitive to rust or other surface impurities. It deposits smooth weld beads in all positions, including vertical down, and the slag is easy to remove. OK 46.00 is very easy to strike and restrike, making it ideal for short welds, root runs and tacking.

Classifications:	SFA/AWS A5.1:E6013, GOST 9467-75:E46, EN ISO 2560-A:E 38 0 RC 11, GOST R ISO 2560-A:E 38 0 RC 11
Approvals:	BV 2, CE EN 13479, DB 10.039.05, DNV 2, GL 2, LR 2, RS 2, VdTÜV 00623, ABS 2, BKI 2, ClassNK KMW2, NAKS/HAKC 2.5, 3.0, 4.0, 5.0 mm, NAKS/HAKC 2.5, 3.0, 4.0, 5.0 mm, NAKS/HAKC 2.5, 3.0, 4.0, 5.0 mm, NAKS/HAKC 3.2-4.0 mm, RRR 2

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon Manganese
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	400 MPa	510 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si
0.08	0.42	0.30

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
1.6 x 300 mm	30-60 A	26 V	0.63	263	36 s	0.38 kg/h
2.0 x 300 mm	50-70 A	25 V	0.60	172	38 s	0.55 kg/h
2.5 x 350 mm	60-100 A	22 V	0.65	86	50 s	0.80 kg/h
3.0 x 350 mm	70-140 A	32 V	0.51	77	46 s	1.0 kg/h
3.2 x 350 mm	80-150 A	22 V	0.65	53	57 s	1.30 kg/h
3.2 x 450 mm	80-150 A	22 V	0.64	43	63 s	1.33 kg/h

OK 46.00

Deposition Data						
Diameter	**Current**	**Voltage**	**kg weld metal/ kg electrodes**	**Number of electrodes/kg weld metal**	**Fusion time per electrode at 90% I max**	**Deposition rate 90% I max**
4.0 x 350 mm	100-200 A	22 V	0.60	39	65 s	1.60 kg/h
4.0 x 400 mm	100-200 A	26 V	0.60	33	64 s	1.69 kg/h
4.0 x 450 mm	100-200 A	23 V	0.58	33	76 s	1.94 kg/h
5.0 x 350 mm	150-290 A	24 V	0.60	24	87 s	2.30 kg/h
5.0 x 400 mm	150-290 A	30 V	0.56	22	71 s	2.2 kg/h
5.0 x 450 mm	150-290 A	24 V	0.60	31	114 s	2.30 kg/h

OK 46.16



OK 46.16 is an all positional, rutile electrode for welding mild steels. It gives less spatter than most other rutile electrodes, the slag is easy to remove and the weld bead is smooth and even. It is easy to strike and restrike and therefore also good for tack welding.

Classifications:	EN ISO 2560-A:E 38 0 RC 11, SFA/AWS A5.1:E7014
Approvals:	CE EN 13479, ABS 2, DNV 2, BV 2, LR 2, GL 2, RS 2, DB 10.039.37, VdTÜV 02528

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon Manganese
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	440 MPa	510 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.09	0.5	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	50-70 A	24 V	0.57	167	40 s	0.54 kg/h
2.5 x 350 mm	60-100 A	25 V	0.6	86	49 s	0.9 kg/h
3.2 x 350 mm	80-150 A	23 V	0.58	52	59 s	1.3 kg/h
4.0 x 350 mm	100-200 A	24 V	0.59	34	65 s	1.8 kg/h

OK 46.30



All-round, general purpose rutile electrode for thin and medium thick plates. Good striking and restriking properties, suitable for tack welding. Useful for bridging gaps.

Classifications:	SFA/AWS A5.1:E6013, EN ISO 2560-A:E 38 0 R 12
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon Manganese
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	440 MPa	515 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	0.48	0.31

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-100 A	24 V	0.60	93	58 s	0.7 kg/h
3.2 x 350 mm	100-140 A	23 V	0.61	57	60 s	1.1 kg/h
4.0 x 450 mm	120-170 A	21 V	0.64	27	96 s	1.4 kg/h
5.0 x 450 mm	160-250 A	21 V	0.66	17	105 s	2.0 kg/h

OK 46.44



Rutile cellulosic electrode particulary suitable for vertical-down welding. Good ability to bridge gaps.

Classifications:	SFA/AWS A5.1:E6013, EN ISO 2560-A:E 38 0 RC 11
Approvals:	CE EN 13479, ABS 2, DNV 2, BV 2, LR 2, RS 2, GL 2Y, DB 10.039.01, VdTÜV 00674

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon - Manganese
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	460 MPa	530 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	60 J
As welded	-10 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si
0.08	0.5	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-100 A	26,5 V	0,61	80	58 s	0,78 kg/h
3.2 x 350 mm	90-150 A	29,8 V	0,51	68,2	52,3 s	1,0 kg/h
4.0 x 350 mm	110-200 A	21.6 V	0.62	36.6	62.4 s	1.58 kg/h

OK 48.04



OK 48.04 is an AC/DC, general purpose, LMA electrode for welding mild and low-alloy steels. It has very good welding properties and deposits a high quality weld metal with very good mechanical properties. The electrode can be used for welding restrained structures where high welding stresses cannot be avoided.

Classifications:	EN ISO 2560-A:E 42 4 B 32 H5, SFA/AWS A5.1:E7018
Approvals:	CE EN 13479, ABS 3Y H5, PRS 3Y H5, BV 3Y H5, GL 3Y H5, DNV 3Y H5, Seproz UNA 272580, RS 3Y H5, NAKS/HAKC 2.5-5.0 mm, ABS AWS A5.1 - E7018, LR 3Ym H15

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	480 MPa	560 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	110 J
As welded	-40 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.2	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	75-110 A	23 V	0.64	67.0	59 s	1.00 kg/h
3.2 x 350 mm	90-155 A	22 V	0.63	42.3	62.4 s	1.37 kg/h
3.2 x 450 mm	90-155 A	25 V	0.67	30.0	92 s	1.50 kg/h
4.0 x 450 mm	125-200 A	26 V	0.68	20.0	101 s	2.00 kg/h
5.0 x 450 mm	190-260 A	26 V	0.72	13.0	106 s	2.80 kg/h

OK 48.05



OK 48.05 is a general purpose, LMA electrode for welding mild and low-alloyed steels. It has very good running characteristics, especially on DC+. OK 48.05 welds very well even at very low currents, an advantage when welding thin-walled pipes.

Classifications:	SFA/AWS A5.1:E7018, EN ISO 2560-A:E 42 4 B 42 H5
Approvals:	CE EN 13479, ABS 3Y H5, DB 10.039.02, DNV 3 YH5, Seproz UNA 272580, VdTÜV 06610, LR 3Ym H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	445 MPa	540 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	80 J
As welded	-40 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.1	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	35-80 A	22 V	0.627	119	50.1 s	0.6 kg/h
2.5 x 350 mm	75-105 A	24 V	0.64	62.5	58 s	1.00 kg/h
3.2 x 350 mm	95-155 A	26 V	0.46	54.3	61 s	1.50 kg/h
3.2 x 450 mm	95-155 A	26 V	0.61	31.3	80 s	1.50 kg/h
4.0 x 450 mm	125-210 A	24 V	0.67	20.5	85 s	2.10 kg/h

OK 48.15



An LMA electrode for welding mild and low-alloy steels. Exceptional welding properties in the vertical-up position. OK 48.15 gives the same good weld metal quality as OK 48.00, which makes the electrode suitable for welding structures in which high stresses cannot be avoided. It is also suitable for welding galvanised plate.

Classifications:	SFA/AWS A5.1:E7018, EN ISO 2560-A:E 42 3 B 32 H5
Approvals:	CE EN 13479, ABS 3Y H5, PRS 3Y H5, BV 3Y H5, GL 3Y H5, DNV 3Y H5, RS 3Y H5, LR 3Ym H5, ABS E7018, DB 10.039.06, VdTÜV 00625

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	490 MPa	575 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	55-80 A	22 V	0.61	125.0	43 s	0.70 kg/h
2.5 x 350 mm	65-110 A	22 V	0.60	67.0	60 s	1.00 kg/h
3.2 x 450 mm	100-140 A	23 V	0.66	31.0	84 s	1.40 kg/h
4.0 x 450 mm	140-200 A	24 V	0.66	21.0	89 s	2.00 kg/h

OK 48.60



General- purpose basic DC + electrode for mild and low alloy steels. Very good running characteristics.

Classifications:	SFA/AWS A5.1:E7018, EN ISO 2560-A:E 42 4 B 42 H5
Approvals:	CE EN 13479, GL 3YH5, LR 3Y H5, DNV 3 YH5, ABS 3 H5, 3Y, BV 3, 3Y H5, DB 10.039.23, VdTÜV 10094

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Carbon - Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	445 MPa	540 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	80 J
As welded	-40 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si
0.04	1.19	0.64

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-110 A	24 V	0.67	65	57 s	0.96 kg/h
3.2 x 350 mm	90-140 A	23 V	0.70	42	68 s	1.24 kg/h
3.2 x 450 mm	90-140 A	23 V	0.73	31	85 s	1.33 kg/h
4.0 x 350 mm	120-190 A	24 V	0.70	29	75 s	1.63 kg/h
4.0 x 450 mm	120-190 A	24 V	0.71	22	92 s	1.76 kg/h
5.0 x 450 mm	190-260 A	24 V	0.75	13	99 s	2.61 kg/h

OK 50.40



OK 50.40 is an all-round electrode for the positional welding of mild steel, also well suited for pipe welding. It is particularly good for welding in the vertical-up position and for welding root runs.

Classifications:	SFA/AWS A5.1:E6013, EN ISO 2560-A:E 42 2 RB 12
Approvals:	CE EN 13479, DNV 2, LR 2, DB 10.039.14, VdTÜV 00629

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon Manganese
Coating Type:	Rutile Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	540 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-20 °C	75 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	0.5	0.2

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	50-100 A	23 V	0.80	88.0	51 s	0.80 kg/h
3.2 x 350 mm	80-150 A	24 V	0.55	59	53 s	1.15 kg/h
4.0 x 450 mm	130-190 A	22 V	1.50	27.0	90 s	1.50 kg/h
5.0 x 450 mm	170-280 A	27.2 V	0.58	17.2	92.3 s	2.26 kg/h

OK 53.05



A low-hydrogen electrode with excellent running characteristics and very good mechanical properties. Because of its double coating, it creates a deep crater which stabilises the arc and gives good protection against air in inclined positions.

Classifications:	SFA/AWS A5.1:E7016, EN ISO 2560-A:E 42 4 B 22 H10
Approvals:	CE EN 13479, LR 3Y H10, DNV 3 YH10, GL 3Y H10, ABS 3 H10, 3Y, BV 3, 3Y H10, DB 10.039.32, RS 3Y H10, VdTÜV 03180

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	540 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	90 J
As welded	-40 °C	80 J
As welded	-50 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.1	0.9	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	50-100 A	24 V	0.63	79	49 s	1.0 kg/h
3.2 x 350 mm	80-140 A	26 V	0.6	52	57 s	1.2 kg/h
3.2 x 450 mm	80-140 A	26 V	0.61	39	70 s	1.3 kg/h
4.0 x 350 mm	110-180 A	25 V	0.63	33	60 s	1.8 kg/h
4.0 x 450 mm	110-180 A	24 V	0.63	25	82 s	1.7 kg/h

OK 53.16 Spezial



OK 53.16 is a double-coated electrode combining the running characteristics of a rutile electrode with the mechanical properties of a basic electrode. OK 53.16 welds on both AC and DC and the spatter loss is minimal.

Classifications:	SFA/AWS A5.1:E7016, EN ISO 2560-A:E 38 2B 32 H10
Approvals:	CE EN 13479, DNV 3YH10, ABS 3H10, 3Y, GL 3YH10, BV 3,3Y H10, DB 10.039.29, LR 3YH10, VdTÜV 02762

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Diffusible Hydrogen:	<10.0 ml/100g
Alloy Type:	CMn
Coating Type:	Basic Special

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	450 MPa	530 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-20 °C	90 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	0.9	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	50-90 A	26,8 V	0,58	83,3	59 s	0.73 kg/h
3.2 x 350 mm	90-150 A	31,2 V	0,54	53,6	56 s	1,2 kg/h
3.2 x 450 mm	90-150 A	30,3 V	0,57	39,5	72 s	1,27 kg/h
4.0 x 450 mm	120-190 A	28 V	0.59	24	90 s	1.65 kg/h
5.0 x 450 mm	160-230 A	28 V	0.61	15.5	109 s	2.14 kg/h

OK 53.70



A low-hydrogen AC/DC electrode for the one-sided welding of pipes and general structures. The root penetration is good, leaving a flat bead with easily removable slag. The stable arc and the well-balanced slag system make the electrode easy to weld in all positions. Suitable for welding transmission pipelines made from pipe steels up to API 5LX56.
It is also suitable for welding the root in higher strength pipes, API 5LX60, 5LX65, 5LX70.

Classifications:	GOST 9467-75:E50A, SFA/AWS A5.1:E7016-1, EN ISO 2560-A:E42 5 B 12 H5
Approvals:	CE EN 13479, ABS 3Y H5, DNV 3Y H5, RS 4Y H5, LR 3Ym H5, ABS E7016-H4

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC +(-)
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	450 MPa	540 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-45 °C	135 J
As welded	-50 °C	130 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.1	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	60-85 A	26 V	0.63	87.7	57 s	0.70 kg/h
3.2 x 350 mm	80-130 A	24 V	0.59	54.5	61 s	1.10 kg/h
4.0 x 450 mm	115-190 A	24 V	0.63	24.6	86 s	1.70 kg/h
5.0 x 450 mm	150-250 A	24 V	0.66	15	104 s	2.26 kg/h

FILARC 27P



This low hydrogen electrode is specially designed for downhill welding circumferential joints in pipes. The low hydrogen weld metal provides high notch toughness and excellent ductility to reduce the risk of cracking. The electrode is used particularly for pipelines, compressor stations, hot tapping and associated work using pipe steels in API 5LX52 to X70 grades in the oil and gas distribution industries, also process piping etc. Productivity is overall 25-30% faster than cellulosic electrodes and 40-50% faster than conventional low hydrogen electrodes for welding vertically up.
Welding advice: Keep short arc using beaded or weaved runs. 2.5 mm size can also be welded uphill for increased heat input. DC- is preferred.

Classifications:	SFA/AWS A5.5:E8018-G (nearest), EN ISO 2560-A:E 46 4 B 41 H5
Approvals:	DB , VdTÜV , CE EN 13479, DNV 3Y H10, ABS 3Y, LR 4Y40 H10, Seproz UNA 272581, BV 3Y H10, GL 4Y H10

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	560 MPa	610 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	90 J
As welded	-50 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si
0.08	1.2	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	80-100 A	25 V	0.67	66.7	53 s	1.0 kg/h
3.2 x 350 mm	110-150 A	26 V	0.68	43.7	53 s	1.6 kg/h
4.0 x 350 mm	180-220 A	28 V	0.74	27.0	50 s	2.8 kg/h

FILARC 35



General-purpose, basic DC+ electrode for mild and low-alloy steels. Very good running characteristics, producing high-quality welds with good impact values.

Classifications:	SFA/AWS A5.1:E7018-1, EN ISO 2560-A:E 42 4 B 42
Approvals:	VdTÜV , CE EN 13479, Seproz UNA 272581, LR 3Y H15, BV 3Y H10, ABS 3Y H10, DNV 4Y H10, GL 3Y H10, NAKS/HAKC 3.2 - 4.0 mm, RS 4Y40 H10

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Carbon manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	440 MPa	530 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.1	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	45-75 A	26 V	0.56	125.0	46 s	0.60 kg/h
2.5 x 350 mm	70-105 A	25 V	0.63	65.8	57 s	0.90 kg/h
3.2 x 450 mm	100-135 A	21 V	0.67	30.9	87 s	1.30 kg/h
4.0 x 450 mm	140-185 A	22 V	0.69	20.5	90 s	1.90 kg/h

FILARC 48



General purpose rutile all-position electrode with particularly satisfying results in the overhead welding of fillet welds, lap joints and sealing runs. Good on rust and paint covered steels. Application in shipbuilding and constructional engineering. Apply a short arc or use touch welding technique.

Classifications:	SFA/AWS A5.1:E6013, EN ISO 2560-A:E 42 0 RC 11
Approvals:	CE EN 13479, ABS 2, DNV 2, BV 2, LR 2, RS 2, GL 2Y, DB 10.105.06, VdTÜV 03086

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC-(+)
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	450 MPa	520 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.08	0.60	0.40

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	60-90 A	25 V	0.62	91	49 s	0.8 kg/h
3.2 x 350 mm	90-140 A	24 V	0.59	59	57 s	1.1 kg/h
4.0 x 350 mm	110-185 A	26 V	0.58	40	64 s	1.4 kg/h

OK Femax 33.60



OK Femax 33.60 is a high-recovery, rutile, iron powder electrode giving a metal recovery of about 160%. OK Femax 33.60 is particularly recommended for welding horizontal-vertical fillets. The weld metal stays well on the vertical leg and gives a good transition to the base material without undercutting, even at high welding currents.

Classifications:	SFA/AWS A5.1:E7024, EN ISO 2560-A:E 42 0 RR 53
Approvals:	CE EN 13479, ABS 2, DNV 2, GL 2, Seproz UNA 272581, DB 10.039.11, VdTÜV 01030

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Alloy Type:	Carbon steel
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	460 MPa	540 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	0.7	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	130-170 A	30 V	0.68	23.0	71 s	2.20 kg/h
4.0 x 450 mm	150-230 A	33 V	0.68	15.0	77 s	3.10 kg/h
5.0 x 450 mm	200-350 A	35 V	0.68	9.5	78 s	4.90 kg/h
6.0 x 450 mm	280-450 A	36 V	0.68	6.4	83 s	6.40 kg/h

OK Femax 33.80



High-recovery rutile electrode for high productivity welding of fillets in the horizontal-vertical position. Particularly suitable for welding thick plates and for long run-out lengths. Good bead apperance. Easy slag removal.

Classifications:	SFA/AWS A5.1:E7024, EN ISO 2560-A:E 42 0 RR 73
Approvals:	CE EN 13479, DB 10.039.28, VdTÜV 00634, ABS 2Y, ABS E7024, BV 2Y, CWB CSA W48: E4924, DNV 2Y, GL 2Y, LR 2Ym, RS 2Y, PRS 2Y, RINA 2

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon Steel
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	460 MPa	550 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	0 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.09	0.7	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	130-170 A	28 V	0.68	21.0	69 s	2.50 kg/h
4.0 x 450 mm	180-230 A	30 V	0.68	13.5	69 s	3.80 kg/h
5.0 x 450 mm	250-340 A	30 V	0.67	9.1	68 s	5.80 kg/h
6.0 x 450 mm	300-430 A	35 V	0.68	6.4	79 s	7.1 kg/h

OK Femax 38.65



High-recovery zircon-basic electrode, especially developed for performing butt welds and fillet welds in the downhand position in ordinary and high tensile steels. Good slag removal.

Classifications:	SFA/AWS A5.1:E7028, EN ISO 2560-A:E 42 4 B 73 H5
Approvals:	CE EN 13479, ABS 3Y H5, PRS 3Y H5, BV 3Y H5, GL 3Y H5, DNV 3Y H5, LR 3Ym H5, ABS E7028, DB 10.039.15, VdTÜV 00635

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Zircon Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	440 MPa	550 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-20 °C	100 J
As welded	-40 °C	85 J

Typical Weld Metal Analysis %

C	Mn	Si
0.08	1.1	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
4.0 x 450 mm	170-240 A	36 V	0.68	14.4	70 s	3.70 kg/h
5.0 x 450 mm	225-355 A	40 V	0.69	9.6	72 s	5.70 kg/h
6.0 x 450 mm	300-430 A	40 V	0.68	6.6	80 s	7.20 kg/h

OK Femax 39.50



Very fast, high recovery electrode for horizontal-vertical fillets, lap and butt joints in mild steels. Approved in grade 3. Tolerates a wide range of run-out lengths. Easy slag removal.

Classifications:	SFA/AWS A5.1:E7027, EN ISO 2560-A:E 42 2 RA 53
Approvals:	CE EN 13479, ABS 3Y, BV 3Y, GL 3Y, DNV 3, PRS 3, Seproz UNA 272581, DB 10.039.07, LR 3Ym, VdTÜV 00636

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Alloy Type:	Carbon steel
Coating Type:	Acid

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	430 MPa	520 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-20 °C	65 J
As welded	-30 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	0.7	0.3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	130-170 A	31 V	0.68	22.6	69 s	2.3 kg/h
4.0 x 450 mm	150-230 A	32 V	0.70	15.6	71 s	3.2 kg/h
5.0 x 450 mm	200-350 A	37 V	0.70	10.1	65 s	5.5 kg/h
6.0 x 450 mm	280-400 A	35 V	0.71	6.6	86 s	6.4 kg/h

Pipeweld 6010 Plus



Cellulosic-coated electrode designed for welding of pipes and pipelines in all positions using conventional and stovepipe techniques. API 5L up to X56, root pass up to X80.

Classifications:	SFA/AWS A5.1:E6010, EN ISO 2560-A:E 38 2 C 21
Approvals:	LR 3, ABS 3

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Carbon - Manganese
Coating Type:	Cellulosic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	480 MPa	590 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	-20 °C	50 J
As welded	-29 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si
0.11	0.44	0.13

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	40-75 A	34 V	0.79	100	54 s	0.7 kg/h
3.2 x 350 mm	60-125 A	25 V	0.69	67	57 s	1.0 kg/h
4.0 x 350 mm	80-180 A	30 V	0.63	50	58 s	1.2 kg/h
5.0 x 350 mm	120-230 A	28 V	0.71	29	65 s	1.9 kg/h

Pipeweld 90DH



A low alloyed low hydrogen electrode of AWS E9045-P2 type specially designed for downhill welding circumferential joints in pipelines API 5L X70,X80. The low hydrogen weld metal provides high notch toughness and excellent ductility to reduce the risk of cracking. The electrode has been specially designed to provide excellent striking properties and elimination of start porosity. Productivity is significantly higher than conventional low hydrogen electrodes for welding vertically up.

Classifications:	SFA/AWS A5.5:E9045-P2 H4R, EN ISO 18275-A:E 55 6 Mn1Ni B 45 H5
Approvals:	NAKS/HAKC 3.2-4.5 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	<4.0 ml/100g
Alloy Type:	Low alloyed
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	590 MPa	670 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	80 J
As welded	-60 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.07	1.5	0.5	0.8

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-100 A	21 V	0.70	61.7	58 s	1.00 kg/h
3.2 x 350 mm	110-150 A	21 V	0.68	42.3	56 s	1.50 kg/h
4.0 x 350 mm	180-220 A	24 V	0.67	28.8	54 s	2.30 kg/h
4.5 x 350 mm	210-270 A	24 V	0.68	22.9	54 s	2.90 kg/h

Pipeweld 100DH



A low alloyed low hydrogen electrode of AWS 10018-G type specially designed for downhill welding circumferential joints in pipelines API 5L, X80. The low hydrogen weld metal provides high notch toughness and excellent ductility to reduce the risk of cracking. The electrode has been specially designed to provide excellent striking properties and elimination of start porosity. Productivity is significantly higher than conventional low hydrogen electrodes for welding vertically up.

Classifications:	SFA/AWS A5.5:E10018-G H4R, EN ISO 18275-A:E 62 5 Z B 45 H5
Approvals:	NAKS/HAKC 3.2-4.5 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 4.0 ml/100g
Alloy Type:	Low alloyed
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	690 MPa	740 MPa	23 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-50 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.89	0.39	1.58	0.03	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	110-150 A	27 V	0.67	43.5	53 s	1.6 kg/h
4.0 x 350 mm	180-220 A	28 V	0.78	25.6	50 s	2.8 kg/h
4.5 x 350 mm	230-270 A	28 V	0.71	22.2	50 s	3.4 kg/h

OK 73.15



OK 73.15 is a basic electrode with very good welding characteristics. The electrode is of AWS 8018-G type and gives a weld metal alloyed with about 0.9% Ni. It fulfils impact requirements down to -50°C. The coating is of low moisture absorption type and the electrode gives less than 4 ml diffusible hydrogen/100 g welded metal.

Classifications:	SFA/AWS A5.5:E8018-G H4R, EN ISO 2560-A:E 46 5 Mn1Ni B 4 2 H5
Approvals:	ABS 3Y H5, DNV 4Y46 H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	<4.0 ml/100g
Alloy Type:	Low alloyed
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	550 MPa	630 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-50 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.51	0.3	0.9	0.04	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-110 A	25 V	0.63	80.6	46 s	1.00 kg/h
3.2 x 450 mm	80-145 A	22 V	0.64	32.6	85 s	1.30 kg/h
4.0 x 450 mm	110-200 A	23 V	0.64	21.9	86 s	1.90 kg/h
5.0 x 450 mm	155-290 A	23 V	0.67	13.2	93 s	2.90 kg/h

OK 76.16



Basic DC low hydrogen electrode for welding creep resisting steels of the type 1.25 % Cr 0.5 % Mo.

Classifications:	SFA/AWS A5.5:E8018-B2-H4R, EN ISO 3580-A:E CrMo1B 4 2 H5
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 4.0-5.0 mm, VdTÜV 10731

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	< 4.0 ml/100g
Alloy Type:	1.25 % Cr - 0.5 % Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
Stress relieved 22 hr 690 °C	520 MPa	600 MPa	28 %
ISO			
Stress relieved 2 hr 690 °C	560 MPa	640 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
Stress relieved 22 hr 690 °C	-20 °C	175 J
Stress relieved 22 hr 690 °C	-30 °C	150 J
ISO		
Stress relieved 2 hr 690 °C	20 °C	150 J
Stress relieved 2 hr 690 °C	-20 °C	120 J
Stress relieved 2 hr 690 °C	-30 °C	95 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.06	0.7	0.3	1.3	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-110 A	22.7 V	0.60	74	75 s	0.65 kg/h
3.2 x 350 mm	95-150 A	22.5 V	0.59	48	71 s	1.07 kg/h
4.0 x 350 mm	130-190 A	22.1 V	0.89	30	78 s	1.55 kg/h
5.0 x 450 mm	150-260 A	23.6 V	0.66	14	102 s	2.49 kg/h

FILARC 56S



Basic, thin-coated AC/DC electrode providing excellent mechanical properties. The electrode ensures fully penetrated root passes, even under adverse conditions. Low moisture content coating and high resistance to moisture re-absorption. The electrode is CTOD tested.

Classifications:	SFA/AWS A5.1:E7016-1 H4 R, EN ISO 2560-A:E 42 5 B 1 2 H5
Approvals:	CE EN 13479, ABS 3YH5, BV 3YH5, DNV 4 YH5, Seproz UNA 272581, DB 10.105.15, GL 4YH5, LR 4Y40H5, VdTÜV 03012, RS 4Y42H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	< 4.0 ml/100g
Alloy Type:	Carbon manganese

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	550 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-45 °C	150 J
As welded	-50 °C	140 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.3	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-85 A	22 V	0.58	90.0	50 s	0.80 kg/h
3.2 x 350 mm	80-140 A	22 V	0.61	52.0	53 s	1.30 kg/h
3.2 x 450 mm	80-130 A	22 V	0.61	41.0	73 s	1.20 kg/h
4.0 x 350 mm	110-180 A	22 V	0.64	34.0	62 s	1.70 kg/h
4.0 x 450 mm	110-170 A	22 V	0.65	26.0	83 s	1.70 kg/h
5.0 x 450 mm	180-230 A	22 V	0.66	17.0	90 s	2.40 kg/h

OK 48.00



A reliable, general purpose electrode for manual metal arc welding of carbon steels, carbon manganese steels and fine-grained carbon manganese steels with elevated yield strength. OK 48.00 deposits a tough, crack-resistant weld metal. The coating is of the low moisture absorption type. High welding speed in the vertical-up position. OK 48.00 is insensitive to the composition of the base material within fairly wide limits. The electrode can be used for welding structures where difficult stress conditions cannot be avoided.

Classifications:	EN ISO 2560-A:E 42 4 B 42 H5, SFA/AWS A5.1:E7018 H4 R
Approvals:	CE EN 13479, ABS 3Y H5, PRS 3Y H5, BV 3Y H5, GL 3Y H5, DNV 3Y H5, RS 3Y H5, LR 3Ym H5, DB 10.039.12, VdTÜV 00690, NAKS/HAKC 2.0-5.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	< 4.0 ml/100g
Alloy Type:	Carbon-Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	475 MPa	565 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	-30 °C	130 J
ISO		
As welded	-30 °C	130 J
As welded	-40 °C	115 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.1	0.5

OK 48.00

Deposition Data						
Diameter	**Current**	**Voltage**	**kg weld metal/ kg electrodes**	**Number of electrodes/kg weld metal**	**Fusion time per electrode at 90% I max**	**Deposition rate 90% I max**
1.6 x 300 mm	30-55 A	24 V	0.59	192	50 s	0.38 kg/h
2.0 x 300 mm	55-80 A	22 V	0.65	125	45 s	0.63 kg/h
2.5 x 350 mm	70-110 A	24 V	0.67	65	57 s	0.96 kg/h
3.2 x 350 mm	90-140 A	23 V	0.70	42	68 s	1.24 kg/h
3.2 x 450 mm	90-140 A	23 V	0.73	31	85 s	1.33 kg/h
4.0 x 350 mm	120-190 A	24 V	0.70	29	75 s	1.63 kg/h
4.0 x 450 mm	120-190 A	24 V	0.71	22	92 s	1.76 kg/h
5.0 x 450 mm	190-260 A	24 V	0.75	13	99 s	2.61 kg/h
6.0 x 450 mm	220-340 A	26 V	0.80	9	97 s	3.88 kg/h
7.0 x 450 mm	280-410 A	27 V	0.79	7.0	104 s	4.83 kg/h

OK 48.50



General purpose AC and DC+ (-) basic electrode for mild and low alloy steels. The running characteristics are very good. It is a Low Moisture Absorption (LMA) type coating.

Classifications:	EN ISO 2560-A:E 42 4 B 32 H5, SFA/AWS A5.1:E7018-1 H4R
Approvals:	CE EN 13479, BV 3YH5, LR 3YH5, GL 4YH5, ABS 3H5, 3Y, DNV 4YH5, RINA 4YH5, VdTÜV 11813

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	<4.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	500 MPa	570 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	70 J
As welded	-45 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.2	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	50-80 A	22 V	0.61	125	44 s	0.7 kg/h
2.5 x 300 mm	70-110 A	23 V	0.60	81	53 s	0.8 kg/h
2.5 x 350 mm	70-110 A	22 V	0.63	68	63 s	0.8 kg/h
3.2 x 450 mm	100-150 A	23 V	0.64	33	92 s	1.2 kg/h
4.0 x 450 mm	130-200 A	22 V	0.65	23	101 s	1.6 kg/h
5.0 x 450 mm	160-260 A	22 V	0.68	15	109 s	2.3 kg/h

OK 53.68



OK 53.68 is an extra-high quality LMA electrode, particularly suitable for on-site welding. OK 53.68 yields a homogeneous, high-quality weld metal with an extra low content of impurities. The electrode operates well on AC as well as DC positive and negative. DC negative is preferred, as it produces a small, easily controlled weld pool, minimising the risk of burn-through or undercutting. OK 53.68 is CTOD tested.

Classifications:	EN ISO 2560-A:E 42 5 B 12 H5, SFA/AWS A5.1:E7016-1 H4 R
Approvals:	CE EN 13479, ABS 3Y H5, BV 3Y H5, DNV 4Y H5, GL 4Y H5, PRS 4Y H5, VdTÜV 06807

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	< 4.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	550 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-45 °C	150 J
As welded	-50 °C	140 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.2	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-85 A	22 V	0.58	90.0	50 s	0.80 kg/h
3.2 x 450 mm	80-130 A	22 V	0.61	41.0	73 s	1.20 kg/h
4.0 x 450 mm	110-170 A	22 V	0.65	26.0	83 s	1.70 kg/h

OK 55.00



OK 55.00 is a reliable, high-quality, LMA electrode, particularly suitable for welding high strength low-alloy steels. The good, low-temperature impact strength of the weld metal should be noted. The weld metal is also very resistant to hot cracking. The electrode is also suitable for welding high strength ships steel, grades A, D and E.

Classifications:	SFA/AWS A5.1:E7018-1H4 R, EN ISO 2560-A:E 46 5 B 32 H5
Approvals:	CE EN 13479, DB 10.039.03, VdTÜV 00632, LR 3Y H5, BV 3Y H5, GL 3Y H5, DNV 3Y H5, RS 3Y H5, ABS 3 H5, 3Y, NAKS/HAKC 5.0mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	< 4.0 ml/100g
Alloy Type:	Carbon Manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	500 MPa	590 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-45 °C	85 J
As welded	-50 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.5	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	80-110 A	23 V	0.64	66	64 s	0.9 kg/h
3.2 x 350 mm	110-140 A	23 V	0.62	41	72 s	1.2 kg/h
3.2 x 450 mm	110-140 A	24 V	0.69	30	88 s	1.4 kg/h
4.0 x 350 mm	140-200 A	23.2 V	0.62	28	72.5 s	1.77 kg/h
4.0 x 450 mm	140-200 A	24 V	0.71	19	94 s	2.0 kg/h
5.0 x 450 mm	200-270 A	24 V	0.72	13	94 s	3.0 kg/h
6.0 x 450 mm	215-360 A	25 V	0.71	9	98 s	4.0 kg/h

Pipeweld 7016



Basic thin coated AC/DC electrode providing excellent mechanical properties. This electrode ensures fully penetrated root passes, even in adverse conditions. Low moisture content of the coating has a high resistance to moisture re-absorption.

Classifications:	SFA/AWS A5.1:E7016-1 H4 R, EN ISO 2560-A:E 42 5 B 1 2 H5

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	< 4.0 ml/100 g
Alloy Type:	Carbon manganese
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	550 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-45 °C	150 J
As welded	-50 °C	140 J

Typical Weld Metal Analysis %

C	Mn	Si
0.06	1.25	0.50

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	80-140 A	22 V	0.61	52.0	53 s	1.30 kg/h
4.0 x 350 mm	110-180 A	22 V	0.64	34.0	62 s	1.70 kg/h

Pipeweld 80DH



A low hydrogen electrode of AWS E8045-P2 type specially designed for downhill welding circumferential joints in pipelines API 5L X52- X70. Suitable for root pass in higher strength steels subject to welding procedure qualification. The low hydrogen weld metal provides high notch toughness and excellent ductility to reduce the risk of cracking. The electrode has been specially designed to provide excellent striking properties and elimination of start porosity. Productivity is significantly higher than conventional low hydrogen electrodes for welding vertically up.

Classifications:	SFA/AWS A5.5:E8045-P2 H4R, EN ISO 2560-A:E 46 4 B 45 H5

Welding Current:	DC+
Diffusible Hydrogen:	<4.0ml/100g
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	530 MPa	620 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-30 °C	90 J
As welded	-40 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si
0.07	1.25	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	80-90 A	25 V	0.67	67	53 s	1 kg/h
3.2 x 350 mm	110-150 A	26 V	0.68	44	53 s	1.6 kg/h
4.0 x 350 mm	180-220 A	28 V	0.74	27	50 s	2.8 kg/h
4.5 x 350 mm	180-280 A	28 V	0.71	23	50 s	3.4 kg/h

FILARC 75S



CTOD-tested, all-positional basic 115% recovery electrode for 50D steels in offshore fabrication. Alloyed with 2.5% nickel. Good CVN toughness down to -60°C. CTOD tested in the AW and SR conditions. Use short arc, weaving slightly where permitted. DC+. Use DC- for root runs.

Classifications:	SFA/AWS A5.5:E8018-C1, EN ISO 2560-A:E 46 6 2Ni B 32 H5
Approvals:	CE EN 13479, ABS 3Y H5, Seproz UNA 272581, LR 5Y42 H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-, AC
Diffusible Hydrogen:	< 5.0 ml/100g
Alloy Type:	C, Mn, 2.5% Ni
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	500 MPa	600 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-60 °C	75 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	0.95	0.39	2.4	0.05	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	90-150 A	21.4 V	0.58	45	68 s	1.19 kg/h
4.0 x 350 mm	120-180 A	22.5 V	0.51	35	68 s	1.49 kg/h
5.0 x 450 mm	180-270 A	23 V	0.65	15	89 s	2.74 kg/h
6.0 x 450 mm	230-320 A	23.4 V	0.68	11	91 s	3.62 kg/h

FILARC 76S



CTOD-tested, all-positional, basic AC/DC electrode with 100% recovery for offshore fabrication (diameter 4.0 and 5.0 mm 115%). Alloyed with max 1%Ni. Good CVN toughness down to -60°C. CTOD tested in the AW and SR conditions. BS4360-50D steel and similar grades. Satisfactory CTOD results eliminate stress relieving for joints up to approx. 50 mm plate thickness. Many approved welding procedures available. Use short arc. Weave slowly when permitted. DC+. Use DC- for root passes.

Classifications:	SFA/AWS A5.5:E7018-G, EN ISO 2560-A:E 46 6 Mn1Ni B 32 H5
Approvals:	CE EN 13479, ABS 3Y H5, BV 3Y H5, DNV 3Y H5, Seproz UNA 272581, LR 5Y42 H5, GL 6Y H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Diffusible Hydrogen:	< 5.0 ml/100g
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	550 MPa	630 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	110 J
As welded	-60 °C	75 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	1.58	0.36	0.87	0.04	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-85 A	24 V	0.65	87	59 s	0.7 kg/h
3.0 x 350 mm	100-125 A	21 V	0.63	55	63 s	1.05 kg/h
3.2 x 350 mm	80-140 A	23.8 V	0.57	54	60 s	1.12 kg/h
3.5 x 350 mm	125-175 A	21.6 V	0.61	41	63 s	1.4 kg/h
4.0 x 350 mm	120-180 A	22 V	0.63	31	78 s	1.51 kg/h
4.0 x 450 mm	120-170 A	22.2 V	0.608	24	109 s	1.4 kg/h
5.0 x 450 mm	180-270 A	24.3 V	0.62	15	106 s	2.22 kg/h

FILARC 88S



CTOD-tested, all-positional, basic AC/DC electrode with 100% recovery for offshore fabrication. Alloyed with max 1% Ni. Good CVN toughness down to -60°C; CTOD tested in the AW and SR conditions. BS4360-55F steel and similar grades. Many approved welding procedures are available. Use short arc. Weave slowly when permitted. DC+. Use DC- for root passes.

Classifications:	SFA/AWS A5.5:E8016-G, EN ISO 2560-A:E 50 6 Mn1Ni B 12 H5
Approvals:	CE EN 13479, DNV 3Y H5, Seproz UNA 272581, LR 5Y42 H5, RS 4Y H5, GL 6Y H5, DB 10.105.16, VdTÜV 06107, NAKS/HAKC 2.5-4.0 mm, ABS E8016-G

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+(-)
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	C, Mn, 1% Ni
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	560 MPa	640 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	115 J
As welded	-60 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.77	0.27	0.9	0.03	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-85 A	24 V	0.65	87	59 s	0.7 kg/h
3.2 x 350 mm	80-140 A	21.4 V	0.59	54.5	69 s	0.96 kg/h
4.0 x 450 mm	110-170 A	21.5 V	0.62	26.8	106 s	1.27 kg/h
5.0 x 450 mm	180-230 A	22.6 V	0.63	16.9	109 s	1.95 kg/h

FILARC 98S



All-positional, low-hydrogen electrode for welding higher strength steels, depositing weld metal with a minimum yield strength of 550 N/mm2 after stress relieving.

Classifications:	SFA/AWS A5.5:E9018-G, EN ISO 18275-A:E 55 6 Mn1NiMo B T 32 H5
Approvals:	Seproz UNA 272581, NAKS/HAKC 3.2 - 4.0 mm, ABS E9018-G

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	C, Mn, 1% Ni
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 580°C 1h	650 MPa	710 MPa	21 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 580°C 1h	-50 °C	80 J
PWHT 580°C 1h	-60 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.85	0.35	0.89	0.05	0.32

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-85 A	24.4 V	0.60	83.3	60 s	0.72 kg/h
3.2 x 350 mm	80-140 A	23.3 V	0.55	56.6	68 s	0.94 kg/h
4.0 x 450 mm	120-180 A	24.0 V	0.60	24.4	103 s	1.43 kg/h

FILARC 118



All-positional, basic AC/DC electrode with 120% recovery for welding steels with min. 680 N/mm2 yield strength; e. g. NAXTRA 70, T1, 80 HLES, HY80 and HY100. Often applied in combination with FILARC 98, where the latter is used for tack welding, root-run welding and for welding standing fillet welds. Use the shortest possible arc. Weave slowly when permitted. A slight weave can be used for standing fillet welds. DC+. Use DC- for root runs.

Classifications:	SFA/AWS A5.5:E11018-M, EN ISO 18275-A:E 69 5 Mn2NiMo B 32 H5
Approvals:	CE EN 13479, Seproz UNA 272581, ABS AWS, E11018-M, BV 4Y62 H5, DNV 4Y62 H5, LR 4Y62 H5, MoD (N) Q1N, HY80

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Diffusible Hydrogen:	< 5.0 ml/100g
Alloy Type:	C, Mn, 2%Ni, 0.4%Mo
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	740 MPa	800 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-50 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.65	0.32	2.27	0.06	0.44

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-105 A	25.3 V	0.61	83.3	46.6 s	0.93 kg/h
3.2 x 350 mm	90-140 A	22.8 V	0.56	46.2	64.3 s	1.21 kg/h
4.0 x 450 mm	110-180 A	22.8 V	0.61	23.1	90.0 s	1.72 kg/h
5.0 x 450 mm	190-280 A	24.6 V	0.63	13.5	90.3 s	2.75 kg/h

OK 48.08



OK 48.08 is an LMA electrode with very good mechanical properties suitable for demanding applications, such as offshore. The weld metal contains approximately 1% Ni for high impact values down to -40°C. The coating is of the latest LMA type for optimum resistance to porosity and hydrogen cracking. OK 48.08 is CTOD tested.

Classifications:	SFA/AWS A5.5:E7018-G, EN ISO 2560-A:E 46 5 1Ni B 32 H5
Approvals:	CE EN 13479, ABS 3Y H5, DNV 4Y40 H5, GL 4Y H5, RS 4Y H5, DB 10.039.31, VdTÜV 05778, LR 4Y40m H5, NAKS/HAKC 2.5-5.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC +(-)
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	0.9% Ni
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	540 MPa	630 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-50 °C	115 J
As welded	-60 °C	90 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.2	0.35	0.95	0.02	0.001

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	55-80 A	22 V	0.57	135.1	42 s	0.60 kg/h
2.5 x 350 mm	75-110 A	27 V	0.57	88	41 s	1.0 kg/h
3.2 x 350 mm	110-150 A	22 V	0.62	42.3	66 s	1.30 kg/h
3.2 x 450 mm	110-150 A	22 V	0.66	30.0	85 s	1.40 kg/h
4.0 x 450 mm	150-200 A	22 V	0.69	20.3	90 s	2.00 kg/h
5.0 x 450 mm	190-275 A	23 V	0.69	14.0	85 s	3.00 kg/h

OK 73.08



OK 73.08 is a NiCu-alloyed LMA electrode, which deposits a weld metal with good corrosion resistance to sea-water and flue gases, for the welding of weatherproof steel and for ship's hull structural steel. The weld metal has excellent mechanical properties. It is particularly suitable for welding the shell plating of ice-breakers and other ships, which work under conditions where the protective paint coating wears off.

Classifications:	SFA/AWS A5.5:E8018-G, EN ISO 2560-A:E 46 5 Z B 32
Approvals:	CE EN 13479, DNV 3Y H10, BV 3Y H10, ABS 3Y H10, GL 3Y H10, RS 3Y H10, LR 3Ym H10, DB 10.039.20, VdTÜV 02115

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	< 10.0 ml/100g
Alloy Type:	Weathering steel
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	520 MPa	610 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-50 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cu
0.06	1.1	0.4	0.7	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	80-115 A	21 V	0.62	66.0	59 s	0.90 kg/h
3.2 x 350 mm	100-150 A	23 V	0.62	43	68 s	1.2 kg/h
3.2 x 450 mm	100-150 A	22 V	0.66	30.5	90 s	1.30 kg/h
4.0 x 450 mm	130-200 A	23 V	0.68	20.0	100 s	1.80 kg/h
5.0 x 450 mm	190-280 A	27 V	0.70	13.5	106 s	2.60 kg/h

OK 73.68



OK 73.68 is a 2.5% nickel-alloyed LMA electrode suitable for the welding of low-alloy steels with impact requirements down to -60°C. The composition of the weld metal is such that good, low-temperature impact properties are obtained, even when welding vertically up. The weld metal of OK 73.68 is also noted for its good corrosion resistance to sea-water and sulphuric acid fumes.

Classifications:	SFA/AWS A5.5:E8018-C1, EN ISO 2560-A:E 46 6 2Ni B 32 H5
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 2.5-5.0 mm, ABS 3Y400 H5*, ABS E 8018-C1, BV 5Y40M H5*, DNV 5Y H5*, GL 6Y46 H5*, LR 5Y42m H5*, PRS 5Y 42 H5, RS 5Y46M H5*, VdTÜV 01529

** Only up to 4.0 mm. NAKS/HAKC: Valid for lot numbers starting with SB. Approvals are based on factory location. Please contact ESAB for more information.*

Welding Current:	AC, DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	2.5% Ni
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
Stress relieved 1 hr 620 °C	500 MPa	600 MPa	28 %
ISO			
As welded	540 MPa	615 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
Stress relieved 1 hr 620 °C	-60 °C	85 J
ISO		
As welded	-60 °C	105 J
As welded	-80 °C	65 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	1	0.35	2.4	0.02	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-110 A	23 V	0.62	70.0	55 s	0.90 kg/h
3.2 x 450 mm	105-150 A	23 V	0.62	32.0	81 s	1.40 kg/h
4.0 x 450 mm	140-190 A	23 V	0.65	21.0	88 s	2.00 kg/h
5.0 x 450 mm	190-270 A	27 V	0.65	13.5	104 s	2.50 kg/h

OK 73.79



OK 73.79 is a nickel-alloyed, LMA electrode for welding 3.5 Ni steel with impact requirements down to -101°C. It is used, for example, for ethane tanks and chemical plants.

Classifications:	SFA/AWS A5.5:E8016-C2, EN ISO 2560-A:E 46 6 3 Ni B 12 H5
Approvals:	DNV 5Y H5, GL 6Y46 H5, RS 5Y46 H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Diffusible Hydrogen:	< 5.0 ml/100g
Alloy Type:	3.5% Ni
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	540 MPa	630 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-60 °C	130 J
As welded	-75 °C	110 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	0.8	0.36	3.37	0.05	0.01

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-110 A	25 V	0.60	76.0	60 s	0.80 kg/h
3.2 x 450 mm	80-150 A	25 V	0.60	37.0	77 s	1.50 kg/h
4.0 x 450 mm	90-190 A	27 V	0.63	26.0	88 s	1.80 kg/h
5.0 x 450 mm	110-240 A	29 V	0.60	15.0	100 s	2.10 kg/h

OK 74.46



OK 74.46 is an LMA electrode alloyed with 0.5% Mo for welding steels for pressure vessels. The running characteristics make it suitable for welding joints in inclined positions. The composition of the coating is adapted for welding with low currents, making OK 74.46 very suitable for the welding of pipes.

Classifications:	SFA/AWS A5.5:E7018-A1, EN ISO 3580-A:E Mo B 3 2 H5
Approvals:	CE EN 13479, VdTÜV 01043

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	< 5ml/100g
Alloy Type:	Mo
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 620°C 1h	460 MPa	560 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 620°C 1h	20 °C	175 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.05	0.77	0.38	0.04	0.57

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	55-80 A	22 V	0.59	136.0	40 s	0.7 kg/h
2.5 x 350 mm	75-110 A	23 V	0.59	73.0	55 s	0.9 kg/h
3.2 x 350 mm	105-150 A	23 V	0.54	53	66 s	1 kg/h
3.2 x 450 mm	105-150 A	25 V	0.59	37.0	81 s	1.2 kg/h
4.0 x 450 mm	140-200 A	26 V	0.65	22.5	90 s	1.8 kg/h
5.0 x 450 mm	190-270 A	27 V	0.65	14.5	104 s	2.4 kg/h

OK 74.86 Tensitrode



A basic coated electrode for steels and castings with U.T.S. of min. 690 MPa.

Classifications:	SFA/AWS A5.5:E10018-D2, EN ISO 18275-A:E 62 4 Mn1NiMo B T 32 H5
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 3.2-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Alloy Type:	1.8%Mn, 0.4%Mo
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
Stress relieved 1 hr 590 °C	630 MPa	720 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
Stress relieved 1 hr 590 °C	-40 °C	75 J
Stress relieved 1 hr 590 °C	-50 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.74	0.37	0.83	0.04	0.34

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	75-100 A	21.6 V	0.61	69.4	60.1 s	0.86 kg/h
3.2 x 450 mm	110-140 A	22 V	0.65	35	85.6 s	1.2 kg/h
4.0 x 450 mm	150-190 A	22.8 V	0.62	22.4	93.4 s	1.72 kg/h
5.0 x 450 mm	190-260 A	22.8 V	0.68	14.3	92.6 s	2.72 kg/h

OK 74.70



OK 74.70 is an LMA electrode used for welding high strength, low-alloyed steel. The electrode is designed for various applications, including pipelines.

Classifications:	SFA/AWS A5.5:E8018-G, EN ISO 2560-A:E 50 4 Z B 42 H5
Approvals:	NAKS/HAKC 3.2-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	0.5% Mo
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	550 MPa	650 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-20 °C	120 J
As welded	-40 °C	90 J

Typical Weld Metal Analysis %

C	Mn	Si	Mo
0.08	1.5	0.4	0.45

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	80-140 A	23 V	0.58	50	63 s	1.14 kg/h
3.2 x 450 mm	80-140 A	23 V	0.61	25	91 s	1.6 kg/h
4.0 x 450 mm	90-190 A	24 V	0.63	24	93 s	1.66 kg/h

OK 74.78



OK 74.78 is an LMA electrode suitable for welding high tensile steels used in low-temperature applications. Good notch toughness down to -40°C. Very suitable for both the enclosed welding and cladding of rails, when a hardness of about 250 HV is required. The moisture content of the coating is very low, which makes OK 74.78 suitable when preheating cannot be applied.

Classifications:	SFA/AWS A5.5:E9018-D1, EN ISO 18275-A:E 55 4 MnMo B 3 2 H5
Approvals:	CE EN 13479, DNV 3Y H5, DB 81.039.02, DB 82.039.02, VdTÜV 01027, ABS 3YQ460M H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	0.4% Mo
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	600 MPa	650 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	90 J
As welded	-50 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	1.60	0.35	0.03	0.03	0.35

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	75-100 A	22 V	0.62	73.0	55 s	0.90 kg/h
3.2 x 450 mm	105-140 A	23 V	0.65	32.0	86 s	1.30 kg/h
4.0 x 450 mm	140-190 A	23 V	0.65	20.5	97 s	1.80 kg/h
5.0 x 450 mm	190-260 A	24 V	0.68	14.0	100 s	2.60 kg/h
6.0 x 450 mm	240-340 A	24 V	0.69	10	103 s	3.6 kg/h

OK 75.75



OK 75.75 is an LMA electrode dried to a very low moisture content and suitable for the welding of high-strength, low-alloyed steels, at room temperature or with moderate preheating.

Classifications:	SFA/AWS A5.5:E11018-G, EN ISO 18275-A:E 69 4 Mn2NiCrMo B 42 H5
Approvals:	CE EN 13479, Seproz UNA 272580, ABS E11018-G, DB 10.039.19, VdTÜV 01028

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Low alloy steel
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	780 MPa	830 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	1.61	0.36	2.32	0.32	0.33

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-110 A	22 V	0.67	66.0	54 s	1.00 kg/h
3.2 x 450 mm	100-150 A	23 V	0.67	31.5	80 s	1.40 kg/h
4.0 x 450 mm	135-200 A	24 V	0.65	21.0	92 s	1.90 kg/h
5.0 x 450 mm	180-260 A	25 V	0.63	12.0	105 s	2.50 kg/h

OK 76.18



OK 76.18 is an LMA electrode for welding creep-resistant steels of the 1.Cr0.5Mo type. The electrode welds with a quiet, stable arc and produces a minimum of spatter loss. OK 76.18 deposits a weld metal which is resistant to cracking as well as porosity. The scaling temperature of the weld metal is about 575°C.

Classifications:	SFA/AWS A5.5:E8018-B2, EN ISO 3580-A:E CrMo1 B 4 2 H5
Approvals:	CE EN 13479, VdTÜV 01387, NAKS/HAKC 2.5-4.0 mm, ABS SR H5, BV Welding of low alloy steels type 1%Cr 0.5%Mo, H5, DNV -H5

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	< 5ml/100g
Alloy Type:	Creep resisting
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 690°C 1h	580 MPa	670 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 690°C 1h	20 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.06	0.7	0.3	1.3	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	55-80 A	22 V	0.58	136.0	40 s	0.70 kg/h
2.5 x 300 mm	70-110 A	24 V	0.58	88.0	52 s	0.80 kg/h
3.2 x 350 mm	95-150 A	25 V	0.59	49.0	65 s	1.10 kg/h
4.0 x 450 mm	130-190 A	27 V	0.64	23.0	90 s	1.70 kg/h
5.0 x 450 mm	150-260 A	28 V	0.64	14.5	95 s	2.70 kg/h

OK 76.26



Basic low-hydrogen electrode for the AC/DC welding of creep-resistant steels of the 2.3% Cr/1% Mo type, such as SA - 387 Grade 22/A 335 Grade P22 or similar. The weld metal has the extra-low impurity levels specified in step-cooling requirements.

Classifications:	SFA/AWS A5.5:E9018-B3, EN ISO 3580-A:E CrMo2 B 32 H5
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 2.5-5.0 mm, VdTÜV 10732

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	< 5.0 ml/100g
Alloy Type:	Cr-Mo
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 690°C 4h	520 MPa	610 MPa	21 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 690°C 4h	20 °C	170 J
PWHT 690°C 4h	-20 °C	140 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.07	0.69	0.23	2.17	1.10

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	60-85 A	21 V	0.63	70	68 s	0.76 kg/h
3.2 x 350 mm	90-130 A	23 V	0.60	49	66 s	1.11 kg/h
4.0 x 450 mm	130-190 A	25 V	0.61	23	83 s	1.90 kg/h
5.0 x 450 mm	150-260 A	27 V	0.62	15	92 s	2.60 kg/h

OK 76.28



OK 76.28 is an LMA electrode for welding creep-resistant steels containing approx. 2.25Cr1Mo. The electrode runs with a quiet, stable arc and produces a minimum of spatter loss. OK 76.28 deposits a weld metal with good cracking resistance. The scaling temperature of the weld metal is about 625°C.

Classifications:	SFA/AWS A5.5:E9018-B3, EN ISO 3580-A:E CrMo2 B 4 2 H5
Approvals:	CE EN 13479, NAKS/HAKC* 2.5-5.0 mm, VdTÜV 00971, ABS SR H5, BV C2M1 H5

**NAKS/HACK: valid for lot numbers starting with SB. Approvals are based on factory location. Please contact ESAB for more information.*

Welding Current:	DC+(-)
Diffusible Hydrogen:	<5ml/100g
Alloy Type:	Creep-resisting
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 690°C 1h	630 MPa	720 MPa	21 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 690°C 1h	20 °C	130 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.06	0.7	0.3	2.3	1.1

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	55-80 A	23 V	0.58	136.0	40 s	0.7 kg/h
2.5 x 300 mm	70-110 A	25 V	0.58	88.0	52 s	0.8 kg/h
3.2 x 350 mm	95-150 A	26 V	0.59	49.0	62 s	1.2 kg/h
4.0 x 450 mm	130-190 A	28 V	0.64	23.0	88 s	1.8 kg/h
5.0 x 450 mm	150-260 A	29 V	0.64	14.5	92 s	2.7 kg/h
6.0 x 450 mm	200-350 A	30 V	0.64	10.5	90 s	3.9 kg/h

OK 76.35



OK 76.35 is an LMA electrode containing 5Cr0.5Mo for welding creep-resistant steels. It is especially suitable for pipe welding. The electrode runs with a quiet, stable arc and gives a minimum amount of spatter loss. A preheating and interpass temperature of 150-260°C is normally required. The mechanical properties stated here are after one hour of heat treatment at 740°C.

Classifications:	SFA/AWS A5.5:E8015-B6, EN ISO 3580-A:E CrMo5 4 2 H5
Approvals:	Seproz UNA 272580, NAKS/HAKC 2.5-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	< 5.0 ml/100g
Alloy Type:	Creep resisting
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 750°C 1h	500 MPa	620 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 750°C 1h	20 °C	110 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	0.7	0.4	0.03	5	0.55

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	50-70 A	23 V	0.57	139	53 s	0.49 kg/h
2.5 x 300 mm	65-95 A	23 V	0.57	76.9	63 s	0.7 kg/h
3.2 x 350 mm	90-130 A	24 V	0.56	50.0	70 s	1.0 kg/h
4.0 x 450 mm	125-165 A	24 V	0.58	33.3	80 s	1.3 kg/h

OK 76.98



OK 76.98 is a low-hydrogen electrode for welding modified 9 Cr steels like T91/P91. The electrode is suitable for all-positional welding in pipes and plates. The mechanical properties stated here are after two hours of heat treatment at 750°C.

Classifications:	SFA/AWS A5.5-96:E9015-B9 (nearest), EN ISO 3580-A:E CrMo91 B 4 2 H5
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 2.5-4.0 mm, VdTÜV 07687

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Cr-Mo-Ni-V-Nb
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 755°C 2h	720 MPa	820 MPa	21 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 755°C 2h	20 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	V	Nb
0.1	0.8	0.35	0.7	9	1	0.24	0.06

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-100 A	21 V	0.66	71.4	56 s	0.90 kg/h
3.2 x 350 mm	90-135 A	22 V	0.60	45.5	68 s	1.20 kg/h
4.0 x 450 mm	130-200 A	23 V	0.64	22.6	85 s	1.90 kg/h

OK 78.16



OK 78.16 is a CrMo-alloyed electrode for the welding of 0.25C-1Cr-0.3Mo-alloyed quenched and tempered steel grades. The heat treatment requirements for the weld metal are the same as those for the parent plate. The weld metal of OK 78.16 is also suitable for flame hardening. The welding of high tensile strength steel with OK 78.16 should be carried out at a preheating temperature of minimum 200°C.

Classifications:	SFA/AWS A5.5:E9018-G, EN ISO 18275-A:E 69 A Z B 42
Approvals:	CE EN 13479, Seproz UNA 272581

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Cr 1.0 Mo 0.2 C 0.25
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	800 MPa	900 MPa	17 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.17	0.76	0.52	1.15	0.2

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	75-100 A	20 V	0.64	70.0	58 s	0.90 kg/h
3.2 x 450 mm	105-140 A	21 V	0.64	32.5	78 s	1.40 kg/h
4.0 x 450 mm	145-195 A	22 V	0.66	22.5	83 s	1.90 kg/h
5.0 x 450 mm	190-260 A	23 V	0.68	15.0	86 s	2.80 kg/h

Pipeweld 10018



Pipeweld 10018 is a high strength all positional electrode for pipe applications. This electrode can be used on X80 (strain based) and X100.

Classifications:	SFA/AWS A5.5:E10018-G, EN ISO 18275-A:E 62 4 Mn1NiMo B 32 H5

Welding Current:	DC+, AC
Diffusible Hydrogen:	< 5.0 ml/100g
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	630 MPa	720 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	75 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.70	0.44	0.75	0.05	0.36

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	65-105 A	21.4 V	0.67	76	55.4 s	0.86 kg/h
3.2 x 350 mm	80-140 A	24 V	0.59	50	63 s	1.14 kg/h
3.2 x 450 mm	80-145 A	22 V	0.65	35	85.6 s	1.2 kg/h
4.0 x 350 mm	95-200 A	22 V	0.64	30	74.1 s	1.6 kg/h
4.0 x 450 mm	95-200 A	22 V	0.68	22	88.8 s	1.8 kg/h

Pipeweld 7010 Plus



Cellulosic coated electrode for welding of low alloy steel pipes. Designed for vertical down welding, the deep penetrating arc provides good performance. Suitable for welding pipe steel types API 5L X52 to X60.

Classifications:	SFA/AWS A5.5:E7010-P1, EN ISO 2560-A:E 42 2 Z C 21
Approvals:	FBTS E 7010-P1

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C-Mn-Ni-Mo
Coating Type:	Cellulosic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	480 MPa	570 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	-20 °C	55 J
As welded	-30 °C	45 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.09	0.46	0.12	0.34	0.24

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	65-120 A	31 V	0.58	65	90 s	0.62 kg/h
4.0 x 350 mm	90-180 A	30.5 V	0.59	42	93 s	0.93 kg/h
5.0 x 350 mm	150-240 A	28.6 V	0.67	24	100 s	1.47 kg/h

Pipeweld 8010 Plus



Cellulosic coated electrode designed for low alloy steel. Deep penetration welding in all positions, especially designed for vertical down welding of high strength pipelines. Provides high economic benefits compared to welding vertical up. Recommended for welding pipe-lines of API 5LX: X60- X70

Classifications:	SFA/AWS A5.5:E8010-P1, EN ISO 2560-A:E 46 3 1NiMo C 21
Approvals:	FBTS E 8010-P1

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C-Mn-Ni-Mo
Coating Type:	Cellulosic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	530 MPa	625 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	-30 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.07	0.65	0.13	0.70	0.40

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	65-120 A	30 V	0.62	61	86 s	0.68 kg/h
4.0 x 350 mm	90-180 A	29 V	0.68	37	84 s	1.15 kg/h
5.0 x 350 mm	150-240 A	29 V	0.68	24	97 s	1.55 kg/h

Pipeweld 8016



All positional basic electrode that offers good CVN toughness at low temperatures. Can be used up to X80.

Classifications:	SFA/AWS A5.5:E8016-G, EN ISO 2560-A:E 50 6 Mn1Ni B 12 H5
Approvals:	NAKS/HAKC 3.2-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	C, Mn, 1% Ni
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	560 MPa	640 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	115 J
As welded	-60 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.79	0.29	0.87	0.04	0.00

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	80-140 A	21.4 V	0.59	54.5	69 s	0.96 kg/h
4.0 x 350 mm	110-170 A	21.0 V	0.58	36.6	82 s	1.2 kg/h

Pipeweld 8018



Pipeweld 8018 is an electrode specifically designed for welding high tensile low alloyed pipe steels grades API 5L X60, X65, X70. Excellent welding performance, suitable for positional welding of root pass as well as fill and cap. Good impact properties to -40°C.

Classifications:	SFA/AWS A5.5:E8018-G, EN ISO 2560-A:E 50 4 Z B 42 H5
Approvals:	NAKS/HAKC 3.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+(-)
Diffusible Hydrogen:	<5.0ml/100g
Alloy Type:	0.5% Mo
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	540 MPa	630 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-40 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.06	1.41	0.33	0.03	0.02	0.37

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	80-140 A	23 V	0.61	25	91 s	1.6 kg/h
4.0 x 450 mm	90-190 A	24 V	0.63	24	93 s	1.66 kg/h

Pipeweld 9010 Plus



Cellulosic coated electrode designed for low alloy steel. Deep penetration welding in all positions, especially in the vertical downward; recommended for welding pipe-lines of API 5LX: X70- X80.

Classifications:	EN ISO 2560-A:E 50 2 1NiMo C 21, SFA/AWS A5.5:E9010-P1
Approvals:	FBTS E 9010-P1

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C-Mn-Ni-Mo
Coating Type:	Cellulosic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	620 MPa	700 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	-20 °C	60 J
As welded	-30 °C	35 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.10	1.00	0.20	0.90	0.40

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	65-120 A	32 V	0.63	56	79 s	0.82 kg/h
4.0 x 350 mm	90-180 A	34 V	0.63	39	78 s	1.17 kg/h
5.0 x 350 mm	150-240 A	32 V	0.63	24	90 s	1.67 kg/h

OK 61.20



Rutile coated electrode for welding 19Cr10Ni-type steels. Also suitable for welding stabilised steels of similar composition, except when the full creep resistance of the base material is to be met. The electrode is specially designed for welding thin-walled pipes. Diameters 1.6-2.5 mm can be used in all positions including vertical down.

Classifications:	SFA/AWS A5.4:E308L-16, EN ISO 3581-A:E 19 9 L R 1 1, Werkstoffnummer :1.4316
Approvals:	CE EN 13479, VdTÜV 10769

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 3 - 10
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	430 MPa	560 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	70 J
As welded	-50 °C	48 J
As welded	-60 °C	38 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Cu	N	Ferrite FN
0.026	0.7	0.7	9.6	19.2	0.05	0.10	5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
1.6 x 300 mm	23-40 A	23 V	0.66	227	53 s	0.3 kg/h
2.0 x 300 mm	25-60 A	22 V	0.66	143	38 s	0.7 kg/h
2.5 x 300 mm	28-85 A	22 V	0.63	93	44 s	0.9 kg/h

OK 61.25



OK 61.25 is a basic coated, stainless-steel electrode of the 308H type. The electrode is designed for high-temperature applications in petrochemical and chemical process plants.

Classifications:	EN ISO 3581-A:E 19 9 H B 2 2, SFA/AWS A5.4:E308H-15
Approvals:	Seproz UNA 272580, NAKS/HAKC 2.5-3.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 2-5
Alloy Type:	Austenitic CrNi
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
PWHT 720°C 1000h	300 MPa	570 MPa	45 %
As welded	430 MPa	600 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	95 J
As welded	-18 °C	83 J
PWHT 720°C 1000h	20 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.06	1.7	0.3	9.8	18.8	0.06	4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-85 A	23 V	0.62	93	47 s	0.9 kg/h
3.2 x 350 mm	75-110 A	23 V	0.59	49	66 s	1.2 kg/h
4.0 x 350 mm	80-160 A	24 V	0.61	32	68 s	1.8 kg/h

OK 61.30



Extra-low carbon stainless steel electrode for welding steels of the 19 Cr 10 Ni-type. Also suitable for welding stabilized stainless steels of similar composition, except when full creep resistance of the base material is to be met.

Classifications:	EN ISO 3581-A:E 19 9 L R 1 2, SFA/AWS A5.4:E308L-17, Werkstoffnummer :1.4316, CSA W48:E308L-17
Approvals:	CE EN 13479, Seproz UNA 272580, ABS Stainless, CWB CSA W48: E308L-17, DB 30.039.02, DNV 308L, NAKS/HAKC 2.0-4.0 mm, VdTÜV 00792

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 3-10
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	430 MPa	580 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	70 J
As welded	-60 °C	49 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.03	0.7	0.9	10.0	19.3	0.09	5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
1.6 x 300 mm	35-45 A	27 V	0.55	240	24 s	0.6 kg/h
2.0 x 300 mm	35-65 A	29 V	0.55	160	29 s	0.8 kg/h
2.5 x 300 mm	50-90 A	31 V	0.55	99	36 s	1.1 kg/h
3.2 x 350 mm	70-130 A	31 V	0.60	49	54 s	1.4 kg/h
4.0 x 350 mm	90-180 A	32 V	0.60	33	60 s	2.0 kg/h
5.0 x 350 mm	140-250 A	33 V	0.60	20	60 s	3.0 kg/h

OK 61.35



Basic stainless electrode of the 308L-type designed for positional welding such as piping. Suitable for applications where requirements concerning mechanical properties are demanding. Lateral expansion of min. 0.38 mm is met down to -120°C.

Classifications:	EN ISO 3581-A:E 19 9 L B 2 2, SFA/AWS A5.4:E308L-15, Werkstoffnummer :1.4316
Approvals:	Seproz UNA 272580, NAKS/HAKC 2.5-5.0 mm, VdTÜV 04811

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 4-8
Alloy Type:	Austenitic CrNi
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	445 MPa	610 MPa	44 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	-196 °C	40 J
ISO		
As welded	20 °C	100 J
As welded	-120 °C	70 J
As welded	-196 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.04	1.6	0.3	9.8	19.5	0.06	6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-85 A	22 V	0.61	92	37 s	0.9 kg/h
3.2 x 350 mm	80-120 A	25 V	0.61	50	54 s	1.3 kg/h
4.0 x 350 mm	80-180 A	27 V	0.61	33	58 s	1.9 kg/h
5.0 x 350 mm	160-210 A	26 V	0.58	22	70 s	2.3 kg/h

OK 61.35 Cryo



A basic stainless stick electrode of the 308L-type especially designed for cryogenic applications. Provides controlled low ferrite content to ensure lateral expansion of min. 0.38 mm at -196°C.

Classifications:	EN ISO 3581-A:E 19 9 L B 2 2, SFA/AWS A5.4:E308L-15, Werkstoffnummer :1.4316
Approvals:	VdTÜV 10721

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 2-4
Alloy Type:	Austenitic CrNi
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	425 MPa	580 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	100 J
As welded	-196 °C	50 J
ISO		
As welded	-196 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.04	1.6	0.3	10.5	18.7	0.06	3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-85 A	22 V	0.61	92	37 s	0.9 kg/h
3.2 x 350 mm	80-120 A	25 V	0.61	50	54 s	1.3 kg/h
4.0 x 350 mm	80-180 A	27 V	0.61	33	58 s	1.9 kg/h
5.0 x 350 mm	160-210 A	26 V	0.58	22	70 s	2.3 kg/h

OK 61.50



OK 61.50 is a stainless steel electrode for welding of 19Cr 9 Ni austenitic stainless steels with a carbon content >0.04%. Especially designed for high temperature applications.

Classifications:	EN ISO 3581-A:E 19 9 H R 1 2, SFA/AWS A5.4:E308H-17
Approvals:	NAKS/HAKC 2.5 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 3 - 8
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	430 MPa	600 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.05	0.7	0.7	10.0	19.8	0.10	4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-85 A	27 V	0.56	98	42 s	0.9 kg/h
3.2 x 350 mm	70-110 A	27 V	0.56	51	63 s	1.1 kg/h
4.0 x 350 mm	110-165 A	28 V	0.56	34	62 s	1.7 kg/h

OK 61.80



OK 61.80 is a niobium-stabilised, stainless-steel, LMA electrode with low carbon content for welding stainless types 321 and 347. It is resistant to intergranular corrosion up to 400°C.

Classifications:	Werkstoffnummer :1.4551, EN ISO 3581-A:E 19 9 Nb R 1 2, SFA/AWS A5.4:E347-17
Approvals:	CE EN 13479, GL 4550, NAKS/HAKC 3.2-5.0 mm, VdTÜV 00638

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 6-12
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	480 MPa	620 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	60 J
As welded	-60 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.03	0.6	0.7	10.0	19.5	0.09	0.29	7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-90 A	26 V	0.56	97	38 s	1.0 kg/h
3.2 x 350 mm	70-130 A	28 V	0.56	50	53 s	1.4 kg/h
4.0 x 350 mm	90-180 A	30 V	0.56	33	55 s	2.0 kg/h
5.0 x 350 mm	140-250 A	31 V	0.56	21	60 s	2.9 kg/h

OK 61.81



Nb-stabilized MMA-electrode for welding Nb- or Ti-stabilized stainless steel of the 19Cr10Ni-type. OK 61.81 has a better hot cracking resistance compared with OK 61.80. Owing to the quite high ferrite content level, the working temperature should be limited to maximum 400°C.

Classifications:	EN ISO 3581-A:E 19 9 Nb R 3 2, SFA/AWS A5.4:E347-16, Werkstoffnummer :1.4551
Approvals:	CE EN 13479, DNV 347, NAKS/HAKC 3.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 6-12
Alloy Type:	Austenitic CrNi
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	560 MPa	700 MPa	31 %
Creep resistance+ 500°C 20000h	-	310 MPa	-
Creep resistance 600°C 10000h	-	135 MPa	-
Creep resistance++ 500°C 10000h	-	330 MPa	-
ISO			
As welded	550 MPa	700 MPa	-

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	60 J
ISO		
As welded	-10 °C	71 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.06	1.7	0.7	9.7	20.2	0.08	0.72	7

OK 61.81

Deposition Data						
Diameter	**Current**	**Voltage**	**kg weld metal/ kg electrodes**	**Number of electrodes/kg weld metal**	**Fusion time per electrode at 90% I max**	**Deposition rate 90% I max**
2.0 x 300 mm	40-60 A	26 V	0.60	147	39 s	0.6 kg/h
2.5 x 300 mm	50-80 A	29 V	0.59	82	36 s	1.2 kg/h
3.2 x 350 mm	75-115 A	23 V	0.60	44	66 s	1.2 kg/h
4.0 x 350 mm	80-160 A	24 V	0.60	32	66 s	1.7 kg/h
5.0 x 350 mm	140-210 A	25 V	0.60	20	78 s	2.3 kg/h

OK 61.85



Nb-stabilized basic coated electrode designed for welding of Nb- or Ti-stabilized stainless steels of the 19Cr10Ni-type. OK 61.85 provides the best hot cracking resistance of the products belonging to the 347 range. Due to the relatively high ferrite content level, the maximum working temperature should be limited to 400°C.

Classifications:	Werkstoffnummer :1.4551, EN ISO 3581-A:E 19 9 Nb B 2 2, SFA/AWS A5.4:E347-15
Approvals:	Seproz UNA 272580, NAKS/HAKC 2.5-4.0 mm, VdTÜV 05663

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 6-12
Alloy Type:	Austenitic CrNi
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	500 MPa	620 MPa	40 %
Stress relieved 16 hr 600 °C	500 MPa	640 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	100 J
As welded	-60 °C	70 J
Stress relieved 16 hr 600 °C	20 °C	80 J
Stress relieved 16 hr 600 °C	-60 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.04	1.7	0.4	10.2	19.5	0.07	0.61	6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-80 A	25 V	0.60	98	42 s	0.9 kg/h
3.2 x 350 mm	75-110 A	23 V	0.62	49	64 s	1.2 kg/h
4.0 x 350 mm	80-150 A	24 V	0.61	33	70 s	1.6 kg/h

OK 61.86



Niobium stabilized stainless steel electrode for welding niobium or titanium stabilized steels of the 19Cr 10Ni-type. Specially designed for use in applications where heat treatment is required. OK 61.86 can be a bit sensitive for hot cracking, so issued welding procedures should be followed carefully. Despite the low ferrite content level, the maximum working temperature should be limited to maximum 400°C. It will not match the creep resistance of base materials that are designed to work at higher temperatures.

Classifications:	Werkstoffnummer :1.4551, EN ISO 3581-A:E 19 9 Nb R 1 2, SFA/AWS A5.4:E347-17
Approvals:	Seproz UNA 272580, NAKS/HAKC 4.0-5.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Ferrite Content:	FN 3-8
Alloy Type:	Austenitic CrNi

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	520 MPa	660 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.025	0.7	0.8	10.4	19.0	0.09	0.35	5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	70-120 A	27 V	0.55	53	62 s	1.1 kg/h
4.0 x 350 mm	80-170 A	28 V	0.54	34	64 s	1.7 kg/h

OK 63.20



Rutile coated electrode for welding 18Cr12Ni3Mo-type steels. Also suitable for welding stabilized steels of similar composition. The electrode is especially designed for welding of thin walled pipes. Diameters 1.6-2.5mm. can be used in all positions including vertical down.

Classifications:	SFA/AWS A5.4:E316L-16, EN ISO 3581-A:E 19 12 3 L R 1 1, CSA W48:E316L-16, Werkstoffnummer :1.4430
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 2.5-3.2 mm, CWB CSA W48: E316L-16, VdTÜV 09716

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 3-10
Alloy Type:	Austenitic CrNiMo
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	480 MPa	590 MPa	41 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	56 J
As welded	-60 °C	46 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.02	0.7	0.7	12.1	18.4	2.8	0.11	4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
1.6 x 300 mm	15-40 A	23 V	0.63	227	53 s	0.3 kg/h
2.0 x 265 mm	18-60 A	22 V	0.65	167	44 s	0.6 kg/h
2.0 x 300 mm	18-60 A	25 V	0.62	152	49 s	0.5 kg/h
2.5 x 300 mm	25-80 A	22 V	0.63	96	54 s	0.8 kg/h
3.2 x 350 mm	55-110 A	26 V	0.60	52	65 s	1.2 kg/h

OK 63.30



Extra low carbon stainless steel electrode for welding steelss of the 18Cr 12Ni 2.8Mo-type. Also suitable for welding of stabilized stainless steels of similar composition, except when the full creep resistance of the base metal is to be met.

Classifications:	EN ISO 3581-A:E 19 12 3 L R 1 2, SFA/AWS A5.4:E316L-17, Werkstoffnummer :1.4430, CSA W48:E316L-17
Approvals:	CE EN 13479, BV 316L, DNV 316L, Seproz UNA 272580, GL 4571, NAKS/HAKC 2.5-4.0 mm, ABS SFA/AWS A5:4, E316L-17, CWB CSA W48: E316L-17, DB 30.039.06, LR 316L, VdTÜV 00262

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 3-10
Alloy Type:	Austenitic CrNiMo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	460 MPa	570 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	60 J
As welded	-20 °C	55 J
As welded	-60 °C	43 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.02	0.6	0.8	11.0	18.1	2.6	0.10	6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
1.6 x 300 mm	30-45 A	29 V	0.56	250	37 s	0.4 kg/h
2.0 x 300 mm	45-65 A	29 V	0.60	147	39 s	0.6 kg/h
2.5 x 300 mm	45-90 A	29 V	0.55	96	45 s	0.9 kg/h
3.2 x 350 mm	60-125 A	30 V	0.55	52	57 s	1.4 kg/h
4.0 x 350 mm	70-190 A	32 V	0.56	34	57 s	2.0 kg/h
5.0 x 350 mm	100-280 A	32 V	0.56	21	63 s	3.0 kg/h

OK 63.34



OK 63.34 is a stainless electrode of the 19Cr12Ni2.8Mo type, designed for the vertical-down welding of steels of similar composition. OK 63.34 produces beads with a very good finish and a smooth transition to the joint edges. The slag volume is fairly small and is easy to manipulate and easy to remove.

Classifications:	SFA/AWS A5.4:E316L-16, EN ISO 3581-A:E 19 12 3 L R 1 1, CSA W48:E316L-16, Werkstoffnummer :1.4430
Approvals:	Seproz UNA 272580, CWB E316L-16, VdTÜV 03816

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 3-8
Alloy Type:	Austenitic CrNiMo
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	440 MPa	600 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	65 J
As welded	-20 °C	52 J
ISO		
As welded	20 °C	65 J
As welded	-120 °C	38 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.02	0.8	0.8	11.8	18.7	2.8	0.13	6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	70-90 A	22 V	0.70	94	39 s	1.0 kg/h
3.2 x 300 mm	80-130 A	25 V	0.70	59	39 s	1.6 kg/h

OK 63.35



OK 63.35 is a low carbon stainless steel electrode with basic coating of the 18Cr12Ni3Mo type. It is suitable for applications where the mechanical requirements are tough. It provides good impact toughness levels. Minimum lateral expansion of 0.38 mm requirement is met down to -120°C. The same requirement can be met at -196°C when the ferrite content is at the low end of the specification i.e. FN 3 - 4.

Classifications:	Werkstoffnummer :1.4430, SFA/AWS A5.4:E316L-15, EN ISO 3581-A:E 19 12 3 L B 2 2
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 2.5-4.0 mm, ABS Stainless, VdTÜV 04812

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 3-8
Alloy Type:	Austenitic CrNi
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	430 MPa	560 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	95 J
As welded	-60 °C	75 J
As welded	-120 °C	60 J
As welded	-196 °C	35 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.04	1.6	0.4	12.6	18.3	2.7	0.06	4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-85 A	24 V	0.63	91	42 s	0.9 kg/h
3.2 x 350 mm	80-120 A	24 V	0.63	47	58 s	1.3 kg/h
4.0 x 350 mm	80-180 A	24 V	0.62	32	63 s	1.8 kg/h

OK 63.41



High-efficiency low carbon stainless steel electrode for welding steels of the type 18 Cr 12 Ni 2-3 Mo.

Classifications:	Werkstoffnummer :1.4430, EN ISO 3581-A:E 19 12 3 L R 5 3, SFA/AWS A5.4:E316L-26
Approvals:	CE EN 13479, DNV 316L, LR 316L, 316LN, VdTÜV 01014

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Ferrite Content:	FN 3-8
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	570 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	60 J
As welded	-60 °C	52 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.03	0.7	0.8	12.5	18.2	2.8	0.09	4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	60-90 A	34 V	0.61	65	35 s	1.6 kg/h
3.2 x 350 mm	80-130 A	36 V	0.58	35	50 s	2.1 kg/h
4.0 x 450 mm	110-180 A	37 V	0.60	17	70 s	2.9 kg/h
5.0 x 450 mm	170-240 A	42 V	0.61	11	82 s	4.0 kg/h

OK 63.80



Acid rutile covered MMA-electrode for welding Nb-or Ti stabilized steels of the CrNiMo 18-12-3 type.

Classifications:	EN ISO 3581-A:E 19 12 3 Nb R 3 2, SFA/AWS A5.4:E318-17, Werkstoffnummer :1.4576
Approvals:	CE EN 13479, NAKS/HAKC 3.2 mm, VdTÜV 00639

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 6-12
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	507 MPa	614 MPa	38 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	55 J
As welded	-60 °C	41 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Nb	Ferrite FN
0.02	0.6	0.8	11.5	18.2	2.9	0.08	0.31	7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	45-65 A	29 V	0.56	155	29 s	0.8 kg/h
2.5 x 300 mm	60-90 A	30 V	0.56	97	35 s	1.1 kg/h
3.2 x 350 mm	80-120 A	32 V	0.61	48	54 s	1.4 kg/h
4.0 x 350 mm	120-170 A	33 V	0.61	32	55 s	2.1 kg/h

OK 63.85



OK 63.85 is a niobium-stabilised 18Cr12Ni2.8Mo electrode for welding steels of similar composition.

Classifications:	Werkstoffnummer :1.4576, EN ISO 3581-A:E 19 12 3 Nb B 42, SFA/AWS A5.4:E318-15
Approvals:	Seproz UNA 272580, VdTÜV 05662

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 5-10
Alloy Type:	Nb-stabilized austenitic CrNiMo-type
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	490 MPa	640 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	65 J
As welded	-120 °C	45 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Nb	Ferrite FN
0.04	1.6	0.5	13.0	17.9	2.7	0.06	0.55	5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	22 V	0.66	81	45 s	1.0 kg/h
3.2 x 350 mm	65-120 A	23 V	0.64	43	58 s	1.5 kg/h
4.0 x 350 mm	75-160 A	24 V	0.64	28	64 s	2.0 kg/h

OK 62.53



OK 62.53 is a rutile coated, stainless electrode, specially designed for high-temperature applications. The weld metal has a scaling temperature of about 1150°C. OK 62.53 is recommended for welding steels such as Avesta 253MA, W.nr. 1.4828, W.nr. 1.4835 and UNS S30815.

Welding Current:	AC, DC+
Ferrite Content:	FN 8-12
Alloy Type:	CrNi stainless
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	550 MPa	730 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.07	0.6	1.6	10.4	23.1	0.16	8

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-90 A	26 V	0.55	104	44 s	0.8 kg/h
3.2 x 350 mm	70-110 A	25 V	0.55	54	66 s	1.0 kg/h

OK 64.30



OK 64.30 is an acid-rutile electrode for welding 19Cr 13Ni 3.5Mo (317L) austenitic stainless steels. The high Mo content provides better resistance to acid and pitting corrosion compared with 316L types. OK 64.30 is easy to weld in all positions and yields smooth runs on both AC and DC.

Classifications:	EN ISO 3581-A:E Z 19 13 4 N L R 3 2, SFA/AWS A5.4:E317L-17, Werkstoffnummer :(1.4447)
Approvals:	Seproz UNA 272580, VdTÜV 02311

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 5-10
Alloy Type:	Austenitic CrNiMo
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	480 MPa	600 MPa	35 %
ISO			
As welded	480 MPa	600 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	45 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.02	0.7	0.7	13.1	18.4	3.6	0.08	8

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	29 V	0.56	94	52 s	0.8 kg/h
3.2 x 350 mm	60-120 A	30 V	0.56	51	52 s	1.4 kg/h
4.0 x 350 mm	80-170 A	32 V	0.56	33	58 s	2.1 kg/h

OK 67.13



OK 67.13 is an austenitic, stainless-steel electrode for welding 25Cr20Ni steels. The weld metal resists scaling up to 1100-1150°C and does not contain any measureable ferrite. OK 67.13 can also be used for welding certain air-hardening steels such as armour plate and for welding stainless to unalloyed steel.

Classifications:	EN ISO 3581-A:E 25 20 R 1 2, SFA/AWS A5.4:E310-16, Werkstoffnummer :1.4842

Welding Current:	DC+, AC
Ferrite Content:	FN 0
Alloy Type:	Austenitic CrNi
Coating Type:	Basic Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	430 MPa	600 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	90 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
0.12	1.9	0.6	21.1	25.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-85 A	21 V	0.51	101	42 s	0.8 kg/h
3.2 x 350 mm	65-120 A	24 V	0.51	53	58 s	1.2 kg/h
4.0 x 350 mm	70-160 A	28 V	0.51	34	61 s	1.7 kg/h
5.0 x 350 mm	150-220 A	31 V	0.54	21	67 s	2.6 kg/h

OK 67.15



Basic coated MMA-electrode for welding 25Cr 20Ni-steels. Also suitable for welding armour steels, austenitic manganese steels and for joining of dissimilar steels.

Classifications:	Werkstoffnummer :1.4842, EN ISO 3581-A:E 25 20 B 2 2, SFA/AWS A5.4:E310-15
Approvals:	CE EN 13479, Seproz UNA 272580, DB 30.039.01, VdTÜV 01025

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	Austenitic CrNi
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	410 MPa	590 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	100 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
0.10	2.0	0.4	21.3	25.7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	45-55 A	24 V	0.62	162	36 s	0.6 kg/h
2.5 x 300 mm	50-85 A	25 V	0.61	96	40 s	0.9 kg/h
3.2 x 350 mm	60-115 A	25 V	0.59	50	60 s	1.2 kg/h
4.0 x 350 mm	70-160 A	26 V	0.59	28	62 s	1.8 kg/h
5.0 x 350 mm	130-200 A	26 V	0.60	22	65 s	2.5 kg/h

OK 67.43



OK 67.43 is an austentitic, stainless steel, AC/DC electrode, which deposits a weld metal with a small amount of uniformly distributed ferrite. The tough weld metal has excellent crack resistance, even when welding steels with very poor weldability. Suitable for welding 13Mn steels and steels of this kind to other steels.

Classifications:	EN 14700:E Fe10, EN ISO 3581-A:E 18 8 Mn R 1 2, SFA/AWS A5.4:(E307-16), Werkstoffnummer :1.4370
Approvals:	CE EN 13479, DB 30.039.07, VdTÜV 06797

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Alloy Type:	Austenitic. CrNiMn
Coating Type:	Rutile Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	440 MPa	630 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	80 J
As welded	-60 °C	52 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.08	5.4	0.8	9.1	18.4	0.08	0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	60-80 A	22 V	0.51	106	46 s	0.8 kg/h
3.2 x 350 mm	90-115 A	23 V	0.54	57	54 s	1.3 kg/h
4.0 x 350 mm	100-150 A	23 V	0.56	35	61 s	1.7 kg/h
5.0 x 450 mm	130-210 A	24 V	0.60	17	86 s	2.8 kg/h

OK 67.45



Austenitic stainless-steel electrode producing a weld metal with less than 5% ferrite. The tough weld metal has excellent crack resistance, even when welding steels with very poor weldability. Suitable for joining 12-14% manganese steel to itself or other steels. Also suitable for buffer layers before hardfacing.

Classifications:	EN ISO 3581-A:E 18 8 Mn B 2 2, SFA/AWS A5.4:(E307-15)
Approvals:	CE EN 13479, Seproz UNA 272580, ABS Stainless, VdTÜV 01580

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN <5
Alloy Type:	Stainless austenitic CrNiMn
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	605 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	85 J
As welded	-60 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.09	6.3	0.3	9.1	18.8	0.06	1

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	23 V	0.58	102	50 s	0.7 kg/h
3.2 x 350 mm	70-100 A	24 V	0.60	51	71 s	1.1 kg/h
4.0 x 350 mm	80-140 A	24 V	0.60	33	73 s	1.5 kg/h
5.0 x 350 mm	150-200 A	25 V	0.60	22	80 s	2.2 kg/h

OK 67.50



OK 67.50 is an acid rutile coated type for welding of austenitic-ferritic stainless steels of CrNiMoN 22 5 3 - and CrNiN 23 4-types. The duplex all weld metal offers a high strength level combined with good ductility. The pitting corrosion resistance is good and the all weld metal is not sensitive for stress corrosion cracking.

Classifications:	EN ISO 3581-A:E 22 9 3 N L R 3 2, SFA/AWS A5.4:E2209-17, CSA W48:E2209-17, Werkstoffnummer :1.4462
Approvals:	CE EN 13479, Seproz UNA 272580, ABS Stainless*, BV 2209, CWB CSA W48: E2209-17, DNV For duplex SS, GL 4462, VdTÜV 04368

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 35-50
Alloy Type:	Duplex CrNiMoN
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	691 MPa	857 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	50 J
As welded	-30 °C	41 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.03	0.8	0.8	8.8	23.2	3.2	0.16	42

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	30-65 A	29 V	0.55	152	33 s	0.7 kg/h
2.5 x 300 mm	50-90 A	27 V	0.58	91	38 s	1.0 kg/h
3.2 x 350 mm	80-120 A	28 V	0.58	47	55 s	1.4 kg/h
4.0 x 350 mm	90-160 A	29 V	0.58	32	59 s	1.9 kg/h
5.0 x 350 mm	150-220 A	30 V	0.58	20	64 s	2.8 kg/h

OK 67.53



Thin coated rutile MMA-electrode especially designed for pipe welding of duplex stainless steel. i.e. UNS S31803, CrNiMoN22-5-3, CrNiN23-4. Ideal for root runs and positional welding.

Classifications:	Werkstoffnummer :1.4462, EN ISO 3581-A:E 22 9 3 N L R 1 2, SFA/AWS A5.4:(E2209-16)
Approvals:	CE EN 13479, VdTÜV 05422

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 30-45
Alloy Type:	Duplex CrNi
Coating Type:	Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	680 MPa	860 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	48 J
As welded	-20 °C	40 J
As welded	-30 °C	37 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.03	0.7	1.0	9.3	23.7	3.4	0.18	40

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	30-80 A	23 V	0.63	96	54 s	0.7 kg/h
3.2 x 350 mm	70-110 A	27 V	0.57	51	64 s	1.0 kg/h

OK 67.55



OK 67.55 is a basic coated electrode especially designed for welding duplex stainless steels i, e. UNS S31803. The deposited weld metal gives very high ductility down to -50°C/-60°C. Particularly suitable for welding duplex pipes in offshore applications.

Classifications:	Werkstoffnummer :1.4462, EN ISO 3581-A:E 22 9 3 N L B 2 2, SFA/AWS A5.4:E2209-15
Approvals:	Seproz UNA 272580, DNV For duplex SS, VdTÜV 06774

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 35-50
Alloy Type:	Austenitic CrNiMo
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	650 MPa	800 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	100 J
As welded	-20 °C	85 J
As welded	-40 °C	75 J
As welded	-60 °C	65 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.04	1.0	0.7	9.1	23.2	3.2	0.15	41

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	23 V	0.59	96	49 s	0.8 kg/h
3.2 x 350 mm	65-115 A	24 V	0.59	50	61 s	1.2 kg/h
4.0 x 350 mm	80-140 A	24 V	0.60	33	74 s	1.5 kg/h

OK 67.60



Acid-rutile coated MMA electrode giving an overalloyed weld metal. Suitable for welding stainless steel to mild and low alloyed steels. Also suitable for welding of transition layers when surfacing mild steel with stainless steel weld metal.

Classifications:	SFA/AWS A5.4:E309L-17, EN ISO 3581-A:E 23 12 L R 3 2, CSA W48:E309L-17, Werkstoffnummer :1.4332
Approvals:	CE EN 13479, Seproz UNA 272580, NAKS/HAKC 2.5-4.0 mm, CWB CSA W48: E309L-17, GL 4332, VdTÜV 00898

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 10-22
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	470 MPa	580 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	50 J
As welded	-10 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.03	0.9	0.8	12.4	23.7	0.09	15

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	45-65 A	27 V	0.60	136	38 s	0.7 kg/h
2.5 x 300 mm	45-90 A	28 V	0.60	85	38 s	1.1 kg/h
3.2 x 350 mm	65-120 A	29 V	0.60	45	51 s	1.6 kg/h
4.0 x 350 mm	85-180 A	31 V	0.60	29	51 s	2.5 kg/h
5.0 x 350 mm	110-250 A	32 V	0.60	19	58 s	3.3 kg/h

OK 67.70



Acid rutile MMA-electrode giving an over alloyed weld metal. Suitable for welding acid resistant stainless steels to mild and low alloyed steels. Also suitable for welding buffer layers when surfacing mild steel with acid resistant stainless steel weld metal.

Classifications:	EN ISO 3581-A:E 23 12 2 L R 3 2, SFA/AWS A5.4:E309LMo-17, CSA W48:E309LMo-17, Werkstoffnummer :1.4459
Approvals:	CE EN 13479, Seproz UNA 272580, ABS SS to C&C/Mn steels, BV 309Mo, CWB CSA W48: E309LMo-17, DB 30.039.05, DNV 309 Mo, LR SS/CMn, RINA 309Mo, VdTÜV 02424

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 12-22
Alloy Type:	Austenitic CrNi
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	510 MPa	610 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	50 J
As welded	-20 °C	35 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.02	0.6	0.8	13.4	22.5	2.8	0.09	18

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	40-60 A	26 V	0.58	147	48 s	0.6 kg/h
2.5 x 300 mm	50-90 A	29 V	0.57	94	45 s	0.9 kg/h
3.2 x 350 mm	60-120 A	27 V	0.59	47	61 s	1.4 kg/h
4.0 x 350 mm	85-180 A	31 V	0.61	32	56 s	2.0 kg/h
5.0 x 350 mm	110-250 A	30 V	0.59	20	64 s	2.7 kg/h

OK 67.71



OK 67.71 is an over-alloyed, high-recovery electrode for welding transition layers when surfacing mild steel with stainless and joining stainless steel to other types of steel. The ferritic-austenitic weld metal is very crack resistant.

Classifications:	Werkstoffnummer :1.4459, EN ISO 3581-A:E 23 12 2 L R 5 3, SFA/AWS A5.4:E309LMo-26
Approvals:	DNV 309Mo, VdTÜV 02484

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 12-22
Alloy Type:	Austenitic CrNiMo
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	500 MPa	620 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	55 J
As welded	-60 °C	30 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.04	0.9	0.9	13.3	22.9	2.6	0.08	15

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	60-130 A	34 V	0.61	35	47 s	2.2 kg/h
4.0 x 450 mm	110-170 A	36 V	0.61	18	71 s	3.0 kg/h
5.0 x 450 mm	170-230 A	40 V	0.63	11	79 s	4.3 kg/h

OK 67.75



OK 67.75 is a basic coated, stainless electrode for welding steels of the 24Cr13Ni type, for welding transition layers when surfacing mild steel with stainless, for joining dissimilar steels and welding root runs in the stainless side of clad steels.

Classifications:	Werkstoffnummer :1.4332, EN ISO 3581-A:E 23 12 L B 4 2, SFA/AWS A5.4:E309L-15
Approvals:	Seproz UNA 272580, NAKS/HAKC 2.5-5.0 mm, ABS Stainless, LR SS/CMn, DNV 309, VdTÜV 00633

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 8-15
Alloy Type:	Austenitic CrNi
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	470 MPa	600 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	75 J
As welded	-50 °C	64 J
As welded	-80 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	N	Ferrite FN
0.04	2.0	0.3	12.9	23.5	0.06	11

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	22 V	0.73	78	42 s	1.1 kg/h
3.2 x 350 mm	80-110 A	24 V	0.73	39	60 s	1.5 kg/h
4.0 x 350 mm	80-150 A	26 V	0.73	25	62 s	2.3 kg/h
5.0 x 350 mm	160-220 A	27 V	0.73	17	65 s	3.4 kg/h

OK 310Mo-L



Basic electrode for joining and cladding of steel containing 25% Cr 22% Ni 2% Mo N type. The weld metal has an excellent resistance to very agressive corrosive media, such as in urea plants. The fully austenitic weld metal is insensitive to hot cracking. OK 310Mo-L is approved for construction and repair of urea plants using the stamicarbon process. The electrode is regularly used for routine repair works on AISI 316L in urea plants to gain superior resistance to corrosive attack.

Classifications:	EN ISO 3581-A:E 25 22 2 N L R 1 2, SFA/AWS A5.4:(E310Mo-16)
Approvals:	Snamprogetti Ureaplants, Stamicarbon Ureaplants

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	25Cr 22Ni 2Mo N
Coating Type:	Rutile Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	442 MPa	623 MPa	34 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	54 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.038	4.4	0.4	21.7	24.2	2.4	0.14	0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	70-100 A	24 V	0.56	50	62 s	1.1 kg/h
4.0 x 350 mm	100-140 A	25 V	0.55	33	62 s	1.7 kg/h

OK 68.15



OK 68.15 is a stainless-steel electrode which deposits a ferritic 13Cr weld metal. OK 68.15 is designed for welding steels of similar composition, when CrNi-alloyed austenitic stainless steel electrodes cannot be used, e.g. when the structure is going to be exposed to aggressive sulphuric gases. Depending on the welding parameters, the structure and consequently the mechanical properties of untreated weld metal can vary within fairly large limits.

Classifications:	EN 14700:E Fe7, EN ISO 3581-A:E 13 B 4 2, SFA/AWS A5.4:E410-15, Werkstoffnummer :1.4009
Approvals:	Seproz UNA 272580

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	13% Cr
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
Stress relieved 1 hr 750 °C	370 MPa	520 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
Stress relieved 6 hr 750 °C	20 °C	55 J
Stress relieved 6 hr 750 °C	0 °C	35 J
Stress relieved 6 hr 750 °C	-20 °C	20 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
0.04	0.3	0.4	0.1	12.9

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	65-115 A	25 V	0.62	73	48 s	1.0 kg/h
3.2 x 450 mm	90-160 A	25 V	0.63	33	71 s	1.5 kg/h
4.0 x 450 mm	120-220 A	30 V	0.57	24	73 s	2.0 kg/h

OK 68.17



OK 68.17 is a coated electrode designed for the welding of stainless-steel castings of the 13Cr4NiMo type, for example. OK 68.17 can be welded in all positions apart from vertical down.

Classifications:	EN 14700:E Fe7, EN ISO 3581-A:E 13 4 R 3 2, SFA/AWS A5.4:E410NiMo-16, Werkstoffnummer :1.4351
Approvals:	Seproz UNA 272580

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Diffusible Hydrogen:	<8.0 ml/100g
Alloy Type:	Martensitic 13Cr4Ni-Mo type
Coating Type:	Rutile Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
Stress relieved 8 hr 600 °C	650 MPa	870 MPa	17 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
Stress relieved 8 hr 600 °C	20 °C	45 J
Stress relieved 8 hr 600 °C	-10 °C	45 J
Stress relieved 8 hr 600 °C	-40 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.02	0.6	0.4	4.6	12.0	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	55-100 A	21 V	0.62	73	61 s	0.8 kg/h
3.2 x 350 mm	65-135 A	21 V	0.59	45	66 s	1.2 kg/h
4.0 x 450 mm	90-190 A	24 V	0.59	23	92 s	1.7 kg/h

OK 68.25



OK 68.25 is an electrode for welding corrosion-resistant, martensitic and martensitic-ferritic rolled, forged and cast steels, such as castings of 13Cr4NiMo type.

Classifications:	EN 14700:E Fe7, Werkstoffnummer :1.4351, EN ISO 3581-A:E 13 4 B 4 2, SFA/AWS A5.4:E410NiMo-15
Approvals:	Seproz UNA 272580

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	<5.0 ml/100g
Alloy Type:	Martensitic-ferritic
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
PWHT 600°C 8h	680 MPa	900 MPa	17 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
PWHT 600°C 8h	20 °C	65 J
PWHT 600°C 8h	0 °C	60 J
PWHT 600°C 8h	-20 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.04	0.6	0.4	4.5	12.2	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	90-150 A	28 V	0.64	35	63 s	1.6 kg/h
4.0 x 450 mm	110-190 A	28 V	0.66	22	73 s	2.2 kg/h
5.0 x 450 mm	140-250 A	27 V	0.67	14	86 s	3.1 kg/h

OK 68.53



OK 68.53 is a coated electrode for welding austenitic-ferritic steels of Super Duplex types, e.g. SAF 2507 and Zeron 100. OK 68.53 has good welding characteristics in all positions and the slag is easily detachable.

Classifications:	EN ISO 3581-A:E 25 9 4 N L R 32, SFA/AWS A5.4:E2594-16, Werkstoffnummer :(1.4410)
Approvals:	DNV , CE EN 13479, VdTÜV 07377

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 35-50
Alloy Type:	Austenitic-ferritic CrNiMo
Coating Type:	Basic Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	700 MPa	850 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	50 J
As welded	-40 °C	40 J

Typical Weld Metal Analysis %

C	Si	Ni	Cr	Mo	N	Ferrite FN
0.03	0.6	10.3	25.2	4	0.25	39

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-85 A	22 V	0.60	94	43 s	0.9 kg/h
3.2 x 350 mm	70-110 A	22 V	0.60	47	62 s	1.2 kg/h
4.0 x 350 mm	80-150 A	23 V	0.60	32	67 s	1.7 kg/h

OK 68.55



OK 68.55 is a basic coated electrode for welding austenitc-ferritic steels of the Super Duplex type, e. g. SAF 2507 and Zeron 100. OK 68.55 deposits a weld metal with high ductility.

Classifications:	Werkstoffnummer :(1.4410), EN ISO 3581-A:E 25 9 4 N L B 4 2, SFA/AWS A5.4:E2594-15
Approvals:	DNV Duplex

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 35-50
Alloy Type:	Austenitic CrNiMo
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	700 MPa	900 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	90 J
As welded	-20 °C	70 J
As welded	-40 °C	55 J
As welded	-60 °C	45 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.03	0.9	0.6	10.4	25.2	4.3	0.23	45

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	23 V	0.62	93	48 s	0.8 kg/h
3.2 x 350 mm	60-100 A	23 V	0.63	46	68 s	1.1 kg/h
4.0 x 350 mm	100-140 A	23 V	0.62	32	70 s	1.6 kg/h

OK 68.81



OK 68.81 is a high-alloyed electrode which deposits a ferritic-austenitic duplex weld metal with approx. 40% ferrite. It is resistant to stress corrosion and is highly insensitive to dilution. Good scaling resistance up to 1150°C. OK 68.81 is used for joining dissimilar steels, steels with reduced weldability and buffer layers prior to hardfacing. Applications: rolls, forging dies, hot-work tools, dies for plastics and so on.

Classifications:	EN 14700:E Fe11, EN ISO 3581-A:E 29 9 R 3 2, SFA/AWS A5.4:E312-17, Werkstoffnummer :1.4337
Approvals:	CE EN 13479, Seproz UNA 272580

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 30 - 50
Alloy Type:	Stainless duplex
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	610 MPa	790 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	30 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.13	0.9	0.7	10.2	28.9	0.04	0.09	40

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	40-60 A	22 V	0.64	123	41 s	0.7 kg/h
2.5 x 300 mm	50-85 A	24 V	0.64	78	48 s	0.9 kg/h
3.2 x 350 mm	60-125 A	25 V	0.62	42	65 s	1.3 kg/h
4.0 x 350 mm	80-175 A	26 V	0.62	26	66 s	2.0 kg/h
5.0 x 350 mm	150-240 A	28 V	0.65	17	68 s	3.2 kg/h

OK 68.82



OK 68.82 is a high-alloyed electrode which deposits a ferritic-austenitic duplex weld metal with approx. 30-35% ferrite. It is resistant to stress corrosion and is highly insensitive to dilution. Good scaling resistance up to 1150°C. OK 68.82 is used for joining steels with reduced weldability and buffer layers prior to hard surfacing, dissimilar steels, rolls, aluminium-forging dies, hot-work tools, dies for plastic and so on.

Classifications:	EN ISO 3581-A:E 29 9 R 1 2, SFA/AWS A5.4:(E312-17), EN 14700:E Fe11, Werkstoffnummer :1.4337
Approvals:	CE EN 13479, Seproz UNA 272580

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Ferrite Content:	FN 30 - 50
Alloy Type:	Stainless duplex
Coating Type:	Acid Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	500 MPa	750 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.13	0.6	1.1	9.9	29.1	0.2	0.10	40

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	40-60 A	26 V	0.54	166	33 s	0.7 kg/h
2.5 x 300 mm	50-85 A	25 V	0.52	104	45 s	1.0 kg/h
3.2 x 350 mm	55-120 A	26 V	0.52	55	57 s	1.3 kg/h
4.0 x 350 mm	75-170 A	30 V	0.55	36	60 s	2.0 kg/h

OK 69.25



Basic coated, stainless electrode for welding corrosion-resistant, non-magnetic and cryogenic stainless steels. The electrode produces a fully austenitic Cr-Ni-Mo weld metal with an increased Mn and N content.

Classifications:	EN ISO 3581-A:E 20 16 3 Mn N L B 4 2, SFA/AWS A5.4:E316LMn-15, Werkstoffnummer :1.4455

Welding Current:	DC+
Ferrite Content:	FN <0.5
Alloy Type:	CrNiMo
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	450 MPa	650 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	90 J
As welded	-196 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Ferrite FN
0.04	6.5	0.5	16.0	19.0	3.0	0.15	0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	70-100 A	24 V	0.62	46	72 s	1.2 kg/h
4.0 x 350 mm	100-140 A	25 V	0.64	29	74 s	1.8 kg/h

OK 69.33



OK 69.33 is a stainless-steel electrode which deposits a fully austenitic weld metal with increased resistance to sulphuric acid. The weld metal of OK 69.33 also has good resistance to intergranular and pitting corrosion.

Classifications:	EN ISO 3581-A:E 20 25 5 Cu N L R 3 2, SFA/AWS A5.4:E385-16, Werkstoffnummer :1.4519
Approvals:	CE EN 13479, Seproz UNA 272580, VdTÜV 02723

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Ferrite Content:	FN 0
Alloy Type:	Austenitic CrNi
Coating Type:	Basic Rutile

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	410 MPa	590 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	80 J
As welded	-140 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Cu	N	Ferrite FN
0.03	1.0	0.5	25.5	20.5	4.8	1.70	0.10	0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	60-85 A	24 V	0.60	91	44 s	0.9 kg/h
3.2 x 350 mm	85-130 A	27 V	0.58	41	60 s	1.5 kg/h
4.0 x 350 mm	95-180 A	29 V	0.51	30	64 s	1.9 kg/h

OK Ni-1



OK Ni-1 is a stick electrode for joining commercial pure nickel in wrought and cast forms. It can also be used to join dissimilar metals such as nickel to steel, nickel to copper and copper to steel. Moreover, this electrode can be used for surfacing steel.

Classifications:	SFA/AWS A5.11:ENi-1, EN ISO 14172:E Ni 2061 (NiTi3)

Welding Current:	DC+
Alloy Type:	Nickel-base
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	330 MPa	470 MPa	30 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Al	Fe	Ti
0.04	0.4	0.7	96	0.10	0.4	1.5

Deposition Data

Diameter	Current	kg weld metal/kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	70-95 A	0.55	96	47 s	0.80 kg/h
3.2 x 350 mm	90-135 A	0.55	53	56 s	1.20 kg/h

OK NiCu 1



OK NiCu 1 is a nickel-copper electrode of the monel-alloy type for welding all types of cast iron with or without low preheat. The weld metal is easily machinable and produces a colour very similar to that of cast iron.

Classifications:	EN ISO 1071:E C NiCu 1

Alloy Type:	Nickel-copper alloy
Coating Type:	Basic Special

Typical Tensile Properties

Condition	Tensile Strength	Elongation
ISO		
As welded	300-350 MPa	15 %

Typical Weld Metal Analysis %

C	Mn	Ni	Cu	Fe
0.3	0.9	65	31	3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-100 A	18 V	0.60	96.0	66 s	0.60 kg/h
3.2 x 350 mm	60-125 A	18 V	0.65	49.0	97 s	0.80 kg/h
4.0 x 350 mm	90-140 A	18 V	0.65	32.0	130 s	0.90 kg/h

OK NiCu-7



A nickel-copper electrode for welding NiCu alloys to themselves and to steels and for corrosion-resistant surfacing. The weld metal of OK NiCu-7 is crack resistant and ductile and meets rigorous requirements relating to corrosion resistance in sea water and in reducing and oxidising acids. OK NiCu-7 is used for welding corrosion-resistant monel alloys within the petroleum and ammonium sulphate industry and in power plants.

Classifications:	SFA/AWS A5.11:ENiCu-7, EN ISO 14172:E Ni 4060 (NiCu30Mn3Ti)

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	NiCu-alloy
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	410 MPa	640 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	100 J
As welded	-196 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cu	Fe	Ti
0.02	3.0	0.5	66	29	1.9	0.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-70 A	22 V	0.63	83	45 s	1.0 kg/h
3.2 x 350 mm	70-120 A	26 V	0.63	42	52 s	1.6 kg/h
4.0 x 350 mm	120-140 A	28 V	0.63	28	54 s	2.4 kg/h

OK NiCrFe-2



Nickel based electrode for welding Inconel 600 and similar alloys, cryogenic steels (e.g. 9% and 5% Ni steel), martensitic to austenitic steels, dissimilar steels, heat resisting steel castings of limited weldability etc. Good weldability in all positions, including overhead.

Classifications:	SFA/AWS A5.11:ENiCrFe-2, EN ISO 14172:E Ni 6133 (NiCr16Fe12NbMo)
Approvals:	ABS

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	Nickel alloy
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	420 MPa	660 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	110 J
As welded	-196 °C	90 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb
0.03	2.7	0.5	69	16.1	1.9	7.7	1.9

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-80 A	22 V	0.63	91.0	45 s	0.90 kg/h
3.2 x 350 mm	70-105 A	23 V	0.62	57.0	57 s	1.30 kg/h
4.0 x 350 mm	95-140 A	24 V	0.65	31.0	58 s	2.10 kg/h

OK NiCrFe-3



Nickel based electrode for welding Inconel 600 and similar Inconel alloys, cryogenic steels, martensitic to austenitic steels, dissimilar steels, heat resisting steel castings of limited weldability.

Classifications:	SFA/AWS A5.11:ENiCrFe-3, EN ISO 14172:E Ni 6182 (NiCr15Fe6Mn)
Approvals:	ABS ENiCrFe-3, NAKS/HAKC 4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	Ni-based Cr-alloy
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS			
As welded	410 MPa	640 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS		
As welded	20 °C	100 J
As welded	-196 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Fe	Nb
0.04	6.7	0.8	71	15.6	6.3	1.7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	50-70 A	22 V	0.63	88	50 s	0.9 kg/h
3.2 x 350 mm	65-105 A	23 V	0.62	57	60 s	1.2 kg/h
4.0 x 350 mm	75-150 A	24 V	0.64	31	60 s	2.0 kg/h
5.0 x 350 mm	120-170 A	25 V	0.64	20	68 s	2.7 kg/h

OK NiCrMo-3



Ni-based CrMoNb electrode for welding of Ni-alloys of the same or similar type as e.g. Inconel 625, for welding of 5% and 9% Ni steel. The electrode is very suitable for welding of 254 SMO, i.e. UNS S31254 steel.

Classifications:	SFA/AWS A5.11:ENiCrMo-3, EN ISO 14172:E Ni 6625 (NiCr22Mo9Nb)
Approvals:	CE EN 13479, DNV -(H5), VdTÜV 12414

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	Ni-based CrMoNb
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	500 MPa	780 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	70 J
As welded	-196 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb
0.03	0.2	0.4	62.8	21.7	9.3	2.0	3.3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-75 A	23 V	0.55	100	40 s	0.9 kg/h
3.2 x 350 mm	65-100 A	25 V	0.56	49	52 s	1.4 kg/h
4.0 x 350 mm	80-140 A	27 V	0.58	33	57 s	1.9 kg/h
5.0 x 350 mm	120-170 A	24 V	0.58	21	72 s	2.1 kg/h

OK NiCrMo-5



OK NiCrMo-5 deposits an all weld metal that is similar to AWS classification ENiCrMo-5. The all weld metal consists of a Ni-Cr-Mo-W alloy of Hastelloy C type. The weld metal is tough and work hardens. The high temperature properties regarding tensile strength, hardness, thermal shock and scaling are good. It is resistant to damp chlorine gas and to hydrochloric-, nitric-, sulphuric- and phosphoric acids at room temperature.

Classifications:	EN 14700:E Z Ni2

Welding Current:	DC+, AC
Alloy Type:	Nickel alloy
Coating Type:	Rutile Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	515 MPa	750 MPa	17 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	W
0.05	0.9	0.5	57.5	15.5	16.4	5.5	3.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	65-110 A	18 V	0.61	56	62 s	1.1 kg/h
3.2 x 350 mm	110-150 A	18 V	0.63	28	86 s	1.6 kg/h
4.0 x 350 mm	160-200 A	20 V	0.64	19	89 s	2.3 kg/h
5.0 x 350 mm	190-250 A	20 V	0.65	11	106 s	3.1 kg/h

OK NiCrMo-13



OK NiCrMo-13 is suitable for welding Ni base materials such as Alloy 59, Hasteloy C-276, Inconel 625 and Incoloy 825. It can also be used for welding superaustenitic steels type AISI/ASTM S31254 and S32654. The weld metal provides very good resistance against pitting- and chloride ion stress corrosion cracking.

Classifications:	SFA/AWS A5.11:ENiCrMo-13, EN ISO 14172:E Ni 6059 (NiCr23Mo16)

Welding Current:	DC+
Ferrite Content:	FN 0
Alloy Type:	Ni-based CrMo
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	430 MPa	770 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-60 °C	70 J
As welded	-196 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe
0.013	0.17	0.16	61	22.6	15.2	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	60-90 A	27 V	0.61	46	58 s	3.95 kg/h

OK 92.55



OK 92.55 is an all-positional, basic coated electrode which deposits a NiCr-based alloy with additions of Mo, W and Nb. The electrode is specifically designed for welding 9%Ni steels for cryogenic applications down to -196°C.

Classifications:	SFA/AWS A5.11:ENiCrMo-6, EN ISO 14172:E Ni 6620 (NiCr14Mo7Fe)
Approvals:	CE EN 13479, ABS ENiCrMo-6, BV N50 and 9Ni*, DNV For welding NV 1.5Ni to NV 9Ni, GL NiCr14Mo7Fe, incl X8Ni9*, LR 9Ni

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+-
Ferrite Content:	FN 0
Alloy Type:	Ni-based CrMoNb
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	445 MPa	727 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	-196 °C	91 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb	W
0.05	3.0	0.3	69.4	12.9	6.2	5.0	1.3	1.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	65-115 A	23 V	0.70	55	70 s	1.1 kg/h
3.2 x 350 mm	70-150 A	22 V	0.66	34	68 s	1.5 kg/h
4.0 x 350 mm	120-200 A	22 V	0.67	23	82 s	1.9 kg/h
5.0 x 350 mm	150-240 A	23 V	0.68	14	91 s	2.8 kg/h

OK GPC



OK GPC is designed for gouging, cutting and piercing mild and alloyed steel, cast iron and non-ferrous metals with the exception of pure copper, using standard welding equipment. The electrode can be used in a wide variety of applications, e.g. for bevelling, for preparation of cracked areas before welding, for back-gouging of root runs.

Welding Current:	AC, DC-

Deposition Data		
Diameter	**Current**	**Voltage**
2.5 x 350 mm	100-120 A	43 V
3.2 x 350 mm	130-180 A	43 V
4.0 x 350 mm	170-230 A	48 V
5.0 x 450 mm	230-300 A	48 V

OK 13Mn



OK 13Mn is an austenitic manganese steel electrode which work hardens under impact and compressive stresses. It is primarily used for surfacing and building up manganese steel components exposed to severe impact and moderate abrasion. Typical applications include crusher plates and rolls, cones and mantles of rotary crushers etc. The interpass temperature should be kept as low as possible.

Classifications:	EN 14700:E Fe9

Welding Current:	AC, DC+
Alloy Type:	Austenitic Mn steel
Coating Type:	Lime Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	480 MPa	780 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	70 J
As welded	-20 °C	45 J
As welded	-40 °C	35 J
As welded	-60 °C	25 J

Typical Weld Metal Analysis %

C	Mn	Si
1.08	12.2	0.7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	95-135 A	23 V	0.60	36	95 s	1.1 kg/h
4.0 x 450 mm	130-180 A	23 V	0.60	24	109 s	1.4 kg/h
5.0 x 450 mm	170-230 A	25 V	0.60	15	132 s	1.8 kg/h

OK 14MnNi



Austenitic manganese steel electrode with nickel for surfacing and building up mangnese steel components exposed to severe impact and moderate abrasion. The weld metal is less prone to embrittlement and cracking compared to plain austenitic manganese steel weld metal. Applications include: crusher plates and rolls, cones and mantels of rotary crushers, rail points.

Classifications:	EN 14700:E Z Fe9
Approvals:	CE , DB 82.039.08

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Alloy Type:	Austenitic Mn steel
Coating Type:	Zircon Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	440 MPa	690 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	100 J
As welded	-20 °C	80 J
As welded	-80 °C	45 J
As welded	-120 °C	25 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.67	13.2	0.2	3.0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	100-160 A	30 V	0.54	27	90 s	1.5 kg/h
4.0 x 450 mm	130-210 A	30 V	0.54	18	105 s	2.0 kg/h
5.0 x 450 mm	170-300 A	31 V	0.56	11	114 s	2.9 kg/h

OK Tooltrode 50



Electrode for surfacing hot working tools. Suitable for service temperatures up to about 550°C and applications where toughness and good wear resistance are required. Typical applications include hot working blades and shears, punches and bottom dies. Preheating and interpass temperature should be minimum 200°C to avoid issues with cracking.

Classifications:	EN 14700:E Z Fe3

Welding Current:	AC, DC+
Alloy Type:	High speed steel
Coating Type:	Lime Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Co	Nb	W
0.32	0.9	1.1	1.8	2.1	0.8	7.9

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-110 A	22 V	0.65	72	53 s	0.9 kg/h
3.2 x 350 mm	100-150 A	23 V	0.63	45	62 s	1.3 kg/h
4.0 x 350 mm	130-190 A	23 V	0.63	30	75 s	1.7 kg/h
5.0 x 350 mm	180-250 A	25 V	0.66	18	88 s	2.2 kg/h

OK Tooltrode 60



Hardfacing electrode of the high-speed steel for repair welding of cutting tools, drills, stamping machines etc. The weld metal obtains its maximum hardness by double tempering. Suitable for step welding. To avoid issues with cracking, the working temperature should be preferrably 400-500°C.

Classifications:	EN 14700:E Fe4

Welding Current:	AC, DC+
Alloy Type:	Tool steel
Coating Type:	Lime Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo	V	W
0.93	1.4	1.4	4.7	7.3	1.60	1.39

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	80-110 A	23 V	0.55	67	67 s	0.8 kg/h
3.2 x 350 mm	100-150 A	23 V	0.57	40	82 s	1.1 kg/h
4.0 x 350 mm	120-190 A	25 V	0.58	27	97 s	1.4 kg/h

OK Weartrode 30



OK Weartrode 30 is a chromium-alloyed electrode for hardfacing and cladding tracks, shafts, rolls, rails and rail-crossing sections, as well as components in rolling mills, such as grooved rollers and clutches and large cog wheels made of cast steel. The joining of hardenable steels is another application.

Classifications:	EN 14700:E Z Fe1
Approvals:	CE EN 13479, DB 82.039.07

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Alloy Type:	Martensitic steel
Coating Type:	Lime Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.1	0.7	0.7	3.2

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	60-90 A	20 V	0.64	69	75 s	0.7 kg/h
3.2 x 450 mm	100-140 A	21 V	0.66	34	88 s	1.2 kg/h
4.0 x 450 mm	140-190 A	22 V	0.66	23	92 s	1.7 kg/h
5.0 x 450 mm	190-260 A	23 V	0.68	15	86 s	2.8 kg/h
6.0 x 450 mm	230-320 A	23 V	0.68	11	92 s	3.7 kg/h

OK Weartrode 30 HD



Electrode for hardfacing rails, rail points, crossings, wheel conveyors, rolls etc. Weld metal hardness approx. 30 HRC.

Classifications:	EN 14700:E Fe1

Welding Current:	AC, DC+
Alloy Type:	Martensitic steel
Coating Type:	Zircon Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.1	0.8	0.7	3.0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	110-180 A	26 V	0.67	23	66 s	2.4 kg/h
4.0 x 450 mm	160-240 A	30 V	0.67	15	69 s	3.4 kg/h
5.0 x 450 mm	230-330 A	42 V	0.68	10	73 s	5.0 kg/h

OK Weartrode 35



This electrode is a hardfacing basic type yielding an as welded hardness of 300 HV. It combats metal to metal wear and slight abrasion. It is used mainly for surfacing worn train and tramway rails. Also for carbon manganese crossings.

Other areas of use: Cog-wheels.

Classifications:	EN 14700:E Fe1

Welding Current:	DC+
Ferrite Content:	N/A
Alloy Type:	C, Si, Mn, Cr
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.09	0.9	0.8	3.0

Deposition Data

Diameter	Current	kg weld metal/kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	110-140 A	0.77	36	84 s	1.2 kg/h
4.0 x 450 mm	140-160 A	0.77	23	98 s	1.6 kg/h
5.0 x 450 mm	180-200 A	0.77	15	100 s	2.4 kg/h

OK Weartrode 40



OK Weartrode 40 is used in applications exposed to metal to metal wear. A common application is surfacing wear resistant dies operating at temperatures up to 400°C.

OK Weartrode 40 provides a weld metal with minimum hardness level of 40 HRC, typical value is around 45 HRC.

Classifications:	EN 14700:E Z Fe2

Welding Current:	DC+
Alloy Type:	C, Mn , Si, Cr, V
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo	V
0.20	0.9	0.4	2.0	0.5	0.5

Deposition Data

Diameter	Current	kg weld metal/kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	90-110 A	0.59	77	58 s	0.9 kg/h
3.2 x 450 mm	90-130 A	0.71	34	97 s	1.1 kg/h
4.0 x 450 mm	160-180 A	0.67	22	112 s	1.4 kg/h
5.0 x 450 mm	170-220 A	0.71	14	127 s	2.0 kg/h

OK Weartrode 45



Heavy coated general purpose hardfacing electrode for worn parts providing a hardness level of approximately 45 HRC.

Classifications:	EN 14700:E Z Fe3

Welding Current:	DC+
Alloy Type:	Martensitic
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.3	2.0	0.8	1.3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	100-130 A	24 V	0,63	35,3	94 s	1,1 kg/h
4.0 x 450 mm	130-180 A	26 V	0,6	25	105 s	1,4 kg/h
5.0 x 450 mm	180-220 A	25 V	0,64	15,4	124 s	1,9 kg/h

OK Weartrode 50



General purpose hardfacing electrode for repair welding worn parts on agricultural equipment, forestry tools, loading machines, etc. Transformers with low low open circuit voltage can be used (>45 volt).

Classifications:	EN 14700:E Z Fe2

Welding Current:	AC, DC+
Alloy Type:	Martensitic steel
Coating Type:	Acid Rutile

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.46	0.4	0.5	6.0	0.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	60-120 A	28 V	0.46	88	49 s	0.8 kg/h
3.2 x 350 mm	90-160 A	30 V	0.46	52	59 s	1.2 kg/h
4.0 x 450 mm	125-210 A	33 V	0.48	26	82 s	1.7 kg/h
5.0 x 450 mm	160-260 A	37 V	0.48	16	86 s	2.6 kg/h

OK Weartrode 50 T



OK Weartrode 50 T is primarily used for surfacing objects that are exposed to impact, metal to metal and pressure in environments up to 400 °C i.e. dies, cog wheels, cutting edges and press tooling.

Classifications:	EN 14700:E Z Fe8

Welding Current:	DC+
Alloy Type:	C, Mn, Si, Cr
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.20	0.6	0.3	12.7

Deposition Data

Diameter	Current	kg weld metal/kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.0 x 300 mm	50-70 A	0.63	125	56 s	0.5 kg/h
2.5 x 350 mm	60-80 A	0.59	77	55 s	0.9 kg/h
3.2 x 450 mm	90-110 A	0.71	34	80 s	1.3 kg/h
4.0 x 450 mm	140-160 A	0.71	22	106 s	1.6 kg/h
5.0 x 450 mm	180-200 A	0.71	14	112 s	2.3 kg/h

OK Weartrode 55



Heavy coated general purpose hardfacing electrode for worn parts where a hardness level of minimum 50 HRC is required.

Classifications:	EN 14700:E Z Fe3

Welding Current:	DC+
Alloy Type:	Martensitic
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.5	0.6	1.4	5.7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	100-130 A	23 V	0,65	46	72,8 s	1,1 kg/h
4.0 x 450 mm	130-180 A	24 V	0,64	24	107 s	1,4 kg/h
5.0 x 450 mm	180-220 A	24 V	0,64	15	126 s	1,9 kg/h
6.0 x 450 mm	210-270 A	25 V	0,66	10,3	140 s	2,5 kg/h

OK Weartrode 55 HD



A general purpose hardfacing electrode depositing a semi corrosion resistant martensitic steel with a hardness of about 57 HRC. The electrode is specially suitable for hardfacing parts exposed to different forms of abrasive and impact wear, e.g. farming equipment, forestry tools, loading machines and mixers.

Classifications:	EN 14700:E Z Fe6

Welding Current:	AC, DC+
Alloy Type:	Martensitic steel
Coating Type:	Lime Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.67	0.7	0.7	10.4

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	75-110 A	23 V	0.67	58	62 s	1.0 kg/h
3.2 x 450 mm	110-150 A	23 V	0.67	27	95 s	1.4 kg/h
4.0 x 450 mm	145-200 A	24 V	0.67	18	107 s	1.9 kg/h
5.0 x 450 mm	190-270 A	26 V	0.66	12	110 s	2.8 kg/h

OK Weartrode 60



Electrode for hardfacing parts of dredgers, feed screws, crusher and tractor parts exposed to wear by stone, coal, sand, soil, etc. The weld metal presents a relatively good resistance to oxidation, also at elevated temperatures.

Classifications:	EN 14700:E Z Fe2

Welding Current:	AC, DC+
Alloy Type:	Martensitic steel
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
0.80	0.4	4.5	2.0

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 450 mm	100-140 A	23 V	0.68	34	87 s	1.2 kg/h
4.0 x 450 mm	140-190 A	25 V	0.68	22	90 s	1.8 kg/h

OK Weartrode 60 T



Electrode producing a weld metal with coarse chromium carbides in an austenitic matrix. Suitable for surfacing worn parts exposed to abrasion and wear by coal, ore or other minerals. Typical applications include earth-moving machines, mixers, feeder screws, dust exhausters and crushers. It can also be used on components operating in corrosive environments and/or at elevated temperatures.

Classifications:	EN 14700:E Z Fe14

Welding Current:	AC, DC+
Alloy Type:	Carbide rich steel
Coating Type:	Rutile Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr
4.8	1.0	0.7	34.3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	90-120 A	24 V	0.62	48	60 s	1.2 kg/h
3.2 x 350 mm	115-170 A	24 V	0.62	26	85 s	1.6 kg/h
4.0 x 450 mm	130-210 A	26 V	0.64	14	135 s	2.0 kg/h
5.0 x 450 mm	150-300 A	26 V	0.64	9	140 s	2.9 kg/h

OK Weartrode 62



A hardfacing electrode depositing a weld metal with a high volume fraction of fine carbides in a martensitic matrix. It is designed for protection of parts subjected to severe abrasion from rock, sand, cement, etc. Applications: earth-drilling equipment, hammers, scrapers, knives, conveyor screws, etc.

Welding Current:	AC, DC+-
Alloy Type:	Carbide rich steel
Coating Type:	Basic

Typical Weld Metal Analysis %

C	Mn	Si	Cr	V	Ti
2.9	0.4	1.9	6.2	5.2	4.9

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	70-100 A	17 V	0.63	71	105 s	0.5 kg/h
3.2 x 350 mm	100-150 A	17 V	0.60	44	110 s	0.7 kg/h
4.0 x 350 mm	115-200 A	17 V	0.64	27	120 s	1.0 kg/h

OK Weartrode 65 T



The electrode deposits a high density of wear resisting carbides in an austenitic matrix capable of resisting extreme conditions of abrasion up to 700°C. Recovery approximately 220%. Typical applications include exhaust fans, ash ploughs, conveyor screws and sinter plant components.

Classifications:	EN 14700:E Fe16

Welding Current:	DC+
Alloy Type:	Austenitic iron
Coating Type:	Special

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo	V	Nb	W
6.0	0.7	1.9	24.5	6.6	0.8	5.4	1.7

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
3.2 x 350 mm	150-170 A	22 V	0.72	22	132 s	1.2 kg/h
4.0 x 350 mm	220-250 A	23 V	0.71	15	123 s	2.0 kg/h

OK AlMn1



Covered electrode suitable for welding of Mn-alloyed aluminium and aluminium alloys containing up to 3 % Mg, e.g. EN AW-3103, 3207, 3003, 5005.

Classifications:	EN ISO 18273:AlMn1

Welding Current:	DC+
Alloy Type:	Aluminium alloy AlMn1
Coating Type:	Cloride and Fluoride Salt

Typical Weld Metal Analysis %

Mn	Si	Al	Fe
1.3	0.1	98.1	0.3

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.4 x 350 mm	50-90 A	25 V	0.41	294	24 s	0.51 kg/h
3.2 x 350 mm	70-120 A	21 V	0.89	88	23 s	1.74 kg/h

OK AlSi5



Covered electrode suitable for welding of AlMgSi-alloys e.g. EN AW 6060/6063, 6005, 6201 etc. Also suitable for welding of AlSi5Cu- and AlSi7Mg-castings.

Classifications:	EN ISO 18273:AlSi5

Welding Current:	DC+
Alloy Type:	Aluminium-silicon alloy, AlSi5
Coating Type:	Cloride and Fluoride Salt

Typical Weld Metal Analysis %

Si	Al	Fe
4.9	94.9	0.2

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.4 x 350 mm	50-90 A	25 V	0.37	333	24 s	0.45 kg/h
3.2 x 350 mm	70-120 A	23 V	0.47	166	27 s	0.80 kg/h

OK AlSi12



Covered electrode suitable for welding of aluminium castings of AlSi-, AlSiMg- and AlSiCu-types. Also possible to use as filler material in gas welding.

Classifications:	EN ISO 18273:AlSi12

Welding Current:	DC+
Alloy Type:	Aluminium-silicon alloy, AlSi12
Coating Type:	Cloride and Fluoride Salt

Typical Weld Metal Analysis %

Si	Al	Fe
12.4	87.4	0.2

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.4 x 350 mm	50-90 A	23 V	0.42	294	23 s	0.54 kg/h
3.2 x 350 mm	70-120 A	23 V	0.45	176	30 s	0.69 kg/h

OK Ni-CI



OK Ni-CI is a nickel cored electrode for joining normal grades of cast iron, such as grey-, ductile- and malleable irons. It is also suitable for rectification and repair of these grades and for joining them to steel. Deposition is done on cold or slightly preheated cast iron. Weld metal is well machinable. Typical applications are repair of cast iron parts such as cracks in engine blocks, pump housings, gear boxes, frames as well as foundry defects.

Classifications:	SFA/AWS A5.15:ENi-CI, EN ISO 1071:E C Ni-CI 3

Welding Current:	AC, DC+-
Alloy Type:	Ni-base alloy
Coating Type:	Basic Special high graphite

Typical Tensile Properties

Condition	**Tensile Strength**
AWS	
As welded	300 MPa

Typical Weld Metal Analysis %

C	**Mn**	**Si**	**Ni**	**Al**	**Cu**	**Fe**
1.0	0.2	0.3	93.5	0.1	0.3	4.5

Deposition Data

Diameter	**Current**	**Voltage**	**kg weld metal/ kg electrodes**	**Number of electrodes/kg weld metal**	**Fusion time per electrode at 90% I max**	**Deposition rate 90% I max**
2.5 x 300 mm	55-110 A	21 V	0.71	83	46 s	0.9 kg/h
3.2 x 350 mm	80-140 A	20 V	0.68	45	66 s	1.2 kg/h
4.0 x 350 mm	100-190 A	19 V	0.70	29	71 s	1.7 kg/h

OK NiFe-Cl-A



A nickel-iron cored electrode for joining normal grades of cast iron, such as grey-, ductile- and malleable irons. It is also suitable for rectification and repair of these grades and for joining them to steel. Deposition is done on cold or slightly preheated cast iron. The electrode produces a weld metal stronger and more resistant to solidification cracking than that of the pure nickel electrode type. It is specially suited for high duty welds in ductile irons and for welding grey irons with increased contents of sulphur and phosphorous. Typical applications include repair of pump bodies, heavy machine sections, gear teeth, flanges and pulleys.

Classifications:	SFA/AWS A5.15:ENiFe-Cl-A, EN ISO 1071:E C NiFe-Cl-A 1

Welding Current:	AC, DC+-
Alloy Type:	Ni-Fe alloy
Coating Type:	Basic Special high graphite

Typical Tensile Properties

Condition	**Tensile Strength**
AWS	
As welded	375 MPa

Typical Weld Metal Analysis %

C	**Mn**	**Si**	**Ni**	**Al**	**Fe**
1.5	0.8	0.7	51	1.4	46

Deposition Data

Diameter	**Current**	**kg weld metal/kg electrodes**	**Number of electrodes/kg weld metal**	**Fusion time per electrode at 90% I max**	**Deposition rate 90% I max**
2.5 x 300 mm	55-75 A	0.70	90	70 s	0.6 kg/h
3.2 x 350 mm	75-100 A	0.70	45	90 s	0.9 kg/h
4.0 x 350 mm	85-160 A	0.70	30	70 s	1.8 kg/h

OK NiFe-CI



A nickel-iron electrode for welding normal grades of cast iron and for joining them to steel. Can be used for malleable nodular cast iron and alloy cast iron. It has a special iron jacketed Ni core wire, which gives the electrode much improved current carrying capacity compared to electrodes with a homogeneous core wire. The electrode produces a weld metal stronger and more resistant to solidification cracking than the pure nickel electrode types. Typical applications are repair of pump bodies, heave machine sections, gear teeth, flanges and pulleys.

Classifications:	SFA/AWS A5.15:ENiFe-CI, EN ISO 1071:E C NiFe-1 3

Welding Current:	AC, DC+
Alloy Type:	Ni-Fe alloy
Coating Type:	Basic Special high graphite

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	380 MPa	560 MPa	>15 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Al	Cu	Fe
0.9	0.6	0.5	53	0.4	0.9	44

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	60-100 A	22 V	0.70	85.0	45 s	0.80 kg/h
3.2 x 350 mm	80-150 A	23 V	0.70	44.0	56 s	1.20 kg/h
4.0 x 350 mm	100-200 A	23 V	0.70	30.0	59 s	1.60 kg/h

OK 94.25



Electrode for welding copper and bronzes, especially tin bronzes. It is also suitable for cladding steels and for small-scale repair work in weldable cast irons.

Applications:
For the repair and construction of parts in casting such as:
- valves
- pumps
- housings
- bearing surfaces

Classifications:	DIN 1733:(EL-CuSn7)
Approvals:	Seproz UNA 272581

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Copper alloy
Coating Type:	Basic

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
ISO			
As welded	235 MPa	330-390 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
ISO		
As welded	20 °C	25 J
As welded	0 °C	20 J

Typical Weld Metal Analysis %

Mn	Cu	Sn
0.4	93	6.5

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 350 mm	60-90 A	22 V	0.71	77.0	39 s	1.20 kg/h
3.2 x 350 mm	90-125 A	24 V	0.72	46.0	40 s	1.90 kg/h
4.0 x 350 mm	125-170 A	25 V	0.74	30.5	41 s	2.90 kg/h

OK 94.35



Copper-nickel electrode used for chemical process equipment, desalination plants and offshore applications. It is suitable for the joining and cladding of matching and dissimilar alloys.

Classifications:	SFA/AWS A5.6:ECuNi

Welding Current:	DC+
Alloy Type:	Copper Nickel
Coating Type:	Basic

Typical Tensile Properties

Condition	Tensile Strength	Elongation
AWS		
As welded	400 MPa	30 %

Typical Weld Metal Analysis %

Mn	Ni	Cu	Fe
1.6	30	67	0.6

Deposition Data

Diameter	Current	Voltage	kg weld metal/ kg electrodes	Number of electrodes/kg weld metal	Fusion time per electrode at 90% I max	Deposition rate 90% I max
2.5 x 300 mm	55-70 A	22 V	0.64	93	49 s	3.9 kg/h
3.2 x 350 mm	70-120 A	23 V	0.66	48	50 s	4.4 kg/h

MIG/MAG Wires (GMAW)



MILD STEEL WIRES **2-4**
OK AristoRod 12.50 2-4
OK AristoRod 12.57 2-6
OK AristoRod 12.62 2-7
OK AristoRod 12.63 2-8
OK Autrod 12.51 2-10
OK Autrod 12.58 2-11
OK Autrod 12.64 2-13
FILARC PZ6000 2-15
Pipeweld 70S-6 2-16
Pipeweld 70S-6 Plus 2-17
Weld G3Si1 2-18

LOW ALLOY WIRES **2-19**
OK AristoRod 13.08 2-19
OK AristoRod 13.09 2-20
OK AristoRod 13.12 2-22
OK AristoRod 13.16 2-24
OK AristoRod 13.22 2-25
OK AristoRod 13.26 2-27
OK AristoRod 55 2-29
OK AristoRod 69 2-31
OK AristoRod 79 2-32
OK AristoRod 89 2-33
OK Autrod 13.17 2-34
OK Autrod 13.23 2-35
OK Autrod 13.25 2-36
OK Autrod 13.28 2-37
OK Autrod 13.29 2-38
OK Autrod 13.37 2-39
Pipeweld 100S 2-40

ALUMINIUM WIRES **2-41**
OK Autrod 1070 2-41
OK Autrod 1100 2-42
OK Autrod 1450 2-43
OK Autrod 18.22 2-44
OK Autrod 4008 2-45
OK Autrod 4043 2-46
OK Autrod 4047 2-47
OK Autrod 5087 2-48
OK Autrod 5183 2-49
OK Autrod 5356 2-50
OK Autrod 5554 2-51
OK Autrod 5556 2-52
OK Autrod 5556A 2-53
OK Autrod 5754 2-54

STAINLESS STEEL WIRES 2-55
OK Autrod 16.95 2-55
OK Autrod 308L 2-56
OK Autrod 308LSi 2-57
OK Autrod 308H 2-58
OK Autrod 309L 2-59
OK Autrod 309LSi 2-60
OK Autrod 309Si 2-61
OK Autrod 309MoL 2-62
OK Autrod 310 2-63
OK Autrod 312 2-64
OK Autrod 316L 2-65
OK Autrod 316LSi 2-66
OK Autrod 16.38 2-67
OK Autrod 317L 2-68
OK Autrod 318Si 2-69
OK Autrod 347Si 2-70
OK Autrod 385 2-71
OK Autrod 2209 2-72
OK Autrod 2307 2-73
OK Autrod 2509 2-74
OK Autrod 409Nb 2-75
OK Autrod 410NiMo 2-76
OK Autrod 430LNb 2-77
OK Autrod 430Ti 2-78
OK Autrod 430LNbTi 2-79

NICKEL WIRES 2-80
OK Autrod Ni-1 2-80
OK Autrod NiCr-3 2-81
OK Autrod NiCrMo-3 2-82
OK Autrod NiFeCr-1 2-83
OK Autrod NiCrMo-4 2-83
OK Autrod NiCrMo-13 2-84
OK Autrod NiCu-7 2-85

COPPER-BASED ALLOYS 2-86
OK Autrod 19.12 2-86
OK Autrod 19.30 2-87
OK Autrod CuSi Laser 2-88
OK Autrod 19.40 2-89
OK Autrod 19.41 2-90
OK Autrod 19.46 2-91
OK Autrod 19.49 2-92

HARDFACING 2-93
OK Autrodur 38 G M 2-93
OK Autrodur 56 G M 2-93
OK Autrodur 58 G M 2-94

OK AristoRod 12.50

OK AristoRod 12.50 is a bare Mn-Si-alloyed G3Si1/ER70S-6 solid wire for the GMAW of non-alloyed steels, as used in general construction, automotive components, pressure vessel fabrication and shipbuilding. OK AristoRod 12.50 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 38 3 C1 3Si1, EN ISO 14341-A:G 42 4 M21 3Si1, EN ISO 14341-A:G 42 4 M20 3Si1
Classifications Wire Electrode:	EN ISO 14341-A:G 3Si1, SFA/AWS A5.18:ER70S-6, CAN/CSA-ISO 14341:B-G 49A 3 C1 S6, JIS Z 3312:YGW 12 (C1)
Approvals:	GL 3YS, DNV III YMS, VdTÜV 10052, PRS 3YS, RS 3YMS, ABS 3Y SA, BV SA3YM, CE EN 13479, CWB B-G 49A 3 C1 S6 (B-G 49A 3 C G6), DB 42.039.29, DNV III YMS, NAKS/HAKC 1.0MM-1.6MM, GL 3YS, JIS YGW12 (C1), LR 3YS H15, PRS 3YS, RINA 3Y S (C1), RINA 3Y S (M21), RS 3YMS

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	480 MPa	560 MPa	26 %
Stress relieved 15 hr 620 °C	380 MPa	495 MPa	28 %
EN CO2 (C1)			
As welded	450 MPa	540 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	130 J
As welded	-20 °C	90 J
As welded	-30 °C	70 J
As welded	-40 °C	60 J
Stress relieved 15 hr 620 °C	20 °C	120 J
Stress relieved 15 hr 620 °C	-20 °C	90 J
EN CO2 (C1)		
As welded	20 °C	110 J
As welded	-29 °C	98 J

OK AristoRod 12.50

Typical Wire Composition %		
C	**Mn**	**Si**
0.08	1.46	0.85

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	60-200 A	18-24 V	3.2-10.0 m/min	0.8-2.5 kg/h
0.9 mm	70-250 A	18-26 V	3.0-12.0 m/min	0.8-3.3 kg/h
1.0 mm	80-300 A	18-32 V	2.7-15.0 m/min	1.0-5.5 kg/h
1.14 mm	100-350 A	18-34 V	2.6-15.0 m/min	1.2-7.0 kg/h
1.2 mm	120-380 A	18-35 V	2.5-15.0 m/min	1.3-8.0 kg/h
1.32 mm	130-400 A	19-35 V	2.4-15.0 m/min	1.5-8.5 kg/h
1.4 mm	150-420 A	22-36 V	2.3-15.0 m/min	1.6-8.7 kg/h
1.6 mm	225-550 A	28-38 V	2.3-15.0 m/min	2.1-11.4 kg/h

OK AristoRod 12.57

OK AristoRod 12.57 is a bare Mn-Si-alloyed G2Si/ER70S-3 solid wire for the GMAW of non-alloyed steels, as used in general construction, automotive components, pressure vessel fabrication and shipbuilding. OK AristoRod 12.57 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 35 2 C1 2Si, EN ISO 14341-A:G 38 3 M21 2Si
Classifications Wire Electrode:	EN ISO 14341-A:G 2Si, SFA/AWS A5.18:ER70S-3, CAN/CSA-ISO 14341:B-G 49A 2 C1 S3
Approvals:	CE EN 13479, CWB B-G 49A 2 C1 S3 (B-G 49A 2 C G3), DB 42.039.10, VdTÜV 10615

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	430 MPa	515 MPa	26 %
EN CO2 (C1)			
As welded	385 MPa	485 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	140 J
As welded	-20 °C	110 J
As welded	-30 °C	90 J
EN CO2 (C1)		
As welded	20 °C	125 J
As welded	-20 °C	90 J

Typical Wire Composition %

C	Mn	Si
0.074	1.05	0.55

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.9 mm	70-250 A	18-26 V	3.0-12.0 m/min	0.8-3.3 kg/h
1.0 mm	80-300 A	18-32 V	2,7-15 m/min	1-5,6 kg/h
1.2 mm	120-380 A	18-34 V	2,5-15 m/min	1,3-8 kg/h
1.6 mm	120-380 A	18-34 V	2,5-15 m/min	1,3-8 kg/h

OK AristoRod 12.62

OK AristoRod 12.62 is a bare triple deoxidised G2Ti/ER70S-2 solid wire for the GMAW of non-alloyed steels, as used in general construction, pressure vessel fabrication and shipbuilding. It yields high-quality welds in semi-killed and rimmed steels, as well as with grades with various carbon contents. Added desoxidants, Al - Ti- Zr, make the wire also suitable for steels with a dirty or rusty surface, without sacrificing weld quality.

OK AristoRod 12.62 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 42 3 C1 2Ti, EN ISO 14341-A:G 46 4 M21 2Ti
Classifications Wire Electrode:	EN ISO 14341-A:G 2Ti, SFA/AWS A5.18:ER70S-2

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	570 MPa	625 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	-40 °C	180 J

Typical Wire Composition %

C	Mn	Si
0.06	1.1	0.60

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	60-200 A	18-24 V	3.2-10.0 m/min	0.8-2.5 kg/h
0.9 mm	70-250 A	18-26 V	3.0-12.0 m/min	0.8-3.3 kg/h
1.0 mm	80-300 A	18-32 V	2.7-15.0 m/min	1.0-5.5 kg/h
1.2 mm	120-380 A	18-35 V	2.5-15.0 m/min	1.3-8.0 kg/h
1.6 mm	225-550 A	28-38 V	2.3-15.0 m/min	2.1-11.4 kg/h

OK AristoRod 12.63

OK AristoRod 12.63 is a bare Mn-Si-alloyed G4Si1/ER70S-6 solid wire for the GMAW of non-alloyed steels, as used in general construction, automotive components, pressure vessel fabrication and shipbuilding. It has a slightly higher manganese and silicon content than OK AristoRod 12.50 to increase the weld metal strength. This also promotes a low sensitivity to surface impurities and contributes to smooth, sound welds. OK AristoRod 12.63 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 42 3 C1 4Si1, EN ISO 14341-A:G 46 4 M21 4Si1, EN ISO 14341-B:G 55A 5 M21 S6
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, CAN/CSA-ISO 14341:B-G 49A 3 C1 S6, EN ISO 14341-A:G 4Si1, EN ISO 14341-B:G S6
Approvals:	CE EN 13479, DNV III YMS (M21), ABS 3YSA (M21), CWB B-G 49A 3 C1 S6 (B-G 49A 3 C G6), ABS 3YSA (C1), DB 42.039.30, DNV III YMS (C1), GL 3YS (C1), LR 3YS H15 (C1), LR 3YS H15 (M21), NAKS/HAKC 1.2MM, VdTÜV 10051, BV SA3YM (C1 & M21)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties			
Condition	**Yield Strength**	**Tensile Strength**	**Elongation**
EN 80Ar/20CO2 (M21)			
As welded	495 MPa	580 MPa	29 %
Stress relieved 15 hr 650 °C	395 MPa	520 MPa	28 %
EN CO2 (C1)			
As welded	485 MPa	570 MPa	28 %

Typical Charpy V-Notch Properties		
Condition	**Testing Temperature**	**Impact Value**
EN 80Ar/20CO2 (M21)		
As welded	20 °C	130 J
As welded	-20 °C	90 J
As welded	-30 °C	70 J
As welded	-40 °C	60 J
Stress relieved 15 hr 650 °C	20 °C	120 J
Stress relieved 15 hr 650 °C	-20 °C	90 J
EN CO2 (C1)		
As welded	20 °C	110 J
As welded	-30 °C	76 J

OK AristoRod 12.63

Typical Wire Composition %		
C	**Mn**	**Si**
0.074	1.68	0.95

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	60-185 A	18-24 V	3,2-10 m/min	0,8-2,5 kg/h
0.9 mm	70-250 A	18-26 V	3-12 m/min	0,8-3,3 kg/h
1.0 mm	80-300 A	18-32 V	2,7-15 m/min	1-5,5 kg/h
1.2 mm	120-380 A	18-35 V	2,3-15 m/min	1,2-8 kg/h
1.4 mm	120-380 A	18-35 V	2,3-15 m/min	1,2-8 kg/h
1.6 mm	120-380 A	18-35 V	2,3-15 m/min	1,2-8 kg/h

OK Autrod 12.51

OK Autrod 12.51 is a copper-coated solid wire with higher levels of deoxidizers (manganese and silicon). The high content of deoxidizers allow welding over heavier amounts of dirt, rust, and mill scale while providing a more fluid puddle and smoother bead profile.

Classifications Weld Metal:	EN ISO 14341-A:G 38 3 C1 3Si1, EN ISO 14341-A:G 42 4 M21 3Si1
Classifications Wire Electrode:	EN ISO 14341-A:G 3Si1, SFA/AWS A5.18:ER70S-6, CAN/CSA-ISO 14341:B-G 49A 3 C1 S6, JIS Z 3312:YGW 12(C1)
Approvals:	CE EN 13479, DNV III YMS (M21), VdTÜV 00899, BV SA3YM (M21), JIS YGW12, CWB B-G 49A 3 C1 S6 (B-G 49A 3 C G6), DNV III YMS (C1), GL 3YS (C1), BV SA3YM (C1), DB 42.039.06, RINA 3YS (C1), RINA 3YS (M21), NAKS/HAKC 1.0MM-2.0MM, NAKS/HAKC 1.2MM-1.6MM, ABS 3YSA (C1 & M21), LR 3YS H15 (C1 & M21), PRS 3YS (C1 & M21), RS 3YMS (C1 & M21)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar 20CO2			
As welded	480 MPa	560 MPa	26 %
Stress relieved 15 hr 620 °C	380 MPa	495 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar 20CO2		
As welded	20 °C	130 J
As welded	-20 °C	130 J
As welded	-30 °C	90 J
As welded	-40 °C	90 J
Stress relieved 15 hr 620 °C	20 °C	120 J
Stress relieved 15 hr 620 °C	-20 °C	90 J

Typical Wire Composition %

C	Mn	Si
0.078	1.46	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.6 mm	30-100 A	15-20 V	5,5-13 m/min	0,7-1,7 kg/h
0.8 mm	60-200 A	18-24 V	3,2-13 m/min	0,8-3,0 kg/h
0.9 mm	70-250 A	18-26 V	3,0-12 m/min	0,9-3,6 kg/h
1.0 mm	80-300 A	18-32 V	2,7-15 m/min	1,0-5,6 kg/h
1.2 mm	120-380 A	18-34 V	2,5-15 m/min	1,3-8,0 kg/h
1.4 mm	150-420 A	22-36 V	2,3-12 m/min	1,6-8,7 kg/h
1.6 mm	225-550 A	28-38 V	2.3-12 m/min	2.1-11.4 kg/h
2.0 mm	300-650 A	32-44 V	4-15 m/min	3,2-12,5 kg/h

OK Autrod 12.58

OK Autrod 12.58 is a copper-coated, Mn-Si-alloyed G2Si/ER70S-3 solid wire for the GMAW of non-alloyed steels, as used in general construction, pressure vessel fabrication and shipbuilding. The wire has a carefully controlled wire chemistry and a unique surface technology providing superior weld -metal quality at high wire feed speeds and at high welding currents. The wire can be used with both Ar/CO2 mixed gas and pure CO2 shielding gas.

Classifications Weld Metal:	EN ISO 14341-A:G 35 2 C1 2Si, EN ISO 14341-A:G 38 3 M21 2Si
Classifications Wire Electrode:	EN ISO 14341-A:G 2Si, SFA/AWS A5.18:ER70S-3
Approvals:	CE EN 13479, ABS 3YSA (M21), ABS 3YSA (C1), BV SA3YM (C1&M21), LR 3YS H15 (C1), LR 3YS H15 (M21), DB 42.039.17, GL 3YS (C1&M21), LR 3YM H15 (C1), LR 3YM H15 (M21), VdTÜV 07653

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	430 MPa	515 MPa	26 %
EN CO2 (C1)			
As welded	410 MPa	500 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	140 J
As welded	-20 °C	130 J
As welded	-30 °C	90 J
EN CO2 (C1)		
As welded	20 °C	125 J
As welded	-20 °C	90 J

Typical Wire Composition %

C	Mn	Si
0.074	1.05	0.55

OK Autrod 12.58

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.6 mm	30-100 A	15-20 V	5,5-13 m/min	0,7-1,7 kg/h
0.8 mm	60-200 A	18-24 V	3,2-10 m/min	0,8-3 kg/h
0.9 mm	70-250 A	18-26 V	3-12 m/min	0,9-3,6 kg/h
1.0 mm	80-300 A	18-32 V	2,7-15 m/min	1-5,6 kg/h
1.2 mm	120-380 A	18-34 V	2,5-15 m/min	1,3-8 kg/h
1.6 mm	225-550 A	28-38 V	2.3-12 m/min	2.1-11.4 kg/h

OK Autrod 12.64

OK Autrod 12.64 is a copper-coated, Mn-Si-alloyed G4Si1/ER70S-6 solid wire for the GMAW of non-alloyed steels, as used in general construction, automotive components, pressure vessel fabrication and shipbuilding. It has a slightly higher manganese and silicon content than OK Autrod 12.50 to increase the weld metal strength. This also promotes low sensitivity to surface impurities and contributes to smooth, sound welds. The wire can be used with both Ar/CO2 mixed gas and pure CO2 shielding gas

Classifications Weld Metal:	EN ISO 14341-A:G 42 3 C1 4Si1, EN ISO 14341-A:G 46 4 M21 4Si1, EN ISO 636-A:W 46 3 W4Si1
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, EN ISO 14341-A:G 4Si1, EN ISO 636-A:W4Si1
Approvals:	CE EN 13479, DNV III YMS (M21), ABS 3YSA (M21), ABS 3YSA (C1), BV SA3YM (C1&M21), DNV III YMS (C1), LR 3YS H15 (C1), LR 3YS H15 (M21), RS 3YMS (C1), RS 3YMS (M21), GL 3YS (C1&M21), DB 42.039.11, NAKS/HAKC 1.2MM-1.6MM, VdTÜV 04294

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	535 MPa	595 MPa	26 %
EN 80Ar/20CO2 (M21)			
Stress relieved 15 hr 620 °C	395 MPa	520 MPa	28 %
EN CO2 (C1)			
As welded	427 MPa	537 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	130 J
As welded	-20 °C	90 J
As welded	-30 °C	75 J
As welded	-40 °C	70 J
EN 80Ar/20CO2 (M21)		
Stress relieved 15 hr 620 °C	20 °C	120 J
Stress relieved 15 hr 620 °C	-20 °C	90 J
EN CO2 (C1)		
As welded	20 °C	110 J
As welded	-29 °C	76 J

OK Autrod 12.64

Typical Wire Composition %		
C	**Mn**	**Si**
0.074	1.68	0.95

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	60-185 A	18-24 V	3,2-10 m/min	0,8-2,5 kg/h
0.9 mm	70-250 A	18-26 V	3-12 m/min	0,8-3,3 kg/h
1.0 mm	80-300 A	18-32 V	2,7-15 m/min	1-5,5 kg/h
1.2 mm	120-380 A	18-35 V	2,3-15 m/min	1,2-8 kg/h
1.4 mm	150-420 A	22-36 V	2,5-12 m/min	1,7-8,5 kg/h
1.6 mm	120-380 A	18-35 V	2,3-15 m/min	1,2-8 kg/h
2.0 mm	120-380 A	18-35 V	2,3-15 m/min	1,2-8 kg/h

FILARC PZ6000

Copper coated, manganese-silicon alloyed solid wire for GMAW of unalloyed steels, such as general structural, pressure vessel, shipbuilding and for fine-grained carbon-manganese steels for the same purpose with a minimum yield strength of max 420 MPa. The electrode can be welded with Ar/CO2 or with pure CO2 as the shielding gas. FILARC PZ6000 delivered in the unique ESAB Marathon Pac is excellent in mechanised welding applications.

Classifications Weld Metal:	EN ISO 14341-A:G 38 2 C1 3Si1, EN ISO 14341-A:G 42 3 M21 3Si1
Classifications Wire Electrode:	EN ISO 14341-A:G 3Si1, SFA/AWS A5.18:ER70S-6
Approvals:	CE EN 13479, DB 42.105.01, VdTÜV 06309

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	450 MPa	560 MPa	26 %
EN CO2 (C1)			
As welded	430 MPa	520 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	130 J
As welded	-30 °C	70 J
As welded	-40 °C	70 J
EN CO2 (C1)		
As welded	20 °C	110 J
As welded	-29 °C	98 J

Typical Wire Composition %

C	Mn	Si
0.078	1.46	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.6 mm	30-100 A	15-20 V	5,5-13 m/min	0,7-1,7 kg/h
0.8 mm	60-200 A	18-24 V	3,2-13 m/min	0,8-3,0 kg/h
0.9 mm	70-250 A	18-26 V	3,0-12 m/min	0,9-3,6 kg/h
1.0 mm	80-300 A	18-32 V	2,7-15 m/min	1,0-5,6 kg/h
1.2 mm	120-380 A	18-34 V	2,5-15 m/min	1,3-8,0 kg/h

Pipeweld 70S-6

A copper coated solid wire especially designed for downhill circumferential GMAW on pipes in materials such as APi 5L (grade 52 up to grade 70). The main applications are pipelines, compressor stations and associated works in the oil and gas distribution industries with special requirements. To meet these requirements the electrode is a “clean” type of EN ISO 14341-A G4Si1 as regards chemical analysis.

Classifications Weld Metal:	EN ISO 14341-A:G 42 2 C1 4Si1, EN ISO 14341-A:G 46 3 M21 4Si1, EN ISO 636-A:W 46 3 W4Si1
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, EN ISO 636-A:W4Si1, EN ISO 14341-A:G4Si1
Approvals:	VdTÜV 12430

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	545 MPa	600 MPa	26 %
EN CO2 (C1)			
As welded	485 MPa	575 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	140 J
As welded	-20 °C	100 J
As welded	-30 °C	80 J
EN CO2 (C1)		
As welded	20 °C	120 J
As welded	-20 °C	80 J

Typical Wire Composition %

C	Mn	Si
0.09	1.65	0.97

Pipeweld 70S-6 Plus

Pipeweld 70S-6 Plus is a copper free solid wire of very high purity for downhill circumferential GMAW welding on pipe qualities API 5L, Grade X52 to Grade X70. The electrode permits welding with high current (spray-arc) and also with short circuiting transfer in all positions.

Classifications Weld Metal:	EN ISO 14341-A:G 42 2 C1 4Si1, EN ISO 14341-A:G 46 3 M21 4Si1
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, EN ISO 14341-A:G 4Si1

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	545 MPa	600 MPa	26 %
EN CO2 (C1)			
As welded	495 MPa	575 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	140 J
As welded	-20 °C	100 J
As welded	-30 °C	80 J
EN CO2 (C1)		
As welded	20 °C	120 J
As welded	-20 °C	80 J

Typical Wire Composition %

C	Mn	Si
0.090	1.7	1.0

Weld G3Si1

A copper coated, G3Si1 solid wire for GMAW of all general structural and engineering unalloyed and low-alloyed carbon-manganese steels. The electrode may be welded with either a gas mixture or with pure CO2 as the shielding gas.

Classifications Weld Metal:	EN ISO 14341-A:G 38 2 C1 3Si1, EN ISO 14341-A:G 42 3 M21 3Si1
Classifications Wire Electrode:	EN ISO 14341-A:G 3Si1, SFA/AWS A5.18:ER70S-6
Approvals:	CE EN 13479, NAKS/HAKC 1.2MM, DB 42.039.39, VdTÜV 13038

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel (Mn/Si-alloyed)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	470 MPa	560 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	-30 °C	70 J

Typical Wire Composition %

C	Mn	Si
0.078	1.46	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	60-180 A	18-22 V	3,2-11 m/min	0,8-2,6 kg/h
1.0 mm	80-250 A	18-30 V	2,7-13 m/min	1-4,8 kg/h
1.2 mm	120-330 A	18-34 V	2,3-13 m/min	1,3-6,9 kg/h

OK AristoRod 13.08

OK AristoRod 13.08 is a 0.4Mo-alloyed (ER80S-D2), bare, solid wire for the GMAW of creep-resistant steels of the same composition, like those used with a service temperature of up to 500°C. OK AristoRod 13.08 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 46 0 C1 4Mo, EN ISO 14341-A:G 50 4 M21 4Mo
Classifications Wire Electrode:	EN ISO 14341-A:G 4Mo, SFA/AWS A5.28:ER80S-D2, CAN/CSA-ISO 14341:B-G 55A 3 C1 S4M31

Alloy Type:	Low alloyed (1.6 % Mn, 0.4 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS CO2 (C1)			
As welded	540 MPa	645 MPa	25 %
EN 80Ar/20CO2 (M21)			
As welded	590 MPa	685 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS CO2 (C1)		
As welded	20 °C	90 J
As welded	-20 °C	36 J
As welded	-40 °C	38 J
EN 80Ar/20CO2 (M21)		
As welded	20 °C	140 J
As welded	-20 °C	100 J
As welded	-40 °C	80 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.098	1.78	0.6	0.05	0.04	0.47

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
0.9 mm	70-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.0 mm	90-300 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,10-12 m/min	3,3-11.6 kg/h

OK AristoRod 13.09

OK AristoRod 13.09 is a 0.5Mo-alloyed, bare, solid wire for the GMAW of creep-resistant steels of the same composition, like those used for pipes in pressure vessels and boilers with a service temperature of up to 500°C. OK AristoRod 13.09 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 38 0 C1 2Mo, EN ISO 14341-A:G 46 2 M21 2Mo
Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-G, EN ISO 14341-A:G 2Mo, EN ISO 21952-A:G MoSi, EN ISO 21952-B:G 1M3
Approvals:	CE EN 13479, DNV III YMS (M21), NAKS/HAKC 1.2MM, DB 42.039.31, VdTÜV 10088

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
80Ar/20CO2			
As welded	515 MPa	630 MPa	26 %
As welded+	425 MPa	570 MPa	20 %
80Ar/20CO2 Tested at 450°C			
Stress relieved 15 hr 620 °C	430 MPa	545 MPa	26 %
Stress relieved 15 hr 620 °C	370 MPa	490 MPa	23 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
80Ar/20CO2		
As welded	20 °C	117 J
As welded	-20 °C	75 J
As welded	-40 °C	57 J
Stress relieved 15 hr 620 °C	20 °C	150 J
Stress relieved 15 hr 620 °C	0 °C	130 J
Stress relieved 15 hr 620 °C	-20 °C	95 J
Stress relieved 15 hr 620 °C	-40 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.094	1.09	0.61	0.04	0.07	0.45

OK AristoRod 13.09

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,10-12 m/min	3,3-11.6 kg/h

OK AristoRod 13.12

OK AristoRod 13.12 is a 1.1Cr-0.5Mo-alloyed, bare, solid wire for the GMAW of creep-resistant steels of the same composition, like those used for pipes in pressure vessels and boilers with a service temperature of up to 450°C. OK AristoRod 13.12 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-G, EN ISO 21952-A:G CrMo1Si, EN ISO 21952-B:G 55M 1CM3, GOST 2246:08X CM A
Approvals:	NAKS/HAKC 1.2MM, VdTÜV 10089

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low Alloyed (1 % Cr, 0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
Q.T. 940+730°C 15h	320 MPa	460 MPa	35 %
As welded	670 MPa	785 MPa	18 %
Stress relieved 0.5 hr 700 °C	450 MPa	580 MPa	24 %
EN 80Ar/20CO2 (M21) Tested at 450°C			
Q.T.+ 940+730°C 15h	210 MPa	410 MPa	25 %
As welded+	605 MPa	760 MPa	15 %
Stress relieved 0.5 hr 700 °C	390 MPa	500 MPa	17 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	40 J
As welded	0 °C	30 J
As welded	-20 °C	25 J
PWHT 700°C 0.5h	-40 °C	25 J
Q.T. 940+730°C 15h	20 °C	115 J
Q.T. 940+730°C 15h	0 °C	60 J
Q.T. 940+730°C 15h	-20 °C	30 J
Stress relieved 0.5 hr 700 °C	20 °C	80 J
Stress relieved 0.5 hr 700 °C	0 °C	40 J
Stress relieved 0.5 hr 700 °C	-20 °C	30 J

OK AristoRod 13.12

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
0.11	1.00	0.65	0.02	1.18	0.42

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,1-12 m/min	3,3-11,6 kg/h

OK AristoRod 13.16

OK AristoRod 13.16 is a low-alloyed, chromium-molybdenum (1,3% Cr, 0,5% Mo) ER80S-B2, solid wire for GMAW of creep resistant steels like SA-387 Grade 11, A 335 Grade P11 or similar materials. OK AristoRod 13.16 is a high purity wire with a guaranteed Bruscato factor X<15. It is treated with ESAB's unique advanced surface characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristics features include excellent start properties; trouble free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Wire Electrode:	EN ISO 21952-A:Z CrMo1Si, EN ISO 21952-B:G 55A 1CM, SFA/AWS A5.28:ER80S-B2
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low-alloyed, 1,3Cr-0,5Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar / 1-3% O2 (M13) AWS			
Stress relieved 1 hr 620 °C	540 MPa	640 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar / 1-3% O2 (M13) AWS		
Stress relieved 1 hr 620 °C	20 °C	163 J
Stress relieved 1 hr 620 °C	-20 °C	100 J
Stress relieved 1 hr 620 °C	-40 °C	>47 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.1	0.4	0.5	0.1	1.3	0.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK AristoRod 13.22

OK AristoRod 13.22 is a 2.5Cr-1.0Mo-alloyed, bare, solid wire for the GMAW of creep-resistant steels of similar composition, with service temperatures of up to 600°C, but is also suitable for welding high strength steels.
OK AristoRod 13.22 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Wire Electrode:	EN ISO 21952-A:G CrMo2Si, EN ISO 21952-B:G 62 M 2C1M3, SFA/AWS A5.28:ER90S-G
Approvals:	NAKS/HAKC 1.2MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (Cr 2.5% and Mo 1.0%)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS 80Ar/20CO2 (M21)			
As welded	750 MPa	890 MPa	19 %
AWS 80Ar/20CO2 (M21) Tested at 450°C			
As welded+	680 MPa	880 MPa	19 %
EN 80Ar/20CO2 (M21)			
Stress relieved 1 hr 690 °C	550 MPa	655 MPa	24 %
Stress relieved 1 hr 720 °C	530 MPa	642 MPa	24 %
EN 80Ar/20CO2 (M21) Tested at 450°C			
Stress relieved 0.5 hr 750 °C	410 MPa	520 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS 80Ar/20CO2 (M21)		
As welded	20 °C	55 J
As welded	-40 °C	30 J
EN 80Ar/20CO2 (M21)		
Stress relieved 1 hr 720 °C	20 °C	150 J
Stress relieved 1 hr 720 °C	20 °C	150 J
Stress relieved 1 hr 720 °C	-20 °C	120 J
Stress relieved 1 hr 720 °C	-20 °C	120 J
Stress relieved 1 hr 720 °C	-40 °C	85 J
Stress relieved 1 hr 720 °C	-40 °C	85 J

OK AristoRod 13.22

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
0.07	1.0	0.65	0.1	2.45	1.0

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.0 mm	80-280 A	18-28 V	2.7-14.7 m/min	1.0-5.4 kg/h
1.2 mm	120-350 A	20-33 V	2.7-12.4 m/min	1.5-6.6 kg/h
1.6 mm	225-480 A	26-38 V	3.1-8.1 m/min	3.3-0 kg/h

OK AristoRod 13.26

OK AristoRod 13.26 is a 0.8Ni-0.3Cu-alloyed, bare, solid wire for the GMAW of weathering steels such as COR-TEN, Patinax, Dillicor and so on. It is also suitable for high strength steels with a yield strength of up to 470 MPa.

OK AristoRod 13.26 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 14341-A:G 42 0 C1 Z 3Ni1Cu, EN ISO 14341-A:G 46 4 M21 Z 3Ni1Cu
Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-G, EN ISO 14341-A:G Z 3Ni1Cu
Approvals:	CE EN 13479, DNV III YMS (M21), NAKS/HAKC 1.2MM, DB 42.039.32, DNV II YMS (C1)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (0.8 % Ni, 0.4 % Cu)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS 80Ar/20CO2 (M21)			
As welded	540 MPa	625 MPa	26 %
AWS 98Ar/2O2 (M13)			
As welded	580 MPa	650 MPa	22 %
EN 80Ar/20CO2 (M21)			
As welded	540 MPa	625 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS 80Ar/20CO2 (M21)		
As welded	20 °C	140 J
As welded	0 °C	142 J
As welded	-20 °C	110 J
As welded	-40 °C	83 J
As welded	-60 °C	50 J
AWS 98Ar/2O2 (M13)		
As welded	20 °C	140 J
As welded	-20 °C	100 J
As welded	-40 °C	70 J
As welded	-60 °C	30 J
EN 80Ar/20CO2 (M21)		
As welded	-60 °C	50 J

OK AristoRod 13.26

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**
0.095	1.32	0.80	0.84	0.12	0.02	0.30

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.4 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,1-8,1 m/min	3,3-0 kg/h

OK AristoRod 55

OK AristoRod 55 is a 0.5Cr-0.5Ni-0.2Mo-alloyed, bare, solid wire for the GMAW of high strength steels. OK AristoRod 55 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 16834-A:G 55 4 M Mn3NiCrMo
Classifications Wire Electrode:	EN ISO 16834-A:G Mn3NiCrMo, SFA/AWS A5.28:ER100S-G
Approvals:	CE EN 13479, NAKS/HAKC 1.2MM, LR 4Y55S H5

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (0.5 % Cr, 0.5 % Ni, 0.2 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	690 MPa	770 MPa	20 %
Stress relieved 1 hr 570 °C	660 MPa	750 MPa	24 %
Stress relieved 1 hr 620 °C	660 MPa	750 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	0 °C	80 J
As welded	-20 °C	75 J
As welded	-30 °C	65 J
As welded	-40 °C	60 J
As welded	-50 °C	50 J
As welded	-60 °C	50 J
Stress relieved 1 hr 620 °C	0 °C	95 J
Stress relieved 1 hr 570 °C	-20 °C	60 J
Stress relieved 1 hr 620 °C	-20 °C	70 J
Stress relieved 1 hr 620 °C	-30 °C	55 J
Stress relieved 1 hr 570 °C	-40 °C	50 J
Stress relieved 1 hr 620 °C	-50 °C	40 J
Stress relieved 1 hr 570 °C	-60 °C	35 J

OK AristoRod 55

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
0.12	1.38	0.71	0.53	0.58	0.20

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,5-12,0 m/min	3,3-11,6 kg/h

OK AristoRod 69

The non-copper-coated OK AristoRod 69 is a low-alloyed, chromium-nickel-molybdenum (0,3% Cr, 1,4% Ni, 0,25% Mo), solid wire for GMAW of high tensile strength steels requiring tough weld metal for critical applications. Also suitable when high impact strength at lower temperatures is required. The AristoRod wires are suitable for operating at high currents with maintained disturbance free wire feeding giving a stable arc with a low amount of spatter. OK AristoRod 69 delivered in the unique ESAB Marathon Pac is excellent in mechanised welding applications.

Classifications Weld Metal:	EN ISO 16834-A:G 69 4 M Mn3Ni1CrMo
Classifications Wire Electrode:	EN ISO 16834-A:G Mn3Ni1CrMo, SFA/AWS A5.28:ER110S-G
Approvals:	CE EN 13479, NAKS/HAKC 1.2MM, ABS ER 110S-G (M21), DB 42.039.33, DNV IV Y69MS, GL 4Y69M, VdTÜV 11837

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (1.4 % Ni, 0.3 % Cr, 0.3 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	730 MPa	800 MPa	19 %
Stress relieved 15 hr 620 °C	690 MPa	750 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	100 J
As welded	-40 °C	73 J
Stress relieved 15 hr 620 °C	20 °C	130 J
Stress relieved 15 hr 620 °C	-20 °C	60 J
Stress relieved 15 hr 620 °C	-30 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.089	1.54	0.53	1.23	0.26	0.24

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
0.9 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,1-8,1 m/min	3,3-0 kg/h

OK AristoRod 79

OK AristoRod 79 is a 0.3Cr-1.9Ni-0.5Mo-alloyed, bare, solid wire for the GMAW of high strength steels, heat-treated steels and fine-grained structural steels with a yield strength of up to 850 MPa, such as XABO90. OK AristoRod 79 is treated with ESAB's unique Advanced Surface Characteristics (ASC) technology, taking MAG welding operations to new levels of performance and all-round efficiency, especially in robotic and mechanised welding. Characteristic features include excellent start properties; trouble-free feeding at high wire speeds and lengthy feed distances; a very stable arc at high welding currents; extremely low levels of spatter; low fume emission; reduced contact tip wear and improved protection against corrosion of the wire.

Classifications Weld Metal:	EN ISO 16834-A:G 79 4 M Mn4Ni2CrMo
Classifications Wire Electrode:	EN ISO 16834-A:G Mn4Ni2CrMo, SFA/AWS A5.28:ER120S-G
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	0,3% Cr, 1,9% Ni, 0,5% Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	810 MPa	900 MPa	18 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	0 °C	70 J
As welded	-20 °C	60 J
As welded	-40 °C	55 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.09	1.82	0.89	2.03	0.25	0.64

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK AristoRod 89

The non copper coated OK AristoRod 89 is a low-alloyed, chromium-nickel-molybdenum (0,4% Cr, 2,2% Ni, 0,55% Mo), solid wire for GMAW of ultra high tensile strength steels requiring tough weld metal for critical applications. Also suitable when high impact strength at lower temperatures is required. The AristoRod wires are suitable for operating at high currents with maintained disturbance free wire feeding giving a stable arc with a low amount of spatter, due to its unique Advanced Surface Characteristics ASC) technology. OK AristoRod 89 is delivered on spools or in the unique ESAB Marathon Pac, which is excellent in mechanised welding applications.

Classifications Weld Metal:	EN ISO 16834-A:G89 4 M Mn4Ni2CrMo
Classifications Wire Electrode:	EN ISO 16834-A:G Mn4Ni2CrMo, SFA/AWS A5.28:ER120S-G
Approvals:	CE EN 13479, DB 42.039.37, GL 4Y89S, VdTÜV 11881

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	0,4% Cr, 2,2%Ni, 0,55% Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	920 MPa	940 MPa	18 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	-40 °C	47 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.081	1.75	0.8	2.22	0.41	0.533

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrod 13.17

OK Autrod 13.17 is a 2.5Cr-1.1Mo-alloyed (ER90S-B3), copper-coated, solid wire for the GMAW of creep-resistant steels like SA-387 Grade 22, A335 Grade P22 or similar materials. The wire has a high purity chemistry with a guaranteed Bruscato factor X < 15.

Classifications Wire Electrode:	EN ISO 21952-B:G 62A 2C1M, SFA/AWS A5.28:ER90S-B3

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
80Ar/20CO2 (M21) AWS			
Stress relieved 1 hr 690 °C	590 MPa	720 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
80Ar/20CO2 (M21) AWS		
Stress relieved 1 hr 690 °C	-40 °C	47 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.1	0.5	0.5	0.05	2.4	1.0

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrod 13.23

OK Autrod 13.23 is a 0.9 Ni-alloyed (ER80S-Ni1), copper-coated, solid wire for the GMAW of low-temperature, fine-grained steels. The wire provides good impact toughness down to -50°C and is especially suitable for use in the offshore industry.

Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-Ni1
Approvals:	BV SA4Y40M, NAKS/HAKC 1.0MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (1 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS 80Ar/20CO2			
As welded	480 MPa	560 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS 80Ar/20CO2		
As welded	20 °C	150 J
As welded	0 °C	130 J
As welded	-46 °C	70 J
As welded	-60 °C	20 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.07	1.11	0.57	0.9	0.07	0.29

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrod 13.25

OK Autrod 13.25 is a 1.0Ni-0.3Mo-0.1Ti-alloyed, copper-coated, solid wire for the GMAW of low-alloyed, high tensile strength steels and fine-grained steels for use in constructions such as bridges, offshore and hoists with a minimum yield strength of up to 610 MPa. The alloy has good impact properties down to -60°C. When used in mechanical pipe welding in narrow grooves, yield strengths in excess of 700 MPa may be obtained, permitting the overmatching of X80 pipeline steel.

Classifications Wire Electrode:	SFA/AWS A5.28:ER100S-G

Alloy Type:	Low alloyed (1 % Ni, 0.3 % Mo, 0.1 % Ti)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS 80Ar/20CO2			
As welded	620 MPa	700 MPa	20 %
Stress relieved 15 hr 620 °C	640 MPa	700 MPa	24 %
EN 80Ar/20CO2			
As welded	620 MPa	700 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS 80Ar/20CO2		
As welded	-20 °C	130 J
As welded	-40 °C	90 J
As welded	-60 °C	70 J
Stress relieved 15 hr 620 °C	-20 °C	140 J
Stress relieved 15 hr 620 °C	-60 °C	70 J
EN 80Ar/20CO2		
As welded	-60 °C	70 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Ti
0.08	1.73	0.65	0.94	0.09	0.33	0.1

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrod 13.28

A copper coated, Ni-alloyed (2,4% Ni), solid wire for GMAW of low-alloyed and low temperature steels in applications such as vessels, pipes and in the offshore industry with a minimum yield strength less than 470 Mpa. The wire provides a good impact thoughness down to -60°C.

Classifications Weld Metal:	EN ISO 14341-A:G 46 6 M21 2Ni2
Classifications Wire Electrode:	EN ISO 14341-A:G 2Ni2, SFA/AWS A5.28:ER80S-Ni2
Approvals:	CE EN 13479, NAKS/HAKC , DNV V YMS (M21), VdTÜV 06852 (RG)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (2.5 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS Ar/1-5O2 (M13)			
Stress relieved 1 hr 620 °C	540 MPa	630 MPa	29 %
EN Ar/20CO2 (M21)			
As welded	540 MPa	630 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS Ar/1-5O2 (M13)		
Stress relieved 1 hr 620 °C	0 °C	162 J
Stress relieved 1 hr 620 °C	-29 °C	168 J
Stress relieved 1 hr 620 °C	-62 °C	131 J
EN Ar/20CO2 (M21)		
As welded	0 °C	130 J
As welded	-40 °C	100 J
As welded	-60 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr
0.08	1.04	0.53	2.36	0.03

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrod 13.29

A copper-coated, low-alloy, chromium-nickel-molybdenum (0.3% Cr, 1.4% Ni, 0.25% Mo), solid wire for the GMAW of high tensile strength steels requiring a tougher weld metal for critical applications. Also suitable when fairly high impact strength at lower temperatures is required. OK Autrod 13.29 is usually welded with 80% Ar - 20% CO2 as the shielding gas. OK Autrod 13.29 in the unique ESAB Octagonal Marathon Pac is excellent in mechanised welding applications.

Classifications Weld Metal:	EN ISO 16834-A:G 69 3 M Mn3Ni1CrMo
Classifications Wire Electrode:	EN ISO 16834-A:G Mn3Ni1CrMo, SFA/AWS A5.28:ER100S-G
Approvals:	CE EN 13479, DB 42.039.18, VdTÜV 04436

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed (1.4 % Ni, 0.3 % Cr, 0.3 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN 80Ar/20CO2 (M21)			
As welded	730 MPa	820 MPa	19 %
Stress relieved 15 hr 620 °C	690 MPa	750 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN 80Ar/20CO2 (M21)		
As welded	20 °C	100 J
As welded	-20 °C	70 J
As welded	-30 °C	60 J
Stress relieved 15 hr 620 °C	20 °C	130 J
Stress relieved 15 hr 620 °C	-20 °C	60 J
Stress relieved 15 hr 620 °C	-30 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.089	1.54	0.53	1.23	0.26	0.24

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	40-170 A	16-22 V	2-10,8 m/min	0,4-2,6 kg/h
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,1-8,1 m/min	3,3-0 kg/h

OK Autrod 13.37

A copper-coated, low-alloyed, chromium-molybdenum (9% Cr, 1% Mo) solid wire for the GMAW of high temperature steels and steels for hot hydrogen service, especially in oil refineries.

Classifications Wire Electrode:	EN ISO 21952-A:G CrMo9, EN ISO 21952-B:G 55A 9C1M, SFA/AWS A5.28:ER80S-B8

Alloy Type:	Alloyed steel (9 % Cr, 1 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS Ar/1-5%O2 (M13)			
Stress relieved 2 hr 745 °C	523 MPa	680 MPa	22 %
EN 80Ar/20CO2 (M21)			
Stress relieved 2 hr 760 °C	536 MPa	620 MPa	23 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS Ar/1-5%O2 (M13)		
Stress relieved 2 hr 745 °C	20 °C	115 J
Stress relieved 2 hr 745 °C	-20 °C	50 J
EN 80Ar/20CO2 (M21)		
Stress relieved 2 hr 760 °C	20 °C	91 J
Stress relieved 2 hr 760 °C	-20 °C	50 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.06	0.52	0.45	0.23	8.66	1.00

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.9 mm	70-250 A	18-26 V	3,0-12 m/min	0,9-3,6 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

Pipeweld 100S

A copper coated, low-alloyed, nickel-molybdenum-titanium (1,0 % Ni, 0,3% Mo, 0,1% Ti), solid wire for GMAW of low alloyed high tensile strength steels and fine grained steels for use in constructions such as bridges, off-shore and hoists with a minimum yield strength less than 610 Mpa. The alloy has good impact properties down to -60 C.When used in mechanical pipe welding in narrow groove, yield strngths in excess of 700 MPa may be obtained, allowing overmatching of X80 pipeline steel.

Classifications Wire Electrode:	SFA/AWS A5.28:ER100S-G

Alloy Type:	Low alloyed (1 % Ni, 0.3 % Mo, 0.1 % Ti)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS 80Ar/20CO2			
As welded	620 MPa	700 MPa	20 %
Stress relieved 15 hr 620 °C	640 MPa	700 MPa	24 %
EN M21			
As welded	620 MPa	700 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS 80Ar/20CO2		
As welded	-20 °C	130 J
As welded	-40 °C	90 J
As welded	-60 °C	70 J
Stress relieved 15 hr 620 °C	-20 °C	140 J
Stress relieved 15 hr 620 °C	-40 °C	110 J
Stress relieved 15 hr 620 °C	-60 °C	70 J
EN M21		
As welded	-60 °C	70 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Ti
0.08	1.73	0.65	0.94	0.09	0.33	0.1

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrod 1070

OK Autrod 1070 is highly resistant to chemical attack and weathering. It is a relatively soft alloy that is very formable and it is used extensively in thin-gauge and foil products. It has good welding characteristics. One characteristic feature of the alloy is the bright finish obtained by anodising. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 1070 (Al99,7)

Alloy Type:	Al

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	35 MPa	75 MPa	45 %

Typical Wire Composition %

Mn	Si	V	Al	Cu	Fe
0.01	0.02	0.01	99.80	0.01	0.13

Deposition Data

Diameter	Current	Voltage
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.0 mm	190-350 A	25-30 V
2.4 mm	280-400 A	26-31 V

OK Autrod 1100

OK Autrod 1100 is highly resistant to chemical attack and weathering. It is a relatively soft alloy that is very formable and is used extensively in thin gauge and foil products. It has good welding characteristics. A desirable characteristic of the alloy is the bright finish obtained by anodising. Non-heat treatable.

Classifications Wire Electrode:	SFA/AWS A5.10:ER1100, EN ISO 18273:S Al 1100 (Al99,0Cu)
Approvals:	CWB AWS A5.10/A5.10M:2012 (ER1100)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Al

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	30 MPa	75 MPa	35 %

Typical Wire Composition %

Cu	Be	Si+Fe	Zn
0.07	0.0001	0.55	0.01

Deposition Data

Diameter	Current	Voltage
1.0 mm	140-260 A	20-29 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V

OK Autrod 1450

OK Autrod 1450 is highly resistant to chemical attack and weathering. The alloy has a small addition of titanium, which has a grain refining effect, which reduces the cracking susceptibility. It has good welding characteristics. A desirable characteristic of the alloy is the bright finishes obtained by anodising. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 1450 (Al99,5Ti)

Alloy Type:	Al

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	40 MPa	90 MPa	35 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Ti	Zn
0.02	0.02	99.8	0.01	0.16	0.12	0.01

Deposition Data

Diameter	Current	Voltage
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.4 mm	280-400 A	26-31 V

OK Autrod 18.22

Continuous solid wire suitable for welding of aluminium alloys with more than 3 % Mg, e.g. AlMg4.5Mn, AlMg5Mn and AlMg5Cr, where high tensile strength is required. Can also be used for materials of type AlMgSiCu and AlSi1MgMn and weldable AlZnMg-alloys, like AlZn4.5Mg1. The welding wire has small additions of Zr which increases the fine grained structure of weld deposit and makes it less sensitive to hot cracking during welding.

Alloy Type:	AlMgMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	160 MPa	330 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	26 J

Typical Wire Composition %

Mn	Si	Al	Cu	Mg	Ti	Zr
0.8	0.06	92.93	0.03	5.8	0.03	0.1

Deposition Data

Diameter	Current	Voltage
1.2 mm	140-260 A	20-29 V

OK Autrod 4008

Alloy 4008 has controlled lower levels of impurities than those present in alloys 4010 and 356.0. It is a product that meets the chemistry requirements of AMS 4181. Alloys 356.0, A356.0 and A357.0 are typically used to manufacture sand and permanent mold castings. Alloy 4008 is excellent choice to join or repair these castings, and if needed, it can be heat treated to increased mechanical properties.

Classifications Wire Electrode:	EN ISO 18273:S Al Z (AlSi7MgTi)
Approvals:	CE EN 13479, DB 61.039.09, VdTÜV 12189

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlSiMg

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	55 MPa	165 MPa	18 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Mg	Ti	Zn
0.01	7.0	Rem	0.02	0.06	0.4	0.1	0.01

Deposition Data

Diameter	Current	Voltage
1.6 mm	90-210 A	15-26 V
2.0 mm	90-210 A	15-26 V

OK Autrod 4043

OK Autrod 4043 is one of the most widely used welding and brazing alloys and can be classed as a general purpose filler alloy. The silicon additions result in improved fluidity (wetting action) to make the alloy a preferred choice by welders. The alloy is not sensitive to weld cracking and produces bright and almost smut free welds. Not recommended for anodizing. Non-heat treatable.

Classifications Wire Electrode:	SFA/AWS A5.10:ER4043, EN ISO 18273:S Al 4043 (AlSi5), JIS Z 3232:A4043
Approvals:	CE EN 13479, DB 61.039.05, JIS JIS Z 3232, VdTÜV 12187, CWB AWS A5.10/A5.10M:2012 (ER4043)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlSi

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	55 MPa	124 MPa	18 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Ti	Zn
0.01	5.00	Rem	0.02	0.14	0.01	0.01

Deposition Data

Diameter	Current	Voltage
0.8 mm	60-170 A	13-24 V
0.9 mm	60-170 A	13-24 V
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.0 mm	280-400 A	26-31 V
2.4 mm	280-400 A	26-31 V

OK Autrod 4047

OK Autrod 4047 was originally developed as a brazing alloy to take advantage of its low melting point and narrow freezing range. In addition, it has higher silicon content than OK Autrod 4043, which provides an increased fluidity and reduced shrinkage. The alloy produces bright and almost smut free welds. Hot cracking is significantly reduced when using OK Autrod 4047 as a filler alloy. The alloy may be used in applications of sustained elevated temperatures.
Non-heat treatable.

Classifications Wire Electrode:	SFA/AWS A5.10:ER4047, EN ISO 18273:S Al 4047 (AlSi12)
Approvals:	CWB AWS A5.10

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlSi

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	55 MPa	124 MPa	12 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Zn
0.01	11.5	Rem	0.01	0.18	0.01

Deposition Data

Diameter	Current	Voltage
0.8 mm	60-170 A	13-24 V
0.9 mm	60-170 A	13-24 V
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V

OK Autrod 5087

Continuous solid wire suitable for welding aluminium alloys with up to 5% Mg and alloys where a higher tensile strength is required. The alloying element Zr produces improved resistance to hot cracking during solidification.

Classifications Wire Electrode:	SFA/AWS A5.10:ER5087, EN ISO 18273:S Al 5087 (AlMg4,5MnZr)
Approvals:	CE EN 13479, DB 61.039.07, VdTÜV 05816

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMgMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	130 MPa	280 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	35 J

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn	Zr
0.8	0.04	0.08	Rem	0.01	0.12	4.7	0.08	0.01	0.11

Deposition Data

Diameter	Current	Voltage
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V

OK Autrod 5183

OK Autrod 5183 was developed to provide the highest strengths possible in the as welded condition of alloy AA 5083 and other similar high magnesium alloys. The more common OK Autrod 5356 will typically fail to meet the as-welded tensile requirements of AA 5083. The alloy is typically utilised in marine and structural applications where high strengths, high fracture toughness for impact resistance and exposure to corrosive elements are important. The alloy is not recommended for elevated temperature applications due to its susceptibility to stress corrosion cracking. The alloy is non-heat treatable.

Classifications Wire Electrode:	SFA/AWS A5.10:ER5183, EN ISO 18273:S Al 5183 (AlMg4,5Mn0,7(A)), JIS Z 3232:A5183
Approvals:	CE EN 13479, JIS JIS Z 3232, BV WC, ClassNK KAl5RCG(I-1)(I-4), DB 61.039.03, DNV 5183, GL RAlMg4,5Mn, LR WC1/I-1, VdTÜV 04666, ABS ER 5183, CWB A5.10/A5.10M:2012 ER5183, RINA WC (*)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMgMn

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	90 J

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.65	0.04	0.08	94.200	0.01	0.13	4.9	0.100	0.01

Deposition Data

Diameter	Current	Voltage
0.8 mm	60-170 A	13-24 V
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.4 mm	280-400 A	26-31 V

OK Autrod 5356

OK Autrod 5356 is the most widely used welding alloy and can be classified as a general purpose type filler alloy. OK Autrod 5356 is typically chosen because of its relatively high shear strength. The 5XXX alloy base material, welded with OK Autrod 5356, with a weld pool chemistry greater than 3 % Mg and service temperatures in excess of 65°C are susceptible to stress corrosion cracking. The alloy is non-heat treatable.

Classifications Wire Electrode:	SFA/AWS A5.10:ER5356, EN ISO 18273:S Al 5356 (AlMg5Cr(A)), JIS Z 3232:A53556
Approvals:	CE EN 13479, JIS JIS Z 3232, ABS ER 5356, BV WB, DB 61.039.01, DNV 5356, LR WB/I1, VdTÜV 04664, RINA WC (*), CWB A5.10/A5.10M:2012 ER5356, GL S-AlMg 5

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMg 5

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Zn
0.13	0.05	0.12	94.560	0.01	0.13	4.9	0.01

Deposition Data

Diameter	Current	Voltage
0.8 mm	60-170 A	13-24 V
0.9 mm	60-170 A	13-24 V
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.4 mm	280-400 A	26-31 V

OK Autrod 5554

OK Autrod 5554 is a solid aluminium wire with a content of 2.7% Mg. It is recommended for weld-ing AlMg alloys like 5454. Typical applications include chemical storage tanks, automotive components like wheels and frame sections. The weld metal is not sensitive to stress corrosion cracking at elevated temperatures.

Classifications Wire Electrode:	SFA/AWS A5.10:ER5554, EN ISO 18273:S Al 5554 (AlMg2,7Mn)
Approvals:	CE EN 13479, CWB A5.10/A5.10:2012 ER5554

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMg 2.7Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	110 MPa	230 MPa	17 %

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.7	0.1	0.1	96	0.01	0.1	2.7	0.15	0.01

Deposition Data

Diameter	Current	Voltage
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V

OK Autrod 5556

Continuous solid wire suitable for welding of aluminium alloys with up to approx. 5 % Mg that are not age-hardenable and alloys where a higher tensile strength is required. The corrosion resistance in marine atmosphere is high.

Classifications Wire Electrode:	SFA/AWS A5.10:ER5556, EN ISO 18273:S Al 5556A (AlMg5Mn1Ti)
Approvals:	ABS ER 5556, CWB A5.10/A5.10:2012 ER5556

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMgMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	145 MPa	295 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	24 J

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.7	0.05	0.10	Rem	0.01	0.12	5.2	0.080	0.005

Deposition Data

Diameter	Current	Voltage
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.4 mm	280-400 A	26-31 V

OK Autrod 5556A

Continuous solid wire suitable for welding aluminium alloys with up to approx. 5% Mg that are not age hardenable and alloys where a higher tensile strength is required. The corrosion resistance in a marine atmosphere is high.

Classifications Wire Electrode:	SFA/AWS A5.10:ER5556A, EN ISO 18273:S Al 5556A (AlMg5Mn)
Approvals:	CE EN 13479, VdTÜV 05794

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMgMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	145 MPa	295 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	24 J

Typical Wire Composition %

Mn	Si	Cr	Cu	Fe	Mg	Ti
0.68	0.05	0.10	0.01	0.12	5.2	0.08

Deposition Data

Diameter	Current	Voltage
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V
2.4 mm	280-400 A	26-31 V

OK Autrod 5754

OK Autrod 5754 is a solid aluminium wire with a content of 3 % Mg. It is recommended for welding of Al-Mg alloys with less than 3 % magnesium. The alloy has a relatively high strength and corrosion resistance.

Classifications Wire Electrode:	EN ISO 18273:S Al 5754 (AlMg3), SFA/AWS A5.10:ER5754
Approvals:	VdTÜV 04758

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMg

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	110 MPa	230 MPa	23 %

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.26	0.03	0.15	96.19	0.01	0.09	3.1	0.13	0.01

Deposition Data

Diameter	Current	Voltage
0.8 mm	60-170 A	13-24 V
0.9 mm	60-170 A	13-24 V
1.0 mm	90-210 A	15-26 V
1.2 mm	140-260 A	20-29 V
1.6 mm	190-350 A	25-30 V

OK Autrod 16.95

A continuous solid, corrosion resisting chromium-nickel-manganese wire for welding of austenitic stainless alloys of 18% Cr, 8% Ni, 7% Mn types. OK Autrod 16.95 has a general corrosion resistance similar to that of the corresponding parent metal. The higher silicon content improves the welding properties, such as wetting. The product is a modified variant of ER307, basically with a higher Mn content to make the weld less sensitive to hot cracking. When used for joining dissimilar materials the corrosion resistance is of secondary importance. The alloy is used in a wide range of applications across the industry such as the joining of austenitic, manganese, work hardenable steels as well as armour plate and heat resistant steels.

Classifications Wire Electrode:	EN ISO 14343-A:G 18 8 Mn, SFA/AWS A5.9:ER307 mod, Werkstoffnummer :~1.4370
Approvals:	CE EN 13479, NAKS/HAKC 1.2MM, DB 43.039.10, VdTÜV 05420

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (18 % Cr - 8 % Ni - 7 % Mn)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	450 MPa	640 MPa	41 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	130 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.08	7.0	0.9	8.1	18.7	0.20	0.10

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
0.9 mm	65-220 A	15-28 V	3.5-18.0 m/min	1.1-5.4 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h
1.6 mm	230-375 A	23-31 V	5.5-9.0 m/min	5.2-8.6 kg/h

OK Autrod 308L

A continuous solid corrosion resisting chromium-nickel wire. OK Autrod 308L has a good general corrosion resistance. The alloy has a low carbon content which makes this alloy particularly recommended were there is a risc of intergranular corrosion. The alloy is widely used in the chemical and food processing industries as well as for pipes, tubes and boilers. For joining of stainless steels of 18% Cr - 8% Ni-type and Nb-stabilized steels of the same type if the service temperature will not exceed 350°C.

Classifications Wire Electrode:	Werkstoffnummer :~1.4316, EN ISO 14343-A:G 19 9 L, SFA/AWS A5.9:ER308L

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	450 MPa	620 MPa	36 %
Tested at 350\00B0C			
As welded	370 MPa	490 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	110 J
As welded	-60 °C	90 J
As welded	-196 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.02	1.9	0.4	9.8	19.8	0.20	0.15	0.05	9

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	0.9-4.1 kg/h
0.9 mm	55-160 A	15-24 V	4.0-17.0 m/min	0.9-4.1 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.14 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	14-28.5 V	3.0-14.0 m/min	1.6-7.5 kg/h

OK Autrod 308LSi

A continuous solid corrosion resisting chromium-nickel wire for welding of austenitic chromium nickel alloys of 18% Cr - 8% Ni-type. OK Autrod 308LSi has a good general corrosion resistance. The alloy has a low carbon content making it particularly recommended where there is a risk of intergranular corrosion. The higher silicon content improves the welding properties, such as wetting. The alloy is widely used in the chemical and food processing industries as well as for pipes, tubes and boilers.

Classifications Wire Electrode:	SFA/AWS A5.9:ER308LSi, Werkstoffnummer :~1.4316, EN ISO 14343-A:G 19 9 L Si
Approvals:	CE EN 13479, BV 308L SA BT (M12), CWB ER308LSi, DB 43.039.01, DNV NV 308 L (M13), VdTÜV 04267, NAKS/HAKC 1.0MM-1.2MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Low C - High Si

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	400 MPa	570 MPa	36 %
Tested at 350\00B0C.			
As welded	370 MPa	490 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	110 J
As welded	-60 °C	70 J
As welded	-196 °C	45 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.01	1.8	0.9	10.5	19.9	0.15	0.10	9

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
0.9 mm	65-220 A	15-28 V	3.5-18.0 m/min	1.1-5.4 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h
1.6 mm	230-375 A	23-29 V	5.5-9.0 m/min	5.2-8.6 kg/h

OK Autrod 308H

A continuous, solid, corrosion-resistant, chromium-nickel wire for welding austenitic chromium-nickel alloys of the 18% Cr-8% Ni type. OK Autrod 308H has good general corrosion resistance. The alloy has a high carbon content, making it suitable for applications used at higher temperatures. The alloy is used in chemical and petrochemical plants for the welding of pipes, cyclones and boilers.

Classifications Wire Electrode:	EN ISO 14343-A:G 19 9 H, SFA/AWS A5.9:ER308H

Alloy Type:	Austenitic 19% Cr - 9% Ni - High C

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.05	1.9	0.5	9.2	19.8	0.15	0.1

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3.40-11.00 m/min	0.8-2.7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 309L

A continuous, solid, corrosion resisting chromium-nickel wire for welding of similar steels, wrought and cast steels of 23% Cr-12% Ni types. The alloy is also used for welding of buffer layers on CMn steels and welding of dissimilar joints. When using the wire for buffer layers and dissimilar joints it is necessary to control the dilution of the weld. OK Autrod 309L has a good general corrosion resistance. When used for joining dissimilar materials the corrsion resistance is of secondary importance.

Classifications Wire Electrode:	Werkstoffnummer :~1.4332, EN ISO 14343-A:G 23 12 L, SFA/AWS A5.9:ER309L
Approvals:	CE EN 13479, NAKS/HAKC 1.2MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 9 % ferrite) 24 % Cr - 13 % Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	440 MPa	600 MPa	41 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	160 J
As welded	-60 °C	130 J
As welded	-110 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N	FN WRC-92
0.02	1.8	0.4	13.4	23.2	0.10	0.05	10

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
0.9 mm	65-220 A	15-28 V	3.5-18.0 m/min	1.1-5.4 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h

OK Autrod 309LSi

A continous solid corrosion resistant chromium-nickel wire for welding of similar steels, wrought and cast steels of 23% Cr-12% Ni types. The alloy is also used for welding of buffer layers on CMn steels and welding of dissimilar joints. When using the wire for buffer layers and dissimilar joints it is necessary to control the dilution of the weld.
OK Autrod 309LSi has a good general corrosion resistance. The higher silicon content improves the welding properties, such as wetting.

Classifications Wire Electrode:	EN ISO 14343-A:G 23 12 L Si, SFA/AWS A5.9:ER309LSi, Werkstoffnummer :~1.4332
Approvals:	CE EN 13479, NAKS/HAKC 1.0MM-1.2MM, CWB ER309LSi, DB 43.039.16, VdTÜV 10020

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 24 % Cr - 13 % Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	440 MPa	600 MPa	41 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	160 J
As welded	-60 °C	130 J
As welded	-110 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.02	1.7	0.9	13.5	23.4	0.15	0.12	9

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
0.9 mm	65-220 A	15-28 V	3.5-18.0 m/min	1.1-5.4 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h
1.6 mm	230-375 A	23-31 V	5.5-9.0 m/min	5.2-8.6 kg/h

OK Autrod 309Si

A continuous solid corrosion resisting chromium-nickel wire for joining stainless steels to non-alloy or low alloy steels as well as welding of austenitic stainless alloys of 24% Cr, 13% Ni, high C types. OK Autrod 309Si has a good general corrosion resistance. The higher silicon content improves the welding properties such as wetting. When used for joining dissimilar materials the corrosion resistance is of secondary importance.

Classifications Wire Electrode:	EN ISO 14343-A:G 22 12 H, SFA/AWS A5.9:ER309Si, Werkstoffnummer :~1.4829

Alloy Type:	Austenitic (with approx. 10 % ferrite) 23 % Cr - 13 % Ni - High Si

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	440 MPa	620 MPa	36 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	100 J
As welded	-60 °C	80 J
As welded	-110 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.08	1.8	0.9	12.7	23.3	0.20	0.15	5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h
1.6 mm	230-350 A	24-28 V	3,2-5,5 m/min	3-5,2 kg/h

OK Autrod 309MoL

A continuous solid corrosion resisting wire of “309LMo” type. OK Autrod 309MoL is used for overlay welding of unalloyed and low alloyed steels and for welding of dissimilar steels such as 316L to unalloyed and low alloyed steels when Mo is essential.

Classifications Wire Electrode:	EN ISO 14343-A:G 23 12 2 L, SFA/AWS A5.9:ER309LMo (mod)
Approvals:	CE EN 13479, VdTÜV 07352

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) “309LMo” 22 % Cr - 15 % Ni - 3 % Mo - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	400 MPa	600 MPa	31 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	110 J
As welded	-60 °C	65 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.01	1.5	0.4	14.6	21.4	2.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 310

A continuous, solid ,corrosion-resistant, chromium-nickel wire for welding heat-resistant austenitic steels of the 25% Cr, 20% Ni types. OK Autrod 310 has good general oxidation resistance, especially at high temperatures, due to its high Cr content. The alloy is fully austenitic and is therefore sensitive to hot cracking. Common applications include industrial furnaces and boiler parts, as well as heat exchangers.

Classifications Wire Electrode:	EN ISO 14343-A:G 25 20, SFA/AWS A5.9:ER310

Alloy Type:	Fully austenitic (25 % Cr - 20 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	390 MPa	590 MPa	43 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	175 J
As welded	-196 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.10	1.6	0.4	20.7	25.8	0.10	0.05

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h
1.6 mm	230-350 A	24-28 V	3,2-5,5 m/min	3-5,2 kg/h

OK Autrod 312

A continuous, solid, corrosion-resistant, chromium-nickel wire for welding stainless steels of the 29% Cr, 9% Ni types. OK Autrod 312 has good oxidation resistance at high temperatures due to its high content of Cr. The alloy is widely used for joining dissimilar steels, especially if one of the components is fully austenitic, and steels that are difficult to weld, i.e. machine components, tools and austenitic-manganese steels.

Classifications Wire Electrode:	EN ISO 14343-A:G 29 9, SFA/AWS A5.9:ER312

Alloy Type:	Ferritic-austenitic (29 % Cr - 9 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	610 MPa	770 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	50 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.10	1.6	0.4	8.8	30.7	0.20	0.14

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 316L

A continous solid corrosion resisting chromium-nickel-molybdenum wire for welding of austenitic stainless alloys of 18% Cr - 8% Ni and 18% Cr - 10% Ni - 3% Mo-types. OK Autrod 316L has a good general corrosion resistance, particularly against corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended were there is a risk of intergranular corrosion. The alloy is widely used in the chemical and food processing industries as well as in ship building and various types of architectural structures.

Classifications Wire Electrode:	Werkstoffnummer :~1.4430, EN ISO 14343-A:G 19 12 3 L, SFA/AWS A5.9:ER316L

Alloy Type:	Austenitic (with appr. 8 % ferrite) 19 % Cr - 12 % Ni - 3 % Mo - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	440 MPa	620 MPa	37 %
SHT 1050°C 0.5h	350 MPa	590 MPa	42 %
Tested at 350\00B0C.			
As welded	340 MPa	440 MPa	26 %
SHT 1050°C 0.5h	250 MPa	430 MPa	31 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	120 J
As welded	-60 °C	95 J
As welded	-196 °C	55 J
SHT 1050°C 0.5h	20 °C	110 J
SHT 1050°C 0.5h	-60 °C	90 J
SHT 1050°C 0.5h	-196 °C	50 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.01	1.7	0.4	12.0	18.2	2.6	0.10	0.04	7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
0.9 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.14 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h

OK Autrod 316LSi

A continuous, solid , corrosion-resistant, chromium-nickel-molybdenum wire for welding austenitic stainless alloys of the 18% Cr -8% Ni and 18% Cr -10% Ni -3% Mo types. OK Autrod 316LSi has good general corrosion resistance; in particular, the alloy has very good resistance to corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended when there is a risk of intergranular corrosion. The higher silicon content improves the welding properties such as wetting. The alloy is widely used in the chemical and food processing industries, as well as in shipbuilding and various types of architectural structure.

Classifications Wire Electrode:	SFA/AWS A5.9:ER316LSi, Werkstoffnummer :~1.4430, EN ISO 14343-A:G 19 12 3 L Si
Approvals:	CE EN 13479, VdTÜV 04268, NAKS/HAKC 1.0MM-1.2MM, CWB ER316LSi, DB 43.039.05, DNV NV 316L (M13)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 12% Ni - 3% Mo - Low C - High Si

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	400 MPa	560 MPa	37 %
Tested at 350\00B0C.			
As welded	340 MPa	440 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	120 J
As welded	-60 °C	95 J
As welded	-110 °C	70 J
As welded	-196 °C	45 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.01	1.8	0.9	12.2	18.4	2.60	0.12	7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	12-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
0.9 mm	65-220 A	15-28 V	3.5-18.0 m/min	1.1-5.4 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h
1.6 mm	230-375 A	23-31 V	5.5-9.0 m/min	5.2-8.6 kg/h

OK Autrod 16.38

A continuous solid corrosion resisting non-magnetic chromium-nickel-molybdenium wire for welding of stabilized and non-stabilized austenitic alloys of the same type as well as non magnetic steels. The alloy is corrosion resistant in seawater environment and has very good corrosion resistance to acids such as nitric acid. Excellent impact properties at low temperatures

Classifications Wire Electrode:	EN ISO 14343-A:G 20 16 3 Mn L

Alloy Type:	Austenitic (7 % Mn - 20 % Cr - 16 % Ni - 3 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	400 MPa	600 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-60 °C	90 J
As welded	-110 °C	70 J
As welded	-196 °C	40 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N
0.01	6.9	0.4	16.5	19.9	3.0	0.18

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 317L

A continuous, solid, corrosion-resistant, chromium-nickel-molybdenum wire for welding austenitic stainless alloys of the 19% Cr, 13% Ni, 3% Mo types. OK Autrod 317L has good resistance to general corrosion and pitting due to its high content of molybdenum. The alloy has a low carbon content which makes it particularly recommended where there is a risk of intergranular corrosion. The alloy is used in severe corrosion conditions, such as in the petrochemical, pulp and paper industries.

Classifications Wire Electrode:	SFA/AWS A5.9:ER317L, EN ISO 14343-A:G 18 15 3 L

Alloy Type:	Austenitic (with approx. 8 % ferrite)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	390 MPa	600 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	135 J
As welded	-196 °C	55 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.01	1.4	0.4	13.6	18.9	3.6	0.05	0.05	7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,6-7,1 m/min	0,9-2,7 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h
1.6 mm	230-350 A	24-28 V	3,2-5,5 m/min	3-5,2 kg/h

OK Autrod 318Si

A continuous, solid, corrosion-resistant, stabilised, chromium-nickel-molybdenum wire for welding Cr-Ni-Mo and Cr-Ni stabailised or non-stabilised steels. OK Autrod 318Si has good general corrosion resistance. The alloy is stabilised with niobium to improve resistance to the intergranular corrosion of the weld metal. The higher silicon content improves the welding properties such as wetting. Due to stabilisation by niobium, this alloy is recommended for service temperatures up to 400ºC.

Classifications Wire Electrode:	EN ISO 14343-A:G 19 12 3 Nb Si, Werkstoffnummer :~1.4576
Approvals:	CE EN 13479, NAKS/HAKC 1.2MM, DB 43.039.14, VdTÜV 09735

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 7 % ferrite) 19% Cr - 12% Ni - 3 % Mo - Nb

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	460 MPa	615 MPa	35 %
Tested at 400\00B0C.			
As welded	360 MPa	480 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	100 J
As welded	-60 °C	70 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Ferrite FN
0.05	1.7	0.8	11.9	18.8	2.60	0.10	0.50	6

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
1.0 mm	80-240 A	15-28 V	4.0-16.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h

OK Autrod 347Si

A continuous, solid, corrosion-resistant, chromium-nickel wire for welding austenitic chromium-nickel alloys of the 18% Cr-8% Ni type. OK Autrod 347Si has good general corrosion resistance. The alloy is stabilised with niobium to improve resistance to the intergranular corrosion of the weld metal. The higher silicon content improves the welding properties such as wetting. Due to the niobium content, this alloy is recommended for use at higher temperatures.

Classifications Wire Electrode:	EN ISO 14343-A:G 19 9 Nb Si, SFA/AWS A5.9:ER347Si, Werkstoffnummer :~1.4551
Approvals:	CE EN 13479, VdTÜV 09734, NAKS/HAKC 1.0MM-1.2MM, DB 43.039.13

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Nb

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	440 MPa	640 MPa	37 %
Tested at 400\00B0C.			
As welded	340 MPa	460 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	110 J
As welded	-60 °C	80 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Ferrite FN
0.04	1.7	0.7	9.8	19	0.1	0.10	0.60	7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
1.0 mm	80-240 A	15-28 V	3.5-18.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h
1.6 mm	230-375 A	23-31 V	5.5-9.0 m/min	5.2-8.6 kg/h

OK Autrod 385

A continuous, solid, corrosion-resistant, chromium-nickel-molybdenum-copper wire for welding austenitic stainless alloys of the 20% Cr, 25% Ni, 5% Mo, 1.5% Cu, low C types. OK Autrod 385 weld metal has good resistance to stress corrosion and intergranular corrosion and shows very good resistance to attack in non-oxidising acids. The resistance to crevice corrosion is better than that of ordinary 18% Cr, 8% Ni, Mo steels. The alloy is widely used in many applications related to the process industry.

Classifications Wire Electrode:	EN ISO 14343-A:G 20 25 5 Cu L, SFA/AWS A5.9:ER385
Approvals:	VdTÜV 04905 (IT)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Fully austenitic (20 % Cr - 25 % Ni - 5 % Mo - 1.5 % Cu - Low C)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	340 MPa	540 MPa	37 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	120 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N
0.01	1.7	0.4	25.0	20.0	4.4	1.5	0.05

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	55-160 A	15-24 V	4.0-17.0 m/min	1.0-4.1 kg/h
1.0 mm	80-240 A	15-28 V	3.5-18.0 m/min	1.5-6.0 kg/h
1.2 mm	100-300 A	15-29 V	3.0-14.0 m/min	1.6-7.5 kg/h
1.6 mm	230-375 A	23-31 V	5.5-9.0 m/min	5.2-8.6 kg/h

OK Autrod 2209

A continuous solid corrosion resisting duplex wire for welding of austenitic-ferritic stainless alloys of 22% Cr, 5% Ni, 3% Mo types. OK Autrod 2209 has a high general corrosion resistance. In media containing chloride and hydrogen sulphide the alloy has a high resistance to intergranular, pitting and especially to stress corrosion. The alloy is used in a variety of applications across all industrial segments.

Classifications Wire Electrode:	EN ISO 14343-A:G 22 9 3 N L, SFA/AWS A5.9:ER2209
Approvals:	CE EN 13479, VdTÜV 05387, NAKS/HAKC 1.2MM, DB 43.039.18, DNV For duplex stainless steels* (M13), GL 4462S* (M13), VdTÜV 13039*

**Valid for lot numbers starting with PV. Approvals are based on factory location. Please contact ESAB for more information.*

Alloy Type:	Austenitic-ferritic (22.5 % Cr - 8 % Ni - 3 % Mo - Low C)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS 98 Ar/2 O2 (M13)			
As welded	590 MPa	785 MPa	31 %
EN 98 Ar/2 O2 (M13)			
As welded	610 MPa	785 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS 98 Ar/2 O2 (M13)		
As welded	-30 °C	105 J
As welded	-46 °C	90 J
EN 98 Ar/2 O2 (M13)		
As welded	-30 °C	95 J
As welded	-46 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N
0.01	1.5	0.5	8.5	22.7	3.2	0.17

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h
1.6 mm	230-350 A	24-28 V	3,2-5,5 m/min	3-5,2 kg/h

OK Autrod 2307

A continous, solid, corrosion-resistent duplex wire for welding austenitic-ferritic stainless alloys of the 21% Cr-1% Ni or 23% Cr-4% Ni type. OK Autrod 2307 is overalloyed in Ni to ensure a correct Ferrite balance in the weld metal. Lean duplex types are used for civil engineering, storage tanks, containers, etc. These steels have in general medium corrosion resistance and good strength properties. The welding should be done as for ordinary austenitic steels, but high amperages should be avoided and interpass temperature should be maximum 150°C.

Classifications Wire Electrode:	EN ISO 14343-A:G 23 7 N L
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	560 MPa	730 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	160 J
As welded	-60 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N
0.01	1.4	0.5	7.1	23.2	3.20	0.2	0.15

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 2509

A continuous, solid, corrosion-resistant, “Super Duplex” wire for welding austenitic-ferritic, stainless alloys of the 25% Cr, 7% Ni, 4% Mo, low C types. OK Autrod 2509 has high intergranular-corrosion, pitting and stress-corrosion resistance. The alloy is widely used in applications in which corrosion resistance is of the utmost importance. The pulp and paper industry, offshore and gas industry are areas of interest.

Classifications Wire Electrode:	SFA/AWS A5.9:ER2594, EN ISO 14343-A:G 25 9 4 N L
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic-ferritic (25 % Cr - 10 % Ni - 4 % Mo - Low C)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	659 MPa	832 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	159 J
As welded	-40 °C	129 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N
0.01	0.4	0.4	9.4	25.2	3.9	0.24

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 409Nb

A ferritic stabilized stainless solid welding wire of 12% Cr and 0,4% Nb type. OK Autrod 409Nb is used for welding of similar steels in applications such as catalytic converters and mufflers.

Classifications Wire Electrode:	SFA/AWS A5.9:ER409Nb

Alloy Type:	Ferritic stainless (12 % Cr - 0.4 % Nb)

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb
0.03	0.5	0.7	0.3	11.3	0.10	0.02	0.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 410NiMo

A continuous, solid welding wire of the 12% Cr, 4.5% Ni, 0.5% Mo type.
OK Autrod 410NiMo is used for welding similar martentsitic and martensitic-ferritic steels in different applications, such as hydro turbines.

Classifications Wire Electrode:	EN ISO 14343-A:G 13 4

Alloy Type:	Martensitic-ferritic (12 % Cr - 4.5 % Ni - 0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	860 MPa	1050 MPa	13 %
Stress relieved 2 hr 600 °C	850 MPa	900 MPa	17 %
Stress relieved 8 hr 600 °C	750 MPa	850 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	0 °C	35 J
As welded	-20 °C	30 J
Stress relieved 2 hr 600 °C	0 °C	70 J
Stress relieved 8 hr 600 °C	0 °C	75 J
Stress relieved 2 hr 600 °C	-20 °C	55 J
Stress relieved 8 hr 600 °C	-20 °C	75 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.02	0.5	0.4	4.2	12.4	0.6	0.1

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3,4-11 m/min	0,8-2,7 kg/h
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h

OK Autrod 430LNb

A continous ferritic stainless solid wire with low carbon content, 18 % Cr and stabilized with Nb, for welding similar and matching steels. OK Autrod 430LNb (W) is developed and designed for the automotive industry and used for production of exhaust systems. The wire should be used when there is a need for good resistance to corrosion and thermal fatigue. The OK Autrod 430LNb (W) is a new version of OK Autrod 430LNb, with restricted Nb limits.

Classifications Wire Electrode:	Werkstoffnummer :~1.4511, EN ISO 14343-A:G 18 L Nb

Alloy Type:	18 % Cr - 0.5 % Nb

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	275 MPa	420 MPa	26 %

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb
0.01	0.5	0.5	0.2	18.5	0.06	0.10	0.45

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	50-140 A	16-22 V	3.4-11 m/min	0.8-2.7 kg/h
1.2 mm	180-280 A	20-28 V	4.9-8.5 m/min	2.6-4.5 kg/h

OK Autrod 430Ti

A ferritic, stainless, solid wire with a content of 18% Cr and stabilised with 0.5% Ti for welding similar and matching steels. The alloy is also used for cladding on unalloyed and low-alloyed steels. OK Autrod 430Ti is also widely used in the automotive industry for the welding of manifolds, catalytic converters and exhaust pipes.

Classifications Wire Electrode:	EN ISO 14343-A:G Z 17 Ti, Werkstoffnummer :1.4502
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	18 % Cr - 0.5 % Ti

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Stress relieved 0.5 hr 780 °C	380 MPa	580 MPa	28 %
Stress relieved 0.5 hr 780 °C	390 MPa	600 MPa	24 %

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ti
0.07	0.5	0.9	0.3	17.6	0.05	0.10	0.400

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-190 A	16-24 V	2,9-8,4 m/min	1,1-3,1 kg/h
1.2 mm	180-280 A	20-28 V	4,9-8,5 m/min	2,6-4,5 kg/h
1.6 mm	230-350 A	24-28 V	3,2-5,5 m/min	3-5,2 kg/h

OK Autrod 430LNbTi

A ferritic stainless solid wire with low carbon content and excellent welding properties, 18 % Cr and stabilized with Nb and Ti, for welding similar and matching steels. OK Autrod 430LNbTi is developed and designed for the Automotive industry and used for production of exhaust systems. The wire should be used when there is a need for very good resistance to corrosion and thermal fatigue.

Classifications Wire Electrode:	EN ISO 14343-A:G Z 18 L Nb Ti, Werkstoffnummer :1.4509 mod

Alloy Type:	18 % Cr - Nb stabilized

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ti
0.01	0.5	0.5	0.2	18.5	0.06	0.10	0.20

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	180-280 A	20-28 V	4.9-8.5 m/min	2.6-4.5 kg/h

OK Autrod Ni-1

A continuous solid nickel based electrode alloyed with about 3% Ti for welding of high purity nickel (min 99.6%Ni), ordinary wrought nickel and nickel with reduced C content. The weld metal can be used in a wide range of applications were the construction is working with corrosive media.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNi-1, EN ISO 18274:S Ni 2061 (NiTi3)
Approvals:	VdTÜV 12658 (MV), VdTÜV 12664 (FP)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Nickel (Ni + 2.5 % Ti)

Typical Wire Composition %

C	Mn	Si	Ni	Al	Cu	Fe	Ti
0.01	0.4	0.5	96	0.06	0.01	0.04	3.1

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	100-200 A	21-27 V	6-13 m/min	2,5-5,5 kg/h

OK Autrod NiCr-3

Continuous solid Ni-Cr wire for welding of high alloyed heat-resisting and corrosion resisting materials, 9%Ni-steels and similar steels with high notch toughness at low temperatures. Also for joining of dissimilar metals of the types mentioned. The weld metal has very good mechanical properties at high and low temperatures. Good resistance to stress corrosion.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCr-3, EN ISO 18274:S Ni 6082 (NiCr20Mn3Nb)
Approvals:	VdTÜV 12656 (MV), VdTÜV 12666 (FP)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 20 % Cr + 3 % Mn + 2.5 % Nb)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	400 MPa	650 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	150 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Fe	Nb+Ta
0.04	3.0	0.2	bal	20.0	1.3	2.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.8 mm	70-190 A	20-27 V	5-18 m/min	1,3-4,8 kg/h
1.0 mm	100-200 A	21-27 V	6-13 m/min	2,5-5,5 kg/h
1.2 mm	160-280 A	24-30 V	6-10 m/min	3,6-6 kg/h

OK Autrod NiCrMo-3

A continuous solid corrosion and heat-resisting Ni-Cr-Mo wire for welding of high alloyed heat-resisting and corrosion resisting materials, 9%Ni-steels and similar steels with high notch toughness at low temperatures. Also for joining of dissimilar metals of the types mentioned. The weld metal has very good mechanical properties at high and low temperatures. Good resistance to pitting and stress corrosion. This alloy is extensively required for weld cladding of valve components and pipe inner diameters in oil and gas applications.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-3, EN ISO 18274:S Ni 6625
Approvals:	CE EN 13479, DNV For NV 1.5Ni up to NV 9Ni, VdTÜV 12413, NAKS/HAKC 1.0MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 22 % Cr + 9 % Mo - 3.5 % Nb)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	500 MPa	780 MPa	45 %
As welded+	380 MPa	580 MPa	48 %
SHT 1175°C 0.5h	375 MPa	765 MPa	46 %
SHT+ 1175°C 0.5h	270 MPa	590 MPa	46 %
Stress relieved 15 hr 550 °C	490 MPa	796 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	130 J
As welded	-105 °C	120 J
As welded	-196 °C	110 J
SHT 1175°C 0.5h	20 °C	185 J
SHT 1175°C 0.5h	-105 °C	170 J
SHT 1175°C 0.5h	-196 °C	150 J
Stress relieved 15 hr 550 °C	20 °C	140 J
Stress relieved 15 hr 550 °C	-196 °C	120 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb+Ta
0.02	0.04	0.06	bal	22.7	8.6	0.3	3.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
0.9 mm	80-190 A	20-27 V	5-16 m/min	2-4.2 kg/h
1.0 mm	100-200 A	21-27 V	6-13 m/min	2.5-5.5 kg/h
1.14 mm	130-240 A	22-28 V	6-12 m/min	3-5.7 kg/h
1.2 mm	160-280 A	24-30 V	6-10 m/min	3.6-6 kg/h
1.6 mm	200-350 A	25-32 V	4-8 m/min	4.3-8.6 kg/h

OK Autrod NiFeCr-1

OK Autrod NiFeCr-1 is developed for overlay welding of low alloy steel pipes in the oil and gas industry.
OK Autrod NiFeCr-1 can also be used to join 825 and materials of similar chemical composition using GTAW and GMAW.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiFeCr-1, EN ISO 18274:S Ni 8065

Alloy Type:	Nickel alloy (22% Fe, 22% Cr, 3% Mo)

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Fe	Ti
0.01	0.5	0.3	bal	21	3.0	2.3	24	0.7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.14 mm	130-240 A	22-28 V	6-12 m/min	3-5.7 kg/h

OK Autrod NiCrMo-4

OK Autrod NiCrMo-4 is a corrosion and heat resistant, nickel-chromium wire welding of high alloyed steel, heat resistant steel, corrosion resistant steel, 9Ni steels and similar steels with high notch toughness at low temperatures. Good resistance to stress corrosion.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-4, EN ISO 18274:S Ni 6276 (NiCr15Mo16Fe6W4)

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Fe	W
0.01	0.45	0.05	Bal.	15.5	16.1	5.8	3.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	100-200 A	21-27 V	6-13 m/min	2.5-5.5 kg/h
1.2 mm	160-280 A	24-30 V	6-10 m/min	3.6-6 kg/h

OK Autrod NiCrMo-13

A continuous solid Ni-Cr-Mo electrode for welding of high alloyed Ni-base materials, 9%Ni steel and super austenitic steels of type 20Cr-25Ni with 4-6% Mo. Can also be used for welding carbon steel to Ni base steel. The weld metal has a very good toughness and is corrosion resistant over a wide range of applications in oxidising and reducing media.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-13, EN ISO 18274:S Ni 6059 (NiCr23Mo16)
Approvals:	VdTÜV 12662 (MV)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 23 % Cr + 16 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	500 MPa	750 MPa	40 %
As welded	500 MPa	700 MPa	42 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-110 °C	120 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Al	Fe
0.01	0.2	0.1	61.0	23.0	16.0	0.3	1.0

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	100-200 A	21-27 V	6-13 m/min	2,5-5,5 kg/h
1.2 mm	160-280 A	24-30 V	6-10 m/min	3,6-6 kg/h
1.6 mm	200-350 A	25-32 V	4-8 m/min	4,3-8,6 kg/h

OK Autrod NiCu-7

A continuous solid nickel based electrode alloyed with 30% Cu for welding of base materials of the same type. Can also be used to join these alloys to steel. The weld metal has good resistance to flowing seawater and has high strength and toughness over a rather wide temperature range. This alloy also has good resistance to hydrofluoric acid, sulfuric acid, alkalis etc. Can be used for welding of similar types of base materials which are age-hardenable with small additions of Ti and Al. Usable for cladding on carbon steel with an intermediate layer of OK Autrod Ni-1.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCu-7, EN ISO 18274:S Ni 4060 (NiCu30Mn3Ti)
Approvals:	VdTÜV 12660 (MV), VdTÜV 12668 (FP)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 30 % Cu + 2 % Ti + 2 % Fe)

Typical Wire Composition %

C	Mn	Si	Ni	Al	Cu	Fe	Nb+Ta	Ti
0.03	3	0.3	64	0.03	28	2	< 0.5	2

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	160-280 A	24-30 V	6-10 m/min	3,6-6 kg/h

OK Autrod 19.12

A continuous, solid, copper wire for the GMAW joining of oxygen-free, pure copper and low-alloyed copper. OK Autrod 19.12 is alloyed with tin and has good flow properties. OK Autrod 19.12 is normally welded with pure Ar as the shielding gas.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCu, EN ISO 24373:CuSn1
Approvals:	NAKS/HAKC 1.2MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Copper (Cu + 0.7 % Sn)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	75 MPa	220 MPa	30 %

Typical Wire Composition %

Mn	Si	Cu	Fe
0.2	0.2	Bal	0.05

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
0.8 mm	60-165 A	13-17.5 V	4-13 m/min
1.0 mm	80-210 A	12.5-18 V	4-12 m/min
1.2 mm	150-320 A	16-29 V	5-11.5 m/min

OK Autrod 19.30

A continuous, solid, copper wire for the GMAW joining of copper-zinc alloys and low-alloyed copper and for the GMAW brazing of zinc-coated steel sheets. OK Autrod 19.30 is alloyed with silicon and manganese and has good flow properties and wear resistance. The alloy is widely used in the joining of zinc-coated steel sheets in car body production, as well as for overlay welding on low- and non-alloyed steels and cast iron. Pulsed GMAW is recommended. OK Autrod 19.30 is normally weld-ed with pure Ar as the shielding gas; however, for GMAW brazing, the addition of 1% O2 improves the brazing properties.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuSi-A, EN ISO 24373:CuSi3Mn1
Approvals:	VdTÜV 09147

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed copper (Cu + 3 % Si)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	130 MPa	350 MPa	40 %

Typical Wire Composition %

Mn	Si	Cu	Fe	Sn	Zn
0.9	3	96	0.05	0.01	0.05

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
0.8 mm	60-165 A	13-17.5 V	4.0-13.0 m/min
1.0 mm	80-210 A	12.5-18 V	4.0-12.0 m/min
1.2 mm	150-320 A	16-29 V	5-11.5 m/min

OK Autrod CuSi Laser

A solid copper wire intended for laser brazing of zinc coated steel sheets. OK Autrod CuSi Laser is especially developed for laser brazing of body-in-white applications within the automotive industry. Compared to a standard CuSi3Mn1 copper wire OK Autrod CuSi Laser provides a more stable brazing process as well as a superior surface finish.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuSi-A, EN 14640:S Cu 6560 (CuSi3Mn1)

Alloy Type:	S Cu 6560 (CuSi3Mn1)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	130 MPa	350 MPa	40 %

Typical Wire Composition %

Mn	Si	Cu	Fe	Sn	Zn
0.9	2.85	96	0.05	0	0.05

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
1.0 mm	80-210 A	12.5-18 V	4-12 m/min
1.2 mm	150-320 A	16-29 V	5-11.5 m/min

OK Autrod 19.40

A continuous, solid, copper wire for the GMAW joining of aluminium bronzes. OK Autrod 19.40 is alloyed with aluminium and is recognised for its high strength, good wear resistance and very good corrosion resistance, particularly in salt water. The alloy is widely used for joining corrosion-resistant pipes made of aluminium bronze or other special brass alloys. Other common applications include the overlay welding of bearings, ships propellers and rails. OK Autrod 19.40 is normally welded with pure Ar as the shielding gas.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuAl-A1, EN ISO 24373:S Cu 6100 (CuAl7)

Alloy Type:	Alloyed copper (Cu + 8 % Al)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	175 MPa	420 MPa	40 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Pb	Zn
0.3	0.1	7	Bal	0.4	0.01	0.1

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
0.8 mm	60-165 A	13-17.5 V	4.0-13.0 m/min
1.0 mm	80-210 A	12.5-18 V	4.0-12.0 m/min
1.2 mm	150-320 A	16-29 V	5.0-11.5 m/min

OK Autrod 19.41

A continuous solid aluminium bronze electrode alloyed with Ni. OK Autrod 19.41 is used for overlay welding of steel and for welding of cast or wrought nickel-aluminium bronze materials. The alloy has very good resistance to seawater.

Classifications Wire Electrode:	EN ISO 24373:CuAl8Ni2Fe2Mn2

Alloy Type:	Alloyed copper (Cu + 8 % Al + 2 % Ni)

Typical Wire Composition %

Mn	Si	Ni	Al	Cu	Fe	Zn
2	0.05	2	8.0	85.00	2.5	0.04

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
1.2 mm	150-320 A	16-29 V	5-11.5 m/min

OK Autrod 19.46

A copper-manganese-aluminium (CuMn13Al7) electrode for the GMAW and cladding of copper-aluminium alloys alloyed with nickel and manganese. Produces a wear-resistant, corrosion-resistant and seawater-resistant layer on steel and cast iron. The alloy has fairly high resistance to erosion and cavitation. OK Autrod 19.46 is usually welded with pure Ar as the shielding gas.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuMnNiAl, EN ISO 24373:CuMn13Al8Fe3Ni2

Alloy Type:	Alloyed copper (Cu +13 % Mn + 7 % Al + 2 % Ni)

Typical Wire Composition %			
Mn	**Ni**	**Al**	**Fe**
13	2	8	2.5

Deposition Data			
Diameter	**Current**	**Voltage**	**Wire Feed Speed**
1.2 mm	150-320 A	16-29 V	5-11.5 m/min

OK Autrod 19.49

A continuous, solid, Cu-Ni wire for welding similar alloys like 90Cu10Ni, 80Cu20Ni and 70Cu30Ni alloys. The addition of nickel strengthens the weld metal and improves the corrosion resistance, particularly in the case of salt water. The alloy is used for the overlay welding of steels and is widely used for welding Cu-Ni components for desalination plants.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuNi, EN 14640:S Cu 7158 (CuNi30)

Alloy Type:	Alloyed copper (Cu + 30 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	180 MPa	350 MPa	40 %

Typical Wire Composition %

C	Mn	Si	Ni	Cu	Fe
0.02	0.7	0.05	31	Bal	0.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
0.8 mm	60-165 A	13-17.5 V	4-13 m/min
1.0 mm	80-210 A	12.5-18 V	4-12 m/min
1.2 mm	150-320 A	16-29 V	5-11.5 m/min

OK Autrodur 38 G M

OK Autrod 13.89 is a copper-coated, low-alloyed, solid GMAW wire used for hardfacing and building up, producing a wear-resistant weld metal with a hardness of between 35-40 HRC. It is used for the repair and maintenance of tracks, rails, wheels, rolls, rail crossings, shafts, shovel teeth and other parts on digging machines, tools like dies and so on.

Classifications Wire Electrode:	EN 14700:Fe2

Alloy Type:	Low alloyed (0.7 C, 2 % Mn, 1 % Cr, 0.2 % Ti)

Typical Wire Composition %

C	Mn	Si	Cr	Ti
0.69	1.92	0.49	1.00	0.2

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

OK Autrodur 56 G M

OK Autrod 13.91 is a copper coated, low-alloyed solid GMAW wire used for hardfacing and building up highly wear-resistant layers on tools and machinery parts, driving rollers, digging tools and so on.
The hardness of the weld metal becomes 50-60 HRC.

Classifications Wire Electrode:	EN 14700:Fe8

Alloy Type:	Low alloyed (0.45 % C, 3 % Si, 9 % Cr)

Typical Wire Composition %

C	Mn	Si	Cr
0.44	0.4	3.02	9.24

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h
1.6 mm	225-480 A	26-38 V	3,1-8,1 m/min	3,3-0 kg/h

OK Autrodur 58 G M

OK Autrod 13.90 is a copper-coated, low-alloyed, solid GMAW wire used for hardfacing and building up highly wear-resistant layers on machinery parts like shafts, feed screws, driving rollers, cutting tools, dies and other parts subjected to heavy wear. The hardness of the weld metal becomes 50-60 HRC.

Classifications Wire Electrode:	EN 14700:ZFe8

Alloy Type:	Low alloyed (1.1 % C, 2 % Mn, 1.8 % Cr, 0.2 % Ti)

Typical Wire Composition %

C	Mn	Si	Cr
1.04	1.87	0.48	1.82

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-280 A	18-28 V	2,7-14,7 m/min	1-5,4 kg/h
1.2 mm	120-350 A	20-33 V	2,7-12,4 m/min	1,5-6,6 kg/h

TIG Rods (GTAW)



MILD STEEL RODS 3-4
OK Tigrod 12.60 3-4
OK Tigrod 12.61 3-5
OK Tigrod 12.62 3-6
OK Tigrod 12.64 3-7
FILARC PZ6500 3-8

LOW ALLOY RODS 3-9
FILARC PZ6512 3-9
FILARC PZ6513 3-10
OK Tigrod 13.08 3-11
OK Tigrod 13.09 3-12
OK Tigrod 13.12 3-13
OK Tigrod 13.16 3-14
OK Tigrod 13.17 3-15
OK Tigrod 13.22 3-16
OK Tigrod 13.23 3-17
OK Tigrod 13.26 3-18
OK Tigrod 13.28 3-19
OK Tigrod 13.32 3-20
OK Tigrod 13.37 3-21
OK Tigrod 13.38 3-22
OK Tigrod 55 3-23

ALUMINIUM RODS 3-24
OK Tigrod 1070 3-24
OK Tigrod 1100 3-24
ok Tigrod 1450 3-25
OK Tigrod 18.22 3-25
OK Tigrod 4008 3-26
OK Tigrod 4043 3-26
OK Tigrod 4047 3-27
OK Tigrod 5087 3-27
OK Tigrod 5183 3-28
OK Tigrod 5356 3-28
OK Tigrod 5554 3-29
OK Tigrod 5556A 3-29
OK Tigrod 5754 3-30

STAINLESS STEEL RODS 3-31
OK Tigrod 16.95 3-31
OK Tigrod 308L 3-32
OK Tigrod 308LSi 3-33
OK Tigrod 308H 3-34
OK Tigrod 309L 3-35
OK Tigrod 309LSi 3-36
OK Tigrod 309MoL 3-37
OK Tigrod 310 3-38
OK Tigrod 312 3-39
OK Tigrod 316L 3-40
OK Tigrod 316LSi 3-41
OK Tigrod 317L 3-42
OK Tigrod 318Si 3-43
OK Tigrod 347 3-44
OK Tigrod 347Si 3-45
OK Tigrod 385 3-46
OK Tigrod 2209 3-47
OK Tigrod 2307 3-48
OK Tigrod 2509 3-49
OK Tigrod 410NiMo 3-50
OK Tigrod 430LNbTi 3-50

NICKEL-BASED ALLOYS 3-51
OK Tigrod Ni-1 3-51
OK Tigrod NiCr-3 3-52
OK Tigrod NiCrMo-3 3-53
OK Tigrod NiCrMo-4 3-53
OK Tigrod NiCrMo-13 3-54
OK Tigrod NiCu-7 3-54
COPPER-BASED ALLOYS 3-55
OK Tigrod 19.12 3-55
OK Tigrod 19.30 3-55
OK Tigrod 19.40 3-56
OK Tigrod 19.49 3-56

OK Tigrod 12.60

OK Tigrod 12.60 is a copper-coated Mn-Si-alloyed W2Si/ER70S-3 solid rod for the GTAW of non-alloyed steels, as used in general construction, pressure vessel fabrication and shipbuilding.

Classifications Weld Metal:	EN ISO 636-A:W 38 3 W2Si
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-3, EN ISO 636-A:W2Si
Approvals:	CE EN 13479, BV 3YM, ABS ER70S-s, DNV III YM (I1)*, NAKS/HAKC 2.0MM, VdTÜV 11141, ABS 3YSA

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) EN			
As welded	420 MPa	515 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) EN		
As welded	-30 °C	90 J

Typical Wire Composition %

C	Mn	Si
0.10	1.11	0.72

OK Tigrod 12.61

OK Tigrod 12.61 is a copper-coated Mn-Si-alloyed W3Si1/ER70S-6 solid rod for the GTAW of non-alloyed steels, as used in general construction, pressure vessel fabrication and shipbuilding.

Classifications Weld Metal:	EN ISO 636-A:W 42 3 W3Si1
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, EN ISO 636-A:W3Si1
Approvals:	CE EN 13479, DB 42.039.07, VdTÜV 09124

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) EN			
As welded	470 MPa	560 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) EN		
As welded	-30 °C	70 J

Typical Wire Composition %

C	Mn	Si
0.078	1.46	0.85

OK Tigrod 12.62

A triple deoxidized copper-coated rod designed for GTAW of mild and fine grained structural and pressure vessel steels as well as shipbuilding steels. The rod is capable of producing high quality welds in semi-killed and rimmed steel as well as steel of various carbon levels. Because of added deoxidants, Al-Ti-Zr, the rod can also be used for welding steels with a rusty or dirty surface without any sacrifice of weld quality.

Classifications Weld Metal:	EN ISO 636-A:W 46 4 W2Ti
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-2, EN ISO 636-A:W2Ti

Alloy Type:	Carbon-manganese steel

Typical Tensile Properties			
Condition	**Yield Strength**	**Tensile Strength**	**Elongation**
Ar (I1) EN			
As welded	570 MPa	625 MPa	26 %

Typical Charpy V-Notch Properties		
Condition	**Testing Temperature**	**Impact Value**
Ar (I1) EN		
As welded	-40 °C	180 J

Typical Wire Composition %		
C	**Mn**	**Si**
0.06	1.1	0.6

OK Tigrod 12.64

OK Tigrod 12.64 is a copper-coated Mn-Si-alloyed W4Si1/ER70S-6 solid rod for the GTAW of non-alloyed steels, as used in general construction, pressure vessel fabrication and shipbuilding. It has a slightly higher manganese and silicon content than OK Tigrod 12.61 to increase the weld metal strength. This also promotes low sensitivity to surface impurities and contributes to smooth, sound welds.

Classifications Weld Metal:	EN ISO 636-A:W 46 3 W4Si1
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, EN ISO 636-A:W4Si1
Approvals:	CE EN 13479, DNV III YM (I1), ABS 3Y (I1), BV 3YM (I1), GL 3Y (I1), LR 3Ym H15 (I1), NAKS/HAKC 1.6MM-2.4MM, VdTÜV 05260

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) EN			
As welded	525 MPa	595 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) EN		
As welded	-30 °C	70 J

Typical Wire Composition %

C	Mn	Si
0.074	1.68	0.95

FILARC PZ6500

A copper coated, manganese-silicon alloyed rod for GTAW of all general engineering and structural steels with a minimum yield strength of max 420 MPa. The rod is usually welded with pure argon (I1) as the shielding gas.

Classifications Weld Metal:	EN ISO 636-A:W 42 3 W3Si1
Classifications Wire Electrode:	SFA/AWS A5.18:ER70S-6, EN ISO 636-A:W3Si1
Approvals:	CE EN 13479, VdTÜV 11842

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Carbon-manganese steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN Ar (I1)			
As welded	470 MPa	560 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN Ar (I1)		
As welded	-30 °C	70 J

Typical Wire Composition %

C	Mn	Si
0.078	1.46	0.85

FILARC PZ6512

A copper coated, low-alloyed, nickel-copper (0,8% Ni, 0,4% Cu), rod for GTAW of weathering steels, such as COR-TEN A, B and C. The weld metal composition and mechanical properties also make this product suitable for welding high strength steels in low temperature applications.

Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-G

Alloy Type:	Low alloyed steel (0.8 % Ni - 0.4 % Cu)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
As welded	480 MPa	580 MPa	30 %
Stress relieved 2 hr 650 °C	430 MPa	545 MPa	32 %
M21 EN			
As welded	540 MPa	625 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
As welded	20 °C	110 J
As welded	-20 °C	70 J
As welded	-40 °C	60 J
Stress relieved 2 hr 650 °C	20 °C	230 J
Stress relieved 2 hr 650 °C	-20 °C	210 J
Stress relieved 2 hr 650 °C	-40 °C	170 J
Stress relieved 2 hr 650 °C	-60 °C	160 J
M21 EN		
As welded	-60 °C	50 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ti
0.095	1.32	0.80	0.74	0.12	0.02	0.30	0.001

FILARC PZ6513

A copper coated, low-alloyed, nickel (1% Ni), rod for GTAW of low-temperature fine grained steels with a minimum yield strength not less than 470 MPa and minimum tensile strength exceeding 550 MPa.

Classifications Weld Metal:	EN ISO 636-A:W 46 5 W3Ni1
Classifications Wire Electrode:	EN ISO 636-A:W3Ni1, SFA/AWS A5.28:ER80S-Ni1
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (1 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
As welded	500 MPa	600 MPa	25 %
Ar (I1) EN			
As welded	500 MPa	600 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
As welded	0 °C	230 J
As welded	-20 °C	200 J
As welded	-46 °C	140 J
As welded	-60 °C	90 J
Ar (I1) EN		
As welded	-20 °C	200 J
As welded	-50 °C	135 J
As welded	-60 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.07	1.11	0.57	0.9	0.1	0.10

OK Tigrod 13.08

OK Tigrod 13.08 is a 1.5Mn-0.4Mo-alloyed (ER80S-D2), copper-coated rod for the GTAW of creep-resistant steels of the same type, such as pipes in pressure vessels and boilers with a working temperature of up to about 500°C. The rod can also be used for welding low-alloyed, high tensile strength steels.

Classifications Weld Metal:	EN ISO 636-B:W55 3 W4M31
Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-D2, EN ISO 636-B:W4M31
Approvals:	NAKS/HAKC 2.4mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
As welded	520 MPa	615 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
As welded	-29 °C	80 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.07	1.8	0.7	0.05	0.05	0.4

OK Tigrod 13.09

OK Tigrod 13.09 is a 0.5Mo-alloyed, copper-coated rod for the GTAW of creep-resistant steels of the same type, such as pipes in pressure vessels and boilers with a working temperature of up to about 500°C.

Classifications Weld Metal:	EN ISO 636-A:W 46 2 W2Mo
Classifications Wire Electrode:	EN ISO 636-A:W2Mo, EN ISO 21952-A:W MoSi, EN ISO 21952-B:W 52 1M3, SFA/AWS A5.28:ER70S-A1 (ER80S-G)
Approvals:	CE EN 13479, DNV III YMS, DB 42.039.08, NAKS/HAKC 2.0MM-3.2MM, VdTÜV 04950

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS Ar (I1)			
As welded	520 MPa	620 MPa	27 %
PWHT 620°C 1h	510 MPa	610 MPa	28 %
EN Ar (I1)			
PWHT 620°C 1h	450 MPa	550 MPa	31 %
As welded	490 MPa	600 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS Ar (I1)		
As welded	-29 °C	150 J
As welded	-46 °C	130 J
PWHT 620°C 1h	-20 °C	220 J
EN Ar (I1)		
As welded	20 °C	180 J
As welded	-20 °C	160 J
As welded	-40 °C	90 J
As welded	-60 °C	25 J
PWHT 620°C 1h	20 °C	190 J
PWHT 620°C 1h	-20 °C	170 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.094	1.09	0.61	0.05	0.05	0.45

OK Tigrod 13.12

OK Tigrod 13.12 is a 1.0Cr-0.5Mo-alloyed, copper-coated rod for the GTAW of creep-resistant steels of the same type, such as pipes in pressure vessels and boilers. The rod can also be used for welding low-alloyed, high strength steels with a minimum tensile strength of 550 MPa.

Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-G, EN ISO 21952-A:W CrMo1Si, EN ISO 21952-B:W 55 1CM3
Approvals:	NAKS/HAKC 2.4mm, VdTÜV 04952

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (1 % Cr - 0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
As welded	560 MPa	720 MPa	24 %
Ar (I1) EN			
Stress relieved 0,5 hr 700 °C	560 MPa	650 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
As welded	20 °C	120 J
As welded	-20 °C	50 J
As welded	-30 °C	40 J
As welded	-40 °C	20 J
As welded	-60 °C	20 J
Ar (I1) EN		
Stress relieved 0,5 hr 700 °C	20 °C	180 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.09	1.00	0.65	0.02	1.18	0.49

OK Tigrod 13.16

OK Tigrod 13.16 is a 1.3Cr-0.5Mo-alloyed (ER80S-B2), copper-coated rod for the GTAW of creep-resistant steels like SA-387 Grade 11, A 335 Grade P11 or similar materials. The rod has a high purity chemistry with a guaranteed Bruscato factor X < 15.

Classifications Wire Electrode:	EN ISO 21952-A:Z CrMo1Si, SFA/AWS A5.28:ER80S-B2, EN ISO 21952-B:W 55 1CM
Approvals:	CE EN 13479, NAKS/HAKC 2.0MM-2.4MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (1,3%Cr, 0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
Stress relieved 1 hr 620 °C	640 MPa	730 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
Stress relieved 1 hr 620 °C	-40 °C	>47 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.08	0.5	0.5	0.08	1.3	0.5

OK Tigrod 13.17

OK Tigrod 13.17 is a 2.5Cr-1.1Mo-alloyed (ER90S-B3), copper-coated rod for the GMAW of creep-resistant steels like SA-387 Grade 22, A335 Grade P22 or similar materials. The rod has a high purity chemistry with a guaranteed Bruscato factor X < 15.

Classifications Wire Electrode:	SFA/AWS A5.28:ER90S-B3, EN ISO 21952-A:Z CrMo2Si, EN ISO 21952-B:W 62 2C1M
Approvals:	CE EN 13479, NAKS/HAKC 2.0-2.4MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (2,5%Cr, 1 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Stress relieved 1 hr 690 °C	620 MPa	730 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Stress relieved 1 hr 690 °C	-40 °C	>47 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.08	0.5	0.5	0.05	2.4	1.0

OK Tigrod 13.22

OK Tigrod 13.22 is a 2.5Cr-1.0Mo-alloyed, copper-coated rod for the GTAW of creep-resistant steels such as pipes in pressure vessels and boilers of similar composition, with service temperatures of up to 600°C, but it is also suitable for welding high strength steels.

Classifications Wire Electrode:	SFA/AWS A5.28:ER90S-G, EN ISO 21952-A:W CrMo2Si, EN ISO 21952-B:W 62 2C1M3
Approvals:	NAKS/HAKC 2.0MM, VdTÜV 11884

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (2.5 % Cr - 1.0 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS and EN I1 (Ar)			
Stress relieved 1 hr 690 °C	550 MPa	655 MPa	24 %
EN I1 (Ar)			
Stress relieved 1 hr 720 °C	530 MPa	640 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS and EN I1 (Ar)		
Stress relieved 1 hr 690 °C	20 °C	190 J
EN I1 (Ar)		
Stress relieved 1 hr 720 °C	20 °C	120 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.07	1.02	0.61	0.08	2.45	1.01

OK Tigrod 13.23

OK Tigrod 13.23 is a 0.9Ni-alloyed (ER80S-Ni1), copper-coated rod for the GTAW of low-temperature, fine-grained steels. The wire provides good impact toughness down to -50°C and is especially suitable for use in the offshore industry.

Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-Ni1
Approvals:	DNV IVY40M, NAKS/HAKC 2.0MM-2.4MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (1 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
As welded	500 MPa	600 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
As welded	0 °C	230 J
As welded	-20 °C	200 J
As welded	-46 °C	140 J
As welded	-60 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.07	1.11	0.57	0.9	0.07	0.29

OK Tigrod 13.26

A copper coated, low alloyed, nickel copper (0,8% Ni, 0,3 %Cu) rod for the GTAW of weathering steels such as COR-TEN, Patinax, Dillicor etc. The weld metal composition and mechanical properties also make this product suitable for welding high strength steels with a minimum yield strength less than 470 Mpa.

Classifications Weld Metal:	EN ISO 636-A:W46 6 W3Ni1
Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-G, EN ISO 636-A:W3Ni1
Approvals:	CE EN 13479, DNV IV YM*

**Valid for lot numbers starting with PV. Approvals are based on factory location. Please contact ESAB for more information.*

Alloy Type:	Low alloyed steel (0.8 % Ni - 0.4 % Cu)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
Stress relieved 2 hr 650 °C	430 MPa	545 MPa	32 %
Ar (I1) EN			
As welded	490 MPa	580 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
Stress relieved 2 hr 650 °C	20 °C	230 J
Stress relieved 2 hr 650 °C	-20 °C	210 J
Stress relieved 2 hr 650 °C	-40 °C	170 J
Stress relieved 2 hr 650 °C	-60 °C	160 J
Ar (I1) EN		
As welded	20 °C	200 J
As welded	-20 °C	140 J
As welded	-40 °C	60 J
As welded	-60 °C	100 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.095	1.32	0.80	0.8	0.06	0.006	0.5

OK Tigrod 13.28

OK Tigrod 13.28 is 2.4Ni-alloyed (ER80S-Ni2), copper-coated rod for the GTAW of low-temperature, fine-grained steels in applications such as pressure vessels, pipes and the offshore industry, with a minimum yield strength of up to 470 MPa. The wire provides good impact toughness down to -60°C.

Classifications Weld Metal:	EN ISO 636-A:W 46 6 W2Ni2
Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-Ni2, EN ISO 636-A:W2Ni2
Approvals:	VdTÜV 06243 (RG)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Low alloyed steel (2.8 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar AWS			
As welded	495 MPa	600 MPa	31 %
Stress relieved 1 hr 620 °C	515 MPa	585 MPa	30 %
I1 EN			
As welded	540 MPa	630 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar AWS		
As welded	-60 °C	180 J
Stress relieved 1 hr 620 °C	-60 °C	150 J
Stress relieved 1 hr 620 °C	-101 °C	150 J
I1 EN		
As welded	-60 °C	150 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr
0.08	1.04	0.53	2.36	0.03

OK Tigrod 13.32

OK Tigrod 13.32 is a 5Cr-0.5Mo-alloyed (ER80S-B6), copper-coated rod for the GTAW of creep-resistant steels of similar composition. The rod is also suitable for welding high strength steels with a minimum yield strength of up to 730 MPa. AWS has changed the classification for this product. The previous classification was A5.9 ER502.

Classifications Wire Electrode:	EN ISO 21952-A:W CrMo5Si, EN ISO 21952-B:W 55 5CM, SFA/AWS A5.28:ER80S-B6

Alloy Type:	Low alloyed steel (5 % Cr - 0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) AWS			
As welded	730 MPa	900 MPa	22 %
Stress relieved 1 hr 745 °C	580 MPa	680 MPa	22 %
Ar (I1) EN			
Stress relieved 1 hr 730-760 °C	550 MPa	640 MPa	23 %
Stress relieved 1 hr 730-760 °C	430 MPa	477 MPa	19 %
Stress relieved 1 hr 730-760 °C	465 MPa	527 MPa	18 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) AWS		
As welded	20 °C	100 J
As welded	-20 °C	80 J
As welded	-29 °C	50 J
Stress relieved 1 hr 745 °C	20 °C	230 J
Stress relieved 1 hr 745 °C	-20 °C	200 J
Stress relieved 1 hr 745 °C	-29 °C	200 J
Ar (I1) EN		
Stress relieved 1 hr 730-760 °C	20 °C	250 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.07	0.48	0.44	0.06	5.73	0.58

OK Tigrod 13.37

OK Tigrod 13.37 is a 9Cr-1Mo-alloyed, copper-coated rod for the GTAW of high temperature steels and steels for hot hydrogen service, especially in oil refineries. The electrode is a plain ER505 type.

Classifications Wire Electrode:	SFA/AWS A5.28:ER80S-B8, EN ISO 21952-A:W CrMo9, EN ISO 21952-B:W 55 9C1M

Alloy Type:	Alloyed steel (9 % Cr - 1 % Mo) “ER505”

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) EN			
Stress relieved 2 hr 760 °C	540 MPa	660 MPa	26 %
Stress relieved 4 hr 735 °C	560 MPa	680 MPa	22 %
Tested at 450°C			
Stress relieved 2 hr 760 °C	430 MPa	500 MPa	17 %
Tested at 482°C			
Stress relieved 2 hr 760 °C	410 MPa	480 MPa	18 %
Tested at 560°C			
Stress relieved 2 hr 760 °C	350 MPa	390 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) EN		
Stress relieved 4 hr 735 °C	-20 °C	150 J
Stress relieved 4 hr 735 °C	-40 °C	130 J
Stress relieved 4 hr 735 °C	-60 °C	50 J
Stress relieved 2 hr 760 °C	-20 °C	140 J
Stress relieved 2 hr 760 °C	-40 °C	120 J
Stress relieved 2 hr 760 °C	-60 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.06	0.52	0.45	0.23	8.66	1.00

OK Tigrod 13.38

OK Tigrod 13.38 is a non-copper coated, low alloyed, 9CrMoVN rod for the GTAW of high-temperature steels and steels for hot hydrogen service, especially in oil refineries. It should preferably be used for 9% Cr steels, such as P 91/T 91 steels. The alloy is modified in terms of the limits for impurity elements and is extremely “clean”. This produces improved strength levels both at room temperature and at higher temperatures. AWS has changed the classification for this product. The previous classification was A5.9 ER505.

Classifications Wire Electrode:	EN ISO 21952-A:W CrMo91, EN ISO 21952-B:W 62 9C1MV, SFA/AWS A5.28:ER90S-B9
Approvals:	VdTÜV 07686

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed steel (9 % Cr - 1 % Mo - V - N) “9CrMoVN”

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) EN			
Stress relieved 4 hr 735 °C	670 MPa	760 MPa	20 %
Stress relieved 2 hr 760 °C	690 MPa	785 MPa	20 %
Tested at 450ºC			
Stress relieved 2 hr 760 °C	510 MPa	580 MPa	14 %
Tested at 482ºC			
Stress relieved 2 hr 760 °C	500 MPa	560 MPa	16 %
Tested at 560ºC			
Stress relieved 2 hr 760 °C	420 MPa	450 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) EN		
Stress relieved 4 hr 735 °C	20 °C	210 J
Stress relieved 4 hr 735 °C	0 °C	190 J
Stress relieved 4 hr 735 °C	-20 °C	130 J
Stress relieved 4 hr 735 °C	-40 °C	60 J
Stress relieved 4 hr 735 °C	-60 °C	30 J
Stress relieved 2 hr 760 °C	20 °C	200 J
Stress relieved 2 hr 760 °C	0 °C	180 J
Stress relieved 2 hr 760 °C	-20 °C	150 J
Stress relieved 2 hr 760 °C	-40 °C	90 J
Stress relieved 2 hr 760 °C	-60 °C	70 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	V	N
0.1	0.5	0.3	0.5	8.7	0.9	0.20	0.05

OK Tigrod 55

A copper coated, low alloyed, chromium-nickel-molybdenum (0,5% Cr, 0,5% Ni, 0,2% Mo) rod for GTAW of high strength steels with a minimum tensile strength of 690 MPa. The rod is also suitable for welding of steels where a good impact strength at low temperatures is required.

Classifications Wire Electrode:	SFA/AWS A5.28:ER100S-G, EN ISO 16834-A:Mn3NiCrMo
Classifications:	SFA/AWS A5.28:ER100S-G, EN ISO 16834-A:W 55 4 Mn3NiCrMo, EN ISO 16834-A:Mn3NiCrMo

Alloy Type:	Low alloyed steel (0.5 % Cr - 0.5 % Ni - 0.2 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Ar (I1) EN			
As welded	720 MPa	817 MPa	21 %
Stress relieved 2 hr 620 °C	629 MPa	716 MPa	23 %
Ar(I1) AWS			
As welded	636 MPa	713 MPa	16 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Ar (I1) EN		
As welded	-30 °C	129 J
As welded	-40 °C	120 J
Stress relieved 2 hr 620 °C	-30 °C	140 J
Stress relieved 2 hr 620 °C	-40 °C	79 J
Ar(I1) AWS		
As welded	-30 °C	123 J
As welded	-40 °C	86 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo
0.118	1.38	0.71	0.52	0.57	0.19

OK Tigrod 1070

OK Tigrod 1070 is highly resistant to chemical attack and weathering. It is a relatively soft alloy that is very formable and it is used extensively in thin-gauge and foil products. It has good welding characteristics. One characteristic feature of the alloy is the bright finish obtained by anodising. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 1070 (Al99,7)

Alloy Type:	Al

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	35 MPa	75 MPa	33 %

Typical Wire Composition %

Mn	Si	V	Al	Cu	Fe
0.01	0.02	0.01	99.80	0.01	0.13

OK Tigrod 1100

OK Tigrod 1100 is highly resistant to chemical attack and weathering. It is a relatively soft alloy that is very formable and it is used extensively in thin-gauge and foil products. It has good welding characteristics. One desirable characteristic of the alloy is the bright finish obtained by anodising. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 1100 (Al99,0Cu), SFA/AWS A5.10:R1100
Approvals:	CWB AWS A5.10/A5.10M:2012 (ER1100)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Al

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	30 MPa	75 MPa	35 %

Typical Wire Composition %

Cu	Be	Si+Fe	Zn
0.07	0.0001	0.55	0.01

OK Tigrod 1450

OK Tigrod 1450 is highly resistant to chemical attack and weathering. The alloy has a small addition of titanium, which has a grain-refining effect, which reduces cracking susceptibility. It has good welding characteristics. One characteristic feature of the alloy is the bright finishes obtained by anodising. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 1450 (Al99,5Ti)

Alloy Type:	Al

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	40 MPa	90 MPa	35 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Ti	Zn
0.02	0.02	99.8	0.01	0.16	0.12	0.01

OK Tigrod 18.22

OK Tigrod 18.22 is suitable for welding aluminium alloys with a magnesium content of more than 3% where high strength is required. The alloy has a small addition of zirconium that has a fine graining effect that makes it less sensitive to hot cracking during solidification. Non-heat treatable.

Alloy Type:	Alloyed aluminium (Al + 6 % Mg + 0.8 % Mn + Ti + Zr)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	160 MPa	330 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	26 J

Typical Wire Composition %

Mn	Si	Al	Cu	Mg	Ti	Zr
0.8	0.06	92.93	0.03	5.8	0.03	0.1

OK Tigrod 4008

Alloy 4008 has controlled lower levels of impurities than those present in alloys 4010 and 356.0. It is a product that meets the chemistry requirements of AMS 4181. Alloys 356.0, A356.0 and A357.0 are typically used to manufacture sand and permanent mold castings. Alloy 4008 is excellent choice to join or repair these castings, and if needed, it can be heat treated to increased mechanical properties.

Classifications Wire Electrode:	EN ISO 18273:S Al Z (AlSi7MgTi)
Approvals:	CE EN 13479, DB 61.039.10, VdTÜV 12188

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlSiMg

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	55 MPa	165 MPa	18 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Mg	Ti	Zn
0.01	7.0	Rem	0.02	0.06	0.4	0.1	0.01

OK Tigrod 4043

OK Tigrod 4043 is one of the most widely used welding alloys. The alloy is used for welding AlMgSi - types and AlSi - alloys with up to 7% Silicon. Not recommended for anodizing. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 4043 (AlSi5), JIS Z 3232:A4043, SFA/AWS A5.10:R4043
Approvals:	CE EN 13479, DB 61.039.06, JIS JIS Z 3232, CWB AWS A5.10/A5.10M:2012 (ER4043)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlSi

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	55 MPa	124 MPa	18 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Ti	Zn
0.01	5.00	Rem	0.02	0.14	0.01	0.01

OK Tigrod 4047

OK Tigrod 4047 was originally developed as a brazing alloy to take advantage of its low melting point and narrow freezing range. In addition, it has higher silicon content than OK Tigrod 4043, which provides an increased fluidity and reduced shrinkage. Hot cracking is significantly reduced when using OK Autrod 4047 as a filler alloy. The alloy may be used in applications of sustained elevated temperatures. Non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 4047 (AlSi12), SFA/AWS A5.10:R4047
Approvals:	CWB AWS A5.10

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed aluminium (Al + 12 % Si)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	55 MPa	124 MPa	12 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Zn
0.01	11.5	Rem	0.01	0.18	0.01

OK Tigrod 5087

Bare welding rod suitable for welding aluminium alloys with up to 5% Mg and alloys where a higher tensile strength is required. The alloying element Zr produces improved resistance to hot cracking during solidification.

Classifications Wire Electrode:	EN ISO 18273:S Al 5087 (AlMg4,5MnZr), SFA/AWS A5.10:R5087
Approvals:	CE EN 13479, DB 61.039.08, VdTÜV 05796

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMgMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	130 MPa	280 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	35 J

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn	Zr
0.8	0.04	0.08	Rem	0.01	0.12	4.7	0.08	0.01	0.11

OK Tigrod 5183

OK Tigrod 5183 was developed to provide the highest strengths possible in the as welded condition of alloy AA 5083 and other similar high magnesium alloys. The more common OK Tigrod 5356 will typically fail to meet the as-welded tensile requirements of AA 5083. The alloy is typically utilised in marine and structural applications where high strengths, high fracture toughness for impact resistance and exposure to corrosive elements are important. The alloy is not recommended for elevated temperature applications due to its susceptibility to stress corrosion cracking. The alloy is non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 5183 (AlMg4,5Mn0,7(A)), JIS Z 3232:A5183, SFA/AWS A5.10:R5183
Approvals:	CE EN 13479, JIS JIS Z 3232, DB 61.039.04, VdTÜV 04667, CWB A5.10/A5.10M:2012 ER5183, ABS R 5183, NAKS/HAKC 3.2MM

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMgMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	140 MPa	290 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	90 J

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.65	0.04	0.08	94.200	0.01	0.13	4.9	0.100	0.01

OK Tigrod 5356

OK Tigrod 5356 is the most widely used welding alloy and can be classified as a general purpose type filler alloy. OK Tigrod 5356 is typically chosen because of its relatively high shear strength. The 5XXX alloy base material, welded with OK Tigrod 5356, with a weld pool chemistry greater than 3 % Mg and service temperatures in excess of 65°C are susceptible to stress corrosion cracking. The alloy is non-heat treatable.

Classifications Wire Electrode:	EN ISO 18273:S Al 5356 (AlMg5Cr(A)), SFA/AWS A5.10:R5356
Approvals:	CE EN 13479, JIS JIS Z 3232, DB 61.039.02, VdTÜV 04665, CWB A5.10/A5.10M:2012 ER5356, ABS R 5356

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMg 5

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Zn
0.13	0.05	0.12	94.560	0.01	0.13	4.9	0.01

OK Tigrod 5554

OK Tigrod 5554 is a solid aluminium rod with a content of 2.7% Mg. It is recommended for the welding of AlMg alloys like 5454. Typical applications include chemical storage tanks, automotive components like wheels and frame sections. The weld metal is not sensitive to stress corrosion cracking at elevated temperatures.

Classifications Wire Electrode:	EN ISO 18273:S Al 5554 (AlMg2,7Mn), SFA/AWS A5.10:R5554
Approvals:	CWB A5.10/A5.10:2012 ER5554

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMg 5

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	110 MPa	230 MPa	17 %

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.7	0.1	0.1	96	0.01	0.1	2.7	0.15	0.01

OK Tigrod 5556A

Bare welding rod suitable for welding aluminium alloys with up to approx. 5% Mg that are not age hardenable and alloys where a higher tensile strength is required. The corrosion resistance in a marine atmosphere is very good.

Classifications Wire Electrode:	SFA/AWS A5.10:R5556, EN ISO 18273:S Al 5556A (AlMg5Mn)
Approvals	VdTÜV 05795

Approvals are based on factory location. Please contact ESAB for more information.

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As Welded	145 MPa	295 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As Welded	+20 °C	25 J

OK Tigrod 5754

OK Tigrod 5754 is a solid aluminium rod with a content of 3% Mg. It is recommended for welding of Al-Mg alloys with less than 3% magnesium. The alloy has a relatively high strength and corrosion resistance.

Classifications Wire Electrode:	EN ISO 18273:S Al 5754 (AlMg3), SFA/AWS A5.10:R5754
Approvals:	VdTÜV 04759

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	AlMg

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	110 MPa	230 MPa	23 %

Typical Wire Composition %

Mn	Si	Cr	Al	Cu	Fe	Mg	Ti	Zn
0.26	0.03	0.15	96.19	0.01	0.09	3.1	0.13	0.01

OK Tigrod 16.95

Bare, corrosion-resistant, chromium-nickel-manganese welding rods for welding austenitic stainless alloys of the 18% Cr, 8% Ni, 7% Mn types. OK Tigrod 16.95 has general corrosion resistance similar to that of the corresponding parent metal. The higher silicon content improves the welding properties such as wetting. When used for joining dissimilar materials, the corrosion resistance is of secondary importance. The alloy is used in a wide range of applications across the industry, such as the joining of austenitic, manganese, work-hardenable steels, as well as armour plate and heat-resistant steels.

Classifications Wire Electrode:	SFA/AWS A5.9:ER307 mod, Werkstoffnummer :~1.4370, EN ISO 14343-A:W 18 8 Mn
Approvals:	CE EN 13479, DB 43.039.12, VdTÜV 05421

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (18 % Cr - 8 % Ni - 7 % Mn)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	450 MPa	640 MPa	41 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	130 J
As welded	-60 °C	56 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.08	7.0	0.9	8.1	18.7	0.20	0.10

OK Tigrod 308L

OK Tigrod 308L has a good general corrosion resistance. The alloy has a low carbon content which makes this alloy particularly recommended were there is a risk of intergranular corrosion. The alloy is widely used in the chemical and food processing industries as well as for pipes, tubes and boilers. For joining of stainless steels of 18% Cr - 8% Ni-type with low carbon content and Nb-stabilized steels of the same type if the service temperature will not exceed 350°C. Can also be used for welding of Cr-steels except in sulphur rich environments.

Classifications Wire Electrode:	Werkstoffnummer :~1.4316, SFA/AWS A5.9:ER308L, EN ISO 14343-A:W 19 9 L
Approvals:	CE EN 13479, NAKS/HAKC 1.6MM-2.4MM, CWB ER308L, DNV 308L (-60°C), VdTÜV 04269

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	480 MPa	610 MPa	36 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	170 J
As welded	-80 °C	135 J
As welded	-196 °C	80 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.02	1.9	0.4	9.8	19.8	0.20	0.15	0.05	9

OK Tigrod 308LSi

Bare, corrosion-resistant, chromium-nickel rods for welding austenitic chromium-nickel alloys of the18% Cr-8% Ni type. OK Tigrod 308LSi has good general corrosion resistance. The alloy has a low carbon content which makes it particularly recommended when there is a risk of intergranular corrosion. The higher silicon content improves the welding properties such as wetting. The alloy is widely used in the chemical and food-processing industries, as well as for pipes, tubes and boilers.

Classifications Wire Electrode:	SFA/AWS A5.9:ER308LSi, Werkstoffnummer :~1.4316, EN ISO 14343-A:W 19 9 L Si
Approvals:	CE EN 13479, NAKS/HAKC 2.0MM-3.2MM, BV 308L BT, DB 43.039.11, DNV 308L M, VdTÜV 05335

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	480 MPa	625 MPa	37 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	170 J
As welded	-60 °C	150 J
As welded	-110 °C	140 J
As welded	-196 °C	75 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.01	1.8	0.9	10.5	19.9	0.15	0.10	9

OK Tigrod 308H

Bare, corrosion-resistant, chromium-nickel rods for welding austenic chromium-nickel alloys of the18% Cr-8% Ni type. OK Tigrod 308H has good general corrosion resistance. The alloy has a high carbon content, which makes it suitable for applications at higher temperatures. The alloy is used in the chemical and petrochemical industries for the welding of tubes, cyclones and boilers.

Classifications Wire Electrode:	SFA/AWS A5.9:ER308H, EN ISO 14343-A:W 19 9 H

Alloy Type:	Austenitic 19% Cr - 9% Ni - High C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	350 MPa	550 MPa	30 %

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.05	1.9	0.5	9.2	19.8	0.15	0.1

OK Tigrod 309L

Bare corrosion resisting chromium-nickel welding rod for welding of similar steels of 24% Cr, 13% Ni types. The alloy is also used for welding of buffer layers on CMn steels and welding of dissimilar joints. When using the wire for buffer layers and dissimilar joints it is necessary to control the dilution of the weld. OK Tigrod 309L has a good general corrosion resistance. When used for joining dissimilar materials the corrosion resistance is of secondary importance.

Classifications Wire Electrode:	Werkstoffnummer :~1.4332, SFA/AWS A5.9:ER309L, EN ISO 14343-A:W 23 12 L
Approvals:	CE EN 13479, CWB ER309L, NAKS/HAKC 1.6MM, VdTÜV 10021

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 10 % ferrite) 24 % Cr - 13 % Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	430 MPa	590 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	160 J
As welded	-60 °C	130 J
As welded	-110 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.02	1.8	0.4	13.4	23.2	0.10	0.08	0.05	9

OK Tigrod 309LSi

Bare, corrosion-resistant, chromium-nickel welding rod for welding steels with similar composition, wrought and cast steels of the 23% Cr-12% Ni types. The alloy is also used for welding buffer layers on CMn steels and for welding dissimilar joints. When using the wire for buffer layers and dissimilar joints, it is necessary to control the dilution of the weld. OK Tigrod 309LSi has good general corrosion resistance. The higher silicon content improves the welding properties such as wetting.

Classifications Wire Electrode:	SFA/AWS A5.9:ER309LSi, Werkstoffnummer :~1.4332, EN ISO 14343-A:W 23 12 L Si
Approvals:	CE EN 13479, NAKS/HAKC 2.4mm, DB 43.039.17, VdTÜV 12489

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 24 % Cr - 13 % Ni - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	475 MPa	635 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	150 J
As welded	0 °C	150 J
As welded	-60 °C	150 J
As welded	-110 °C	130 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.02	1.7	0.9	13.5	23.4	0.15	0.12	9

OK Tigrod 309MoL

Bare, corrosion-resistant rod of “309LMo” type. OK Tigrod 309MoL is used for the overlay welding of unalloyed and low-alloyed steels and for welding dissimilar steels such as 316L to unalloyed and low-alloyed steels when Mo is essential.

Classifications Wire Electrode:	SFA/AWS A5.9:ER309LMo (mod), EN ISO 14343-A:W 23 12 2 L
Approvals:	DNV 309MoL

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8% ferrite) “309LMo”, 22 % Cr - 15 % Ni - 3 % Mo - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	500 MPa	610 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	130 J
As welded	-60 °C	65 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.01	1.5	0.4	14.6	21.4	2.5	0.12

OK Tigrod 310

Bare, corrosion-resistant, chromium-nickel welding rod for welding heat-resistant austenitic steels of the 25Cr-20Ni type. The wire has a high Cr content and provides good oxidation resistance at high temperatures. Common applications include industrial furnaces and boiler parts, as well as heat exchangers.

Classifications Wire Electrode:	SFA/AWS A5.9:ER310, EN ISO 14343-A:W 25 20

Alloy Type:	Fully austenitic (25 % Cr - 20 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	390 MPa	590 MPa	43 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	175 J
As welded	-196 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.10	1.6	0.4	20.7	25.8	0.10	0.05

OK Tigrod 312

Bare, corrosion-resistant, chromium-nickel welding rods for welding materials of the 29% Cr, 9% Ni types. OK Tigrod 312 has good oxidation resistance at high temperatures due to its high content of Cr. The alloy is widely used for joining dissimilar steels, especially if one of the components is fully austenitc, and for steels that are difficult to weld, i.e. machine components, tools and austenitic-manganese steels.

Classifications Wire Electrode:	SFA/AWS A5.9:ER312, EN ISO 14343-A:W 29 9

Alloy Type:	Ferritic-austenitic (29 % Cr - 9 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	610 MPa	770 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	50 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.10	1.6	0.4	8.8	30.7	0.20	0.14

OK Tigrod 316L

Bare corrosion resisting chromium-nickel-molybdenium welding rods for welding of austenitic stainless alloys of 18% Cr - 8% Ni and 18% Cr - 10% Ni - 3% Mo-types. OK Tigrod 316L has a good general corrosion resistance, particularly against corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended where there is a risk of intergraular corrosion. The alloy is widely used in the chemical and food processing industries as well as in shipbuilding and various types of architectural structures.

Classifications Wire Electrode:	Werkstoffnummer :~1.4430, SFA/AWS A5.9:ER316L, EN ISO 14343-A:W 19 12 3 L
Approvals:	CE EN 13479, ABS ER 316L, NAKS/HAKC 2.0MM-3.2MM, BV 316L BT, CWB ER316L, DNV 316L (-60 C), VdTÜV 04270

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 10 % ferrite) 19% Cr - 12% Ni - 3% Mo - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	470 MPa	600 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	175 J
As welded	-60 °C	130 J
As welded	-110 °C	120 J
As welded	-196 °C	75 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.01	1.7	0.4	12.0	18.2	2.6	0.10	0.04	7

OK Tigrod 316LSi

Bare, corrosion-resistant, chromium-nickel-molybdenum rods for welding austenitic stainless alloys of the 18% Cr-8% Ni and 18% Cr-10% Ni-3% Mo types. OK Tigrod 316LSi has good general corrosion resistance, particularly to corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended when there is a risk of intergranular corrosion. The higher silicon content improves the welding properties such as wetting. The alloy is widely used in the chemical and food-processing industries, as well as in shipbuilding and various types of architectural structure.

Classifications Wire Electrode:	SFA/AWS A5.9:ER316LSi, Werkstoffnummer :~1.4430, EN ISO 14343-A:W 19 12 3 L Si
Approvals:	CE EN 13479, NAKS/HAKC 2.0MM-2.4MM, BV 316L BT, DB 43.039.06, DNV 316L (-196°C), GL 4429 (I1), VdTÜV 05336

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 12% Ni - 3% Mo - Low C- High Si

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	500 MPa	630 MPa	33 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	175 J
As welded	-110 °C	110 J
As welded	-196 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ferrite FN
0.01	1.8	0.9	12.2	18.4	2.60	0.12	7

OK Tigrod 317L

Bare, corrosion-resistant, chromium-nickel-molybdenum welding rods for welding austenitic stainless alloys of the 19% Cr, 9% Ni, 3% Mo types. OK Tigrod 317L has good resistance to general corrosion and pitting due to its high content of molybdenum. The alloy has a low carbon content which makes it particularly recommended when there is a risk of intergranular corrosion. The alloy is used in severe corrosion conditions such as in the petrochemical, pulp and paper industries.

Classifications Wire Electrode:	SFA/AWS A5.9:ER317L, EN ISO 14343-A:W18 15 3 L

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 12% Ni - 3% Mo - Low C

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	390 MPa	600 MPa	45 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	135 J
As welded	-196 °C	55 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N	FN WRC-92
0.01	1.4	0.4	13.6	18.9	3.6	0.05	0.05	7

OK Tigrod 318Si

Bare, corrosion-resistant, stabilised, chromium-nickel-molybdenum wire for welding Cr-Ni-Mo and Cr-Ni stabilised or non-stabilised steels. OK Tigrod 318Si has good general corrosion resistance. The alloy is stabilised with niobium to improve resistance to the intergranular corrosion of the weld metal. The higher silicon content improves the welding properties such as wetting. Due to stabiliation by niobium, this alloy is recommended for service temperatures up to 400°C.

Classifications Wire Electrode:	Werkstoffnummer :~1.4576, EN ISO 14343-A:W 19 12 3 Nb Si
Approvals:	CE EN 13479, DB 43.039.15, VdTÜV 09737

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 7 % ferrite) 19% Cr - 12% Ni - 3 % Mo - Nb

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	460 MPa	615 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	40 J
As welded	-60 °C	70 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Ferrite FN
0.05	1.7	0.8	11.9	18.8	2.60	0.10	0.50	6

OK Tigrod 347

Bare, corrosion-resistant, chromium-nickel rods for welding stabilised austenitic chromium-nickel alloys of the 18% Cr-8% Ni type. The rods are stabilised with niobium, which provides good resistance to the intergranular corrosion of the weld metal. Due to the niobium content, this alloy is recommended for use at higher temperatures.

Classifications Wire Electrode:	Werkstoffnummer :~1.4551, SFA/AWS A5.9:ER347, EN ISO 14343-A:W 19 9 Nb
Approvals:	NAKS/HAKC 2.4mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Nb

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	510 MPa	655 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	130 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Ferrite FN
0.04	1.4	0.4	9.5	19.3	0.10	0.05	0.50	7

OK Tigrod 347Si

Bare, corrosion-resistant, chromium-nickel rods for welding austenitic chromium nickel alloys of the 18% Cr-8% Ni type. OK Tigrod 347Si has good general corrosion resistance. The alloy is stabilised with niobium to improve resistance to the intergranular corrosion of the weld metal. The higher silicon content improves the welding properties such as wetting. Due to the niobium content, this alloy is recommended for use at higher temperatures.

Classifications Wire Electrode:	SFA/AWS A5.9:ER347Si, Werkstoffnummer :~1.4551, EN ISO 14343-A:W 19 9 Nb Si
Approvals:	NAKS/HAKC 1.6MM-2.4MM, VdTÜV 09736

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 8 % ferrite) 19% Cr - 9% Ni - Nb

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	440 MPa	640 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	90 J
As welded	-60 °C	75 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Ferrite FN
0.04	1.7	0.7	9.8	19	0.1	0.10	0.60	7

OK Tigrod 385

Bare, corrosion-resistant welding rods for welding austenitic stainless steels of the 20Cr-25Ni-4.5Mo-1.5Cu type. The weld metal has good resistance to stress corrosion and intergranular corrosion and shows very good resistance to attack in non-oxidising acids. The resistance to pitting and crevice corrosion is better than that of ordinary 18Cr-8Ni-Mo steels.

Classifications Wire Electrode:	SFA/AWS A5.9:ER385, EN ISO 14343-A:W 20 25 5 Cu L
Approvals:	VdTÜV 05444 (IT)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Fully austenitic (20 % Cr - 25 % Ni - 5 % Mo - 1.5 % Cu - Low C)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	340 MPa	540 MPa	37 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	120 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N
0.01	1.7	0.4	25.0	20.0	4.4	1.5	0.05

OK Tigrod 2209

Bare, corrosion-resistant, duplex welding rods for welding austenitic-ferritic stainless alloys of the 22% Cr, 5% Ni, 3% Mo types. OK Tigrod 2209 has high general corrosion resistance. In media containing chloride and hydrogen sulphide, the alloy has high resistance to intergranular corrosion, pitting and especially to stress corrosion. The alloy is used in a variety of applications across all industrial segments.

Classifications Wire Electrode:	SFA/AWS A5.9:ER2209, EN ISO 14343-A:W 22 9 3 N L
Approvals:	CE EN 13479, VdTÜV 05519, VdTÜV 06282, NAKS/HAKC 2.0MM-3.2MM, DB 43.039.19, VdTÜV 13010

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic-ferritic (22.5 % Cr - 8 % Ni - 3 % Mo - Low C)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	600 MPa	765 MPa	28 %
SHT 1050°C 0.5h	450 MPa	730 MPa	34 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	100 J
As welded	-20 °C	85 J
As welded	-60 °C	60 J
SHT 1050°C 0.5h	20 °C	130 J
SHT 1050°C 0.5h	-20 °C	110 J
SHT 1050°C 0.5h	-60 °C	90 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N
0.01	1.5	0.5	8.5	22.7	3.2	0.17

OK Tigrod 2307

A continous, solid, corrosion-resistent duplex wire for welding austenitic-ferritic stainless alloys of the 21% Cr-1% Ni or 23% Cr-4% Ni type. Lean duplex types are used for civil engineering, storage tanks, containers, etc. The welding should be done as for ordinary austenitic steels, but high amperages should be avoided and the interpass temperature should be maximum 150°C.

Classifications Wire Electrode:	EN ISO 14343-A:W 23 7 N L
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	560 MPa	730 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	160 J
As welded	-60 °C	60 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	N
0.01	1.4	0.5	7.1	23.2	3.20	0.2	0.15

OK Tigrod 2509

Bare, corrosion-resistant, “Super Duplex” rods for welding austenitic-ferritic stainless alloys of the 25% Cr, 7% Ni, 4% Mo, low C types. OK Autrod 2509 has high intergranular-corrosion, pitting and stress-corrosion resistance. The alloy is widely used in applications where corrosion resistance is of the utmost importance. The pulp and paper industry, offshore and gas industry are areas of interest.

Classifications:	SFA/AWS A5.9:ER2594, EN ISO 14343-A:W 25 9 4 N L

Alloy Type:	Austenitic-ferritic (25 % Cr - 10 % Ni - 4 % Mo - Low C)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	660 MPa	835 MPa	37 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-20 °C	200 J
As welded	-50 °C	180 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N
0.01	0.4	0.4	9.4	25.2	3.9	0.24

OK Tigrod 410NiMo

Bare welding rods of the 420NiMo type alloyed with 13% Cr, 4.5% Ni and 0.5% Mo. This alloy is used for welding similar composition martensitic and martensitic-ferritic steels in different applications, such as hydroturbines.

Classifications Wire Electrode:	EN ISO 14343-A:W 13 4

Alloy Type:	Martensitic-ferritic (13 % Cr - 4.5 % Ni - 0.5 % Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Stress relieved 2 hr 600 °C	930 MPa	1000 MPa	17 %
Stress relieved 8 hr 600 °C	770 MPa	870 MPa	22 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
Stress relieved 2 hr 600 °C	0 °C	120 J
Stress relieved 2 hr 600 °C	-20 °C	120 J
Stress relieved 8 hr 600 °C	0 °C	175 J
Stress relieved 8 hr 600 °C	-20 °C	165 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu
0.02	0.5	0.4	4.2	12.4	0.6	0.1

OK Tigrod 430LNbTi

A ferritic stainless solid wire with low carbon content and excellent welding properties, 18 % Cr and stabilized with Nb and Ti, for welding similar and matching steels. OK Tigrod 430LNbTi is developed and designed for the automotive industry and used for production of exhaust systems. The wire should be used when there is a need for very good resistance to corrosion and thermal fatigue.

Classifications Wire Electrode:	Werkstoffnummer :1.4509 mod, EN ISO 14343-A:W Z 18 L Nb Ti

Alloy Type:	18 % Cr - Nb stabilized

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Cu	Ti
0.01	0.5	0.5	0.2	18.5	0.06	0.10	0.20

OK Tigrod Ni-1

A bare nickel based rod alloyed with about 3% Ti for welding of high purity nickel (min 99.6 %Ni), ordinary wrought nickel and nickel with reduced C content. The weld metal can be used in a wide range of applications were the construction is working with corrosive media.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNi-1, EN ISO 18274:S Ni 2061 (NiTi3)
Approvals:	VdTÜV 12659, VdTÜV 12665

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Nickel (Ni + 2.5 % Ti)

Typical Wire Composition %

C	Mn	Si	Ni	Al	Cu	Fe	Ti
0.01	0.4	0.5	96	0.06	0.01	0.04	3.1

OK Tigrod NiCr-3

Bare corrosion and heat-resisting Ni-Cr-Mo rods for welding of high alloyed heat-resisting and corrosion resisting materials, 9%Ni-steels and similar steels with high notch toughness at low temperatures.

Also for joining of dissimilar metals of the types mentioned. The weld metal has very good mechanical properties at high and low temperatures. Good resistance to pitting and stress corrosion.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCr-3, EN ISO 18274:S Ni 6082 (NiCr20Mn3Nb)
Approvals:	VdTÜV 12657, VdTÜV 12667

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 20 % Cr + 3 % Mn + 2.5 % Nb)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	400 MPa	650 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	20 °C	150 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Cu	Fe	Nb+Ta	Ti
0.04	3.0	0.2	72.50	20.0	0.01	1.3	2.5	0.35

OK Tigrod NiCrMo-3

Bare corrosion and heat-resisting Ni-Cr-Mo rods for welding of high alloyed heat-resisting and corrosion resisting materials, 9%Ni-steels and similar steels with high notch toughness at low temperatures. Also for joining of dissimilar metals of the types mentioned. The weld metal has very good mechanical properties at high and low temperatures. Good resistance to pitting and stress corrosion.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-3, EN ISO 18274:S Ni 6625
Approvals:	DNV For NV1.5Ni up to NV9Ni, VdTÜV 12460

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 22 % Cr + 9 % Mo - 3.5 % Nb)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	550 MPa	780 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-196 °C	100 J

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb+Ta
0.02	0.04	0.06	64.8	22.7	8.6	0.3	3.5

OK Tigrod NiCrMo-4

OK Tigrod NiCrMo-4 is a corrosion and heat resistant, nickel-chromium rod for TIG welding of high alloyed steel, heat resistant steel, corrosion resistant steel, 9Ni steels and similar steels with high notch toughness at low temperatures. Good resistance to stress corrosion.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-4, EN ISO 18274:S Ni 6276 (NiCr15Mo16Fe6W4)

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	Fe	W
0.01	0.45	0.05	Bal.	15.5	16.1	5.8	3.5

OK Tigrod NiCrMo-13

Bare Ni-Cr-Mo rods for welding of high alloyed Ni-base materials, 9% Ni steel and super austenic steels of type 20Cr-25Ni with 4-6% Mo. Can also be used for welding carbon steel to Ni base steel. The weld metal has a very good toughness and is corrosion resistant over a wide range of applications in oxidizing and reducing media.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-13, EN ISO 18274:S Ni 6059 (NiCr23Mo16)
Approvals:	VdTÜV 12663 (MV)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 23 % Cr + 16 % Mo)

Typical Tensile Properties			
Condition	**Yield Strength**	**Tensile Strength**	**Elongation**
As welded	500 MPa	750 MPa	40 %

Typical Charpy V-Notch Properties		
Condition	**Testing Temperature**	**Impact Value**
As welded	-110 °C	120 J

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Al**	**Fe**
0.01	0.2	0.1	61.0	23.0	16.0	0.3	1.0

OK Tigrod NiCu-7

Bare nickel based welding rods alloyed with 30% Cu for welding of base materials of the same type. Can also be used to join these alloys to steel. The weld metal has good resistance to flowing seawater and has high strength and toughness over a rather wide temperature range. Has also good resistance to hydrofluoric acid, sulfuric acid, alkalis etc. Can be used for welding of similar types of base materials which are age-hardenable with small additions of Ti and Al.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCu-7, EN ISO 18274:S Ni 4060 (NiCu30Mn3Ti)
Approvals:	VdTÜV 12661 (MV), VdTÜV 12669 (FP)

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed nickel (Ni + 30 % Cu + 2 % Ti + 2 % Fe)

Typical Wire Composition %								
C	**Mn**	**Si**	**Ni**	**Al**	**Cu**	**Fe**	**Nb+Ta**	**Ti**
0.03	3	0.3	64	0.03	28	2	< 0.5	2

OK Tigrod 19.12

A continuous, solid, Cu-Ni wire for welding similar alloys like 90Cu10Ni, 80Cu20Ni and 70Cu30Ni alloys. The addition of nickel strengthens the weld metal and improves the corrosion resistance, particularly in the case of salt water. The alloy is used for the overlay welding of steels and is widely used for welding Cu-Ni components for desalination plants.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCu, EN ISO 24373:CuSn1

Alloy Type:	Copper (Cu + 0.7 % Sn)

Typical Tensile Properties			
Condition	**Yield Strength**	**Tensile Strength**	**Elongation**
As welded	75 MPa	220 MPa	30 %

Typical Wire Composition %			
Mn	**Si**	**Cu**	**Fe**
0.2	0.2	Bal	0.05

OK Tigrod 19.30

Bare copper wire for the GTAW joining of copper-zinc alloys and low-alloyed copper alloys. OK Tigrod 19.30 is alloyed with silicon and manganese and has good flow properties and wear resistance. The alloy is widely used in the joining of zinc-coated steel sheets andfor joining low- and non-alloyed steels and cast iron. OK Tigrod 19.30 is normally welded with pure Ar as the shielding gas.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuSi-A, EN ISO 24373:CuSi3Mn1

Alloy Type:	Alloyed copper (Cu + 3 % Si)

Typical Tensile Properties			
Condition	**Yield Strength**	**Tensile Strength**	**Elongation**
As welded	150 MPa	350 MPa	40 %

Typical Wire Composition %					
Mn	**Si**	**Cu**	**Fe**	**Sn**	**Zn**
0.9	3	96	0.05	0.01	0.05

OK Tigrod 19.40

An aluminium-bronze (CuAl8) rod for the GTAW of rolled and cast aluminium-bronze alloys. The alloy is noted for its high strength, good wear resistance and very good corrosion resistance, particularly in salt water. OK Tigrod 19.40 is normally welded with pure Ar as the shielding gas.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuAl-A1, EN ISO 24373:CuAl7

Alloy Type:	Alloyed copper (Cu + 8 % Al)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	175 MPa	420 MPa	40 %

Typical Wire Composition %

Mn	Si	Al	Cu	Fe	Pb	Zn
0.3	0.1	7	Bal	0.4	0.01	0.1

OK Tigrod 19.49

Bare Cu-Ni rods for welding similar alloys, such as 90Cu10Ni, 80Cu20Ni and 70Cu30Ni alloys. The addition of nickel strengthens the weld metal and improves corrosion resistance, particularly to salt water. The alloy is used for the overlay welding of steels and is widely used for welding Cu-Ni components for desalination plants.

Classifications Wire Electrode:	SFA/AWS A5.7:ERCuNi, EN 14640:S Cu 7158 (CuNi30)
Approvals:	VdTÜV 11600

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Alloyed copper (Cu + 30 % Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	180 MPa	350 MPa	40 %

Typical Wire Composition %

C	Mn	Si	Ni	Cu	Fe
0.02	0.7	0.05	31	Bal	0.5

Cored Wire (FCAW) (MCAW)



MILD STEEL WIRES **4-4**
Dual Shield 7100 Ultra 4-4
Dual Shield 7100SRM 4-5
Dual Shield II 71 HI 4-6
FILARC PZ6111 4-7
FILARC PZ6111HS 4-8
FILARC PZ6113 4-9
FILARC PZ6113S 4-10
OK Tubrod 15.00 4-11
OK Tubrod 15.13 4-12
OK Tubrod 15.13 C 4-13
OK Tubrod 15.14 4-14
OK Tubrod 15.15 4-15
Vertomax 2MG 4-16

LOW ALLOY WIRES **4-17**
Dual Shield 110C 4-17
Dual Shield 55 4-18
Dual Shield 62 4-19
Dual Shield 69 4-20
Dual Shield CrMo1 4-21
Dual Shield CrMo2 4-22
Dual Shield II 4130 SR 4-23
Dual Shield II 81-K2 4-24
Dual Shield MoL 4-25
FILARC PZ6112 4-26
FILARC PZ6114 4-27
FILARC PZ6114S 4-28
FILARC PZ6115 4-29
FILARC PZ6116S 4-30
FILARC PZ6125 4-31
FILARC PZ6138 4-32
FILARC PZ6138SR 4-33
FILARC PZ6138S SR 4-34
FILARC PZ6148 4-35
FILARC PZ6222 4-36
OK Tubrod 15.06 4-37
OK Tubrod 15.09 4-38
OK Tubrod 15.11 4-39
OK Tubrod 15.17 4-40
OK Tubrod 15.19 4-41
OK Tubrod 15.20 4-42
OK Tubrod 15.21TS 4-43
OK Tubrod 15.22 4-44
OK Tubrod 15.27S 4-45
Pipeweld 71T-1 4-46
Pipeweld 91T-1 4-47
Pipeweld 101T-1 4-48
Pipeweld 111T-1 4-49
Primeweld 81-K2 4-50
Primeweld 81-Ni1 4-51
Primeweld 81-Ni1M 4-52

STAINLESS STEEL WIRES **4-53**
FILARC PZ6163 4-53
FILARC PZ6166 4-54
Shield-Bright 2209 4-55
Shield-Bright 2594 4-56
Shield-Bright 308H 4-57
Shield-Bright 308L 4-58
Shield-Bright 308L X-tra 4-59
Shield-Bright 309L 4-60
Shield-Bright 309L X-tra 4-61
Shield-Bright 309LMo 4-62
Shield-Bright 309LMo X-tra 4-63

Shield-Bright 316L 4-64
Shield-Bright 316L X-tra 4-65
Shield-Bright 347 4-66

NICKEL WIRES 4-67
Shield-Bright NiCrMo-3 4-67

SELF-SHIELDED FLUX-CORED WIRES (FCAW) 4-68

MILD STEEL WIRES 4-68
Coreshield 8 4-68
Coreshield 15 4-69

METAL-CORED WIRES (MCAW) 4-70

MILD STEEL WIRES 4-70
Coreweld 46 LS 4-70
FILARC PZ6102 4-71
FILARC PZ6103 4-72
FILARC PZ6104 4-73
FILARC PZ6105R 4-74
OK Tubrod 14.10 4-75
OK Tubrod 14.11 4-76
OK Tubrod 14.12 4-77
OK Tubrod 14.13 4-78

LOW ALLOY WIRES 4-79
OK Tubrod 14.01 4-79
OK Tubrod 14.02 4-80
OK Tubrod 14.03 4-81
OK Tubrod 14.04 4-82
OK Tubrod 14.05 4-83

STAINLESS STEEL WIRES 4-84
Arcaloy MC308L 4-84
Arcaloy MC309L 4-85
Arcaloy MC316L 4-86
Arcaloy MC409Ti 4-87
Arcaloy MC439Ti 4-88
Arcaloy MC18CrCb 4-88
OK Tubrod 15.30 4-89
OK Tubrod 15.31 4-89
OK Tubrod 15.34 4-90
OK Tubrod 15.37 4-90

CAST IRON WIRES 4-91
NICORE 55 4-91

REPAIR AND MAINTENANCE 4-92

HARDFACING ALLOYS 4-92
OK Tubrodur 12Cr S 4-92
OK Tubrodur 13Cr G 4-92
OK Tubrodur 13Cr S 4-93
OK Tubrodur 13Mn O/G 4-93
OK Tubrodur 15CrMn O/G 4-94
OK Tubrodur 23Cr S 4-94
OK Tubrodur 30 O M 4-95
OK Tubrodur 35 G M 4-95
OK Tubrodur 35 O M 4-96
OK Tubrodur 35 S M 4-96
OK Tubrodur 40 O M 4-97
OK Tubrodur 40 S M 4-97
OK Tubrodur 53 G M 4-98
OK Tubrodur 55 O A 4-98
OK Tubrodur 58 O/G M 4-99
OK Tubrodur 58 S M 4-99
OK Tubrodur 60 G M 4-100
OK Tubrodur 200 O D 4-100

Dual Shield 7100 Ultra

Like many other Dual Shield products, Dual Shield 7100 Ultra operates in a wider parameter range and generates less welding fumes than many similar welding wires. The low spatter levels and easy slag removal minimizes post weld cleanup. Dual Shield 7100 Ultra can be used with either 100% CO2 or 75% Ar/25% CO2. This versatility in gas selection provides the fabricator greater flexibility in choosing both wire and gas. Applications include railcar and earth moving equipment, as well as general structural steel fabrication.

Classifications Weld Metal:	SFA/AWS A5.20:E71T-1C, SFA/AWS A5.20:E71T-9C, SFA/AWS A5.20:E71T-9M, JIS Z 3313:T49 2 T1-1 C AP-U (KR), EN ISO 17632-A:T 42 2 P C 1 H10, EN ISO 17632-A:T 42 2 P M 1 H10
Approvals:	CE EN 13479, DNV III YMS (M21), ABS 3YSA (C1), DNV III YMS (C1), DNV III YMS H10, ABS 2SA (C1), ABS 3YSA, H10 (C1), ABS 3YSA, H10 (M21), BV SA3YM H10 (C1), BV SA3YM H10 (M21), BV SA3YM H15 (C1), CCS 4YSH5 (C1), ClassNK KSW53G(C) H10 (C1), ClassNK KSW53G(M2)H10 (M21), CWB E491T-9-H8 (C1), CWB E491T-9M-H16 (M21), DNV III YMS H10 (C1), GL 3Y H10S (C1), GL 3Y H10S (M21), GL 3Y H15S (C1), KR 3YSG(C)H10 (C1), LR 3YS H10 (C1), LR 3YS H10 (M21), RS 3YS H10 (C1), VdTÜV 06616

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	515 MPa	585 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-20 °C	55 J
As welded	-29 °C	34 J

Typical Weld Metal Analysis %

C	Mn	Si
C1 shielding gas		
0.038	1.30	0.55

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	140-330 A	22-34 V	5.1-15.2 m/min	1.7-5.3 kg/h
1.4 mm	155-390 A	23-35 V	4.5-14.0 m/min	2.2-6.8 kg/h
1.6 mm	170-460 A	24-36 V	3.8-12.7 m/min	2.5-8.3 kg/h

Dual Shield 7100SRM

Dual Shield 7100SRM is an all-position flux cored wire that displays exceptional impact properties in both the as welded and stress relieved condition when used with 75% Ar/25% CO2 shielding gas. The weld deposit has less than 0.5% nickel which conforms to the A-1 composition in ASME Section IX, QW-440.

Classifications Weld Metal:	SFA/AWS A5.20:E71T-9MJH4/T-12MJH4
Approvals:	LR 5Y40S(H5), CWB CSA W48: Class E491T-9MJ-H4, E491T-12MJ-H4

Approvals are based on factory location. Please contact ESAB for more information.

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As Welded	425 MPa	510 MPa	32 %
Stress Relieved 8 hr 620 °C	405 MPa	498 MPa	33 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As Welded	-29 °C	123 J
As Welded	-40 °C	94 J
As Welded	-46 °C	89 J
Stress Relieved 8 hr 620 °C	-29 °C	115 J
Stress Relieved 8 hr 620 °C	-40 °C	86 J
Stress Relieved 8 hr 620 °C	-46 °C	76 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.03	1.40	0.41	0.45

Dual Shield II 71 HI

Dual Shield II 71 HI is an all-position flux cored wire designed for optimum performance when using 100% CO2 shielding gas, while producing diffusible hydrogen levels of <4 mL/100g over a wide range of welding parameters. This wire was designed to join low and medium carbon steels where higher impacts and toughness are required. Dual Shield II 71 HI has excellent welder appeal and performs well over steels with moderate rust and mill scale. The smooth metal transfer facilitates easy deposition of vertical-up stringer beads.

Classifications Weld Metal:	SFA/AWS A5.20:E71T-1CJ H4/T-9CJ H4
Approvals:	BV SA4YMH5, DNV IV YMS H5, LR 4YS H5, ABS 4YSAH5, CWB CSA W48: Class E491T-9J-H4

Approvals are based on factory location. Please contact ESAB for more information.

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As Welded	526 MPa	585 MPa	34 %
Stress Relieved 8 hr 620 °C	472 MPa	538 MPa	31 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As Welded	-30 °C	120 J
As Welded	-40 °C	106 J
Stress Relieved 2 hr 620 °C	-30 °C	79 J
Stress Relieved 2 hr 620 °C	-40 °C	51 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.03	1.25	0.33	0.35

FILARC PZ6111

A downhand rutile wire for use with Ar/CO2 or CO2 shielding gas in the flat and horizontal/vertical positions. The slag is often self lifting leaving a clean weld bead surface.

Classifications Weld Metal:	SFA/AWS A5.36:E70T1-C1A0-G, SFA/AWS A5.36:E70T1-M21A0-G, EN ISO 17632-A:T 42 2 1Ni R C 3 H10, EN ISO 17632-A:T 46 2 1Ni R M 3 H10
Approvals:	CE EN 13479, LR 3YS H10 (C1), LR 3YS H10 (M21), ABS 3SA, 3YSA H10, GL 3Y H10S, BV S3M, S3YM HH (C1), BV S3M, S3YM HH (M21), CRS 3Y H10S (C1), CRS 3Y H10S (M21), DB 42.105.06, DNV III YMS (H10) (C1), DNV III YMS (H10) (M21), PRS 3YS H10 (C1), PRS 3YS H10 (M21), VdTÜV 03013

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy (<1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	465 MPa	530 MPa	28 %
M21 shielding gas			
As welded	495 MPa	576 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-20 °C	89 J
M21 shielding gas		
As welded	-20 °C	114 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.062	1.07	0.53	0.70

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-38 V	5.8-20.7 m/min	2.1-7.5 kg/h
1.4 mm	150-350 A	26-36 V	3.4-12.0 m/min	1.8-6.3 kg/h
1.6 mm	150-450 A	24-40 V	2.8-12.4 m/min	1.6-8.1 kg/h

FILARC PZ6111HS

A high filling ratio, downhand, rutile cored wire that produces weld deposits at rates of up to 15 kg/h with conventional equipment. The finished weld is free from spatter and the self-releasing slag adds to the quality of the finished weld deposit. Shielding gas Ar+15-25% CO2 and CO2

Classifications Weld Metal:	EN ISO 17632-A:T 42 2 1Ni R C 3 H10, EN ISO 17632-A:T 46 2 1Ni R M 3 H10, SFA/AWS A5.36:E70T1-C1A0-G-H8, SFA/AWS A5.36:E70T1-M21A0-G-H8
Approvals:	CE EN 13479, LR 3YS H10 (C1), LR 3YS H10 (M21), ABS 3SA, 3YSA H10, BV S3YM HH (C1,M21), DB 42.105.18, DNV III Y40MS (H10) (C1), DNV III Y40MS (H10) (M21), GL 3Y H10S, VdTÜV 07668

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy (<1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	465 MPa	540 MPa	27 %
M21 shielding gas			
As welded	490 MPa	560 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-20 °C	78 J
M21 shielding gas		
As welded	-20 °C	97 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.052	1.04	0.53	0.70

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	250-450 A	26-40 V	6.5-19.1 m/min	4.0-12.1 kg/h

FILARC PZ6113

Multi-purpose, all-positional, rutile cored wire for use with either Ar/CO2 or CO2. Exceptionally easy to use in all positions, the smooth, stable arc promotes spatter-free welds with smooth tie-ins. The wire is ideally suited for use with ceramic backing for root runs. (Chemical composition; M21 shielding gas). (Mechanical properties of weld metal; M21 shielding gas).

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-C1A0-CS2-H4, SFA/AWS A5.36:E71T1-M21A0-CS2-H8 (H8 for 1.2 and 1.4mm), EN ISO 17632-A:T 42 2 P C 1 H5, EN ISO 17632-A:T 46 2 P M 1 H10
Approvals:	CE EN 13479, ABS 3YSA H10 (M21), BV SA3M, SA3YM H10 (M21), GL 3YH10S (M21), PRS 3YS H10 (M21), RINA 3YS H5 (M21), DNV III Y40MS H5 (M21)*, LR 3YS H10 (M21), RS 3Y H5 (M21), ClassNK KSW53G H10 (C1&M21), CRS 3Y H5S (C1 & M21), DB 42.105.07, DNV III YMS H5 (M21), LR 3YS H5 (M21), PRS 3YS H5 (C1 & M21), VdTÜV 04902, ABS 3SA, 3YSA H5 (C1 & M21), NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding gas			
As welded	495 MPa	585 MPa	25 %
M21 Shielding gas			
As welded	535 MPa	601 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-20 °C	110 J
M21 Shielding gas		
As welded	-20 °C	128 J

Typical Weld Metal Analysis %

C	Mn	Si
C1 shielding gas		
0.06	1.20	0.40

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.8-20.7 m/min	2.1-7.5 kg/h
1.4 mm	150-350 A	22-34 V	3.3-11.6 m/min	1.8-6.3 kg/h
1.6 mm	150-450 A	22-36 V	2.8-12.4 m/min	1.8-8.1 kg/h

FILARC PZ6113S

Firmly established as the leading CO2, all-positional, rutile cored wire, PZ6113S has a high degree of welder appeal. For example, the 1.2 mm diameter can weld in several positions at a single current/voltage setting, which explains why it is highly regarded in the shipbuilding segment.

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-C1A2-CS2, EN ISO 17632-A:T 46 3 P C 2 H5
Approvals:	CE EN 13479, LR 3YS H5 (C1), DNV III YMS H10 (C1), ABS 3SA, H5, BV SA3YM H5 (C1), CCS 3Y40SH5 (C1), CRS 4Y H5S (C1), GL 4Y42H10S (C1), PRS 3YS H5 (C1), RINA 3Y S H5 (C1), RS 3YH5 (C1), VdTÜV 07085

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	560 MPa	628 MPa	23.3 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	0 °C	140 J
As welded	-20 °C	125 J
As welded	-30 °C	109 J

Typical Weld Metal Analysis %

C	Mn	Si
C1 shielding gas		
0.065	1.27	0.43

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-38 V	5.8-20.7 m/min	2.1-7.5 kg/h

OK Tubrod 15.00

OK Tubrod 15.00 is a flux-cored wire which deposits very low-hydrogen quality weld metal. Diameters 1.0 and 1.2 mm are available for positional welding. The slag cover is thin and easily remelted. Shielding gas CO2 or Ar + 20% CO2. OK Tubrod 15.00 is designed for general fabrication where the risk of hydrogen-induced cracking is to be avoided.

Classifications Weld Metal:	SFA/AWS A5.36:E71T5-M21A2-CS1-H4, SFA/AWS A5.36:E71T5-C1A2-CS1-H4, EN ISO 17632-A:T 42 3 B C 2 H5, EN ISO 17632-A:T 42 3 B M 2 H5
Approvals:	CE EN 13479, DNV III YMS (M21), LR 3YS H5 (M21), VdTÜV 02181, GL 3Y H10S, RINA 3YS H5 (M21), DB 42.039.12, DB 81.039.03

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC-
Diffusible Hydrogen:	< 4 ml/100g
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas EN			
As welded	456 MPa	569 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas EN		
As welded	-20 °C	145 J
As welded	-30 °C	129 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 shielding gas		
0.06	1.44	0.70

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	100-230 A	14-30 V	4.5-13.0 m/min	1.2-4.0 kg/h
1.2 mm	120-300 A	16-32 V	4.0-15.0 m/min	1.7-6.5 kg/h
1.4 mm	130-350 A	16-32 V	3.0-12.0 m/min	1.5-7.5 kg/h
1.6 mm	140-400 A	24-34 V	3.0-10.5 m/min	2.0-8.0 kg/h
2.4 mm	250-500 A	28-38 V	1.5-6.0 m/min	3.5-9.5 kg/h

OK Tubrod 15.13

A multi-purpose, all-positional wire for use with Ar/CO2 gas or CO2 producing spatter-free welds with a self-releasing slag over a wide application base, but it is ideally suited for shipbuilding thanks to its ease of use and excellent feedability. Vertical-up welds, with or without the use of a backing material for root runs, are the hallmark of this wire, where deposition rates of 4-5 kg/h can be achieved.

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-C1A0-CS2-H4, EN ISO 17632-A:T 42 2 P C 1 H5, EN ISO 17632-A:T 46 2 P M 1 H10, SFA/AWS A5.36:E71T1-M21A0-CS2-H8 H8 (for 1.2 and 1.4mm only)
Approvals:	CE EN 13479, LR 3YS H5 (M21), LR 3YS H5 (C1), GL 3Y H10S (M21), RS 3YH5 (C1), PRS 3YS H5 (C1 & M21), GL 3Y H5S (C1), RINA 2YS H5 (C1), RINA 3YS H5 (M21), ABS 3SA, 3YSA H5 (C1 & M21), BV SA3M, SA3YM H5 (M21), BV SA3M,SA3YM HHH (C1), DB 42.039.21, DNV III YMS (H5) (C1), DNV III YMS (H5) (M21), RS 3YH5 (M21), VdTÜV 05019

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	535 MPa	601 MPa	25 %
M21 shielding gas			
As welded	550 MPa	620 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-20 °C	128 J
M21 shielding gas		
As welded	-20 °C	135 J

Typical Weld Metal Analysis %

C	Mn	Si
C1 shielding gas		
0.059	1.33	0.63

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.8-20.7 m/min	2.1-7.5 kg/h
1.4 mm	150-350 A	22-34 V	3.3-11.6 m/min	1.8-6.3 kg/h
1.6 mm	150-450 A	22-36 V	2.8-12.4 m/min	1.8-8.1 kg/h

OK Tubrod 15.13 C

A multi-purpose all positional rutile cored wire for use with C1 shielding gas.

Classifications Weld Metal:	EN ISO 17632-A:T 46 4 P C 1 H5, SFA/AWS A5.36:E71T1-C1A4-CS2-H4
Approvals:	DNV IV Y40MS (H5) (C1), GL 4YH5S (C1), LR 3YS H5 (C1), BV S4YM H5 (C1), ABS 4YSA H5 (C1 & M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 (EN ISO 14175)			
As welded	529 MPa	586 MPa	25.5 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 (EN ISO 14175)		
As welded	-40 °C	111 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
C1 (EN ISO 14175)			
0.056	1.39	0.43	0.40

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-35 V	5.6-19.8 m/min	2.1-7.5 kg/h

OK Tubrod 15.14

OK Tubrod 15.14 is a flux-cored, tubular wire for all-positional welding using either Ar/CO2 or CO2. The wire is suitable for all mild and medium tensile structural steels. The running characteristics are exceptional, using the spray mode of transfer, and this applies equally to both shielding gases. OK Tubrod 15.14 is also universally approved to grade 3 by all major authorities. Shielding gas Ar/20%CO2 or CO2.

Classifications Weld Metal:	EN ISO 17632-A:T 46 2 P C 1 H5, EN ISO 17632-A:T 46 2 P M 2 H5, SFA/AWS A5.36:E71T1-M21A0-CS2-H8, SFA/AWS A5.36:E71T1-C1A0-CS2-H8
Approvals:	CE EN 13479, DNV III YMS (M21), GL 3YS, BV SA3YM (M21), LR 3YS H5 (M21), LR 3YS H5 (C1), DNV III YMS (C1), BV SA3YM (C1), ABS 3YSA H5 (M21), PRS 3YS H10 (C1), PRS 3YS H10 (M21), DNV III YMS H5 (C1), ABS 3YSA H5 (C1), DB 42.039.05 (M21 and C1), DNV III YMS H5 (M21), LR 3YM H5 (M21)*, LR 3YS H5 (M21)*, RINA 2Y S H5 (C1), RINA 3Y S H5 (M21), RS 3YHS H5 (M21), RS 3YMS H5 (C1), RS 3YSH5 (C1), RS 3YSH5 (M21), VdTÜV 07651, NAKS/HAKC 1.2 mm

**Also with OK Backing Rectangular 13. Approvals are based on factory location. Please contact ESAB for more information.*

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g (<10ml/100g for 1.4 & 1.6mm)
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	497 MPa	588 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-20 °C	110 J

Typical Weld Metal Analysis %

C	Mn	Si
C1 shielding gas		
0.05	1.30	0.54

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	110-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h
1.4 mm	130-320 A	22-32 V	3.0-12.5 m/min	1.4-6.3 kg/h
1.6 mm	150-360 A	24-34 V	3.0-11.0 m/min	2.0-6.2 kg/h

OK Tubrod 15.15

OK Tubrod 15.15 is a flux-cored, tubular wire designed as a truly all-positional, general-purpose wire for welding mild and medium tensile steels up to 510 MPa tensile strength. Using either Ar/CO2 or CO2 as the shielding gas, the 1.2 and 1.4 mm sizes can be used in the vertical position on spray transfer providing for maximum deposition and time savings. Weld pool control is easy both vertically up and downwards and slag removal is rapid. OK Tubrod 15.15 is designed for a wide range of applications especially where manipulation of the work is impractical.

Classifications Weld Metal:	EN ISO 17632-A:T 46 2 P C 1 H5, EN ISO 17632-A:T 46 2 P M 2 H5, SFA/AWS A5.36:E71T1-C1A0-CS2, SFA/AWS A5.36:E71T1-M21A0-CS2
Approvals:	CE EN 13479, LR 3YS H5 (M21), LR 3YS H5 (C1), ABS 3YSA H5 (M21), GL 3Y H10S, DNV III YMS H5 (C1), ABS 3YSA H5 (C1), DNV III YMS H5 (M21), RS 3YMS H5 (C1), BV 3YS H5 (C1), BV 3YS H5 (M21), DB 42.039.14 (M21 and C1), RS 3YMS H5 (M21), VdTÜV 04175

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g (<10 ml/100g for 1.6mm)
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas EN			
As welded	528 MPa	560 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas EN		
As welded	-20 °C	159 J

Typical Weld Metal Analysis %

C	Mn	Si
C1 Shielding gas		
0.05	1.31	0.31
M21 shielding gas		
0.06	1.40	0.40

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	20-30 V	3.2-14.5 m/min	1.3-5.8 kg/h
1.6 mm	150-360 A	24-34 V	3.0-11.0 m/min	2.0-6.2 kg/h

Vertomax 2MG

A flux-cored, tubular wire designed for automatic vertical-upwards welding using the electrogas process. The core formulation ensures good arc stability and excellent mechanical properties even on thin plate at heat inputs as high as 40 kJ/cm. It can also be used in conjunction with separate metal powder addition for a further improvement in mechanical properties, deposition rate and reduced heat loading to the plate. Shielding gas: CO2.

Classifications Weld Metal:	SFA/AWS A5.26:EG70T-Ni1
Approvals:	VdTÜV 10794

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	428 MPa	568 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	0 °C	88 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.068	1.28	0.38	0.70	0.16

Deposition Data

Diameter	Current	Voltage	Deposition Rate
1.6 mm	350-400 A	32-36 V	12.5-14.5 kg/h
2.4 mm	420-480 A	32-34 V	13.0-13.8 kg/h
3.2 mm	590-650 A	32-35 V	12.0-14.0 kg/h

Dual Shield 110C

High strength steels are increasingly being used as they offer the designer the possibility of making lighter, higher performance structures with good overall cost effectiveness together with lower environmental impacts. The use of high-strength steel can mean lower fabrication costs, increased payloads, more durable products, more effective space utilization and increased safety.

Dual Shield 110C is ESAB's new all-positional, low hydrogen rutile cored wire for use with CO2 shielding gas mixtures. Designed for high integrity welding of high strength steels this wire produces tough weld metal down to -60°C and meets the low diffusible hydrogen grade of H4. The benefits of using this wire with CO2 shielding gas include availability, cost and the advantageous depth to width bead profile.

Dual Shield 110C is extremely welder friendly. It is easy to obtain flat welds with good penetration and smooth wetting into the plate edges. The brittle slag is easily removed leaving a smooth weld appearance. Typical positional welding defects such as lack of fusion and slag inclusions are avoided. The wires have a high tolerance for poor joint preparation and high quality one-sided root runs can be made economically on ceramic backing.

High strength steels can be difficult to weld and in order to achieve the desired mechanical properties, without defects requires strict control of the welding parameters including the weld cooling rate.

Classifications Weld Metal:	SFA/AWS A5.36:E111T1-C1A6-G-H4, EN ISO 18276-A:T 69 6 Z P C 2 H5
Approvals:	ABS 4Y69M*, ABS E111T1-GJM-H4*

** CVN >47J at -60°C. Approvals are based on factory location. Please contact ESAB for more information.*

Welding Current:	DC+
Alloy Type:	Low Alloy (Ni Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas AWS			
As welded	761 MPa	840 MPa	18 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas AWS		
As welded	-60 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
C1 Shielding gas				
0.055	1.21	0.39	2.3	0.4

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

Dual Shield 55

An all-positional rutile cored wire for welding steels with a minimum yield strength of 550 MPa, for use with M21 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E91T1-M21A4-G, EN ISO 18276-A:T 55 4 Z P M 2 H5
Approvals:	CE EN 13479, ABS 4YQ500

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Low alloy steel (<1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	604 MPa	663 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	106 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.05	1.45	0.41	0.95

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

Dual Shield 62

An all-positional rutile cored wire for welding steels with a minimum yield strength of 620 MPa, for use with M21 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E101T1-M21A4-G-H4, EN ISO 18276-A:T 62 4 Mn1.5Ni P M 2 H5
Approvals:	NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	670 MPa	740 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	95 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.061	1.58	0.41	1.50

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

Dual Shield 69

Dual Shield 69 is ESAB's new all-positional, low hydrogen rutile cored wire for use with Ar/CO2 shielding gas mixtures. Designed for high integrity welding of high strength steels this wire produces tough weld metal down to -60°C and meets the low diffusible hydrogen grade of H4. High strength steels are increasingly being used as they offer the designer the possibility of making lighter, higher performance structures with good overall cost effectiveness together with lower environmental impacts. The use of high-strength steel can mean lower fabrication costs, increased payloads, more durable products, more effective space utilisation and increased safety.

Classifications Weld Metal:	SFA/AWS A5.36:E111T1-M21A6-G-H4, EN ISO 18276-A:T 69 6 Z P M 2 H5
Approvals:	ABS 4Y69M, ABS E111T1-GJM-H4

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low Alloy (Ni-Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	740 MPa	790 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-40 °C	65 J
As welded	-60 °C	58 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.095	1.25	0.34	2.8	0.4

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	21-32 V	5.6-19.8 m/min	2.1-7.5 kg/h

Dual Shield CrMo1

Dual Shield CrMo1 is an all positional rutile, low-hydrogen flux-cored wires for welding 1.25%Cr creep resisting steels. Designed for use in Ar/CO2 shielding gas, it has excellent weldability and produce flat beads with good wetting and appearance as well as good impact toughness down to -20°C after stress relieving.

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21PY-B2, EN ISO 17634-A:T CrMo1 P M 2 H5
Approvals:	VdTÜV 12138

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	1Cr 0.5Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
PWHT 690°C 1h	563 MPa	626 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
PWHT 690°C 1h	20 °C	156 J
PWHT 690°C 1h	0 °C	149 J
PWHT 690°C 1h	-20 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.06	0.90	0.35	1.29	0.54

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.8-20.7 m/min	2.1-7.5 kg/h

Dual Shield CrMo2

An all-positional rutile cored wire which contains 2Cr 1Mo. Designed for use with argon + 15-25% carbon dioxide shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E91T1-M21PY-B3, EN ISO 17634-A:T CrMo2 P M 2 H5

Welding Current:	DC+
Alloy Type:	2Cr 1Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
PWHT 690°C 1h	625 MPa	710 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
PWHT 690°C 1h	20 °C	130 J
PWHT 690°C 1h	0 °C	110 J
PWHT 690°C 1h	-20 °C	65 J

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.06	0.84	0.33	2.26	0.94

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.8-20.7 m/min	2.1-7.5 kg/h

Dual Shield II 4130 SR

Dual Shield II 4130 SR is an all position flux cored wire for welding low alloy, high strength steels such as 4130. Ideal for offshore oil and gas topsides and platforms requiring high corrosion resistance with stress relieved high strength and low temperature impact toughness properties. Excellent welder appeal and mechanical properties after PWHT. Meets ANSI/NACE MR0175/ISO 15156-1.

Typical Diffusible Hydrogen: <4 ml/100g of deposited metal.

Classifications:	AWS A5.29/A5.29M, ASME SFA 5.29:E101T1-GM, AWS A5.36/A5.36M:E101T1-M21AP5-G-H4

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
Stress Relieved 2 hr 620 °C	648 MPa	731 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As Welded	-46 °C	64 J
Stress Relieved 6G Pipe 2 hr 620 °C	-46 °C	43 J
Stress Relieved Vertical Postition 2 hr 620 °C	-46 °C	69 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.05	2.0	0.3	0.90	0.03	0.43

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	TTW Dist.
1.2 mm	150-170 A	23-24 V	432 m/min	19 mm
1.2 mm	180-220 A	24-26 V	719 m/min	16 mm
1.2 mm	230-280 A	26-28 V	1016 m/min	16 mm

Dual Shield II 81-K2

The wire produces a smooth stable arc and low spatter levels using a 100% CO2 shielding gas. Dual Shield II 81-K2 was developed for higher tensile steels such as ASTM A302, A533 Class I and A537. Applications include ship fabrication, offshore oil rigs, and heavy equipment construction. This wire is an excellent choice for welding ASTM steels A302, A533 Class I and A537. Dual Shield II 81-K2 produces a smooth stable arc and low spatter levels using 100% CO2 shielding gas. Applications include ship building, offshore oil rigs, and heavy equipment construction.

Classifications Weld Metal:	SFA/AWS A5.29:E81T1-K2C, JIS Z 3313:T 55 6 T1-1C A-N3, EN ISO 17632-A:T 46 6 1.5Ni P C 1 H5
Approvals:	ABS 5Y400SA, H5 (C1), BV SA5Y40M HHH (C1), CCS 5Y42SH5, CE EN 13479, ClassNK KSWL3G(C)H5, KSW54Y40G(C)H5 (C1), DNV V Y40MS H5 (C1), GL 6Y40H5S (C1), KR L3SG(C) H5 & 5Y40SG(C) H5, LR 5Y40S H5 (C1), RINA 5YS H10 (C1)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy (1.5% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
CO2 shielding gas			
As welded	542 MPa	608 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
CO2 shielding gas		
As welded	-30 °C	110 J
As welded	-40 °C	94 J
As welded	-50 °C	83 J
As welded	-60 °C	64 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
CO2 shielding gas			
0.04	1.14	0.41	1.55

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	140-330 A	22-34 V	3.8-15.2 m/min	1.9-5.8 kg/h

Dual Shield MoL

An all-positional rutile cored wire which contains 0.5Mo. Designed for argon 15-25% carbon dioxide shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21PY-A1, EN ISO 17634-A:T MoL P M 2 H5
Approvals:	VdTÜV 12161

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	0.5Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 Shielding gas			
PWHT 615°C 1h	563 MPa	626 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 Shielding gas		
PWHT 615°C 1h	20 °C	156 J
PWHT 615°C 1h	0 °C	149 J
PWHT 615°C 1h	-20 °C	131 J

Typical Weld Metal Analysis %

C	Mn	Si	Mo
0.043	0.72	0.25	0.47

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.8-20.7 m/min	2.1-7.5 kg/h

FILARC PZ6112

An all positional rutile cored wire for weathering steels, used with C1 or M21 shielding gas. Diameters less than 1.4 mm are all-positional except vertical down.

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-C1A2-G-H4, SFA/AWS A5.36:E71T1-M21A2-G-H8, EN ISO 17632-A:T 42 2 Z P C 1 H5, EN ISO 17632-A:T 46 2 Z P M 1 H10
Approvals:	CE EN 13479, DB 42.105.13, VdTÜV 06767

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	541 MPa	620 MPa	24.6 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-20 °C	66 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cu
0.065	1.07	0.66	0.66	0.42

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-38 V	5.8-20.7 m/min	2.1-7.5 kg/h

FILARC PZ6114

An all-positional, rutile cored wire for use with mixed gas (Ar/CO2) with dependable Charpy impact properties to -40°C. A versatile and productive wire for general fabrication and shipbuilding.

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-M21A4-CS2-H4, EN ISO 17632-A:T 46 4 P M 1 H5
Approvals:	CE EN 13479, ABS 4YSA H5, LR 3YS H5, GL 4YH5S, BV S4YM H5, CCS 4Y40SH5, CRS 4YH5S, DB 42.105.16, DNV IV Y40MS (H5), PRS 4YS H5, RS 4Y42MSH5 (M21), VdTÜV 07669

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	529 MPa	586 MPa	25.5 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	111 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.056	1.25	0.41	0.41

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-35 V	5.6-19.8 m/min	2.1-7.5 kg/h

FILARC PZ6114S

An all-positional rutile cored wire with good toughness down to -40ºC for use with C1 shielding gas. Diameters less than 1.4 mm are all positional, with the exception of vertical down.

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-C1A4-CS2-H4, EN ISO 17632-A:T 46 4 P C 1 H5
Approvals:	CE EN 13479, ABS 4YSA H5, LR 3YS H5 (C1), CRS 4Y H5S (C1), BV S4YM H5 (C1), CCS 4Y40SH5 (C1), DB 42.105.15, DNV IV Y40MS (H5) (C1), GL 4YH5S, PRS 4YS H5 (C1), RS 4Y42MSH5 (C1), VdTÜV 07683, NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	539 MPa	605 MPa	23.9 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-40 °C	105 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
C1 shielding gas			
0.06	1.39	0.43	0.40

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-35 V	5.6-19.8 m/min	2.1-7.5 kg/h

FILARC PZ6115

An all-positional rutile cored wire for use with mixed gas providing very good toughness down to -50°C.

Classifications Weld Metal:	EN ISO 17632-A:T 50 5 2Ni P M 2 H5
Approvals:	BV SA5Y50M H5 (M21), DNV V Y50MS (H5) (M21), RS 5Y50MSH5 (M21), NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	557 MPa	662 MPa	21 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-50 °C	93 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.054	1.06	0.39	2.36

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-35 V	5.6-19.8 m/min	2.1-7.5 kg/h

FILARC PZ6116S

An all-positional rutile cored wire with good toughness down to -60ºC for use with C1 shielding gas. Diameters of less than 1.4 mm are all positional, with the exception of vertical down.

Classifications Weld Metal:	EN ISO 17632-A:T 46 6 1.5Ni P C 1 H5, SFA/AWS A5.36:E81T1-C1A8-K2-H4
Approvals:	CE EN 13479, PRS 3YS H5 (C1), ABS 3SA H5, 3YSA H5 , BV S3YMH5 (C1), DNV V Y46MS (H5) (C1), GL 6Y40H5S, LR 5Y40S H5 (C1), RINA 4Y S (C1), RS 5Y42MSH5 (C1)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	553 MPa	624 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-60 °C	69 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.054	1.38	0.43	1.42

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.6-19.8 m/min	2.1-7.5 kg/h

FILARC PZ6125

All-positional, basic wire for demanding applications, such as offshore fabrication, with dependable CVN toughness down to -50°C and reliable CTOD properties, both AW and SR. Ar/CO2 gas. Lack of fusion in vertical-up welding is largely avoided by semi-spray arc operation.

Classifications Weld Metal:	SFA/AWS A5.36:E71T5-M21A8-G-H4, SFA/AWS A5.36:E71T5-M21P8-G-H4, EN ISO 17632-A:T 42 6 1Ni B M 1 H5
Approvals:	CE EN 13479, ABS 3SA, 3YSA H5, BV S4M, S5YM H5 (M21), DB 42.105.12, DNV V Y40MS (H5) (M21), GL 6YH10S, LR 5Y40S H5 (M21), RS 5Y42HHS (M21), VdTÜV 05648

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC-(+)
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	445 MPa	556 MPa	28 %
Stress relieved 2 hr 600 °C	410 MPa	510 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-60 °C	109 J
Stress relieved 2 hr 600 °C	-40 °C	100 J
Stress relieved 2 hr 600 °C	-60 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.084	1.24	0.45	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	100-250 A	16-31 V	5.6-18.6 m/min	1.4-4.7 kg/h
1.2 mm	150-350 A	20-35 V	5.8-22.0 m/min	2.1-7.9 kg/h
1.6 mm	150-450 A	18-36 V	2.8-12.0 m/min	1.8-7.9 kg/h

FILARC PZ6138

Well established in the offshore sector, PZ6138 alloyed with 0.9% Ni produces reliable Charpy impact properties down to -60°C and CTOD performance to -10°C. The wire exhibits a smooth stable arc with virtually no spatter.

Classifications Weld Metal:	SFA/AWS A5.29:E81T1-Ni1M JH4, SFA/AWS A5.36:E81T1-M21A8-Ni1-H4, EN ISO 17632-A:T 50 6 1Ni P M 1 H5
Approvals:	CE EN 13479, ABS 3SA, 3YSA H5, BV S3YM H5 (M21), LR 5Y40S H5 (M21), DB 42.105.08, DNV V Y46MS (H5) (M21), GL 6Y46H5S, PRS 3YS H5 (M21), RS 5Y42MSH5 (M21), VdTÜV 04903, NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 Shielding gas			
As welded	577 MPa	616 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 Shielding gas		
As welded	-20 °C	145 J
As welded	-40 °C	130 J
As welded	-60 °C	114 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cu
M21 Shielding gas				
0.04	1.1	0.33	0.93	0.021

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	20-35 V	5.8-22.0 m/min	2.1-7.9 kg/h

FILARC PZ6138SR

An all-positional rutile cored wire for use with M21 providing very good toughness down to -60°C after stress relieving.

Classifications Weld Metal:	SFA/AWS A5.29:E81T1-Ni1M J, SFA/AWS A5.36:E71T1-M21P8-Ni1, SFA/AWS A5.36:E81T1-M21A8-Ni1, EN ISO 17632-A:T 46 6 1Ni P M 1 H5
Approvals:	NAKS/HAKC 1.2MM, ABS 4YSA H5 (M21), ABS 5Y46M H5 (C1), DNV V Y42MS H5 (M21), LR 5Y42S, 5Y42srS H5 (M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
Stress relieved 2 hr 600 °C	505 MPa	585 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
Stress relieved 2 hr 600 °C	-60 °C	84 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.048	1.24	0.37	0.84

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	175-350 A	25-38 V	5.6-12.8 m/min	2.8-8.1 kg/h

FILARC PZ6138S SR

An all-positional rutile cored wire for use with M21 providing very good toughness down to -60°C after stress relieving. Diameters less than 1.4 mm are all-positional except vertical down.

Classifications Weld Metal:	SFA/AWS A5.29:E81T1-Ni1C J, SFA/AWS A5.36:E71T1-C1P8-Ni1, SFA/AWS A5.36:E81T1-C1A8-Ni1, EN ISO 17632-A:T 46 6 1Ni P C 1 H5
Approvals:	DNV V Y46MS (H5) (C1), ABS 5Y42M H5, ABS 5Y46M H5, BV 5Y42 H5 (C1), BV 5Y46 H5 (C1), DNV V Y42MS (H5) (C1), GL 5Y42H5S (stress relieved), GL 5Y46H5S (as welded)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas			
As welded	498 MPa	579 MPa	28 %
Stress relieved 2 hr 600 °C	480 MPa	560 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas		
As welded	-60 °C	90 J
Stress relieved 2 hr 600 °C	-60 °C	83 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
C1 shielding gas			
0.05	1.20	0.30	0.90

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	175-350 A	25-38 V	5.6-12.8 m/min	2.8-8.1 kg/h

FILARC PZ6148

A basic cored wire suitable for the welding steels with a minimum yield strength of 690 MPa for use with M21 shielding gas. Diameters less than 1.4 mm are all-positional.

Classifications Weld Metal:	EN 12535:T 69 5 Mn2NiCrMo B M 2 H5, SFA/AWS A5.29:E111T5-K4M H4

Welding Current:	DC-
Alloy Type:	Low alloy (2%Ni, 0.5% Mo, 0.5% Cr)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	817 MPa	879 MPa	18.5 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-50 °C	69 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
M21 shielding gas					
0.075	1.67	0.47	2.18	0.48	0.48

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	20-35 V	5.8-22.0 m/min	2.1-7.9 kg/h

FILARC PZ6222

An all-positional rutile cored wire for 0.5% Mo creep resisting steels used with M21 shielding gas. Diameters less than 1.4 mm are all-positional except vertical down.

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21PY-A1, EN ISO 17634-A:T MoL P M 2 H5, SFA/AWS A5.36:E81T1-M21AY-A1
Approvals:	VdTÜV 07071

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low alloy (0.5% Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	573 MPa	635 MPa	24 %
PWHT 610°C 1h	533 MPa	592 MPa	*24 %*

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	20 °C	75 J
PWHT 610°C 1h	20 °C	69 J

Typical Weld Metal Analysis %

C	Mn	Si	Mo
M21 shielding gas			
0.036	0.76	0.41	0.47

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	27-35 V	5.6-19.8 m/min	2.1-7.5 kg/h

OK Tubrod 15.06

A basic cored wire which gives good toughness down to -60°C for use with M21 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E71T5-M21A8-G-H4, EN ISO 17632-A:T 42 6 1Ni B M 1 H5
Approvals:	CE EN 13479, DB 42.039.25, VdTÜV 05647

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC-(+)
Alloy Type:	Low alloy 1% Ni

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	445 MPa	556 MPa	28 %
PWHT 600°C 2h	425 MPa	535 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-60 °C	109 J
PWHT 600°C 2h	-40 °C	100 J
PWHT 600°C 2h	-60 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.084	1.24	0.45	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	20-35 V	5.8-22.0 m/min	2.1-7.9 kg/h
1.6 mm	150-450 A	18-36 V	2.8-12.0 m/min	1.8-7.9 kg/h

OK Tubrod 15.09

An all-positional rutile cored wire for welding high strength steel with a minimum yield strength of 690 MPa for use with M21 shielding gas. Diameters of less than 1.4 mm are all positional, with the exception of vertical down.

Classifications Weld Metal:	SFA/AWS A5.36:E111T1-M21A4-K3-H4, EN ISO 18276-A:T 69 4 2NiMo P M 2 H5
Approvals:	CE EN 13479, VdTÜV 10733, NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Low Alloy (Ni Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	761 MPa	840 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.055	1.21	0.39	2.3	0.4

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	21-32 V	5.6-19.8 m/min	2.1-7.5 kg/h

OK Tubrod 15.11

A rutile, all-positional, flux-cored, tubular wire containing 2.5 Ni for the welding of mild and medium tensile steels where good notch toughness down to -50°C is required. Extra productivity is available using the spray transfer mode when compared with the traditional basic types using short arc for vertical and overhead welding. All types of fabrication application involving mild and medium tensile steels with a min. yield strength of 510 MPa. This includes shipbuilding and offshore fabrication. Shielding gas: Ar + 20% CO2.

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21-A8-Ni2, EN ISO 17632-A:T 50 6 2Ni P M 2 H5
Approvals:	CE EN 13479, LR 4Y46S H5 (M21), DNV IV Y46MS H5 (M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Low alloy (2.5% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 Shielding gas			
As welded	576 MPa	606 MPa	24 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 Shielding gas		
As welded	-60 °C	92 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 Shielding gas			
0.04	0.86	0.32	2.20

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	110-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

OK Tubrod 15.17

OK Tubrod 15.17 is an all-positional, rutile, flux-cored wire for good toughness down to -40°C. The wire contains 1% nickel and has exceptional operating characteristics in all positions with high deposition rates. Shielding gas Ar + 20% CO2 or CO2. OK Tubrod 15.17 is designed for the all-positional welding of carbon-manganese and low-alloy steels, e.g. offshore fabrications, vessels and structural steelwork.

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21A4-Ni1, EN ISO 17632-A:T 46 3 1Ni P C 2 H5, EN ISO 17632-A:T 46 4 1Ni P M 2 H5
Approvals:	CE EN 13479, BV SA3YM (M21), DNV IV Y42MS H10 (M21), LR 4Y46S H5 (M21), LR 3YS H5 (C1), ABS 3YSA H5 (M21), ABS 3YSA H5 (C1), BV SA3YM HH (C1), DB 42.039.26 (M21 and C1), GL 4Y46H5S, RINA 4Y40 S H10 (M21), RS 4YMS H5 (M21), RS 4YMS H10 (M21), VdTÜV 05198, NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g (< 10 for Ø 1.6mm)
Alloy Type:	Low alloy steel (1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas EN			
As welded	544 MPa	613 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas EN		
As welded	-40 °C	124 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.05	1.15	0.34	0.96

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	110-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h
1.6 mm	150-360 A	24-34 V	3.0-11.0 m/min	2.0-6.2 kg/h

OK Tubrod 15.19

OK Tubrod 15.19 is an all-positional, rutile, flux-cored wire specially developed to produce high yield strength (min 550 MPa) and good toughness down to -50°C and high deposition spray transfer welding. Also suitable for open butt joints using non-fusible (e.g. ceramic) backing material. Shielding gas Ar + 20% CO2. Ideal for welding quenched and tempered steels of the HY80 type

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21A6-Ni1, EN ISO 17632-A:T 50 5 Z P M 2 H5
Approvals:	MoD Q1N, NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Low alloy steel (1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	604 MPa	663 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-50 °C	106 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.05	1.45	0.41	1.00

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

OK Tubrod 15.20

OK Tubrod 15.20 is a fully basic, low-hydrogen, flux-cored wire containing 1%Cr–0.5Mo, designed for welding creep-resistant steels of similar composition. Shielding gas CO2 or Ar + 20% CO2. Typical applications include fabrication and repair in the power industry.

Classifications Weld Metal:	SFA/AWS A5.36:E81T5-M21PZ-G-H4

Welding Current:	DC-
Diffusible Hydrogen:	< 4 ml/100g
Alloy Type:	Creep resisting low alloy steel (1% Cr, 0.5% Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength
M21 shielding gas		
PWHT 690°C 1h	570 MPa	670 MPa

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
M21 shielding gas				
0.05	1.02	0.53	1.35	0.60

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	120-300 A	16-32 V	4.0-15.0 m/min	1.7-6.5 kg/h

OK Tubrod 15.21TS

A basic, flux-cored wire used in conjunction with OK Flux 10.71 for the submerged arc welding of high tensile steels. The weld metal is alloyed with 0.5% Mo, which permits a very wide range of applications including elevated temperatures up to 500°C. The fully basic formulation ensures a very tough, high-quality weld deposit.

Applications: Typical examples include structural steelwork, pressure vessels and piping, cranes, contractor's plant and so on. It is also ideally suited to the rebuilding of marine engine piston crowns.

Classifications Weld Metal:	SFA/AWS A5.23:F7A2-EC-A4

Welding Current:	AC, DC+
Alloy Type:	Low alloy Cr Mo

Typical Weld Metal Analysis %				
C	**Mn**	**Si**	**Cr**	**Mo**
OK Flux 10.71				
0.077	1.31	0.50	0.55	0.50

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
2.4 mm	250-500 A	28-38 V	1.5-2.5 m/min	3.5-9.5 kg/h

OK Tubrod 15.22

OK Tubrod 15.22 is a low-hydrogen, flux-cored wire containing 2.25Cr–1Mo for welding creep-resistant steels of similar compositon and intended for service at around 600°C. Shielding gas CO2, Ar + 20% CO2. Typical applications include fabrication and repair in the power generation sector.

Classifications Weld Metal:	SFA/AWS A5.29:E90T5-B3

Welding Current:	DC-
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Creep resisting low alloy steel (2% Cr, 1% Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength
AWS M21 shielding gas		
PWHT 675°C 1h	605 MPa	685 MPa

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
M21 shielding gas				
0.06	0.95	0.52	2.32	0.99

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	120-300 A	16-32 V	4.0-15.0 m/min	1.7-6.5 kg/h

OK Tubrod 15.27S

A basic cored wire designed for the submerged arc welding of steels with a minimum yield strength of 690 MPa.

Classifications Weld Metal:	SFA/AWS A5.23:F11A8-EC-G (OK Flux 10.62), EN ISO 26304-A:T 69 6 FB TZ H5 (OK Flux 10.62)
Approvals:	CE EN 13479, CE EN 13479 (10.62), NAKS/HAKC 4.0mm, ABS 5YQ690M H5 (10.62), DNV V Y69MH5 (10.62), GL 6Y69MH5 (10.62), LR 5Y69M H5 (10.62)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Low alloy high strength steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
OK Flux 10.62			
As welded	747 MPa	812 MPa	23 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
OK Flux 10.62		
As welded	-40 °C	110 J
As welded	-60 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
OK Flux 10.62				
0.07	1.90	0.40	2.44	0.32

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-500 A	28-38 V	1.5-2.5 m/min	3.5-9.5 kg/h
3.0 mm	300-700 A	28-38 V	2.5-5.5 m/min	6.0-12.5 kg/h
3.2 mm	350-750 A	28-38 V	2.5-5.0 m/min	5.5-13.5 kg/h
4.0 mm	450-900 A	28-40 V	2.0-5.5 m/min	7.0-18.0 kg/h

Pipeweld 71T-1

An all-positional rutile cored wire for pipe welding. The weld metal has a minimum yield strength of 420 MPa with CO_2 shielding gas and 460 MPa with Ar/CO_2 mixed gas.

Classifications Weld Metal:	SFA/AWS A5.36:E71T1-C1A0-CS2-H4, EN ISO 17632-A:T 42 2 P C 1 H5, EN ISO 17632-A:T 46 2 P M 1 H10, SFA/AWS A5.20:E71T-1M H8

Welding Current:	DC+
Alloy Type:	Non alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	535 MPa	601 MPa	25.4 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 Shielding gas		
As welded	-20 °C	128 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 Shielding gas		
0.059	1.33	0.63

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	23-35 V	5.8-20.7 m/min	2.1-7.5 kg/h

Pipeweld 91T-1

An all-positional rutile cored wire for the welding of pipes with a minimum strength of 540 MPa, for use with M21 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E91T1-M21A4-G, EN ISO 18276-A:T 55 4 Z P M 2 H5

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	604 MPa	670 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-40 °C	95 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.05	1.25	0.37	0.93	0.12

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

Pipeweld 101T-1

An all-positional rutile cored wire for pipe welding of steels with a minimum strength of 610 MPa, for use with M21 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E101T1-M21A4-G, EN ISO 18276-A:T 62 4 Mn1Ni P M 2 H5

Welding Current:	DC+
Alloy Type:	Low alloy

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 Shielding gas			
As welded	654 MPa	709 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 Shielding gas		
As welded	-40 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
M21 shielding gas				
0.06	1.54	0.40	0.97	0.15

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-300 A	21-32 V	3.2-14.5 m/min	1.3-5.8 kg/h

Pipeweld 111T-1

An all positionable rutile flux cored wire that is used with Ar-CO2 shielding gas. This wire offers excellent weldability. Suitable for up to X100 strength pipe.

Classifications Weld Metal:	SFA/AWS A5.36:E111T1-M21A4-K3-H4, EN ISO 18276-A:T 69 4 2NiMo P M 2 H5

Welding Current:	DC+
Alloy Type:	Low Alloy (Ni Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	761 MPa	840 MPa	19 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	60 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
0.055	1.21	0.39	2.3	0.4

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	21-32 V	5.6-19.8 m/min	2.1-7.5 kg/h

Primeweld 81-K2

A seamless positional rutile cored wire for use with C1 shielding, providing very good toughness down to -60°C and very low diffusible hydrogen content even after exposure to high temperatures and humidity.

Classifications Weld Metal:	EN ISO 17632-A:T 46 6 1.5Ni P C 1 H5, SFA/AWS A5.36:E81T1-C1A8-K2-H4
Approvals:	ABS 5Y400SA, H5 (C1), BV SA5Y40, H5 (C1), DNV V Y40MS(H5) (C1), GL 6Y40H5S (C1), KR 5Y40SG (C) H5, LR 5Y40 (C1)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 4 ml/100g
Alloy Type:	Low alloy steel (1.5% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding gas AWS			
As welded	561 MPa	620 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 Shielding gas AWS		
As welded	-60 °C	98 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
C1 Shielding gas			
0.04	1.24	0.27	1.56

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	170-310 A	23-35 V	6.0-16.5 m/min	2.5-6.2 kg/h

Primeweld 81-Ni1

A seamless positional rutile cored wire for use with C1 shielding, providing very good toughness down to -60°C and very low diffusible hydrogen content even after exposure to high temperatures and humidity.

Classifications Weld Metal:	EN ISO 17632-A:T 46 6 1Ni P C 1 H5, SFA/AWS A5.36:E81T1-C1A8-Ni1-H4
Approvals:	ABS 5YQ460SA H5, DNV V Y46MS H5, GL 5Y46H5S, RS 5Y46S H5 (C1)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 4 ml/100g
Alloy Type:	Low alloy steel (1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding gas AWS			
As welded	561 MPa	620 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 Shielding gas AWS		
As welded	-60 °C	85 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
C1 Shielding gas			
0.05	1.15	0.34	0.96

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	170-310 A	23-35 V	6.0-16.5 m/min	2.5-6.2 kg/h
1.4 mm	180-400 A	23-38 V	4.0-13.5 m/min	2.6-7.1 kg/h

Primeweld 81-Ni1M

A seamless positional rutile cored wire for use with M21 shielding, providing very good toughness down to -60°C and very low diffusible hydrogen content even after exposure to high temperatures and humidity.

Classifications Weld Metal:	SFA/AWS A5.36:E81T1-M21A8-Ni1-H4, EN ISO 17632-A:T 50 6 1Ni P M 1 H5
Approvals:	ABS 5YQ460SA H5, GL 5Y46H5S, DNV V Y46MS (H5), RS 5Y46S H5 (M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 4 ml/100g
Alloy Type:	Low alloy steel (1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 Shielding gas AWS			
As welded	565 MPa	622 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 Shielding gas AWS		
As welded	-60 °C	103 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.03	1.29	0.34	0.90

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	170-310 A	23-35 V	6.0-16.5 m/min	2.5-6.2 kg/h

FILARC PZ6163

A metal cored wire alloyed with 17% Cr and 1% Mo used with M21 shielding gas.

Classifications Weld Metal:	EN 14700:T Fe7, DIN 8555:MF5-400GC

Welding Current:	DC+

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
0.17	0.53	0.83	16.6	1.08

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	150-450 A	21-40 V	2.4-11.9 m/min	1.8-9.0 kg/h

FILARC PZ6166

A metal cored wire for the fabrication and repair of Pelton and Francis wheels and other turbine components in 13% Cr 4% Ni alloyed soft martensitic steels used with M13 or M14 shielding gas.

Classifications Weld Metal:	EN 14700:T Fe7, EN ISO 17633-A:T 13 4 M M12 2, EN ISO 17633-A:T 13 4 M M13 2

Welding Current:	DC+

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M12			
PWHT 580-600°C 8h	681 MPa	835 MPa	18.7 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M12		
PWHT 580-600°C 8h	-20 °C	51 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
M12					
0.021	1.13	0.72	4.43	12.8	0.43

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	18-34 V	5.3-16.4 m/min	2.2-7.0 kg/h

Shield-Bright 2209

Shield-Bright 2209 was developed for the welding of “2205” duplex stainless steels (UNS S31803, S32205, and J92205). It can also be used for the welding of leaner grades of duplex stainless steels. It has been approved with a 25°C critical pitting temperature and impact toughness at -40°C (-40°F).

Classifications Weld Metal:	SFA/AWS A5.22:E2209T1-4, E2209T1-1, EN ISO 17633-A:T 22 9 3 N L P C1 2, EN ISO 17633-A:T 22 9 3 N L P M21 2
Approvals:	CE EN 13479, ABS E2209T1-1 (C1), BV 2205 (C1), CCS 2205-S (C1), DNV Duplex (C1), LR S31803 (C1), VdTÜV 09123 , CWB E2209T1-1 (C1), CWB E2209T1-4 (M21), DNV-GL Duplex (M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Duplex stainless steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
80%Ar/20%CO2 Shielding Gas (M21)			
As welded	640 MPa	840 MPa	27 %
CO2 Shielding Gas (C1)			
As welded	650 MPa	800 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
80%Ar/20%CO2 Shielding Gas (M21)		
As welded	-20 °C	55 J
As welded	-45 °C	45 J
As welded	-46 °C	52 J
CO2 Shielding Gas (C1)		
As welded	-46 °C	50 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N
0.03	1.05	0.45	8.85	22.95	3.44	0.16

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	25-30 V	5.8-14.4 m/min	1.9-4.6 kg/h
1.6 mm	170-300 A	25-29 V	3.9-8.2 m/min	2.4-5.2 kg/h

Shield-Bright 2594

Shield-Bright 2594 is designed for the welding of 25Cr-9Ni-3Mo-0.2N super duplex stainless steel (UNS S32750, S32760). It has excellent slag removal and bead shape with all position welding for use with Ar/CO2 gas mixtures (M21).

Classifications Weld Metal:	EN ISO 17633-A:T 25 9 4 N L P M21 2, SFA/AWS A5.22:E2594T1-4

Welding Current:	DC+
Alloy Type:	Super Duplex

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	700 MPa	860 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-29 °C	48 J
As welded	-46 °C	44 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N
0.03	0.95	0.62	9.68	25.34	3.59	0.23

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-220 A	25-30 V	8.3-11.5 m/min	2.4-4.6 kg/h

Shield-Bright 308H

Shield-Bright 308H was developed for welding Type 304H stainless steel and can also be used for welding Type 301, 302, and 304 steels. It contains a higher carbon level than 308L filler metals to give greater high temperature strength. The ferrite content is also lower for high temperature service. It has greater ductility than 347 types at high temperatures and for that reason it is sometimes used to weld Types 321 and 347 for service above 750°F (399°C) coupled with high stress.

Classifications Weld Metal:	SFA/AWS A5.22:E308HT1-1, SFA/AWS A5.22:E308HT1-4, KS D 3612:YF 308C, EN ISO 17633-A:T 19 9 H P M21 2, JIS Z 3232:TS308H-FB1, EN ISO 17633-A:T 19 9 H P C1 2

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 Shielding Gas			
As welded	371 MPa	580 MPa	46 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
M21 shielding gas				
0.05	1.08	0.87	9.65	19.21

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	24-29 V	5.8-14.4 m/min	1.9-4.6 kg/h

Shield-Bright 308L

Shield-Bright 308L is a rutile cored wire designed for the all-positional welding of stainless steels excluding vertical down. In addition to the 304L and 308L grades it is also suitable for welding the stabilised 321 and 347 grades with Ar/15-25%CO2 or CO2 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.22:E308LT1-4, SFA/AWS A5.22:E308LT1-1, JIS Z 3323:TS308L-FB1 , KS D 3612:YF 308LC, EN ISO 17633-A:T 19 9 L P C1 2 , EN ISO 17633-A:T 19 9 L P M21 2
Approvals:	CE EN 13479, ABS E308LT1-1 (C1), BV 308L (C1), CCS 308L (C1), ClassNK KW308LG(C) (C1), CWB E308LT1-1 (C1), CWB E308LT1-4 (M21), DNV NV 308L (C1), KR RW308LG (C) (C1), LR 304L (C1), VdTÜV 04832 (M20,M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 308L

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding gas			
As welded	410 MPa	580 MPa	44 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
C1 shielding gas				
0.030	1.20	0.90	10.0	19.0

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	24-29 V	5.8-14.4 m/min	1.9-4.6 kg/h

Shield-Bright 308L X-tra

Shield-Bright 308L X-tra was designed for welding type 304L stainless steel but can be used for types 301, 302, and 304 steels. It may also be used successfully for welding of types 321 and 347 stainless steel. Service conditions should not exceed an approximate of 750°F (399°C). Shield-Bright 308L X-tra was designed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal.

Classifications Weld Metal:	SFA/AWS A5.22:E308LT0-1, SFA/AWS A5.22:E308LT0-4, JIS Z 3323:TS308L-FB0 - KR, KS D 3612:YF 308LC - KR, EN ISO 17633-A:T 19 9 L R C1 3, EN ISO 17633-A:T 19 9 L R M21 3
Approvals:	CE EN 13479, ABS E308LT0-1 (C1), BV 308L (M21), CWB E308LT0-1 (C1), CWB E308LT0-4 (M21), DNV 308L (C1), KR RW308LG(C) (C1), LR 304L S (C1), VdTÜV 06611

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 308L

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas AWS			
As welded	410 MPa	580 MPa	40 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
C1 shielding gas				
0.022	1.40	0.90	9.9	19.6

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-250 A	25-32 V	8.0-16.0 m/min	2.5-7.0 kg/h
1.6 mm	200-350 A	26-34 V	4.0-11.0 m/min	3.0-7.5 kg/h

Shield-Bright 309L

Shield-Bright 309L is a rutile cored wire designed for the all-positional welding, except vertical down, of stainless steels to carbon or low alloy steels and for the first layer cladding of carbon and low alloy steels with Ar/15-25%CO2 or CO2 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.22:E309LT1-4, SFA/AWS A5.22:E309LT1-1, JIS Z 3323:TS309L-FB1, KS D 3612:YF-309LC, EN ISO 17633-A:T 23 12 L P C1 2 , EN ISO 17633-A:T 23 12 L P M21 2
Approvals:	CE EN 13479, BV 309L (C1), ABS E309LT1-1 (C1), CCS 309L (C1), ClassNK KW309LG(C) (C1), CWB E 309LT1-1 (C1), CWB E 309LT1-4 (M21), DNV NV 309L (C1), GL 4332S (C1), KR RW309LG(C) (C1), LR SS/CMn (C1), VdTÜV 04833 (M20,M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 309L

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding gas			
As welded	450 MPa	580 MPa	40 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
C1 shielding gas				
0.030	1.30	0.90	12.5	23.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	24-29 V	5.8-14.4 m/min	1.9-4.6 kg/h

Shield-Bright 309L X-tra

Shield-Bright 309L X-tra was developed for the welding of stainless steels to carbon or low alloy steels and for the first layer cladding of carbon and low alloy steels. Shield-Bright 309L X-tra was developed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal. For joining thick sections, it is preferred the non-stainless steel be buttered with a layer of Shield-Bright 309L X-tra and the joint completed with Shield-Bright 316L X-tra or 308L X-tra. The service temperature should not exceed approximately 750°F (399°C).

Classifications Weld Metal:	SFA/AWS A5.22:E309LT0-1, SFA/AWS A5.22:E309LT0-4, JIS Z 3323:TS309L-FB0 - KR, KS D 3612:YF 309LC - KR, EN ISO 17633-A:T 23 12 L R C1 3, EN ISO 17633-A:T 23 12 L R M21 3
Approvals:	CE EN 13479, BV 309L (C1), ABS E309LT0-1 (C1), CCS 309LS (C1), CWB E309LT0-1 (C1), CWB E309LT0-4 (M21), DNV 309L MS (C1), DNV 309L MS (M21), VdTÜV 06594

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 309L

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas AWS			
As welded	480 MPa	600 MPa	35 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas AWS		
As welded	20 °C	40 J
As welded	-110 °C	32 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
C1 shielding gas				
0.030	1.40	0.80	12.5	24.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-250 A	25-32 V	8.0-16.0 m/min	2.5-7.0 kg/h
1.6 mm	200-350 A	26-34 V	4.0-11.0 m/min	3.0-7.5 kg/h

Shield-Bright 309LMo

Shield-Bright 309LMo was designed for welding type 316 clad steels on the first pass in cladding steels or for welding dissimilar metals such as molybdenum-containing austenitic stainless steels to carbon steels. It is used in paper mills and in power plants to give greater corrosion resistance. This wire performs best when used out-of-position shielded with either Argon/C02 or 100% C02.

Classifications Weld Metal:	SFA/AWS A5.22:E309LMoT1-1, SFA/AWS A5.22:E309LMoT1-4, JIS Z 3323:TS309LMo-FB1, KS D 3612:YF309MoLC, EN ISO 17633-A:T 23 12 2 L P C1 2, EN ISO 17633-A:T 23 12 2 L P M21 2
Approvals:	DNV VL 309MoL, KR RW 309MoLG(C)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 309LMo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding Gas			
As welded	480 MPa	620 MPa	30 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.03	1.267	0.63	12.55	22.50	2.69

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	24-29 V	5.8-14.4 m/min	1.9-4.6 kg/h

Shield-Bright 309LMo X-tra

Shield-Bright 309LMo X-tra was developed for the welding of stainless steels to carbon or low alloy steels. For thick sections it is often preferable that the non-stainless steel should be buttered with a layer of Shield-Bright 309L X-tra and the joint made with Shield-Bright 316L X-tra or 308L X-tra. It was also developed for the first layer cladding of carbon and low alloy steels prior to subsequent layers from Shield-Bright 316L X-tra or 317L X-tra. The service temperature of all the resulting weldments should not exceed about 700°F (370°C). Multiple layer cladding with Shield-Bright 309LMo X-tra can be used for additional corrosion resistance in some applications in the pulp and paper industry. Shield-Bright 309LMo X-tra was developed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal. It can be used with either 75% Ar + 25% CO2 or 100% CO2 gases.

Classifications Weld Metal:	SFA/AWS A5.22:E309LMoT0-1, SFA/AWS A5.22:E309LMoT0-4, JIS Z 3323:YF 309MoLC - KR, KS D 3612:YF 309MoLC - KR, EN ISO 17633-A:T 23 12 2 L R C1 3, EN ISO 17633-A:T 23 12 2 L R M21 3

Welding Current:	DC+
Alloy Type:	Austenitic 309LMo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength
C1 shielding gas AWS		
As welded	480 MPa	620 MPa

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
C1 shielding gas					
0.030	1.2	0.75	13.5	23.5	2.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-250 A	25-32 V	8.0-16.0 m/min	2.5-7.0 kg/h

Shield-Bright 316L

Shield-Bright 316L was developed for the welding of Type 316L stainless steel but can be used for other stainless steels including Types 316 and 304L. In a few cases, e.g. nitric acid service, Shield-Bright 316L should not be used to weld 304L. It contains molybdenum which resists pitting corrosion induced by sulphuric and sulphurous acids, chlorides and cellulose solutions. Used widely in the rayon, dye and paper making industries.

Classifications Weld Metal:	SFA/AWS A5.22:E316LT1-4, SFA/AWS A5.22:E316LT1-1, JIS Z 3323:TS316L-FB1, KS D 3612:YF 316LC, EN ISO 17633-A:T 19 12 3 L P C1 2, EN ISO 17633-A:T 19 12 3 L P M21 2
Approvals:	CE EN 13479, ABS E316LT1-1 (C1), BV 316L (C1), DNV 316L (C1), ClassNK KW316LG (C1), CWB E 316LT1-1 (C1), CWB E 316LT1-4 (M21), KR RW316LG(C) (C1), LR 316L (C1), VdTÜV 04834 (M20,M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 316L

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 Shielding gas			
As welded	450 MPa	580 MPa	40 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 Shielding gas		
As welded	-120 °C	40 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
C1 shielding gas					
0.030	1.30	0.60	12.0	18.5	2.7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	24-29 V	5.8-14.4 m/min	1.9-4.6 kg/h

Shield-Bright 316L X-tra

Shield-Bright 316L X-tra was developed for the welding Type 316L stainless steel and also can be used for the other stainless steels including Types 316 and 304L. In a few cases, e.g. nitric acid service, Shield-Bright 316L X-tra should not be used to weld 304L. It was designed specifically for applications where the service environment can produce pitting corrosion. Shield-Bright 316L X-tra was developed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal.

Classifications Weld Metal:	SFA/AWS A5.22:E316LT0-1, SFA/AWS A5.22:E316LT0-4, JIS Z 3323:TS316L-FB0 - KR, KS D 3612:YF 316LC - KR, EN ISO 17633-A:T 19 12 3 L R C1 3, EN ISO 17633-A:T 19 12 3 L R M21 3
Approvals:	CE EN 13479, ABS E316LT0-1 (C1), CWB E316LT0-1 (C1), CWB E316LT0-4 (M21), DNV 316L (C1), KR RW316LG (C1), LR 316L S (C1), VdTÜV 06612

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 316L

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
C1 shielding gas AWS			
As welded	450 MPa	580 MPa	36 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
C1 shielding gas AWS		
As welded	-110 °C	38 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
C1 shielding gas					
0.030	1.30	0.60	12.0	18.5	2.7

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-250 A	25-32 V	8.0-16.0 m/min	2.5-7.0 kg/h
1.6 mm	200-350 A	26-34 V	4.0-11.0 m/min	3.0-7.5 kg/h

Shield-Bright 347

An all-positional rutile cored wire for the welding of pipes with a minimum strength of 610 MPa, for use with M21 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.22:E347T1-1, SFA/AWS A5.22:E347T1-4, EN ISO 17633-A:T 19 9 Nb P M21 2

Welding Current:	DC+
Alloy Type:	347 stainless

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	510 MPa	670 MPa	34 %

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr
0.03	1.2	0.90	9.8	19.3

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-220 A	24-29 V	5.8-14.4 m/min	1.9-4.6 kg/h

Shield-Bright NiCrMo-3

A positional rutile wire for the welding Ni-Cr-Mo alloys with 80% Ar + 20% CO2 shielding gas.

Classifications Weld Metal:	AWS A5.34:ENiCrMo3T1-4

Welding Current:	DC+
Alloy Type:	Ni-Cr-Mo

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	501 MPa	788 MPa	42 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	0 °C	75 J
As welded	-196 °C	70 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb	Nb+Ta	Ti
0.023	0.24	0.36	64.3	21.89	8.63	0.52	3.8	3.57	0.18

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-210 A	23-32 V	5.8-13.8 m/min	1.9-4.2 kg/h

Coreshield 8

Coreshield 8 is a self-shielded flux cored wire designed to weld critical structural applications while maintaining excellent arc characteristics and high welder appeal using DCEN polarity. Coreshield 8 is tested and certified to meet the new AWS D designation requirements, making this self-shielded wire an excellent choice for demand critical welds when the AWS D1.8 Seismic Supplement is utilized

Classifications Weld Metal:	SFA/AWS A5.20:E71T-8, EN ISO 17632-A:T 42 2 Y N 2
Approvals:	CE EN 13479, GL 3YS, ABS 3YSA H10, NAKS/HAKC 1.6MM, BV SA3YM H10, CWB E491T-8-H16, DB 42.039.35, DNV III YMS H10, LR 3YS H10, VdTÜV 10019

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC-
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	457 MPa	552 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-20 °C	75 J
As welded	-29 °C	63 J

Typical Weld Metal Analysis %

C	Mn	Si	Al
0.17	0.45	0.12	0.50

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	155-240 A	21-25 V	3.8-7.6 m/min	1.9-3.7 kg/h

Coreshield 15

Coreshield 15 is an all-position self-shielded flux cored welding wire for single pass applications. Coreshield 15 produces smooth arc action, full slag coverage, easy slag removal, and low spatter. The use of DCEN (electrode negative) current minimizes the risk of burn-through. Coreshield 15 is excellent for use on lap and fillet welds on thin gauge galvanized and mild steels in all welding positions. The availability of 0.8 mm (.030 in.) diameter makes it possible to use this product on materials as thin as 1.2 mm (18 gauge). The wire is particularly suitable for thin gauge materials 0.8-5.0 mm (0.030 - 3/16 in.) in galvanised, zinc-aluminum carbon, or aluminised carbon steels. In structural fabrications, the product can be used where no seismic requirements are present.

Classifications Weld Metal:	SFA/AWS A5.20:E71T-GS

Welding Current:	DC-
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Tensile Strength
As welded	614 MPa

Typical Weld Metal Analysis %

C	Mn	Si	Al
0.23	0.70	0.40	1.98

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
0.8 mm	40-100 A	14-16 V	3.0-7.0 m/min

Coreweld 46 LS

Coreweld 46 LS is a new generation metal cored wire based on ESAB's revolutionary cored wire surface technology. It has been developed for the welding of thin-plate with a minimum thickness of 1.0 mm and provides fabricators with a substantially faster and higher quality welding solution to solid MAG wire. The absence or very low levels of silica on the weld surface and minimal spatter result in reduced post weld cleaning before coating/painting. Coreweld 46 LS is a unique product that markedly lowers the welding costs for mechanised and robotic fabrication.

The many advantages relative to solid wire are associated with the extremely wide spray arc parameter envelope that starts as low as 160A. With solid wire spray arc starts at around 200A for diameter 1.0 mm and 230A for diameter 1.2 mm. These features are valid for the standard shielding gas M21 (Ar + 15-25% CO2), although optimal results are obtained in 92% Ar + 8% CO2 mixtures. Switching from solid wire to Coreweld 46 LS will in most cases, require no change in the positioning of the welding gun so the conversion time is limited to the optimisation of welding parameters.

Classifications Weld Metal:	SFA/AWS A5.36:E71T15-M20A4-CS1 H4, SFA/AWS A5.36:E71T15-M21A4-CS1 H4, EN ISO 17632-A:T 46 4 M M 2 H5
Approvals:	CE EN 13479, DB 42.039.38, VdTÜV 12152, ABS 4Y40M H5 (M20), ABS 4Y40M H5 (M21), BV 4Y40 H5 (M20), BV 4Y40 H5 (M21), DNV IV Y40MS(H5) (M20), DNV IV Y40MS(H5) (M21), GL 4Y40H5S (M20), GL 4Y40H5S (M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 4 ml/100g
Alloy Type:	C Mn steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
As welded	485 MPa	545 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
As welded	-40 °C	72 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
0.04	1.25	0.63	0.35

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-360 A	16-32 V	1.8-13.0 m/min	1.3-8.0 kg/h
1.4 mm	150-380 A	18-34 V	2.5-9.0 m/min	1.8-7.0 kg/h
1.6 mm	150-450 A	17-36 V	2.0-9.3 m/min	1.7-7.8 kg/h

FILARC PZ6102

A metal-cored wire suitable for the welding of thin plate (>3 mm) using M21 shielding gas. Diameters of less than 1.4 mm are all positional, with the exception of vertical down.

Classifications Weld Metal:	EN ISO 17632-A:T 46 4 M M 2 H5, SFA/AWS A5.36:E71T15-M21A4-CS1-H4
Approvals:	CE EN 13479, LR 4Y46S H5 (M21), ABS 3SA, 3YSA H5, BV S3M, S3YM H5 (M21), DB 42.105.09, DNV IV YMS (H5) (M21), GL 4YH10S (M21), VdTÜV 04901

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	485 MPa	570 MPa	28.9 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	75 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 shielding gas		
0.075	1.55	0.65

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-350 A	16-34 V	4.6-18.5 m/min	2.0-8.0 kg/h
1.4 mm	150-380 A	18-34 V	2.5-9.0 m/min	1.8-7.0 kg/h
1.6 mm	150-450 A	17-36 V	2.0-9.3 m/min	1.7-7.8 kg/h

FILARC PZ6103

A general purpose metal cored wire for use with M21shielding gas. Diameters less than 1.4 mm are all-positional except vertical down.

Classifications Weld Metal:	SFA/AWS A5.36:E71T15-M21A0-G-H4, EN ISO 17632-A:T 42 2 M M 2 H5
Approvals:	CE EN 13479, DB 42.105.05, LR 3YS H5 (M21), VdTÜV 04461

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	463 MPa	568 MPa	28.7 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-20 °C	109 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 shielding gas		
0.066	1.36	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	21-35 V	5.0-21.3 m/min	2.1-9.0 kg/h
1.4 mm	150-350 A	18-33 V	3.5-12.1 m/min	2.1-7.2 kg/h
1.6 mm	150-450 A	17-34 V	2.7-12.3 m/min	2.1-9.6 kg/h

FILARC PZ6104

A 1% Ni metal cored wire which gives good toughness down to -50°C using M21 shielding gas. Diameters less than 1.4 mm are all-positional except vertical down.

Classifications Weld Metal:	SFA/AWS A5.36:E71T15-M21A6-G-H4, EN ISO 17632-A:T 42 5 Z M M 2 H5
Approvals:	CE EN 13479, LR 3YS H5 (M21), ABS 3SA, 3YSA H5, BV 3YMH5 (M21), DB 42.105.11, DNV IV YMS (H5) (M21), VdTÜV 05477

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Alloy Type:	Low alloy (1%Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	459 MPa	553 MPa	28 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	133 J
As welded	-50 °C	107 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.061	1.40	0.47	0.85

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	21-35 V	5.0-21.3 m/min	2.1-9.0 kg/h
1.6 mm	150-450 A	17-34 V	2.7-12.3 m/min	2.1-9.6 kg/h

FILARC PZ6105R

A metal-cored wire for robotic welding of single and multi-pass fillet welds using M21 and M12 shielding gas. Used in the downhand and horizontal/vertical positions.

Classifications Weld Metal:	SFA/AWS A5.36:E70T15-M12A4-G-H4, SFA/AWS A5.36:E70T15-M21A4-G-H4, EN ISO 17632-A:T 42 4 M M 3 H5
Approvals:	CE EN 13479, ABS 4Y400SA H5, BV S3YM H5 (M21), DB 42.105.14, DNV III Y40 (H5) (M21), GL 4Y40H5S, LR 4Y40SH5 (M21), VdTÜV 09082

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	CMn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	453 MPa	558 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si
M12 shielding gas		
0.045	1.8	0.80
M21 shielding gas		
0.045	1.72	0.76

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-350 A	14-32 V	1.8-18.5 m/min	1.3-8.0 kg/h
1.4 mm	150-350 A	18-33 V	3.5-12.1 m/min	2.1-7.2 kg/h
1.6 mm	250-450 A	28-38 V	4.3-10.7 m/min	3.4-8.5 kg/h

OK Tubrod 14.10

A metal cored wire suitable for the welding of thin plate (>3 mm) using M21 shielding gas.

Classifications Weld Metal:	EN ISO 17632-A:T 46 4 M M 2 H5, SFA/AWS A5.36:E71T15-M21A4-CS1-H4
Approvals:	CE EN 13479, DB 42.039.22, DNV IV YMS(H5) (M21), VdTÜV 05018

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	485 MPa	570 MPa	28.9 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	75 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 shielding gas		
0.075	1.55	0.65

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	130-350 A	16-34 V	4.6-18.5 m/min	2.0-8.0 kg/h

OK Tubrod 14.11

OK Tubrod 14.11 is a wire that has been specially designed for robotic applications, particularly in the area of thin plate welding. The welding characteristics of the wire permit the use of lower arc voltages in the spray transfer mode, which reduces arc power and thereby reduces the risk of blow-through in situations where the fit-up is variable. The wire also exhibits excellent feedability and deposits weld metal of the highest quality with Ar + 20% CO_2 shielding gas.

Classifications Weld Metal:	SFA/AWS A5.36:E70T15-M12A4-G-H4, SFA/AWS A5.36:E70T15-M21A4-G-H4, EN ISO 17632-A:T 42 4 M M 3 H5
Approvals:	CE EN 13479, BV S3YM H5 (M21), LR 4Y40SH5 (M21), ABS 4Y400SA H5 (M21), DB 42.039.28 (M21), DNV III Y40 H5 (M21), GL 4Y40H5S (M21), VdTÜV 10010

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21			
As welded	453 MPa	558 MPa	32 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21		
As welded	-40 °C	55 J

Typical Weld Metal Analysis %

C	Mn	Si
M12		
0.050	1.9	0.9
M21		
0.048	1.45	0.64

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-350 A	14-32 V	1.8-18.5 m/min	1.3-8.0 kg/h
1.4 mm	150-350 A	18-33 V	3.5-12.1 m/min	2.1-7.2 kg/h

OK Tubrod 14.12

OK Tubrod 14.12 is a tubular wire for use with both Ar/CO2 mixtures or CO2 shielding gases. Improved productivity and weld quality compared with solid wire under CO2. It is especially suitable for fillet welding and has a high tolerance to primer.

Classifications Weld Metal:	EN ISO 17632-A:T 42 2 M C 1 H10, EN ISO 17632-A:T 42 2 M M 1 H10, SFA/AWS A5.36:E71T15-C1A2-CS1, SFA/AWS A5.36:E71T15-M21A2-CS1
Approvals:	CE EN 13479, DNV III YMS (M21), GL 3YS, ABS 3YSAH10 (M21), DNV III YMS (C1), BV SA3YM H10 (C1), BV SA3YM H10 (M21), LR 3YS H10 (C1), LR 3YS H10 (M21), ABS 3YSAH10 (C1), DB 42.039.24 (M21 & C1), RINA 3Y S (C1), RINA 3Y S (M21), RS 3YS, 3YS H10 (C1), RS 3YS, 3YS H10 (M21), VdTÜV 06649, NAKS/HAKC 1.2 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	< 10 ml/100g
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas EN			
As welded	481 MPa	586 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas EN		
As welded	-20 °C	96 J
As welded	-29 °C	82 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 Shielding gas		
0.08	1.43	0.60

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-250 A	14-30 V	2.5-10.0 m/min	1.2-4.2 kg/h
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h
1.4 mm	120-380 A	16-34 V	2.0-9.0 m/min	1.6-7.5 kg/h
1.6 mm	140-450 A	18-36 V	1.5-8.5 m/min	1.6-8.0 kg/h

OK Tubrod 14.13

OK Tubrod 14.13 is a tubular wire particularly suited to the rapid welding of fillet and butt joints in the flat and horizontal positions. The arc action is stable at all current levels, which results in an excellent weld appearance with the absence of undercut and spatter.

Classifications Weld Metal:	EN ISO 17632-A:T 42 2 M M 2 H5, SFA/AWS A5.36:E71T15-M21A2-CS1
Approvals:	CE EN 13479, DNV III YMS (M21), GL 3YS, BV SA3YM (M21), LR 3YS H5 (M21), ABS 3YSA H5, DB 42.039.03 (M21), VdTÜV 09086

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas EN			
As welded	503 MPa	611 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas EN		
As welded	-20 °C	106 J
As welded	-29 °C	85 J

Typical Weld Metal Analysis %

C	Mn	Si
M21 Shielding gas		
0.08	1.51	0.63

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h
1.4 mm	120-380 A	16-34 V	2.0-9.0 m/min	1.6-7.5 kg/h
1.6 mm	140-450 A	18-36 V	1.5-8.5 m/min	1.6-8.0 kg/h

OK Tubrod 14.01

OK Tubrod 14.01 is a metal-cored wire containing copper, specially designed for the welding of Corten A & B and similar weathering steels or other high tensile structural steels with a tensile strength of up to 510 MPa. Shielding gas Ar + 20% CO2. Slag levels are comparable with solid wire, often permitting multi-pass welding without inter-pass deslagging. OK Tubrod 14.01 is designed for bridge and general structural steelwork, ships and chimneys.

Classifications Weld Metal:	SFA/AWS A5.36:E71T15-M21A0-G, EN ISO 17632-A:T 42 2 Z M M 2 H10
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	<10 ml/100g
Alloy Type:	Low alloy (0.5% Cu).

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	489 MPa	595 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-20 °C	98 J

Typical Weld Metal Analysis %

C	Mn	Si	Cu
M21 shielding gas			
0.07	1.35	0.58	0.48

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h

OK Tubrod 14.02

OK Tubrod 14.02 is a metal-cored wire similar to OK Tubrod 14.12 with the addition of Mo for use on high tensile and quenched and tempered steels with tensile strengths of up to 550 MPa. Shielding gas Ar + 20% CO2. Slag levels are comparable with solid wire, often permitting multi-pass welding without inter-pass deslagging. Suitable for marine structures, heavy machinery and high strength applications requiring good notch ductility. Steels include RQT 500, 600, Hyplus29, Ducol W30 and OK602.

Classifications Weld Metal:	SFA/AWS A5.36:E81T15-M21A0-G, EN ISO 17632-A:T 50 2 Z M M 2 H10
Approvals:	CE EN 13479, DB 42.039.34 (M2), VdTÜV 10716

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	< 10 ml/100g
Alloy Type:	C Mn low alloy steel (0.5 % Mo).

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	588 MPa	663 MPa	25 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-20 °C	79 J

Typical Weld Metal Analysis %

C	Mn	Si	Mo
M21 shielding gas			
0.06	1.27	0.58	0.51

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h
1.6 mm	140-450 A	18-36 V	1.5-8.5 m/min	1.6-8.0 kg/h

OK Tubrod 14.03

OK Tubrod 14.03 is a metal-cored wire alloyed with nickel and molybdenum to provide extra high strength with good notch ductility down to -40°C. Shielding gas Ar + 20% CO2. Typical applications for OK Tubrod 14.03 are offshore jack-up structures and the general fabrication of high-tensile steels.

Classifications Weld Metal:	SFA/AWS A5.36:E111T15-M21A4-G, EN ISO 18276-A:T 69 4 Mn2NiMo M M 2 H5
Approvals:	CE EN 13479, DB 42.039.23 (M21), VdTÜV 04142

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	< 5ml/100g
Alloy Type:	C Mn, low alloy steel (2% Ni, 0.5% Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	757 MPa	842 MPa	20 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-40 °C	71 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
M21 shielding gas				
0.07	1.60	0.50	2.25	0.56

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h
1.4 mm	120-380 A	16-34 V	2.0-9.0 m/min	1.6-7.5 kg/h
1.6 mm	140-450 A	18-36 V	1.5-8.5 m/min	1.6-8.0 kg/h

OK Tubrod 14.04

OK Tubrod 14.04 contains nickel for applications that require -60°C impact properties, e.g. offshore. Shielding gas Ar + 20% CO2. The 1.2 mm and 1.4 mm diameter wires are suitable for all-positional welding using the dip transfer mode. OK Tubrod 14.04 is designed for all general fabrication and structural steelwork.

Classifications Weld Metal:	SFA/AWS A5.36:E71T15-M21A8-Ni2, EN ISO 17632-A:T 42 6 2Ni M M 2 H5
Approvals:	CE EN 13479, LR 5Y40S H5 (M21), ABS 3YSAH10, DNV V YMS H10 (M21), GL 6YH10, RS 5YMS H5 (M21), VdTÜV 04304

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Low alloy steel - (2% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	460 MPa	570 MPa	26 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-20 °C	141 J
As welded	-60 °C	78 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.05	0.98	0.40	2.26

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h
1.4 mm	120-380 A	16-34 V	2.0-9.0 m/min	1.6-7.5 kg/h

OK Tubrod 14.05

OK Tubrod 14.05 is a metal-cored wire containing 1% nickel for toughness properties down to -40°C. Available in a wide range of sizes including 1.0 mm, which is ideal for root passes when used for one-sided welding. Shielding gas Ar + 20% CO2. Slag levels are comparable with solid wire, often permitting multi-pass welding without inter-pass deslagging. OK Tubrod 14.05 is designed for all general fabrication and structural steel work, including offshore equipment where sub-zero impact properties are of prime importance.

Classifications Weld Metal:	SFA/AWS A5.36:E71T15-M21A4-G, EN ISO 17632-A:T 42 4 Z M M 2 H5
Approvals:	CE EN 13479, ABS 3YSA H10 (M21), BV SA3YM HH (M21), DNV IIIYMS (H10) (M21), LR 4Y40S H5 (M21)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+-
Diffusible Hydrogen:	<5 ml/100g
Alloy Type:	Low alloy steel - (1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
M21 shielding gas			
As welded	501 MPa	601 MPa	27 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
M21 shielding gas		
As welded	-20 °C	110 J
As welded	-40 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
M21 shielding gas			
0.05	1.36	0.52	0.91

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.0 mm	80-250 A	14-30 V	2.5-10.0 m/min	1.2-4.2 kg/h
1.2 mm	100-320 A	16-32 V	1.8-12.0 m/min	1.3-7.5 kg/h

Arcaloy MC308L

Arcaloy MC308L is a composite metal cored stainless steel wire which has a stainless steel sheath. Arcaloy MC308L is used for welding types 301, 302, 304, and 304L. This may be used for welding types 321 and 347 if service temperatures do not exceed 500°F (260°C). Its higher deposition rate and less penetration compared to solid wire makes it very suitable for making butt, fillet and lap welds on gauge material. Higher speeds are also possible compared to solid wire. The low spatter and slag-free welds make this electrode ideal for automatic and robotic welding. The pushing technique can be used to further minimize the penetration and oxide film formed on the surface of the weld. Typical applications include automobile catalytic converters, manifolds, mufflers, exhaust systems. For welding in the spray mode of metal transfer, the shielding gas should be argon with 1% or 2% oxygen or carbon dioxide. Pulse welding can also be used to further minimize penetration in thin gauge steels. This metal cored wire can also be used in submerged arc welding in combination with OK Flux 10.93.

Classifications:	AWS A5.22: EC308L

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate	Efficiency (%)
1.2 mm	144 A	16 V	406 cm/min	1.9 kg/h	99.3 %
1.2 mm	245 A	25 V	673 cm/min	3.2 kg/h	99.3 %
1.2 mm	321 A	26 V	939 cm/min	4.5 kg/h	99.4 %
1.2 mm	390 A	28 V	1206 cm/min	5.9 kg/h	98.5 %
1.2 mm	441 A	30 V	1473 cm/min	7.2 kg/h	99.2 %
1.6 mm	212 A	23 V	368 cm/min	3.1 kg/h	99.2 %
1.6 mm	285 A	23 V	571 cm/min	4.9 kg/h	98.8 %
1.6 mm	332 A	26 V	762 cm/min	6.2 kg/h	98.1 %
1.6 mm	420 A	28 V	965 cm/min	8.3 kg/h	99.5 %
1.6 mm	500 A	31 V	1168 cm/min	10.22 kg/h	98.9 %

Arcaloy MC309L

Arcaloy MC309L is a composite metal cored stainless steel wire which has a stainless steel sheath. Arcaloy MC 309L is designed for welding type 309 wrought or for welding type 304 to mild carbon steel. It is also recommended for cladding 304 when welded to carbon steel. As a small diameter cored wire, it can be used for welding thin gauge 304L where increased corrosion resistance over Arcaloy MC308L is needed. It is also used for dissimilar welding between the 300 and 400 series stainless steels and mild and low alloys steels. Its higher deposition rate and less penetration compared to solid wire make it very suitable for making butt, fillet and lap welds on gauge material. Higher speeds are also possible compared to solid wire. The low spatter and slag-free welds make this electrode ideal for automatic and robotic welding. The pushing technique can be used to further minimize the penetration and oxide film formed on the surface of the weld. Typical applications include automobile catalytic converters, manifolds, mufflers, exhaust systems. For welding in the spray mode of metal transfer, the shielding gas should be argon with 1% or 2% oxygen or carbon dioxide. Pulse welding can also be used to further minimize penetration in thin gauge steels. This metal cored wire can also be used in submerged arc welding in combination with OK Flux 10.93.

Classifications:	AWS A5.22: EC309L

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate	Efficiency (%)
1.2 mm	144 A	16 V	406 cm/min	1.9 kg/h	99.3 %
1.2 mm	245 A	25 V	673 cm/min	3.2 kg/h	99.3 %
1.2 mm	321 A	26 V	939 cm/min	4.5 kg/h	99.4 %
1.2 mm	390 A	28 V	1206 cm/min	5.9 kg/h	98.5 %
1.2 mm	441 A	30 V	1473 cm/min	7.2 kg/h	99.2 %
1.6 mm	212 A	23 V	368 cm/min	3.1 kg/h	99.2 %
1.6 mm	285 A	23 V	571 cm/min	4.9 kg/h	98.8 %
1.6 mm	332 A	26 V	762 cm/min	6.2 kg/h	98.1 %
1.6 mm	420 A	28 V	965 cm/min	8.3 kg/h	99.5 %
1.6 mm	500 A	31 V	1168 cm/min	10.22 kg/h	98.9 %

Arcaloy MC316L

Arcaloy MC316L is a composite metal cored stainless steel wire which has a stainless steel sheath. The addition of molybdenum helps reduce pitting corrosion. As a small diameter cored wire it can be used for the welding of thin gauge 316, 316L and sometimes 304 and 304L stainless steels. Its higher deposition rate and less penetration compared to solid wire makes it very suitable for making butt, fillet and lap welds on gauge material. Higher speeds are also possible compared to solid wire. The low spatter and slag-free welds make this electrode ideal for automatic and robotic welding. The pushing technique can be used to further minimize the penetration and oxide film formed on the surface of the weld. Typical applications include automobile catalytic converters, manifolds, mufflers, exhaust systems. For welding in the spray mode of metal transfer, the shielding gas should be argon with 1% or 2% oxygen or carbon dioxide. Pulse welding can also be used to further minimize penetration in thin gauge steels. This metal cored wire can also be used in submerged arc welding. It can be used with OK Flux 10.93.

Classifications:	AWS A5.22: EC316L

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate	Efficiency (%)
1.2 mm	144 A	16 V	406 cm/min	1.9 kg/h	99.3 %
1.2 mm	245 A	25 V	673 cm/min	3.2 kg/h	99.3 %
1.2 mm	321 A	26 V	939 cm/min	4.5 kg/h	99.4 %
1.2 mm	390 A	28 V	1206 cm/min	5.9 kg/h	98.5 %
1.2 mm	441 A	30 V	1473 cm/min	7.2 kg/h	99.2 %
1.6 mm	212 A	23 V	368 cm/min	3.1 kg/h	99.2 %
1.6 mm	285 A	23 V	571 cm/min	4.9 kg/h	98.8 %
1.6 mm	332 A	26 V	762 cm/min	6.2 kg/h	98.1 %
1.6 mm	420 A	28 V	965 cm/min	8.3 kg/h	99.5 %
1.6 mm	500 A	31 V	1168 cm/min	10.22 kg/h	98.9 %

Arcaloy MC409Ti

Arcaloy MC409Ti is a 12% Cr alloy metal cored electrode stabilized with Titanium (Ti) for arc stability and to improve corrosion resistance, increase strength at high temperatures, and promote the ferritic microstructure. Arcaloy MC409Ti produces a smooth spray-type metal transfer with very minimal spatter. It is particularly suited for welding parts with poor fit up. It was designed for welding stainless steel catalytic converters, manifolds, mufflers, and exhaust systems.

Classifications:	AWS A5.22:EC409

Deposition Data

Diameter	**Current**	**Voltage**	**Wire Feed Speed**
1.2 mm	200 A	20 V	533 cm/min
1.2 mm	215 A	21 V	584 cm/min
1.2 mm	234 A	22 V	635 cm/min
1.2 mm	290 A	24 V	762 cm/min
1.2 mm	323 A	24 V	889 cm/min

Arcaloy MC439Ti

Arcaloy MC439Ti is an 16-17% Cr alloy metal cored electrode stabilized with Titanium (Ti). The high level of chromium provides additional oxidation and corrosion resistance when welding stainless steel catalytic converters, manifolds, mufflers, and exhaust systems. It is also suited for welding parts with poor fit up. Arcaloy MC439Ti produces a spray-type metal transfer with minimal spatter.

Classifications:	AWS A5.22:EC439

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
1.2 mm	200 A	20 V	533 cm/min
1.2 mm	215 A	21 V	584 cm/min
1.2 mm	234 A	22 V	635 cm/min
1.2 mm	290 A	24 V	762 cm/min
1.2 mm	323 A	24 V	889 cm/min

Arcaloy MC18CrCb

Arcaloy MC18CrCb is an 18% Cr alloy metal cored electrode stabilized with Titanium (Ti) and Niobium (Nb). It is designed for welding Armco 18Cr-Cb HP-10TM stainless steels used in catalytic converters, manifolds, mufflers, and exhaust systems. It is also suited for welding parts with poor fit up. Arcaloy MC18CrCb produces a smooth spray-type metal transfer with very minimal spatter.

Classifications:	AWS A5.22:EC439Nb

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed
1.2 mm	200 A	20 V	533 cm/min
1.2 mm	215 A	21 V	584 cm/min
1.2 mm	234 A	22 V	635 cm/min
1.2 mm	290 A	24 V	762 cm/min
1.2 mm	323 A	24 V	889 cm/min

OK Tubrod 15.30

AISI 304 type metal-cored wire developed for high deposition welding of (multi-layer) standing fillet welds. No slag and low spatter, making it suitable for mechanised and robotic operation, as well as for cladding. Shielding gas: M13 (Ar/2%O2).

Classifications Weld Metal:	EN 14700:T Fe12, EN ISO 17633-A:T 19 9 L M M12 2, EN ISO 17633-A:T 19 9 L M M13 2
Approvals:	CE EN 13479, DB 43.039.02, VdTÜV 03014

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Stainless 308L

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.2 mm	150-350 A	18-34 V	5.3-16.4 m/min	2.2-7.0 kg/h
1.6 mm	150-450 A	18-39 V	2.4-11.2 m/min	1.8-10.0 kg/h

OK Tubrod 15.31

AISI 316 type metal-cored wire developed for high deposition welding of (multi-layer) standing fillet welds. No slag and low spatter, making it suitable for mechanised and robotic operation, as well as for cladding. Shielding gas: M13 (Ar/2%O2).

Classifications Weld Metal:	EN ISO 17633-A:T 19 12 3 L M M12 2, EN ISO 17633-A:T 19 12 3 L M M13 2
Approvals:	CE EN 13479, DB 43.039.07, DNV 316L (M12), LR 316L S (M13), VdTÜV 03171

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Austenitic 316L

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.2 mm	150-350 A	18-34 V	5.3-16.4 m/min	2.2-7.0 kg/h
1.6 mm	150-450 A	18-39 V	2.4-11.2 m/min	1.8-10.0 kg/h

OK Tubrod 15.34

AISI 307 type metal-cored wire with a hot cracking-resistant austenitic weld metal, for welding armour steel, austenitic-manganese steel and dissimilar steels. Designed for the high deposition welding of (multi-layer) standing fillet welds.
Shielding gas M13 (Ar/2%O2).

Classifications Weld Metal:	EN 14700:T Fe10, EN ISO 17633-A:T 18 8 Mn M M12 2, EN ISO 17633-A:T 18 8 Mn M M13 2, EN ISO 17633-A:T 18 8 Mn M M21 2
Approvals:	CE EN 13479, DB 43.039.03, VdTÜV 04335

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	307

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	18-34 V	5.3-16.4 m/min	2.2-7.0 kg/h

OK Tubrod 15.37

A metal cored duplex stainless steel cored wire for use with M12 or M13 shielding gas.

Classifications Weld Metal:	EN 14700:T Fe11, SFA/AWS A5.9:EC2209, EN ISO 17633-A:T 22 9 3 N L M M12 2, EN ISO 17633-A:T 22 9 3 N L M M13 2
Approvals:	CE EN 13479, VdTÜV 09775

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Duplex

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N
0.016	0.78	0.63	8.6	21.7	2.8	0.13

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-350 A	18-34 V	5.3-16.4 m/min	2.2-7.0 kg/h

NICORE 55

Nicore 55 is a composite metal cored wire for repair and joining of cast iron materials. The deposit, which is approximately 53% iron and 45% nickel, provides an excellent match for the coefficient of expansion exhibited by cast irons. Cracking is minimized because thermal stresses caused by the heat of welding are minimized. The light slag is easily removed enhancing visual weld inspection. The fact that this is a continuous electrode will improve the operating factor and minimize unnecessary stops and starts. This electrode can replace covered electrodes such as AWS ENiFe-CI or ENiFe-CI-A. It may be used for repair welds or for joining various types of cast irons. Cast irons may be welded to steel and other ferrous and non-ferrous materials with this product. The machinability of the weld deposit is comparable to the matching covered electrode. Substantial savings in weld metal deposition costs will be realized when replacing 55% nickel coated electrodes with Nicore 55. The deposition rate of this wire is more than twice that of a comparable coated electrode. The efficiency (approximately 97%) compared to that of coated electrodes (56% assuming 3 in. stub loss) is substantially greater. These two factors result in substantial savings in weld metal deposition costs. Because of the high deposition rate, the travel rate is very fast, resulting in lower heat input which is advantageous in welding cast irons.

Welding Current:	DC+
Alloy Type:	Cast iron

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Al
1.04	0.23	0.71	45.3	0.01

Deposition Data

Diameter	Current	Voltage
1.2 mm	220-250 A	28-30 V

OK Tubrodur 12Cr S

A cored wire which produces a martensitic 12%-chromium alloy steel deposit with nitrogen addition. It is used under flux in the submerged arc process.

Classifications Weld Metal:	EN 14700:T Fe7

Welding Current:	DC+-
Alloy Type:	Surfacing alloy: martensitic stainless steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	V	N	Nb
OK Flux 10.33								
0.05	0.86	0.51	3.88	11.9	1.02	0.10	0.061	0.11

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
3.0 mm	400-700 A	28-36 V	2.5-5.5 m/min	5.5-12.0 kg/h

OK Tubrodur 13Cr G

OK Tubrodur 13Cr G is a versatile, metal-cored, hardfacing wire which deposits a martensitic 13Cr alloy steel deposit, especially suitable for applications involving wear at elevated temperatures. They include shafts, valve seats, rolls and other parts subjected to wear and/or corrosion at high temperatures. An 80% Ar + 20% CO_2 gas mix is recommended.

Classifications Weld Metal:	EN 14700:T Z Fe7
Approvals:	NAKS/HAKC 1.6 mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Martensitic stainless steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	V	Nb
M21 shielding gas							
0.15	1.14	0.31	2.23	12.53	1.40	0.23	0.23

Deposition Data

Diameter	Current	Voltage
1.6 mm	200-260 A	28-30 V

OK Tubrodur 13Cr S

OK Tubrodur 13Cr S is a cored wire which produces a 13%-chromium alloy steel deposit used with OK Flux 10.37 or OK Flux 10.61.

Classifications Weld Metal:	EN 14700:T Fe7
Approvals:	NAKS/HAKC 3.0mm

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Surfacing alloy: martensitic stainless steel weld metal

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-450 A	28-38 V	2.0-5.0 m/min	4.0-9.0 kg/h
3.0 mm	400-700 A	28-36 V	2.5-5.5 m/min	5.5-12.0 kg/h

OK Tubrodur 13Mn O/G

OK Tubrodur 13Mn O/G is a self-shielded, flux-cored wire of the austentic-manganese type. The work hardening characteristics and extremely tough crack-resistant weld metal ensure that OK Tubrodur 13Mn O/G is the ideal solution for rebuilding 13Mn steels, normally found in crusher jaws, swing hammers and numerous parts of earth-moving, mining and quarrying equipment.

Classifications Weld Metal:	EN 14700:T Fe9

Welding Current:	DC+
Alloy Type:	13% manganese steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Al
0.85	11.78	0.63	2.95	0.38

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	150-260 A	24-30 V	2.0-4.2 m/min	2.5-3.2 kg/h

OK Tubrodur 15CrMn O/G

OK Tubrodur 15.65 is a flux-cored wire for self- or CO2 shielding, depositing a martensitic-austenitic, work-hardening deposit. OK Tubrodur 15.65 can be used for the rebuilding of mild, low-alloy and 13Mn steels. The weld metal combines excellent abrasion and impact resistance and is suitable for applications such as crusher jaws and hammers, railway point frogs, ripper teeth and wear plates.

Classifications Weld Metal:	EN 14700:T Fe9
Approvals:	CE EN 13479, DB 82.039.10

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	14% Mn 14%Cr steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	V
0.3	13.5	0.5	1.75	16.0	0.8	0.65

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.2 mm	150-250 A	28-37 V	6.5-21.5 m/min	3.3-7.2 kg/h
1.6 mm	200-330 A	24-33 V	5.0-12.0 m/min	3.7-8.0 kg/h

OK Tubrodur 23Cr S

A tubular electrode for submerged arc welding with OK Flux 10.92. This electrode produces a weld metal with the following composition: 22% chromium, 4% nickel and 1% molybdenum. The weld metal is oxidation and heat resistant.

Applications: This electrode is suitable for a wide range of components subjected to corrosive media or high-temperature conditions. Examples include shafts, axles, wheels, rollers and so on which are subject to wear by corrosion-oxidation processes. It can be used as a buffer layer on high carbon-base material, prior to hardfacing with high carbon deposits.

Classifications Weld Metal:	EN 14700:T Fe7

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo
0.04	0.23	0.77	4.0	23.4	1.3

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
3.0 mm	400-700 A	28-36 V	2.5-5.5 m/min	5.5-12.0 kg/h

OK Tubrodur 30 O M

OK Tubrodur 30 O M is a self-shielded, flux-cored wire for semi-automatic hardfacing, producing a chromium-manganese-alloyed weld metal with a hardness of 28-36 HRC. It is ideal for the on-site rebuilding of rollers, shafts, wheels and worn parts of CMn railway tracks, point frogs and so on.

Classifications Weld Metal:	EN 14700:T Z Fe1
Approvals:	CE EN 13479, DB 82.039.09

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Al
0.10	1.41	0.43	2.94	1.37

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	150-300 A	25-36 V	5.0-12.6 m/min	2.4-6.8 kg/h
2.4 mm	250-550 A	26-40 V	2.5-9.0 m/min	3.7-11.4 kg/h

OK Tubrodur 35 G M

OK Tubrodur 35 G M is a CO2-shielded, flux-cored wire for the hardfacing deposit of a manganese-chromium-molybdenum-alloyed weld metal. It is used for the surfacing of wheel runners, wheels and rollers for conveyor belts, wheels for mine trucks, rolls and shafts.

Classifications Weld Metal:	EN 14700:T Fe1

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Cr
C1 shielding gas			
0.21	1.40	1.10	1.47

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	250-350 A	28-34 V	5.0-12.6 m/min	2.4-6.8 kg/h

OK Tubrodur 35 O M

OK Tubrodur 35 O M is a self-shielded, flux-cored, tubular wire, primarily developed for the on-site rebuilding of worn CMn railway and tram tracks. The weld deposit is of the CrNiMo type and has excellent compressive strength with a hardness of 30-40 HRC.

Classifications Weld Metal:	EN 14700:T Z Fe3

Welding Current:	DC+
Alloy Type:	Surfacing alloy: martensitic steel weld metal

Typical Weld Metal Analysis %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Al**
0.14	1.10	0.28	2.23	1.04	0.48	1.5

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.2 mm	150-250 A	28-37 V	6.5-21.5 m/min	3.3-7.2 kg/h
1.6 mm	150-300 A	25-36 V	5.0-12.6 m/min	2.4-6.8 kg/h

OK Tubrodur 35 S M

OK Tubrodur 15.40S is a flux-cored wire for SAW hardfacing in conjunction with OK Flux 10.71, depositing a manganese-chromium-molybdenum-alloyed weld metal with a hardness of 32-36 Rockwell C. Suitable for surfacing wheel runners, track links, wheels and rollers for conveyor belts, wheels for mine trucks, rolls and shafts, where a hardness within the range of 32-40 Rockwell C is desired. With negative polarity, less heat input to the base material, less dilution of the weld metal and a higher deposition rate are obtained. In most cases, surfacing with OK Tubrodur 15.40S can be performed without preheat. The need for preheat and increased interpass temperature is determined by the weldability of the parent material in question and the form and dimensions of the workpiece. Whenever possible, surfaced axles and similar objects, which are exposed to a bending stress during rotation, should always be stress relieved at 500-600°C.

Classifications Weld Metal:	EN 14700:T Fe1

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %			
C	**Mn**	**Si**	**Cr**
0.21	1.40	1.10	1.47

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
3.0 mm	400-700 A	28-36 V	2.5-5.5 m/min	5.5-12.0 kg/h
4.0 mm	500-900 A	28-34 V	2.0-5.0 m/min	6.5-12.5 kg/h

OK Tubrodur 40 O M

OK Tubrodur 15.42 is a self- or CO2-shielded, flux-cored wire for GMAW hardfacing. It is designed for surfacing wheel runners, track links, billet rolls, wheels and rollers for conveyor belts, wheels for mine trucks, rolls and shafts, where a hardness of 35-45 HRC is desired.

Classifications Weld Metal:	EN 14700:T Z Fe2

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Al
0.14	1.59	0.62	0.55	4.64	0.49	1.55

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	150-300 A	25-36 V	5.0-12.6 m/min	2.4-6.8 kg/h

OK Tubrodur 40 S M

A tubular hardfacing wire for rebuilding and surfacing using the submerged arc welding process.

Classifications Weld Metal:	EN 14700:T Z Fe1

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
OK Flux 10.71				
0.15	1.14	0.51	4.07	0.77

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
3.0 mm	400-700 A	28-36 V	2.5-5.5 m/min	5.5-12.0 kg/h
4.0 mm	500-900 A	28-34 V	2.0-5.0 m/min	6.5-12.5 kg/h

OK Tubrodur 53 G M

A cored wire which produces a Cr-Mo-V-Co-W alloyed weld metal for hardfacing used with C1 shielding gas.

Classifications Weld Metal:	EN 14700:T Fe3, DIN 8555:MF3-50T

Welding Current:	DC+
Alloy Type:	Surfacing alloy Cr-Mo-V-Co-W

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo	V	Co	W
C1 shielding gas							
0.33	1.14	0.94	1.76	0.44	0.40	2.03	8.17

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	150-450 A	21-40 V	2.4-11.9 m/min	1.8-9.0 kg/h

OK Tubrodur 55 O A

OK Tubrodur 55 O A is a self-shielded, Cr-carbide type flux-cored wire. The weld metal is extremely resistant to abrasive wear by gritty fine grain materials such as earth, ore, clay, etc. Typical applications are the hardfacing of bucket lips, auger points, mining and earthmoving equipment, scraper blades etc. Maximum 2-3 layers should be deposited.

Classifications Weld Metal:	EN 14700:T Z Fe14

Welding Current:	DC+
Alloy Type:	Carbide-rich steel weld metal

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo	V
3.6	0.88	0.53	22.5	3.5	0.5

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
1.6 mm	150-300 A	25-36 V	5.0-12.6 m/min	2.4-6.8 kg/h

OK Tubrodur 58 O/G M

OK Tubrodur 58 O/G M is a self- or CO2-shielded, flux-cored wire for hardfacing with a hardness of 55-60 HRC. It is designed for hardfacing feed screws, mixer blades and vessels and ring grooves on diesel-engine pistons.

Classifications Weld Metal:	EN 14700:T Fe6

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %					
C	**Mn**	**Si**	**Cr**	**Mo**	**Al**
No shielding gas					
0.42	1.22	0.31	4.89	1.14	0.6

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.6 mm	200-300 A	28-36 V	7.0-12.6 m/min	2.4-5.5 kg/h

OK Tubrodur 58 S M

OK Tubrodur 58 S M is a flux cored wire for SAW hardfacing in conjuction with OK Flux 10.71. OK Tubrodur 58 S M is designed for hardfacing of feed screws, mixer blades and vessels, ring grooves on diesel motor pistons.

Classifications Weld Metal:	EN 14700:T Fe6

Welding Current:	DC+
Alloy Type:	Martensitic steel weld metal

Typical Weld Metal Analysis %				
C	**Mn**	**Si**	**Cr**	**Mo**
OK Flux 10.71				
0.45	1.61	0.68	5.2	1.25

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
3.0 mm	400-700 A	28-36 V	2.5-5.5 m/min	5.5-12.0 kg/h

OK Tubrodur 60 G M

OK Tubrodur 60 G M deposits a weld metal with a structure consisting of evenly divided, hard chromium carbides in a martensitic matrix, with a hardness of HV 600-700. It is suitable for hardfacing parts subjected to extremely severe service conditions involving a combination of impact and abrasion. The weld deposit can only be machined by grinding. It is advisable to apply no more than three layers of weld metal. When badly worn surfaces have to be rebuilt, it is recommended to begin by using a tougher weld metal.

Applications:

- Mill hammers
- Parts of agricultural equipment
- Earth-moving equipment
- Grinders for animal carcasses

Classifications Weld Metal:	DIN 8555:MF6-55GP, EN 14700:T Z Fe2

Welding Current:	DC+
Alloy Type:	5%Cr 1%Mo

Typical Weld Metal Analysis %				
C	**Mn**	**Si**	**Cr**	**Mo**
0.67	0.78	0.71	5.33	1.00

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.2 mm	150-350 A	18-34 V	5.3-16.4 m/min	2.2-7.0 kg/h
1.6 mm	150-450 A	21-40 V	2.4-11.9 m/min	1.8-9.0 kg/h

OK Tubrodur 200 O D

A stainless, 18.8.6Mn, self-shielded, tubular wire for cladding and joining 13% Mn steels and steels with limitied weldability. It is also useful for buffer layers prior to hardfacing.

Classifications Weld Metal:	EN 14700:T Fe10

Welding Current:	DC+
Alloy Type:	Austenitic Cr-Ni-Mn weld metal

Typical Weld Metal Analysis %				
C	**Mn**	**Si**	**Ni**	**Cr**
0.026	5.12	0.48	8.7	19.1

Deposition Data				
Diameter	**Current**	**Voltage**	**Wire Feed Speed**	**Deposition Rate**
1.6 mm	150-450 A	21-40 V	2.4-11.9 m/min	1.8-9.0 kg/h



Submerged Arc Wires and Fluxes (SAW)

MILD STEEL WIRES **5-4**
OK Autrod 12.10 5-4
OK Autrod 12.20 5-4
OK Autrod 12.22 5-4
OK Autrod 12.30 5-5
OK Autrod 12.32 5-5
OK Autrod 12.40 5-5
OK Tubrod 14.00S 5-6
OK Tubrod 15.00S 5-7

LOW ALLOY WIRES **5-8**
OK Autrod 12.24 5-8
OK Autrod 12.34 5-8
OK Autrod 13.10 SC 5-8
OK Autrod 13.20 SC 5-9
OK Autrod 13.21 5-9
OK Autrod 13.24 5-9
OK Autrod 13.27 5-10
OK Autrod 13.33 5-10
OK Autrod 13.35 5-10
OK Autrod 13.36 5-11
OK Autrod 13.40 5-11
OK Autrod 13.43 5-11
OK Autrod 13.49 5-12
OK Autrod 13.64 5-12
OK Tubrod 14.07S 5-13
OK Tubrod 15.24S 5-14
OK Tubrod 15.25S 5-15
OK Tubrod 15.27S 5-16

STAINLESS STEEL WIRES **5-17**
OK Autrod 16.97 5-17
OK Autrod 308L 5-17
OK Autrod 308H 5-18
OK Autrod 309L 5-18
OK Autrod 309MoL 5-19
OK Autrod 310 5-19
OK Autrod 310MoL 5-20
OK Autrod 312 5-20
OK Autrod 316L 5-21
OK Autrod 316H 5-21
OK Autrod 16.38 5-22
OK Autrod 317L 5-22
OK Autrod 318 5-23
OK Autrod 347 5-23
OK Autrod 385 5-24
OK Autrod 2209 5-24
OK Autrod 2307 5-25
OK Autrod 2509 5-25
OK Autrod 410 5-26
OK Autrod 410NiMo 5-26
OK Autrod 420 5-27
OK Autrod 430 5-27

NICKEL-BASED ALLOYS **5-28**
OK Autrod NiCr-3 5-28
OK Autrod NiCrMo-3 5-28
OK Autrod NiCrMo-4 5-29
OK Autrod NiCrMo-13 5-29

CLADDING STRIP **5-30**
OK Band 308L 5-30
OK Band 309L 5-30
OK Band 309L ESW 5-30
OK Band 316L 5-31
OK Band 309LMo ESW 5-31

OK Band 317L 5-31
OK Band 347 5-32
OK Band 309LNb ESW 5-32
OK Band 309LNb 5-32
OK Band 310MoL 5-33
OK Band 2209 5-33
OK Band NiCr3 5-33
OK Band NiCrMo3 5-34
OK Band NiCrMo7 5-34
OK Band NiFeCr1 5-35
OK Band NiCu7 5-35

HARDFACING STRIP 5-36
OK Band 7018 5-36
OK Band 430 5-36
OK Band 11.21 5-36
OK Band 11.23 5-37
OK Band 11.27 5-37
OK Band 11.84 5-37
OK Band 11.85 5-37

MILD STEEL/LOW ALLOY FLUXES 5-38
OK Flux 10.61 5-38
OK Flux 10.62 5-41
OK Flux 10.63 5-45
OK Flux 10.64 5-47
OK Flux 10.69 5-48
OK Flux 10.70 5-49
OK Flux 10.71 5-51
OK Flux 10.72 5-55
OK Flux 10.74 5-57
OK Flux 10.76 5-59
OK Flux 10.77 5-61
OK Flux 10.80 5-63
OK Flux 10.81 5-65
OK Flux 10.83 5-67
OK Flux 10.87 5-69
OK Flux 10.88 5-71

STAINLESS STEEL FLUXES 5-73
OK Flux 10.92 5-73
OK Flux 10.93 5-75
OK Flux 10.94 5-79
OK Flux 10.95 5-80
OK Flux 10.99 5-81

NICKEL-BASED ALLOY FLUXES 5-83
OK Flux 10.16 5-83
OK Flux 10.90 5-84

CLADDING FLUXES 5-86
OK Flux 10.05 5-86
OK Flux 10.10 5-88
OK Flux 10.11 5-90
OK Flux 10.14 5-91
OK Flux 10.16 5-92
OK Flux 10.17 5-93
OK Flux 10.18 5-94
OK Flux 10.26 5-94
OK Flux 10.27 5-95

HARDFACING FLUXES 5-96
OK Flux 10.07 5-96
OK Flux 10.31 5-97
OK Flux 10.33 5-97
OK Flux 10.96 5-98
OK Flux 10.97 5-98

OK Autrod 12.10

Copper-coated, unalloyed wire for Submerged Arc Welding. For low requirements or in combination with high Si and Mn alloying fluxes. Suitable for non- and low alloyed steels.

Classifications Wire Electrode:	SFA/AWS A5.17:EL12, EN ISO 14171-A:S1
Approvals:	CE EN 13479, DB 52.039.01, VdTÜV 12103

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %		
C	**Mn**	**Si**
0.07	0.52	0.08

OK Autrod 12.20

Copper-coated, unalloyed wire for Submerged Arc and Electroslag Welding. Suitable in combination with most fluxes. For structural steels, ship building steels, pressure vessel steels, fine grained steels, etc.

Classifications Wire Electrode:	SFA/AWS A5.17:EM12, EN ISO 14171-A:S2
Approvals:	CE EN 13479, VdTÜV 12103, DB 52.039.02, NAKS/HAKC 3.0 mm, 4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %		
C	**Mn**	**Si**
0.10	1.06	0.07

OK Autrod 12.22

Copper-coated, unalloyed wire for Submerged Arc Welding. Suitable in combination with most fluxes. Increased Si content and thus especially for neutral fluxes (e.g: OK Flux 10.62) or in order to increase the fluidity of the molten pool. For structural steels, ship buildings steels, pressure vessel steels, fine grained steels, etc.

Classifications Wire Electrode:	SFA/AWS A5.17:EM12K, EN ISO 14171-A:S2Si
Approvals:	CE EN 13479, VdTÜV 12103, DB 52.039.05, NAKS/HAKC 2.0 mm-5.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %		
C	**Mn**	**Si**
0.09	1.01	0.19

OK Autrod 12.30

Copper-coated, unalloyed wire for Submerged Arc Welding. For structural steels, pressure vessel steels, fine grained steels, etc.

Classifications Wire Electrode:	EN ISO 14171-A:S3
Approvals:	CE EN 13479, VdTÜV 12103, DB 52.039.03

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %		
C	**Mn**	**Si**
0.11	1.61	0.13

OK Autrod 12.32

Copper-coated, unalloyed wire for Submerged Arc and Electroslag Welding. Increased Si content and thus especially suitable for neutral fluxes (e.g.: OK Flux 10.62) or in order to increase the fluidity of the molten pool. With OK Flux 10.62 excellent toughness values; CTOD tested. For structural steels, ship building steels, pressure vessel steels, fine grained steels, off-shore constructions, etc.

Classifications Wire Electrode:	SFA/AWS A5.17:EH12K, EN ISO 14171-A:S3Si
Approvals:	CE EN 13479, NAKS/HAKC 2.0, 3.0, 4.0, 5.0 mm, VdTÜV 12103, DB 52.039.12

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %		
C	**Mn**	**Si**
0.13	1.77	0.30

OK Autrod 12.40

Copper-coated, unalloyed wire for Submerged Arc and Electroslag Welding. For structural steels, ship building steels, pressure vessel steels, fine grained steels, etc.

Classifications Wire Electrode:	SFA/AWS A5.17:EH14, EN ISO 14171-A:S4
Approvals:	VdTÜV 12103

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %		
C	**Mn**	**Si**
0.12	2.04	0.08

OK Tubrod 14.00S

OK Tubrod 14.00S is a tubular wire designed for the submerged arc welding of mild and medium tensile steels and is suitable for fillet and multi-pass butt joints. When used in conjunction with OK Flux 10.71, exceptional productivity can be obtained at deposition rates up to 20% higher than with the same size of solid wire at the same current.

Classifications Weld Metal:	SFA/AWS A5.17:F7A2-EC1
Classifications:	EN ISO 14174:SA AB 1 67 AC H5, SFA/AWS A5.17:F7A2-EC1
Approvals:	CE EN 13479, CE EN 13479 (10.71), ABS 3YM (10.71), BV 3YM (10.71), DB 52.039.13 - 51.039.05 (10.71), DNV III YM (10.71), GL 3YM (10.71), LR 3YM (10.71), VdTÜV 09143 (10.71)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Diffusible Hydrogen:	< 10 ml/100g
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
EN with OK Flux 10.71			
As welded	454 MPa	538 MPa	30 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
EN with OK Flux 10.71		
As welded	-20 °C	132 J

Typical Weld Metal Analysis %

C	Mn	Si
with OK Flux 10.71		
0.06	1.52	0.47

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-450 A	28-38 V	2.0-5.0 m/min	4.0-9.0 kg/h
3.0 mm	400-700 A	28-40 V	2.5-5.5 m/min	5.5-12.0 kg/h
4.0 mm	500-850 A	28-40 V	2.0-5.0 m/min	6.5-12.5 kg/h

OK Tubrod 15.00S

OK Tubrod 15.00S is a tubular wire for submerged arc welding in conjunction with OK Flux 10.71, when high integrity welded joints are required in mild and medium tensile steels. General fabrication, structural engineering and shipbuilding are the principal areas of application. The welding of primed plate at high speeds is a particular benefit.

Classifications Weld Metal:	SFA/AWS A5.17:F7A4-EC1 (OK Flux 10.71), SFA/AWS A5.17:F7A5-EC1 (OK Flux 10.62), EN ISO 14171-A:S 42 4 AB T3 (OK Flux 10.71)
Approvals:	CE EN 13479, CE EN 13479 (10.71), LR 3Ym, ABS 3YM, BV A3YM, DNV III YM, GL 3YM, PRS 3YM (10.71), VdTÜV 09144, DB 52.039.14

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Diffusible Hydrogen:	<5ml/100g
Alloy Type:	C Mn

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
OK Flux 10.62			
As welded	465 MPa	540 MPa	26 %
OK Flux 10.71			
As welded	463 MPa	556 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
OK Flux 10.62		
As welded	-40 °C	140 J
As welded	-60 °C	75 J
OK Flux 10.71		
As welded	-40 °C	114 J

Typical Weld Metal Analysis %

C	Mn	Si
OK Flux 10.62		
0.06	1.40	0.35
OK Flux 10.71		
0.07	1.61	0.59

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-350 A	28-38 V	1.5-2.5 m/min	3.5-9.5 kg/h
3.0 mm	400-800 A	28-40 V	2.5-6.0 m/min	6.0-14.5 kg/h
4.0 mm	500-900 A	28-40 V	2.0-5.5 m/min	7.0-18.0 kg/h

OK Autrod 12.24

Mo-alloyed, copper-coated wire for Submerged Arc Welding. For creep resistant steels (0,5% Mo), structural steels, ship building steels, pressure vessel steels, pipeline steels up to X70, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:EA2, EN ISO 14171-A:S2Mo, EN ISO 24598-A:S S Mo
Approvals:	CE EN 13479, VdTÜV 12103, DB 52.039.06, NAKS/HAKC 3.0, 4,0, 5.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %			
C	**Mn**	**Si**	**Mo**
0.09	1.08	0.14	0.48

OK Autrod 12.34

Mo-alloyed, copper-coated wire for Submerged Arc and Electroslag Welding. For creep resistant steels (0,5% Mo), structural steels, ship building steels, pressure vessel steels, pipeline steels up to X80, high strength steels, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:EA4, EN ISO 14171-A:S3Mo, EN ISO 24598-A:S S MnMo
Approvals:	VdTÜV 12103, NAKS/HAKC 4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %			
C	**Mn**	**Si**	**Mo**
0.13	1.51	0.16	0.48

OK Autrod 13.10 SC

Cr-, Mo-alloyed, copper-coated wire for Submerged Arc Welding. Very low level of impurities. X-factor (Bruscato-) max. 11. With OK Flux 10.63 for highest toughness requirements also after Step-Cooling; very clean weld metal with X-factor max. 15. Mainly for creep resistant steels (1,25% Cr, 0,5% Mo).

Classifications Wire Electrode:	SFA/AWS A5.23:EB2R, EN ISO 24598-A:S S CrMo1
Approvals:	CE EN 13479, VdTÜV 12104, NAKS/HAKC 3.2-4.0 mm, DB 52.039.09

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %					
C	**Mn**	**Si**	**Cr**	**Mo**	**X**
0.10	0.83	0.12	1.21	0.49	≤ 11

OK Autrod 13.20 SC

OK Autrod 13.20 SC is a Cr-, Mo-alloyed, copper-coated wire for Submerged Arc Welding. Very low level of impurities. X-factor (Bruscato-) max. 11. With OK Flux 10.63 for highest toughness requirements also after Step-Cooling; very clean weld metal with X-factor max. 15. Mainly for creep resistant steels (2,25% Cr, 1% Mo).

Classifications Wire Electrode:	SFA/AWS A5.23:EB3R, EN ISO 24598-A:S S CrMo2
Approvals:	CE EN 13479, VdTÜV 12104, NAKS/HAKC 3.0 mm, 4.0mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %					
C	**Mn**	**Si**	**Cr**	**Mo**	**X**
0.11	0.66	0.15	2.33	0.95	≤ 11

OK Autrod 13.21

Ni-alloyed, copper-coated wire for Submerged Arc Welding. For structural steels, ship building steels, pressure vessel steels, fine grained steels, etc. at lower temperatures.

Classifications Wire Electrode:	SFA/AWS A5.23:ENi1, EN ISO 14171-A:S2Ni1
Approvals:	VdTÜV 12103

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %			
C	**Mn**	**Si**	**Ni**
0.11	0.98	0.15	0.90

OK Autrod 13.24

Ni-, Mo-alloyed, copper-coated wire for Submerged Arc Welding. With OK Flux 10.62 excellent toughness values; CTOD tested. For low temperature steels and fine grained steels in ship building and off-shore industries, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:ENi6, EN ISO 14171-A:S3Ni1Mo0,2
Approvals:	CE EN 13479, VdTÜV 12103, NAKS/HAKC 3.2-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %				
C	**Mn**	**Si**	**Ni**	**Mo**
0.12	1.52	0.23	0.88	0.19

OK Autrod 13.27

Ni-alloyed, copper-coated wire for Submerged Arc Welding. With OK Flux 10.62 excellent toughness values; CTOD tested. For low temperature steels and fine grained steels in ship building, off-shore, pressure vessel industries, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:ENi2, EN ISO 14171-A:S2Ni2
Approvals:	CE EN 13479, VdTÜV 12103, DB 52.039.08, NAKS/HAKC 2.5, 3.0, 4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %			
C	**Mn**	**Si**	**Ni**
0.10	1.02	0.14	2.19

OK Autrod 13.33

Cr-, Mo-alloyed, copper-coated wire for Submerged Arc Welding. Mainly for creep resistant steels (5% Cr, 0,5% Mo).

Classifications Wire Electrode:	SFA/AWS A5.23:EB6, EN ISO 24598-A:S S CrMo5
Approvals:	VdTÜV 12104

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %				
C	**Mn**	**Si**	**Cr**	**Mo**
0.09	0.51	0.42	5.73	0.53

OK Autrod 13.35

Cr-, Mo-alloyed, non copper-coated wire for Submerged Arc Welding. Mainly for creep resistant steels (9% Cr, 1% Mo V Nb).

Classifications Wire Electrode:	SFA/AWS A5.23:EB91, EN ISO 24598-A:S S CrMo91
Approvals:	VdTÜV 12104

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**V**	**N**	**Nb**
0.10	0.52	0.22	0.67	8.82	0.92	0.20	0.05	0.07

OK Autrod 13.36

Ni-, Cu-, Cr-alloyed, copper-coated wire for Submerged Arc Welding. For weather resistant steels such as COR-TEN, Patinax, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:EG, EN ISO 14171-A:S2Ni1Cu
Approvals:	CE EN 13479, VdTÜV 12103, DB 52.039.04

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Cu**
0.10	0.95	0.29	0.78	0.29	0.48

OK Autrod 13.40

Ni-, Mo-alloyed, copper-coated wire for Submerged Arc Welding. Preferably in combination with OK Flux 10.62.
For high strength steels with minimum yield strengths up to 620 MPa, low temperature steels, fine grained steels, etc.

Classifications Wire Electrode:	EN ISO 14171-A:S3Ni1Mo, EN ISO 26304-A:S3Ni1Mo, EN ISO 26304-B:(SUN2M2), SFA/AWS A5.23:EG
Approvals:	CE EN 13479, VdTÜV 12103, NAKS/HAKC 3.2-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %				
C	**Mn**	**Si**	**Ni**	**Mo**
0.11	1.63	0.16	0.86	0.51

OK Autrod 13.43

Ni-, Cr-, Mo-alloyed, copper-coated wire for Submerged Arc Welding. Preferably in combination with OK Flux 10.62.
For high strength steels with minimum yield strengths up to 690 MPa, low temperature steels, fine grained steels, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:EG, EN ISO 26304-A:S3Ni2,5CrMo, EN ISO 26304-B:(SUN4C1M3)
Approvals:	CE EN 13479, VdTÜV 12104

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
0.12	1.55	0.19	2.29	0.67	0.47

OK Autrod 13.49

Ni-alloyed, copper-coated wire for Submerged Arc Welding. Mainly for low temperature steels down to temperatures of -101°C.

Classifications Wire Electrode:	SFA/AWS A5.23:ENi3, EN ISO 14171-A:S2Ni3
Approvals:	VdTÜV 12103

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %			
C	**Mn**	**Si**	**Ni**
0.09	0.95	0.15	3.28

OK Autrod 13.64

Low-alloyed and Ti-B micro-alloyed, copper-coated solid wire for Submerged Arc Welding. Especially for high dilution welds where low temperature impact toughness properties are required. For fine grained steels, pipeline steels, ship building steels, etc.

Classifications Wire Electrode:	SFA/AWS A5.23:EA2TiB, EN ISO 14171-A:S2MoTiB
Approvals:	VdTÜV 12103 , NAKS/HAKC 3.0, 4.0, 5.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %					
C	**Mn**	**Si**	**Mo**	**B**	**Ti**
0.07	1.22	0.28	0.49	0.013	0.14

OK Tubrod 14.07S

A metal cored wire containing 1% Cr 0.5% Mo for submerged arc welding. Used with OK Flux 10.63 fully basic flux, the weld metal is of the highest metallurgical integrity for service temperatures up to 500°C. The wire may also be used with OK Flux 10.71 for fillet welding applications.

Applications: Steels with a similar composition to those used in steam boilers, process plants and piping, together with pressure vessels in the power generation industry. This product has been successfully used in tube-to-fin applications with OK Flux 10.71.

Preheating dependent on thickness up to 300°C is essential, followed by post-weld heat treatment at 650-700°C.

Classifications Weld Metal:	EN 14700:T Fe1, SFA/AWS A5.23:F9AZ-EC-B2
Classifications:	EN 14700:T Fe1, EN 760:SA AB 1 67 AC H5, SFA/AWS A5.23:F9AZ-EC-B2

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+, AC
Diffusible Hydrogen:	< 10 ml/100g
Alloy Type:	Low alloy (Cr 0.5% Mo)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
OK Flux 10.71			
As welded	640 MPa	721 MPa	23 %

Typical Weld Metal Analysis %

C	Mn	Si	Cr	Mo
OK Flux 10.71				
0.07	1.05	0.45	1.18	0.51

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-450 A	28-38 V	2.0-5.0 m/min	4.0-9.0 kg/h

OK Tubrod 15.24S

A 1% Ni basic cored wire for submerged arc welding giving good toughness down to -50 °C.

Classifications Weld Metal:	SFA/AWS A5.23:F7P8-EC-G (10.61), SFA/AWS A5.23:F8A6-EC-G (10.62), SFA/AWS A5.23:F8A6-EC-G (10.71), EN ISO 14171-A:S 46 4 AB TZ (10.71), EN ISO 14171-A:S 46 5 FB T3Ni1 (10.62)
Approvals:	ABS 4YQ460M H5 (10.62), BV 4Y46M H5 (10.62), CE EN 13479 (10.62), CE EN 13479 (10.71), DNV IV Y46M(H5) (10.62)

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	<5ml/100g
Alloy Type:	Low alloy (1% Ni)

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
AWS OK Flux 10.62			
As welded	510 MPa	610 MPa	29 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
AWS OK Flux 10.62		
As welded	-50 °C	106 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni
with OK Flux 10.61			
0.10	2.00	0.40	0.90
with OK Flux 10.62			
0.08	1.61	0.24	0.65
with OK Flux 10.71			
0.10	2.30	0.70	0.90

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-500 A	28-38 V	1.5-2.5 m/min	3.5-9.5 kg/h
3.0 mm	400-800 A	28-40 V	2.5-6.0 m/min	6.0-14.5 kg/h
4.0 mm	500-900 A	28-40 V	2.0-5.5 m/min	7.0-18.0 kg/h

OK Tubrod 15.25S

OK Tubrod 15.25S is a 2.5Ni tubular wire for submerged arc welding in conjunction with OK Flux 10.62 when Charpy V values down to -60°C are required. It has also high tolerance to shop primer when welding high-speed fillets, as well as single-sided, single-pass butt joints.

Classifications Weld Metal:	SFA/AWS A5.23:F7A8-EC-Ni2
Classifications:	EN ISO 14174:S A FB 1 55 AC H5, SFA/AWS A5.23:F7A8-EC-Ni2

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	AC, DC+
Diffusible Hydrogen:	<5 ml/100g
Alloy Type:	Low alloy steel -2.5% Nickel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
OK Flux 10.62			
As welded	450 MPa	564 MPa	33 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
OK Flux 10.62		
As welded	-60 °C	112 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cu
OK Flux 10.62				
0.05	1.28	0.35	2.26	0.02

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
4.0 mm	500-900 A	28-40 V	2.0-5.5 m/min	7.0-18.0 kg/h

OK Tubrod 15.27S

A basic cored wire designed for the submerged arc welding of steels with a minimum yield strength of 690 MPa.

Classifications Weld Metal:	SFA/AWS A5.23:F11A8-EC-G (OK Flux 10.62), EN ISO 26304-A:T 69 6 FB TZ H5 (OK Flux 10.62)
Approvals:	CE EN 13479, CE EN 13479 (10.62), NAKS/HAKC 4.0mm, ABS 5YQ690M H5 (10.62), DNV V Y69MH5 (10.62), GL 6Y69MH5 (10.62), LR 5Y69M H5 (10.62)

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	DC+
Diffusible Hydrogen:	< 5 ml/100g
Alloy Type:	Low alloy high strength steel

Typical Tensile Properties

Condition	Yield Strength	Tensile Strength	Elongation
OK Flux 10.62			
As welded	747 MPa	812 MPa	23 %

Typical Charpy V-Notch Properties

Condition	Testing Temperature	Impact Value
OK Flux 10.62		
As welded	-40 °C	110 J
As welded	-60 °C	80 J

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
OK Flux 10.62				
0.07	1.90	0.40	2.44	0.32

Deposition Data

Diameter	Current	Voltage	Wire Feed Speed	Deposition Rate
2.4 mm	250-500 A	28-38 V	1.5-2.5 m/min	3.5-9.5 kg/h
3.0 mm	300-700 A	28-38 V	2.5-5.5 m/min	6.0-12.5 kg/h
3.2 mm	350-750 A	28-38 V	2.5-5.0 m/min	5.5-13.5 kg/h
4.0 mm	450-900 A	28-40 V	2.0-5.5 m/min	7.0-18.0 kg/h

OK Autrod 16.97

OK Autrod 16.97 is an 18% Cr, 8% Ni, 6% Mo type of submerged arc wire, used in a wide range of applications throughout industry, such as joining austenitic-manganese, work-hardenable steels and heat-resistant steels. OK Autrod 16.97 is usully welded with OK Flux 10.93 or OK Flux 10.92.

Classifications Wire Electrode:	EN ISO 14343-A:S 18 8 Mn
Approvals:	VdTÜV 12101

Typical Wire Composition %				
C	**Mn**	**Si**	**Ni**	**Cr**
0.07	6.5	0.4	8.2	18.9

OK Autrod 308L

A continuous solid corrosion resisting chromium-nickel wire. OK Autrod 308L has a good general corrosion resistance. The alloy has a low carbon content which makes this alloy particularly recommended were there is a risk of intergranular corrosion. The alloy is widely used in the chemical and food processing industries as well as for pipes, tubes and boilers. The alloy has a low carbon content which makes this alloy particularly recommended were there is a risk of intergranular corrosion. OK Autrod 308L can be used in combination with OK Flux 10.92, OK Flux 10.93, OK Flux 10.99 or others.

Classifications Wire Electrode:	SFA/AWS A5.9:ER308L, EN ISO 14343-A:S 19 9 L
Approvals:	CE EN 13479, VdTÜV 12101, NAKS/HAKC 3.2-4.0 mm, DB 52.039.15

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 10 % ferrite) 19% Cr - 9% Ni - Low C

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**N**	**FN WRC-92**
0.02	1.9	0.4	9.8	19.8	0.05	9

OK Autrod 308H

A continuous solid corrosion resisting chromium-nickel wire for the welding of austenitic chromium nickel alloys of the 18% Cr - 8% Ni type. OK Autrod 308H has a good general corrosion resistance. The alloy has a high carbon content which makes this alloy suitable for applications used at higher temperatures. The alloy is used in chemical and food processing industries as well as for pipes, tubes and boilers. OK Autrod 308H can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER308H, EN ISO 14343-A:S 19 9 H
Approvals:	VdTÜV 12101

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic 19% Cr - 9% Ni - High C

Typical Wire Composition %				
C	**Mn**	**Si**	**Ni**	**Cr**
0.05	1.9	0.5	9.2	19.8

OK Autrod 309L

A continuous solid corrosion resisting chromium-nickel wire for joining stainless steels to non-alloy or low-alloy steels as well as for welding austenitic stainless alloys of 24% Cr, 13% Ni types. OK Autrod 309L has a good general corrosion resistance. When used for joining dissimilar materials, the corrosion resistance is of secondary importance. OK Autrod 309L can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER309L, EN ISO 14343-A:S 23 12 L
Approvals:	CE EN 13479, VdTÜV 12101, NAKS/HAKC 3.2-4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 12 % ferrite) 24 % Cr - 13 % Ni - Low C

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**FN WRC-92**
0.02	1.8	0.4	13.4	23.2	0.10	0.05	10

OK Autrod 309MoL

OK Autrod 309MoL is a stainless steel, over-alloyed wire for submerged arc welding. Suitable for joining of stainless Cr-Ni and Cr-Ni-Mo steels 304, 309 or 316 to ensure corrosion resistance in e.g. the pulp and paper industry. Dissimilar steels when alloying with Mo is essential. OK Autrod 309MoL can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER309LMo (mod), EN ISO 14343-A:S 23 12 2 L
Approvals:	VdTÜV 12101

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
0.01	1.5	0.4	14.6	21.4	2.5

OK Autrod 310

A continuous solid corrosion resisting chromium-nickel wire for welding heat resistant austenitic steels of the 25% Cr, 20% Ni type. OK Autrod 310 has a good general oxidation resistance especially at high temperatures due to its high Cr content. The alloy is fully austenitic and therefore sensitive to hot cracking. Common applications are industrial furnaces and boiler parts as well as heat exchangers. OK Autrod 310 can be used in combination with OK Flux 10.93 or OK Flux 10.92.

Classifications Wire Electrode:	SFA/AWS A5.9:ER310, EN ISO 14343-A:S 25 20

Alloy Type:	Fully austenitic (25 % Cr - 20 % Ni)

Typical Wire Composition %				
C	**Mn**	**Si**	**Ni**	**Cr**
0.10	1.6	0.4	20.7	25.8

OK Autrod 310MoL

A continous solid corrosion resisting chromium-nickel-molybdenum wire for welding of austenitic manganese steels of 25% Cr, 22% Ni, 2% Mo types. OK Autrod 310MoL has a good resistance to pitting, intergranular corrosion and stress corrosion cracking. The alloy is used in acid rich environments, in the urea industry and in gas treatment plants. OK Autrod 310MoL can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	EN ISO 14343-A:S 25 22 2 N L

Alloy Type:	Austenitic (25% Cr - 22% Ni - 2% Mo - nitrogen - low carbon)

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**FN WRC-92**
0.01	4.5	0.1	22.0	25.0	2.0	0.14	0

OK Autrod 312

A continuous solid corrosion resisting chromium-nickel wire for welding stainless steels of the 29% Cr, 9% Ni type. OK Autrod 312 has a good oxidation resistance at high temperatures due to its high content of Cr. The alloy is widely used for joining dissimilar steels, especially if one of the component is fully austenitic, and for steels that are difficult to weld, i e machine components, tools, austenitic manganese steels. OK Autrod 312 can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER312, EN ISO 14343-A:S 29 9

Alloy Type:	Ferritic-austenitic (29 % Cr - 9 % Ni)

Typical Wire Composition %				
C	**Mn**	**Si**	**Ni**	**Cr**
0.10	1.6	0.4	8.8	30.7

OK Autrod 316L

A continous solid corrosion resisting chromium-nickel-molybdenum wire for welding of austenitic stainless alloys of 18% Cr - 8% Ni and 18% Cr - 8% Ni - 3% Mo-types. OK Autrod 316L has a good general corrosion resistance, in particularly the alloy has very good resistance against corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended were there is a risk of intergranular corrosion. The alloy is widely used in the chemical and food processing industries as well as in ship building and various types of architectural structures. OK Autrod 316L can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER316L, EN ISO 14343-A:S 19 12 3 L
Approvals:	CE EN 13479, VdTÜV 12101, NAKS/HAKC 3.2-4.0 mm, DB 52.039.16

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 10 % ferrite) 19% Cr - 12% Ni - 3% Mo - Low C

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N	FN WRC-92
0.01	1.7	0.4	12.0	18.2	2.6	0.04	7

OK Autrod 316H

A continous solid corrosion resisting chromium-nickel-molybdenum wire for welding of austenitic stainless alloys of 17% Cr 12% Ni 3% Mo types. OK Autrod 316H can be used in combination with OK Flux 10.93. OK Autrod 316H has a good general corrosion resistance The alloy has a high carbon content which makes this alloy suitable for applications used at higher temperatures. The alloy is used in the chemical and food processing industries as well as for pipes, tubes and boilers.

Classifications Wire Electrode:	EN ISO 14343-A:S 19 12 3 H, SFA/AWS A5.9:ER316H

Alloy Type:	Austenitic (with approx. 10 % ferrite)

Typical Wire Composition %

C	Mn	Si	Ni	Cr	Mo	N	FN WRC-92
0.05	1.7	0.4	12.5	19.3	2.2	0.04	6

OK Autrod 16.38

A continuous solid corrosion resisting non-magnetic chromium-nickel-molybdenium wire for welding of stabilized and non-stabilized austenitic alloys of the same type as well as non magnetic steels. OK Autrod 16.38 can be used in combination with OK Flux 10.93 The alloy is corrosion resistant in seawater environment at temperatures below 350°C and has very good corrosion resistance to acids such as nitric acid. Excellent impact properties at low temperatures.

Classifications Wire Electrode:	EN ISO 14343-A:S 20 16 3 Mn L

Alloy Type:	Austenitic (7 % Mn - 20 % Cr - 16 % Ni - 3 % Mo)

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**
0.01	6.9	0.4	16.5	19.9	3.0	0.18

OK Autrod 317L

A continous solid corrosion resisting chromium-nickel-molybdenum wire for welding of austenitic stainless alloys of 19% Cr 13% Ni 3% Mo types. OK Autrod 317L has a good resistance to general corrosion and pitting due to its high content of molybdenium. The alloy has a low carbon content which makes this alloy particularly recommended were there is a risk of intergranular corrosion. The alloy is used in severe corrosion conditions such as in the petrochemical and paper industries. OK Autrod 317L can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	EN ISO 14343-A:S 18 15 3 L, SFA/AWS A5.9:ER317L

Alloy Type:	Austenitic (with approx. 10 % ferrite)

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**FN WRC-92**
0.01	1.4	0.4	13.6	18.9	3.6	0.05	7

OK Autrod 318

OK Autrod 318 is an extra low carbon, stainless wire for the submerged arc welding of corrosion-resistant steels of the 18Cr12Ni3Mo type, such as AISi 316 and 316L or somewhat lower alloyed types. OK Autrod 318 can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	EN ISO 14343-A:S 19 12 3 Nb, SFA/AWS A5.9:ER318
Approvals:	CE EN 13479, VdTÜV 12101, DB 52.039.11, NAKS/HAKC 4.0mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Nb**	**FN WRC-92**
0.04	1.8	0.4	11.5	18.9	2.6	0.04	0.7	11

OK Autrod 347

A continuous solid corrosion resisting chromium-nickel wire for the welding of austenitic chromium nickel alloys of the 18% Cr - 8% Ni type. OK Autrod 347 has a good general corrosion resistance. The alloy is stabilized with niobium to improve the resistance against intergranular corrosion of the weld metal. Due to the niobium content this alloy is recommended for use at higher temperatures. OK Autrod 347 can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	EN ISO 14343-A:S 19 9 Nb, SFA/AWS A5.9:ER347
Approvals:	CE EN 13479, VdTÜV 12101, DB 52.039.07, NAKS/HAKC 2.4, 3.2, 4.0 mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic (with approx. 10 % ferrite) 19% Cr - 9% Ni - Nb

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**N**	**Nb**	**FN WRC-92**
0.04	1.4	0.4	9.5	19.2	0.05	0.6	7

OK Autrod 385

A continuous solid corrosion resisting chromium-nickel-molybdenum-copper wire for welding of austenitic stainless alloys of 20% Cr, 25% Ni, 5% Mo, 1,5% Cu, low C types. OK Autrod 385 weld metal has a good resistance to stress corrosion and intergranular corrosion and shows a very good resistance to attack in non-oxidizing acids. The resistance and crevice corrosion is better than for ordinary 18% Cr, 8% Ni, Mo steels. The alloy is widely used in many applications related to the process industry. OK Autrod 385 can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER385, EN ISO 14343-A:S 20 25 5 Cu L
Approvals:	VdTÜV 12101

Alloy Type:	Fully austenitic (20 % Cr - 25 % Ni - 5 % Mo - 1.5 % Cu - Low C)

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**	**N**
0.01	1.7	0.4	25.0	20.0	4.4	1.5	0.05

OK Autrod 2209

A continous solid corrosion resisting Duplex wire for welding of austenitic-ferritic stainless alloys of 22% Cr, 5% Ni, 3% Mo types. OK Autrod 2209 has a high general corrosion resistance. In media containing chloride and hydrogen sulphide the alloy has a high resistance to intergranular, pitting and especially to stress corrosion. The alloy is used in a variety of applications across all industrial segments. OK Autrod 2209 can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER2209, EN ISO 14343-A:S 22 9 3 N L
Approvals:	CE EN 13479, VdTÜV 12101, NAKS/HAKC 3.2-4.0mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic-ferritic (22.5 % Cr - 8 % Ni - 3 % Mo - Low C)

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**
0.01	1.5	0.5	8.5	22.7	3.2	0.17

OK Autrod 2307

A continous, solid, corrosion-resistent duplex wire for welding austenitic-ferritic stainless alloys of 21% Cr, 1% Ni or 23% Cr, 4% Ni types. OK Autrod 2307 is overalloyed in Ni to ensure correct Ferrite balance in the weld metal. Lean duplex types is used for civil engineering, storage tanks, containers, etc. These steels have in general medium corrosion resistance and good strength properties.The welding should be done as for ordinary austenitic steels, but high amperages should be avoided and interpass temperature should be maximum 150°C.

Classifications Wire Electrode:	EN ISO 14343-A:S 23 7 N L

Alloy Type:	Austenitic-ferritic

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Cu**	**N**
0.01	1.4	0.5	7.1	23.2	0.2	0.15

OK Autrod 2509

A continous solid corrosion resisting “Super Duplex” wire for welding of austenitic-ferritic stainless alloys of 25% Cr, 10% Ni, 4% Mo, low C types. OK Autrod 2509 has a high intergranular corrosion resistance and pitting. The alloy is widely used in applications were corrosion resistance is of utmost importance. Pulp and paper industry, offshore and gas industry are areas of interest. OK Autrod 2509 can be used in combination with OK Flux 10.93 or OK Flux 10.94.

Classifications Wire Electrode:	EN ISO 14343-A:S 25 9 4 N L, SFA/AWS A5.9:ER2594
Approvals:	CE EN 13479, VdTÜV 12101

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic-ferritic (25% Cr - 10% Ni - 4% Mo - Low C)

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**
0.01	0.4	0.4	9.4	25.2	3.9	0.24

OK Autrod 410

A continuous solid welding wire of 13% Cr type. OK Autrod 410 is used for welding of similar martensitic and martensitic-ferritic steels in different applications. OK Autrod 410 can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER410

Alloy Type:	Martensitic-ferritic (13 % Cr)

Typical Wire Composition %			
C	**Mn**	**Si**	**Cr**
0.12	0.5	0.3	12.2

OK Autrod 410NiMo

A continuous solid corrosion resisting “410NiMo” type alloyed with 13 % Cr, 4.5 % Ni and 0.5 % Mo. This alloy is used for welding of similar martensitic and martensitic-feritic steels in different applications such as for example hydro-turbines. OK Autrod 410NiMo can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	EN ISO 14343-A:S 13 4

Alloy Type:	Martensitic-ferritic (12 % Cr - 4.5 % Ni - 0.5 % Mo)

Typical Wire Composition %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
0.02	0.5	0.4	4.2	12.4	0.6

OK Autrod 420

A continous solid welding wire of 13% Cr type. OK Autrod 420 is used for welding of similar martensitic and martensitic-ferritic steels in different applications. The wire 420 type can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER420

Alloy Type:	13Cr

Typical Wire Composition %			
C	**Mn**	**Si**	**Cr**
0.3	0.4	0.3	13.0

OK Autrod 430

A continous solid corrosion resisting 17% Cr wire for welding of stainless alloys of 13-18% Cr. OK Autrod 430 is used for cladding on un-alloyed and low alloyed steels. The wire can be used in combination with OK Flux 10.93.

Classifications Wire Electrode:	SFA/AWS A5.9:ER430

Alloy Type:	Ferritic (17 % Cr)

Typical Wire Composition %			
C	**Mn**	**Si**	**Cr**
0.02	0.4	0.3	16.8

OK Autrod NiCr-3

OK Autrod NiCr-3 is a corrosion and heat resistant, nickel-chromium wire for submerged arc welding of high alloyed steel, heat resistant steel, corrosion resistant steel, 9Ni steels and similar steels with high notch toughness at low temperatures. OK Autrod NiCr-3 can be combined with OK Flux 10.90 or OK Flux 10.16.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCr-3, EN ISO 18274:S Ni 6082 (NiCr20Mn3Nb)
Approvals:	VdTÜV 12101

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Fe**	**Nb+Ta**
0.04	3.0	0.2	bal	20.0	1.3	2.5

OK Autrod NiCrMo-3

Ni-based solid wire for SAW welding. Corrosion and heat resistant. For welding of high alloyed steels, heat resistant steels, corrosion resistant steels, 9% Ni-steels and similar steels with high toughness at low temperatures.
OK Autrod NiCrMo-3 shall be combined with OK Flux 10.90 or OK Flux 10.16.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-3, EN ISO 18274:S Ni 6625 (NiCr22Mo9Nb)

Alloy Type:	NiCrMo-3

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Fe**	**Nb+Ta**
0.02	0.04	0.06	Bal	22.7	8.6	0.3	3.5

OK Autrod NiCrMo-4

OK Autrod NiCrMo-4 is a corrosion and heat resistant, nickel-chromium wire for submerged arc welding of high alloyed steel, heat resistant steel, corrosion resistant steel, 9Ni steels and similar steels with high notch toughness at low temperatures. OK Autrod NiCrMo-4 can be combined with OK Flux 10.90 or OK Flux 10.16.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-4, EN ISO 18274:S Ni 6276 (NiCr15Mo16Fe6W4)

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Fe**	**W**
0.01	0.45	0.05	Bal.	15.5	16.1	5.8	3.5

OK Autrod NiCrMo-13

OK Autrod NiCrMo-13 is a Nb-free, Ni-Cr-Mo wire for welding high-alloyed steels of the 20Cr25Ni4-6Mo type and nickel-based alloys of similar type. The wire can also be used for welding these steels with dissimilar steels. The weld metal has very good corrosion resistance in both oxidizing and reducing media. OK Autrod NiCrMo-13 can be combined with OK Flux 10.90 or OK Flux 10.16.

Classifications Wire Electrode:	SFA/AWS A5.14:ERNiCrMo-13, EN ISO 18274:S Ni 6059 (NiCr23Mo16)

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Al**	**Fe**
0.01	0.2	0.1	Bal	23.0	16.0	0.3	1.0

OK Band 308L

OK Band 308L is a stainless welding strip designed for surfacing using the submerged arc welding process. Together with OK Flux 10.05, it produces a 308L type of weld deposit.

Classifications:	EN ISO 14343-A:B 19 9 L, SFA/AWS A5.9:EQ308L
Approvals:	VdTÜV 12102

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic CrNi

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**N**	**Ferrite FN**
0.015	1.8	0.3	10.5	20.0	0.06	12

OK Band 309L

OK Band 309L is a stainless welding strip designed for surfacing using the submerged arc strip cladding process. Commonly used as a buffer layer. Often used with OK Flux 10.05.

Classifications:	EN ISO 14343-A:B 23 12 L, SFA/AWS A5.9:EQ309L
Approvals:	VdTÜV 12102, NAKS/HAKC 30x0.5mm, NAKS/HAKC 60x0.5mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic 24Cr - 13Ni

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**N**	**Ferrite FN**
0.01	1.71	0.36	13.3	23.72	0.05	15

OK Band 309L ESW

OK Band 309L ESW is a stainless strip for single layer electroslag strip surfacing. Together with OK Flux 10.10 it produces a 308L type of weld deposit.

Classifications:	EN ISO 14343-A:B 22 11 L

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**N**	**Ferrite FN**
0.010	1.8	0.2	11.0	21.1	0.05	15

OK Band 316L

OK Band 316L is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 316L weld deposit.

Classifications:	SFA/AWS A5.9:EQ316L, EN ISO 14343-A:B 19 12 3 L
Approvals:	VdTÜV 12102

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic CrNiMo

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Ferrite FN**
0.01	1.73	0.4	12.6	18.5	2.9	0.05	7

OK Band 309LMo ESW

OK Band 309LMo ESW is a stainless strip for single layer electroslag strip surfacing. Together with OK Flux 10.10 and OK Flux 10.14 it produces a 316L type of weld deposit.

Classifications:	EN ISO 14343-A:B 21 13 3 L, SFA/AWS A5.9:EQ309LMo (Mod)

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Ferrite FN**
0.015	1.8	0.2	13.5	20.5	2.9	0.06	13

OK Band 317L

OK Band 317L is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 317L weld deposit.

Classifications:	EN ISO 14343-A:B 18 15 3 L, SFA/AWS A5.9:EQ317L

Alloy Type:	Austenitic 18Cr- 15Ni - 3Mo - L

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**
0.01	1.26	0.45	14.0	19.0	3.6	0.05

OK Band 347

OK Band 347 is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 347 weld deposit.

Classifications:	EN ISO 14343-A:B 19 9 Nb, SFA/AWS A5.9:EQ347
Approvals:	VdTÜV 12102, NAKS/HAKC 30x0.5mm, NAKS/HAKC 60x0.5mm

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	Austenitic CrNiNb

Typical Wire Composition %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.02	1.8	0.37	10.0	19.5	0.06	0.5	11

OK Band 309LNb ESW

OK Band 309LNb ESW is a stainless strip for single layer electroslag strip surfacing. Together with OK Flux 10.10 it produces a 347 type of weld deposit.

Classifications:	EN ISO 14343-A:B 22 12 L Nb
Approvals:	NAKS/HAKC 30, 60 and 90 mm

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.01	1.74	0.20	11.0	21.14	0.04	0.6	15

OK Band 309LNb

OK Band 309LNb is a stainless welding strip designed for the submerged arc or electroslag welding process. Together with OK Flux 10.05 it produces a 309LNb type of weld deposit using SAW. In combination with OK Flux 10.14 it manufactures a 347 type of weld deposit using single layer electroslag strip cladding.

Classifications:	EN ISO 14343-A:B 23 12 L Nb
Approvals:	VdTÜV 12102

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %

C	Mn	Si	Ni	Cr	N	Nb	Ferrite FN
0.01	1.98	0.23	12.5	23.83	0.03	0.7	23

OK Band 310MoL

Strip for submerged arc and electroslag strip cladding. Together with OK Flux 10.10 is used for electroslag strip cladding giving low carbon “310LMo” material in the second layer. The alloy is fully austenitic and mostly used in urea plants.

Classifications:	EN ISO 14343-A:B 25 22 2 N L
Approvals:	VdTÜV 12102

Approvals are based on factory location. Please contact ESAB for more information.

Alloy Type:	25Cr - 22 Ni - 2 Mo - 5 Mn - N

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Ferrite FN**
0.02	4.5	0.22	22.0	25.0	2.1	0.13	0

OK Band 2209

An duplex austenitic-ferritic stainless welding strip designed for surfacing using the submerged arc welding process. Together with OK Flux 10.05 it produces a duplex 2209 type of weld deposit.

Classifications:	EN ISO 14343-A:B 22 9 3 N L, SFA/AWS A5.9:EQ2209

Alloy Type:	Duplex Austenitic-Ferritic CrNiMo

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Ferrite FN**
0.015	1.5	0.4	9.0	23.0	3.2	0.15	50

OK Band NiCr3

OK Band NiCr3 is a nickel-based strip for submerged arc strip cladding. Together with OK Flux 10.11, OK Flux 10.16 or OK Flux 10.17 it produces a weld overlay with good corrosion resistance and high temperature properties.

Classifications:	SFA/AWS A5.14:EQNiCr-3, EN ISO 18274:B Ni 6082 (NiCr20Mn3Nb)
Approvals:	VdTÜV 12102

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Fe**	**Nb**
< 0.1	3.0	0.2	≥67.0	20.0	≤3.0	2.5

OK Band NiCrMo3

OK Band NiCrMo3 is a nickel-based strip for submerged arc strip cladding. Together with OK Flux 10.11, OK Flux 10.16 or OK Flux 10.17 it produces a weld overlay with good corrosion resistance and high temperature properties.

Classifications:	SFA/AWS A5.14:EQNiCrMo-3, EN ISO 18274:B Ni 6625 (NiCr22Mo9Nb)
Approvals:	VdTÜV 12102

Approvals are based on factory location. Please contact ESAB for more information.

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Fe**	**Nb+Ta**
<0.1	0.3	0.1	≥58.0	22.0	9.0	≤2.0	4.0

OK Band NiCrMo7

OK Band NiCrMo7 is a nickel-based strip for submerged arc and electroslag strip cladding.

Classifications:	SFA/AWS A5.14:EQNiCrMo-7, EN ISO 18274:B Ni 6455 (NiCr16Mo16Ti)

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Fe**
≤ 0.01	≤1.0	≤0.08	≥56.0	16.0	16.0	≤3.0

OK Band NiFeCr1

OK Band NiFeCr1 is a nickel-iron-chromium strip with additions of molybdenum and copper. The weld deposit in combination with OK Flux 10.11 has excellent resistance to both reducing and oxidizing acids, to stress corrosion cracking, and to localized attack such as pitting and crevice corrosion. The alloy is especially resistant to sulfuric and phosphoric acids.

Classifications:	SFA/AWS A5.14:EQNiFeCr-1, EN ISO 18274:B Ni 8065 (NiFe30Cr21Mo3)

Typical Wire Composition %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**	**Fe**	**Ti**
0.01	0.78	0.3	42.5	22.5	3.0	2.2	>22.0	1.0

OK Band NiCu7

OK Band NiCu7 is a Monel strip for submerged arc strip cladding. Together with OK Flux 10.18 it produces a weld overlay with good corrosion resistance and high temperature properties.

Classifications:	SFA/AWS A5.14:EQNiCu-7, EN ISO 18274:B Ni 4060 (NiCu30Mn3Ti)

Alloy Type:	NiCu-7

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cu**	**Fe**	**Ti**
< 0.1	3.0	1.0	67.0	29	≤2.0	2.5

OK Band 7018

A low alloy welding strip designed for surfacing using the submerged arc welding process.

Alloy Type:	CMn-steel

Typical Wire Composition %		
C	**Mn**	**Si**
0.11	0.39	0.23

OK Band 430

OK Band 430 is a 17Cr welding strip designed for surfacing using the submerged arc welding and electroslag processes. The strip is used mainly for R+M applications. In combination with OK Flux 10.07 is giving a weld metal with 14Cr-4Ni-1Mo and a hardness of 370-420 HB.

Classifications:	EN ISO 14343-A:B 17

Alloy Type:	17Cr

Typical Wire Composition %			
C	**Mn**	**Si**	**Cr**
0.04	0.66	0.4	17.0

OK Band 11.21

A sintered welding strip electrode designed for hardfacing by submerged arc or electroslag strip cladding.

Alloy Type:	CrMo 5-3

Typical Wire Composition %				
C	**Mn**	**Si**	**Cr**	**Mo**
0.29	1.80	0.31	5.3	3.0

OK Band 11.23

A sintered welding strip designed for hardfacing of steel mill rollers.

Alloy Type:	13Cr - 1Mo

Typical Wire Composition %				
C	**Mn**	**Si**	**Cr**	**Mo**
0.29	1.35	0.17	14.3	1.4

OK Band 11.27

A sintered welding strip designed for hardfacing of steel mill rollers.

Alloy Type:	13Cr - 1Mo - V

Typical Wire Composition %					
C	**Mn**	**Si**	**Cr**	**Mo**	**V**
0.27	0.70	0.53	12.8	1.8	0.12

OK Band 11.84

A welding strip designed for surfacing using the electroslag strip cladding process.

Alloy Type:	7Cr - Mo - W - with higher C content

Typical Wire Composition %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**W**
0.35	1.18	0.22	0.5	6.5	1.7	1.8

OK Band 11.85

Sinterd strip electrode for single layer submerged arc or electroslag strip cladding.

Alloy Type:	13Cr - 2Ni - Mo

Typical Wire Composition %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**V**	**Nb**
0.20	0.75	0.25	2.2	14.0	1.2	0.25	0.25

OK Flux 10.61

OK Flux 10.61 is an agglomerated, high-basic flux for submerged arc welding. It is used for single and multi-run butt welding when demands on impact toughness values are high. This is a good alternative to other high basic fluxes when welding is done with single wire DC+. The flux alloys very little Si and Mn to the weld metal and thus it is well suited for welding of unlimited plate thicknesses. OK Flux 10.61 is used in general construction, pressure vessel construction, power generation and transport industries.

Classifications:	EN ISO 14174:S A FB 1 65 DC
Approvals:	CE EN 13479, NAKS/HAKC RD 03-613-03, DB 51.039.03

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Fluoride-basic
Alloy Transfer:	Slightly Silicon and no Manganese alloying
Density:	nom: 1.1 kg/dm3
Basicity Index:	nom: 2.6
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
26 V	0.7 kg
30 V	1.0 kg
34 V	1.3 kg
38 V	1.6 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 35 2 FB S1	-	-
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 38 4 FB S2Si	A5.17: F7A8-EM12K	A5.17: F6P8-EM12K
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 42 2 FB S2Mo	A5.23: F7A4-EA2-A2	A5.23: F7P2-EA2-A2
OK Autrod 12.32	A5.17:EH12K/ 14171-A:S3Si	S 42 5 FB S3Si	A5.17: F7A6-EH12K	A5.17: F7P8-EH12K
OK Autrod 12.40	A5.17:EH14/ 14171-A:S4	S 46 3 FB S4	A5.17: F7A6-EH14	A5.17: F7P6-EH14
OK Autrod 13.10 SC	A5.23:EB2R/ 24598-A:S S CrMo1	-	-	A5.23: F8P2-EB2R-B2
OK Autrod 13.20 SC	A5.23:EB3R/ 24598-A:S S CrMo2	-	-	A5.23: F8P0-EB3R-B3
OK Autrod 13.36	A5.23:EG/ 14171-A:S2Ni1Cu	S 46 3 FB S2Ni1Cu	-	-

OK Flux 10.61

Approvals

Wire	DB	CE	VdTÜV
OK Autrod 12.10	•	•	•
OK Autrod 12.22	-	•	-
OK Autrod 12.24	-	•	•
OK Autrod 12.32	-	•	-
OK Autrod 13.10 SC	•	•	•
OK Autrod 13.20 SC	-	-	•
OK Autrod 13.36	•	•	-

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.10	As Welded EN DC+	375 MPa	445 MPa	30 %	180 J @ 20°C 130 J @ -10°C 100 J @ -20°C
OK Autrod 12.22	As Welded AWS DC+	440 MPa	520 MPa	30 %	120 J @ -20°C 85 J @ -30°C 75 J @ -40°C 35 J @ -62°C
OK Autrod 12.24	As Welded AWS DC+	480 MPa	570 MPa	26 %	130 J @ 20°C 120 J @ 0°C 80 J @ -20°C 45 J @ -29°C 35 J @ -40°C
OK Autrod 12.32	As Welded AWS DC+	450 MPa	560 MPa	27 %	120 J @ -20°C 100 J @ -40°C 55 J @ -51°C 35 J @ -62°C
OK Autrod 12.40	As Welded AWS DC+	490 MPa	580 MPa	26 %	60 J @ -30°C 40 J @ -40°C 35 J @ -51°C
OK Autrod 13.10 SC	Stress relieved 690°C 1.0h AWS DC+	550 MPa	620 MPa	26 %	100 J @ -18°C 70 J @ -29°C
OK Autrod 13.20 SC	Stress relieved 690°C 1.0h AWS DC+	540 MPa	630 MPa	25 %	80 J @ -18°C 30 J @ -29°C
OK Autrod 13.36	As Welded 580A, 29V, 55cm/min DC+	545 MPa	640 MPa	25 %	70 J @ -20°C 55 J @ -30°C 40 J @ -40°C 35 J @ -50°C

OK Flux 10.61

Typical Weld Metal Analysis %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**
OK Autrod 12.10 DC+, 580A, 29V						
0.07	0.5	0.15	-	-	-	-
OK Autrod 12.22 DC+, 580A, 29V						
0.08	1.0	0.35	-	-	-	-
OK Autrod 12.24 DC+, 580A, 29V						
0.06	1.0	0.25	-	-	0.5	-
OK Autrod 12.32 DC+, 580A, 29V						
0.09	1.4	0.3	-	-	-	-
OK Autrod 12.40 DC+, 580A, 29V						
0.08	1.8	0.15	-	-	-	-
OK Autrod 13.10 SC DC+, 580A, 29V						
0.08	0.7	0.30	-	1.1	0.5	-
OK Autrod 13.20 SC DC+, 580A, 29V						
0.08	0.8	0.3	-	2.1	1.0	-
OK Autrod 13.36 DC+, 580A, 29V, 55cm/min						
0.07	1.0	0.5	0.7	0.2	-	0.4

OK Flux 10.62

Agglomerated fluoride-basic flux for Submerged Arc Welding. Primarily for multi-run welding. For highest demands on impact properties, low temperature toughness, strength and CTOD-values. Especially suitable for narrow gap welding due to good slag detachability and smooth side-wall blending. For offshore constructions, pressure vessels, power generation, shipbuilding, pipe mills, civil constructions, transport industries, etc. Produces low-oxygen weld metal (approx. 300 ppm) with hydrogen contents maximum 5 ml/100 g, in BlockPac (moisture protection) maximum 4 ml/100g. Operates optimally at the lower end of the voltage range. Designed for single and multi wire procedures, for butt and fillet welds. Works equally well on DC and AC current. Single layer and multi layer welding of unlimited plate thickness.

Classifications:	EN ISO 14174:S A FB 1 55 AC H5, EN ISO 14174:S A FB 1 55 AC H4 only BlockPac/moisture-protection
Approvals:	CE EN 13479, NAKS/HAKC RD 03-613-03, DB 51.039.07

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux); max 4 ml H/100g in BlockPac (moisture protection)
Slag Type:	Fluoride-basic
Alloy Transfer:	No Silicon or Manganese alloying
Density:	nom: 1.1 kg/dm3
Basicity Index:	nom: 3.2
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption

Volts	kg Flux / kg Wire DC+	kg Flux / kg Wire AC
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	Amps	Travel Speed
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 38 5 FB S2Si	A5.17: F7A8-EM12K	A5.17: F6P8-EM12K
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 46 4 FB S2Mo	A5.23: F8A6-EA2-A2	A5.23: F8P6-EA2-A2
OK Autrod 12.32	A5.17:EH12K/ 14171-A:S3Si	S 46 6 FB S3Si	A5.17: F7A8-EH12K	A5.17: F7P8-EH12K
OK Autrod 12.34	A5.23:EA4/ 14171-A:S3Mo; 24598-A:S S MnMo	S 50 4 FB S3Mo	A5.23: F8A6-EA4-A4	A5.23: F8P6-EA4-A4
OK Autrod 12.40	A5.17:EH14/ 14171-A:S4	S 50 4 FB S4	A5.17: F7A6-EH14	A5.17: F7P6-EH14

OK Flux 10.62

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 13.10 SC	A5.23:EB2R/ 24598-A:S S CrMo1	-	-	A5.23: F8P2-EB2R-B2
OK Autrod 13.20 SC	A5.23:EB3R/ 24598-A:S S CrMo2	-	-	A5.23: F8P2-EB3R-B3
OK Autrod 13.21	A5.23:ENi1/ 14171-A:S2Ni1	S 42 4 FB S2Ni1	A5.23: F7A6-ENi1-Ni1	A5.23: F7P8-ENi1-Ni1
OK Autrod 13.24	A5.23:ENi6/ 14171-A:S3Ni1Mo0,2	S 50 6 FB S3Ni1Mo0.2	A5.23: F8A10-ENi6-Ni6	A5.23: F8P8-ENi6-Ni6
OK Autrod 13.27	A5.23:ENi2/ 14171-A:S2Ni2	S 46 7 FB S2Ni2	A5.23: F7A10-ENi2-Ni2	A5.23: F7P10-ENi2-Ni2
OK Autrod 13.40	A5.23:EG/ 14171-A:S3Ni1Mo 26304-A:S3Ni1Mo 26304-B:(SUN2M2)	S 55 6 FB S3Ni1Mo (DC+)	A5.23:F9A8-EG-F3 (DC+)	A5.23: F9P8-EG-F3
OK Autrod 13.43	A5.23:EG/ 26304-A:S3Ni2,5CrMo; 26304-B:(SUN4C1M3)	S 69 6 FB S3Ni2,5CrMo	A5.23: F11A8-EG-G	A5.23: F11P8-EG-G
OK Autrod 13.49	A5.23:ENi3/ 14171-A:S2Ni3	S 46 8 FB S2Ni3	A5.23: F8A15-ENi3-Ni3	A5.23: F8P15-ENi3-Ni3

Approvals										
Wire	**ABS**	**BV**	**DNV**	**GL**	**LR**	**DB**	**CE**	**RINA**	**RS**	**VdTÜV**
OK Autrod 12.22	•	•	•	•	•	•	•	-	-	•
OK Autrod 12.24	-	-	-	-	-	-	•	-	-	•
OK Autrod 12.32	•	•	•	•	•	•	•	•	•	•
OK Autrod 12.34	•	•	•	•	•	-	-	-	-	-
OK Autrod 13.10 SC	-	-	-	-	-	•	•	-	-	•
OK Autrod 13.20 SC	-	-	-	-	-	-	•	-	-	•
OK Autrod 13.24	•	•	•	•	•	-	•	-	-	-
OK Autrod 13.27	•	•	•	•	•	•	•	•	•	•
OK Autrod 13.40	•	•	•	•	•	-	•	-	-	•
OK Autrod 13.43	•	•	•	•	•	-	•	-	-	-
OK Tubrod 15.27S	•	-	•	•	•	-	•	-	-	-

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.62

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.22	As Welded AWS DC+	410 MPa	500 MPa	33 %	170 J @ 0°C 160 J @ -20°C 90 J @ -40°C 70 J @ -50°C 35 J @ -62°C
OK Autrod 12.24	As Welded AWS DC+	500 MPa	580 MPa	25 %	140 J @ 20°C 115 J @ 0°C 80 J @ -20°C 60 J @ -40°C 45 J @ -51°C
OK Autrod 12.32	As Welded AWS DC+	475 MPa	560 MPa	28 %	175 J @ 20°C 150 J @ 0°C 130 J @ -30°C 110 J @ -40°C 70 J @ -62°C
OK Autrod 12.34	As Welded AWS DC+	540 MPa	620 MPa	24 %	170 J @ 20°C 160 J @ 0°C 140 J @ -20°C 115 J @ -40°C 45 J @ -51°C
OK Autrod 12.40	As Welded AWS DC+	530 MPa	620 MPa	26 %	140 J @ 20°C 110 J @ 0°C 80 J @ -20°C 50 J @ -40°C 40 J @ -51°C
OK Autrod 13.10 SC	Stress relieved 690°C 1.0h AWS DC+	500 MPa	610 MPa	26 %	110 J @ -18°C 80 J @ -29°C
OK Autrod 13.20 SC	Stress relieved 690°C 1.0h AWS DC+	525 MPa	620 MPa	25 %	120 J @ -18°C 80 J @ -29°C
OK Autrod 13.21	As Welded AWS DC+	470 MPa	560 MPa	28 %	195 J @ 20°C 185 J @ 0°C 160 J @ -20°C 70 J @ -40°C 60 J @ -51°C
OK Autrod 13.24	As Welded AWS DC+	530 MPa	620 MPa	25 %	120 J @ -40°C 110 J @ -50°C 70 J @ -60°C 50 J @ -73°C
OK Autrod 13.27	As Welded AWS DC+	460 MPa	570 MPa	28 %	140 J @ -20°C 110 J @ -40°C 80 J @ -60°C 50 J @ -73°C
OK Autrod 13.40	As Welded AWS DC+	610 MPa	690 MPa	24 %	90 J @ -40°C 80 J @ -50°C 50 J @ -62°C
OK Autrod 13.43	As Welded AWS DC+	700 MPa	800 MPa	21 %	100 J @ -20°C 75 J @ -40°C 65 J @ -50°C 50 J @ -62°C
OK Autrod 13.49	As Welded AWS DC+	500 MPa	600 MPa	27 %	95 J @ -70°C 40 J @ -101°C

OK Flux 10.62

Typical Weld Metal Analysis %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
OK Autrod 12.22 DC+, 580A, 29V					
0.07	1.0	0.30	-	-	-
OK Autrod 12.24 DC+, 580A, 29V					
0.07	1.0	0.22	-	-	0.5
OK Autrod 12.32 DC+, 580A, 29V					
0.10	1.6	0.35	-	-	-
OK Autrod 12.34 DC+, 580A, 29V					
0.10	1.45	0.21	-	-	0.5
OK Autrod 12.40 DC+, 580A, 29V					
0.08	1.9	0.12	-	-	-
OK Autrod 13.10 SC DC+, 580A, 29V					
0.08	0.7	0.22	-	1.1	0.5
OK Autrod 13.20 SC DC+, 580A, 29V					
0.08	0.60	0.20	-	2.2	0.95
OK Autrod 13.21 DC+, 580A, 29V					
0.06	1.0	0.25	0.9	-	-
OK Autrod 13.24 DC+, 580A, 29V					
0.08	1.4	0.30	0.9	-	0.2
OK Autrod 13.27 DC+, 580A, 29V					
0.06	1.0	0.25	2.1	-	-
OK Autrod 13.40 DC+, 580A, 29V					
0.07	1.50	0.26	0.9	-	0.5
OK Autrod 13.43 DC+, 580A, 29V					
0.11	1.5	0.25	2.2	0.6	0.5
OK Autrod 13.49 DC+, 580A, 29V					
0.06	1.0	0.25	3.1	-	-

OK Flux 10.63

OK Flux 10.63 is an agglomerated, high-basic flux for submerged arc welding. It is used for multi-run welding of creep resistant Cr-Mo-alloyed steels when high toughness values are required, even after step cooling heat treatment. It can be used for single and multi-wire procedures, for butt and fillet welds and works equally well on DC and AC current. The flux is neutral in terms of Si and Mn alloying and thus it is perfect for multi-layer welding of unlimited plate thicknesses. It is well suited for narrow gap welding, due to good slag detachability and smooth sidewall blending. The optimum voltage is at the lower end of the voltage range. The weld metal produced has a very low level of impurities with well controlled X-factors with various wires. It has a low oxygen content, approx. 300ppm and hydrogen levels lower than 5ml/100g. OK Flux 10.63 is used in the petrochemical, chemical, power generation and pressure vessels industries, mainly for creep resistant steels when the requirements on toughness values are high. Due to the very clean weld metal, it is especially suited when stringent requirements after a step cooling treatment need to be fulfilled.

Classifications:	EN ISO 14174:S A FB 1 55 AC H5
Approvals:	NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux)
Slag Type:	Fluoride-basic
Alloy Transfer:	No Silicon or Manganese alloying
Density:	nom: 1.1 kg/dm3
Basicity Index:	nom: 3.0
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal
Wire	**AWS/EN**	**AWS - PWHT**
OK Autrod 13.10 SC	A5.23:EB2R/ 24598-A:S S CrMo1	A5.23: F8P4-EB2R-B2R
OK Autrod 13.20 SC	A5.23:EB3R/ 24598-A:S S CrMo2	A5.23: F8P8-EB3R-B3R

OK Flux 10.63

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 13.10 SC	Stress relieved 690°C 1.0h AWS DC+	500 MPa	600 MPa	27 %	200 J @ -20C 150 J @ -29°C 140 J @ -40°C
OK Autrod 13.20 SC	Stress relieved 690°C 1.0h AWS DC+	530 MPa	630 MPa	25 %	180 J @ 20°C 150 J @ -20°C 110 J @ -40°C 50 J @ -62°C

Typical Weld Metal Analysis %					
C	**Mn**	**Si**	**Cr**	**Mo**	**X**
OK Autrod 13.10 SC DC+, 485A, 30V					
0.075	0.8	0.25	1.1	0.5	<= 15
OK Autrod 13.20 SC DC+, 580A, 29V					
0.07	0.60	0.20	2.1	1.0	<= 15

OK Flux 10.64

Agglomerated fluoride-basic flux for Submerged Arc Welding. Designed for multi-run welding with EB91-wire for joining of T/P91 base materials. The flux is C and Cr compensating so that the weld metal fully complies with B91 weld metal chemistry according to AWS. Mainly for power generation and pressure vessel production. Very good slag detachability. Suitable for DC only. Single layer and multi layer welding of unlimited plate thickness.

Classifications:	EN ISO 14174:S A FB 1 54 DC H5

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux)
Slag Type:	Fluoride-basic
Alloy Transfer:	No Silicon alloying, Manganese slightly burning off
Density:	nom: 1.1 kg/dm3 Approx.
Basicity Index:	nom: 2.6
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Classifications	Wire	Weld Metal
Wire	**AWS/EN**	**AWS - PWHT**
OK Autrod 13.35	A5.23:EB91/ 24598-A:S S CrMo91	A5.23: F10PZ-EB91-B91

Typical Mechanical Properties				
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**
OK Autrod 13.35	Stress relieved 760°C 2h AWS DC+	670 MPa	780 MPa	20 %

Typical Weld Metal Analysis %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**V**	**N**	**Nb**
OK Autrod 13.35 DC+, 400A, 28V (2,4 mm wire)								
0.11	0.65	0.25	0.55	8.8	0.90	0.17	0.05	0.05

OK Flux 10.69

An agglomerated, basic flux specifically designed as a backing flux for one-sided submerged arc welding. The flux creates a perfect root weld with a smooth surface and has a good capability to support the molten weld pool, even at high heat inputs. Since this flux is a backing flux it does not take part in the welding process in a metallurgical way, so no alloying takes place from this flux. OK Flux 10.69 is mainly used in shipbuilding industries where it is applied to a copper backing bar with a groove that supports the flux on the backside of the weld joint. Welding is done with single wire, tandem or 3-wire systems. Plates up to approx 25 mm thickness can be welded in one run from a single side.

Classifications:	EN ISO 14174:S A CS 4

Slag Type:	Calcium-silicate
Alloy Transfer:	No alloying
Density:	nom: 1.3 kg/dm3
Basicity Index:	nom: 1.8
Grain Size (met):	0.2-1.25 mm (14x65 mesh)

OK Flux 10.70

OK Flux 10.70 is an agglomerated, basic flux for submerged arc welding. It is designed for welding joints with high dilution such as I-joints with one run from each side and fillet welds. Due to its high alloying of mainly Mn, it creates a weld metal with good toughness values in these joints. It can be used for single and multi-wire procedures and works equally well on DC and AC. On multi-pass welding the number of passes is limited and the plate thickness should not exceed approx. 25 mm. Non-alloyed wires such as OK Autrod 12.10 and OK Autrod 12.20 are the preferred ones to be matched with OK Flux 10.70. The main application area for OK Flux 10.70 is in shipbuilding. Here it is used preferably in the two run, double-sided technique. However, it is also used in other market segments where joints with high dilution or a number of passes are welded. This is in the construction of pressure vessels, in the transport industries and general construction.

Classifications:	EN ISO 14174:S A AB 1 79 AC
Approvals:	CE EN 13479, DB 51.039.06

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Aluminate-basic
Alloy Transfer:	Moderately Silicon and very high Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.4
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 42 3 AB S1	A5.17: F7A4-EL12	A5.17: F7P4-EL12
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 46 3 AB S2	A5.17: F7A2-EM12	A5.17: F7P2-EM12
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 50 0 AB S2Mo	A5.23: F9A0-EA2-A3	A5.23: F9PZ-EA2-A3

OK Flux 10.70

Approvals

Wire	ABS	BV	DNV	GL	LR	DB	CE	PRS	RS	VdTÜV
OK Autrod 12.10	•	•	•	•	•	•	•	•	•	•
OK Autrod 12.20	-	-	-	-	-	•	•	-	-	•

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.10	As Welded AWS DC+	430 MPa	520 MPa	30 %	125 J @ 20°C 100 J @ 0°C 70 J @ -20°C 55 J @ -30°C 40 J @ -40°C
OK Autrod 12.20	As Welded AWS DC+	470 MPa	580 MPa	29 %	100 J @ 20°C 90 J @ 0°C 75 J @ -20°C 50 J @ -29°C
OK Autrod 12.24	As Welded AWS DC+	580 MPa	670 MPa	23 %	60 J @ 20°C 50 J @ 0°C 40 J @ -18°C

Typical Weld Metal Analysis %

C	Mn	Si	Mo
OK Autrod 12.10 DC+ , 580A, 29V			
0.05	1.7	0.5	-
OK Autrod 12.20 DC+, 580A, 29V			
0.06	1.9	0.6	-
OK Autrod 12.24 DC+, 580A, 29V			
0.06	2.0	0.6	0.5

OK Flux 10.71

OK Flux 10.71 is an agglomerated, basic flux for submerged arc welding. It is used for single and multi-run welding of all plate thicknesses. It can be combined with a wide range of solid wires and cored wires and thus it is suitable for all kinds of steels. OK Flux 10.71 combines good toughness values with excellent weldability. It is used for single and multiwire procedures such as tandem, twin-arc, tandem-twin welding and many more, for butt, overlap and fillet welds. It works equally well on DC and AC current. The good slag detachability and limited alloying of Si and Mn makes it well suited for multi-pass thick section welding. High welding speeds can be achieved producing a finely rippled weld metal, all this in combination with very good impact values. In general construction, OK Flux 10.71 is one of the most used SAW fluxes. Not just for structural steels and fine-grained steels, but also for weather resistant steels e.g. for bridges. Pressure vessels are welded with this flux, because it can be used for a wide range of steels including low temperature steels. This reduces the number of different fluxes a customer needs to have in stock. Wind tower production with plate thicknesses of greater than 50 mm require not only excellent slag detachability, particularly in the first run, and high deposition rates in all following runs, but also excellent toughness values. Since OK Flux 10.71 offers all this it is well established in this market segment. Other applications are in shipbuilding with approvals or in the production of pipes with steels up to X70 strength level. OK Flux 10.71 can also be combined with a number of SAW cored wires in order to increase the productivity and the mechanical properties of the weld metal.

Classifications:	EN ISO 14174:S A AB 1 67 AC H5
Approvals:	CE EN 13479, NAKS/HAKC RD 03-613-03, NAKS/HAKC RD 03-613-03, DB 51.039.05

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux)
Slag Type:	Aluminate-basic
Alloy Transfer:	Slightly Silicon and moderately Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.5
Grain Size (met):	0.2-1.6 mm (10x65 mesh) or 0.315 -2.0 mm (9x48 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 35 4 AB S1	A5.17: F6A4-EL12	A5.17: F6P5-EL12
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 38 4 AB S2	A5.17: F7A4-EM12	A5.17: F6P4-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 38 4 AB S2Si	A5.17: F7A5-EM12K	A5.17: F6P5-EM12K

OK Flux 10.71

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 46 2 AB S2Mo	A5.23: F8A2-EA2-A4	A5.23: F7P0-EA2-A4
OK Autrod 12.30	14171-A:S3	S 46 3 AB S3	-	-
OK Autrod 12.32	A5.17:EH12K/ 14171-A:S3Si	S 46 4 AB S3Si	A5.17: F7A5-EH12K	A5.17: F7P5-EH12K
OK Autrod 12.34	A5.23:EA4/ 14171-A:S3Mo; 24598-A:S S MnMo	S 50 3 AB S3Mo	A5.23: F8A4-EA4-A3	A5.23: F8P2-EA4-A3
OK Autrod 13.24	A5.23:ENi6/ 14171-A:S3Ni1Mo0,2	S 50 4 AB S3Ni1Mo0,2	A5.23: F8A5-ENi6-Ni6	A5.23: F8P4-ENi6-Ni6
OK Autrod 13.27	A5.23:ENi2/ 14171-A:S2Ni2	S 46 5 AB S2Ni2	A5.23: F8A6-ENi2-Ni2	A5.23: F7P6-ENi2-Ni2
OK Autrod 13.36	A5.23:EG/ 14171-A:S2Ni1Cu	S 46 3 AB S2Ni1Cu	A5.23: F8A2-EG-G	-
OK Autrod 13.64	A5.23:EA2TiB/ 14171-A:S2MoTiB	-	A5.23: F8TA6-EA2TiB	-

Approvals

Wire	ABS	BV	DNV	GL	LR	DB	CE	PRS	RINA	RS	ClassNK	VdTÜV
OK Autrod 12.10	•	•	•	•	•	•	•	•	-	•	-	•
OK Autrod 12.20	•	•	•	•	•	•	•	•	•	•	-	•
OK Autrod 12.22	•	•	•	•	•	•	•	-	-	•	•	•
OK Autrod 12.24	•	•	•	•	•	•	•	•	•	•	•	•
OK Autrod 12.30	-	-	-	-	-	•	•	-	-	-	-	•
OK Autrod 12.32	-	-	-	-	-	•	•	-	-	-	-	•
OK Autrod 13.27	-	-	-	-	-	-	-	-	-	-	-	•
OK Autrod 13.36	-	-	-	-	-	-	•	-	-	-	-	-

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.10	As Welded AWS DC+	360 MPa	465 MPa	30 %	125 J @ 0°C 95 J @ -20°C 75 J @ -30°C 65 J @ -40°C
OK Autrod 12.20	As Welded AWS DC+	410 MPa	510 MPa	29 %	135 J @ 20°C 125 J @ 0°C 80 J @ -20°C 55 J @ -40°C

OK Flux 10.71

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.22	As Welded AWS DC+	425 MPa	520 MPa	29 %	140 J @ 0°C 100 J @ -20°C 60 J @ -40°C 40 J @ -46°C
OK Autrod 12.24	As Welded AWS DC+	500 MPa	580 MPa	24 %	125 J @ 20°C 100 J @ 0°C 60 J @ -18°C 40 J @ -29°C
OK Autrod 12.30	As Welded EN DC+	490 MPa	580 MPa	29 %	130 J @ 20°C 110 J @ 0°C 90 J @ -20°C 60 J @ -30°C
OK Autrod 12.32	As Welded AWS DC+	480 MPa	580 MPa	28 %	150 J @ 20°C 130 J @ 0°C 95 J @ -20°C 65 J @ -40°C 40 J @ -46°C
OK Autrod 12.34	As Welded AWS DC+	535 MPa	620 MPa	27 %	120 J @ 20°C 105 J @ 0°C 70 J @ -20°C 60 J @ -30°C 45 J @ -40°C
OK Autrod 13.24	As Welded AWS DC+	560 MPa	630 MPa	25 %	120 J @ 20°C 85 J @ -20°C 70 J @ -30°C 60 J @ -40°C 40 J @ -46°C
OK Autrod 13.27	As Welded AWS DC+	500 MPa	600 MPa	28 %	100 J @ -20°C 60 J @ -40°C 50 J @ -51°C
OK Autrod 13.36	As Welded AWS DC+	490 MPa	580 MPa	27 %	120 J @ 20°C 70 J @ -20°C 55 J @ -29°C
OK Autrod 13.64	Two-Run (acc. to AWS) Plate thickness 12mm Heat input 2.2kJ/mm 700A, 32V, 60cm/min DC+	550 MPa	650 MPa	28 %	40 J @ -51°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Cu
OK Autrod 12.10 DC+ , 580A, 29V						
0.04	1.0	0.3	-	-	-	-
OK Autrod 12.20 DC+, 580A, 29V						
0.05	1.35	0.3	-	-	-	-

OK Flux 10.71

Typical Weld Metal Analysis %						
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**
OK Autrod 12.22 DC+, 580A, 29V						
0.05	1.4	0.5	-	-	-	-
OK Autrod 12.24 DC+, 580A, 29V						
0.05	1.4	0.4	-	-	0.5	-
OK Autrod 12.30 DC+, 580A, 29V						
0.09	1.65	0.4	-	-	-	-
OK Autrod 12.32 DC+, 580A, 29V						
0.09	2.0	0.5	-	-	-	-
OK Autrod 12.34 DC+, 580A, 29V						
0.09	1.6	0.4	-	-	0.5	-
OK Autrod 13.24 DC+, 580A, 29V						
0.07	1.70	0.5	0.9	-	0.2	-
OK Autrod 13.27 DC+, 580A, 29V						
0.05	1.4	0.4	2.2	-	-	-
OK Autrod 13.36 DC+, 580A, 29V						
0.08	1.3	0.5	0.7	0.3	-	0.5

OK Flux 10.72

OK Flux 10.72 is an agglomerated, basic flux, designed for the production of wind towers. It combines the high demands for multi-layer thick section welding, using high deposition rates with respectable toughness values down to -50°C when combined with a standard non-alloyed SAW wire. It is used for single and multi-wire procedures such as tandem, twin arc, tandem-twin welding and many more, for butt and fillet welds. It works equally well on DC and AC current. The excellent slag removal in narrow V-joints allows the included angle of the joint to be reduced. OK Flux 10.72 can be applied for unlimited plate thicknesses. In wind tower production, plate thicknesses of 50 mm and above are common, generally welded with Y-joints. It is essential that the slag is easily removable on the first run. For the remaining filling passes the flux needs to offer a high current carrying capacity, to allow for high deposition rates, for example, 38 kg/h with the tandem twin process. Often toughness values down to -500°C are required throughout the thickness. This excellent flux can also be utilised in other market segments with similar welding requirements e.g. pressure vessels and general construction welding.

Classifications:	EN ISO 14174:S A AB 1 57 AC H5
Approvals:	CE EN 13479, DB 51.039.12

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux)
Slag Type:	Aluminate-basic
Alloy Transfer:	No Silicon and moderately Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.9
Grain Size (met):	0.315-2.0 mm (9x48 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 38 5 AB S2	A5.17: F7A8-EM12	A5.17: F6P8-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 38 5 AB S2Si	A5.17: F7A8-EM12K	A5.17: F6P8-EM12K
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 46 3 AB S2Mo	A5.23: F8A5-EA2-A3	A5.23: F8P5-EA2-A3
OK Autrod 13.27	A5.23:ENi2/ 14171-A:S2Ni2	S 46 6 AB S2Ni2	A5.23: F8A8-ENi2-Ni2	A5.23: F7P8-ENi2-Ni2
OK Autrod 13.64	A5.23:EA2TiB/ 14171-A:S2MoTiB	-	A5.23: F8TA8-EA2TiB	-

OK Flux 10.72

Approvals

Wire	DNV	GL	DB	CE	CWB	VdTÜV
OK Autrod 12.20	-	-	•	•	-	•
OK Autrod 12.22	•	•	•	•	•	•
OK Autrod 12.24	-	-	•	•	-	•
OK Autrod 13.27	-	-	-	•	-	-

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.20	As Welded AWS DC+	415 MPa	500 MPa	30 %	125 J @ -30°C 100 J @ -40°C 70 J @ -50°C 50 J @ -62°C
OK Autrod 12.22	As Welded AWS DC+	415 MPa	500 MPa	30 %	120 J @ -30°C 100 J @ -40°C 70 J @ -50°C 50 J @ -62°C
OK Autrod 12.24	As Welded AWS DC+	500 MPa	590 MPa	25 %	60 J @ -30°C 40 J @ -40°C 35 J @ -46°C
OK Autrod 13.27	As Welded AWS DC+	490 MPa	610 MPa	30 %	100 J @ -40°C 80 J @ -51°C 50 J @ -62°C
OK Autrod 13.64	Two-Run (acc. to AWS) Plate thickness 12mm Heat input 2.2kJ/mm 700A, 32V, 60cm/min DC+	560 MPa	660 MPa	27 %	50 J @ -62°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Mo
OK Autrod 12.20 DC+, 580A, 29V				
0.05	1.5	0.2	-	-
OK Autrod 12.22 DC+, 580A, 29V				
0.05	1.5	0.3	-	-
OK Autrod 12.24 DC+, 580A, 29V				
0.05	1.6	0.2	-	0.5
OK Autrod 13.27 DC+, 520A, 29V				
0.05	1.4	0.30	2.2	-

OK Flux 10.74

OK Flux 10.74 is an agglomerated, basic flux designed primarily for multi-wire procedures in the production of longitudinal welded line pipes. The flux alloys some Si and Mn to the weld metal and works equally well on DC and AC current. It offers best weldability on SAW processes with at least 3 independent welding wires.

OK Flux 10.74 produces a low bead profile in longitudinal line pipe welding at high welding speeds. A low profile without peaks means cost saving in the later pipe coating operation, since the coating thickness can be reduced. With various wires, OK Flux 10.74 is suited for all pipe steels. In combination with the Ti-B micro alloyed wire OK Autrod 13.64 toughness values are increased to an outstanding level. Due to the careful metallurgical design OK Flux 10.74 produces a weld metal free of hard spots.

Classifications:	EN ISO 14174:S A AB 1 67 AC H5
Approvals:	NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux)
Slag Type:	Aluminate-basic
Alloy Transfer:	Slightly Silicon and moderately Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.4
Grain Size (met):	0.2-2.0 mm (9x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 42 4 AB S2	A5.17: F7A6-EM12	A5.17: F6P6-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 42 4 AB S2Si	A5.17: F7A6-EM12K	A5.17: F6P6-EM12K
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 46 2 AB S2Mo	A5.23: F8A2-EA2-A4	A5.23: F7P0-EA2-A4
OK Autrod 12.34	A5.23:EA4/ 14171-A:S3Mo; 24598-A:S S MnMo	S 50 2 AB S3Mo	A5.23: F9A2-EA4-A3	A5.23: F9P0-EA4-A3
OK Autrod 13.64	A5.23:EA2TiB/ 14171-A:S2MoTiB	-	A5.23: F8TA6-EA2TiB	-

OK Flux 10.74

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 12.20	As Welded AWS DC+	440 MPa	540 MPa	30 %	60 J @ -40°C 40 J @ -51°C
OK Autrod 12.22	As Welded AWS DC+	440 MPa	540 MPa	30 %	55 J @ -40°C 35 J @ -51°C
OK Autrod 12.24	As Welded AWS DC+	520 MPa	590 MPa	24 %	100 J @ 0°C 65 J @ -20°C 50 J @ -29°C 30 J @ -40°C
OK Autrod 12.34	As Welded AWS DC+	590 MPa	670 MPa	24 %	90 J @ 0°C 60 J @ -18°C 55 J @ -20°C 40 J @ -29°C
OK Autrod 13.64	Two-Run (acc. to AWS) Plate thickness 12mm Heat input 2.2kJ/mm 700A, 32V, 60cm/min DC+	550 MPa	650 MPa	26 %	70 J @ -51°C

Typical Weld Metal Analysis %			
C	**Mn**	**Si**	**Mo**
OK Autrod 12.20 DC+, 580A, 29V			
0.07	1.5	0.3	-
OK Autrod 12.22 DC+, 580A, 29V			
0.07	1.5	0.5	-
OK Autrod 12.24 DC+, 580A, 29V			
0.05	1.4	0.4	0.5
OK Autrod 12.34 DC+, 580A, 29V			
0.08	1.6	0.4	0.5

OK Flux 10.76

OK Flux 10.76 is an agglomerated, basic flux for submerged arc welding. It is especially suited for welding joints with high dilution, such as I-joints with one run from each side and fillet welds. Due to its high alloying of mainly Mn, it creates a weld metal with outstanding toughness values in these joint types. It is used for single and multi-wire procedures and works equally well on DC and AC current. On multi-pass welding the number of passes is limited and the plate thickness should not exceed about 20 mm. OK Flux 10.76 is recommended to be used with OK Autrod 12.10.
The main application area for OK Flux 10.76 is in shipbuilding, where it is used preferably for two run double-sided welding. However, it is also utilised in other market segments where joints with high dilution or with only a few passes are welded, such as the production of pressure vessels, in the transport industry and in general construction.

Classifications:	EN ISO 14174:S A AB 1 89 AC
Approvals:	CE EN 13479, DB 51.039.11

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Aluminate-basic
Alloy Transfer:	High Silicon and very high Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.5
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 42 3 AB S1	A5.17: F7A4-EL12	A5.17: F7P4-EL12

Approvals									
Wire	**ABS**	**BV**	**DNV**	**GL**	**LR**	**DB**	**CE**	**PRS**	**RS**
OK Autrod 12.10	•	•	•	•	•	•	•	•	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.76

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 12.10	As Welded AWS DC+	450 MPa	540 MPa	25 %	100 J @ 0°C 70 J @ -20°C 55 J @ -30°C 45 J @ -40°C

Typical Weld Metal Analysis %		
C	**Mn**	**Si**
OK Autrod 12.10 DC+ , 580A, 29V		
0.06	1.9	0.5

OK Flux 10.77

OK Flux 10.77 is an aglomerated, basic flux designed primarily for multi-wire procedures in the production of spiral welded line pipes. The flux alloys some Si and Mn to the weld metal and it works equally well on DC and AC current. It is used in single wire, tandem and 3-wire systems and it is also suitable for longitudinal welded pipes of limited plate thicknesses. OK Flux 10.77 produces welded joints with shallow reinforcement, low transition angles and smooth surface finish even at high welding speeds. A shallow reinforcement means cost saving in the later pipe coating operation, since the coating thickness can be reduced. With different wires it is suitable for all mild and high strength line pipe steels.

Classifications:	EN ISO 14174:S A AB 1 67 AC H5
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Diffusible Hydrogen:	max 5 ml H/100g weld metal (Redried flux)
Slag Type:	Aluminate-basic
Alloy Transfer:	Slightly Silicon and moderately Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.3
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 38 4 AB S2	A5.17: F7A4-EM12	A5.17: F6P4-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 38 4 AB S2Si	A5.17: F7A5-EM12K	A5.17: F6P5-EM12K
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 46 2 AB S2Mo	A5.23: F8A4-EA2-A2	A5.23: F7P2-EA2-A2
OK Autrod 12.34	A5.23:EA4/ 14171-A:S3Mo; 24598-A:S S MnMo	S 50 3 AB S3Mo	A5.23: F8A4-EA4-A4	A5.23: F8P2-EA4-A4
OK Autrod 13.64	A5.23:EA2TiB/ 14171-A:S2MoTiB	-	A5.23: F8TA6-EA2TiB	-

OK Flux 10.77

Approvals	
Wire	**CE**
OK Autrod 12.20	•
OK Autrod 12.22	•
OK Autrod 12.24	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.20	As Welded AWS DC+	420 MPa	500 MPa	28 %	80 J @ -20°C 65 J @ -30°C 55 J @ -40°C
OK Autrod 12.22	As Welded AWS DC+	420 MPa	520 MPa	26 %	130 J @ -20°C 110 J @ -30°C 80 J @ -40°C 50 J @ -46°C
OK Autrod 12.24	As Welded AWS DC+	495 MPa	580 MPa	25 %	90 J @ 0°C 60 J @ -18°C 60 J @ -20°C 50 J @ -29°C 40 J @ -40°C
OK Autrod 12.34	As Welded AWS DC+	540 MPa	630 MPa	25 %	70 J @ -20°C 60 J @ -29°C 45 J @ -40°C
OK Autrod 13.64	Two-Run (acc. to AWS) Plate thickness 12mm Heat input 2.2kJ/mm 700A, 32V, 60cm/min DC+	550 MPa	650 MPa	24 %	60 J @ -51°C

Typical Weld Metal Analysis %

C	Mn	Si	Mo
OK Autrod 12.20 DC+, 580A, 29V			
0.06	1.4	0.3	-
OK Autrod 12.22 DC+, 580A, 29V			
0.07	1.4	0.4	-
OK Autrod 12.24 DC+, 580A, 29V			
0.07	1.3	0.3	0.5
OK Autrod 12.34 DC+, 580A, 29V			
0.08	1.5	0.3	0.5

OK Flux 10.80

OK Flux 10.80 is an agglomerated, neutral-basicity flux for submerged arc welding. It alloys a lot of Si and Mn to the weld metal and thus is suited for single and limited pass butt welds and for surfacing tasks. It is welded with single and multi-wire procedures, with either DC or AC current. Due to the high alloying the flux is intended for plate thickness up to approximately 20 mm in joining applications. OK Flux 10.80 is used in general construction, pressure vessel industries and others. It is appreciated for surface buildup jobs such as the repair of diesel engine pistons, because hardness of the weld metal is increased due to the high alloying.

Classifications:	EN ISO 14174:S A CS 1 89 AC
Approvals:	CE EN 13479, DB 51.039.02

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Calcium-silicate
Alloy Transfer:	High Silicon and very high Manganese alloying
Density:	nom: 1.1 kg/dm3
Basicity Index:	nom: 1.1
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption

Volts	kg Flux / kg Wire DC+	kg Flux / kg Wire AC
26 V	0.6 kg	0.5 kg
30 V	0.9 kg	0.7 kg
34 V	1.2 kg	1.0 kg
38 V	1.5 kg	1.3 kg

Dimensions	Amps	Travel Speed
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 38 0 CS S1	A5.17: F7A2-EL12	A5.17: F6P0-EL12
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 42 0 CS S2	A5.17: F7A2-EM12	A5.17: F6P0-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	-	A5.17: F7A2-EM12K	A5.17: F6P0-EM12K

Approvals

Wire	DB	CE	VdTÜV
OK Autrod 12.10	•	•	•
OK Autrod 12.20	•	•	•

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.80

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 12.10	As Welded AWS DC+	410 MPa	520 MPa	28 %	110 J @ 20°C 80 J @ 0°C 45 J @ -20°C 40 J @ -29°C
OK Autrod 12.20	As Welded AWS DC+	440 MPa	550 MPa	29 %	90 J @ 20°C 70 J @ 0°C 40 J @ -29°C
OK Autrod 12.22	As Welded AWS DC+	440 MPa	550 MPa	30 %	60 J @ -18°C 45 J @ -29°C

Typical Weld Metal Analysis %		
C	**Mn**	**Si**
OK Autrod 12.10 DC+ , 580A, 29V		
0.07	1.4	0.7
OK Autrod 12.20 DC+, 580A, 29V		
0.09	1.7	0.6
OK Autrod 12.22 DC+, 525 A, 29 V		
0.07	1.5	1.0

OK Flux 10.81

OK Flux 10.81 is an agglomerated, low-basicity flux. The benefits of this flux are the smooth surface finish and excellent slag detachability. It is intended for a limited number of passes and plate thickness up to approx. 25 mm. It is used for single and multi-wire procedures such as tandem and twin-arc welding. Concave fillet welds with an excellent washing on the sidewalls are created with this flux as well as attractive butt and overlap welds. It works equally well on DC and AC current and the high alloying of Si makes it well suited for high speed welding. Due to its good weldability, OK Flux 10.81 is often used in the production of pressure vessels and spiral welded water pipes. The excellent sidewall wetting, which is preferred for dynamic loads in horizontal fillet welds is made use of in general construction, beam fabrication, the automotive industry and tube to fin welding in the production of membrane wall panels. In many applications where the appearance of the weld bead or the nice washing on the sidewalls in fillet welds are the main requirements, OK Flux 10.81 is chosen.

Classifications:	EN ISO 14174:S A AR 1 97 AC
Approvals:	CE EN 13479, NAKS/HAKC RD 03-613-03, DB 51.039.04

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Aluminate-rutile
Alloy Transfer:	Very high Silicon and moderately Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 0.6
Grain Size (met):	0.2-1.6 mm (10x65 mesh) or 0.2-1.25 mm (14x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 42 A AR S1	A5.17: F7AZ-EL12	A5.17: F7PZ-EL12
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 46 0 AR S2	A5.17: F7A0-EM12	A5.17: F7PZ-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 50 A AR S2Si	A5.17: F7AZ-EM12K	A5.17: F7PZ-EM12K
OK Autrod 12.24	A5.23:EA2/ 14171-A:S2Mo; 24598-A:S S Mo	S 50 A AR S2Mo	A5.23: F9AZ-EA2-A4	A5.23: F9PZ-EA2-A4
OK Autrod 12.30	14171-A:S3	S 50 0 AR S3	-	-
OK Autrod 13.10 SC	A5.23:EB2R/ 24598-A:S S CrMo1	-	-	A5.23: F9PZ-EB2R-G
OK Autrod 13.36	A5.23:EG/ 14171-A:S2Ni1Cu	S 50 A AR S2Ni1Cu	A5.23: F9A0-EG-G	-

OK Flux 10.81

Approvals

Wire	ABS	BV	DNV	GL	LR	DB	CE	VdTÜV
OK Autrod 12.10	-	-	-	-	-	•	•	•
OK Autrod 12.20	•	•	•	•	•	•	•	•
OK Autrod 12.22	-	-	-	-	-	-	•	-
OK Autrod 12.24	-	-	-	-	-	-	-	•
OK Autrod 12.30	-	-	-	-	-	•	•	•
OK Autrod 13.10 SC	-	-	-	-	-	-	-	•
OK Autrod 13.36	-	-	-	-	-	-	•	-

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.10	As Welded AWS DC+	450 MPa	540 MPa	25 %	50 J @ 20°C 30 J @ 0°C
OK Autrod 12.20	As Welded AWS DC+	510 MPa	610 MPa	25 %	80 J @ 20°C 60 J @ 0°C 40 J @ -18°C
OK Autrod 12.22	As Welded AWS DC+	530 MPa	610 MPa	24 %	60 J @ 20°C
OK Autrod 12.24	As Welded AWS DC+	565 MPa	660 MPa	23 %	65 J @ 20°C 45 J @ 0°C
OK Autrod 12.30	As Welded EN DC+	550 MPa	640 MPa	25 %	80 J @ 20°C 60 J @ 0°C
OK Autrod 13.10 SC	PWHT 575A DC 29V 690°C 1h	650 MPa	730 MPa	22	30 J @ 20°C
OK Autrod 13.36	As Welded AWS DC+	570 MPa	680 MPa	23 %	55 J @ 20°C 40 J @ 0°C 35 J @ -18°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Cu
OK Autrod 12.10 DC+, 580A, 29V						
0.06	1.2	0.8	-	-	-	-
OK Autrod 12.20 DC+, 580A, 29V						
0.07	1.5	0.8	-	-	-	-
OK Autrod 12.22 DC+, 580A, 29V						
0.07	1.5	0.9	-	-	-	-
OK Autrod 12.24 DC+, 580A, 29V						
0.07	1.5	0.8	-	-	0.5	-
OK Autrod 12.30 DC+, 580A, 29V						
0.08	1.75	0.7	-	-	-	-
OK Autrod 13.10 SC DC+, 575A, 29V						
0.06	1.4	0.9	-	1.0	0.5	-
OK Autrod 13.36 DC+, 580A, 29V						
0.07	1.4	0.9	0.7	0.3	-	0.5

OK Flux 10.83

OK Flux 10.83 is an agglomerated, low-basicity flux for submerged arc welding. Highest welding speeds can be obtained with wire diameters of 3.0 mm or less with this flux. Further attributes include smooth weld beads and excellent slag detachability. It is used for single pass butt, overlap and fillet welds at high travel speeds and works equally well on DC and AC current, primarily used with single or twin-arc wire systems. High welding speeds are applied e.g. in long weld runs for general construction, beam fabrication, membrane wall panel tube to fin welding and in the automotive industry for the production of car and truck wheels. In all these applications OK Flux 10.83 is found, when no impact toughness is required.

Classifications:	EN ISO 14174:S A AR 1 85 AC
Approvals:	CE EN 13479

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Aluminate-rutile
Alloy Transfer:	High Silicon, no Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 0.3
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.7 kg	0.6 kg
30 V	1.0 kg	0.9 kg
34 V	1.3 kg	1.2 kg
38 V	1.6 kg	1.4 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 38 Z AR S1	A5.17: F7AZ-EL12	A5.17: F6PZ-EL12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 42 Z AR S2Si	A5.17: F7AZ-EM12K	A5.17: F7PZ-EM12K

Approvals		
Wire	**CE**	**VdTÜV**
OK Autrod 12.22	•	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.83

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 12.10	As Welded AWS DC+	440 MPa	520 MPa	30 %	30 J @ 20°C
OK Autrod 12.22	As Welded AWS DC+	470 MPa	560 MPa	26 %	50 J @ 20°C 30 J @ 0°C

Typical Weld Metal Analysis %		
C	**Mn**	**Si**
OK Autrod 12.10 DC+, 580A, 29V		
0.05	0.5	0.7
OK Autrod 12.22 DC+, 580A, 29V		
0.05	0.9	0.8

OK Flux 10.87

OK Flux 10.87 is an agglomerated, low-basicity flux for submerged arc welding. It gives perfect wetting and excellent weld bead appearance in butt, overlap and fillet welds at high welding speeds. OK Flux 10.87 is used for single and multi-wire procedures and works equally well on DC and AC current. It is intended for a limited number of passes and plate thickness up to 25 mm. The main application area for OK Flux 10.87 is in the production of air compressor tanks, LPG bottles and fire extinguishers. A flat weld bead and smooth, clean surface with excellent slag detachability is achieved, also when the second run has been preheated by the first run. Other industries with similar requirements also make use of OK Flux 10.87, including general construction and the automotive industry.

Classifications:	EN ISO 14174:S A AR 1 95 AC

Slag Type:	Aluminate-rutile
Alloy Transfer:	Very high Silicon alloying, neutral on Manganese
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 0.4
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption

Volts	kg Flux / kg Wire DC+	kg Flux / kg Wire AC
26 V	0.6 kg	0.5 kg
30 V	0.9 kg	0.7 kg
34 V	1.2 kg	1.0 kg
38 V	1.5 kg	1.3 kg

Dimensions	Amps	Travel Speed
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 35 A AR S1	A5.17: F6AZ-EL12	A5.17: F6PZ-EL12
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 42 A AR S2	A5.17: F7AZ-EM12	A5.17: F6PZ-EM12
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 42 A AR S2Si	A5.17: F7AZ-EM12K	A5.17: F6PZ-EM12K

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 12.10	As Welded AWS DC+	370 MPa	470 MPa	25 %	50 J @ 20°C 25 J @ 0°C
OK Autrod 12.20	As Welded AWS DC+	410 MPa	500 MPa	25 %	50 J @ 20°C 25 J @ 0°C
OK Autrod 12.22	As Welded AWS DC+	420 MPa	510 MPa	25 %	50 J @ 20°C 25 J @ 0°C

OK Flux 10.87

Typical Weld Metal Analysis %		
C	**Mn**	**Si**
OK Autrod 12.10 DC+, 580A, 29V		
0.05	0.6	0.8
OK Autrod 12.20 DC+, 580A, 29V		
0.05	1.0	0.8
OK Autrod 12.22 DC+, 580A, 29V		
0.05	1.0	0.9

OK Flux 10.88

OK Flux 10.88 is an agglomerated, low-basicity flux for submerged arc welding. If welding is to be done without removing the heavy mill scale or rust from the welding area then this flux is the correct one to choose. Furthermore it produces a weld metal with toughness values down to -20°C when combined with a standard, non-alloyed wire. The flux is designed for single layer and multi-layer welding of up to 30 mm plate thickness. It works equally well on DC and AC current and is designed for butt, fillet and overlap welds. It can be used over a wide parameter range giving excellent slag removal and smooth weld bead surfaces. OK Flux 10.88 is used in all market segments where severe plate surface conditions are found. This includes general constructions, beam fabrications, pressure vessels, shipbuilding and transport industries. Additionally, this flux is appreciated on clean plates for its high resistance against porosity and its wide application field due to the toughness of the weld metal down to -20°C.

Classifications:	EN ISO 14174:S A AR 1 89 AC

Slag Type:	Aluminate-rutile
Alloy Transfer:	High Silicon and very high Manganese alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 0.7
Grain Size (met):	0.2-1.6 mm (10x65 mesh)

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
26 V	0.6 kg	0.5 kg
30 V	0.9 kg	0.7 kg
34 V	1.2 kg	1.0 kg
38 V	1.5 kg	1.3 kg

Dimensions	**Amps**	**Travel Speed**
Ø 4.0 mm	580 A	55 cm/min

Classifications	Wire	Weld Metal		
Wire	**AWS/EN**	**EN - As Welded**	**AWS - As Welded**	**AWS - PWHT**
OK Autrod 12.10	A5.17:EL12/ 14171-A:S1	S 38 0 AR S1	A5.17: F6AZ-EL12	-
OK Autrod 12.20	A5.17:EM12/ 14171-A:S2	S 42 2 AR S2	A5.17: F7A0-EM12	-
OK Autrod 12.22	A5.17:EM12K/ 14171-A:S2Si	S 42 2 AR S2Si	A5.17: F7A0-EM12K	A5.17: F6P0-EM12K

Approvals					
Wire	**ABS**	**BV**	**DNV**	**GL**	**LR**
OK Autrod 12.22	•	•	•	•	•

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.88

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 12.10	As Welded AWS DC+	400 MPa	470 MPa	30 %	-
OK Autrod 12.20	As Welded AWS DC+	430 MPa	520 MPa	25 %	70 J @ 0°C 50 J @ -18°C
OK Autrod 12.22	As Welded AWS DC+	440 MPa	510 MPa	26 %	70 J @ 0°C 50 J @ -18°C

Typical Weld Metal Analysis %		
C	**Mn**	**Si**
OK Autrod 12.10 DC+, 580A, 29V		
0.05	1.7	0.6
OK Autrod 12.20 DC+, 580A, 29V		
0.05	1.8	0.6
OK Autrod 12.22 DC+, 580A, 29V		
0.05	1.8	0.7

OK Flux 10.92

OK Flux 10.92 is a neutral, agglomerated Cr-compensating flux designed for strip cladding, butt and fillet welding of stainless and corrosion resistant steel types. Good welding characteristics and easy slag removal.

Classifications:	EN ISO 14174:S A CS 2 57 53 DC
Approvals:	NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Calcium silicate SiO2-MgO-Al2O3-(CaF2)
Alloy Transfer:	Chromium compensating
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 1.0

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
26 V	0.4 kg
30 V	0.55 kg
34 V	0.7 kg
38 V	0.9 kg

Dimensions	**Amps**	**Travel Speed**
4.0 mm	580 A	33 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Autrod 16.97	14343-A:S 18 8 Mn
OK Autrod 308L	A5.9:ER308L/ 14343-A:S 19 9 L
OK Autrod 309L	A5.9:ER309L/ 14343-A:S 23 12 L
OK Autrod 316L	A5.9:ER316L/ 14343-A:S 19 12 3 L
OK Autrod 318	A5.9:ER318/ 14343-A:S 19 12 3 Nb
OK Autrod 347	A5.9:ER347/ 14343-A:S 19 9 Nb

Approvals	
Wire	**VdTÜV**
OK Autrod 308L	•
OK Autrod 316L	•
OK Autrod 318	•
OK Autrod 347	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.92

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 16.97	As Welded DC+	450 MPa	630 MPa	42 %	60 J @ 20°C 55 J @ -20°C 45 J @ -60°C
OK Autrod 308L	As Welded DC+	365 MPa	580 MPa	38 %	60 J @ -60°C 50 J @ -110°C
OK Autrod 309L	As Welded DC+	420 MPa	560 MPa	32 %	40 J @ -20°C
OK Autrod 316L	As Welded DC+	385 MPa	590 MPa	36 %	55 J @ -70°C
OK Autrod 318	As Welded DC+	440 MPa	600 MPa	42 %	100 J @ 20°C 90 J @ -60°C 40 J @ -110°C
OK Autrod 347	As Welded DC+	470 MPa	640 MPa	35 %	65 J @ 20°C 55 J @ -60°C 40 J @ -110°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Nb
OK Autrod 16.97						
0.04	5.0	0.95	8.5	18.8	-	-
OK Autrod 308L Current: DC+, 420A, 27V						
0.02	1.0	0.9	10.0	20.0	-	-
OK Autrod 309L Current: DC+, 420A, 27V						
0.02	1.1	0.8	12.9	24.1	-	-
OK Autrod 316L Current: DC+, 420A, 27V						
0.02	1.0	0.8	11.9	19.1	2.7	-
OK Autrod 318						
0.035	1.2	0.5	12.0	18.5	2.6	0.3
OK Autrod 347 Current: DC+, 420 A, 27 V						
0.040	0.9	0.75	9.7	19.8	-	0.5

OK Flux 10.93

Basic, agglomerated flux for butt welding of stainless steels. A suitable flux for welding of high alloyed CrNi-steels like e.g. duplex stainless steel. The low Si addition during welding provides good mechanical properties in the weld metal.

Classifications:	EN ISO 14174:S A AF 2 56 54 DC
Approvals:	CE EN 13479, NAKS/HAKC RD 03-613-03, DB 51.039.10

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Fluoride basic CaF2-Al2O3-SiO2
Alloy Transfer:	Non alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 1.9

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
26 V	0.5 kg
30 V	0.6 kg
34 V	0.8 kg
38 V	1.0 kg

Dimensions	**Amps**	**Travel Speed**
4.0 mm	580 A	33 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Autrod 16.97	14343-A:S 18 8 Mn
OK Autrod 308L	A5.9:ER308L/ 14343-A:S 19 9 L
OK Autrod 308H	A5.9:ER308H/ 14343-A:S 19 9 H
OK Autrod 309L	A5.9:ER309L/ 14343-A:S 23 12 L
OK Autrod 309MoL	A5.9:ER309LMo (mod)/ 14343-A:S 23 12 2 L
OK Autrod 310MoL	14343-A:S 25 22 2 N L
OK Autrod 312	A5.9:ER312/ 14343-A:S 29 9
OK Autrod 316L	A5.9:ER316L/ 14343-A:S 19 12 3 L
OK Autrod 316H	A5.9:ER316H/ 14343-A:S 19 12 3 H
OK Autrod 16.38	14343-A:S 20 16 3 Mn L
OK Autrod 317L	A5.9:ER317L/ 14343-A:S 18 15 3 L
OK Autrod 318	A5.9:ER318/ 14343-A:S 19 12 3 Nb
OK Autrod 347	A5.9:ER347/ 14343-A:S 19 9 Nb
OK Autrod 385	A5.9:ER385/ 14343-A:S 20 25 5 Cu L
OK Autrod 2209	A5.9:ER2209/ 14343-A:S 22 9 3 N L
OK Autrod 2307	14343-A:S 23 7 N L

OK Flux 10.93

Classifications	Wire
Wire	**AWS/EN**
OK Autrod 2509	A5.9:ER2594/ 14343-A:S 25 9 4 N L
OK Autrod 410NiMo	14343-A:S 13 4

Approvals

Wire	ABS	BV	DNV	GL	LR	DB	CE	VdTÜV
OK Autrod 16.97	-	-	•	-	-	-	-	-
OK Autrod 308L	•	•	•	-	-	•	•	•
OK Autrod 309L	•	-	•	-	•	-	•	•
OK Autrod 316L	•	-	•	-	-	•	•	•
OK Autrod 318	-	-	-	-	-	•	•	•
OK Autrod 385	-	-	-	-	-	-	-	•
OK Autrod 2209	•	•	•	•	•	-	•	•
OK Autrod 2509	-	-	-	-	-	-	•	•

**Selected production units only. Please contact ESAB for more information.*

Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 16.97	As Welded DC+	400 MPa	600 MPa	45 %	60 J @ -20°C
OK Autrod 308L	As Welded DC+	400 MPa	560 MPa	38 %	100 J @ 20°C 75 J @ -40°C 65 J @ -60°C 55 J @ -110°C 40 J @ -196°C
OK Autrod 309L	As Welded DC+	430 MPa	570 MPa	33 %	90 J @ 20°C 70 J @ -60°C 60 J @ -110°C 35 J @ -196°C
OK Autrod 309MoL	As Welded DC+	400 MPa	600 MPa	38 %	120 J @ 20°C
OK Autrod 310MoL	As Welded DC+	335 MPa	575 MPa	42 %	120 J @ 20°C
OK Autrod 316L	As Welded DC+	390 MPa	565 MPa	42 %	100 J @ 20°C 95 J @ -40°C 90 J @ -60°C 75 J @ -110°C 40 J @ -196°C
OK Autrod 16.38	As Welded DC+	410 MPa	600 MPa	44 %	70 J @ -60°C 60 J @ -110°C 40 J @ -196°C
OK Autrod 317L	As Welded DC+	440 MPa	615 MPa	28 %	80 J @ 20°C 50 J @ -60°C
OK Autrod 318	As Welded DC+	440 MPa	600 MPa	42 %	100 J @ 20°C 90 J @ -60°C 40 J @ -110°C

OK Flux 10.93

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 347	As Welded DC+	455 MPa	635 MPa	36 %	105 J @ 20°C 85 J @ -60°C 60 J @ -110°C 30 J @ -196°C
OK Autrod 385	As Welded DC+	310 MPa	530 MPa	35 %	80 J @ 20°C
OK Autrod 2209	As Welded DC+	630 MPa	780 MPa	30 %	140 J @ 20°C 125 J @ -20°C 110 J @ -40°C 80 J @ -60°C
OK Autrod 2307	As Welded DC+	560 MPa	730 MPa	32 %	140 J @ 20°C 125 J @ -20°C 90 J @ -40°C 60 J @ -60°C
OK Autrod 2509	As Welded DC+	640 MPa	840 MPa	28 %	85 J @ 20°C 60 J @ -40°C
OK Autrod 410NiMo	As Welded DC+, 450A, 28V	900 MPa	1000 MPa	15.5 %	30 J @ 0°C 30 J @ -20°C
OK Autrod 410NiMo	Stress Relieved DC+, 450A, 28V Stress relieved 600°C, 2h	770 MPa	850 MPa	19 %	55 J @ 0°C 55 J @ -20°C
OK Autrod 410NiMo	Stress Relieved DC+, 500A, 30V Stress relieved 580°C, 4h	785 MPa	860 MPa	18 %	55 J @ 0°C 50 J @ -20°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Cu	N	Nb	FN WRC-92
OK Autrod 16.97									
0.06	6.3	1.2	8.0	18.0	-	-	-	-	-
OK Autrod 308L Current: DC+, 420A, 27V									
0.02	1.4	0.6	10.0	19.5	-	-	0.1	-	8
OK Autrod 308H DC+									
0.05	1.5	0.6	9.9	19.9	-	-	-	-	-
OK Autrod 309L Current: DC+, 420 A, 27 V									
0.02	1.3	0.5	12.5	23.0	-	-	-	-	-
OK Autrod 309MoL DC+, 420 A, 27 V									
0.02	1.5	0.5	14.5	20.8	2.8	-	-	-	-
OK Autrod 310MoL Current: DC+, 420A, 27V									
0.02	4.0	0.1	22.0	24.5	2.1	-	0.12	-	0
OK Autrod 312 Current: DC+, 420A, 27V									
0.1	1.5	0.5	9.5	29.0	-	-	-	-	-
OK Autrod 316L									
0.02	1.4	0.5	12.5	18.0	2.6	-	-	-	8

OK Flux 10.93

Typical Weld Metal Analysis %									
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Nb**	**FN WRC-92**
OK Autrod 316H DC+									
0.05	1.5	0.6	12.5	19.0	2.2	-	-	-	-
OK Autrod 16.38 Current: DC+, 420A, 30V, 30m/h									
0.02	5.4	0.7	15.5	20.0	2.5	-	0.13	-	0
OK Autrod 317L Current: DC+, 420 A, 27 V									
0.02	1.5	0.5	13.5	18.5	3.2	-	-	-	-
OK Autrod 318 Current: DC+, 440A, 30V									
0.035	1.2	0.5	12.0	18.5	2.6	-	-	0.3	-
OK Autrod 347 Current: DC+, 420A, 27V									
0.035	1.1	0.5	9.6	19.2	-	-	-	0.5	8
OK Autrod 385 Current: DC+, 420A, 27V									
0.02	1.5	0.5	25.0	19.0	4.0	1.5	0.02	-	-
OK Autrod 2209 Current: DC+, 420A, 27V									
0.02	1.3	0.5	9.0	22.5	3.1	-	0.17	-	45
OK Autrod 2307 DC+, 420A, 31V									
0.015	1.1	0.65	7.5	22.5	0.3	-	0.12	-	40
OK Autrod 2509 Current: DC+, 420A, 27V									
0.02	0.4	0.5	10.0	23.5	3.5	-	0.19	-	40
OK Autrod 410NiMo DC+, 450A, 28V									
0.02	0.4	0.5	4.1	11.7	0.51	-	-	-	-

OK Flux 10.94

Basic, chromium-compensating, agglomerated flux for butt welding of stainless steels. Specially recommended for welding of stainless steels of the super duplex type. Low Si addition during welding provides good mechanical properties in the weld metal.

Classifications:	EN ISO 14174:S A AF 2 56 64 DC

Slag Type:	Fluoride basic CaF2-Al2O3-SiO2
Alloy Transfer:	Chromium compensating
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 1.9

Flux Consumption

Volts	kg Flux / kg Wire DC+
26 V	0.5 kg
30 V	0.6 kg
34 V	0.8 kg
38 V	1.0 kg

Dimensions	Amps	Travel Speed
4.0 mm	580 A	33 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Autrod 308L	A5.9:ER308L/ 14343-A:S 19 9 L
OK Autrod 347	A5.9:ER347/ 14343-A:S 19 9 Nb
OK Autrod 2509	A5.9:ER2594/ 14343-A:S 25 9 4 N L

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 308L	As Welded DC+	400 MPa	560 MPa	40 %	85 J @ 20°C 70 J @ -40°C 60 J @ -60°C
OK Autrod 347	As Welded DC+	455 MPa	620 MPa	38 %	100 J @ 20°C 70 J @ -60°C 50 J @ -110°C 30 J @ -196°C
OK Autrod 2509	As Welded DC+	625 MPa	830 MPa	28 %	90 J @ 20°C 50 J @ -60°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Nb	FN WRC-92
OK Autrod 308L DC+								
0.02	1.4	0.5	9.5	20	-	-	-	-
OK Autrod 347 DC+								
0.04	1.0	0.5	9.6	19.6	-	-	0.5	-
OK Autrod 2509 DC+, 420A, 27V								
0.02	0.4	0.5	10.1	24.5	3.5	0.15	-	54

OK Flux 10.95

Basic, nickel alloying, agglomerated flux for butt welding of stainless steels. Specially recommended for welding of stainless steels when impact strength at low temperatures is required. Low Si addition during welding provides good mechanical properties in the weld metal.

Classifications:	EN ISO 14174:S A AF 2 56 44 Ni DC

Slag Type:	Fluoride basic CaF2-Al2O3-SiO2
Alloy Transfer:	Nickel alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 2.0

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
26 V	0.5 kg
30 V	0.6 kg
34 V	0.8 kg
38 V	1.0 kg

Dimensions	**Amps**	**Travel Speed**
4.0 mm	580 A	33 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Autrod 308L	A5.9:ER308L/ 14343-A:S 19 9 L

Typical Mechanical Properties					
Wire	**Condition**	**Yield Strength**	**Tensile Strength**	**Elongation**	**Charpy V-Notch**
OK Autrod 308L	As Welded DC+	400 MPa	540 MPa	40 %	80 J @ -60°C 70 J @ -110°C 50 J @ -196°C

Typical Weld Metal Analysis %						
C	**Mn**	**Si**	**Ni**	**Cr**	**N**	**FN WRC-92**
OK Autrod 308L Current: DC+, 420A, 27V						
<0.03	1.4	0.6	11.0	20.0	0.06	5

OK Flux 10.99

OK Flux 10.99 is an agglomerated basic flux designed for the submerged arc welding process of austenitic and ferritic-austenitic stainless steels, either using AC or DC current. Welding in AC usually provides good mechanical properties and better impact properties (when compared to DC current). This flux can be also used in DC to weld Ni-based alloys with Ni-based wires. The high basicity of OK Flux 10.99 gives better impact values, regardless of the current being used. It also has very good weldability in 1G and 2G position. The slag is self-lifting or easily detached leaving clean and nice bead appearance.

Classifications:	EN ISO 14174:S A FB 2 55 53 AC

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Fluoride basic CaF2 - MgO - Al2O3
Alloy Transfer:	Non alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 2.5

Flux Consumption

Volts	kg Flux / kg Wire DC+	kg Flux / kg Wire AC
26 V	0.7 kg	0.6 kg
30 V	0.8 kg	0.8 kg
34 V	0.9 kg	1.1 kg
38 V	1.1 kg	1.3 kg

Dimensions	Amps	Travel Speed
3.2 mm	400 A	50 cm/min

Classifications	Wire
Wire	**AWS/EN**
OK Autrod 16.38	14343-A:S 20 16 3 Mn L
OK Autrod 308L	A5.9:ER308L/ 14343-A:S 19 9 L
OK Autrod 309L	A5.9:ER309L/ 14343-A:S 23 12 L
OK Autrod 316L	A5.9:ER316L/ 14343-A:S 19 12 3 L

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 308L	As Welded AC	400 MPa	560 MPa	36 %	105 J @ -20°C 100 J @ -40°C 90 J @ -60°C 55 J @ -196°C
OK Autrod 308L	As Welded DC+	400 MPa	560 MPa	36 %	85 J @ -20°C 80 J @ -40°C 75 J @ -60°C 50 J @ -196°C

OK Flux 10.99

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod 309L	As Welded AC	410 MPa	575 MPa	36 %	105 J @ -20°C 100 J @ -40°C 95 J @ -60°C 85 J @ -110°C
OK Autrod 316L	As Welded AC	410 MPa	570 MPa	35 %	110 J @ -20°C 105 J @ -40°C 100 J @ -60°C 70 J @ -196°C
OK Autrod 16.38	As Welded AC	420 MPa	630 MPa	40 %	105 J @ -60°C 90 J @ -110°C 55 J @ -196°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	N	Nb+Ta	FN WRC-92
OK Autrod 308L AC									
0.025	1.9	0.3	9.8	19.2	0.1	-	6	0.07	-
OK Autrod 308L DC+									
0.02	1.9	0.3	9.8	19.2	0.1	-	6	0.07	-
OK Autrod 309L AC									
0.030	1.9	0.4	13.0	22.0	0.1	-	-	0.09	-
OK Autrod 316L AC									
0.025	1.7	0.4	12.0	18.3	2.6	-	6	0.05	-
OK Autrod 16.38 AC									
0.03	7.0	0.5	16.0	20.0	3.0	-	0	0.17	-

OK Flux 10.16

High basic, all mineral, agglomerated flux designed for welding nickel and nickel based alloys. The flux is particularly suitable for strip cladding with Ni-based strip. The silicon transfer from the flux to the weld metal is strongly reduced by the well balanced flux composition and thus minimizing the risk for hot cracking in welding Ni-based alloys.

Classifications:	EN ISO 14174:S A FB 2 55 43 DC
Approvals:	NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Fluoride basic CaF2-Al2O3-(TiO2)-(MnO)
Alloy Transfer:	Moderately manganese and silicon alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 2.4

Classifications	Wire
Wire	**AWS/EN**
OK Autrod NiCr-3	A5.14:ERNiCr-3/ 18274:S Ni 6082 (NiCr20Mn3Nb)
OK Autrod NiCrMo-3	A5.14:ERNiCrMo-3/ 18274:S Ni 6625 (NiCr22Mo9Nb)
OK Autrod NiCrMo-13	A5.14:ERNiCrMo-13/ 18274:S Ni 6059 (NiCr23Mo16)

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod NiCr-3	As Welded 325A DC+ Feed speed: 25m/h	360 MPa	600 MPa	41 %	140 J @ 20°C 100 J @ -196°C
OK Autrod NiCrMo-3	As Welded HI ~ 1.0-1.7 kJ/mm DC+	450 MPa	720 MPa	43 %	100 J @ -140°C 90 J @ -196°C
OK Autrod NiCrMo-13	As Welded 300A DC+ Feed speed: 25m/h	490 MPa	730 MPa	44 %	80 J @ 20°C 75 J @ -60°C 60 J @ -196°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Al	Fe	Nb+Ta
OK Autrod NiCr-3 DC+ , 325A, 30V								
0.01	3.2	0.3	Bal.	19.0	-	-	1.3	2.3
OK Autrod NiCrMo-3 DC+, 320A, 30V								
0.01	0.6	0.3	Bal.	19.5	8.5	-	2.0	3.0
OK Autrod NiCrMo-13 Current Type: DC+ , 300A, 30V								
0.02	0.7	0.2	Bal	18.0	16.5	0.1	2.0	0.1

OK Flux 10.90

Agglomerated aluminate-fluoride-basic flux for welding of 9% Ni steels and other high alloyed steels with Ni based wires. The flux is manganese adding, which reduces the risk of hot cracking. Good slag detachability and nice bead appearance.

Classifications:	EN ISO 14174:S A AF 2 55 53 MnNi DC

Slag Type:	Fluoride basic CaF2-Al2O3-SiO2
Alloy Transfer:	Chromium compensating. Nickel- and manganese alloying.
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 1.7

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
26 V	0.5 kg
30 V	0.6 kg
34 V	0.8 kg
38 V	1.0 kg

Dimensions	**Amps**	**Travel Speed**
4.0 mm	580 A	33 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Autrod NiCr-3	A5.14:ERNiCr-3/ 18274:S Ni 6082 (NiCr20Mn3Nb)
OK Autrod NiCrMo-3	A5.14:ERNiCrMo-3/ 18274:S Ni 6625 (NiCr22Mo9Nb)
OK Autrod NiCrMo-4	A5.14:ERNiCrMo-4/ 18274:S Ni 6276 (NiCr15Mo16Fe6W4)
OK Autrod NiCrMo-13	A5.14:ERNiCrMo-13/ 18274:S Ni 6059 (NiCr23Mo16)

Approvals	
Wire	**DNV**
OK Autrod NiCrMo-3	•
OK Autrod NiCrMo-4	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.90

Typical Mechanical Properties

Wire	Condition	Yield Strength	Tensile Strength	Elongation	Charpy V-Notch
OK Autrod NiCr-3	As Welded ISO DC+	400 MPa	600 MPa	35 %	145 J @ -80°C 130 J @ -196°C
OK Autrod NiCrMo-3	As Welded HI ~ 1.0-1.7 kJ/mm DC+	440 MPa	720 MPa	42 %	100 J @ -196°C
OK Autrod NiCrMo-4	As Welded DC+	480 MPa	700 MPa	35 %	60 J @ -196°C
OK Autrod NiCrMo-13	As Welded 350 A, HI 1.3-1.7 kJ/mm DC+	470 MPa	675 MPa	46 %	70 J @ -196°C

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	Fe	Nb+Ta	W
OK Autrod NiCr-3								
0.004	4.4	0.35	Bal.	19.3	0.1	1.7	2.6	-
OK Autrod NiCrMo-3 DC+, 350A, 29V								
0.01	1.7	0.2	Bal.	21.0	8.5	2.0	3.0	-
OK Autrod NiCrMo-4 DC+, 350A, 29V								
0.01	2.2	0.2	Bal.	15.0	15.5	6.0	-	3.4
OK Autrod NiCrMo-13 Current Type: DC+ , 350A, 29V								
0.01	2.8	0.2	Bal.	22.0	15.0	2.0	-	-

OK Flux 10.05

An agglomerated flux designed for strip cladding on unalloyed or low alloyed steels with high-alloyed Cr or Cr-Ni strips.

Classifications:	EN ISO 14174:S A AAS 2B 56 34 DC
Approvals:	VdTÜV , NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	1000 A (60 x 0.5 mm strip)
Slag Type:	Acid-aluminium-silicate Al2O3-SiO2-CaF2-MgO
Alloy Transfer:	Non alloying
Density:	nom: 0.7 kg/dm3
Basicity Index:	nom: 1.1

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
25 V	0.4 kg
28 V	0.5 kg
32 V	0.6 kg

Dimensions	**Amps**	**Travel Speed**
60 x 0.5 mm	750 A	7 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Band 308L	A5.9:EQ308L/ 14343-A:B 19 9 L
OK Band 316L	A5.9:EQ316L/ 14343-A:B 19 12 3 L
OK Band 347	A5.9:EQ347/ 14343-A:B 19 9 Nb
OK Band 309LNb	14343-A:B 23 12 L Nb

Approvals	
Wire	**VdTÜV**
OK Band 316L	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.05

Typical Weld Metal Analysis %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Nb**	**FN WRC-92**
OK Band 308L								
0.02	1.0	0.6	10.5	19.0	-	0.03	-	6
OK Band 316L								
0.02	1.1	0.7	13.0	18,0	2.5	0.02	-	7
OK Band 347								
0.02	1.1	0.7	10.5	19.0	-	0.03	0.35	8
OK Band 309LNb DC+								
0.03	1.1	0.6	10.0	19.0	-	0.04	0.35	5

OK Flux 10.10

High basic, all mineral, agglomerated flux designed for electro slag strip surfacing. The flux is particularly suitable for strip cladding with stainless strip of the Cr-, Cr-Ni- and Cr-Ni-Mo-steel types, with or without Nb.

Classifications:	EN ISO 14174:ES A FB 2B 56 44 DC
Approvals:	NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	1700 A (60 x 0.5 mm strip)
Slag Type:	Fluoride basic CaF2-Al2O3
Alloy Transfer:	Moderately silicon alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 4.0

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
25 V	0.5 kg

Dimensions	Amps	Travel Speed
60 x 0.5 mm	1250 A	9 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Band 309L ESW	14343-A:B 22 11 L
OK Band 309LMo ESW	A5.9:EQ309LMo (Mod)/ 14343-A:B 21 13 3 L
OK Band 309LNb ESW	14343-A:B 22 12 L Nb
OK Band 310MoL	14343-A:B 25 22 2 N L

Approvals	
Wire	**VdTÜV**
OK Band 309LNb ESW	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

OK Flux 10.10

Typical Weld Metal Analysis %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**Nb**	**FN WRC-92**
OK Band 309L ESW								
0.03	1.2	0.4	10.0	19.0	-	0.05	-	4
OK Band 309LMo ESW								
0.02	1.1	0.4	12.5	18.0	2.8	0.04	-	6
OK Band 309LNb ESW								
0.03	1.3	0.5	10.0	19.0	-	0.05	0.4	4
OK Band 310MoL								
0.02	3.2	0.4	22	24	2	0.14	-	-

OK Flux 10.11

OK Flux 10.11 is very high basic agglomerated flux for electroslag strip cladding. The flux has low viscosity and is suitable for cladding with Ni base, Co and fully-austenitic alloys due to its good wetting behaviour. It is also suitable for welding at higher travel speeds.

Classifications:	EN ISO 14174:ES A FB 2B 56 44 DC

Welding Current:	approx. 2500 (90 x 0.5 mm strip)
Slag Type:	Fluoride basic CaF2-Al2O3
Alloy Transfer:	Moderately silicon alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 5.4

Classifications	Wire
Wire	**AWS/EN**
OK Band NiCr3	A5.14:EQNiCr-3/ 18274:B Ni 6082
OK Band NiFeCr1	A5.14:EQNiFeCr-1/ 18274:B Ni 8065 (NiFe30Cr21Mo3)

Typical Weld Metal Analysis %									
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Cu**	**Fe**	**Ti**	**Nb+Ta**
OK Band NiCr3 DC+, 1200A, 25V, 20cm/min									
0.02	2.5	0.45	67	18.2	-	-	9.8	-	2.2
OK Band NiFeCr1 - 1st Layer - Base Material: 10CrMo9-10									
0.018	0.5	0.85	38.5	20.0	2.9	1.8	31.0	0.1	-
OK Band NiFeCr1 - 2nd Layer - Base Material: 10CrMo9-10									
0.017	0.5	0.85	39.5	20.5	3.0	1.9	28.0	0.1	-

Strip dimensions: 60x0.5mm. Parameters: 1250A, 24V, 18cm/min. Stick-out 30mm.

OK Flux 10.14

High basic agglomerated flux for electro slag strip cladding. The flux is suitable for cladding with austenitic Cr-, CrNi- and CrNiMo-strips at higher travel speeds.

Classifications:	EN ISO 14174:ES A FB 2B 56 44 DC

Approvals are based on factory location. Please contact ESAB for more information.

Welding Current:	approx. 2500 A
Slag Type:	Fluoride basic CaF2-Al2O3
Alloy Transfer:	Moderately silicon alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 4.4

Classifications	Wire
Wire	**AWS/EN**
OK Band 309LMo ESW	A5.9:EQ309LMo (Mod)/ 14343-A:B 21 13 3 L
OK Band 309LNb	14343-A:B 23 12 L Nb

Typical Weld Metal Analysis %

C	Mn	Si	Ni	Cr	Mo	N	Nb	FN WRC-92
OK Band 309LMo ESW								
0.030	1.38	0.37	11.7	17.4	2.43	0.03	-	4
OK Band 309LNb								
0.04	1.6	0.5	10.0	19.0	-	0.02	0.6	5

OK Flux 10.16

High basic, all mineral, agglomerated flux designed for welding nickel and nickel based alloys. The flux is particularly suitable for strip cladding with Ni-based strip. The silicon transfer from the flux to the weld metal is strongly reduced by the well balanced flux composition and thus minimizing the risk for hot cracking in welding Ni-based alloys.

Classifications:	EN ISO 14174:S A FB 2 55 43 DC
Approvals:	NAKS/HAKC RD 03-613-03

Approvals are based on factory location. Please contact ESAB for more information.

Slag Type:	Fluoride basic CaF2-Al2O3-(TiO2)-(MnO)
Alloy Transfer:	Moderately manganese and silicon alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 2.4

Classifications	Wire
Wire	**AWS/EN**
OK Band NiCr3	A5.14:EQNiCr-3/ 18274:B Ni 6082
OK Band NiCrMo3	A5.14:EQNiCrMo-3/ 18274:B Ni 6625 (NiCr22Mo9Nb)

Approvals	
Wire	**VdTÜV**
OK Band NiCr3	•

**Selected production units only. Please contact ESAB for more information.*
Visit esab.com to download specific flux/wire combination fact sheets for more details.

Typical Weld Metal Analysis %								
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Al**	**Fe**	**Nb+Ta**
OK Band NiCr3 DC+, 750A, 28V, 12cm/min								
0.02	3.0	0.5	Bal	20.0	-	-	-	2.5
OK Band NiCrMo3 DC+, 750A, 27V, 13cm/min								
0.02	1.0	0.2	Bal	19.0	7.4	-	12.8	2.6

OK Flux 10.17

High basic, agglomerated flux designed for welding nickel based alloys. The flux is particularly suitable for submerged arc strip cladding with all grades of Ni-based strips. OK Flux 10.17 used for internal overlay welding on mild or low alloyed steel. It has very good welding characteristics gives a smooth bead appearance and easy slag removal. For chemical and petrochemical plants, offshore constructions, marine equipments, pressure vessels, storage tanks, etc.

Classifications:	EN ISO 14174:S A FB 2B 57 24 DC

Welding Current:	900 A (60 x 0.5 mm strip)
Slag Type:	Aluminate-fluoride-basic, Al2O3-CaF2
Alloy Transfer:	Moderately silicon alloying
Density:	nom: 1,1 kg/dm³
Basicity Index:	nom: 2,5

Classifications	Wire
Wire	**AWS/EN**
OK Band NiCr3	A5.14:EQNiCr-3/ 18274 B Ni 6082
OK Band NiCrMo3	A5.14: EQNiCrMo-3/ 18274 B Ni 6625 (NiCr22Mo9Nb)

Typical Weld Metal Analysis %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**Fe**	**Nb+Ta**
OK Band NiCr3 DC+, 750A, 28V, 12cm/min							
0.02	2.3	0.7	67	18	-	8	2.2
OK Band NiCrMo3 DC+, 850A, 28V, 12cm/min							
0.03	0.1	0.6	61	19.6	8.0	9	2.7

OK Flux 10.18

OK Flux 10.18 is an agglomerated flux designed for cladding with Monel strip. The flux is particularly suitable for strip cladding with NiCu7-strip giving shiny bead finish and smooth overlaps.

Classifications:	EN ISO 14174:S A CS 2B 58 13 DC

Welding Current:	1000 A
Slag Type:	Calcium silicate SiO2-CaO-CaF2-(MnO-Al2O3)
Alloy Transfer:	Moderately silicon alloying
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 1.0

Classifications	Wire
Wire	**AWS/EN**
OK Band NiCu7	A5.14:EQNiCu-7/ 18274 B Ni 4060 (NiCu30Mn3Ti)

Typical Weld Metal Analysis %						
C	**Mn**	**Si**	**Ni**	**Cu**	**Fe**	**Ti**
OK Band NiCu7						
0.029	3.0	1.0	Bal.	23.0	17	0.25

OK Flux 10.26

High basic, agglomerated Ni-, Cr- and Mo-adding flux designed for electroslag strip cladding with ESAB OK Band 316L strips gives 316L overlay in first layer. The flux has very good welding characteristics gives a smooth bead appearance and easy slag removal. For chemical industry, marine applications, paper industry digesters, evaporators and handling equipments, petroleum refining equipment, duct works, water tubes and heat exchangers.

Classifications:	EN ISO 14174:ES A FB 2B 54 91 NiMo DC

Slag Type:	Fluoride basic
Alloy Transfer:	Nickel, chromium and molybdenum
Density:	nom: 1.2 kg/dm3
Basicity Index:	nom: 3.0

Classifications	Wire
Wire	**AWS/EN**
OK Band 316L	A5.9:EQ316L/ 14343-A B 19 12 3 L

Typical Weld Metal Analysis %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**FN WRC-92**
OK Band 316L DC+, 1200A, 24V, 16-18 cm/min							
0.02	1.2	0.2	12.8	19.0	2.7	0.05	7

OK Flux 10.27

OK Flux 10.27 is an high basic, agglomerated Ni-, Cr- and Mo-adding flux designed for electroslag strip cladding with ESAB 309LMo ESW strips gives 317L overlay in first layer. It has a smooth bead appearance, very good welding properties and easy slag removal. Suitable for special applications like flue gas desulfurization scrubber systems chemical and petrochemical processing equipments and pulp and paper plants, etc.

Classifications:	EN ISO 14174:ES A FB 2B 54 62 NiMo DC

Slag Type:	Fluoride basic
Alloy Transfer:	Nickel, chromium and molybdenum
Density:	nom: 1.2 kg/dm^3
Basicity Index:	nom: 3.1

Classifications	Wire
Wire	**AWS/EN**
OK Band 309LMo ESW	A5.9:EQ309LMo (Mod)/ 14343-A B 21 13 3 L

Typical Weld Metal Analysis %							
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**	**N**	**FN WRC-92**
OK Band 309LMo ESW DC+, 1200A, 24V, 16-18 cm/min							
0.03	1.0	0.2	13.2	18.8	3.4	0.05	8

OK Flux 10.07

Neutral, agglomerated, nickel- and molybdenium alloying flux, specially designed for strip cladding with a 17Cr-strip, producing a weld metal with 14Cr-4Ni-1Mo and a hardness of 370-420 HB. Can also be used for cladding with a 17Cr-wire producing the same weld metal.

Classifications:	EN ISO 14174:S A GS 3 Ni4 Mo1 DC

Welding Current:	1000 A
Slag Type:	Calcium silicate SiO2-MgO-Al2O3-(CaF2)
Alloy Transfer:	Nickel and molybdenium alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 1.0

Flux Consumption	
Volts	**kg Flux / kg Wire DC+**
26 V	0.65 kg
28 V	0.65 kg

Dimensions	**Amps**	**Travel Speed**
60 x 0.5 mm	750 A	7 m/h

Classifications	Wire
Wire	**AWS/EN**
OK Band 430	14343-A B 17

Typical Weld Metal Analysis %					
C	**Mn**	**Si**	**Ni**	**Cr**	**Mo**
OK Band 430 Current: DC+, 770A, 25V, 22 cm/min					
0.05	0.15	0.6	4.0	13.0	1.0

OK Flux 10.31

Neutral, agglomerated, slighltly molybdenium alloyed flux for strip cladding with unalloyed CMn-steel strips.

Classifications:	EN ISO 14174:S A CS 3 Mo1 DC

Slag Type:	Calcium silicate SiO2-MgO-Al2O3-(CaF2)
Alloy Transfer:	Molybdenium alloying
Density:	nom: 1.0 kg/dm3
Basicity Index:	nom: 1.0

Typical Weld Metal Analysis %		
C	**Mn**	**Si**
OK Band 7018 DC+, 850A, 24V, 13cm/min		
0.07	0.30	0.4

OK Flux 10.33

Agglomerated fluoride-basic flux designed primarily for surfacing of continuous casting rollers, using cored wires with single- or twin-arc technique with oscillating procedure. The flux has excellent slag removal and can tolerate high interpass temperatures.

Classifications:	EN ISO 14174:S A FB 2 56 53 DC

Slag Type:	Fluoride-basic MgO-CaF2-Al2O3-SiO2
Alloy Transfer:	Non-alloying
Density:	nom: 1.1 %
Basicity Index:	nom: 2.9 %

OK Flux 10.96

A neutral, agglomerated chromium alloying flux for hardsurfacing purpose producing a weld metal with a hardness of about 35 HRC with a mild steel electrode.

Classifications:	EN ISO 14174:S A CS 3 Cr3 DC

Slag Type:	Calcium silicate SiO2-MgO-Al2O3-Cr
Alloy Transfer:	Chromium alloying
Basicity Index:	nom: 0.7

Flux Consumption		
Volts	**kg Flux / kg Wire DC+**	**kg Flux / kg Wire AC**
30 V	0.7 kg	0.6 kg
34 V	0.9 kg	0.8 kg
38 V	1.2 kg	1.0 kg

Dimensions	**Amps**	**Travel Speed**
4.0 mm	580 A	33 m/h

OK Flux 10.97

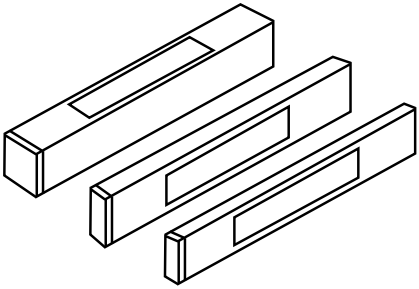
A neutral, agglomerated chromium alloying flux for hardsurfacing purpose producing a weld metal with a hardness of about 35 HRC with a mild steel electrode.

Classifications:	EN ISO 14174:S A CS 3 C0.3 Mn1 Cr1 DC

Slag Type:	Calcium silicate SiO2-MgO-Al2O3-Cr
Alloy Transfer:	Chromium alloying
Density:	nom: 1.1 kg/dm^3
Basicity Index:	nom: 1.4

Packaging for Coated Electrodes





Standard Packaging

The standard electrode packaging consists of cardboard in PE shrink film for the inner package; the outer carton is also made of recyclable cardboard.

The amounts contained depend on:

1. Full package (cross-sectional square)
2. Half package (½ of the full package)
3. Quarter package (¼ of the full package)

ESAB Part Number (suffix):

-00 Full package cardboard in PE film

-10 Half package cardboard in PE film, 6 packets/box

Packaging for Coated Electrodes







VacPac

The vacuum-packed VacPac protects electrodes in the box during transport.

VacPac saves time and money by simplifying storage and elimination of re-drying.

The vacuum-packed VacPac is:

1. Optional for stick electrodes for unalloyed steels and fine grain steels
2. For all electrodes for heat-resistant and high-strength steels (low alloy electrodes)
3. For high-alloy and nickel-based electrodes with diameters of Ø ≥ 4.0 mm
   (½ - VacPac, type -G0)

ESAB Part Number (suffix):

-K0 Quarter package
(¼ VacPac, 9 packages/box)

-G0 Half package
(½ - VacPac, 6 packets/box)

-V0 Three quarter package
(¾ VacPac, 4 packets/box)

Mini VacPac

The vacuum-packed Mini VacPac is used for:

1. Type L for small diameter (Ø 1,6 - 2,5 mm) high alloyed stick electrodes, nickel-based electrodes, and stick electrodes for welding cast iron.
2. Type T for high-alloyed stick electrodes Ø 3,2 mm.
3. Type G for high-alloy and nickel-based electrodes from Ø ≥ 4.0 mm.

ESAB Part Number (suffix):

-L0 Quarter package, ¼ - VacPac, 6 packets/box

-T0 Half package, ½ - VacPac, 3 packets/box

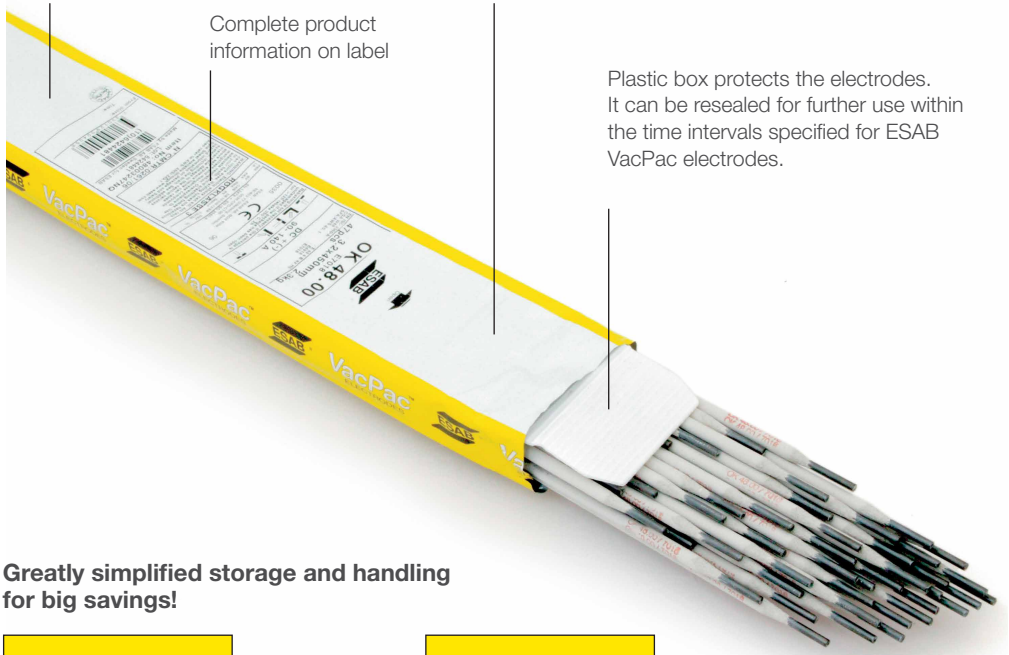
-G0 Half package, ½ - VacPac, 6 packets/box

Area to note date and time of when the package was opened

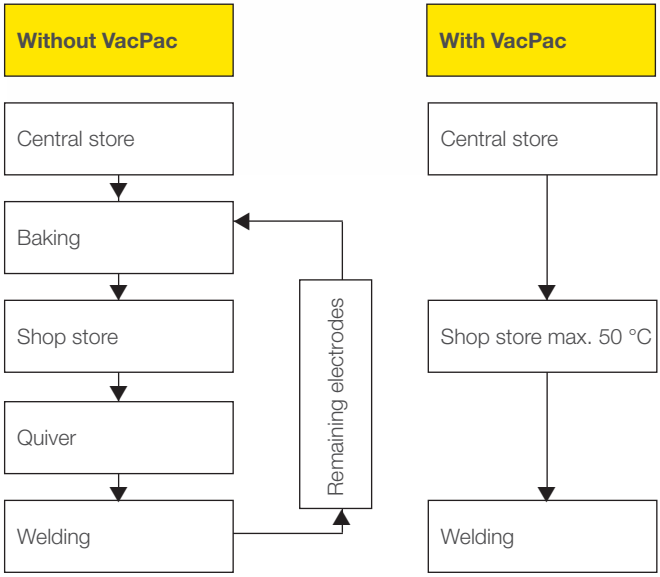
Complete product information on label

Ducted plastic box and aluminium foil can be separated for disposal and recycling. The plastic box only produces carbon dioxide and water when incinerated.

Plastic box protects the electrodes. It can be resealed for further use within the time intervals specified for ESAB VacPac electrodes.



Greatly simplified storage and handling for big savings!



Packaging for Coated Electrodes



Plastic

The plastic packaging is for high-quality electrodes for repair and hardfacing use. It consists of resealable plastic quivers to remove electrodes as needed.

ESAB Part Number (suffix):

-20 Full package, plastic quiver, resealable

-30 Half package, Plastic quiver, resealable



Pipeweld Metal Canister (not shown)

The metal canister packaging is used exclusively for cellulose electrodes. Unlike other electrodes, cellulose electrodes must not be too dry or too wet, they are therefore “climate-controlled” in cans.

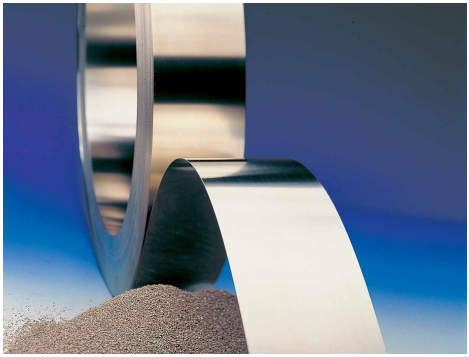
Suitable for rough construction site application and for steady supplies.

Pipeweld electrodes cannot be re-dried.

ESAB Part Number (suffix):

-3640 Bottle packaging, depending on the diameter, 12-14 kg/box

-3B40 Canned packaging with 20 kg/box



TIG Rods

Tig rods are packed in strong, air-tight fibre cylinders with a resealable plastic lid.

Strip Electrodes

OK Band welding strip is normally supplied in 50 kg coils, 60 x 0.5 mm. However, other widths such as 30 or 90 mm or larger coil weights are available on request.



Paper Bag - 25 kg



Bucket - generally 25 kg



BigBag - 1,000 kg



BlockPac - 25 kg

Flux Packaging

ESAB fluxes are normally supplied in paper bags of 20 or 25 kg each. An inner bag of polythene provides extra protection from moisture pick-up from the surrounding atmosphere. ESAB fluxes for submerged arc welding can also be supplied in steel buckets of 25 kg. This packaging type is very strong and is used for demanding handling conditions. The resealable metal lid has a rubber seal to prevent the flux from absorbing moisture.

BigBag is intended for bulk usage. Fluxes, including OK Flux 10.71, are available in 1,000 kg content. BigBag offers six-fold security in terms of weight and has base dimensions of 85 x 85 cm. The height of a one tonne BigBag is 88 cm, enabling two bags to be stacked in a truck or container for transport.

BigBag is made of strong woven polypropylene material that has an internal muli-layered aluminium lining, keeping the flux “factory dry”. There is a discharge spout with a diameter of 150 mm. It can easily be resealed so that only some of the flux is taken out at a time. BigBag has four strong straps allowing it to be lifted by a forklift truck or overhead crane and emptied directly into a flux container.

BlockPac™ provides full protection from moisture absorption during transport and storage. The bag is made of a laminated, multi-layer aluminium foil which creates a 100% moisture barrier. The flux is delivered in block shape with most of the bags having a low air pressure.

Fluxes delivered in BlockPac can be used without re-drying. Especially on hydrogen sensitive applications, such as welding of high strength steels thus significant handling times and costs can be saved on customer side. BlockPac allows more severe storage conditions and an unlimited shelf life as long as the foil is not damaged.



MARATHON PAC™ — endless feedability

For many customers, Marathon Pac™ bulk drums for MIG/MAG and FCAW are key in maximising production efficiency and quality in manual welding and especially in mechanised and robotic welding.

Marathon Pac can cut the time taken by spool changes and maintenance by almost 95%. Marathon Pac comes in three sizes – the standard version, the jumbo version and the mini version – and is available for non- and low-alloyed MAG wires, stainless MIG wires, aluminium MIG wires, MAG-brazing wires, cored wires, and SAW wires up to 2 mm diameter.

In addition, there is an ”endless version”, which makes it possible to combine the content of a series of Marathon Pacs to form a continuous in-line supply source, thereby necessitating no stops whatsoever for wire exchange.

This is ideal for multi-robot stations. A special wire resistance welder is available from ESAB for this purpose. Availability and content weight are given in the table below.

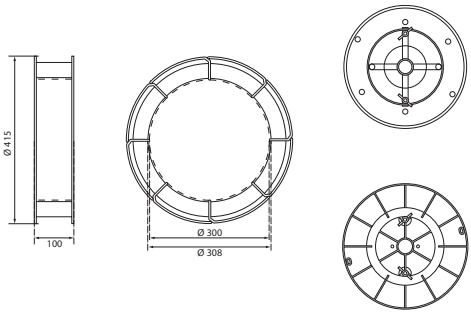
Perfect delivery to the welding head

The special coiling technique that is used when packing the drum ensures that the wire is never twisted or warped, which would otherwise cause arc wander. Welds are well positioned and perfectly straight. The unwinding process from the drum is automatic, so no separate de-coiling equipment is needed and no additional forces are required, like those that are needed when pulling a traditional revolving spool. This translates into a lower wear rate for the wire feeder.

Easy Recycling

Marathon Pac comes in cardboard drums that are fully recyclable. They can be folded flat after use to save on storage space.

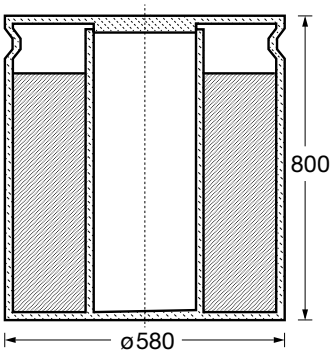
Marathon Pac		
Marathon Pac Version	**Wire Types**	**Filling Content**
Standard - w x h: 513 x 830 mm	Non-/low-alloyed Stainless MAG-brazing Cored wires	250 kg (ø 0.8 mm : 200 kg) 250 kg (ø 0.8 mm : 200 kg) 200 kg depending on the wire type
Jumbo - w x h: 595 x 1000 mm	Non-/low-alloyed Stainless Aluminium Cored wires Submerged arc wires	500 kg (min. ø 1.0 mm) 500 kg (min. ø 1.0 mm) 141 kg depending on the wire type 450 kg (ø 2.0 mm)
Mini - w x h: 513 x 500 mm	Stainless	100 kg
Endless - 2x standard or jumbo	Non-/low-alloyed Stainless	2x 250 kg or 2x 500 kg 2x 250 kg or 2x 500 kg



Spool 03

03-0	25 kg

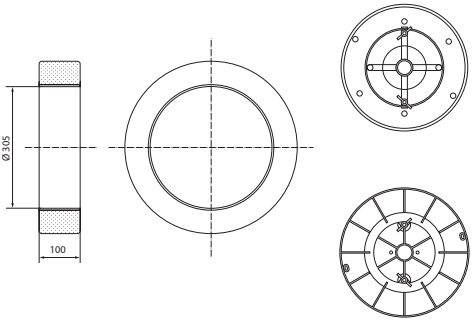
Random-wound wire basket.
The spool is also suitable for coil holders with crossed arms. The empty basket is non-returnable.



Spool 04

04-0	280 kg

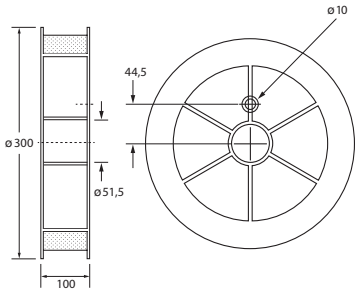
Random-wound pay-off drum. The empty spool is non-returnable.



Spool 08

08-0	30 kg

Layer-wound spool without cardboard former. The spool is not suitable for coilholders with crossed arms.



Spool 24

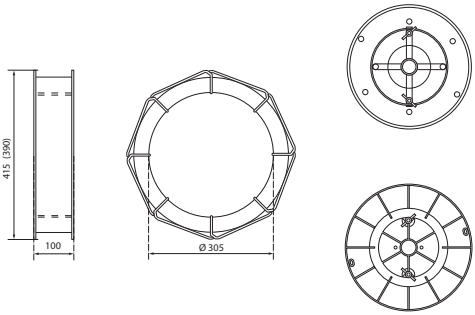
24-7	15 kg

Plastic spool. Layer wound.
EN ISO 544: S 300

Spool 25

25-0	15 kg
25-2	10 kg

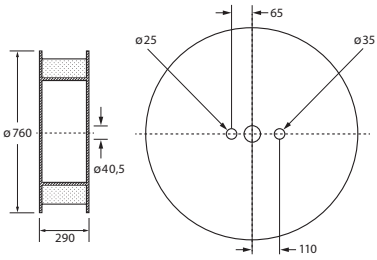
Plastic spool. Random wound.
EN ISO 544: S 300



Spool 28/31 Eurospool

28-0	30 kg
28-1	25 kg

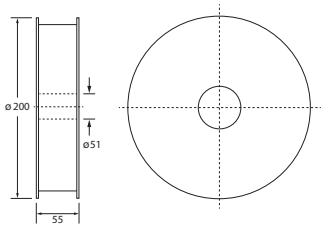
Precision-wound octagonal wire basket. This spool is also suitable for coil holders with crossed arms. The empty basket is non-returnable, but fully recyclable.



Spool 34

34-0	300 kg

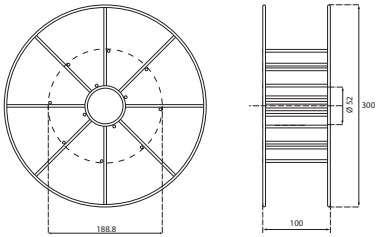
Random-wound wooden bobbin.
Decoiling stand required.The empty bobbin is non-returnable.



Spool 46

46-0	5 kg
46-2	2 kg

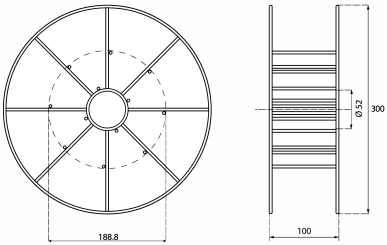
Plastic spool. Random wound
EN ISO 544: S 200



Spool 67

67-0	15 kg
67-3	18 kg
66-3	16 kg

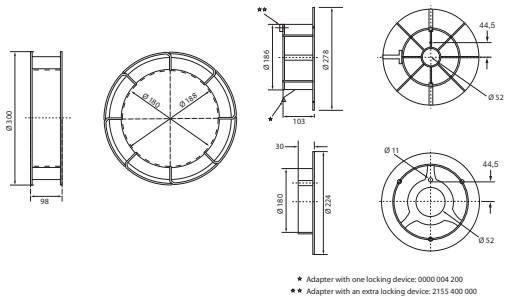
Wire basket. Layer wound.
EN ISO 544: BS 300
67-copper-coated



Spool 69

67-0	15 kg
66-3	16 kg

Wire basket. Layer wound.
EN ISO 544: KS 300
69-bare



Spool 76

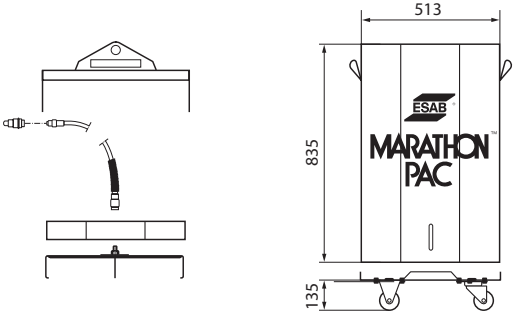
76-0	15 kg
76-1	18 kg
76-3	16 kg

Wire basket. Random wound.
EN ISO 544: B 300

Spool 77

77-0	15 kg
77-1	18 kg
77-3	16 kg

Wire basket. Layer wound.
EN ISO 544: B 300

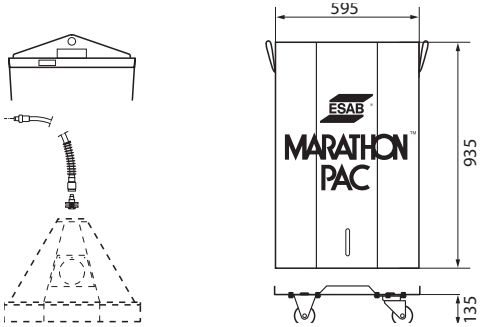


Spool 93 MARATHON PAC

93-0	200 kg
93-2	250 kg
93-X	catch weight

Accessories:

1. Wire conduit attachment
2. Wire conduits
3. Connector wire feed unit
4. Lifting yoke
5. Trolley

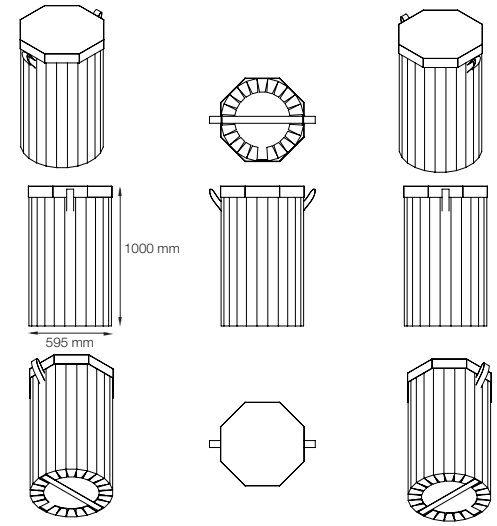


Spool 94 MARATHON PAC

94-0	475 kg

Accessories:

1. Plastic hood
2. Quick connector
3. Wire conduits
4. Connector wire feed unit
5. Lifting yoke
6. Trolley

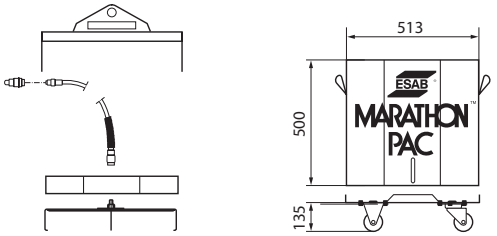


Spool 9A MARATHON PAC 2

9A-0	500 kg
9A-7	500 kg Endless

Accessories:

1. Plastic hood
2. Quick connector
3. Wire conduits
4. Connector wire feed unit
5. Lifting yoke
6. Trolley

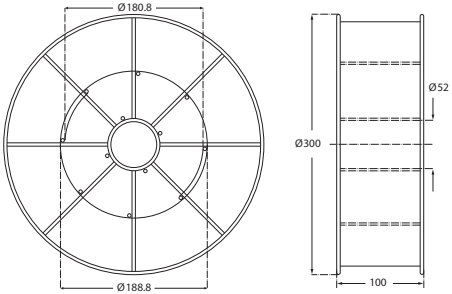


Spool 95 MARATHON PAC

95-0	100 kg

Accessories:

1. Quick connector
2. Wire conduits
3. Connector wire feed unit
4. Lifting yoke
5. Trolley



Spool 98

98-2	15 kg
98-3	18 kg
98-4	16 kg
98-6	6 kg
98-7	7 kg

EN ISO 544: BS 300
Layer-wound wire basket, plastic coated, which is used without adapter. Fitting to hub with diam.= 51 mm. Empty spool is recyclable.

Recommendations for the storage, re-drying and handling of ESAB covered electrodes

General Information

All covered electrodes are sensitive to moisture re-absorption to a greater or lesser degree. Care must be taken during storage and handling to prevent moisture being re-absorbed.

Storage

Covered electrodes of any type will pick up moisture only very slowly if they are stored in the following climatic conditions.

Temperature	Relative Humidity
5-15°C	< 60%
15-25°C	< 50%
above 25°C	< 40%

During the winter, it is possible to have low relative humidity by keeping the temperature in the storeroom at least 10°C above the outdoor temperature. During certain periods in the summer and in a tropical climate, sufficiently low relative humidity can be maintained by air dehumidification.

If the electrodes have been stored in a cold place, allow them to reach ambient temperature before breaking the package.

Re-drying

Low-hydrogen basic electrodes should be re-dried before use whenever there are application requirements relating to weld metal hydrogen content and/or radiographic soundness (not needed for VacPac).

Acid rutile stainless electrodes and all types of basic electrode may produce pores in the weld if they have not been stored in sufficiently dry conditions. Re-drying the electrodes will restore their usability.

Mild steel rutile and acid electrodes normally require no re-drying.

Cellulose electrodes must not be re-dried.

Electrodes which are seriously damaged by moisture can normally not be re-dried with first-class results. These electrodes should be scrapped.

Re-Drying Conditions

Re-drying temperatures and holding times are specified on the label and in the product specification.The re-drying temperature is the temperature in the bulk of the electrodes. The re-drying time is measured from the point at which the re-drying temperature has been reached. Do not stack more than four layers of electrodes in the re-drying oven. It is recommended not to re-dry covered electrodes more than three times.

Holding Oven

The holding oven is used for intermediate storage to avoid moisture pick-up in the coating of low-hydrogen electrodes and acid rutile stainless electrodes. The electrodes which should be stored in the holding oven are:

1. Electrodes that have been re-dried
2. Electrodes that have been removed from their hermetically-sealed container
3. Electrodes that are considered to be in good condition and are transferred directly from the storeroom after unpacking

Holding oven temperature: 120-150°C.

Precautions On Site

Keep the electrodes in electrically-heated quivers at a minimum temperature of 70°C. After work, return the remaining electrodes to the holding oven.

Discoloration in the Coating

If the colour of the electrodes changes during storage, they should be scrapped or the electrode manufacturer should be contacted.

Damaged Coating

Mechanically damaged electrodes on which parts of the coating are missing will not perform correctly and should be scrapped.

VacPac

Electrodes in VacPac will not pick up any moisture during storage. They require no re-drying before use, provided the package is undamaged. This is indicated by the vacuum in the package.

Handling VacPac Electrodes

Protect VacPac from damage at all times. The outer board packaging offers extra protection from mechanical damage to the metal foil. Handle the single inner, metal foil, VacPac with special care.

Do not use a knife or any other sharp object to open the outer board packaging.

Before Using VacPac Electrodes

Check if the protective foil still contains a vacuum. If the vacuum has been lost, re-dry the electrodes before use.

Cut open the protective foil at one end.

Do not take out more than one electrode at a time, thereby ensuring that the remaining electrodes are still protected inside the package. Put the top back on the plastic capsule.

Discard or re-dry electrodes that have been exposed to the atmosphere in an opened Vac-Pac for more than 9 hours.

Storage and Handling Recommendations for OK Tubrod Cored Wires

Cored wire should be stored in conditions which prevent the accelerated deterioration of products or packaging. All cored wires should avoid direct contact with water or moisture. This could take the form of rain or the condensation of moisture on a cold wire.

Cored wires must be stored in dry conditions. The relative humidity and temperature should be monitored and the temperature should not fall below the dew point.

To avoid condensation, the wire should be kept in the original packaging and, if necessary, left to warm up to at least the ambient temperature before opening the package.

Other hydrogen-containing substances, such as oil, grease and corrosion, or substances that could absorb moisture must also be avoided on the wire surface.

Products must be stored in such a way as to avoid damage during storage.

Easy and Efficient Storage and Handling of Fluxes

ESAB agglomerated fluxes have a guaranteed as-manufactured moisture content from production. This moisture content is controlled by internal ESAB specifications. Before transport, each pallet is shrinked or wrapped in plastic foil. This precautionary action is done in order to maintain the as-manufactured moisture content for as long as possible. Flux should never be exposed to wet conditions, such as rain or snow.

Storage

- Unopened flux bags must be stored in maintained storage conditions as follows:

  Temperature: 20 +/- 10°C
  Relative humidity: As low as possible, not exceeding 60%.
- Fluxes delivered in aluminium lined 25 kg bags (BlockPac™) or BigBags can be stored under more severe climatic conditions, because the packaging protects the flux reliably from moisture pick-up, as long as it is unopened and undamaged.
- Fluxes shall not be stored longer than 3 years (exept BlockPac).
- Fluxes in BlockPac have unlimited shelf life as long as the foil is not damaged.
- The content of unprotected flux hoppers must, after an 8 hours shift, be placed in a drying cabinet or heated flux hopper at a temperature of 150 +/- 25°C.
- Remaining flux from opened bags must be placed at a temperature of 150 +/- 25°C.

Recycling

- Moisture and oil must be removed from the compressed air used in the re-cycling system.
- Addition of new flux must be done with the proportion of at least one part new flux to three parts re-cycled flux.
- Foreign material, such as millscale and slag, must be removed by a suitable system, such as sieving.

Re-drying

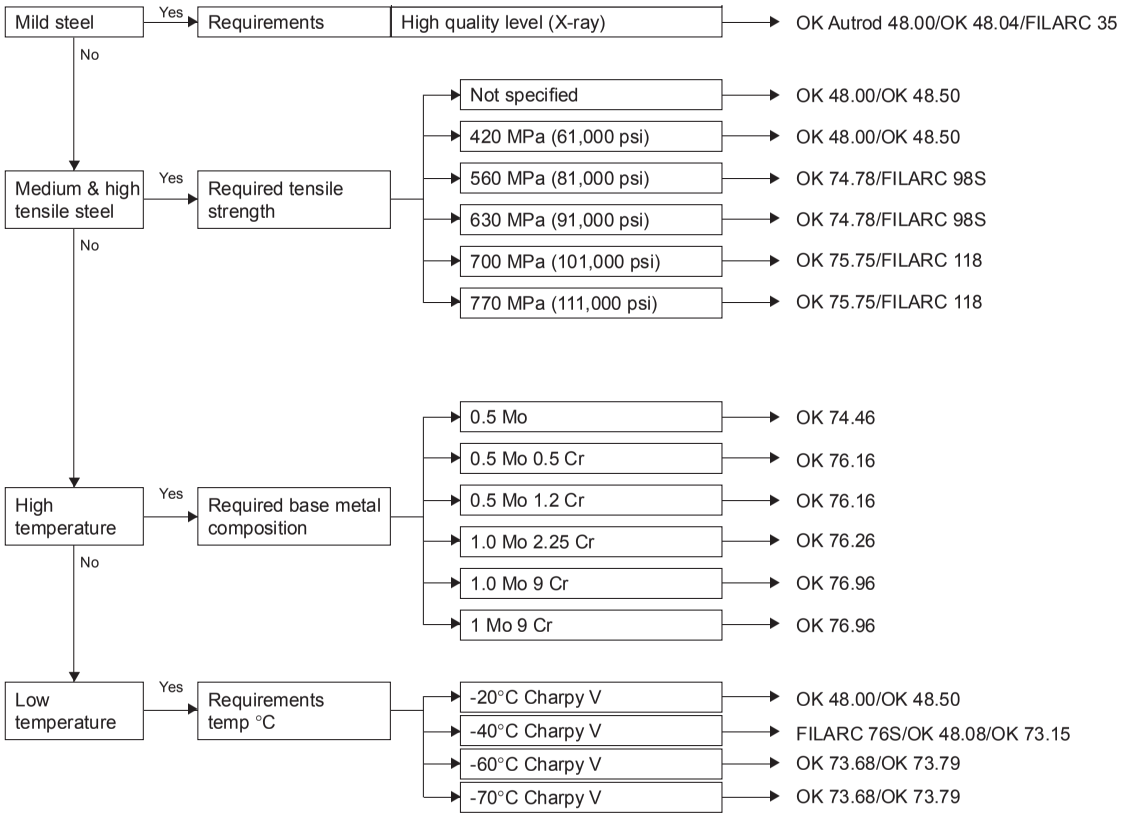
- When handled and stored as above, the ESAB fluxes can normally be used straight away.
- In severe applications, stipulated by the applicable material specification or if the flux has somehow picked up moisture, re-drying of the flux is recommended.
- Re-drying shall be performed as follows:

  300 +/- 25°C for about 2-4 hours.
- Redrying must be done either in equipment that turns the flux so that the moisture can evaporate easily or in an oven on shallow plates with a flux height not exceeding 5 cm.
- Re-dried flux, not immediately used, must be kept at 150 +/- 25°C before use.

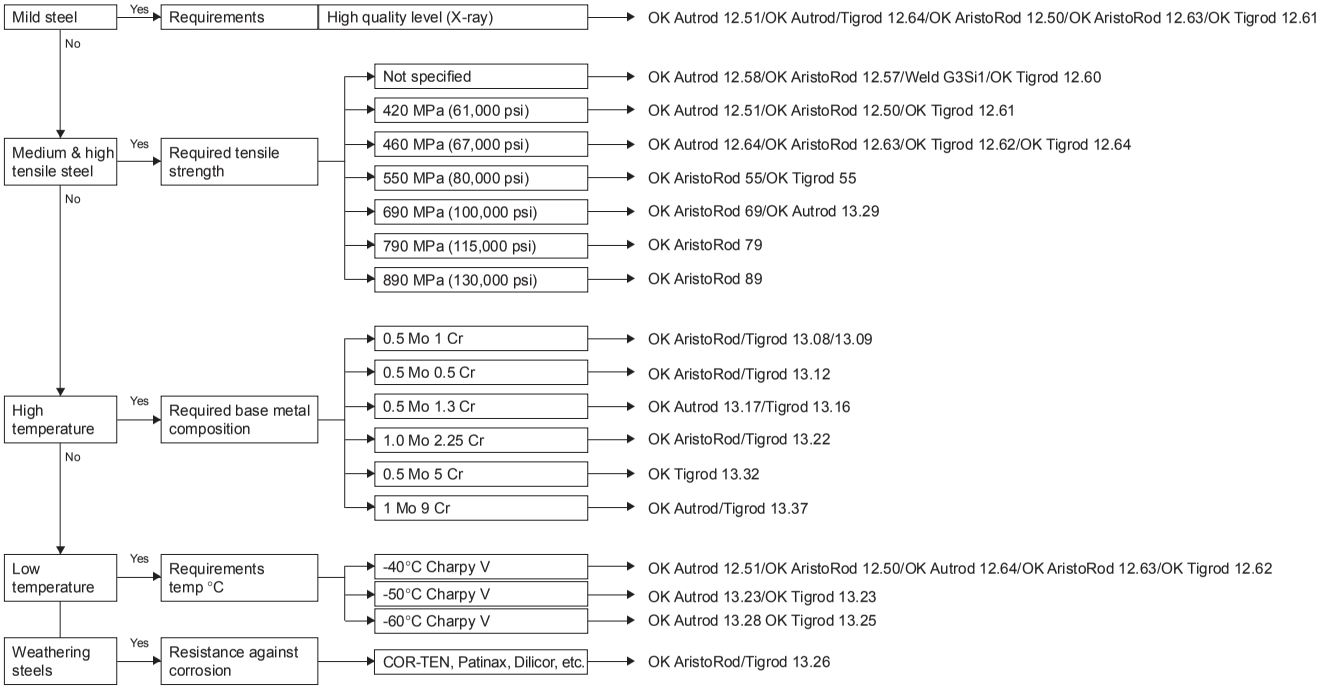
Disposal

- Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal and local regulations.
- Please address your local disposal company for prescribed disposal.
- Information on product and residues are given in the Safety Data Sheets available through www.esab.com.

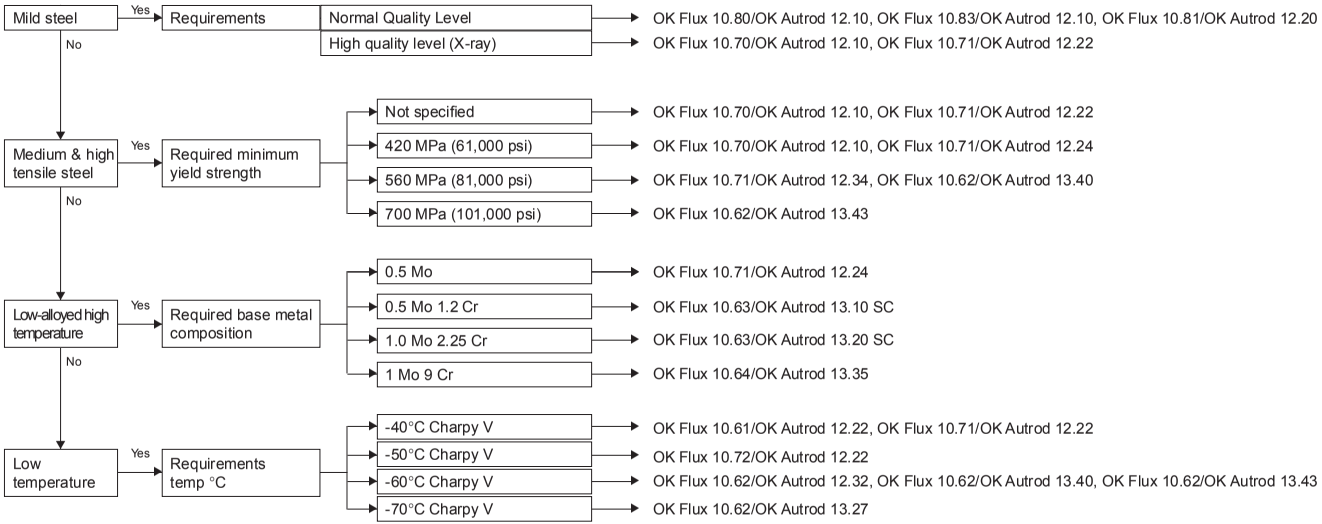
1. MMA electrodes for mild and low-alloyed steels



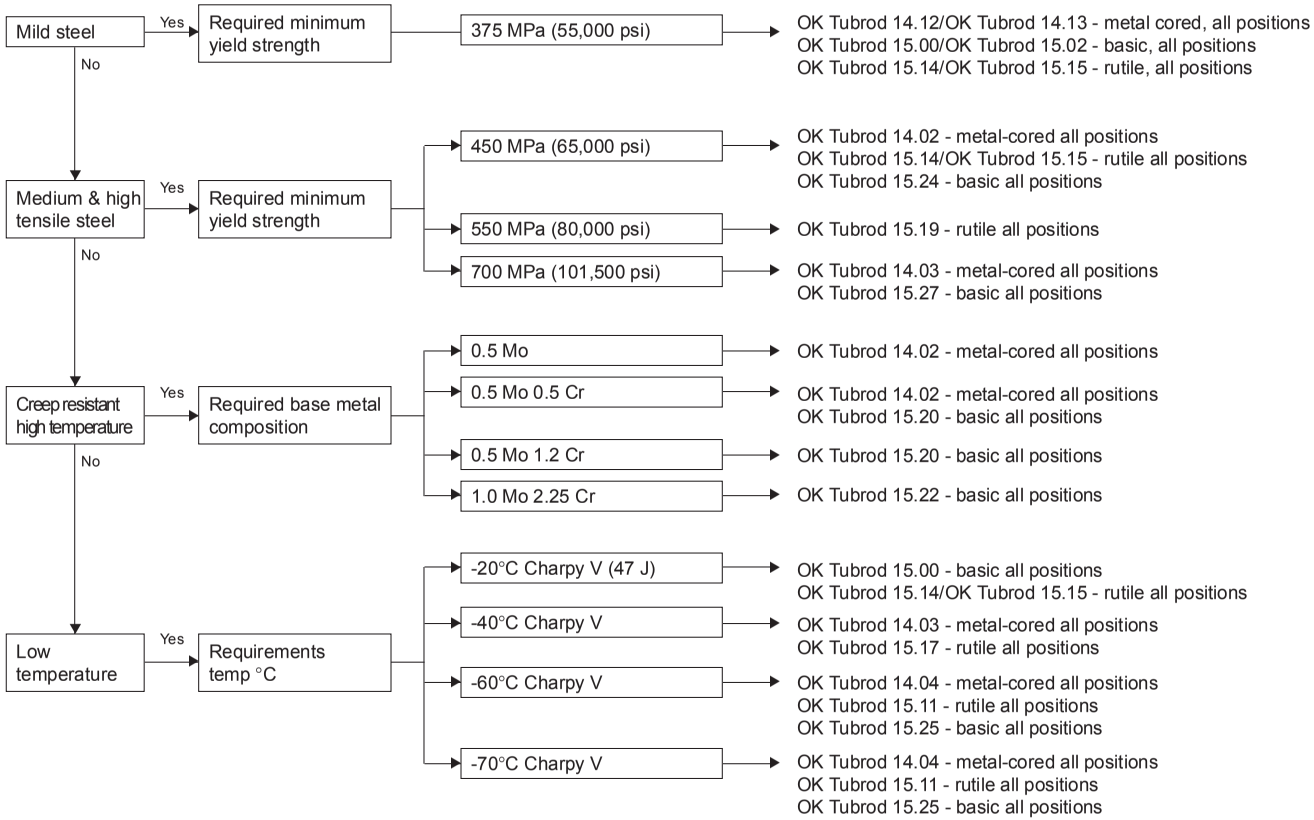
2. Solid wires



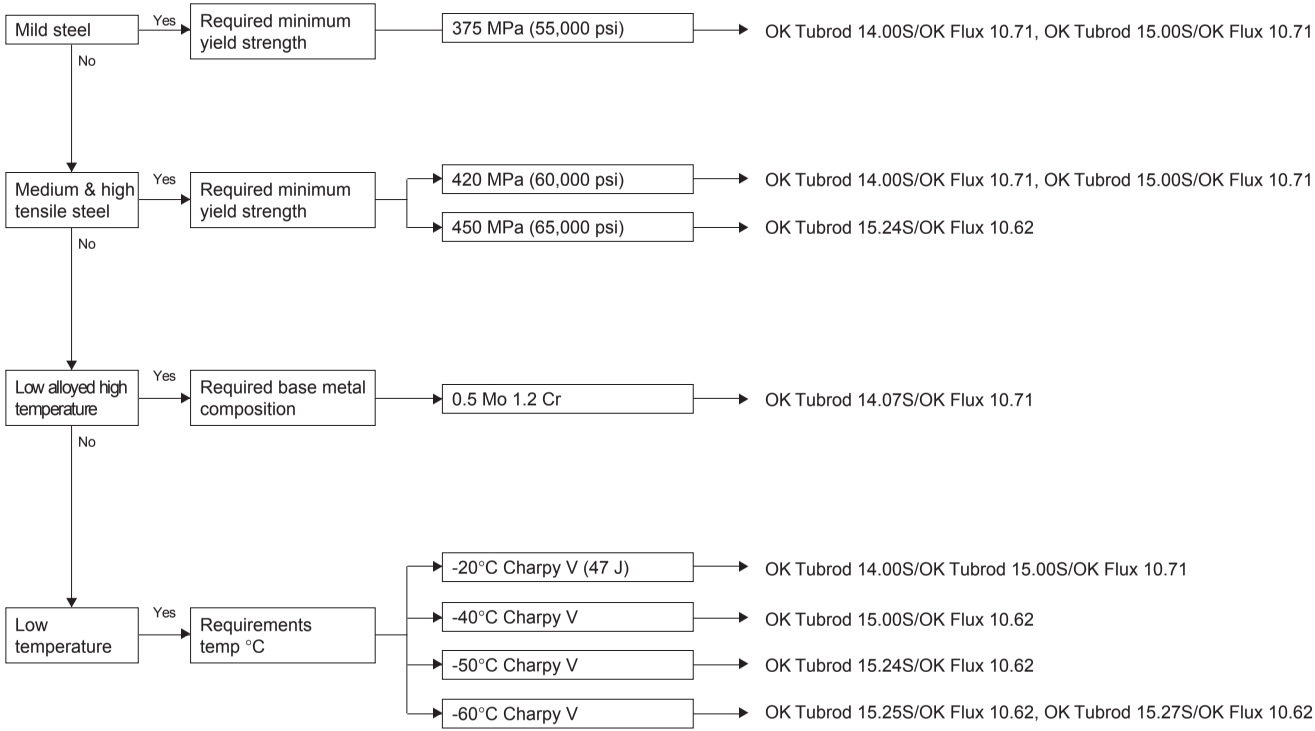
3. Submerged arc fluxes and wires



4. Cored wires



4. Submerged arc cored wires and fluxes



6. Wires for stainless steels - selection by wire classification

EN 10088-1 Designation	Werkst. Nr.	USA AISI	C	Cr	Ni	Mo	Other elements	MIG OK Autrod	TIG OK Tigrod
Austenitic									
X10CrNi18-8	1.4310	302	< 0.12	18	8	-	-	308LSi	308L, 308LSi
X5CrNi18-10	1.4301	304	< 0.07	18	10	-	-	308LSi	308L, 308LSi
X6CrNiTi18-10	1.4541	321	< 0.08	18	11	-	Ti 0.7	347Si, (308LSi)	347, 347Si, (308LSi)
X6CrNiNb18-10	1.4550	347	< 0.08	18	11	-	Nb 0.7	347Si, (308LSi)	347, 347Si, (308LSi)
X8CrNiS18-9	1.4305	303	< 0.12	18	9	-	S 0.2	308LSi, 309LSi	308L, 308LSi, 309L
X2CrNi18-9	1.4307	304L	< 0.03	18	10	-	-	308LSi	308L, 308LSi
X2CrNiN18-10	1.4311	304LN	< 0.03	18	10	-	N 0.15	308LSi	308L, 308LSi
-	-	304N	< 0.08	18	9	-	N 0.15	308LSi	308L, 308LSi
X3CrNiMo17-13-3	1.4436	316	< 0.05	18	12	2.5	-	316LSi	316L, 316LSi
X5CrNiMo17-12-2	1.4401	316	< 0.05	18	12	2.5	-	-	-
X2CrNiMo17-12-2	1.4404	316L	< 0.03	18	12	2.5	-	-	-
X2CrNiMo18-14-3	1.4435	316L	< 0.03	18	13	2.5	-	16.38	16.38
X6CrNiMoTi17-13-2	1.4571	316Ti	< 0.08	18	12	2.5	Ti 0.7	318Si, (316LSi)	318Si, (316LSi)
X2CrNiMoN17-13-3	1.4429	316LN	< 0.03	18	12	2.5	N 0.5	316LSi	316L, 316LSi
X12CrMnNiN	1.4372	202	< 0.15	18	5	-	Mn 8	16.95	16.95
X2CrNiMo18-15-4	1.4438	S31703	< 0.03	18	16	3.5	-	317L	317L
X1NiCrMoCuN25-20-5	1.4539	N08904	< 0.03	20	25	4.5	Cu 1.5	385	385
X1CrNiMoCuN20-18-7	1.4547	S31254	< 0.02	20	18	6.2	Cu 0.8, N 0.2	19.81, 19.82	19.81, 19.82
X1NiCrMoCu31-27-4	1.4563	N08028	< 0.02	27	31	3.5	Cu 1.5	19.81, 19.82	19.81, 19.82
-	1.4652	S32654	< 0.02	24	22	7.3	Cu 0.5, N 0.5	19.81	19.81
X9CrNiSiNCe21-11-2	1.4835	S30815	< 0.10	21	11	-	N 0.17 + Ce	310	310
Austenitic-ferritic (Duplex)									
-	1.4162	S32101	0.03	21.5	1.5	-	Mn 5	2209	2209
X2CrNiN23-4	1.4362	S32304	< 0.03	23	4	-	N 0.10	2209	2209
X2CrNiMoN22-5-3	1.4462	S31803	< 0.03	22	5	3	N 0.10	2209	2209
X2rNiMoN25-7-4	1.4410	S32750	< 0.03	25	7	4	N 0.25	2509	2509
X2CrNiMoCuWN25-7-4	1.4501	S32760	< 0.03	25	6	3	N 0.25 W 0.7	2509	2509

EN 10088-1 Designation	Werkst. Nr.	USA AISI	C	Cr	Ni	Mo	Other elements	MIG OK Autrod	TIG OK Tigrod
Ferritic-martensitic									
X6Cr13	1.4000	403	< 0.08	13	-	-	-	308LSi	308L, 308LSi
X2CrNi12	1.4003	S41050	< 0.03	12	0.7	-	-	308LSi	308L, 308LSi
X12Cr13	1.4006	410	0.1	13	-	-	-	309LSi	309L, 309LSi
Ferritic									
X6Cr17	1.4016	430	< 0.08	16.5	-	-	-	430Ti, 430LNb, 308LSi	430Ti, 308L, 308LSi
X6CrTiNb18	1.4509	441	< 0.03	18	-	-	Ti, Nb	430Ti, 430LNb	430Ti
X6CrTi17	1.4510	439	< 0.8	17	-	-	Ti	430Ti	430Ti
X2CrMoTi18-2	1.4521	S44400	< 0.03	18	-	2	-	316LSi	316L,316LSi
-	-	446	<0.20	26	-	-	-	310	310

7. The most common fluxes and wires for SAW stainless steel

European standard EN 10088-1 Designation	No	Werkst. Nr.	SS steel No	USA AISI	Recommended SAW consumables OK Flux + OK Autrod
X 6 Cr 13	1.4000	1.4000	2301	403	10.93+308L or 308H/10.92+308L
X 12 Cr 13	1.4006	1.4006	2302	410	10.93+308L or 308H/10.92+308L
X 20 Cr 13	1.4021	1.4021	2303	420	10.93+308L or 308H/10.92+308L
X 30 Cr 13	1.4028	1.4028	2304	-	10.93+308L or 308H/10.92+308L
X 6 Cr 17	1.4016	1.4016	2320	430	10.93+308L or 308H/10.92+308L
X 17 Cr Ni 16-2	1.4057	1.4057	2321	431	10.93+347 or 10.92+347
-	-	1.4749[1]	2322	446	10.92+310
-	-	1.4460[1]	2324	329	10.93+2209/10.94+2209
X 2 Cr Ni N 23-4	1.4362	-	2327	S32304	10.93+2209/10.94+2209
X 2 Cr Ni Mo N 22-5-3	1.4462	-	2377	S31803	10.93+2209/10.94+2209
X 2 Cr Ni Mo N 25-7-4	1.4410	-	2328	S32750	10.94+2509
X 2 Cr Ni Mo Ca WN 25-7-4	1.4501	-	-	S32760	10.94+2509
X 10 Cr Ni 18-8	1.4310	-	2331	302	10.93+308L /10.92+308L
X 5 Cr Ni 18-10	1.4301	1.4301	2332	304	10.93+308L /10.92+308L
X 5 Cr Ni 18-10	(1.4301)	(1.4301)	2333	(304)	10.93+308L /10.92+308L
X 6 Cr Ni Ti 18-10	1.4541	1.4541	2337	321	10.93+347 or 10.92+347
X 6 Cr Ni Nb 18-10	1.4550	1.4550	2338	347	10.93+347 or 10.92+347
X 3 Cr Ni Mo 17-13-3	1.4436	1.4436	2343	(316)	10.93+316L or 10.92+316L
X 5 Cr Ni Mo 17-12-2	(1.4401)	(1.4401)	2347	(316)	10.93+316L or 10.92+316L
X 2 Cr Ni Mo 17-12-2	1.4404	1.4404	2348	316 L	10.93+316L or 10.92+316L
X 6 Cr Ni Mo Ti 17-12-2	1.4571	1.4571	2350	316 Ti	(10.93+316L) or (10.92+316L)
X 2 Cr Ni 18-9	1.4307	1.4306	2352	304 L	10.93+308L or 308H/10.92+308L
X 2 Cr Ni Mo 18-14-3	1.4435	1.4435	2353	316 L	10.93+316L or 10.92+316L
(EN 10095) X 8 Cr Ni 25-21	1.4845	1.4845[1]	2361	310 S	10.92+310
X 2 Cr Ni Mo 18-15-4	1.4438	1.4438	2367	317 L	10.93+317L or 10.92+317L
X 2 Cr Ni N 18-10	1.4311	1.4311	2371	304 LN	(10.93+308L) or (10.92+308L)
X 2 Cr Ni Mo N 17-13-3	1.4429	1.4429	2375	316 LN	(10.93+316L) or (10.92+316L)

1 not standard

8. Comparison table for stainless steels and MMA electrodes, part 1

European standard EN 10088-1/EN 10095 Designation	Werkst. Nr.	SS steel No	England BS 970; 1=Part 1 BS 1449; 2=Part 2
X 6 Cr 13	1.4000	2301	403 S 17
X 12 Cr 13	1.4006	2302	410 S 21
X 20 Cr 13	1.4021	2303	420 S 37
X 30 Cr 13	1.4028	2304	420 S 45
X 6 Cr 17	1.4016	2320	430 S 17
X 17 Cr Ni 16-2	1.4057	2321	431 S 29
X 18 Cr N 28	1.4749[1]	2322	-
X 4 Cr Ni Mo N 27-5-2	1.4460[1]	2324	-
X 10 Cr Ni 18-8	1.4310	2331	302 S 31
X 5 Cr Ni 18-10	1.4301	2332	304 S 31
X 5 Cr Ni 18-10	1.4301	2333	(304 S 15)
X 6 Cr Ni Ti 18-10	1.4541	2337	321 S 31
X 6 Cr Ni Nb 18-10	1.4550	2338	347 S 31
X 3 Cr Ni Mo 17-13-3	1.4436	2343	(316 S 33)
X 8 Cr Ni S 18-9	1.4305	2346	303 S 31
X 5 Cr Ni Mo 17-12-2	(1.4401)	2347	(316 S 31)
X 2 Cr Ni Mo 17-12-2	1.4404	2348	316 S 11
X 6 Cr Ni Mo Ti 17-12-2	1.4571	2350	320 S 31
X 2 Cr Ni 18-9	1.4307	2352	304 S 11
X 2 Cr Ni Mo 18-14-3	1.4435	2353	316 S 3
X 8 Cr Ni 25-21	1.4845	2361	(310 S 24)
X 2 Cr Ni Mo 18-15-4	1.4438	2367	-
X 2 Cr Ni N 18-10	1.4311	2371	-
X 2 Cr Ni Mo N 17-13-3	1.4429	2375	-
X 12 Cr S 13	1.4005	2380	416 S 21
X 14 Cr Mo S 17	1.4104	2383	-
X 2 Cr Ni N 23-4	1.4362	2327	-
X 2 Cr Ni Mo N 22-5-3	1.4462	2377	-
X 2 Cr Ni Mo N 25-7-4	1.4410	2328	-
X 2 Cr Ni Mo Cu WN 25-7-4	1.4501	-	-

8. Comparison table for stainless steels and MMA electrodes, part 2

France AFNOR NFA 35-572 to NFA 35-578	USA AISI	Japan JIS G4303-4318 SUS	Italy UNI 6900-71	MMA electrode OK
Z 6 C 13	403	403	X 6 Cr 13	61.30, 61.35, 68.15
Z 12 C 13	410	410	X 10 Cr 13	61.30, 61.35, 68.15
Z 20 C 13	420	420 J1	X 20 Cr 13	61.30, 61.35, 68.15
Z 30 C 13	-	420 J2	X 38 Cr 13	61.30, 61.35, 68.15
Z 8 C 17	430	430	X 8 Cr 17	61.30, 61.35, 61.80
Z 15 CN 16.02	431	431	X 16 Cr Nr 16	61.30, 61.35, 61.80
Z 10 C 24	446	-	X 16 Cr 26	67.15
-	329	329 J1	-	67.50, 68.60
Z 10 CN 18.09	302	302	-	61.30, 61.35
Z 6 CN 18.09	304	304	X 5 Cr Ni 18 10	61.30, 61.35
(Z 6 CN 18.09)	(304)	(304)	(X 5 Cr Ni 18 10)	61.30, 61.35
Z 6 CNT 18.10	321	321	X 6 Cr Ni Ti-18 11	(63.34), 61.80, 61.85
Z 6 CNNb 18.10	347	347	X 8 Cr Ni Nb 1811	(63.34), 61.80, 61.85
(Z 6 CND 17.12)	(316)	(316)	(X 5 Cr Ni Mo 17 13)	63.30, 63.34, 63.41
Z 10 CNF 18.09	303	303	X 10 Cr Ni 18 09	68.81
(Z 6 CND 17.11)	(316)	(316)	X 5 Cr Ni Mo 17 12	63.30, 63.34, 63.41
Z 2 CND 17.12	316 L	316 L	X 2 Cr Ni Mo 17 2	63.30, 63.34, 63.41
Z 6 CNDT 17.12	316 Ti	-	X 6 Cr Ni Mo Ti 17 12	63.80
Z 2 CN 18.10	304 L	304 L	X 2 Cr Ni 18 11	61.30, 61.35
Z 2 CND 17.13	316 L	316 L	X 2 Cr Ni Mo 17 13	63.30, 63.34, 63.41
(Z 12 CN 25-20)	310 S	310 S	X 6 Cr Ni 2520	67.15
Z 2 CND 19.15	317 L	317 L	X 2 Cr Ni Mo 18 16	64.30
Z 2 CN 18.10 Az	304 LN	304 LN	X 2 Cr Ni N 18 11	61.30, 61.35
Z 2CND 18.10 Az	316 LN	316 LN	X 2 Cr Ni Mo N 17 13	63.30, 63.41, 69.25
Z 12 CF 13.4 M	416	416	X 12 Cr S 13	61.30, 61.35, 68.15
Z 10 CF 17	430 F	430 F	X 10 Cr S 17	61.30, 61.35
-	S32304	-	-	67.50, 67.55
-	S31803	-	-	67.50, 67.55
-	S32750	-	-	68.53, 68.55
-	S32760	-	-	68.53, 68.55

9. MIG and TIG wires for aluminium

EN 573 Alloy designation Numerical	Chemical symbols	The Aluminum Association	ESAB filler metal OK Autrod/Tigrod
EN AW-1050A	EN AW-Al 99,5	AA 1050A	1070,1100, 1450
EN AW-1070A	EN AW-Al 99,7	AA 1070A	1070,1100, 1450
EN AW-1100	EN AW-Al 99,0Cu	AA 1100	1070,1100
EN AW-1200	EN AW-Al 99.0	AA 1200	1070,1100
EN AW-3003	EN AW-Al Mn1Cu	AA 3003	4043, 4047
EN AW-3103	EN AW-Al Mn1	AA 3103	4043, 5356
EN AW-3004	EN AW-Al Mn1Mg1	AA 3004	4043, 5356
EN AW-4045	EN AW-Al Si10	AA 4045	4043,4047
EN AW-5005	EN AW-Al Mg1(B)	AA 5005	5356
EN AW-5019	EN AW-Al Mg5	AA 5019	5356
EN AW-5050	EN AW-Al Mg1,5(C)	AA 5050	5356
EN AW-5052	EN AW-Al Mg2,5	AA 5052	5356
EN AW-5083	EN AW-Al Mg4,5Mn0,7	AA 5083	5183
EN AW-5086	EN AW-Al Mg4	AA 5086	5356
EN AW-5454	EN AW-Al Mg3Mn	AA 5454	5554
EN AW-6013	EN AW-Al Mg1Si0,8CuMn	AA 6013	4043, 5356
EN AW-6060	EN AW-Al MgSi	AA 6060	4043, 5356
EN AW-6061	EN AW-Al Mg1SiCu	AA 6061	5356
EN AW-6063	EN AW-Al Mg0,7Si	AA 6063	5356
EN AW-6082	EN AW-Al Si1MgMn	AA 6082	4043, 5356
EN AW-7005	EN AW-Al Zn4,5Mg1,5Mn	AA 7005	5356
EN AW-7021	EN AW-Al Zn5,5Mg1,5	AA 7021	5356
EN AW-7029	EN AW-Al Zn4,5Mg1,5Cu	AA 7029	5356
EN AW-7039	EN AW-Al Zn4Mg3	AA 7039	5356
EN AW-7050	EN AW-Al Zn6CuMgZr	AA 7050	5356

Since their introduction for shipbuilding, the use of ceramic weld metal supports for fast root pass deposition has spread to bridge building, pressure vessels, general steel component construction and other areas of fabrication. This has been accompanied by an increase in the use of flux- and metal-cored wires to obtain optimum productivity.

The process advantages can be summarised as follows:

- Higher welding currents are possible, thereby substantially increasing the root pass deposition rate
- High-quality root runs with dependable penetration and smooth profile
- Applicable in the 1G, 2G, 3G up positions
- Gouging, grinding and sealing of the back side are avoided
- Welder qualification easier to obtain

FILARC ceramic weld metal supports have no adverse effect on weld metal composition and mechanical properties. They are dry and insensitive to moisture absorption, leaving the low-hydrogen performance of consumables unaffected.

The FILARC range presented here comprises the most commonly used types, covering the majority of applications in any type of industry. The range comprises grey and brown ceramic blocks/strips.

The grey types are of a harder ceramic, with a higher melting point and lower slag production than the brown types. The grey types are more prone to cracking by thermal expansion and therefore always require a carrier in the form of a rail or adhesive strip.

The brown types can be applied without a carrier and they can also be cut.

Types with a concave groove are used for processes producing no or relatively small amounts of slag, such as GMAW with solid wire and FCAW with basic flux-cored or metal-cored wires.

Rectangular grooves are required to accommodate the higher slag production from special basic stick electrodes, such as FILARC 35B, rutile flux-cored wires, and SAW fluxes.

Both types are supplied in the form of loose ceramic blocks, blocks mounted in rigid metal rails for straight joints, or blocks on self-adhesive aluminium tape or fitted on wire. Blocks on tape are available in semi-rigid form for straight joints and in flexible form for curved joints, like those used in ship's hulls, tanks, vessels, and pipes.

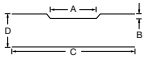
Centreline cracking on ceramic backing

When welding root runs on ceramic backing strips, centreline cracking may occur at high heat inputs. This is a characteristic aspect of all rutile cored wires.

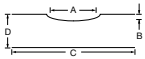
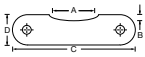
The concave bead shape promotes unfavourable solidification, making the weld prone to hot cracking, especially when shrinkage forces are high.
For crack-free welding, the following guidelines should be observed:

- Use a joint angle of 45-60°C and a root opening of approx. 5 mm
- Use ceramic strips with a rectangular groove to accommodate the slag; the groove width must be around 15 mm
- Use welding currents below 180A (Ø1.2 mm). This produces a more or less oval weld pool, instead of the unfavourable arrow shape
- Minimise weaving to avoid excessive bead thickness, while keeping the arc in front of the weld pool to obtain sufficient penetration

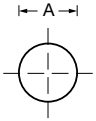
Rectangular groove type for all-postitional welding suitable for flux-cored wires, submerged arc welding, and stick electrodes

	Type	Dimensions, mm				Length, mm	Assembly	Colour
		A	B	C	D			
	PZ1500/33	16	0.9	35	9	100	Loose block	Grey
	PZ1500/81	13	1.5	30	7	600	Tape/block 25 mm	Grey
	PZ1500/54	16	0.9	35	9	600	Tape	Grey
	OK Backing Rectangular 13	13	1.5	26.5	7.3	600	Tape/block 25 mm	Brown

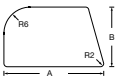
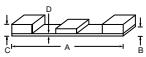
Concave groove type for all-positional welding. Suitable for metal-cored wires, low-slag, flux-cored wires, and solid wires

	Type	Dimensions, mm				Length, mm	Assembly	Colour
		A	B	C	D			
	PZ1500/30	11.5	0.7	25	7	150	Loose block	Brown
	PZ1500/32	13.5	1.3	25	7	150	Loose block	Grey
	PZ1500/70	13.2	1.3	25	7	500	Tape	Grey
	PZ1500/87	5.6	0.9	28	6.5	500	Tape/block 25 mm	Grey
	PZ1500/72	9.5	1.5	25	7	500	Tape/block 25 mm	Grey
	PZ1500/73	12.5	1	25	7	500	Tape/block 25 mm	Brown
	PZ1500/80	16	1.5	30	7	600	Tape/block 25 mm	Grey
	OK Backing Concave 13	13	1.5	26.5	7.3	600	Tape/block 25 mm	Brown
	PZ1500/02	13.2	0.8	30	7	1000	Wire/block 20 mm	Brown

Round type for all-positional welding, flexible for straight or curved plates. Suitable for cored wires, solid wires, and stick electrodes for T, K, and X joints.

	Type	Dimensions, mm				Length, mm	Assembly	Colour
		A	B	C	D			
	PZ1500/01	12	-	-	-	150	Loose block	Brown
	PZ1500/50	7	-	-	-	500	Tape/block 20 mm	Brown
	PZ1500/56	9	-	-	-	500	Tape/block 25 mm	Grey
	PZ1500/51	9.5	-	-	-	500	Tape/block 25 mm	Brown
	PZ1500/57	11.3	-	-	-	500	Tape/block 25 mm	Grey
	PZ1500/52	12	-	-	-	500	Tape/block 25 mm	Brown
	OK Backing Pipe 9	9	-	-	-	600	Tape	Brown
	OK Backing Pipe 12	12	-	-	-	600	Tape	Brown

Special types for all-positional welding straight or curved plates. Suitable for cored wires, solid wires and electrodes

	Type	Dimensions, mm				Length, mm	Assembly	Colour
		A	B	C	D			
For T joints with large root gap								
	PZ1500/29	14.2	9.5	-	-	500	Tape/block 25 mm	Grey
Magnetic clamp for fixing rails or wire-held ceramic block								
	PZ1504/01	250	50	7	1	-	-	-

Packing Data

FILARC Type No.	No/Box	Gross Weight, kg/Box	Box/Pallet
Loose Blocks			
PZ1500/01	200	7	48
PZ1500/32	175	10	48
PZ1500/33	160	12	48
PZ1500/30	175	9	48
Semi-rigid on Adhesive Tape			
PZ1500/70	56	11	42
Flexible on Adhesive Tape or Wire			
PZ1500/02	24	11	36
PZ1500/29	48	9	42
PZ1500/50	100	5	42
PZ1500/51	72	6.5	42
PZ1500/52	60	8.5	42
PZ1500/54	30	13.5	35
PZ1500/56	72	7	42
PZ1500/57	60	9	42
PZ1500/72	56	13	42
PZ1500/73	56	10	42
PZ1500/80	48	12.2	42
PZ1500/81	48	12.2	42
PZ1500/87	54	12.5	42
OK Backing Rectangular 13	56	13.5	35
OK Backing Concave 13	56	13.4	35
OK Backing Pipe 9	72	8	35
OK Backing Pipe 12	56	10	35
Magnetic Clamps			
PZ1504/01	66	10	48

Hand Welding Electrodes

Official Approval

In addition to the official approval given in this catalogue, many OK electrodes are approved by foreign authorities, railway boards, private companies and so on. Information about the different types of approval is available on request.

Tensile Properties

Unless otherwise stated, tensile properties refer to all weld metal test pieces prepared according to the rules of the classification societies using 4 and 6 mm diameter electrodes.

Welding Current

Maximum and minimum values are given.
The most suitable welding current depends largely on the size of the workpiece, the welding position, and the type of joint.

Small workpieces require a lower current, larger workpieces a higher current, depending on the dissipation of heat from the joint.

Cold Cracking

Cold cracking will only occur if the following three factors are present at the same time:

1. Hard phases in the weld, preferably martensite
2. Sufficient stress
3. Hydrogen dissolved in the weld metal

Hard phases form when the weld is cooled rapidly from melting temperature to room temperature. Alloying elements, mostly carbon, are forced to dissolve in the weld metal and make it brittle. The following formula describes this process in the case of standard carbon-manganese steel.

$$E_C = \%C + \frac{\%Mn}{6} + \frac{\%(Cr+Mo+V)}{5} + \frac{\%(Ni+Cu)}{15}$$

Steels with E_C =0.35 and below are usually weldable without any problems at normal steel sizes. For the more highly alloyed steels and steels with thicker dimensions, an elevated working temperature is necessary in order to reduce the cooling rate.

The elevated temperature also allows the hydrogen to diffuse.

To determine elevated working temperatures, please consult BS EN 1011-2 (2011). If the E_C dimension of the plates and heat input are known, these standards will state whether heating is necessary and the level at which it should take place.

Tension cannot be avoided when welding, as steel expands when heated, although correct planning and heat treatment can reduce tension considerably.

Hydrogen forms from water in the surroundings and from the electrode coating. The water is divided into oxygen and hydrogen in the arc and the hydrogen in particular has a strong tendency to dissolve in the weld metal and initiate cold cracking.

Conclusion: Dry basic electrodes when there is risk of cold cracking.

Labelling

The electrode type is clearly marked on the coating of each electrode near the grip end, e.g. OK 48.00.

Choice of Suitable Electrode

The OK electrodes in this catalogue are placed into groups according to the type of alloy deposited. Within each group of electrodes for welding mild, low alloy and stainless steels, there are several cases in which many different electrodes are designed for welding the same type of steel. So, for each steel grade, there are often a large number of electrode types to choose from, all of which produce similar weld metal compositions but have different coatings, welding properties, welding speeds and weld metal quality. This large choice makes it possible to choose the electrode which produces the right weld metal quality at the lowest cost.

When selecting an electrode, the first rule is to select one which produces a weld metal quality equal to or better than that of the base material and, when necessary, is approved for the material in question. Welding position and type of joint are other factors which influence the choice of electrode, as different electrodes have different properties in different welding positions and types of joint.

Influence of coating type on welding properties, welding speed and weld metal quality

Rutile electrodes giving about 100% weld metal recovery are easy to strike and use and are particularly suitable for short welds in mild steel, for fillet welds, welding sheet steels and for bridging large joint gaps. The welds have a fine finish and spatter losses are negligible. The welding speed is moderate.

Unalloyed Electrodes

Unalloyed rutile electrodes are not normally recommended for welding steel with a nominal tensile strength exceeding 440 MPa (45 kp/mm^2). Rutile electrodes are relatively insensitive to moisture.

High-Efficiency Rutile Electrodes

High-efficiency rutile electrodes generally produce a higher welding speed, which increases as the weld metal recovery increases, up to a maximum of about 140 g/min for 6 mm diameter OK Femax 33.80.

They are all easy to use, produce excellent slag detachability, fine bead appearance and are particularly suitable for welding horizontal/vertical fillets. The weld metal has tensile properties which are as high as, or somewhat higher than, those of the weld metal from unalloyed basic electrodes but have lower elongation and impact strength.

The evenness of the weld and the smooth transition of the base material make joints produced with rutile electrodes at least as good in terms of fatigue strength as unmachined joints produced using basic electrodes. Unalloyed rutile electrodes, irrespective of their efficiency, can be recommended for welding mild steel with a nominal tensile strength of 440 MPa (45 kp/mm^2). When it comes to the tensile strength of the deposit, rutile electrodes can also be used for welding steels with a nominal tensile strength of more than 440 MPa (45 kp/mm^2), but as a general rule, only electrodes producing a weld metal with a low hydrogen content, e.g. basic, rutile-basic or zircon-basic electrodes, should be used to weld these steels.

Acid Electrodes

Acid electrodes without iron powder in the covering are easier to strike than basic electrodes, but more difficult to strike and re-strike than rutile electrodes. The welding speed is moderate. The weld beads are smooth and shiny. The slag is inflated and easy to remove. The weld metal has a lower yield stress and tensile strength compared with that produced by rutile electrodes, but it has higher elongation and impact strength.

This type of electrode, which completely dominated the market a few decades ago, has gradually been replaced by rutile electrodes for welding in the flat position and basic electrodes for positional welding. Unalloyed acid electrodes are suitable for welding steels with a nominal tensile strength of up to 440 MPa (45 kp/mm^2).

High-Efficiency Acid Electrodes

High-efficiency acid electrodes have a considerably higher welding speed than normal electrodes, up to a maximum of about 120 g/min for 6 mm diameter OK Femax 39.50. The beads are smooth and shiny. The slag is inflated and easy to remove. High-efficiency acid electrodes are particularly suitable for making butt joints and fillet welds in the flat position. OK Femax 39.50 in long lengths is suitable for gravity welding with short-neck equipment.

The weld metal has the same strength as that produced by normal acid electrodes and the range of applications is therefore similar, i.e. they are suitable for welding mild steels with a nominal tensile strength of no more than 440 MPa (45 kg/mm^2).

Unalloyed Basic Electrodes

Unalloyed basic electrodes give moderate welding speed in the flat position but are faster than other types when welding vertically upwards. The reason for this is that basic electrodes can be deposited at a higher current in the vertical position than other types of electrodes. In addition, the amount of weld metal deposited per electrode is greater than that of other electrodes which can be used in this position. This results in a smaller number of electrode changes. The normal result is therefore a higher fusion rate and higher arc-time factor when welding vertically upwards with basic electrodes compared with other types.

The slag is normally not quite as easy to remove as the slag from acid or rutile electrodes, but in spite of this, it can be classed as easily detachable. The slag from basic electrodes has a lower melting point than that from rutile or acid electrodes. The risk of slag inclusions during normal production welding is therefore unusually small when basic electrodes are used, even if the slag is not completely removed between beads during multi-run welding.

The weld metal from basic electrodes has a low hydrogen content and usually has good toughness even at low temperatures. Basic electrodes are less likely to produce either hot cracks or cold cracks compared with other types of electrode. The superiority of basic electrodes from this point of view appears when welding manganese-alloyed structural steels, pressure vessel steels and ship's plate with a nominal tensile strength of 490-530 MPa (50-54 kp/mm^2). The higher the hardenability of the steel to be welded, the greater the necessity to use basic electrodes and the greater the need for low moisture content in the coating.

Zircon-Basic, High-Efficiency Electrodes

Zircon-basic, high-efficiency electrodes are the fastest of all and are preferably deposited in the flat position. OK Femax 38.95 deposits a maximum of 250 g/min with 6 mm diameter electrodes. Zircon-basic, high-efficiency electrodes can be used for welding the same steels as unalloyed basic electrodes. OK Femax 38.65 is suitable for welding butt joints and fillet joints in the horizontal, vertical, and flat positions.

OK Femax 38.95 is recommended for welding butt joints and fillet joints.

Rutile-Basic, High-Efficiency Electrodes

Rutile-basic, high-efficiency electrodes combine the good welding properties of rutile electrodes with the high weld metal quality of basic electrodes. They are therefore the best electrodes for performing horizontal-vertical fillet welds in high strength steels, where ordinary rutile, high-efficiency electrodes are not permitted. They can be used for welding the same steels as standard unalloyed basic electrodes or unalloyed zircon-basic, high efficiency electrodes.

OK Femax 38.85 is the fastest low-hydrogen electrode for horizontal fillet welds.

Cellulose Electrodes

Cellulose electrodes are easy to use in all welding positions and are particularly good for vertical and overhead welding. Cellulose electrodes are recommended for all-positional welding where the mechanical properties of the deposit are of the greatest importance and radiographic requirements must be met. Vertical and overhead welding often require an electrode one size larger in comparison to electrodes with other types of coating. Cellulose electrodes are extremely good for vertical-down welding.

Higher tensile steel requires preheating and higher interpass temperatures than when the welding is done with low-hydrogen electrodes.

Choose the Correct OK Electrodes, Wires and Fluxes for Hardfacing and Maintenance

Recommendations for the right choice of electrodes for joining dissimilar materials can be found in Figs 1 and 2 on the next page.

The conditions to be considered when choosing the correct electrode, wire and flux for hardfacing and maintenance are summarised in the following outline.

A classification of weld metal resistance to different kinds of working condition can be found in Table 1.

The working conditions for an object that is going to be repaired are often known. The table provides information about suitable electrodes and the different kinds of attack which must be taken into account.

The recommended OK electrodes, wires and fluxes for some of the most common objects for hardfacing and maintenance by welding can be found in Table 2.

Short rules for choosing the correct type of weld metal alloy for hardfacing and cladding with regard to:

1. Type of wear
2. Working conditions
3. Machinability requirements

Useful information when choosing the correct type of alloy

1. The composition of the material to be welded when deciding:
   - Which types of welding alloy are usable and suitable
   - If preheating is favourable
   - If welding a buffer layer is necessary
2. Conditions for welding:
   - Is preheating possible or not? If it is not possible, hardenable welding alloys can only be used to a very limited extent.

   For steel and cast iron weldments, austenitic or non-ferrous alloys are preferable:
   - OK 67.45, OK 67.75 – austenitic
     OK 68.81 and OK 68.82 – austenitic-ferritic
     OK NiFe-Cl, OK NiFe-Cl-A,
     OK NiCrMo-5 – non-ferrous
   - The welding position
   - Can submerged arc welding or gas metal arc welding be applied?
   - For which of the applicable welding processes is suitable filler material available?
3. Working conditions for the repaired workpiece:
   - Type of wear: abrasive, erosive or cavitation. To resist abrasive wear by sharp-edged blast stone and ore, a hard surface or a work-hardening surface is required or desirable.

     Recommended:
     OK Weartrode 60T, OK Weartrode 65T
     OK Weartrode 55 HD, OK Weartrode 60
     OK 13Mn, OK 14MnNi
   - To resist erosive wear, a hard surface and a fine-grained microstructure in the weld metal is required.

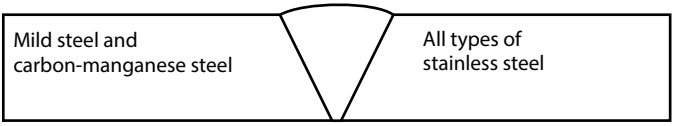
     Recommended:
     OK Weartrode 65T, OK Weartrode 60T
     OK Tooltrode 60, OK Weartrode 55HB
     OK Weartrode 60, remove OK 84.52

     Cavitation attacks in water turbines can usually be prevented by cladding with austenitic electrodes. OK 63.35 is the most frequently used electrode for this purpose, but the following are also suitable:
     OK 67.70, OK 67.71
4. Environment:
   - Corrosive or non-corrosive?
   - The temperature, high or low?
   - To resist wear in a corrosive environment, the weld metal must be resistant to both corrosion and wear. So, depending on the severity of the corrosion attacks, an alloy with some degree of corrosion resistance is required.

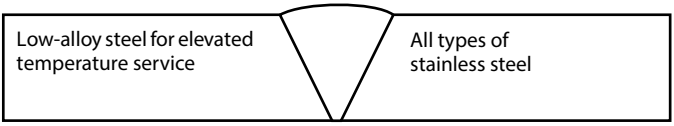
Choose the right OK Electrodes for joining dissimilar materials

Fig. 1

1. OK 67.70, OK 67.75
2. OK 67.45, OK 68.81, OK 68.82



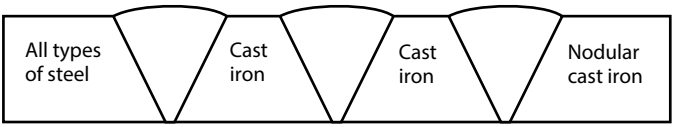
1. OK NiCrFe-3
2. OK 67.70, OK 67.75, OK 67.45
3. OK 63.30, OK 63.35



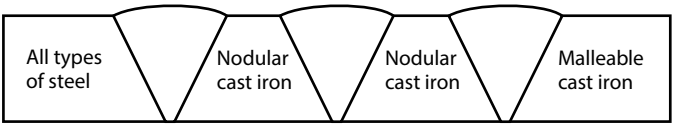
Never use unalloyed electrodes for these joints:

Fig. 2

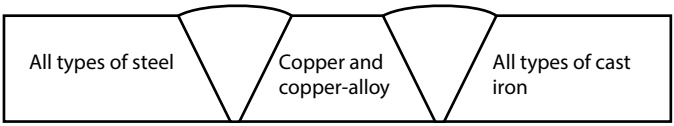
1. OK Ni-CI
2. OK NiFe-CI, OK NiFe-CI-A



1. OK NiFe-CI, OK NiFe-CI-A
2. OK Ni-CI



OK 94.25



1. First choice
2. Second choice
3. Third choice

Table 1. Hardfacing and cladding

Choose the right OK electrode for different working conditions.

Environment	Resistance-Suitability 5. Superior 3. Good 1. Limited Usability
Corrosive Environment Requirements: Corrosion Resistance	**5.** OK NiCrFe-3, OK NiCrMo-5, OK NiCu-7 OK 94.25, Stoodite 1 **4.** OK 68.81, OK 68.82, OK 67.45 **3.** OK Weartrode 65 T, OK Weartrode 60T **2.** OK Weartrode 55 HD, OK Weartrode 50 **1.** OK Weartrode 30, OK Weartrode 60, OK Tooltrode 50, OK Tooltrode 60, OK 13Mn
High Temperature **Oxidizing** Requirements: Scaling Resistance	**5.** OK NiCrFe-3, OK NiCrMo-5 **4.** OK 68.81, OK 68.82, OK Weartrode 60 T, OK 67.45, OK Weartrode 60, OK Weartrode 65 T **3.** OK Weartrode 55 HD, OK Weartrode 50, OK Weartrode 60 **2.** OK Weartrode 50, OK NiCu-7 **1.** OK Weartrode 30, OK 13Mn, OK 14MnNi
Annealing, Softening Requirements: Hardness at high temperature, annealing resistance	**5.** OK NiCrMo-5 **4.** OK Weartrode 60 T, OK Tooltrode 50, OK Tooltrode 60 **3.** OK 84.42, OK 84.52, OK 84.58, OK 83.50, OK 83.65 **2.** OK Weartrode 30, OK 13Mn, OK 14MnNi, OK 68.81, OK 68.82 **1.** OK 67.45
Low Temperature Requirements: Cold Toughness	**5.** OK NiCrFe-3, OK NiCrMo-5, OK NiCu-7, OK 67.45, OK 94.25 **4.** OK 14MnNi, OK 13Mn **3.** OK Weartrode 30, OK 68.81, OK 68.82 **2.** OK Weartrode 50 **1.** OK Weartrode 60, OK Weartrode 55 HD, OK Weartrode 60 T, OK Tooltrode 60
Type of Wear **Impact, high surface pressure** Requirements: Impact resistance and resistance to crushing	**5.** OK NiCrMo-5, OK 13Mn, OK 14MnNi, OK 68.81, OK 68.82 **4.** OK 67.45, OK Weartrode 30 **2.** OK Tooltrode 60 **1.** OK Weartrode 50, OK Weartrode 60, OK Weartrode 55 HD, OK Weartrode 60 T, OK 94.25, Stoodite 1
Wear by Blast Stone and Ore Requirements: High surface-hardness or cold-work hardening weld metal	**5.** OK Weartrode 60 T, OK Weartrode 62, OK Weartrode 65 T, Stoodite 1 **4.** OK 13Mn, OK 14MnNi, OK Weartrode 60, OK Tooltrode 60 **3.** OK Weartrode 50, OK Weartrode 55 HD, Stoodite 6 **2.** OK Tooltrode 50, OK 68.81, OK 68.82, OK 67.45 **1.** OK Weartrode 30
Wear by Fine Grained Materials Sand and Clay Requirements: High surface hardness	**5.** OK Weartrode 62, OK Weartrode 60 T, OK Weartrode 65 T, Stoodite 1 **4.** OK Weartrode 60, OK Tooltrode 60 **3.** OK Weartrode 55 HD, OK Weartrode 50, Stoodite 6 **2.** OK 68.81, OK 68.82 **1.** OK 67.45, OK Weartrode 30, OK 13Mn, OK 14MnNi
Cavitation	**5.** OK 63.35, OK 67.71, Stoodite 6 **4.** OK 67.45, OK 94.25 **2.** OK Weartrode 55 HD, Stoodite 1 **1.** OK Weartrode 30

Table 2. Application range electrodes, wires and fluxes for hardfacing and maintenance

Object	Required Weld Hardness	Consumables for MMA	Consumables for MAG, MIG, FCAW, SAW	Recommended Post Weld Treatment
Shafts NB! Stress relief is recommended for shafts subject to fatigue	< 250 HV 200-300 HV 30-35 HRC 35-40 HRC 44-49 HRC 50-56 HRC	OK 48.xx, OK 55.00 OK 74.78, OK 74.79 OK Weartrode 30/30 HD OK Weartrode 45 OK Weartrode 50/55	 OK Flux 10.96/OK Autrod 12.10 OK Flux 10.71/OK Tubrodur 35 S M OK Flux 10.61/OK Tubrodur 13Cr S	Stress relief Stress relief Stress relief Stress relief
Caterpillar tracks Links	30-35 HRC 35-40 HRC	OK Weartrode 30/30 HD	OK Flux 10.96/OK Autrod 12.10 OK Flux 10.71/OK Tubrodur 35 S M	-
Plates and rollers	31-35 HRC 45-50 HRC	OK Weartrode 30/30 HD OK 14MnNi, work hardening	OK Tubrodur 15CrMn O/G OK Tubrodur 13Mn O/G	-
Brake shoes	30-35 HRC 45-50 HRC	OK Weartrode 30/30 HD OK 14MnNi, work hardening	-	-
Mixer arms, etc	50-56 HRC 55-63 HRC > 62 HRC > 62 HRC	OK Weartrode 55 OK Weartrode 55 HD OK Weartrode 60 T OK Weartrode 65 T OK Weartrode 62	OK Tubrodur 13Cr G OK Tubrodur 55 O A	-
Impellers for mills and crushers	50-58 HRC 58-63 HRC 63 HRC	OK Weartrode 55 HB OK Weartrode 60 OK Weartrode 60 T OK Weartrode 62	OK Tubrodur 58 OG M OK Tubrodur 55 O A	-
Excavator teeth, forged: Joining Hardfacing	55-58 HRC 58-63 HRC	OK 48.xx, OK 55.00 OK Femax 38.65 OK 48.xx + OK Weartrode 55/55 HB OK 48.xx + OK Weartrode 60 OK Weartrode 60 T OK Weartrode 65 T	OK AristoRod 12.50, OK Autrod 12.51 OK Tubrodur 30 O M + OK Tubrodur 58 O/G M OK Tubrodur 55 O A	-
Excavator teeth, 13% Mn steel Joining	-	OK 63.34, OK 67.45	OK Tubrodur 200 O D	-
Hardfacing	≈ 50 HRC 55-58 HRC > 62 HRC	OK 48.xx OK 48.xx + OK Weartrode 55/55 HB OK Weartrode 62	OK Tubrodur 30 O M OK Tubrodur 58 O/G M	-
Excavator buckets, 13% Manganese steel: Joining Hardfacing	 55-58 HRC 58-63 HRC	OK 63.35, OK 67.45 OK 67.75 OK 48.xx + OK Weartrode 55 HD OK Weartrode 60 T + OK Weartrode 65 T	OK Tubrodur 200 O D OK Tubrodur 58 O/G M OK Tubrodur 55 O A	-
Wheel beds for cranes, lorries and loading wagons	< 250 HV 200-300 HV 30-35 HRC 40-45 HRC	OK 48.xx OK 74.78 OK Weartrode 30, OK Weartrode 30 HD OK Weartrode 30	 OK Flux 10.96/OK Autrod 12.10 OK Flux 10.71/OK Tubrodur 35 S M OK Tubrodur 13Mn O/G OK Tubrodur 15CrMn O/G	Stress relief Stress relief

Table 2. Application range electrodes, wires and fluxes for hardfacing and maintenance Continued

Object	Required Weld Hardness	Consumables for MMA	Consumables for MAG, MIG, FCAW, SAW	Recommended Post Weld Treatment
Guillotine blades	50-56 HRC	OK Weartrode 55	OK Tubrodur 13Cr G	-
Cold die and cutting tools	60-65 HRC	OK Weartrode 60	-	-
Cog wheels and bars	< 250 HV 200-300 HV 30-35 HRC 44-49 HRC 51-56 HRC 55-58 HRC	OK 48.xx OK 74.78 OK Weartrode 30 OK Weartrode 30 DH OK Weartrode 45 OK Weartrode 50	OK AristoRod 12.50, OK Autrod 12.51 OK AristoRod 13.12 OK Flux 10.71/OK Tubrodur 35 S M OK Tubrodur 15.73 + OK Autrod 13.91 OK Flux 10.71/OK Tubrodur 58 S M	-
Feed gears	50-56 HRC 55-63 HRC 30-40 HRC	OK Weartrode 50 OK Weartrode 55 OK Weartrode 55 HD OK Weartrode 60 T OK Weartrode 65 T	OK Tubrodur 58 O/G M OK Tubrodur 55 O A OK Tubrodur 200 O D	Hammering
Dredger buckets 13% Mn steel	200-230 HV* 30-50 HRC* 50 HRC 55-58 HRC > 62 HRC	OK Weartrode 30 OK 67.45 OK 48.xx OK 48.xx + OK Weartrode 55/55 T OK Weartrode 60 T OK Weartrode 65 T OK Weartrode 62	OK Tubrodur 15CrMn O/G OK Tubrodur 200 O D OK Tubrodur 58 O/G M, OK Autrod 13.91 OK Tubrodur 55 O A	-
Links and pins 13% Mn steel	-	See buckets, Mn steel	-	-
Buckets, links and pins of carbon steel or low alloyed steel	< 250 HV 200-300 HV 200-300 HV 31-35 HRC 44-50 HRC	OK 48.xx OK 74.78 OK 67.45 OK Weartrode 30 OK Weartrode 30 HD OK Weartrode 45 OK 14MnNi	OK AristoRod 12.50, OK Autrod 12.51 OK AristoRod 13.12 OK Tubrodur 200 O D OK Tubrodur 30 O M OK Tubrodur 40 O M OK Tubrodur 15CrMn O/G	-
Chequer-net wearing plates	50-58 HRC 58-63 HRC > 62 HRC	OK Weartrode 55 HD OK Weartrode 60 OK Weartrode 60 T OK Weartrode 65 T OK Weartrode 62	OK Tubrodur 58 O/G M OK Tubrodur 55 O A	-
Unalloyed and low alloyed C steel	< 250 HV 250-300 HV 31-35 HRC 45-50 HRC** 50-58 HRC	OK 48.xx OK 74.78, OK 74.79 OK Weartrode 30 OK Weartrode 30 HD OK 14MnNi OK Weartrode 55	OK Flux 10.96/OK Autrod 12.10 OK Tubrodur 15CrMn O/G OK Flux 10.71/OK Tubrodur 58 S M OK Autrod 13.91	-
13% Mn steel	200-230 HV 400 HV**	OK 14MnNi OK 67.45	OK Tubrodur 200 O D OK Tubrodur 15CrMn O/G	-

Table 2. Application range electrodes, wires and fluxes for hardfacing and maintenance Continued

Object	Required Weld Hardness	Consumables for MMA	Consumables for MAG, MIG, FCAW, SAW	Recommended Post Weld Treatment
Forging tools	31-35 HRC ≈ 40 HRC** ≈ 45 HRC 40-52 HRC	OK Weartrode 30 OK NiCrMo-5 OK Weartrode 45 Stoodite 1, Stoodite 6	OK Tubrodur 30 O M OK Tubrodur 13Cr G	Tempering 550°C
Stone and ore crushers 13% Mn steel: Plates, cones, spindles, casings, rollers, etc.	200-230 HV 45-50 HRC 55-58 HRC 58-63 HRC	Stoodite 1 Stoodite 6 OK 48.xx + OK Weartrode 55 HD/55 OK 48.xx + OK Weartrode 60 OK Weartrode 60 T	OK Tubrodur 15CrMn O/G OK Tubrodur 58 O/G M	-
High speed tools	60-65 HRC	OK Tooltrode 60	-	Tempering 625°C
Hot bar shears steel	≈ 45 HRC** 50-56 HRC	OK Tooltrode 50		Tempering 625°C
Hot rollers, C steel and low alloyed steel	250-300 HV 30-35 HRC 40-50 HRC 44-50 HRC 40-52 HRC	OK 74.78, OK 74.79 OK Weartrode 30 OK Weartrode 30 HD OK NiCrMo-5 OK Weartrode 45 Stoodite 1, Stoodite 6	OK Tubrodur 30 O M OK Flux 1071/OK Tubrodur 40 S M OK Flux 10.61/OK Tubrodur 13Cr S	Stress relief 500°C Stress relief 500°C Stress relief 500°C

**Chromium-carbide ≈ 1500 HV*
***Work-hardened*
OK 48.xx = all electrodes of the OK 48-series

General Recommendations GMAW

GMAW – Gas Metal Arc Welding

The electrodes and joint faces should be clean. This is particularly important when welding aluminium and aluminium alloys. The shielding gases which are used must be of a purity suitable for welding. Moisture in the gas can produce porous welds.

Shielding Gas for Mild and Low-Alloy Steels

Carbon dioxide, CO_2, is the cheapest and most commonly used gas and, in most cases, it produces satisfactory welds in both mild and low-alloy steel.

Mixed gas, of which the most commonly used consists of 80% Ar + 20% CO_2, is more expensive than pure CO_2, but produces a softer arc, quieter welding, better bead appearance and less spatter. It is therefore often used, in spite of its higher price, for welding sheet steel 0.8-1.5 mm thick, which is more difficult to weld with pure CO_2. A further advantage of mixed gas is the higher quality, in particular notch toughness, compared with CO_2. For this reason, mixed gas is often recommended for welding low-alloy steels, such as creep-resistant steels, even in thicknesses greater than 1.5 mm. Mixed gas of the 80/20 type, in which the argon is of a lower purity, is also available. These gases are less expensive than those based on pure argon and can often be used with equally good results.

One drawback of Ar/CO_2 mixtures is that they lead to increased ozone formation, compared with pure CO_2, when used as shielding gas in arc welding.

Another drawback when using the mixture is that the current load capacity of the welding gun is reduced by about 30% compared with welding with CO_2.

Shielding Gas for Stainless and Heat-Resistant Steels

Argon containing 1% oxygen is normally used for welding stainless and heat-resistant steels, but argon containing 2% O_2 or 5% O_2 is also available. The latter produces a more fluid weld pool. A shielding gas which consists of 98% argon + 2% CO_2 has gained favour for MIG welding stainless steels. It can often replace argon/helium mixtures, which are used to help fusion when welding thick stainless steel, and can very often replace argon/oxygen mixtures.

Choice of Welding Process:

Short Arc or Spray Arc

The electrodes for gas metal arc welding listed in these pages are suitable for short arc welding in the smallest diameters and for spray arc welding in diameters 1.2-2.4 mm. Short arc welding (welding with short circuiting droplet transfer) can be carried out in all positions and is the best process for welding sheet material approximately 0.8-3 mm thick and for making the root run in prepared butt joints. Spray arc welding (welding with finely divided free flight drop transfer) is carried out at higher currents and voltages than short arc welding and is, therefore generally faster and more economical than short arc welding for plate thicknesses exceeding 2-3 mm. It is only used for welding in the horizontal or horizontal/vertical positions. The gas consumption is 6-10 litres/min for short arc welding and 12-20 litres/min for spray arc welding. The higher the welding current, the higher the gas flow required.

Welding Technique

The welding gun is normally held in the right hand, which means that the weld is made from right to left with the gun directed away from the deposited weld at an angle of 75-80° between the electrode and the workpiece, thereby giving the operator a good view of the weld pool and the joint. This produces a smoother weld bead than if the gun is directed towards the finished weld.

Abbreviations

MIG welding = metal inert gas welding
Metal arc welding in an atmosphere consisting mainly of an inert gas such as argon.

MAG welding = metal active gas welding
Metal arc welding in an atmosphere consisting of an active gas, usually carbon dioxide. Gas mixtures containing 20% or more CO_2 are usually classified as active.

General Recommendations for Submerged Arc Welding

1. **The flux must be dry**. Agglomerated fluxes must be protected from moisture pick-up.

   In tropical, humid areas, re-drying agglomerated fluxes at 250-350°C before use is recommended. The remaining flux in the welding machine container should be removed and stored in a dry cabinet and should therefore not be left in the open container during the night.

   During the transport of fluxes, a maximum of two pallets should be stacked to prevent the grains being crushed.

2. The fusion faces and the plate in the vicinity of the joint should be clean and dry. The cleaner the joint, the better the chances of obtaining a satisfactory weld. Rust, mill scale, paint, oil and residue from arc-air gouging or grinding can adversely affect the quality of the weld metal. The more impurities on the fusion faces, the greater the risk of weld metal defects.

3. The arc voltage must be kept constant. Increased arc voltage results in higher flux consumption. If the flux contains alloying elements, the amount transferred to the weld metal will increase as the arc voltage increases.

4. As a general rule, multi-run deposits made at moderate welding currents have better mechanical properties than one- or two-layer deposits made at high currents in similar plate thicknesses.

The mechanical properties are obtained according to the welding conditions given in applicable standards such as EN ISO or AWS.

Other welding conditions may produce weld metal analyses and mechanical properties which differ from those given in the handbook.

Approval in Accordance with Classification Society Rules

Welding materials are normally classified by ESAB in accordance with a standard, e.g. AWS and EN ISO. To verify mechanical properties they are also approved in accordance with the rules of the classification societies.

Classification

The classification of welding products refers to standards and, when a welding product is classified, its type, properties and field of application are given. The manufacturer verifies the correct classification of a product by internal testing and/or by witness of an outside organisation.

Approval

Ship owners and partners in offshore enterprises require welding consumables to be approved in accordance with the rules of the classification societies. Approval is also required by clients in accordance with national or international standards for boiler and pressure vessels as well as other standards to be verified by an authorized approval institute.

Approved welding products are entered on the “List of Approved Welding Consumables” distributed annually by the societies and other institutes.

The ESAB Welding Handbook provides information about the welding position, current/polarity, low hydrogen and grading.

Non-Alloyed and Low-Alloyed Steels

Consumables are divided into three categories based on their tensile strength level:

Normal strength steel: indicated by the numbers 1, 2 or 3 (e.g. 3 3M) that the electrode is to be used in steel with a minimum yield strength (ReH) of 305 and a tensile strength of 400-560 MPa.

High strength steel: indicated by 2Y, 3Y, 4Y, 5Y (ReH min 375 and Rm 490-660 MPa) and 2Y40, 3Y40, 4Y40 (ReH min 400 and Rm 510-690 MPa).

Extra high strength steel: indicated by 3Y42, 4Y42, 5Y42 up to 5Y69 and so on for the different strength steel categories, where the numbers 42...69 symbolize a yield strength in MPa indicating that the electrodes can be used for extra high tensile steels.

Toughness Level

Each steel category is divided into three to five toughness levels represented by the first digit in the grade (1, 2, 3, 4 or 5)

-1 suitable for grade A steel (impact tested at 20°C)

-2 suitable for grade A, B and C steels (impact tested at 0°C)

-3 suitable for grade A, B, D and E steels (impact tested at -20°C)

-4 suitable for grade A, B, D, E and F steels (impact tested at -40°C)

-5 suitable for grades A, B, D, E and F steels (impact tested at -60°C)

Other Frequently Used Abbreviations

T two-run welding (submerged arc welded with one run from eachside)

M multi-run welding (submerged arc or automatic gas-shielded arc welding)

S semi-automatic, gas-shielded and flux-cored arc welding

H5, H10, H15 low-hydrogen welding consumables

DP deep penetration

Stainless Steel and Other High-Content Alloyed Steels

Grades of stainless steel for which the welding consumable is approved are indicated with respect to one or more of the types of stainless steels: 304L, 304LN, 316LN and so on.

The abbreviation SS/CMn indicates approval for joining any of the austenitic types of stainless steel to any of the normal strength or higher tensile ship steels. Dup/CMn indicates approval for joining any of the duplex types of stainless steel to any of the normal strength or higher tensile ship steels.

The system described for grading the consumables in accordance with the rules of the classification societies changes as new steels appear on the market and sometimes there are changes to the approval ratings which might mean that the handbook may not be currently up-to-date. To ensure that valid information is used, please request the latest issued Product Data Sheet for the filler material or please look into the list of product type approvals of the marine society you need the approval from.

EN ISO 2560-A: for covered electrodes for manual arc welding of non-alloyed and fine grain steels

E 46 3 1Ni B 5 4 H5

Symbol for strength and elongation

Symbol	Min. Yield Strength[1], MPa	Tensile Strength, MPa	Min. Elongation[2], %
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
46	460	530-680	20
50	500	560-720	18

1 - For the yield strength the lower yield (R_{eL}) shall be used when yielding occurs, otherwise the 0.2% proof stress ($R_{p0.2}$) shall be used. 2 - $L_0 = 5d$

Symbol for impact properties

Symbol	Min. average impact energy 32 J °C
Z	no requirements
A	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60

Symbol for chemical composition of all weld metal

Alloy Symbol	Chemical Composition[123] %		
	Mn	Mo	Ni
no symbol	2.0	-	-
Mo	1.4	0.3-0.6	-
MnMo	1.4-2.0	0.3-0.6	-
1Ni	1.4	-	0.6-1.2
2Ni	1.4	-	1.8-2.6
3Ni	1.4	-	2.6-3.8
Mn1Ni	1.4-2.0	-	0.6-1.2
Mn2Ni	1.4-2.0	1.2-2.6	1.2-2.6
1NiMo	1.4	0.3-0.6	0.6-1.2
Z	any other agreed composition		

1 - If not specified: Mo <0.2, Ni <0.3, Cr <0.2,V <0.05, Nb <0.05, Cu <0.3(electrodes without gas shield only)
2 - Single values shown in the table mean maximum values
3 - The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31-0, annex B Rule A.

Symbol for diffusible hydrogen

Symbol	Max. hydrogen content, ml/100g deposited weld metal
H 5	5
H 10	10
H 15	15

Symbol for the welding position

Welding positions in accordance with ISO 6947.
1: all positions
2: all positions,except vertical down
3: flat butt weld, flat fillet weld, horizontal/vertical weld
4: flat butt weld, flat fillet weld
5: as 3 and recommended vertical down welding

Symbol for recovery and type of current

Symbol	Weld metal recovery %	Type of current[1,2]
1	≤105	AC + DC
2	≤105	DC
3	>105 ≤125	AC + DC
4	>105 ≤125	DC
5	>125 ≤160	AC + DC
6	>125 ≤160	DC
7	>160	AC + DC
8	>160	DC

1 - In order to demonstrate operability on ac, tests shall be carried out with no load voltage not higher than 65V.
2 - AC = alternation current DC = direct current

Symbol for the type of electrode covering

A	Acid
C	Cellulosic
R RC RA RB RR	Rutile Rutile-cellulosic Rutile-acid Rutile-basic Rutile-thick
B	Basic

EN ISO 18275 – A: for covered electrodes for manual metal arc welding of high-strengths steels.

E 55 4 MnMo B 3 2 H5

Symbol for strength and elongation

Symbol	Min. Yield Strength[1], MPa	Tensile Strength, MPa	Min. Elongation[2], %
55	550	610-780	18
62	620	690-890	18
69	690	760-960	17
79	790	880-1080	16
89	890	980-1180	15

1 - For the yield strength the lower yield (R_{eL}) shall be used when yielding occurs, otherwise the 0.2% proof stress ($R_{p0.2}$) shall be used.
2 - The guage length is equal to five times the test specimen diameter

Symbol for impact properties

Symbol	Min. average impact energy 32 J °C
Z	no requirements
A	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60
7	-70
8	-80

Symbol for chemical composition of all weld metal

Alloy Symbol	Chemical Composition[1,2] %			
	Mn	Ni	Cr	Mo
MnMo	1.4-2.0	-	-	0.3-0.6
Mn1Ni	1.4-2.0	0.6-1.2	-	-
1NiMo	1.4	0.6-1.2	-	0.3-0.6
1.5NiMo	1.4	1.2-1.8	-	0.3-0.6
2NiMo	1.4	1.8-2.6	-	0.3-0.6
Mn1NiMo	1.4-2.0	0.6-1.2	-	0.3-0.6
Mn2NiMo	1.4-2.0	1.8-2.6	-	0.3-0.6
Mn2NiCrMo	1.4-2.0	1.8-2.6	0.3-0.6	0.3-0.6
Mn2Ni1CrMo	1.4-2.0	1.8-2.6	0.6-1.0	0.3-0.6
Z[3]	any other agreed composition			

1 - If not specified: Mo <0.2, Ni <0.3, Cr <0.2,V <0.05, Nb <0.05, Cu <0.3, C ≤ 0.10, P < 0.025, S < 0.020, Si < 0.80
2 - Single values shown in the table mean maximum values
3 - Consumables for which the chemical composition is not listed shall be symbolized similarily and prefixed by the letter Z. The chemical composition ranges are not specified and it is possible that two electrodes with the same Z classification are not interchangeable.

Symbol for diffusible hydrogen

Symbol	Max. hydrogen content, ml/100g deposited weld metal
H 5	5
H 10	10
H 15	15

Symbol for the welding position

Welding positions in accordance with ISO 6947.
1: all positions
2: all positions,except vertical down
3: flat butt weld, flat fillet weld, horizontal/vertical weld
4: flat butt weld, flat fillet weld
5: as 3 and recommended vertical down welding

Symbol for recovery and type of current

Symbol	Weld metal recovery %	Type of current[1,2]
1	≤105	AC + DC
2	≤105	DC
3	>105 ≤125	AC + DC
4	>105 ≤125	DC
5	>125 ≤160	AC + DC
6	>125 ≤160	DC
7	>160	AC + DC
8	>160	DC

1 - In order to demonstrate operability on ac, tests shall be carried out with no load voltage not higher than 65V.
2 - AC = alternation current DC = direct current

Symbol for the type of electrode covering

B	Basic

For other electrodes covering, consult ISO 2560-A.

The letter T indicates that strength, elongation and impact properties in the classification of the deposited weld metal are obtained after a post-weld heat treatment between 560 °C and 600 °C for 1 h. The test piece shall be left in the furnace to cool down to 300 °C.

EN ISO 14171-A: for flux/wire combinations

S 38 5 AB S2Si

S	Submerged arc welding

Symbol for tensile properties

Grade Designation	Min. Yield Strength[1], MPa	Tensile Strength, MPa	Elongation[2], %
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
46	460	530-680	20
50	500	560-720	18

Symbol	Minimum parent material yield strength, MPa	Minimum tensile strength of the welded joint, MPa
2T	275	370
3T	355	470
4T	420	520
5T	500	600

All-weld chemical compositionof FCAW

Symbol	Chemical Composition %			
	Mn	Ni	Mo	Cu
T3	1.4-2.0	-	-	0.3
T3Ni1	1.4-2.0	0.6-1.2	-	0.3

Chemical composition of flux

Symbol	Type of flux
MS	Manganese-silicate
CS	Calcium-silicate
ZS	Zirconium-silicate
RS	Rutile-silicate
AR	Aluminate-rutile
AB	Aluminate-basic
AS	Aluminate-silicate
AF	Aluminate-fluoride-basic
FB	Fluoride-basic
GS	Magnesium-silicate
Z	Any other composition

Symbol for impact properties

Grade Designation	Charpy-V Impact J (min)	Temp °C
Z	No requirements	-
A	47	20
0	47	0
2	47	-20
3	47	-30
4	47	-40
5	47	-50
6	47	-60
7	47	-70
8	47	-80

Type of wire according to EN ISO 14171-A and chemical composition of wire electrode

Grade Designation	C	Si	Mn	Ni	Mo	Cr	Other Elements
SZ	Any other agreed analysis						
S1	0.05-0.15	-0.15	0.35-0.60	-0.15	-0.15	-0.15	*
S2	0.07-0.15	-0.15	0.80-1.30	-0.15	-0.15	-0.15	*
S3	0.07-0.15	-0.15	1.30-1.75	-0.15	-0.15	-0.15	*
S4	0.07-0.15	-0.15	1.75-2.25	-0.15	-0.15	-0.15	*
S1Si	0.07-0.15	0.15-0.40	0.35-0.60	-0.15	-0.15	-0.15	*
S2Si	0.07-0.15	0.15-0.40	0.80-1.30	-0.15	-0.15	-0.15	*
S2Si2	0.07-0.15	0.40-0.60	0.80-1.20	-0.15	-0.15	-0.15	*
S3Si	0.07-0.15	0.15-0.40	1.30-1.85	-0.15	-0.15	-0.15	*
S4Si	0.07-0.15	0.15-0.40	1.85-2.25	-0.15	-0.15	-0.15	*
S1Mo	0.05-0.15	0.05-0.25	0.35-0.60	-0.15	0.45-0.65	-0.15	*
S2Mo	0.07-0.15	0.05-0.25	0.80-1.30	-0.15	0.45-0.65	-0.15	*
S2MoTiB	0.05-0.15	0.15-0.35	1.00-1.35	-	0.40-0.65	-	**
S3Mo	0.07-0.15	0.05-0.25	1.30-1.75	-0.15	0.45-0.65	-0.15	*
S4Mo	0.07-0.15	0.05-0.25	1.75-2.25	-0.15	0.45-0.65	-0.15	*
S2Ni1	0.07-0.15	0.05-0.25	0.80-1.30	0.80-1.20	-0.15	-0.15	*
S2Ni1.5	0.07-0.15	0.05-0.25	0.80-1.30	1.20-1.80	-0.15	-0.15	*
S2Ni2	0.07-0.15	0.05-0.25	0.80-1.30	1.80-2.40	-0.15	-0.15	*
S2Ni3	0.07-0.15	0.05-0.25	0.80-1.30	2.80-3.70	-0.15	-0.15	*
S2Ni1Mo	0.07-0.15	0.05-0.25	0.80-1.30	0.80-1.20	0.45-0.65	-0.20	*
S3Ni1.5	0.07-0.15	0.05-0.25	1.30-1.70	1.20-1.80	-0.15	-0.20	*
S3Ni1Mo	0.07-0.15	0.05-0.25	1.30-1.80	0.80-1.20	0.45-0.65	-0.20	*
S3Ni1Mo0,2	0.07-0.15	0.10-0.35	1.20-1.60	0.80-1.20	0.15-0.30	-0.15	P, S: -0.015
S3Ni1.5Mo	0.07-0.15	0.05-0.25	1.20-1.80	1.20-1.80	0.30-0.50	-0.20	*
S2Ni1Cu	0.06-0.12	0.15-0.35	0.70-1.20	0.65-0.90	0.15	-0.40	Cu: 0.40-0.65
S3Ni1Cu	0.05-0.15	0.15-0.40	1.20-1.70	0.60-1.20	0.15	-0.15	Cu: 0.30-0.60

** Cu: -0.30 P, S: 0.025 or 0.020 Al: -0.030 ** Ti: 0.10-0.20 B: 0.005-0.020*

EN ISO 17632: for Cored Wires

T 46 3 1Ni B M 4 H5

Symbol for strength and elongation

Symbol	Min. Yield Strength[1], MPa	Tensile Strength, MPa	Min. Elongation[2], %
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
46	460	530-680	20
50	500	560-720	18

1 - For the yield strength the lower yield (R_e) shall be used when yielding occurs, otherwise the 0.2% proof stress ($R_{p0.2}$) shall be used. 2 - $L_0 = 5d$

Symbol for impact properties

Symbol	Min. average impact energy 47J °C
Z	no requirements
A	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60

Symbol for chemical composition of all weld metal

Alloy Symbol	Chemical Composition[1][2][3] %		
	Mn	Mo	Ni
no symbol	2.0	-	-
Mo	1.4	0.3-0.6	-
MnMo	> 1.4-2.0	0.3-0.6	-
1Ni	1.4	-	0.6-1.2
2Ni	1.4	-	1.8-2.6
3Ni	1.4	-	> 2.6-3.8
Mn1Ni	> 1.4-2.0	-	0.6-1.2
1NiMo	1.4	0.3-0.6	0.6-1.2
Z	any other agreed composition		

1 - If not specified: Mo <0.2, Ni <0.3, Cr <0.2,V <0.05, Nb <0.05, Cu <0.3(electrodes without gas shield only)
2 - Single values shown in the table mean maximum values
3 - The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31-0, annex B Rule A.

Symbol for diffusible hydrogen

Symbol	Max. hydrogen content, ml/100g deposited weld metal
H 5	5
H 10	10
H 15	15

Symbol for the welding position

The welding positions are symbolised by a digit designating the positions for which the electrode is tested according to prEN-3 (00121205)
1: all positions 2: all positions,except vertical down 3: flat butt weld, flat fillet weld, horizontal/vertical weld 4: flat butt weld, flat fillet weld 5: as 3 and recommended vertical down welding

Shielding gas

EN 758 symbol	
M	Argon mixture
C	CO_2
N	No shielding gas

Description of core

Gas-Shielded	
R	Rutile base, slow freezing slag
P	Rutile base, fast freezing slag
B	Basic slag
M	Metal powder core
Self-Shielded	
U	
V	Rutile of basic/fluoride
W	Basic/fluoride, slow freezing slag
X	
Y	Basic/fluoride, fast freezing slag
Z	Other types
S	

EN ISO 14174: for fluxes

S A AB 1 67 AC H5

S	Submerged arc welding
ES	Electroslag welding

Method of manufacture

Symbol	
F	Fused flux
A	Agglomerated flux
M	Mixed flux

Chemical composition of flux

Symbol	Type of flux
MS	Manganese-silicate
CS	Calcium-silicate
ZS	Zirconium-silicate
RS	Rutile-silicate
AR	Aluminate-rutile
AB	Aluminate-basic
AS	Aluminate-silicate
AF	Aluminate-fluoride-basic
FB	Fluoride-basic
GS	Magnesium-silicate
Z	Any other composition

Application

Class	
1	SA welding of non alloy and low alloy steels
2 and 2B	Fluxes for joining and surfacing of/with stainless and heat resisting Cr and Cr-Ni steels and/or Ni and Ni-based alloys. 2B for fluxes especially for strip cladding.
3	Fluxes for hardfacing overlay welding which alloy elements such as C, Cr or Mo to the weld metal.
4	Other fluxes which do not fit in class 1 to 3, e.g. fluxes for backing in one-side welding applications.

Hydrogen content of deposited metal

Symbol	Max. hydrogen content, ml/100g deposited weld metal
H 2	2
H 4	4
H 5	5
H 10	10

Type of current

Symbol	
DC	Direct current only
AC	Alternating and direct current

Metallurgical behaviour, flux class 1

Symbol	Metallurgical behaviour	Contribution from flux
1	Burn-out	>0.7
2	Burn-out	0.5-0.7
3	Burn-out	0.3-.05
4	Burn-out	0.1-0.3
5	Neutral	0.0-0.1
6	Pick-up	0.1-0.3
7	Pick-up	0.3-0.5
8	Pick-up	0.5-.07
9	Pick-up	>0.7
Sequence	Si, then Mn	

Metallurgical behaviour, flux class 2 and class 2B

Symbol	Metallurgical Behaviour	Chemical Composition[123] %			
		C	Si	Cr	Nb
1	Burn-out	>0.020	>0.7	>2.0	>0.20
2	Burn-out	-	0.5-0.7	1.5-2.0	0.15-1.20
3	Burn-out	0.010-0.020	0.3-0.5	1.0-1.5	0.10-0.15
4	Burn-out	-	0.1-0.3	0.5-1.0	0.05-0.10
5	Neutral	0.000-0.010	0.0-0.1	0.0-0.5	0.00-0.05
6	Pick-up	-	0.1-0.3	0.5-1.0	0.05-0.10
7	Pick-up	0.010-0.020	0.3-0.5	1.0-1.5	0.10-0.15
8	Pick-up	-	0.5-0.7	1.5-2.0	0.15-0.20
9	Pick-up	>0.020	>0.7	>2.0	>2.0
Sequence	C, Si, then Cr, Nb (then other elements if applicable)				

Metallurgical behaviour, flux class 3 and class 4

Class 3	Stating chemical symbols of alloying elements (e.g. C, Cr, Mo) and approximate amount (without the % symbol).
Class 4	Stating chemical symbols of alloying elements

SFA/AWS A5.17: specification for carbon steel electrodes and fluxes for submerged arc welding

F 7 A 5 - EM12K

F	Submerged arc welding flux

Symbol for strength and elongation

Symbol	Min. Yield Strength, MPa	Tensile Strength, MPa	Min. Elongation, %
6	330	415 - 550	22
7	400	480 - 650	22

Symbol for heat treatment

Symbol	
A	As Welded
P	Postweld heat treated (PWHT); 620°C / 1h

Symbol for impact properties

Symbol	Min. average impact energy 27J °C
0	-18
2	-29
4	-40
5	-46
6	-51
8	-62
Z	no requirements

Symbol for chemical composition of wire electrodes

Symbol	Chemical Composition %					
	C	Mn	Si	S	P	Cu (including Cu-coating)
EL12	0.04-0.14	0.25-0.60	0.10	0.030	0.030	0.35
EM12	0.06-0.15	0.80-1.25	0.10	0.030	0.030	0.35
EM12K	0.05-0.15	0.80-1.25	0.10-0.35	0.030	0.030	0.35
EH12K	0.06-0.15	1.50-2.00	0.25-0.65	0.025	0.025	0.35
EH14	0.10-0.20	1.70-2.20	0.10	0.030	0.030	0.35
Single values are maximum.						

Symbol for chemical composition for composite electrode weld metal

Symbol	Chemical Composition %					
	C	Mn	Si	S	P	Cu
EC1	0.15	1.80	0.90	0.035	0.035	0.35
ECG	Not specified					
Single values are maximum.						

EN ISO 24598-A: welding consumables - solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of creep-resisting steels

S S CrMo1 FB

S	Submerged arc welding

Type of wire

S	Solid Wire
T	Tubular Wire

Type of flux

FB	Flouride-basic

Chemical composition of solid wire electrodes for submerged arc welding (extract of table)

Symbol	Chemical Composition[123] %										
	C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Other
Mo	0.08-0.15	0.05-0.25	0.80-1.20	0.025	0.025	0.2	0.3	0.45-0.65	0.030	0.3	Nb: 0.01
MnMo	0.08-0.15	0.05-0.25	1.30-1.70	0.025	0.025	0.2	0.3	0.45-0.65	0.030	0.3	Nb: 0.01
CrMo1	0.08-0.15	0.05-0.25	0.60-1.00	0.020	0.020	0.90-1.30	0.3	0.40-0.65	0.030	0.3	Nb: 0.01
CrMo2	0.08-0.15	0.05-0.25	0.30-0.70	0.020	0.020	2.2-2.8	0.3	0.90-1.15	0.025	0.3	Nb: 0.01
CrMo5	0.03-0.10	0.20-0.50	0.40-0.75	0.020	0.020	5.5-6.5	0.3	0.50-0.80	0.030	0.3	Nb: 0.01
CrMo91	0.07-0.15	0.60	0.4-1.5	0.020	0.020	8.0-10.5	0.4-1.0	0.80-1.20	0.025	0.15-0.30	Nb: 0.03-0.10 N: 0.02-0.07
Z	Any other agreed composition.										
Single values shown in the table are maximum values.											

Chemical composition for all weld metal deposits (extract of table)

Symbol	Chemical Composition[123] %										
	C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Other
Mo	0.15	0.80	1.4	0.030	0.030	0.2	0.3	0.45-0.65	0.35	0.3	Nb: 0.01
MnMo	0.15	0.80	2.0	0.030	0.030	0.2	0.3	0.45-0.65	0.35	0.3	Nb: 0.01
CrMo1	0.15	0.80	1.20	0.030	0.030	0.80-1.30	0.25	0.35-0.65	0.40	0.3	Nb: 0.01
CrMo2	0.15	0.80	1.20	0.030	0.030	2.2-2.8	0.3	0.80-1.15	0.35	0.3	Nb: 0.01
CrMo5	0.10	0.80	1.20	0.030	0.030	4.5-6.5	0.3	0.45-0.80	0.35	0.3	Nb: 0.01
CrMo91	0.15	0.80	1.80	0.030	0.030	8.0-10.5	1.0	0.70-1.20	0.35	0.10-0.30	Nb: 0.02-0.10 N: 0.02-0.07
Z	Any other agreed composition.										
Single values shown in the table are maximum values.											

Mechanical properties of all weld metal deposits (Extract of table)

Symbol	Min. Yield Strength[1], MPa	Min. Tensile Strength, MPa	Min. Elongation[2], %	Min. Toughness at 20°C		Heat Treatment		
				Average of 3, J	Single Value, J	Preheat interpass, °C	PWHT Temp °C	PWHT Time, minutes
Mo	355	510	22	47	38	<200	-	-
MnMo	355	510	22	47	38	<200	-	-
CrMo1	355	510	20	47	38	150-250	660-700	60
CrMo2	400	500	18	47	38	200-300	690-750	60
CrMo5	400	590	17	47	38	200-300	730-760	60
CrMo91	415	585	17	47	38	250-350	750-760	180
Z	Any other agreed composition.							

SFA/AWS A5.23: specification for low-alloy steel electrodes and fluxes for submerged arc welding - two-run classification system

F 8T A 6 - EA2TiB

S	Submerged arc welding flux

Symbol for strength and elongation, two-run (T)

Symbol	Yield Strength[1], MPa	Tensile Strength, MPa	Min. Elongation[2], %
6T	340	410	22
7T	410	480	22
8T	480	550	20
9T	550	620	17
10T	620	690	16
11T	690	760	15
12T	760	830	14
13T	830	900	14

All values are minimum requirements.

Symbol for impact properties

Symbol	Min. average impact energy 27J °C
0	-18
2	-29
4	-40
5	-46
6	-51
8	-62
10	-73
15	-101
Z	no requirements

Symbol for heat treatment

Symbol	
A	As Welded
P	Postweld heat treated (PWHT); depending on alloy, 620°C, 690°C and other temp. / 1h

Chemical composition of solid wire electrodes for submerged arc welding (extract of table)

Symbol	Chemical Composition[123] %									
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu (incl Cu-coating)	Other
EA2	0.05-0.17	0.95-1.35	0.20	0.025	0.025	-	-	0.45-0.65	0.35	-
EA2TiB	0.05-0.17	0.95-1.35	0.35	0.025	0.025	-	-	0.45-0.65	0.35	see 1
EA4	0.05-0.17	1.20-1.70	0.20	0.025	0.025	-	-	0.45-0.65	0.35	-
EB2R	0.07-0.15	0.45-1.00	0.05-0.30	0.010	0.010	1.00-1.75	-	0.45-0.65	0.15	see 2
EB3R	0.05-0.15	0.40-0.80	0.05-0.30	0.010	0.010	2.25-3.00	-	0.90-1.00	0.15	see 2
EB6	0.10	0.35-0.70	0.05-0.50	0.025	0.025	4.50-6.50	-	0.45-0.70	0.35	-
EB91	0.07-0.13	1.25	0.50	0.010	0.010	8.50-10.50	1.00	0.85-1.15	0.10	see 3
ENi1	0.12	0.75-1.25	0.05-0.30	0.020	0.020	0.15	0.75-1.25	0.30	0.35	-
ENi2	0.12	0.75-12.5	0.05-0.30	0.020	0.020	-	2.10-2.90	-	0.35	-
ENi3	0.13	0.60-1.20	0.05-0.30	0.020	0.020	0.15	3.10-3.80	-	0.35	-
ENi6	0.07-0.15	1.20-1.60	0.05-0.30	0.020	0.020	-	0.75-1.25	0.10-0.30	0.35	-
EG	not specified									
(EC)	(composite electrode)									

Single values are maximum.
1.) Ti: 0.05-0.30; B: 0.005 - 0.030 2) As: 0.005; Sn: 0.005; Sb: 0.005 3) V: 0.15-0.25; Nb: 0.02-0.10; N: 0.03-0.07; Al: 0.04

SFA/AWS A5.23: specification for low-alloy steel electrodes and fluxes for submerged arc welding - multiple pass classification system

F 8 A 10 - ENi6 - Ni6

S	Submerged arc welding flux

Symbol for strength and elongation

Symbol	Min. Yield Strength[1], MPa	Tensile Strength, MPa	Min. Elongation[2], %
7	400	480-650	22
8	470	550-690	20
9	540	620-760	17
10	610	690-830	16
11	680	760-900	15
12	740	830-870	14
13	810	900-1030	14

Symbol for impact properties

Symbol	Min. average impact energy 27J °C
0	-18
2	-29
4	-40
5	-46
6	-51
8	-62
10	-73
15	-101
Z	no requirements

Symbol for heat treatment

Symbol	
A	As Welded
P	Postweld heat treated (PWHT); depending on alloy, 620°C, 690°C and other temp. / 1h (B91: 2h)

Chemical composition of solid wire electrodes for submerged arc welding (extract of table)

Symbol	Chemical Composition[123] %									
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu (incl Cu-coating)	Other
EA2	0.05-0.17	0.95-1.35	0.20	0.025	0.025	-	-	0.45-0.65	0.35	-
EA2TiB	0.05-0.17	0.95-1.35	0.35	0.025	0.025	-	-	0.45-0.65	0.35	see 1
EA4	0.05-0.17	1.20-1.70	0.20	0.025	0.025	-	-	0.45-0.65	0.35	-
EB2R	0.07-0.15	0.45-1.00	0.05-0.30	0.010	0.010	1.00-1.75	-	0.45-0.65	0.15	see 2
EB3R	0.05-0.15	0.40-0.80	0.05-0.30	0.010	0.010	2.25-3.00	-	0.90-1.00	0.15	see 2
EB6	0.10	0.35-0.70	0.05-0.50	0.025	0.025	4.50-6.50	-	0.45-0.70	0.35	-
EB91	0.07-0.13	1.25	0.50	0.010	0.010	8.50-10.50	1.00	0.85-1.15	0.10	see 3
ENi1	0.12	0.75-1.25	0.05-0.30	0.020	0.020	0.15	0.75-1.25	0.30	0.35	-
ENi2	0.12	0.75-12.5	0.05-0.30	0.020	0.020	-	2.10-2.90	-	0.35	-
ENi3	0.13	0.60-1.20	0.05-0.30	0.020	0.020	0.15	3.10-3.80	-	0.35	-
ENi6	0.07-0.15	1.20-1.60	0.05-0.30	0.020	0.020	-	0.75-1.25	0.10-0.30	0.35	-
EG	not specified									
(EC)	(composite electrode)									

Single values shown in the table are maximum values.
1) Ti: 0.05-0.30; B: 0.005-0.030 2) As: 0.005; Sn: 0.005; Sb: 0.005 3) V: 0.15 - 0.25; Nb: 0.02 - 0.10; N: 0.03 - 0.07; Al: 0.04

Chemical composition of weld metal (extract of complete table)

Symbol	Chemical Composition[123] %									
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu (incl Cu-coating)	Other
A2	0.12	1.40	0.80	0.030	0.030	-	-	0.40-0.65	0.35	-
A3	0.15	2.10	0.80	0.030	0.030	-	-	0.40-0.65	0.35	-
A4	0.15	1.60	0.80	0.030	0.030	-	-	0.40-0.65	0.35	-
B2	0.05-0.15	1.20	0.80	0.030	0.030	1.00-1.50	-	0.40-0.65	0.35	-
B2R	0.05-0.15	1.20	0.80	0.010	0.010	1.00-1.50	-	0.40-0.65	0.15	see 1
B3	0.05-0.15	1.20	0.80	0.030	0.030	2.00-2.50	-	0.90-1.20	0.35	-
B3R	0.05-0.15	1.20	0.80	0.010	0.010	2.00-2.50	-	0.90-1.20	0.15	see 1
B91	0.08-0.13	1.20	0.80	0.010	0.010	8.0-10.5	0.80	0.85-1.20	0.25	see 2
Ni1	0.12	1.60	0.80	0.025	0.030	0.15	0.75-1.10	0.24	0.35	see 3
Ni2	0.12	1.60	0.80	0.025	0.030	-	2.00-2.90	-	0.35	-
Ni3	0.12	1.60	0.80	0.025	0.030	0.15	2.80-3.80	-	0.35	-
Ni6	0.14	1.60	0.80	0.025	0.030	-	0.70-1.10	0.10-0.35	0.35	-
F3	0.17	1.25-2.25	0.80	0.030	0.030	-	0.70-1.10	0.40-0.65	0.35	-
G	as agreed between supplier and purchaser									
(EC)	(composite electrode)									

Single values are maximum.
Weld metals generated with a composite electrode have the prefix "EC" before the appropriate electrode description.
1) As: 0.005; Sn: 0.005; Sb: 0.005 2) Mn+Ni = 1.40 max; Nb: 0.02 - 0.10; N: 0.02-0.07; V: 0.15-0.25; Al: 0.04 3) Ti+V+Zr: 0.05

EN ISO 26304-A: welding consumables – solid wire electrodes, tubular cored electrodes and electrode-flux-combinations for saw of high strength steels

S 55 6 FB - S3Ni1Mo

S	Submerged arc welding flux

Symbol for strength and elongation, two-run (T)

Symbol	Min. Yield Strength[1], MPa	Tensile Strength, MPa	Min. Elongation[2], %
55	550	640-820	18
62	620	700-890	18
69	690	770-940	17
79	790	880-1080	16
89	890	940-1180	15

Symbol for impact properties

Symbol	Min. average impact energy 47J °C
A	20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60
Z	no requirements

Chemical composition of flux

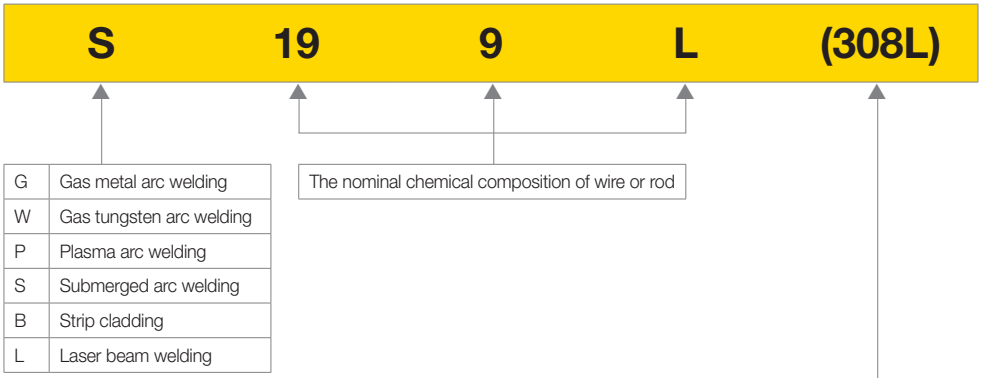
Symbol	Type of flux
MS	Manganese-silicate
CS	Calcium-silicate
ZS	Zirconium-silicate
RS	Rutile-silicate
AR	Aluminate-rutile
AB	Aluminate-basic
AS	Aluminate-silicate
AF	Aluminate-fluoride-basic
FB	Fluoride-basic
GS	Magnesium-silicate
Z	Any other composition

Chemical composition of solid wire electrodes for submerged arc welding (extract of table)

Symbol	Chemical Composition[123] %									
	C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Other
S2Ni1Mo	0.07-0.15	0.05-0.25	0.80-1.30	0.020	0.020	0.20	0.80-1.20	0.45-0.65	0.30	0.50
S3Ni1Mo	0.07-0.15	0.05-0.35	1.30-1.80	0.020	0.020	0.20	0.80-1.20	0.45-0.65	0.30	0.50
S2Ni2Mo	0.05-0.09	0.15	1.10-1.40	0.015	0.015	0.15	2.00-2.50	0.45-0.60	0.30	0.50
S2Ni3Mo	0.08-0.12	0.10-0.25	0.80-1.20	0.020	0.020	0.15	2.80-3.20	0.10-0.25	0.30	0.50
S1Ni2, 5CrMo	0.07-0.15	0.10-0.25	0.45-0.75	0.020	0.020	0.50-0.85	2.10-2.60	0.40-0.70	0.30	0.50
S3Ni2, 5CrMo	0.07-0.15	0.10-0.25	1.20-1.80	0.020	0.020	0.30-0.85	2.00-2.60	0.40-0.70	0.30	0.50
S3Ni1, 5CrMo	0.07-0.14	0.05-0.15	1.30-1.50	0.020	0.020	0.15-0.35	1.50-1.70	0.30-0.50	0.30	0.50
S3Ni1, 5Mo	0.07-0.15	0.05-0.25	1.20-1.80	0.020	0.020	0.20	1.20-1.80	0.30-0.50	0.30	0.50
S4Ni2CrMo	0.08-0.11	0.30-0.40	1.80-2.00	0.015	0.015	0.85-1.00	2.10-2.60	0.55-0.70	0.30	0.50
SZ	any other agreed composition									
(EC)	(composite electrode)									

1) Al, Sn, As and Sb <= 0.02% each and Ti, Pb and N <=0.01%
2) Cu: Including the cu-coating
3) Single vales shown in the table are maximum values.

EN ISO 14343-A: welding consumables - wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat-resisting steels (extract)



G	Gas metal arc welding
W	Gas tungsten arc welding
P	Plasma arc welding
S	Submerged arc welding
B	Strip cladding
L	Laser beam welding

Chemical composition of alloy type

Nominal composition	Alloy Type	Chemical Composition in %										
		C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Other
19 9 L		0.03	0.65	1.0-2.5	0.03	0.02	19.0-21.0	9.0-11.0	0.5	-	0.5	-
	308L	0.03	0.65	1.0-2.5	0.03	0.03	19.5-22.0	9.0-11.0	0.75	-	0.75	-
19 9 H		0.04-0.08	1.0	1.0-2.5	0.03	0.02	18.0-21.0	9.0-11.0	0.5	-	0.5	-
	308H	0.04-0.08	0.65	1.0-2.5	0.03	0.03	19.5-22.0	9.0-11.0	0.5	-	0.75	-
18 8 Mn		0.20	1.2	5.0-8.0	0.03	0.03	17.0-20.0	7.0-10.0	0.5		0.5	-
23 12 L		0.03	0.65	1.0-2.5	0.03	0.02	22.0-25.0	11.0-14.0	0.5	-	0.5	-
	309L	0.03	0.65	1.0-2.5	0.03	0.03	23.0-25.0	12.0-14.0	0.75	-	0.75	-
23 12 2 L		0.03	1.0	1.0-2.5	0.03	0.02	21.0-25.0	11.0-15.5	2.0-3.5	-	0.5	-
	309LMo	0.03	0.65	1.0-2.5	0.03	0.03	23.0-25.0	12.0-14.0	2.0-3.0	-	0.75	-
25 20		0.08-0.15	2.0	1.0-2.5	0.03	0.02	24.0-27.0	18.0-22.0	0.5	-	0.5	-
	310	0.08-0.15	0.65	1.0-2.5	0.03	0.03	25.0-28.0	20.0-22.5	0.75	-	0.75	-
29 9		0.15	1.0	1.0-2.5	0.03	0.02	28.0-32.0	8.0-12.0	0.5	-	0.5	-
	312	0.15	0.65	1.0-2.5	0.03	0.03	28.0-32.0	8.0-10.5	0.75	-	0.75	-
19 12 3 L		0.03	0.65	1.0-2.5	0.03	0.02	18.0-20.0	11.0-14.0	2.5-3.0	-	0.5	-
	316L	0.03	0.65	1.0-2.5	0.03	0.03	18.0-20.0	11.0-14.0	2.0-3.0	-	0.75	-
19 12 3 H		0.04-0.08	1.0	1.0-2.5	0.03	0.02	18.0-20.0	11.0-14.0	2.0-3.0	-	0.5	-
	316H	0.04-0.08	0.65	1.0-2.5	0.03	0.03	18.0-20.0	11.0-14.0	2.0-3.0	-	0.75	-
18 15 3 L		0.03	1.0	1.0-4.0	0.03	0.02	17.0-20.0	13.0-16.0	2.5-4.0	-	0.5	-
	317L	0.03	0.65	1.0-2.5	0.03	0.03	18.5-20.5	13.0-15.0	3.0-4.0	-	0.75	-
19 12 3 Nb		0.08	0.65	1.0-2.5	0.03	0.02	18.0-20.0	11.0-14.0	2.5-3.0	-	0.5	Nb=10xC to 1.0
	318	0.08	0.65	1.0-2.5	0.03	0.03	18.0-20.0	11.0-14.0	2.0-3.0	-	0.75	Nb=8xC to 1.0
19 9 Nb		0.08	0.65	1.0-2.5	0.03	0.02	19.0-21.0	9.0-11.0	0.5	-	0.5	Nb=10xC to 1.0
	347	0.08	0.65	1.0-2.5	0.03	0.03	19.0-21.5	9.0-11.0	0.75	-	0.75	Nb=10xC to 1.0
25 9 4 N L		0.03	1.0	2.5	0.03	0.02	24.0-27.0	8.0-10.5	2.5-4.5	0.2-0.3	1.5	W 1.0
20 25 5 Cu L		0.03	1.0	1.0-4.0	0.03	0.02	19.0-22.0	24.0-27.0	4.0-6.0	-	1.0-2.0	-
	385	0.025	0.5	1.0-2.5	0.02	0.03	19.5-21.5	24.0-26.0	4.2-5.2	-	1.2-2.0	-
20 16 3 Mn L		0.03	1.0	5.0-9.0	0.03	0.02	19.0-22.0	15.0-18.0	2.5-4.5	-	0.5	-
25 22 2 N L		0.03	1.0	3.5-6.5	0.03	0.02	24.0-27.0	21.0-24.0	1.5-3.0	0.1-0.2	0.5	-
22 9 3 N L		0.03	1.0	2.5	0.03	0.02	21.0-24.0	7.0-10.0	2.5-4.0	0.1-0.2	0.5	-
	2209	0.03	0.90	0.5-2.0	0.03	0.03	21.5-23.5	7.5-9.5	2.5-3.5	0.08-0.2	0.75	-
23 7 N L		0.03	1.0	2.5	0.03	0.02	22.5-25.5	6.5-9.5	0.8	0.10-0.20	0.5	-
25 9 4 N L	2594	0.03	1.0	2.5	0.03	0.02	24.0-27.0	8.0-10.5	2.5-4.5	0.20-0.30	1.5	W 1.0
	410NiMo	0.03	0.5	0.6	0.03	0.03	12.0-14.0	0.75	0.75	-	0.75	-

EN ISO 18274: welding consumables - wire and strip electrodes, wires and rods for arc welding of nickel and nickel alloys (extract)



S	Solid wire (electrode), solid rod
B	Solid strip electrode

Symbol for the chemical composition of strip, wire or rod.

Chemical composition of alloy type

Symbol	Chemical Composition in %									
	C	Si	Mn	Cr	Ni	Mo	Nb	Cu	Fe	Other
Ni6082 (NiCr20Mn3Nb)	0.1	0.5	2.5-3.5	18.0-22.0	Min. 67.0	-	2.0-3.0	0.5	3.0	Ti: 0.7 P: 0.03
Ni6625 (NiCr22Mo9Nb)	0.1	0.5	0.5	20.0-23.0	Min. 58.0	8.0-10.0	3.2-4.1	0.5	5.0	Ti: 0.4 Al: 0.4
Ni6276 (NiCr15Mo16Fe6W4)	0.02	0.08	1.0	14.5-16.5	Min. 50.0	15.0-17.0	-	0.5	4.0-7.0	Co: 2.5 W: 3.0-4.5
Ni6059 (NiCr23Mo16)	0.01	0.1	0.5	22.0-24.0	Min. 56.0	15.0-16.5	-	0.5	2.0-5.0	Ti: 0.5 Al: 0.1-0.4

SFA/AWS A5.4: specification for stainless steel electrodes for shielded metal arc welding (extract)



Nominal chemical composition of the filler metal

Symbol	Chemical Composition in %										
	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Other
E307	0.04-0.14	1.0	3.30-4.75	0.04	0.03	18.0-21.5	9.0-10.7	0.50-1.5	-	0.75	-
E308L	0.04	1.0	0.5-2.5	0.04	0.03	18.0-21.0	9.0-11.0	0.75	-	0.75	-
E308H	0.04-0.08	1.0	0.5-2.5	0.04	0.03	18.0-21.0	9.0-11.0	0.75	-	0.75	-
E309L	0.04	1.0	0.5-2.5	0.04	0.03	22.0-25.0	12.0-14.0	0.75	-	0.75	-
E309LMo	0.04	1.0	0.5-2.5	0.04	0.03	22.0-25.0	12.0-14.0	2.0-3.0	-	0.75	-
E310	0.08-0.20	0.75	1.0-2.5	0.03	0.03	25.0-28.0	20.0-22.5	0.75	-	0.75	-
E312	0.15	1.0	0.5-2.5	0.04	0.03	28.0-32.0	8.0-10.5	0.75	-	0.75	-
E316L	0.04	1.0	0.5-2.5	0.04	0.03	17.0-20.0	11.0-14.0	2.0-3.0	-	0.75	-
E316H	0.04-0.08	1.0	0.5-2.5	0.04	0.03	17.0-20.0	11.0-14.0	2.0-3.0	-	0.75	-
E317L	0.04	1.0	0.5-2.5	0.04	0.03	18.0-21.0	12.0-14.0	3.0-4.0	-	0.75	-
E318	0.08	1.0	0.5-2.5	0.04	0.03	17.0-20.0	11.0-14.0	2.0-3.0	-	0.75	Nb=6xCmin/1.0max
E347	0.08	1.0	0.5-2.5	0.04	0.03	18.0-21.0	9.0-11.0	0.75	-	0.75	Nb=8xCmin/1.0max
E385	0.03	0.9	1.0-2.5	0.03	0.02	19.5-21.5	24.0-26.0	4.2-5.2	-	1.2-2.0	
E2209	0.04	1.0	0.5-2.0	0.04	0.03	21.5-23.5	8.5-10.5	2.5-3.5	0.08-0.20	0.75	-
E2594	0.04	1.0	0.5-2.0	0.04	0.03	24.0-27.0	8.0-10.5	3.5-4.5	0.20-0.30	0.75	-

SFA/AWS A5.9: bare stainless steel welding electrodes and rods (extract)

ER **316L**

ER	Solid wires (electrodes or rods
EC	Cored wires
EQ	Strip electrodes

Nominal chemical composition of the filler metal

AWS Classification	Chemical Composition in %										
	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Other
ER307	0.04-0.14	0.30-0.65	3.3-4.75	0.03	0.03	19.5-22.0	8.0-10.7	0.50-1.5	-	0.75	-
ER308L	0.03	0.30-0.65	1.0-2.5	0.03	0.03	19.5-22.0	9.0-11.0	0.75	-	0.75	-
ER308H	0.04-0.08	0.30-0.65	1.0-2.5	0.03	0.03	19.5-22.0	9.0-11.0	0.50	-	0.75	-
ER309L	0.03	0.30-0.65	1.0-2.5	0.03	0.03	23.0-25.0	12.0-14.0	0.75	-	0.75	-
ER309LMo	0.03	0.30-0.65	1.0-2.5	0.03	0.03	23.0-25.0	12.0-14.0	2.0-3.0	-	0.75	-
ER310	0.08-0.15	0.30-0.65	1.0-2.5	0.03	0.03	25.0-28.0	20.0-22.5	0.75	-	0.75	-
ER312	0.15	0.30-0.65	1.0-2.5	0.03	0.03	28.0-32.0	8.0-10.5	0.75	-	0.75	-
ER316L	0.03	0.30-0.65	1.0-2.5	0.03	0.03	18.0-20.0	11.0-14.0	2.0-3.0	-	0.75	-
ER316H	0.04-0.08	0.30-0.65	1.0-2.5	0.03	0.03	18.0-20.0	11.0-14.0	2.0-3.0	-	0.75	-
ER317L	0.03	0.30-0.65	1.0-2.5	0.03	0.03	18.5-20.5	13.0-15.0	3.0-4.0	-	0.75	-
ER318	0.08	0.30-0.65	1.0-2.5	0.03	0.03	18.0-20.0	11.0-14.0	2.0-3.0	-	0.75	Nb=8xCmin/1.0max
ER347	0.08	0.30-0.65	1.0-2.5	0.03	0.03	19.0-21.5	9.0-11.0	0.75	-	0.75	Nb=10xCmin/1.0max
ER385	0.025	0.50	1.0-2.5	0.02	0.03	19.5-21.5	24.0-26.0	4.2-5.2	-	1.2-2.0	
ER2209	0.03	0.90	0.50-2.0	0.03	0.03	21.5-23.5	7.5-9.5	2.5-3.5	0.08-0.20	0.75	-
ER2594	0.03	1.0	2.5	0.03	0.02	24.0-27.0	8.0-10.5	2.5-4.5	0.20-0.30	1.5	W: 1.0
ER410NiMo	0.06	0.5	0.6	0.03	0.03	11.0-12.50	4.0-5.0	0.4-0.7	-	0.75	-

SFA/AWS A5.14: specification for nickel and nickel alloy bare welding electrodes and rods (extract)

ER **NiCrMo-13**

ER	Solid wires (electrodes or rods
EQ	Strip electrodes

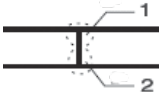
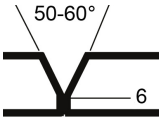
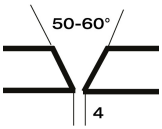
Nominal chemical composition of the filler metal

AWS Classification	Chemical Composition in %										
	C	Si	Mn	P	S	Cr	Ni	Mo	Nb	Cu	Fe
ERNiCr-3	0.1	0.5	2.5-3.5	0.03	0.015	18.0-22.0	min. 67.0	-	2.0-3.0	0.5	3.0
ERNiCrMo-3	0.1	0.5	0.5	0.02	0.015	20.0-23.0	min. 58.0	8.0-10.0	3.15-4.15	0.5	5.0
ERNiCrMo-4	0.02	0.08	1.0	0.04	0.03	14.5-16.5	Bal.	15.0-17.0	-	0.5	4.0-7.0
ERNiCrMo-13	0.01	0.1	0.5	0.015	0.010	22.0-24.0	Bal.	15.0-16.5	-	0.5	1.5

Submerged Arc Welding Joint Preparations

Typical welding data and recommended joint preparations for submerged arc welding.

Non and low-alloyed steels

Type of joint	Plate thickness mm	Wire diameter mm	Run no	Welding current A	Arc voltage V	Welding speed cm/min
	6	3.0	1	320	32	80
		3.0	2	350	32	
	8	4.0	1	450	32	75
		4.0	2	500	32	
	10	4.0	1	550	33	70
		4.0	2	600	33	
	12	4.0	1	600	33	60
		4.0	2	650	33	
	14	4.0	1	700	34	55
		4.0	2	750	34	
	For all procedures: 1 run from back side:					
		4.0	1	680	32	50
	14	4.0	1	650	26	50
	16	4.0	1	580	26	60
		4.0	2	750	34	60
	18	4.0	1	580	26	60
		4.0	2	750	34	50
	20	4.0	1	580	26	60
		4.0	2	750	30	60
		4.0	3	750	34	60
	25	4.0	1	580	26	60
		4.0	2	750	30	60
		4.0	3	750	30	60
		4.0	4 - 5	750	32	50
	30	4.0	1	580	26	60
		4.0	2	750	30	60
		4.0	3	750	30	60
		4.0	4 - 5	750	32	50
		4.0	6 - 8	750	32	50
Gap: as small as possible; in locations where gap > 1 mm: MMA or MAG root run.	Alternative parameters for first run (all thicknesses):					
		4.0	1	450	25	45
	14		1	MAG or MMA		
		4.0	2	550	26	50
		4.0	3	600	30	50
		4.0	4	680	32	50
	16		1	MAG or MMA		
		4.0	2	550	26	50
		4.0	3	650	32	50
		4.0	4 - 5	680	32	50
Welded from 1 side root run: MMA or MAG. Thickness of root run ≥ 5 mm.	18		1	MAG or MMA		
		4.0	2	550	26	50
		4.0	3 - 4	650	30	50
		4.0	5 - 6	680	32	50
	20		1	MAG or MMA		
		4.0	2	550	26	50
		4.0	3 - 4	650	30	50
		4.0	5 - 6	750	32	50
		4.0	7	680	32	50

Submerged Arc Welding Joint Preparations

Typical welding data and recommended joint preparations for submerged arc welding.

Non and low-alloyed steels

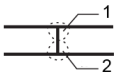
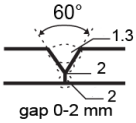
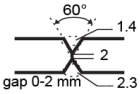
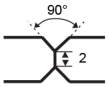
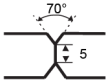
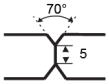
Type of joint	Throat thickness mm	Wire diameter mm	Run no	Welding current A	Arc voltage V	Welding speed cm/min
	3	1 x 3.0	1	500	28	80
	4	1 x 3.0	1	500	28	60
	5	1 x 4.0	1	650	30	60
	7	1 x 3.0	1	500	29	50
		1 x 3.0	2	620	32	60
	4	1 x 3.0	1	600	32	100
	5	1 x 3.0	1	600	32	60
	6	1 x 3.0	1	650	32	55
	7	1 x 3.0	1	750	32	45
	Twin Arc					
	4	2 x 1.6	1	750	32	115
	5	2 x 2.0	1	800	32	100
	Cored wire					
	5	2 x 2.4	1	800	30	120
	Tandem DC+, AC					
	4	4.0	1 (DC+)	800	32	140
		4.0	1 (AC)	700	36	
	Tandem DC+, AC					
	4	4.0	1 (DC+)	800	32	140
		4.0	1 (AC)	700	36	
	5	4.0	1 (DC+)	800	32	90
		4.0	1 (AC)	700	36	

Note: If a cored wire is used, an extra 2 volts are required in the high current range (>600A) to spread the extra weld metal (25-30%).

Submerged Arc Welding Joint Preparations

Typical welding data and recommended joint preparations for submerged arc welding.

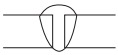
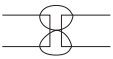
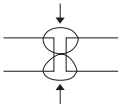
Stainless Steel

Type of joint	Plate thickness mm	Wire diameter mm	Run No.	Welding current A	Arc voltage V	Welding speed cm/min
	6	2.4	1	300	33	40
		2.4	2	400	34	40
		3.2	1	400	34	100
		3.2	2	500	34	130
	8	2.4	1	350	33	40
		2.4	2	450	34	40
		3.2	1	450	34	55
		3.2	2	550	34	55
		4	1	450	34	100
		4	2	550	34	130
	10	2.4	1	420	30	45
		2.4	2	420	32	40
		2.4	3	420	32	40
		3.2	1	500	30	55
		3.2	2	500	32	55
		4	1	550	31	65
		4	2	550	34	100
	12	4	1	600	32	60
		4	2	600	34	80
	20	4	1	575	31	60
		4	2	600	32	60
		4	3-5	600	34	65
	25	4	1	550	32	60
		4	2	600	34	50
		4	3	600	34	50
		4	4-8	600	34	60
	6	2	1-n	300	31	60
	10	3.2	1-n	380	32	65
	16	3.2	1-n	450	34	70
	8	4	1	450	32	90
		4	2	550	34	85
	10	4	1	500	32	65
		4	2	600	34	85
	12	4	1	500	32	60
		4	2	600	34	70
	14	4	1	550	32	60
		4	2	600	34	60

Calculation of Electrode Consumption

In the tables, joint cross section, theoretical joint volume and kg weld metal per metre length of welded joint are given. The electrode consumption per metre of welded joint is obtained by dividing the number of kg of weld metal by N, where N is the kg of weld metal per kg of electrode and is given for each electrode on their respective pages.

Square butt joints: joint volumes and weld metal weights

Position	Plate Thickness, mm	Gap, mm	Volume/Length, cm3/m	Weight/Length weld metal, kg/m
 Flat	1 1.5 2 3	0 0.5 1 1.5	2 3 4 7	0.02 0.03 0.03 0.05
 Flat	4 5 6 7	2 2 2.5 3	17 21 27 36	0.13 0.16 0.21 0.28
 Horizontal-Vertical	1 1.5 2 3	0 0.5 1 1.5	2.5 4 5 9.5	0.02 0.03 0.04 0.07
 Horizontal-Vertical	4 5 6 7	2 2 2.5 3	22 25 32 42	0.17 0.20 0.25 0.33
 Overhead	4 5 6 7 4 5 6 7	2 2 2.5 3 2 2 2.5 3	9 10.5 13 16 10.5 16 18 21	0.07 0.08 0.10 0.13 0.08 0.13 0.14 0.16

Calculation of Electrode Consumption

Square V-joints: volumes and weld metal weights

Plate Thickness	Gap	50° Flat			60° Flat			70° Vertical			80° Overhead			60° Horizontal-Vertical		
mm	mm	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
4	1	11.5	11	0.09	13	12.5	0.10	15	16.5	0.13	17.5	18	0.14	13	14.5	0.11
5	1	16.5	16	0.13	19.5	19	0.15	22.5	24.5	0.19	26	28	0.22	19.5	21	0.16
6	1	23	21.5	0.17	27	25.5	0.20	31	37	0.29	36	38.5	0.30	27	30	0.24
7	1.5	33.5	32.5	0.26	39	38	0.30	45	49	0.38	51.5	56	0.44	39	42	0.33
8	1.5	42	40	0.31	49	46.5	0.37	57	59.5	0.47	65.5	70	0.55	49	56	0.44
9	1.5	51	48	0.38	60.5	56	0.44	70	75.5	0.59	81.5	87.5	0.69	60.5	65	0.51
10	2	66.5	62	0.49	77.5	72	0.57	90	96.5	0.76	104	109	0.86	77.5	81	0.64
11	2	78.5	71.5	0.56	92	83.5	0.66	107	113	0.89	124	130	1.02	92	96.5	0.76
12	2	91	83	0.65	107	97.5	0.77	125	134	1.05	145	157	1.23	107	113	0.89
14	2	120	110	0.86	141	130	1.02	165	171	1.34	193	204	1.60	141	159	1.17
15	2	135	123	0.97	160	146	1.15	188	197	1.55	219	231	1.81	160	171	1.34
16	2	151	132	1.04	180	157	1.23	211	223	1.75	247	257	2.02	180	186	1.46
18	2	189	170	1.33	223	204	1.60	263	276	2.17	308	320	2.51	223	233	1.83
20	2	227	208	1.63	271	247	1.94	320	334	2.62	376	396	3.11	271	281	2.21
25	2	341	313	2.46	411	375	2.94	488	510	4.00	577	606	4.76	411	425	3.34

1 - Theoretical volume cm3/m

2 - Actual joint volume cm3/m (taking account of transverse shrinkage)

3 - Deposited weld metal kg/m

Position	Plate Thickness, mm	Weight/Length, kg/m	Electrode Diameter, mm
Flat	6-12	0.10	3.25
Flat	>2	0.15	4
Vertical	>8	0.15	3.25
Horizontal-Vertical	>8	0.15	3.25
Overhead	>10	0.10	3.25

Calculation of Electrode Consumption

Corner welds: actual joint volumes and weld metal weights

Plate Thickness	Section Size	 Flat		 Flat		 Vertical		 Overhead	
mm	mm²	cm³/m	kg/m	cm³/m	kg/m	cm³/m	kg/m	cm³/m	kg/m
2	2	3.5	0.03	3	0.02	3.5	0.03	3.5	0.03
3	4.5	7	0.05	7	0.5	7	0.05	7.5	0.06
4	8	9	0.07	9	0.07	9.5	0.07	10.5	0.08
5	12.5	13	0.10	13.5	0.11	14.5	0.11	16	0.13
6	18	18.5	0.15	19.5	0.15	21	0.16	22	0.17
7	24.5	25.5	0.20	26.5	0.21	27.5	0.22	31.5	0.25
8	32	33	0.26	34.5	0.27	36	0.28	40.5	0.32
9	40.5	41.5	0.33	43	0.34	45.5	0.36	51	0.40
10	50	51.5	0.40	53.5	0.42	56	0.44	64	0.50
11	60.5	63	0.49	67	0.53	72	0.57	78.5	0.62
12	72	74.5	0.58	79	0.62	84.5	0.66	93	0.73
15	113	116	0.91	123	0.97	132	1.04	141	1.11
18	162	167	0.31	174	1.37	190	1.49	204	1.60
20	200	206	1.62	206	1.62	227	1.78	252	1.98
22	242	248	1.95	255	2.00	275	2.16	204	2.39
25	323	329	2.58	331	2.60	370	2.90	405	3.18

Fillet welds: actual joint volumes and weld metal weights

Throat Thickness	Section Size	 Flat		 Flat		 Vertical		 Overhead	
mm	mm²	cm³/m	kg/m	cm³/m	kg/m	cm³/m	kg/m	cm³/m	kg/m
2	4	5	0.04	6	0.05	5.5	0.04	5.5	0.04
2.5	6.5	7.5	0.06	8.5	0.07	8	0.06	8.5	0.07
3	9	10.5	0.08	12.5	0.10	11	0.09	12	0.09
3.5	12.5	14	0.11	16	0.13	15	0.12	16.5	0.13
4	16	18	0.14	21	0.16	19.5	0.15	22	0.17
4.5	20.5	22.5	0.18	26	0.20	24.5	0.19	26.5	0.21
5	25	27.5	0.22	31.5	0.25	30.5	0.24	33	0.26
5.5	30.5	33.5	0.26	37	0.29	36	0.28	40.5	0.32
6	36	40	0.31	42	0.33	43	0.34	47.5	0.37
6.5	42.5	46.5	0.37	49.5	0.39	51	0.40	56	0.44
7	49	54.5	0.43	57	0.45	56	0.44	65	0.51
7.5	56.5	60.5	0.47	65	0.51	64	0.50	73.5	0.58
8	64	70	0.55	73.5	0.58	76.5	0.60	82.5	0.65
9	81	88	0.69	94	0.74	95	0.75	109	0.86
10	100	108	0.85	114	0.89	116	0.91	130	1.02
11	121	131	1.03	138	1.08	143	1.12	157	1.23
12	144	155	1.22	162	1.27	169	1.33	188	1.48
13	169	179	1.41	190	1.49	195	1.53	220	1.73
14	196	207	1.62	224	1.76	227	1.78	257	2.02
15	225	237	1.86	248	1.95	264	2.07	294	2.31

ESAB / esab.com

XA00003720/GL/EN/05/16/Note: Specifications subject to change without notice. Products may vary from those pictured.