Welding Consumables
Product Catalogue

LINCOLN ELECTRIC
THE WELDING EXPERTS®

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PACKAGING SOLUTIONS

STICK ELECTRODES

CARDBOARD: The cost effective solution for regular applications without special requirements

PROTECH™: Competitive vacuum packaging for stick electrodes

SAHARA READYPACK®: The best vacuum pack for the most demanding applications that require an absolute guarantee for low diffusible hydrogen and/or low moisture level

LINC CAN™: for severe working conditions and when a guarantee on moisture absorption resistance is needed

LINC PACK: 1kg-pack, ideal for maintenance & repair welding and for small welding jobs in general

PE tube

ROD OVEN HYDROGUARD™ Protect your stick electrodes from moisture pick up and prevent weld cracking and porosity

TABLE OF CONTENTS

GENERAL INFORMATION

DATASHEETS COVERED ELECTRODES

DATASHEETS PIPELINER® RANGE

COVERED ELECTRODES FOR MILD AND FINE GRAINED STEEL

Product name	Chemical composition (typical values) in %					AWS		EN/ISO	
	C	Mn	Si	P	S				
Fleetweld® 5P+	0.20	0.56	0.17	-	-	A5.1	E6010	ISO 2560-A	E 42 3 C 2 5
Supra®	0.12	0.5	0.6	-	-	A5.1	E6012	ISO 2560-A	E 38 0 RC 1 1
Omnia®	0.07	0.5	0.5	-	-	A5.1	E6013	ISO 2560-A	E 42 0 RC 1 1
Pantafix	0.09	0.5	0.4	-	-	A5.1	E6013	ISO 2560-A	E 38 0 RC 1 1
Omnia® 46	0.06	0.5	0.45	-	-	A5.1	E6013	ISO 2560-A	E 38 0 R 1 1
Numal	0.06	0.5	0.45	-	-	A5.1	E6013	ISO 2560-A	E 38 0 R 1 1
Cumulo®	0.1	0.5	0.4	-	-	A5.1	E6013	ISO 2560-A	E 38 0 R 1 2
Universalis®	0.1	0.6	0.4	-	-	A5.1	E6013	ISO 2560-A	E 42 0 RR 1 2
Rental	0.07	0.8	0.5	-	-	A5.1	E7024	ISO 2560-A	E 38 0 RR 7 3
Ferrod 165A	0.07	0.95	0.3	-	-	A5.1	E7024-1	ISO 2560-A	E 42 2 RA 7 3
Ferrod 135T	0.08	0.5	0.35	-	-	A5.1	E7024	ISO 2560-A	E 38 0 RR 5 3
Ferrod 160T	0.07	0.9	0.6	-	-	A5.1	E7024	ISO 2560-A	E 42 0 RR 7 3
Gonia 180	0.07	1.0	0.35	-	-	A5.1	E7024	ISO 2560-A	E 42 0 RR 7 3
Baso® 48 SP	0.075	1.4	0.45	-	-	A5.1	E7018-1 H8	ISO 2560-A	E 46 3 B 3 2 H10*
Basic 7018	0.05	1.3	0.4	-	-	A5.1	E7018 H4	ISO 2560-A	E 42 2 B 1 2 H10
Baso® 51P	0.06	1.3	0.5	0.015	0.01	A5.1	E7018-1	ISO 2560-A	E 46 3 B 3 2 H5
Lincoln 7016 DR	0.08	1.2	0.6	-	-	A5.1	E7016	ISO 2560-A	E 42 3 B 1 2 H5
Baso® 100	0.08	1.0	0.5	-	-	A5.1	E7016 H4R	ISO 2560-A	E 42 3 B 1 2 H5
Baso® 120	0.08	1.2	0.5	-	-	A5.1	E7018 H4R	ISO 2560-A	E 42 3 B 3 2 H5
Baso® G	0.05	1.3	0.4	-	-	A5.1	E7018-1 H4R	ISO 2560-A	E 42 5 B 3 2 H5
Baso® 26V	0.09	1.1	0.7	-	-	A5.1	E 7048 H8	ISO 2560-A	E 42 3 B 1 5 H10
Vandal	0.07	1.2	0.5	-	-	A5.1	E7018-1 H4R	ISO 2560-A	E 42 4 B 3 2 H5
Conarc® 48	0.05	1.3	0.3	-	-	A5.1	E7018-1 H4	ISO 2560-A	E 46 4 B 4 2 H5
Conarc® 49	0.09	1.1	0.6	0.015	0.010	A5.1	E7018 H4	ISO 2560-A	E 46 3 B 4 2 H5
Conarc® 49C	0.06	1.4	0.3	0.015	0.010	A5.1	E7018-1 H4R	ISO 2560-A	E 46 4 B 3 2 H5
Conarc® One	0.05	1.3	0.4	0.015	0.010	A5.1	E7018-1 H4R	ISO 2560-A	E 42 5 B 3 2 H5
Conarc® 50	0.05	1.0	0.3	--	-	A5.1	E7018-1 H4	ISO 2560-A	E 46 5 B 4 2 H5
Conarc® 51	0.06	1.4	0.5	0.015	0.010	A5.1	E7016-1 H4R	ISO 2560-A	E 42 4 B 1 2 H5
Conarc® 52	0.06	1.2	0.4	0.015	0.010	A5.1	E7016	ISO 2560-A	E 42 2 B 1 2 H5
LINCOLN® 7018-1	0.05	1.0	0.3	0.015	0.010	A5.1	E7018-1	ISO 2560-A	E 46 3 B 3 2 H5
Conarc® L150	0.07	0.95	0.4	0.015	0.010	A5.1	E7028 H4R	ISO 2560-A	E 42 2 B 5 3 H5
Conarc® V180	0.08	1.2	0.3	0.015	0.010	A5.1	E7028 H4R	ISO 2560-A	E 42 4 B 7 3 H5
Kardo®	0.03	0.4	0.25	0.015	0.010	A5.1	E6018 [1]	ISO 2560-A	E 35 2 B 3 2 H5

[1] according classification 1966

* also complies to E 46 3 BR 32 H10

COVERED ELECTRODES FOR LOW ALLOY STEEL (HIGH YIELD, LOW TEMPERATURE AND CREEP RESISTANT STEEL)

Product	Chemical composition (typical values) in %												AWS		EN/ISO	
	C	Mn	Si	Ni	Cr	Mo	Cu	V	Nb	N	P	S				
Shield Arc® HYP+	0.13-0.17	0.49-0.63	0.08-0.18	-	-	0.27-0.31	-	<0.01	-	-	-	-	A5.5	E 7010-P1	ISO 2560-A	E 42 2 Mo C 2 5
Shield Arc® 70+	0.13-0.17	0.6-1.2	0.05-0.3	0.75-0.97	0.01-0.2	0.05-0.15		0.02-0.04			0.012	0.013	A5.5	E 8010-G	ISO 2560-A	E 46 4 1Ni C 2 5
Conarc® 55CT	0.05	1.5	0.4	0.9	-	-	0.4	-	-	-	0.010	0.015	A5.5	E8018-W2-H4R [1]	ISO 2560-A	E 46 5 Mn1Ni B 3 2 H5
Conarc® 60G	0.06	1.0	0.4	1.6	-	0.3	-	-	-	-	0.015	0.010	A5.5	E9018M-H4	EN-ISO 18275	E 55 4 Z B 3 2 H5
Conarc® 70G	0.06	1.2	0.4	1.0	-	0.4	-	-	-	-	0.014	0.009	A5.5	E9018-G-H4R	EN-ISO 18275	E 55 4 1NiMo B 3 2 H5
Conarc® 74	0.05	1.5	0.5	0.95	-	-	-	-	-	-	0.010	0.005	A5.5	E8018-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5
Conarc® 80	0.06	1.5	0.4	2.2	-	0.4	-	-	-	-	0.015	0.01	A5.5	E11018M-H4	EN-ISO 18275	E 69 5 Z B 3 2 H5
Conarc® 85	0.06	1.4	0.3	2.0	0.4	0.4	-	-	-	-	0.01	0.01	A5.5	E12018-G-H4R	EN-ISO 18275	E 69 5 Mn2NiCrMo B 3 2 H5
Kryo® 1	0.05	1.5	0.4	0.9	-	-	-	-	-	-	0.01	0.01	A5.5	E7018-G-H4R [2]	ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5
Kryo® 1N	0.07	1.7	0.5	0.9	-	-	-	-	-	-	0.02	0.005	A5.5	E8016-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 1 2 H5
Kryo® 1P	0.05	1.5	0.5	0.95	-	-	-	-	-	-	0.010	0.005	A5.5	E 8018-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5
Kryo® 1-145	0.06	1.5	0.5	0.9	-	-	-	-	-	-	0.010	0.010	A5.5	E8018-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 5 3 H5
Kryo® 1-180	0.07	1.2	0.3	0.9	-	-	-	-	-	-	0.020	0.010	A5.5	E 8018-G-H4R	ISO 2560-A	E 50 5 1Ni B 7 3 H5
Kryo® 2	0.05	1.6	0.3	1.5	-	-	-	-	-	-	0.015	0.01	A5.5	E9018-G-H4R	EN-ISO 18275	E 55 6 Z B 3 2 H5
Kryo® 3	0.05	0.7	0.3	2.5	-	-	-	-	-	-	0.015	0.010	A5.5	E8018-C1-H4	ISO 2560-A	E 46 8 3Ni B 3 2 H5*
Kryo® 4	0.03	0.6	0.4	3.6	-	-	-	-	-	-	0.010	0.005	A5.5	E7016-C2L-H4R	ISO 2560-A	E 38 8 3Ni B 3 2 H5
SL®12G	0.05	0.8	0.6	-	-	0.55	-	-	-	-	0.02	0.01	A5.5	E7018-A1-H4R	ISO 3580-A	E Mo B 3 2 H5
SL®19G	0.06	0.75	0.6	-	1.1	0.5	-	-	-	-	0.015	0.01	A5.5	E8018-B2-H4	ISO 3580-A	E CrMo1 B 3 2 H5
SL®20G	0.06	0.8	0.6	-	2.3	1.0	-	-	-	-	0.015	0.01	A5.5	E9018-B3-H4	ISO 3580-A	E CrMo2 B 3 2 H5
SL®22G	0.06	0.8	0.6	-	0.5	0.5	-	0.3	-	-	0.02	0.01	A5.5	E8018-B1-H4	ISO 3580-A	E Z B 3 2 H5
SL®502	0.07	0.8	0.6	-	5.3	0.6	-	-	-	-	0.020	0.010	A5.5	E8018-B6-H4R	ISO 3580-A	E CrMo5 B 3 2 H5
SL®9Cr(P91)	0.09	0.6	0.2	0.6	9.0	1.0	-	0.2	0.04	0.04	0.010	0.010	A5.5	E9016-B9-H4	ISO 3580-A	E CrMo91 B 3 2 H5

[1] For deviations, consult datasheet
[2] meet also AWS A5.5: E8018-G-H4R

COVERED ELECTRODES FOR STAINLESS AND HEAT RESISTANT STEEL

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	Cr	Ni	Mo	Nb	Cu	N	W				
Arosta® 304L	0.02	0.80	0.80	19.5	9.7	-	-	-	-	-	A5.4	E308L-16	ISO 3581-A	E 19 9 L R 12
Limarosta® 304L	0.025	0.75	0.95	19.0	9.7	-	-	-	-	-	A5.4	E308L-17	ISO 3581-A	E 19 9 L R 12
Vertarosta® 304L	0.02	0.8	0.7	20.0	9.8	-	-	-	-	-	A5.4	E308L-15	ISO 3581-A	E 19 9 L R 21
Jungo® 304L	0.025	1.8	0.4	19.0	10.0	-	-	-	-	-	A5.4	E308L-15	ISO 3581-A	E 19 9 L B 22
Arosta® 347	0.03	0.8	0.8	19.5	9.8	-	0.35	-	-	-	A5.4	E347-16	ISO 3581-A	E 19 9 Nb R 12
Jungo® 347	0.02	1.6	0.5	20.0	10.0	-	0.40	-	-	-	A5.4	E347-15	ISO 3581-A	E 19 9 Nb B 22
Arosta® 316L	0.02	0.8	0.8	18.0	11.5	2.85	-	-	-	-	A5.4	E316L-16	ISO 3581-A	E 19 12 3 L R 12
Limarosta® 316L	0.02	0.8	1.0	18.0	11.5	2.8	-	-	-	-	A5.4	E316L-17	ISO 3581-A	E 19 12 3 L R 12
Vertarosta® 316L	0.02	0.7	0.85	18.0	11.5	2.8	-	-	-	-	A5.4	E316L-15	ISO 3581-A	E 19 12 3 L R 21
Jungo® 316L	0.025	1.6	0.4	18.5	11.0	2.7	-	-	-	-	A5.4	E316L-15	ISO 3581-A	E 19 12 3 L B 22
Limarosta® 316L-130	0.02	0.65	1.0	18.0	11.5	2.8	-	-	-	-	A5.4	E316L-17	ISO 3581-A	E 19 12 3 L R 53
Arosta® 318	0.03	0.8	0.85	18.0	11.5	2.7	0.35	-	-	-	A5.4	E318-16	ISO 3581-A	E 19 12 3 Nb R 12
Jungo® 4465	0.03	4.5	0.4	25.0	22.0	2.2	-	-	0.13	-	A5.4	E310Mo-15*	ISO 3581-A	E 25 22 2 N L B 22*
Jungo® 4500	0.02	1.2	0.9	20.0	25.0	5.0	-	1.5	-	-	A5.4	E385-16*	ISO 3581-A	E 20 25 5 Cu N L R 12
Arosta® 4462	0.02	0.8	1.0	22.5	9.5	3.2	-	-	0.16	-	A5.4	E2209-16	ISO 3581-A	E 22 9 3 N L R 32
Jungo® 4462	0.025	1.6	0.5	23.5	9.0	3.0	-	-	0.15	-	A5.4	E2209-15	ISO 3581-A	E 22 9 3 N L B 22
Jungo® 309L	0.025	1.5	0.4	23.0	13.0	-	-	-	-	-	A5.4	E309L-15	ISO 3581-A	E 23 12 L B 22
Arosta® 309S	0.02	0.8	0.8	23.5	12.5	-	-	-	-	-	A5.4	E309L-16	ISO 3581-A	E 23 12 L R 32
Limarosta® 309S	0.02	0.8	1.0	23.0	12.5	-	-	-	-	-	A5.4	E309L-17	ISO 3581-A	E 23 12 L R 32
Arosta® 309Mo	0.02	0.8	0.8	23.0	12.5	2.7	-	-	-	-	A5.4	E309LMo-16	ISO 3581-A	E 23 12 2 L R 32
Nichroma	0.025	0.8	1.0	20.0	9.5	2.3	-	-	-	-	A5.4	E308LMo-16	ISO 3581-A	E 20 10 3 R 32
Nichroma 160	0.05	0.7	1.0	23.7	12.8	2.4	-	-	-	-	A5.4	E309Mo-26	ISO 3581-A	E 23 12 2 LR 53*
Arosta® 329	0.08	0.7	1.2	25.0	4.5	-	-	-	-	-			ISO 3581-A	E 25 4 R 12*
Limarosta® 312	0.11	0.9	1.0	29.0	9.0	-	-	-	-	-	A5.4	E312-17	ISO 3581-A	E 29 9 R 12
Arosta® 307	0.09	5.0	0.6	18.5	8.5	-	-	-	-	-	A5.4	E307-16*	ISO 3581-A	E 18 8 Mn R 12
Arosta® 307-160	0.06	6.0	1.0	18.0	8.0	-	-	-	-	-	A5.4	E307-26*	ISO 3581-A	E 18 8 Mn R 53
Jungo® 307	0.08	5.5	0.3	19.0	8.5	-	-	-	-	-	A5.4	E307-15*	ISO 3581-A	E 18 8 Mn B 22
Arosta® 304H	0.05	0.75	0.85	18.5	9.5	-	-	-	-	-	A5.4	E308H-16	ISO 3581-A	E 19 9 H R 12
Arosta® 309H	0.10	0.8	1.6	22.0	11.0	-	-	-	-	-	A5.4	E309H-16*	ISO 3581-A	E 23 12 R 32*
Intherma® 310	0.12	2.5	0.5	26.0	20.5	-	-	-	-	-	A5.4	E310-16	ISO 3581-A	E 25 20 R 12
Intherma® 310B	0.1	3.0	0.3	25.0	21.0	-	-	-	-	-	A5.4	E310-15*	ISO 3581-A	E 25 20 B 12
Linox P 308L	0.025	0.8	0.6	19.0	9.5						A5.4	E308L-16	ISO 3581-A	E 19 9 L R 32
Linox 308L	0.025	0.8	0.8	19.0	9.5						A5.4	E308L-17	ISO 3581-A	E 19 9 L R 32
Linox P 316L	0.025	0.8	0.6	19.0	12.0	2.5					A5.4	E316L-16	ISO 3581-A	E 19 12 3 L R 32
Linox 316L	0.025	0.8	0.8	18.0	12.0	2.5					A5.4	E316L-17	ISO 3581-A	E 19 12 3 L R 32
Linox P 309L	0.025	0.8	0.6	23.5	13.0	-					A5.4	E309L-16	ISO 3581-A	EE 23 12 L R 32
Linox 309L	0.025	0.7	0.7	24.0	12.5	-					A5.4	E309L-17	ISO 3581-A	E 23 12 L R 32

*For deviations, consult datasheet

COVERED ELECTRODES FOR NICKEL BASE ALLOYS

Product name	Chemical composition (typical values) in %												AWS		EN/ISO	
	C	Mn	Si	Fe	Cr	Ni	Mo	Cu	Nb	W	Ti	S				
NiCro 31/27	0.02	0.8	0.9	bal.	27.1	31.0	3.5	0.9	-	-	-	-	A5.4	E383-16	ISO 3581-A	E 27 31 4 Cu L R 12
NiCro 60/20	0.03	0.5	0.35	0.9	22	62	9	-	3.4	-	-	-	A5.11/A5.11M	ENiCrMo-3	ISO 14172	E Ni 6625 (NiCr22Mo9Nb)
NiCro 70/15	0.02	4.4	0.45	6	18	bal.	-	-	1.9	-	-	-	A5.11/A5.11M	ENiCrFe-2*	ISO 14172	E Ni 6182* (NiCr15Fe6Mn)*
NiCro 70/15Mn	0.025	5.5	0.4	6.5	16	bal.	-	-	2.0	-	-	-	A5.11/A5.11M	ENiCrFe-3	ISO 14172	E Ni 6182 (NiCr15Fe6Mn)
NiCro 70/19	0.03	4.7	0.6	4.0	bal.	bal.	1.5	-	1.9	-	-	-	A5.11/A5.11M	ENiCrFe-2*	ISO 14172	E Ni 6082 (NiCr20Mn3Nb)
NYLOID 2	0.05	3.0	0.4	6	13	68	6	-	1.5	1.5	-	-	A5.11/A5.11M	ENiCrMo-6	ISO 14172	E Ni 6620 (NiCr14Mo7Fe)
NYLOID 4	0.05	3.0	0.4	6	13	bal.	6.5	-	1.5	1.5	-	-	A5.11/A5.11M	ENiCrMo-6	ISO 14172	E Ni 6620 (NiCr14Mo7Fe)

* For deviations, consult datasheet

COVERED ELECTRODES FOR ALUMINIUM ALLOYS

Product name	Chemical composition (typical values) in %									AWS		EN/ISO	
	Mn	Si	Fe	Cu	Al	Mg	Zn	Ti	Others				
AlMn	0.9-1.2	0.3 max.	0.6 max.	0.02 max.	Bal.	0.15 max.	0.09 max.	-	0.15 max.	A5.3	E3003*	ISO 18273	Al 3103 (AlMn1)
AlSi5	-	5.0	-	-	Bal.	-	-	-	-	A5.3	E4043	ISO 18273	Al 4043A* (AlSi5(A))
AlSi12	-	12.0	-	-	Bal.	-	-	-	-			ISO 18273	Al 4047A (AlSi12(A))

* For deviations, consult datasheet

COVERED ELECTRODES FOR REPAIR WELDING

Product name	Chemical composition (typical values) in %										AWS		DIN		EN/ISO	
	C	Mn	Si	Cr	Mo	W	V	Nb	B	Ti						
Wearshield® BU-30	0.2	0.8	1.0	1.5	0.5	-	-	-	-	-			DIN 8555	E1-UM-350-GP	EN 14700	E Fe1
Wearshield® Mangjet (e)	0.7	15	-	3.7	-	-	-	-	-	-			DIN 8555	E7-UM-200-KP	EN 14700	E Fe9
Wearshield® 15CrMn	0.35	14.0	0.6	15.0	-	-	-	-	-	-	A5.13	E Fe9	DIN 8555	E7-UM-250-KP	EN 14700	E Fe9
Wearshield® MM 40	0.2	0.5	1.3	3.4	0.5	-	-	-	-	-			DIN 8555	E1-UM-400-G*	EN 14700	E Fe1
Wearshield® MM	0.55	0.5	1.5	4.5	0.5	0.5	-	-	-	-			DIN 8555	E2-UM-55-G*	EN 14700	E Fe2
Wearshield® T&D	0.65	0.4	0.5	4	6.5	2.6	1.1	-	-	-	A5.13	E Fe6*	DIN 8555	E4-UM-60-SZ	EN 14700	E Fe4
Wearshield® MI (e)	0.5	0.4	1.8	9	-	-	-	-	-	-	A5.13	E Fe6	DIN 8555	E6-UM-60-GPS	EN 14700	E Fe6
Wearshield® ABR	2.1	1.1	0.75	6.5	0.40	-	-	-	-	-			DIN 8555	E10-UM-50-GPZ	EN 14700	E Fe6
Wearshield® ME (e)	3	-	1.0	33	-	-	-	-	-	-			DIN 8555	E10-UM-60-GRZ	EN 14700	E Fe14
Wearshield® 60 (e)	5	-	4	35	-	-	-	-	-	-			DIN 8555	E10-UM-60-GR	EN 14700	E Fe15
Wearshield® 70	4.2	-	2.7	18	8.5	7	-	9	-	-			DIN 8555	E10-UM-65-GRZ	EN 14700	E Fe16
Wearshield® 420	0.5	0.3	0.4	12.4	0.4	-	1.3	-	-	-			DIN 8555	E6-UM-55-RZ	EN 14700	E Fe8

* Nearest classification

COVERED ELECTRODES FOR REPAIR WELDING

Product name	Chemical composition (typical values) in %						AWS		EN/ISO	
	C	Mn	Si	Ni	Cr	Fe				
RepTec Cast 1	0.7	-	-	97	-	2.0	A5.15	ENi-CI	ISO 1071	E C Ni-CI 1
RepTec Cast 3	0.6	-	-	balance	-	40	A5.15	ENiFe-CI	ISO 1071	E C NiFe-CI 1
RepTec Cast 31	0.7	-	-	balance	-	45	A5.15	ENiFe-CI	ISO 1071	E C NiFe-CI 1

MIG WIRES FOR MILD STEEL

Product name	Chemical composition (typical values) in %			AWS		EN/ISO	
	C	Mn	Si				
LNM 25	0.08	1.10	0.60	A5.18/A5.18M	ER70S-3	EN ISO 14341-A	G 42 4 M 2Si
UltraMag®	0.078	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1
UltraMag® G4Si1	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 46 5 M 4Si1/G 46 3 C 4Si1
SupraMIG®	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1
SupraMIG® CF	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1
SupraMIG® HD	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1
SupraMIG Ultra®	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 50 5 M 4Si1 / G 46 3 C 4Si1
SupraMIG Ultra® CF	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 50 5 M 4Si1 / G 46 3 C 4Si1
SupraMIG Ultra® HD	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A	G 50 5 M 4Si1 / G 46 3 C 4Si1

MIG WIRES FOR LOW ALLOY STEEL

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	Ni	Cu	Cr	Mo	V	Ti	N				
LNM 28	0.10	1.4	0.75	0.8	0.3	-	-	-	-	-	A5.28	ER80S-G	EN/ISO 16834-A	G Z Mn3Ni1Cu*
LNM MoNi	0.10	1.65	0.75	0.55	0.08	0.60	0.30	-	-	-	A5.28	ER100S-G	EN/ISO 16834-A	G 62 4 M Mn3NiCrMo
LNM MoNiVa	0.08	1.7	0.44	1.35	0.25	0.23	0.3	0.08	-	-	A5.28	ER110S-G	EN/ISO 16834-A	G 69 4 M Mn3Ni1CrMo
LNM MoNiCr	0.09	1.8	0.80	2.20	-	0.30	0.55	-	-	-	A5.28	ER120S-G	EN/ISO 16834-A	G 89 4 M Mn4Ni2CrMo
LNM Ni1	0.09	1.2	0.6	0.9	-	-		-	-	-	A5.28	ER80S-Ni1	EN/ISO 14341-A	G 46 5 M 3Ni1
LNM Ni2.5	0.10	1.1	0.55	2.4	-	-	-	-	-	-	A5.28	ER80S-Ni2	EN ISO 14341-A	G 46 6 M 2Ni2
LNM 12	0.10	1.12	0.6	-	-	-	0.5	-	-	-	A5.28	ER70S-A1	EN ISO 14341-A	G 46 3 M 2Mo
LNM 19	0.10	1.0	0.5	-	-	1.2	0.5	-	-	-	A5.28	ER80S-B2*	ISO 21952-A	G CrMo1Si
LNM 20	0.08	0.9	0.6	-	-	2.5	1.0	-	-	-	A5.28	ER90S-B3*	ISO 21952-A	G CrMo2Si

* Nearest classification

MIG WIRES FOR STAINLESS STEEL

Product name	Chemical composition (typical values) in %												AWS		EN/ISO	
	C	Mn	Si	Cr	Ni	Mo	Nb	N	Cu	P	S	W				
LNM 304LSi	0.020	1.9	0.8	20.0	10.0	0.1	-	-	-	-	-	-	A5.9	ER308LSi	ISO 14343-A	G 19 9 L Si
LNM 304L	0.010	1.6	0.4	20.0	10.0	0.3	-	-	-	-	-	-	A5.9	ER308L	ISO 14343-A	G 19 9 L
LNM 347Si	0.05	1.4	0.7	19.2	9.9	0.1	0.6	-	-	-	-	-	A5.9	ER347Si	ISO 14343-A	G 19 9 NbSi
LNM 316LSi	0.010	1.8	0.8	18.5	12.2	2.5	-	-	-	-	-	-	A5.9	ER316LSi	ISO 14343-A	G 19 12 3 L Si
LNM 318Si	0.05	1.4	0.7	18.6	11.7	2.5	0.7	-	-	-	-	-	A5.9	ER318*	ISO 14343-A	G 19 12 3 NbSi
LNM 4439Mn	0.01	5.2	0.4	19.0	17.0	4.0	-	0.15	-	-	-	-			ISO 14343-A	G 18 16 5 N L*
LNM 4455	0.015	7.0	0.4	20.0	16.0	3.0	-	0.15	-	-	-	-	A5.9	ER316LMn	ISO 14343-A	G 20 16 3 Mn L
LNM 4500	0.01	1.7	0.3	20.0	25.0	4.4	-	-	1.5	-	-	-	A5.9	ER385	ISO 14343-A	G 20 25 5 Cu L
LNM 4362	0.01	1.4	0.6	23.0	7.0	0.3	-	0.14	-	-	-	-	No EN or AWS standard			
LNM 4462	0.01	1.3	0.5	23.0	8.5	3.0	-	0.15	-	-	-	-	A5.9	ER2209	ISO 14343-A	G 22 9 3 N L
LNM 2507	0.03	2.5	1.0	24.0-27.0	8.0-10.5	2.5-4.5	0.03	0.15	0.05	0.03	0.02	-	A5.9	ER2594	ISO 14343-A	G 25 9 4 N L
LNM 309LSi	0.02	1.8	0.8	23.3	13.8	0.14	-	-	-	-	-	-	A5.9	ER309LSi	ISO 14343-A	G 23 12 L Si
LNM 307	0.07	7.1	0.8	18.6	8.0	-	-	-	-	-	-	-	A5.9	ER307*	ISO 14343-A	G 18 8 Mn
LNM 304H	0.07	1.9	0.4	20.0	9.2	0.1	-	-	-	-	-	-	A5.9	ER308H	ISO 14343-A	G 19 9 H
LNM 309H	0.08	1.8	0.4	23.6	13.2	0.1	-	-	-	-	-	-	A5.9	ER309		
LNM 310	0.1	1.7	0.45	26.0	21.0	0.1	-	-	-	-	-	-	A5.9	ER310	ISO 14343-A	G 25 20
LNM 312	0.1	1.8	0.4	30.7	8.9	-	-	-	-	-	-	-	A5.9	ER312	ISO 14343-A	G 29 9

MIG WIRES FOR NI-BASE ALLOYS

Product name	Chemical composition (typical values) in %												AWS		EN/ISO	
	C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Fe	Al	W	Ti				
LNM NiCro 31/27	0.01	1.6	1.0	31.0	27.0	3.5	1.0	-	-	-	-	-	A5.9	ER383	ISO 14343-A	G 27 31 4 Cu L
LNM NiCro 60/20	0.02	0.06	0.07	64	21.9	9.0	-	3.5	0.4	-	-	-	A5.14/A5.14M	ERNiCrMo-3	ISO 18274	S Ni 6625 (NiCr22Mo9Nb)
LNM NiCro 70/19	0.03	3.1	0.08	72.5	20.5	-	0.01	2.6	0.8	-	-	-	A5.14/A5.14M	ERNiCr-3	ISO 18274	S Ni 6082 (NiCr20Mn3Nb)
LNM NiTi	0.02	0.4	0.2	bal.	-	-	-	-	0.06	-	-	3.1	A5.14/A5.14M	ERNi1	ISO 18274	S Ni 2061 (NiTi3)
LNM NiFe	0.05	0.83	0.14	55	-	-	0.4	-	bal.	-	-	-	A5.15	ENiFe-CI	ISO 1071	S NiFe-CI

MIG WIRES FOR HARDFACING

Product name	Chemical composition (typical values) in %								AWS	EN/ISO	
	C	Mn	Si	Cr	P	S	Ni	Mo			
LNM 420FM	0.5	0.4	0.3	9.0	-	-	-	-		EN 14700	S FE8
LNM 4M	0.7	1.9	0.5	1.0	-	-	-	-		EN 14700	S FE2

* Nearest classification

MIG WIRES FOR CU BASE ALLOYS

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Al	Mn	Ni	Si	Ti	Fe	Sn	P	Zn				
LNM CuAl8	bal.	8	0.3	-	-	-	-	-	-	-	A5.7	ERCuAl-A1	EN ISO 24373	S Cu 6100 (CuAl8)
LNM CuAl8Ni6	bal.	9	2.5	5.0	-	-	4.0	-	-	-	A5.7	ERCuNiAl	EN ISO 24373	S Cu 6328 (CuAl9Ni5)
LNM CuNi30	bal.	-	0.8	31	-	-	-	-	-	-	A5.7	ERCuNi	EN ISO 24373	S Cu 7158 (CuNi30)
LNM CuSn	bal.	-	0.2	0.1	0.3	-	-	0.8	-	-	A5.7	ERCu	EN ISO 24373	S Cu 1898 (CuSn1)
LNM CuSi3	bal.	-	1.0	-	3.0	-	-	0.1	-	0.1	A5.7	ERCuSi-A	EN ISO 24373	S Cu 6560 (CuSi3Mn1)

MIG WIRES FOR ALUMINIUM

Product name	Chemical composition (typical values) in %												AWS 5.10	EN 573.3	ISO 18273
	Al	Mn	Si	Ti	Fe	Zn	Mg	Cr	Cu	Si+Fe	Zr	V			
SuperGlaze® MIG 1070	min.99.7	max. 0.03	max. 0.2	max. 0.03	max. 0.25	max. 0.04	max. 0.03	-	max. 0.04	-	-	max. 0.05			S Al 1070 (Al99.7)
SuperGlaze® MIG 1100	min.99.0	max. 0.05	-	-	-	max. 0.10	-	-	0.05-0.20	max. 0.95	-	-	ER1100	EN AW-Al99.0Cu	S Al 1100 (Al99.0Cu)
SuperGlaze® MIG 2319	bal.	0.2-0.4	max. 0.2	0.1-0.2	max. 0.3	max. 0.1	max. 0.02		5.8-6.8	-	-	-	ER2319	EN AW-AlCu6Mn	S Al 2319 (AlCu6MnZrTi)
SuperGlaze® MIG 4043	bal.	max. 0.05	4.5-6.0	max. 0.2	max. 0.6	max. 0.1	max. 0.05	-	max. 0.3	-	-	-	ER4043	EN AW-Alsi5	S Al 4043 (Alsi5)
SuperGlaze® MIG 4047	bal.	max. 0.15	11-13	-	max. 0.8	max. 0.2	max. 0.10	-	max. 0.3	-	-	-	ER4047	EN AW-Alsi12	S Al 4047 (Alsi12)
SuperGlaze® MIG 5087	bal.	0.7-1.1	max. 0.25	max. 0.15	max. 0.4	max. 0.25	4.5-5.2	0.05-0.25	max. 0.05	-	0.10-0.20	-		EN AW-AlMg4,5MnZr	S Al 5087 (AlMg4,5MnZr)
SuperGlaze® MIG 5183	bal.	0.5-1.0	max. 0.4	max. 0.15	max. 0.4	max. 0.25	4.3-5.2	0.05-0.25	max. 0.1	-	-	-	ER5183	EN AW-AlMg4.5Mn	S Al 5183 (AlMg4.5Mn0.7(A))
SuperGlaze® MIG 5356	bal.	0.05-0.2	max. 0.25	0.06-0.2	max. 0.4	max. 0.1	4.5-5.5	0.05-0.20	max. 0.1	-	-	-	ER5356	EN AW-AlMg5	S Al 5356 (AlMg5Cr(A))
SuperGlaze® MIG 5356 TM™	bal.	0.05-0.2	max. 0.25	0.06-0.2	max. 0.4	max. 0.1	4.5-5.5	0.05-0.20	max. 0.1	-	-	-	ER5356	EN AW-AlMg5	S Al 5356 (AlMg5Cr(A))
SuperGlaze® MIG 5556	bal.	0.5-1.0	max. 0.25	0.05-0.2	max. 0.4	max. 0.25	4.7-5.5	0.05-0.20	max. 0.1	-	-	-	ER5556		S Al 5556 (AlMg5Mn1Ti)
SuperGlaze® MIG 5556A	bal.	0.6-1.0	max. 0.25	0.05-0.2	max. 0.4	max. 0.2	5.0-5.5	0.05-0.20	max. 0.1	-	-	-		EN AW AlMg5Mn	S Al 5556A (AlMg5Mn)
SuperGlaze® MIG 5754	bal.	max. 0.5	max. 0.4	max. 0.15	max. 0.4	max. 0.2	2.6-3.6	max. 0.3	max. 0.1	-	-	-		EN AW AlMg3	S Al 5754 (AlMg3)

TIG RODS FOR MILD STEEL

Product name	Chemical composition (typical values) in %			AWS		EN/ISO	
	C	Mn	Si				
LNT 25	0.08	1.1	0.6	A5.18/A5.18M	ER70S-3	EN/ISO 636-A	W 42 5 W2Si
LNT 26	0.10	1.5	0.9	A5.18/A5.18M	ER70S-6	EN/ISO 636-A	W 42 5 W3Si1

TIG RODS FOR LOW ALLOY STEEL

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	Ni	Cu	Cr	Mo	V	Nb	N				
LNT 28	0.10	1.4	0.75	0.8	0.3	-	-	-	-	-	A5.28	ER80S-G		
LNT Ni1	0.10	1.2	0.6	0.9	-	-	-	-	-	-	A5.28	ER80S-Ni1	EN/ISO 636-A	W 42 6 W3Ni1
LNT NiMo1	0.08	1.7	0.7	0.4	-	-	0.35	-	-	-	A5.28	ER100S-G	EN/ISO16834-A	W Mn3Ni1Mo
LNT Ni2.5	0.10	1.1	0.55	2.4	-	-	-	-	-	-	A5.28	ER80S-Ni2	EN/ISO 636-A	W 2Ni2
LNT 12	0.10	1.2	0.6	-	-	-	0.5	-	-	-	A5.28	ER70S-A1	ISO 21952-A	W MoSi
LNT 19	0.10	1.0	0.6	-	-	1.2	0.5	-	-	-	A5.28	ER80S-B2*	ISO 21952-A	W CrMo1Si
LNT 20	0.08	1.0	0.6	-	-	2.5	1.0	-	-	-	A5.28	ER90S-B3*	ISO 21952-A	W CrMo2Si
LNT 502	0.09	0.6	0.3	-	-	5.7	0.6	-	-	-	A5.28	ER80S-B6	ISO 21952-A	W CrMo5Si
LNT 9Cr(P91)	0.11	0.8	0.25	0.5	0.06	8.9	1.0	0.2	0.06	-	A5.28	ER90S-B9	ISO 21952-A	W CrMo91

TIG RODS FOR STAINLESS STEEL

Product name	Chemical composition (typical values) in %											AWS		EN/ISO	
	C	Mn	Si	Cr	Ni	Mo	Nb	N	Cu	P	S	W			
LNT 304LSi	0.02	2.0	0.8	20.0	10.0	0.1	-	-	-	-	-	-	A5.9	ER308LSi	ISO 14343-A	W 19 9 L Si
LNT 304L	0.01	1.7	0.4	20.0	10.0	0.1	-	-	-	-	-	-	A5.9	ER308L	ISO 14343-A	W 19 9 L
LNT 347Si	0.05	1.4	0.7	19.5	9.5	0.01	0.6	-	-	-	-	-	A5.9	ER347Si	ISO 14343-A	W 19 9 NbSi
LNT 316L	0.01	1.5	0.5	18.5	12	2.7	-	-	-	-	-	-	A5.9	ER316L	ISO 14343-A	W 19 12 3 L
LNT 316LSi	0.03	1.9	0.8	18.5	12.0	2.7	-	-	-	-	-	-	A5.9	ER316LSi	ISO 14343-A	W 19 12 3 L Si
LNT 318Si	0.05	1.4	0.7	18.7	11.7	2.5	0.7	-	-	-	-	-	A5.9	ER318*	ISO 14343-A	W 19 12 3 NbSi
LNT 4439Mn	0.02	7.0	0.4	18.0	16.0	4.5	-	0.15	-	-	-	-			ISO 14343-A	W 18 16 5 N L*
LNT 4500	0.01	1.7	0.4	20.0	25.0	4.5	-	-	1.5	-	-	-	A5.9	ER385	ISO 14343-A	W 20 25 5 Cu L
LNT 4462	0.01	1.6	0.5	22.5	8.5	3.0	-	0.15	-	-	-	-	A5.9	ER2209	ISO 14343-A	W 22 9 3 N L
LNT Zeron® 100X	0.02	0.6	0.23	25.0	9.3	3.6	-	0.22	0.6	-	-	0.6	A5.9	ER2594	ISO 14343-A	W 25 9 4 N L
LNT 309LSi	0.02	2.0	0.8	23.5	13.0	0.1	-	-	-	-	-	-	A5.9	ER309LSi	ISO 14343-A	W 23 12 L Si
LNT 309L	0.01	1.65	0.5	24.0	13.0	0.1	-	-	-	-	-	-	A5.9	ER309L	ISO 14343-A	W 23 12 L
LNT 309LHF	0.02	2.0	0.35	24	13	0.1	-	-	-	-	-	-	A5.9	ER309L	ISO 14343-A	W 23 12 L
LNT 307	0.07	7.1	0.8	18.6	8.0	-	-	-	-	-	-	-	A5.9	ER307*	ISO 14343-A	W 18 8 Mn
LNT 304H	0.07	1.9	0.4	20.0	9.2	0.1	-	-	-	-	-	-	A5.9	ER308H	ISO 14343-A	W 19 9 H
LNT 310	0.1	1.7	0.5	26.0	21	0.1	-	-	-	-	-	-	A5.9	ER310	ISO 14343-A	W 25 20

TIG RODS FOR NI BASE ALLOYS

Product name	Chemical composition (typical values) in %												AWS		EN/ISO	
	C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Fe	Al	W	Ti				
LNT NiCro 60/20	0.03	0.1	0.1	bal.	22.0	9.0	-	3.5	0.4	-	-	-	A5.14/A5.14M	ERNiCrMo-3	ISO 18274	S Ni 6625 (NiCr22Mo9Nb)
LNT NiCro 70/19	0.03	3.0	0.2	bal.	20.0	-	0.1	2.5	1.0	-	-	-	A5.14/A5.14M	ERNiCr-3	ISO 18274	S Ni 6082 (NiCr20Mn3Nb)
LNT NiCroMo 59/23	0.015	0.5	0.06	59	23	16	-	-	1.5	0.4	-	-	A5.14/A5.14M	ERNiCrMo-13	ISO 18274	S Ni 6059 (NiCr23Mo16)
LNT NiCu 70/30	0.06	3.5	0.5	65	-	-	30	-	1.1	-	-	2.0	A5.14/A5.14M	ERNiCu-7	ISO 18274	S Ni 4060 (NiCu30MnTi)
LNT NiTi	0.03	0.5	0.4	bal.	-	-	-	-	0.06	-	-	2.8	A5.14/A5.14M	ERNi1	ISO 18274	S Ni 2061 (NiTi3)

TIG RODS FOR CU BASE ALLOYS

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Al	Mn	Ni	Si	Ti	Fe	Sn	P	Zn				
LNT CuNi30	bal.	-	0.75	30	0.05	0.35	0.5	-	-	-	A5.7	ERCuNi	EN ISO 24373	S Cu 7158 (CuNi30)
LNT CuSn6	bal.	-	-	-	-	-	-	6	0.2	-	A5.7	ERCuSn-A	EN ISO 24373	S Cu 5180 (CuSn6P)
LNT CuSi3	bal.	-	1.0	-	3.0	-	-	0.1	-	0.1	A5.7	ERCuSi-A	EN ISO 24373	S Cu 6560 (CuSi3Mn1)

TIG RODS FOR ALUMINIUM

Product name	Chemical composition (typical values) in %												AWS 5.10	EN 573.3	ISO 18273
	Al	Mn	Si	Ti	Fe	Zn	Mg	Cr	Cu	Si+Fe	Zr	V			
SuperGlaze® TIG 1070	min.99.7	max. 0.03	max. 0.2	max. 0.03	max. 0.25	max. 0.04	max. 0.03	-	max. 0.04	-	-	max. 0.05			S Al 1070 (Al99.7)
SuperGlaze® TIG 1100	min.99.0	max. 0.05	-	-	-	max. 0.10	-	-	0.05-0.20	max. 0.95	-	-	R1100	EN AW-Al99.0Cu	S Al 1100 (Al99.0Cu)
SuperGlaze® TIG 4043	bal.	max. 0.05	4.5-6.0	-	max. 0.8	max. 0.1	max. 0.05	-	max. 0.3	-	-	-	R4043	EN AW-Alsi5	S Al 4043 (Alsi5)
SuperGlaze® TIG 4047	bal.	max. 0.15	11-13	-	max. 0.8	max. 0.2	max. 0.10	-	max. 0.3	-	-	-	R4047	EN AW-Alsi12	S Al 4047 (Alsi12)
SuperGlaze® TIG 5087	bal.	0.7-1.1	max. 0.25	max. 0.15	max. 0.4	max. 0.25	4.5-5.2	0.05-0.25	max. 0.05	-	0.10-0.20	-			S Al 5087 (AlMg4,5MnZr)
SuperGlaze® TIG 5183	bal.	0.5-1.0	max. 0.4	max. 0.15	max. 0.4	max. 0.25	4.3-5.2	0.05-0.25	max. 0.1	-	-	-	R5183	EN AW-AlMg4.5Mn	S Al 5183 (AlMg4.5Mn0.7(A))
SuperGlaze® TIG 5356	bal.	0.05-0.2	max. 0.25	0.06-0.2	max. 0.4	max. 0.1	4.5-5.5	0.05-0.20	max. 0.1	-	-	-	R5356	EN AW-AlMg5	S Al 5356 (AlMg5Cr(A))
SuperGlaze® TIG 5556	bal.	0.5-1.0	max. 0.25	0.05-0.2	max. 0.4	max. 0.25	4.7-5.5	0.05-0.20	max. 0.1	-	-	-	R5556		S Al 5556 (AlMg5Mn1Ti)
SuperGlaze® TIG 5554	bal.	0.5-1.0	max. 0.25	max. 0.20	max. 0.4	max. 0.25	4.7-5.5	0.05-0.20	max. 0.1	-	-	-	R5554		S Al 5554
SuperGlaze® TIG 5754	bal.	max. 0.5	max. 0.4	max. 0.15	max. 0.4	max. 0.2	2.6-3.6	max. 0.3	max. 0.1	-	-	-		EN AW AlMg3	S Al 5754 (AlMg3)

AUTOGENOUS WIRES

Product name	Chemical composition (typical values) in %									AWS		DIN/ISO	
	C	Mn	Si	Cr	P	S	Ni	Mo	Cu				
LNG I	0.07	0.4	0.07	-	0.01	0.01	-	-	-	A5.2	R45*	EN 12536	O I
LNG II	0.1	1.1	0.15	-	0.01	0.01	-	-	-	A5.2	R60*	EN 12536	O II
LNG IV	0.09	1.0	0.19	-	0.010	0.010	-	0.5	-	A5.2	R65*	EN 12536	O IV

All information in this data sheet is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.eu for any updated information.
Fumes: Safety Data Sheets (SDS) are available on our website.

GAS SHIELDED FLUX-CORED WIRES (MILD AND LOW ALLOY STEEL)

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	Gas	C	Mn	Si	P	S	Ni	Cu	Mo	Cr				
Outershield® 70-H	C1	0.06	1.30	0.50	0.015	0.010	-	-	-	-	A5.20/A5.20M	E70T1C-H4 / E70T-1M-H4	EN ISO 17632-A	T 46 0 R C 3 H5 / T 46 0 R M 3 H5
	M21	0.06	1.70	0.35	0.015	0.010	-	-	-	-	A5.20/A5.20M	E70T1C-H4 / E70T-1M-H4	EN ISO 17632-A	T 46 0 R C 3 H5 / T 46 0 R M 3 H5
Outershield® 71E-H	M21	0.04	1.4	0.6	0.013	0.010	-	-	-	-	A5.20/A5.20M	E71T-1C-H4	EN ISO 17632-A	T 42 0 P C 1 H5
	C1	0.05	1.3	0.6	0.015	0.010								
Outershield® 71M-H	C1	0.05	1.3	0.4	0.015	0.009	-	-	-	-	A5.20/A5.20M	E71T-1/9C-H4 / E71T-1/9M-H4	EN ISO 17632-A	T 46 3 P C 1 H5 / T 46 2 P M 2 H5
	M21	0.05	1.47	0.5	0.015	0.009								
Outershield® 71MS-H	C1	0.05	1.3	0.4	0.015	0.010	-	-	-	-	A5.20/A5.20M	E71T-9C-JH4	EN ISO 17632-A	T 46 4 P C 2 H5
Outershield® T55-H	C1	0.05	1.5	0.55	0.012	0.010	-	-	-	-	A5.20/A5.20M	E71T-5C-JH4 / E71T-5M-JH4	EN ISO 17632-A	T 42 4 B C 2 H5 / T 42 4 B M 2 H5
Outershield® T55-H	M21	0.06	1.5	0.6	0.012	0.010	-	-	-	-	A5.20/A5.20M	E71T-5C-JH4 / E71T-5M-JH4	EN ISO 17632-A	T 42 4 B C 2 H5 / T 42 4 B M 2 H5
Outershield® MC700	M21	0.05	1.35	0.6	0.015	0.023	-	-	-	-	A5.18/A5.18M	E70C-6M H8	EN ISO 17632-A	T 46 2 M M 2 H10
Outershield® MC710-H	M21	0.05	1.35	0.6	0.015	0.023	-	-	-	-	A5.18/A5.18M	E70C-6M H4	EN ISO 17632-A	T 46 3 M M 2 H5 [1] / T 46 2 M M 2 H5
Outershield® MC710C-H	C1	0.05	1.35	0.6	0.015	0.023	-	-	-	-	A5.18/A5.18M	E70C-6C H4	EN ISO 17632-A	T 46 3 M C 2 H5
Outershield® MC715Ni1-H	M21	0.05	1.35	0.45	0.002	0.020	0.95	-	-	-	A5.28	E80C-Ni1M H4	EN ISO 17632-A	T 46 5 1Ni M M 2 H5
Outershield® MC715-H	M21	0.04	1.5	0.4	0.012	0.02	-			-	A5.18/A5.18M	E70C-6M H4	EN ISO 17632-A	T 46 4 M M 2 H5
Outershield® MC460VD-H	M21	0.05	1.25	0.6	0.015	0.015	-	-	-	-	A5.18/A5.18M	E70C-6M H4	EN ISO 17632-A	T 46 2 M M 1 H5
Outershield® MC420N-H*	M21	0.03	0.6	0.45	0.017	0.023	2.9	-	-	0.03	A5.28/A5.28M	E70C-GM H4	EN ISO 17632-A	T 38 Z Z M M 2 H5
Outershield® MC555CT-H	M21	0.03	1.3	0.4	0.015	0.020	0.55	0.55		0.55	A5.28/A5.28M	E80C-W2-H4	EN ISO 17632-B	T554T15-0MA-NCC1-UH5
Outershield® 81Ni1C-H	C1	0.05	1.4	0.2	0.013	0.010	0.95	-	-	-	A5.29/A5.29M	E81T1-Ni1C-JH4 [3]	EN ISO 17632-A	T 50 4 1Ni P C 2 H5 [4]
Outershield® 81Ni1-H	M21	0.05	1.4	0.2	0.013	0.010	0.95	-	-	-	A5.29/A5.29M	E81T1-Ni1M-JH4 [3]	EN ISO 17632-A	T 50 5 1Ni P M 2 H5 [4]
Outershield® 81Ni1-HSR	M21	0.05	1.4	0.2	0.013	0.010	0.95	-	-	-	A5.29/A5.29M	E81T1-Ni1M-JH4	EN ISO 17632-A	T 50 5 1Ni P M 2 H5 T
Outershield® 81K2-H	M21	0.04	1.4	0.2	0.012	0.010	1.4	-	-	-	A5.29/A5.29M	E81T1-K2M-JH4 [3]	EN ISO 17632-A	T 50 6 1.5Ni P M 2 H5 [4]
Outershield® 81K2-HSR	M21	0.06	1.3	0.3	0.012	0.010	1.4	-	-	-	A5.29/A5.29M	E81T1-K2M-JH4	EN ISO 17632-A	T 50 6 1.5Ni P M 2 H5 T
Outershield® 500CT-H	M21	0.04	1.3	0.2	0.014	0.010	0.84	0.39	-	-	A5.29/A5.29M	E81T1-GM-H4	EN ISO 17632-A	T 50 5 Z P M 2 H5
Outershield® 555CT-H	M21	0.03	1.1	0.4	0.015	0.010	0.6	0.55	-	0.55	A5.29/A5.29M	E81T1-W2M-JH4	EN ISO 17632-B	T555T1-1MA-NCC1-UH5
Outershield® 91Ni1-HSR	M21	0.05	1.4	02	0.013	0.010	0.95	-	0.4	-	A5.29/A5.29M	E91T1-GM-H4	ISO 18276-A	T 55 4 1NiMo P M 2 H5
Outershield® 91K2-HSR	M21	0.05	1.4	0.2	0.013	0.010	1.4	-	0.4	-	A5.29/A5.29M	E91T1-GM-H4	ISO 18276-A	T 55 4 1,5NiMo P M 2 H5
Outershield® 690-H	M21	0.06	1.5	0.2	0.015	0.010	2.0	-	0.5	-	A5.29/A5.29M	E111T1-K3M-JH4	ISO 18276-A	T 69 4 Z P M 2 H5
Outershield® 690-HSR	M21	0.06	1.5	0.2	0.015	0.010	2.0	-	0.5	-	A5.29/A5.29M	E111T1-K3M-JH4	ISO 18276-A	T 69 4 Z P M 2 H5 T
Outershield® 101Ni1-HSR	M21	0.06	2.0	0.3	0.013	0.010	0.95	-	0.4	-	A5.29/A5.29M	E101T1-G-H4		
Outershield® 12-H	M21	0.065	0.8	0.2	0.014	0.010	-	-	0.46	-	A5.29/A5.29M	E 81T1-A1M-H4	ISO 17634-A	T MoL P M 2 H5
Outershield® 19-H	M21	0.07	0.74	0.24	0.013	0.010	-	-	0.52	1.24	A5.29/A5.29M	E 81T1-B2M-H4	ISO 17634-A	T CrMo1 P M 2 H5
Outershield® 20-H	M21	0.07	0.75	0.21	0.013	0.008	-	-	1.09	2.23	A5.29/A5.29M	E 91T1-B3M-H4	ISO 17634-A	T CrMo2 P M 2 H5

* the mentioned classifications are an indication of the weld metal properties in the as welded condition. However, the Outershield MC420N-H is designed to be used only in the normalized condition. As neither AWS nor EN has included weld metal properties in the normalized condition, the wire cannot be classified for the condition it is designed for.

[1] ø 1.2 and 1.6 mm [2] ø 2.0 and 2.4 mm [3] all diameters [4] only diameter 1.2 mm

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SELF-SHIELDED FLUX-CORED WIRES

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	P	S	Ni	Cr	Al	V	Mo				
Innershield® NR®-152	0.30	0.99	0.24	0.013	0.007	-	-	1.63	-	-	A5.20/A5.20M	E71T-14	EN ISO 17632-A	T 42 Z Z N 5
Innershield® NR®-203 NiC	0.06	0.83	0.05	0.004	0.003	0.57	0.08	0.73	<0.1	<0.1	A5.29/A5.29M	E61T8-K6		
Innershield® NR®-203Ni1	0.08	1.1	0.27	0.008	0.003	0.9	-	0.85	-	-	A5.29/A5.29M	E71T8-Ni1	EN ISO 17632-A	T 42 4 1Ni Y N 1 H10
Innershield® NR®-211-MP	0.21	0.65	0.25	0.010	0.003	-	-	1.30	-	-	A5.20/A5.20M	E71T-11	EN ISO 17632-A	T 42 Z Z N 1 H10
Innershield® NR®-232	0.18	0.65	0.27	0.006	0.004	-	-	0.55	-	-	A5.20/A5.20M	E71T-8	EN ISO 17632-A	T 42 2 Y N 2 H10
Innershield® NR®-233	0.16	0.65	0.21	0.010	0.003	-	-	0.60	-	-	A5.20/A5.20M	E71T-8	EN ISO 17632-A	T 42 3 Y N 2 H10
Innershield® NR®-207-H	0.07	0.9	0.20	0.005	0.003	0.85	-	1.0	-	-	A5.29/A5.29M	E71T8-K6		
Innershield® NR®-208-H	0.05	1.65	0.25	0.007	<0.003	0.8	-	0.85	-	-	A5.29/A5.29M	E91T8-G		
Innershield® NR®-305	0.09	0.9	0.20	0.007	0.008	-	-	0.80	-	-	A5.20/A5.20M	E70T-6	EN ISO 17632-A	T 42 0 W N 3 H15
Innershield® NR®-311	0.27	0.40	0.08	0.007	0.005	-	-	1.5	-	-	A5.20/A5.20M	E70T-7		
Innershield® NR®-400	0.06	0.74	0.17	0.004	0.002	0.75	0.13	0.74	-	-	A5.29/A5.29M	E71T8-K6	EN ISO 17632-A	T 42 6 1Ni Y N 2 H10
Innershield® NS®-3M	0.23	0.45	0.25	0.006	0.006	-	-	1.40	-	-	A5.20/A5.20M	E70T-4	EN ISO 17632-A	T 46 Z V N 3

[1] also meets: E81T8-Ni2

* Chemistries of the welds will change with different heats of steel.

GAS SHIELDED FLUX-CORED WIRES (STAINLESS STEEL)

Product name	Chemical composition (typical values) in %									AWS		EN/ISO	
	Gas	C	Mn	Si	Cr	Ni	Nb	Mo	N				
Cor-A-Rosta® 304L	M21/C1	0.03	1.3	0.7	19.5	10.0	-	-	-	A5.22	E308LT0-1/-4	ISO 17633-A	T 19 9 L R C/M 3
Cor-A-Rosta® P304L	M21/C1	0.03	1.3	0.7	19.5	10.0	-	-	-	A5.22	E308LT1-1/-4	ISO 17633-A	T 19 9 L P C/M 2
Cor-A-Rosta® 347	M21	0.05	1.4	0.6	19.5	10.0	0.5	-	-	A5.22	E347T1-1/4	ISO 17633-A	T 19 9 Nb R M 3
Cor-A-Rosta® 316L	M21/C1	0.03	1.3	0.5	19.0	12.0	-	2.7	-	A5.22	E316LT0-1/ -4	ISO 17633-A	T 19 12 3 L R C/M 3
Cor-A-Rosta® P316L	M21/C1	0.03	1.3	0.5	19.0	12.0	-	2.7	-	A5.22	E316LT1-1/-4	ISO 17633-A	T 19 12 3 L P C/M 2
Cor-A-Rosta® 309L	M21/C1	0.03	1.3	0.6	24.0	12.5	-	-	-	A5.22	E309LT0-1/-4	ISO 17633-A	T 23 12 L R C/M 3
Cor-A-Rosta® P309L	M21/C1	0.04	1.3	0.6	24.0	12.5	-	-	-	A5.22	E309LT1-1/-4	ISO 17633-A	T 23 12 L P C/M 2
Cor-A-Rosta® 309MoL	M21/C1	0.03	1.3	0.7	23.0	12.8	-	2.3	-	A5.22	E309LMoT0-1/-4	ISO 17633-A	T 23 12 2 L R C/M 3
Cor-A-Rosta® P309MoL	M21/C1	0.03	0.8	0.6	22.7	12.5	-	2.3	-	A5.22	E309LMoT1-1/-4	ISO 17633-A	T 23 12 2 L P C/M 2
Cor-A-Rosta® 4462	M21	0.03	1.2	0.7	23.0	9.2	-	3.1	0.12	A5.22	E2209T0-4	ISO 17633-A	T 22 9 3 N L R M 3
Cor-A-Rosta® P4462	M21	0.03	1.2	0.7	23.0	9.2	-	3.1	0.12	A5.22	E2209T1/-4	ISO 17633-A	T 22 9 3 N L P C/M 2

SELF SHIELDING FLUX CORED WIRES FOR HARDFACING APPLICATIONS

Product name	Chemical composition (typical values) in %								EN/ISO	
	C	Mn	Si	Cr	Mo	Al	W	Ni		
Lincore® 33	0.15	2.0	0.7	2.0	-	1.6	-	-	EN 14700	T Fe 1
Lincore® 40-O	0.2	1.5	0.7	3.5	0.4	1.8	-	-	EN 14700	T Fe 1
Lincore® 50	2.2	1.2	1.0	11.0	0.5	0.6	-	-	EN 14700	T Fe 8
Lincore® 55	0.45	1.4	0.55	5.3	0.8	1.4	-	-		
Lincore® 60-O	4.2	1.6	1.3	25.4	-	0.6	-	-		
Lincore® T&D	0.65	1.5	0.8	7.0	1.4	1.8	1.6	-	EN 14700	T Fe 8
Lincore® 15CrMn	0.4	15.0	0.25	16.0	-	-	-	-	EN 14700	T Fe 9
Lincore® 420 ø1.6	0.5	1.7	1.7	11	-	-	-	-		
ø2.0	0.5	1.4	0.7	11	-	-	-	-		
Lincore® M	0.6	13.0	0.4	4.9	-	-	-	0.5	EN 14700	T Fe 9

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SAW WIRES FOR MILD STEEL

Product name	Chemical composition (typical values) in %					AWS		EN/ISO	
	C	Mn	Si	P	S				
L-60	0.09	0.5	0.06	-	-	A5.17	EL12	ISO 14171-A	S1
LNS 135	0.1	1.0	0.10	-	-	A5.17	EM12	ISO 14171-A	S2
L-61	0.1	1.0	0.25	-	-	A5.17	EM12K	ISO 14171-A	S2Si
L-50M (LNS 133U)	0.1	1.6	0.25	-	-	A5.17	EH12K	ISO 14171-A	S3Si

SAW WIRES FOR LOW ALLOY STEEL

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	P	S	Cr	Ti	Ni	Mo	Cu				
L-70	0.10	0.9	0.10	-	-	-		-	0.5		A5.23/A5.23M	EA1	ISO 14171-A	S2 Mo
LNS 140A	0.10	1.0	0.10	-	-	-		-	0.5		A5.23/A5.23M	EA2	ISO 14171-A	S2 Mo
LNS 133TB	0.08	1.55	0.25				0.15				A5.23/A5.23M	EG	ISO 14171-A	SZ
LNS 140TB (LA 81)	0.06	1.1	0.20	-	-	-	0.13	-	0.5		A5.23/A5.23M	EA2TiB	ISO 14171-A	S2MoTiB
LNS 150 (LA 92)	0.13	0.8	0.15	<0.010	-	1.2		-	0.5		A5.23/A5.23M	EB2	ISO 21952-A	S Cr Mo1
LNS 151 (LA 93)	0.10	0.6	0.12	<0.010	-	2.5		-	1.0		A5.23/A5.23M	EB3	ISO 21952-A	S Cr Mo2
LNS 160	0.10	1.1	0.15	-	-	-		1.0	-		A5.23/A5.23M	ENi1	ISO 14171-A	S2 Ni1*
LNS 162	0.10	1.1	0.15	-	-	-		2.2	-		A5.23/A5.23M	ENi2	ISO 14171-A	S2 Ni2*
LNS 163	0.11	1.0	0.25	0.2	0.2	0.2		0.7	-	0.5	A5.23/A5.23M	EG	ISO 14171-A	S2 Ni1Cu
LNS 164 (LA 84)	0.10	1.75	0.10	-	-	-		0.9	0.5		A5.23/A5.23M	EF3	ISO 14171-A	S3 Ni1Mo
LNS 165 (LA 85)	0.08	1.4	0.20	-	-	-		1.0	0.2		A5.23/A5.23M	ENi5	ISO 14171-A	SZ
LNS 168	0.10	1.6	0.15	-	-	0.7		2.3	0.6			-	ISO 26304-A	S3 Ni2.5CrMo
LNS 175	0.08	1.0	0.10	-	-	-		3.5	-		A5.23/A5.23M	ENi3	ISO 14171-A	S2Ni3
LNS T55 **	0.06	1.5	0.60	<0.020	<0.010	-		-	-		A5.17/A5.17M	EC1 H4	ISO 14171-A	TZ

* for deviations consult corresponding data sheet
** flux cored wires

SAW WIRES FOR STAINLESS STEEL

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	Cr	Ni	Mo	Nb	N	Others	Mat.Nr.				
LNS 304L	0.015	1.8	0.4	20	10	0.1	-	-	-	1.4316	A5.9/A5.9M	ER308L	ISO 14343-A	S 19 9 L
LNS 304H	0.05	1.2	0.6	20.1	10.5	-	-	-	-	1.4948	A5.9/A5.9M	ER308H	ISO 14343-A	S 19 9 H
LNS 307	0.07	7.0	0.6	19.0	8.9	-	-	-	-	1.4370	A5.9/A5.9M	ER307	ISO 14343-A	S 18 8 Mn
LNS 309L	0.01	1.8	0.4	23.4	13.8	0.07	-	-	-	1.4332	A5.9/A5.9M	ER309L	ISO 14343-A	S 23 12 L
LNS 316L	0.015	1.75	0.4	18.5	12	2.75	-	-	-	1.4430	A5.9/A5.9M	ER316L	ISO 14343-A	S 19 12 3 L
LNS 318	0.04	1.7	0.4	19.5	11.3	2.6	0.5	-	-	1.4576	A5.9/A5.9M	ER318	ISO 14343-A	S19 12 3 Nb
LNS 347	0.03	1.6	0.4	19.5	9.7	0.1	0.6	-	-	1.4451	A5.9/A5.9M	ER347	ISO 14343-A	S 19 9 Nb
LNS 4455	0.01	7.0	0.4	20	16	2.7	-	0.16	-	1.4455		-	ISO 14343-A	S 20 16 3 Mn L
LNS 4462	0.015	1.6	0.5	23	8.6	3.1	-	0.16	-	1.4462	A5.9/A5.9M	ER2209	ISO 14343-A	S 22 9 3 N L
LNS 4500	0.01	1.8	0.3	20	25.2	4.6	-	-	Cu=1.5	1.4539	A5.9/A5.9M	ER385	ISO 14343-A	S 20 25 5 Cu L
LNS Zeron® 100X	0.02	0.7	0.3	25	9.3	3.7	-	0.23	Cu=0.6	1.4410	A5.9/A5.9M	ER2594	ISO 14343-A	S 25 9 4 N L
									W=0.6					

SAW WIRES FOR NICKEL ALLOYS

Product name	Chemical composition (typical values) in %									AWS		EN/ISO	
	C	Mn	Si	Cr	Ni	Mo	Nb	Others	W.Nr.				
LNS NiCro 60/20	0.05	0.02	0.1	22	65	8.7	3.7	Fe=0.1	2.4831	A5.14/A5.14M	ERNiCrMo-3	ISO 18274	S Ni 6625
LNS NiCro 70/19	0.03	3.1	0.08	20.5	72.5		2.6	Fe=0.8		A5.14/A5.14M	ERNiCr-3	ISO 18274	S Ni 6082
LNS NiCroMo 60/16	0.006	0.5	0.04	16.0	58	16		W=3.6	2.4886	A5.14/A5.14M	ERNiCrMo-4	ISO 18274	S Ni 6276

PIPELINER RANGE

Product name	Chemical composition (typical values) in %										AWS		EN/ISO	
	C	Mn	Si	Ni	Mo	P	S	Cr	Ti	Al				
PIPELINER® 6P+	0.11	0.55	0.18	-	-	0.009	0.009	-	-	-	A5.1	E6010	ISO 2560-A	E 42 3 C 25
PIPELINER® 7P+	0.15	0.6	0.1	0.85	0.1	0.015	0.015	-	-	-	A5.1	E7010-P1	ISO 2560-A	E 42 3 Z C 25
PIPELINER® 8P+	0.17	0.7	0.25	0.8	0.2	0.01	0.01	-	-	-	A5.5	E8010-P1	ISO 2560-A	E 46 4 1Ni C 25
PIPELINER® 16P	0.06	1.3	0.5	-	-	0.013	0.009	-	-	-	A5.1	E7016 H4	ISO 2560-A	E 42 3 B 12 H5
PIPELINER® 18P	0.05	1.5	0.5	0.95	-	0.010	0.009	-	-	-	A5.5	E8018-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 32 H5
PIPELINER® LH-D80	0.05	1.15	0.45	-	-	0.010	0.010	-	-	-	A5.5	E8045-P2 H4R	ISO 2560-A	E 46 4 Z B 45 H5
PIPELINER® LH-D90	0.05	1.3	0.50	0.925	0.2	0.009	0.009	0.05	-	-	A5.5	E8010-45-P2 H4R	ISO 18275	E 55 4 ZB 45 H5
PIPELINER® LH-D100	0.05	1.55	0.45	0.9	0.45	0.009	0.009	-	-	-	A5.5	E10045-P2 H4R		
PIPELINER® 70S-G	0.07	1.25	0.55	-	-	0.010	0.020	-	-	-	A5.18	ER70S-G	ISO 14341-A	G 38 3 M G2Si / G 38 3 C G2Si
PIPELINER® 80S-G	0.09	1.55	0.61	-	-	0.012	0.007	-	-	-	A5.28	ER80S-G	ISO 14341-A	G 50 3 M G4Si1
PIPELINER® 80Ni1	0.07	1.55	0.7	0.9	<0.01	0.11	0.10		0.08	<0.01	A5.28	ER80S-G	ISO 14341-A	G 3Ni1
PIPELINER® G70M-E	0.06	1.5	0.20	0.95	0.15	0.013	0.010	-	-	-	A5.29	E81T1-GM-H4	EN 758	T 50 5 Z P M 2 H5
PIPELINER® G80M-E	0.06	1.5	0.30	0.9	0.40	0.013	0.010	-	-	-	A5.29	E91T1-GM-H4	ISO 18276-A	T 55 4 Z P M 2 H5
PIPELINER® G90M-E	0.06	1.5	0.20	2.0	0.50	0.015	0.010	-	-	-	A5.29	E1111T1-GM-H4	ISO 18276-A	T 69 4 Z P M 2 H5
PIPELINER® NR®-207+	0.05	1.22	0.25	0.82	-	0.010	0.010	-	-	1.1	A5.29	E71T8-K6		
PIPELINER® NR®-208XP	0.02	2.15	0.12	0.75	0.02	0.005	0.002	0.04	-	1.0	A5.29	E81T8-G		

	Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux	
1	Fleetweld 5P+				Innershield NR204-H, NR207-H		1
2	Supra				Innershield NR204-H, NR207-H		2
3	Panta						3
4	Pantafix						4
5	Omnia				Innershield NR-211-MP		5
6	Omnia 46				Innershield NR-232		6
7	Cumulo					L-60, L-61, LNS 135	7
8	Universalis					combined with flux	8
9	Ferrod 165A			Outershield 70-H	Innershield NR-232	761, 780, 781, 782, 960, 980	9
10	Ferrod 135T			Outershield 71E-H	Innershield NR-311		10
11	Ferrod 160T			Outershield 71M-H	Innershield NS-3M		11
12	Gonia 180		LNM 25	Outershield MC700			12
13	Baso 48SP			Outershield MC710-H			13
14	Baso 51P	LNT 25, LNT 26	SupraMIG	Outershield 71C			14
15	Baso 100		SupraMIG Ultra	Outershield MC715-H			15
16	Baso 120			Outershield MC460VD-H	Innershield NR-203Ni		16
17	Baso G			Outershield T55-H	Innershield NR-203NiC		17
18	Baso 26V				Innershield NR-204-H		18
19	Conarc 48				Innershield NR-207-H		19
20	Conarc 49				Innershield NR-208-H		20
21	Conarc 49C				Innershield NR-400		21
22	Conarc 51						22
23	Conarc 52					L-61, L50M (LNS 133U), LNS 140A (L-70), LNS T-55	23
24	Lincoln 7018-1					860, 960, 8500, 888, P223, P230, P240	24
25	Conarc L150						25
26	Conarc V180						26
27	Kardo				Innershield NR-203NiC		27

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	Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux	
1	Shield Arc HYP+	LNT 25, LNT 26	LNM 25	Outershield 71E-H	Innershield NR208-H	LNS 135, LNS 140A (L-70) with flux 780, 860, P230	1
2	Shield Arc 70+	LNT Ni1	LNM Ni1	Outershield 81Ni1-H/HSR	Innershield NR208-H		2
3	Conarc 55CT	LNT 28	LNM 28	Outershield 500CT-H		LNS 163 with flux 960	3
4	Conarc 60G	LNT Ni1	LNM Ni1, LNM 28	Outershield 81K2-H/HSR		LNS 164 with flux P240, 8500, 888	4
5	Conarc 70G	LNT Ni2.5	LNM Ni2.5	Outershield 91K2-HSR			5
6	Conarc 74	LNT Ni1	LNM Ni1	Outershield 81Ni1-H/HSR			6
7	Conarc 80	-	-	Outershield 690-H/HSR		LNS 168,LNS T690 with flux P230, P240, 8500, 888	7
8	Conarc 85	-	LNM MoNiVa				8
9	Kryo 1				Innershield NR-203Ni1		9
10	Kryo 1N	LNT Ni1	LNM Ni1	Outershield 81Ni1-H/HSR	Innershield NR-203Ni-C	LNS 160, LNS 165 with flux P230, P240, 8500, 888	10
11	Kryo 1P				Innershield NR-400		11
12	Kryo 2	LNT Ni2.5	LNM Ni2.5	Outershield 81K2-H/HSR			12
13	Kryo 3	LNT Ni2.5	LNM Ni2.5	-	-	LNS 162 with flux P230, P240, 8500, 888	13
14	Kryo 4				-	LNS 175 with flux P240, 8500, 888	14
15	SL 12G	LNT 12	LNM 12	Outershield 12-H	-	LNS 140A with flux 860, P230	15
16	SL 19G	LNT 19	LNM 19	Outershield 19-H	-	LNS 150 with flux P230, P240, 8500, 888	16
17	SL 20G	LNT 20	LNM 20	Outershield 20-H	-	LNS 151 with flux P230, P240, 8500, 888	17
18	SL 22G	-	-	-	-	-	18
19	SL 502	LNT 502	-	-	-	LNS 502 with flux P230, P240, 8500	19
20	SL 9Cr(P91)	LNT 9Cr(P91)	-	-	-	-	20

	Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux	
1	Arosta 304L	LNT 304LSi	LNM 304LSi	Cor-A-Rosta (P)304L	-	LNS 304L with flux P2007	1
2	Limarosta 304L			Cor-A-Rosta 304L	-		2
3	Vertarosta 304L			Cor-A-Rosta P304L	-		3
4	Jungo 304L	LNT 304L	LNM 304L	Cor-A-Rosta (P)304L	-		4
5	Limarosta 304L-130	LNT 304LSi	LNM 304LSi	Cor-A-Rosta 304L	-		5
6	Arosta 347	LNT 347	LNM 347	Cor-A-Rosta 347	-	LNS 347 with flux P2007	6
7	Jungo 347			-	-		7
8	Arosta 316L	LNT 316LSi	LNM 316LSi	Cor-A-Rosta (P)316L	-	LNS 316L with flux P2007	8
9	Limarosta 316L			Cor-A-Rosta 316L	-		9
10	Vertarosta 316L			Cor-A-Rosta P316L	-		10
11	Jungo 316L	LNT 316L	LNM 316L	Cor-A-Rosta (P)316L	-		11
12	Limarosta 316L-130	LNT 316LSi	LNM 316LSi	Cor-A-Rosta 316L	-		12
13	Arosta 318	LNT 318Si	LNM 318Si	-	-	LNS 318 with flux P2007	13
14	Jungo 318L			-	-		14
15	Jungo 4439	-	LNM 4439Mn	-	-	LNS 4439Mn with flux P2007	15
16	Jungo 4455	-	LNM 4455	-	-	LNS 4455 with flux P2007	16
17	Jungo 4465	-	-	-	-	LNS 4465 with flux P2007	17
18	Jungo 4500	LNT 4500	LNM 4500	-	-	LNS 4500 with flux P2007	18
19	Arosta 4462	LNT 4462	LNM 4462	Cor-A-Rosta (P)4462	-	LNS 4462 with flux P2007, P2000S	19
20	Jungo 4462				-		20
21	Jungo 309L	LNT 309LSi	LNM 309LSi		-	LNS 309L with flux P2007, P2000S	21
22	Arosta 309S			Cor-A-Rosta (P)309L	-		22
23	Limarosta 309S			Cor-A-Rosta 309L	-		23
24	Arosta 309Mo	-	-		-	-	24
25	Nichroma	LNT 309LSi	LNM 309LSi	Cor-A-Rosta (P)309(Mo)L	-	LNS 309L with flux P2007, P2000S	25
26	Nichroma 160				-		26
27	Limarosta 312	-	LNM 12	-	-	-	27
28	Arosta 307		LNM 37	-	-	LNS 307 with flux P2007, P2000S	27
29	Arosta 307-160	-		-	-		29
30	Jungo 307		-	-	-		30
31	Arosta 304-H	LNT 304-H	LNM 304-H	-	-	LNS 304-H with flux P2007	31
32	Arosta 309-H	-	LNM 309-H	-	-	LNS 309-H with flux P2007	32
33	Intherma 310 / 310B	LNT 310	LNM 310	-	-	LNS NiCro 60/20 with flux P2000, P2000	33

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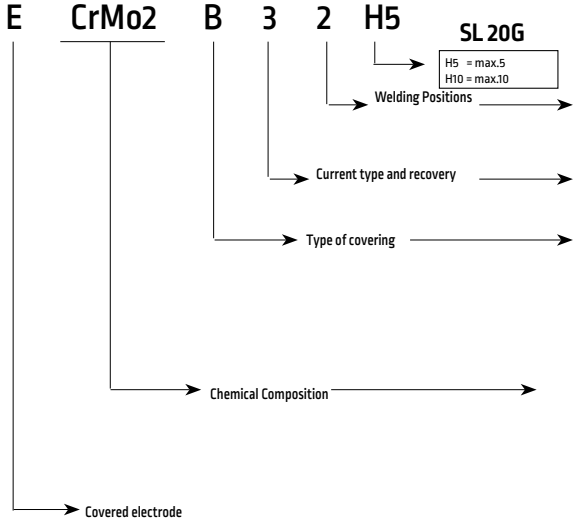
	Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux	
Copper & Nickel base alloys							
1	Nicro 31/27	-	-	-	-	-	1
2	Nicro 60/20	LNT Nicro 60/20	LNM Nicro 60/20	-	-	LNS NiCro 60/20 with flux P2007	2
3	Nicro 70/15			-	-	-	3
4	Nicro 70/15Mn	LNT Nicro 70/19	LNM Nicro 70/19	-	-	-	4
5	Nicro 70/19			-	-	-	5
6	NicroMo 60/16	-	-	-	-	LNS NiCroMo 60/16 with flux P2007	6
7	-	LNT NiTi	LNM NiTi	-	-	-	7
8	Nicu 70/30	LNT NiCu 70/30	-	-	-	-	8
9	Nyloid 2	LNT Nicro 60/20	LNM Nicro 60/20	-	-	LNS NiCro 60/20 with flux P2007	9
10	Nyloid 4			-	-	LNS NiCroMo 60/16 with flux P2007	10
11		LNT CuNi 30	LNM CuNi 30				11
12	-		LNM CuSn	-	-	-	12
13	-	LNT CuSn6	-	-	-	-	13
14	-	LNT CuSi3	LNM CuSi3	-	-	-	14
15	-	-	LNM CuAl8	-	-	-	15
16	-	-	LNM CuAl8Ni6	-	-	-	16
Aluminium alloys							
1	Al99.8	Superglaze TIG 1070	Superglaze MIG 1070	-	-	-	1
2	AlMn	-	-	-	-	-	2
3	-	Superglaze TIG 1070	Superglaze MIG 1070	-	-	-	3
4	-	Superglaze TIG 5754	Superglaze MIG 5754	-	-	-	4
5	-	Superglaze TIG 5356	Superglaze MIG 5356	-	-	-	5
6	-	Superglaze TIG 5183	Superglaze MIG 5183	-	-	-	6
7	-	Superglaze TIG 5087	Superglaze MIG 5087	-	-	-	7
8	-	Superglaze TIG 4043	Superglaze MIG 4043	-	-	-	8
9	-	Superglaze TIG 4047	Superglaze MIG 4047	-	-	-	9

	Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux	
Cast iron							
1	Reptec Cast 1	LNT NiTi	LNM NiTi	-	-	-	1
2	Reptec Cast 3	-	LNM NiFe	-	-	-	2
3	Reptec Cast 31	-	LNM NiFe	-	-	-	3
Hardfacing applications							
1	Wearshield BU 30	-	-	-	Lincore 33	Lincore 30-S with flux 801	1
2	Wearshield Mangjet (e)	-		-	-	-	2
3	Wearshield 15CrMn	-	-	-	Lincore 15CrMn	-	3
4	Wearshield MM40	-	LNM 4M	-	Lincore 40-0	-	4
5	Wearshield MM	-	-	-	Lincore 55	-	5
6	Wearshield T&D	-	-	-	Lincore T&D	-	6
7	Wearshield MI(e)	-	-	-	Lincore 50, Lincore 55	Lincore 50 with flux 801	7
8	Wearshield ABR	-	-	-		-	8
9	Wearshield 44	-	-	-		-	9
10	Wearshield ME(e)	-	-	-	Lincore 60-0	L-60 with flux HS60	10
11	Wearshield 60 (e)	-	-	-		-	11
12	Wearshield 50M	-	-	-	-	-	12
13	Wearshield 70	-	-	-	Lincore 65-0	-	13
14	Wearshield 420	-	LNM 420FM	-	Lincore 420	L-60 with flux 802	14

ISO 3580-A

Classification of covered electrodes for Manual Metal Arc Welding of creep resistant steels



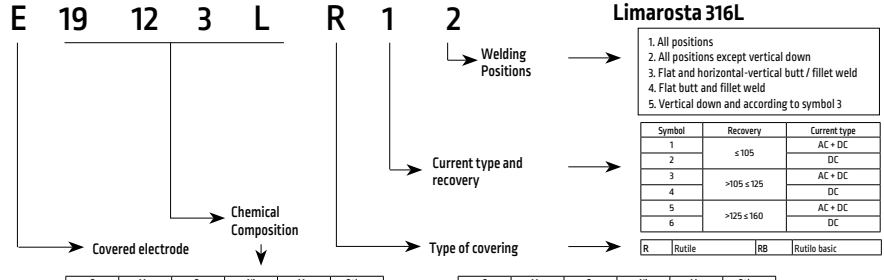
Symbol	Recovery	Current type
1	≤ 105	AC + DC
2		DC
3	>105 ≤ 125	AC + DC
4		DC

A	Acid	RC	Rutilo cellulosic
C	Cellulosic	RA	Rutilo acid
R	Rutile	RB	Rutilo basic
RR	Rutile thick coated	B	Basic

Symbol	Cr	Mo	v	Others
Mo	-	0,40-0,70	-	-
MoV	0,30-0,60	0,8-1,20	0,25-0,60	-
CrMo0,5	0,40-0,65	0,40-0,65	-	-
CrMo1	0,9-1,40	0,45-0,70	-	-
CrMo1L	0,9-1,40	0,45-0,70	-	C<0,05
CrMoV1	0,9-1,30	0,90-1,30	0,10-0,35	-
CrMo2	2,0-2,6	0,90-1,30	-	-
CrMo2L	2,0-2,6	0,90-1,30	-	C<0,05
CrMo5	4,0-6,0	0,40-0,70	-	-
CrMo9	8,0-10,0	0,90-1,20	0,15	Ni ≤1,0
CrMo91	8,0-10,5	0,80-1,20	0,15-0,30	Ni 0,40-1,0
				Nb 0,03-0,10
				W 0,02-0,07
CrMoWV12	10,0-12,0	0,80-1,20	0,20-0,40	Ni ≤ 0,8
				W 0,40-0,60
z		other		

ISO 3581-A

Classification of covered electrodes for Manual Metal Arc Welding of stainless and heat-resisting steels



Symbol	Recovery	Current type
1	≤ 105	AC + DC
2		DC
3	>105 ≤ 125	AC + DC
4		DC
5	>125 ≤ 160	AC + DC
6		DC

R	Rutile	RB	Rutilo basic

	C	Mn	Cr	Ni	Mo	Other
Martensitic/ferritic						
13	0,12	1,5	11-14	-	-	-
13 4	0,06	1,5	11 - 14	3 - 5	0,4 - 1	-
17	0,12	1,5	16 - 18		-	-
Austenitic						
19 9	0,08	2,0	18 - 21	9 - 11	-	-
19 9 L	0,04	2,0	18 - 21	9 - 11	-	-
19 9 Nb	0,08	2,0	18 - 21	9 - 11	-	Nb
19 12 2	0,08	2,0	17 - 20	10 - 13	2 - 3	-
19 12 3 L	0,04	2,0	17 - 20	10 - 13	2 - 3	-
19 12 3 Nb	0,08	2,0	17 - 20	10 - 13	2 - 3	Nb
19 13 4 N L	0,04	1 - 5	17 - 20	12 - 15	3 - 4	0,20N
Austenitic/Ferritic, high corrosion resistance						
22 9 3 N L	0,04	2,5	21 - 24	7 - 10	2 - 4	[1] [5]
25 7 2 N L	0,04	2,0	24 - 28	6 - 8	1 - 3	0,20N
25 9 3 CuN L	0,04	2,5	24 - 27	7 - 10	2 - 4	[2] [5]
25 9 4 N L	0,04	2,5	24 - 27	8 - 10	2 - 4	[3] [5]
Fully austenitic, high corrosion resistance						
18 15 3 L	0,04	1 - 4	16 - 19	14 - 17	2 - 3	[5]
18 16 5 N L	0,04	1 - 4	17 - 20	15 - 19	3 - 5	0,20N [5]

	C	Mn	Cr	Ni	Mo	Other
Fully austenitic, high corrosion resistance (cont.)						
20 25 5 CuN L	0,04	1 - 4	19 - 22	24 - 27	4 - 7	[4]
20 16 3 MnN L	0,04	5 - 8	18 - 21	15 - 18	2 - 3	0,20N [5]
25 22 2 N L	0,04	1 - 5	24 - 27	20 - 23	2 - 3	0,20N
7 31 4 Cu L	0,04	2 - 5	26 - 29	30 - 33	3 - 4	[5]
Special						
18 8 Mn	0,20	45 - 75	17 - 20	7 - 10	-	
18 9 MnMo	0,04-1,4	3 - 5	18 - 21	9 - 11	0,5-1	[5]
20 10 3	0,10	2,5	18 - 21	9 - 12	1 - 3	[5]
23 12 L	0,04	2,5	22 - 25	11 - 14	-	-
23 12 Nb	0,10	2,5	22 - 25	11 - 14	-	Nb
23 12 2 L	0,04	2,5	22 - 25	11 - 14	2 - 3	-
29 9	0,15	2,5	27 - 31	8 - 12	-	-
Heat resisting						
16 8 2	0,08	2,5	14 - 16	7 - 9	1 - 2	[5]
19 9 H	0,04-0,08	2,0	18 - 21	9 - 11	-	-
25 4	0,15	2,5	24 - 27	4 - 6	-	-
22 12	0,06-0,20	1 - 5	20 - 23	10 - 13	-	-
25 20	0,06-0,20	1 - 5	23 - 27	18 - 22	-	-
25 20 H	0,35-0,45	2,5	23 - 27	18 - 22	-	-
18 36	0,25	2,5	14 - 18	33 - 37	-	-

[1] Nb
[2] 0,10 - 0,25N
[3] 0,10 - 0,20N, 1,5-2,5Cu
[4] 0,20-0,30N, 1,5Cu, 1,0W
[5] 1,2Cu
[6] 0,7-1,5Cu

ISO 2560-A

Classification of covered electrodes for Manual Metal Arc Welding of non alloyed and fine grain steels

Kryo 1

E 50 6 Mn1Ni B 3 2 H5 H_{DM}(ml/100g)

- H5 = max.5; H10 = max.10; H15 = max.15
- Welding Positions:
  1. All positions
  2. All positions except vertical down
  3. Flat and horizontal-vertical butt / fillet weld
  4. Flat butt and fillet weld
  5. Vertical down and according to symbol 3
- Current type and recovery:

Symbol	Recovery	Current type
1	≤ 105	AC + DC
2		DC
3	>105 ≤ 125	AC + DC
4		DC
5	> 160	AC + DC
6		DC

- Type of covering:

A	Acid	RC	Rutilo cellulosic
C	Cellulosic	RA	Rutilo acid
R	Rutile	RB	Rutilo basic
RR	Rutile thick coated	B	Basic

- Chemical Composition:

Symbol	Mn	Ni	Mo
-	2,0	-	-
Mo	1,4	-	0,3-0,6
MnMo	>1,4-2,0	-	0,3-0,6
1Ni	1,4	0,6-0,12	-
2Ni	1,4	1,8-2,6	-
3Ni	1,4	>2,6-3,8	-
Mn1Ni	>1,4-2,0	0,6-0,12-	
1NiMo	1,4	0,6-0,12	0,3-0,6
Z		other	

- Minimum impact of avg. 47 Joule at:
- Min. yield strength (N/mm2):

Symbol	Yield	Tensile	A_5
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%

- Covered electrode

no requirem.
A = +20°C
0 = 0° C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C

EN-ISO 18275-A

Classification of covered electrodes for Manual Metal Arc Welding of high strength steels

Conarc 70G

E 55 4 1NiMo B 3 2 H5 T

- Stress relieved 1h / 560-600°C
- H_{DM}(ml/100g): H5 = max.5; H10 = max.10
- Welding Positions:
  1. All positions
  2. All positions except vertical down
  3. Flat and horizontal-vertical butt / fillet weld
  4. Flat butt and fillet weld
  5. Vertical down and according to symbol 3
- Current type and recovery:

Symbol	Recovery	Current type
1	≤ 105	AC + DC
2		DC
3	>105 ≤ 125	AC + DC
4		DC
5	> 160	AC + DC
6		DC

- Type of covering:

A	Acid	RC	Rutilo cellulosic
C	Cellulosic	RA	Rutilo acid
R	Rutile	RB	Rutilo basic
RR	Rutile thick coated	B	Basic

- Chemical Composition:

Symbol	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
Mn2NiCrMo	1,4-2,0	1,8-2,6	0,3-0,6	0,3-0,6
Mn2NiCrMo	1,4-2,0	1,8-2,6	0,6-1,0	0,3-0,6
Z			other	

- Minimum impact of avg. 47 Joule at:
- Min. yield strength (N/mm²):

Symbol	Yield	Tensile	A_5
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%

- Covered electrode

no requirem.
A = +20°C
0 = 0° C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C
7 = -70°C
8 = -80°C

ISO 14341-A

Classification of solid wires and deposits for MIG/MAG Welding of non alloy and fine grain steels

G 46 3 M G3Si1 **LNM 26**

- **G** — Solid wire for GMAW-process
- **46** — Min. yield strength (N/mm²)
- **3** — Minimum impact of avg. 47 Joule at
  - Z = no requirem.
  - A = +20°C
  - O = 0° C
  - 2 = -20°C
  - 3 = -30°C
  - 4 = -40°C
  - 5 = -50°C
  - 6 = -60°C
- **M** — Type of shielding gas
  - M = M2 mixed shielding gas (without helium)
  - C = 100 CO_2
- **G3Si1** — Chemical composition

Symbol	Si	Mn	Ni	Mo
Go				
G2Si	0,50-0,80	0,90-1,30	0,15	0,15
G3Si1	0,70-1,00	1,30-1,60	0,15	0,15
G4Si1	0,80-1,20	1,60-1,90	0,15	0,15
G3Si2	1,00-1,30	1,30-1,60	0,15	0,15
			Al	Ti + Zr
G2Ti	0,40-0,80	0,90-1,40	0,05-0,20	0,05-0,25
G3Ni1	0,50-0,90	1,00-1,60	0,80-1,50	0,15
G2Ni2	0,40-0,80	0,80-1,40	2,10-2,70	0,15
G2Mo	0,30-0,70	0,90-1,30	0,15	0,40-0,60
G4Mo	0,50-0,80	1,70-2,10	0,15	0,40-0,60
				Al
G2Al	0,30-0,50	0,90-1,30	0,15	0,35-0,75

Symbol	Yield	Tensile	A_5
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%

EN/ISO 636-A

Classification of rods, wires and deposits for Tungsten Inert Gas Welding of non alloy and fine grain steels

W 46 3 W3Si1 **LNT 25**

- **W** — GTAW-process, wire and weld metal
- **46** — Min. yield strength (N/mm²)
- **3** — Minimum impact of avg. 47 Joule at
  - Z = no requirem.
  - A = +20°C
  - O = 0° C
  - 2 = -20°C
  - 3 = -30°C
  - 4 = -40°C
  - 5 = -50°C
  - 6 = -60°C
- **W3Si1** — Chemical composition

Symbol	Si	Mn	Ni	Mo
W0				
W2Si	0,50-0,80	0,90-1,3		
W3Si1	0,70-1,00	1,30-1,60		
W4Si1	0,80-1,20	1,60-1,90		
			Al	Ti + Zr
W2Ti	0,40-0,80	0,90-1,40	0,05-0,20	0,05-0,25
W3Ni1	0,50-0,90	1,00-1,60	0,80-1,50	
W2Ni2	0,40-0,80	0,80-1,40	2,10-2,70	
W2Mo	0,30-0,70	0,90-1,30		0,40-0,60

Symbol	Yield	Tensile	A_5
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%

ISO 14343-A

Classification of wire electrodes, wires and rods for arc welding stainless and heat-resisting steels

G 19 12 3 L Si — **LNM 316 LSi**

G = GMAW
W = GTAW
P = PAW
S = SAW

Chemical composition

Classification
Si = 0,65 - 1,2%

Solid wire for :

	C	Mn	Cr	Ni	Mo	Other
Martensitic/ferritic						
13	0.12	1.5	11-14	-	-	-
13 4	0,06	1,5	11 - 14	3 - 5	0,4 - 1	-
17	0,12	1,5	16 - 18		-	-
Austenitic						
19 9	0,08	2,0	18 - 21	9 - 11	-	-
19 9 L	0,04	2,0	18 - 21	9 - 11	-	-
19 9 Nb	0,08	2,0	18 - 21	9 - 11	-	Nb
19 12 2	0,08	2,0	17 - 20	10 - 13	2 - 3	-
19 12 3 L	0,04	2,0	17 - 20	10 - 13	2 - 3	-
19 12 3 Nb	0,08	2,0	17 - 20	10 - 13	2 - 3	Nb
19 13 4 N L	0,04	1 - 5	17 - 20	12 - 15	3 - 4	0,20N
Austenitic/Ferritic, high corrosion resistance						
22 9 3 N L	0,04	2,5	21 - 24	7 - 10	2 - 4	[i] [g]
25 7 2 N L	0,04	2,0	24 - 28	6 - 8	1 - 3	0,20N
25 9 3 CuN L	0,04	2,5	24 - 27	7 - 10	2 - 4	[d] [g]
25 9 4 N L	0,04	2,5	24 - 27	8 - 10	2 - 4	[d] [g]
Fully austenitic, high corrosion resistance						
18 15 3 L	0,04	1 - 4	16 - 19	14 - 17	2 - 3	[g]
18 16 5 N L	0,04	1 - 4	17 - 20	15 - 19	3 - 5	0,20N [g]

	C	Mn	Cr	Ni	Mo	Other
Fully austenitic, high corrosion resistance (cont.)						
20 25 5 CuN L	0,04	1 - 4	19 - 22	24 - 27	4 - 7	[d]
20 16 3 MnN L	0,04	5 - 8	18 - 21	15 - 18	2 - 3	0,20N [g]
25 22 2 N L	0,04	1 - 5	24 - 27	20 - 23	2 - 3	0,20N
7 31 4 Cu L	0,04	2 - 5	26 - 29	30 - 33	3 - 4	[g]
Special						
18 8 Mn	0,20	45 - 75	17 - 20	7 - 10	-	
18 9 MnMo	0,04-1,4	3 - 5	18 - 21	9 - 11	0,5-1	[g]
20 10 3	0,10	2,5	18 - 21	9 - 12	1 - 3	[g]
23 12 L	0,04	2,5	22 - 25	11 - 14	-	-
23 12 Nb	0,10	2,5	22 - 25	11 - 14	-	Nb
23 12 2 L	0,04	2,5	22 - 25	11 - 14	2 - 3	-
29 9	0,15	2,5	27 - 31	8 - 12	-	-
Heat resisting						
16 8 2	0,08	2,5	14 - 16	7 - 9	1 - 2	[g]
19 9 H	0,04-0,08	2,0	18 - 21	9 - 11	-	-
25 4	0,15	2,5	24 - 27	4 - 6	-	-
22 12	0,06-0,20	1 - 5	20 - 23	10 - 13	-	-
25 20	0,06-0,20	1 - 5	23 - 27	18 - 22	-	-
25 20 H	0,35-0,45	2,5	23 - 27	18 - 22	-	-
18 36	0,25	2,5	14 - 18	33 - 37	-	-

[g] Nb
[d] 0,10 - 0,25N
[i] 0,10 - 0,20N, 1,5-2,5Cu
[d] 0,20-0,30N, 1,5Cu, 1,0W
[g] 1,2Cu
[d] 0,7-1,5Cu

EN/ISO 17632-A

Classification of tubular electrodes for metal arc welding with or without a gas shield of non alloy and fine grain steels

T 50 5 1Ni P M 2 H5 — **Outershield 81Ni-H**

H_{DM} (ml/100g)
H5 = max.5
H10 = max.10
H15 = max.15

Welding positions
1. All positions
2. All positions except vertical down
3. Flat and horizontal-vertical butt / fillet weld
4. Flat butt and fillet weld
5. Vertical down and according to symbol 3

Type of shielding gas
M = M2 mixed shielding gas (without helium)
C = 100 CO2

Type of electrode core

Symbol Characteristics

With shielding gas (C en M2)

R	Rutile, slow freezing slag
P	Rutile, fast freezing slag
B	Basic
M	Metal powder

Without shielding gas

V	Rutile or basic / fluoride
W	Basic/fluoride , slow freezing slag
Y	Basic/fluoride, fast freezing slag
S	Other types

Z = no requirem.
A = +20°C
O = 0° C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C

Chemical composition

Symbol	Mn	Ni	Mo
-	2,0	-	-
Mo	1,4	-	0,3-0,6
MnMo	>1,4-2,0	-	0,3-0,6
1Ni	1,4	0,6-0,12	-
2Ni	1,4	1,8-2,6	-
3Ni	1,4	>2,6-3,8	-
Mn1Ni	>1,4-2,0	0,6-0,12	-
1NiMo	1,4	0,6-0,12	0,3-0,6
z		other	

Minimum impact of avg. 47 Joule at

Min. yield strength (N/mm2)

Symbol	Yield	Tensile	A_5
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%

Flux-cored wire

ISO 14174

Classification of flux for submerged arc welding

S A FB 1 54 AC H5 → H_{DM}(ml/100g)

H5 = max.5
H10 = max.10
H15 = max.15

8500

- Current type → AC = AC or DC; DC = DC only
- Metallurgical behaviour

metallurgical behaviour		
burn-out	1	> 0,7
	2	> 0,5 à 0,7
	3	> 0,3 à 0,5
	4	> 0,1 à 0,3
Neutral	5	0 à 0,1
pick-up	6	> 0,1 à 0,3
	7	> 0,3 à 0,5
	8	> 0,5 à 0,7
	9	> 0,7

- Applications
  1. Structural steels, HSLA, etc
  2. Stainless and/or nickel and nickel-based alloys
  3. Surfacing wear-resisting weld
- Type of flux

MS	manganese - silicate	$MnO + SiO_2$	≥ 50
		CaO	≤ 15
CS	calcium - silicate	$CaO + MgO + SiO_2$	≥ 55
		$CaO + MgO$	≥ 15
ZS	zirconium - silicate	$ZrO_2 + SiO_2 + MnO$	≥ 45
		ZrO_2	≥ 15
RS	rutile - silicate	$TiO_2 + SiO_2$	≥ 50
		TiO_2	≥ 20
AR	aluminate - rutile	$Al_2O_3 + TiO_2$	≥ 40
		$Al_2O_3 + SiO_2 + MgO$	≥ 40
AB	aluminate - Basic	Al_2O_3	≥ 20
		CaF_2	≥ 22
		$Al_2O_3 + SiO_2 + ZrO_2$	≥ 40
AS	aluminate - silicate	$CaF_2 + MgO$	≥ 30
		ZrO_2	≥ 5
AF	aluminate - fluorure basic	$Al_2O_3 + CaF_2$	≥ 70
		$CaO + MgO + CaF_2 + MnO$	≥ 50
FB	fluorure - basic	SiO_2	≤ 20
		CaF_2	≥ 15
Z	any other composition		

- Manufacturing process → F = fused; A = agglomerated; M = mixed
- Submerged arc welding

ISO 14171-A

Classification of wire and wire/flux combinations for submerged arc welding of non alloy and fine grain steels

S 42 5 AB S3Si — **LNS133U/P230**

- Chemical Composition

Symbol	C	Mn	Ni	Mo
SZ	any other agreed composition			
S1		0,35-0,60	-	0,3-0,6
S2	0,15	0,80-1,30		
S3		1,31-1,75		
S4		1,76-2,25		
S1Si	0,15-0,40	0,35-0,60		
S2Si	0,15-0,40	0,80-1,30		
S2Si2	0,40-0,60	0,80-1,30		
S3Si	0,15-0,40	1,31-1,85		
S4Si	0,15-0,40	1,86-2,25		
S1Mo		0,35-0,60		0,45-0,65
S2Mo	0,05-0,25	0,80-1,30		0,45-0,65
S3Mo		1,31-1,75		0,45-0,65
S4Mo		1,76-2,25		0,45-0,65
S2Ni1		0,80-1,30	0,80-1,20	
S2Ni1,5		0,80-1,30	1,21-1,80	
S2Ni2		0,80-1,30	1,81-2,40	
S2Ni3	0,05-0,25	0,80-1,30	2,81-3,70	0,3-0,6
S2Ni1Mo		0,80-1,30	0,80-1,20	0,45-0,65
S3Ni1,5		1,31-1,70	1,21-1,80	-
S3Ni1Mo		1,31-1,80	0,80-1,20	0,45-0,65
S3Ni1,5Mo		1,20-1,80	1,20-1,80	0,30-0,50

- Type 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-fluorure basic
FB	Fluorure-basic
Z	any other type

- Minimum impact of avg. 47 Joule at

Z =	no requirem.
A =	+20°C
0 =	0° C
2 =	-20°C
3 =	-30°C
4 =	-40°C
5 =	-50°C
6 =	-60°C

- Min. yield strength (N/mm²)

Two-run		
Symbol	Re	Rm
3T	≥ 355	≥ 470
4T	≥ 420	≥ 520
5T	≥ 500	≥600

Multi-run			
Symbol	Yield	Tensile	A_5
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%

- Submerged arc welding

A-Number according ASME Section IX, QW-442

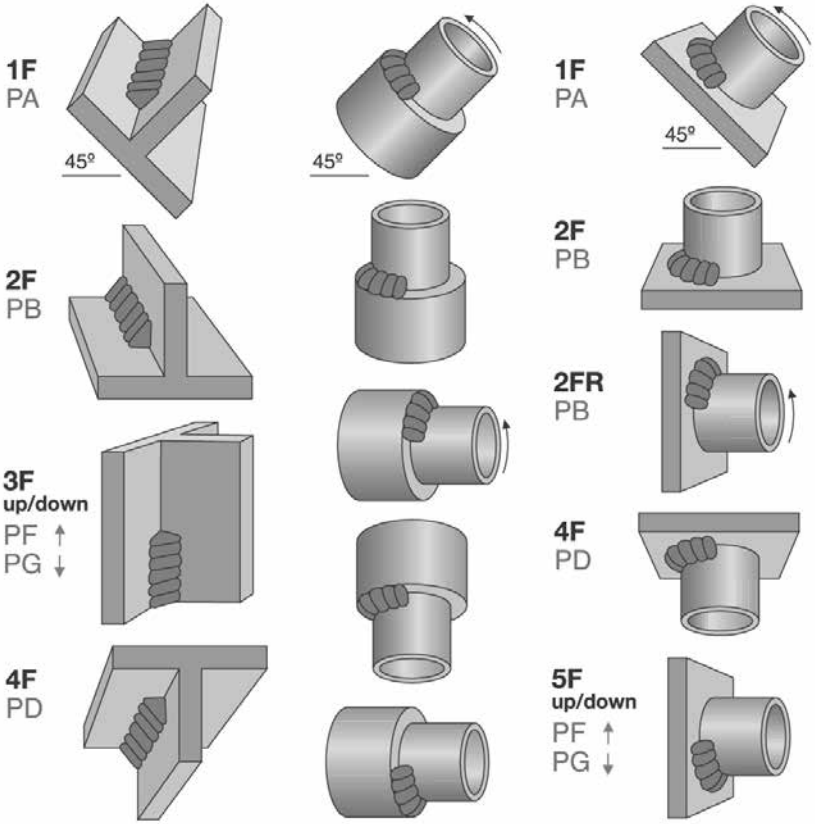
- Applicable only to ferrous metals
- Identification of weld metal chemical composition designated on PQR and WPS

F-Number according ASME Section IX, QW-432

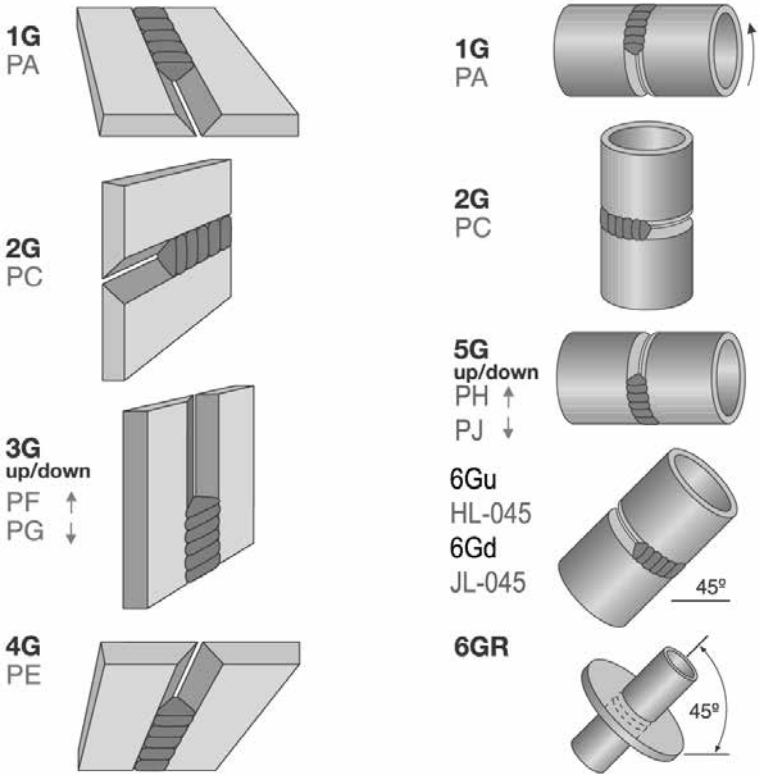
The F-Number grouping of electrodes and welding rods is based on their usability characteristics, which fundamentally determines the ability of welders to make satisfactory welds with a given filler metal. This grouping is made to reduce the number of welding procedure and performance qualifications, where this can logically be done. The grouping does not imply that base metals or filler metals within a group may be indiscriminately substituted for a metal that was used in the qulification test without consideration of the compatibility of the base and filler metals from the standpoint of metallurgical properies, post weld heat treatment design and service requirements, and mechanical properties.

FM-Filler material groups according EN 9606-1 (previously EN 287-1)

Group	Welding consumable for welding of :
FM1	Non-alloy and fine grain steels
FM2	High strength steels
FM3	Creep-resisting steels Cr < 3.75
FM4	Creep-resisting steels 3.75 ≤ Cr ≤ 12%
FM5	Stainless and heat-resisting
FM6	Nickel and nickel alloys



Qualification test		Qualified for fillet welds	
	Position	**Plate**	**Pipe**
Plate-fillet	1F	1F	1F
	2F	1F, 2F	1F, 2F, 2FR
	3F	1F, 2F, 3F	1F, 2F, 2FR
	4F	1F, 2F, 4F	1F, 2F, 2FR, 4F
	3F + 4F	All qualifications	All qualifications
Plate-fillet	1F	1F	1F
	2F	1F, 2F	1F, 2F, 2FR
	2FR		1F, 2FR
	4F	1F, 2F, 4F	1F, 2F, 2FR, 4F
	5F	All qualifications	All qualifications



Qualification test		Qualified for groove welds		Qualified for fillet welds	
	Position	Plate	Pipe	Plate	Pipe
Plate-groove	1G	1G	1G	1F	1F
	2G	1G, 2G	1G, 2G	1F, 2F	1F, 2F, 2FR
	3G	1G, 3G		1F, 2F, 3F	1F, 2F, 2FR
	4G	1G, 4G		1F, 2F, 4F	1F, 2F, 2FR, 4F
Pipe-groove	1G	1G	1G	1F	1F
	2G	1G, 2G	1G, 2G	1F, 2F	1F, 2F, 2FR
	5G	1G, 2G, 4G	1G, 2G	1F, 2F, 4F	All qualifications
	6G +6GR	All qualifications	All qualifications	All qualifications	All qualifications
	2G + 5G	All qualifications	All qualifications	All qualifications	All qualifications

WELDING CONSUMABLES FOR LOW TEMPERATURE SERVICE

Application	Type of gas	Boiling Point		Applicable down to		Consumables				
						SMAW	MIG/MAG	TIG	FCAW	SAW
		°C	K	°C	K					
Fine grained steel with increasing strength	CO_2 (to 1.5 ato)	-28	245			Baso G Conarc 49C/51/V180	LNM 26 Supra MIG	LNT 25 LNT 26	OS MC700 (-20°) OS MC710-H OS MC715-H OS T55-H OS 81Ni1-H / HSR	L61(LNS 129)/860 (-20°C) LNS 135/860 (-20°C) L50M/LNS 133U/P230
	Propane	-42	231	-40	233	Conarc 60G/70G/80/85			OS 81K2-H / HSR OS 91K2-HSR OS 91Ni1-HSR	LNS 160 / P230/P240/888/8500
				-51	222	Kryo1 Kryo2	LNM Ni1	LNT Ni1		LNS 160 / P230/P240/888/8500 LNS 162 / P230/P240/888/8500
				-60	213	Kryo3	LNM Ni2.5	LNT Ni2.5		
12 Ni 14	CO_2 (solid)	-78	195	-80	193					
	Acetylene	-84	189			Nyloid 2	LNM NiCro 70/19	LNT NiCro 70/19		LNS 4455 / P 2007
	Ethane	-88	185							
	Ethylene	-104	169	-105	168					
X12 Ni 5	Krypton	-153	120			Nyloid 2	LNM NiCro 70/19 LNM 4455	LNT NiCro 70/19 LNT 4455		LNS NiCro60/20 / P2007 LNS 4455 / P2007
	Methane	-161	112	-165	108					
X8 Ni 9 Austenitic CrNi steel AISI 304 AISI 316 LN AISI 317 LN						Nyloid 2	LNM NiCro 70/19 LNM 4455	LNT NiCro 70/19 LNT 4455		LNS NiCro 60/20 / P2007 LNS 4455 / P2007
						Jungo 304L NiCro 70/15 NiCro 70/19	LNM 304LSi LNM NiCro 70/19	LNT 304L LNT NiCro 70/19	Cor-A-Rosta P304L	LNS 304L / P2007
	Oxygen	-183	90			NiCro 60/20	LNM NiCro 60/20	LNT NiCro 60/20		LNS NiCro 60/20 / P2007
	Argon	-186	87							
	Nitrogen	-196	77			Arosta 4439	LNM 4439Mn	LNT 4439Mn		LNM 4439Mn / P2007
	Hydrogen	-253	-20	-196	77					
X2 CrNi 19-11 X2 CrNiMo 17-12-2	Helium	-269	4			Jungo 4455	LNM 4455	LNT 4455		LNS 4455 / P2007

		Max. service temp.weld metal (°C)											
		500	550	550	600	600	600	600	700	700	750	900	
Base materials		EN	EN/DIN	DIN	EN/DIN	DIN	DIN	EN/DIN	EN/DIN	EN/DIN	DIN	DIN	
		P295 GH 1.0481 P355 GH 1.0473 16Mo3 1.5415 17Mo3 (1.5415) 14Mo6 1.5423 P265 GH 1.0425	13CrMo4-5 1.7335 16CrMo4-4 1.7337 22CrMo4-4 1.7350 GS-22CrMo54 1.7354 25CrMo4 1.7218	14Mo V6-3 1.7715 17MnMoV6-4 1.5403 10CrSiMoV7 1.8075	10CrMo9-10 1.7380 12CrMO9-10 1.7375 10CrSiMo V7 1.8075 17CrMoV10 1.7766	12CrMo19-5 1.7362	X12CrMo9-1 1.7386	X20CrMoV12-1 1.4922 X20CrMoWV12-1 1.4935 1.4949	X6CrNi18-11 1.4948 X4CrNi18-10 1.4301 GX5CrNi19-10 1.4308 X3CrNiN18-11	X6CrNiMo17-13 1.4919 X3CrNiMoN17-13 1.4910 X4CrNiMo17-12-2 1.4401	X3CrNiN18-11 1.4949	X10NiCrAlTi3220 1.4876 (Alloy 800H) NiCr 15 Fe 2.4816 (Alloy 600) NiCr 23 Fe 2.4851 (Alloy 601(H)	a) 1) b) 2) 3)
		ASTM	ASTM	ASTM	ASTM	ASTM	ASTM		AISI	AISI		ASTM	
		A285GrA/B/C A299 A414grB-F A515 A516 gr. 70 A662 gr. B A 537 gr. 1 A161 gr. T1 A182 gr. F1 A204 gr. A-C A369 gr. FP1	A387Gr 11/12 A213GrT12/13 A335GrP12/11 A336GrF12/11 A182GrF11/2/12 A356 Gr6 A519Gr4130	A405Gr P24	A213GrT22 A335GrP22 A182GrF22 A199GrT22 A200GrT22 A336GrF22 A387Gr 22	A182GrF5 A199GrT5 A200GrT5 A213GrT5 A335GrP5 A336GrF5 A357 A369GrFP5 A473TP501 A473TP502 AISI TP501 AISI TP502 SAE51501 SAE51502	A199GrT91 A200GrT91 A213GrT91 A335GrP91 A336GrF91 SA182F91 SA213T91 SA369FP91 SA387Gr91		TP304H TP304 ASTM A351GrCF8 A296GrCF8	TP316H TP316		B163GrN06 B163GrN08 B167Gr600 B407Gr810	2) 1) 2) 1)
Products	SMAW	SL19G	SL 19G SL 19G(STC)	SL 22G	SL 20G SL 20G(STC)	SL502	SL9Cr(P91)	SL4935	Arosta 304H		Arosta 304H	NiCro 70/15Mn NiCro 70/19 NiCro 60/20	2) 3) 1,2,3)
	TIG	LNT 12	LNT 19		LNT 20	LNT 502	LNT9Cr(P91)		LNT304H		LNT304H	LNT NiCro 70/19 LNT NiCro 60/20	
	MIG/MAG	LNM 12	LNM 19		LNM 20				LNM 304H		LNM 304H	LNM NiCro 70/19 LNM NiCro 60/20	
	FCAW	OS12-H	OS19-H		OS 20-H								
	SAW	LNS 140A P230	LNS 150 P240/888		LNS 151 P 240/888				LNS 304-H P2007/P2000		LNS 304-H P2007/P2000	LNS NiCro 60/20 P2007	

1),2),3) corresponding base and welding materials

a) solution annealed, tempered at max. 600°C

b) pressure vessels max. 450°C

All information in this data sheet is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.eu for any updated information.

Fumes: Safety Data Sheets (SDS) are available on our website.

www.lincolnelectric.eu

LINCOLN ELECTRIC® THE WELDING EXPERTS®

		Max. service temp.weld metal (°C)						
		1000	1050	1100	1100	1100	1100	1200
Base materials		steel with approximately						
			22% Cr, 12% Ni	25% Cr, 4% Ni 0.4% C	25% Cr, 20% Ni	36% Ni, 18% Cr	36% Ni, 25% Cr	25% Cr, 20% Ni
		EN	EN/DIN	EN/DIN	DIN	DIN	DIN	EN/DIN
		NiCr22Mo 9Nb 2.4586 [1] (Alloy 625) X2 NiCrAlTi 32 20 1.4588 [2] (Alloy 800L) X10 NiCrAlTi 32 20 1.4876 [2] (Alloy 800H)	X15 CrNiSi 20-12 1.4828 [1] X12 CrNiTi 18-9 1.4878 [1] GX40 CrNiSi 22-9 1.4826 [1] GX25 CrNiSi 20-14 1.4832 [1] GX25 CrNiSi 18-9 1.4825 [1] GX30 CrSi 13 1.4710 [2] GX40 CrSi 13 1.4729 [2] GX40 CrSi 17 1.4740 [2]	X20 CrNiSi 25-4 1.4821 GX40 CrNi 24-5 1.4822 GX40 CrNiSi 27-4 1.4823 X10 CrAl 7 1.4713 X10 CrAl 13 1.4724 X10 CrAl 18 1.4742 X10 CrAl 24 1.4762	GX40 CrNiSi 25-20 1.4848 GX40 NiCrSi 25-12 1.4837	X12 NiCrSi 36-16 1.4864 GX40 NiCrSi 36-18 1.4865 GX40 NiCrSiNb 35-25 1.4852 X15 NiCrNb 32-21 1.4850	GX40 NiCrSi35-25 1.4857 GX40 NiCrSiNb 38-25 1.4852 GX40 NiCrSiNb 38-18 1.4849	X15 CrNiSi25-20 1.4841 X12 CrNi 25-21 1.4845 GX15 CrNi 25-20 1.4840
			AISi	AISi	AISi	AISi	AISi	AISi
			309 G [1] TP302 B [1] TP321 [1]	TP 327	314	TP 330	310	TP310 TP314
		ASTM		ASTM	ASTM	ASTM	ASTM	
		B163GrN08 [2] B407Gr810 [2]		A297GrHC	A297GrHK A297GrHH	A297GrHU A351GrHT30	A351GrCK20	
Products	SMAW	NiCro 60/20 [1]	Arosta 309H [1,2] Arosta 329 [2]	Arosta 329	NiCro 70/19* Nicro 70/15* NiCro 70/15Mn*	NiCro 70/19* Nicro 70/15* NiCro 70/15Mn*	NiCro 70/19* Nicro 70/15* NiCro 70/15Mn*	Intherma 310
	TIG	LNT NiCro 60/20	LNT NiCro 60/20					LNT310
	MIG/MAG	LNM NiCro 60/20	LNM NiCro 60/20					LNM 310
	SAW	LNS NiCro 60/20 P2007	LNS NiCro 60/20 P2007					LNS NiCro 60/20 P2007

1), 2) corresponding base- and weld materials
* only for repair welding

COVERED ELECTRODE SELECTION TABLE FOR STAINLESS STEEL

Material number	EN Code	Electrode type		Remarks
		First choice	Second choice	
Ferritic chromium steel				
1.4000 1.4001 1.4002 1.4006 1.4008 1.4016 1.4021 1.4024 1.4027	X6Cr13 *X7Cr14 X6CrAl13 X12Cr13 *GX8CrNi13 *X6Cr17 X20Cr13 *X15Cr13 *GX20Cr14	Arosta 309S Limarosta 309S	Arosta 329 Nichroma Arosta 309Mo	Arosta 329, when low Ni-content is required, for heavy material possibly only the capping layer
Martensitic chromium steel				
1.4113 1.4120	X6CrMo17 1 *X20CrMo13	Nichroma Arosta 309Mo	Arosta 329 Arosta 309S Limarosta 309S	Arosta 329, when low Ni-content is required, for heavy material possibly only the capping layer
Austenitic chromium-nickel steel				
1.4301 1.4303 1.4306 1.4308 1.4310 1.4311 1.4312 1.4318	X4CrNi18-10 X4CrNi18-12 X2CrNi19-11 GX5CrNi18-10 X10CrNi18-8 X2CrNiN18-10 *GX10CrNi18-8 X2CrNiN18-7	Arosta 304L Vertarosta 304L	Arosta 347	
1.4335	X1CrNi25-21	Jungo 4465		
1.4347	*GX8CrNi26-7	See Metrode range	Jungo 4462	
1.4362	X2CrNiN23-4	Arosta 4462	Jungo 4462	

* DIN/SEW

COVERED ELECTRODE SELECTION TABLE FOR STAINLESS STEEL

Material number	EN Code	Electrode type		Remarks
		First choice	Second choice	
Austenitic chromium-nickel steel				
1.4401 1.4404 1.4406 1.4408 1.4428 1.4429 1.4432 1.4435 1.4436	X4CrNiMo 17-12-2 X2CrNiMo 17-12-2 X2CrNiMoN 17-11-2 GX5CrNiMo 19-11 X2CrNiMo 18-12-3 X2CrNiMoN 17-13-3 X2CrNiMo 17-12-3 X2CrNiMo 18-14-3 X4CrNiMo 17-13-3	Arosta 316LLimarosta 316L-130 Limarosta 316L Vertarosta 316L		
1.4438 1.4439 1.4446 1.4448	X2CrNiMo 18-15-4 X2CrNiMoN 17-13-5 GX2CrNiMoN 17-13-4 GX6CrNiMo 17-13			
1.4462	X2CrNiMoN 22-5-3	Arosta 4462/ Jungo 4462		
1.4465 1.4466	X1CrNiMoN 25-25-2 X1CrNiMoN 25-22-2	Jungo 4465		
1.4468 1.4469	*GX3CrNiMoN26-6-3 *GX2CrNiMoN26-7-4	See Metrode range		

COVERED ELECTRODE SELECTION TABLE FOR STAINLESS STEEL AND NICKEL BASE ALLOYS

Material number	EN Code	Electrode type		Remarks
		First choice	Second choice	
Austenitic chromium-nickel steel				
1.4500	GX7NiCrMoCuNb 25-20	Jungo 4500	NiCro 31/27	
1.4503	X3NiCrMoTi 27-23	NiCro 31/27	NiCro 60/20	
1.4505 1.4506	X4NiCrMoCuNb 20-18-2 X5NiCrMoCuTi 20-18	Jungo 4500	NiCro 31/27	
1.4510 1.4511 1.4512 1.4513	X3CrTi17 X3CrNb17 X6CrTi12 X6CrMo 17-1	Jungo 309L Arosta 309S Limarosta 309S	Arosta 329 Nichroma Arosta 309Mo	Arosta 329, when low Ni-content is required, for heavy material only the capping layer
1.4515	*GX3CrNiMoCuN 26-6-3	See Metrode range		
1.4517	*GX3CrNiMoCuN 26-6-3-3			
1.4529 1.4531 1.4536 1.4539	X1NiCrMoCuN 25-20-7 GX2NiCrMoCuN 20-18 GX2NiCrMoCuN 25-20 X1NiCrMoCu 25-20-5	NiCro 60/20 Jungo 4500	NiCroMo 59/23 NiCro 31/27 NiCro 60/20	
1.4541 1.4550	X6CrNiTi 18-10 X6CrNiNb 18-10	Arosta 347	Arosta 304L Limarosta 304L	Type 304L, TÜV approval for service temperatures up to 350°C (intergranular corrosion)
1.4552	GX5CrNiNb 18-9		Vertarosta 304L	
1.4558 1.4559	*X2NiCrAlTi 32-20 *GX7NiCrMoCuNb 42-2	NiCro 60/20	repair welding NiCro 70/19	
1.4563	X1NiCrMoCu 31-27-4	NiCro 31/27	NiCro 60/20 Arosta 316L Limarosta 316L130	
1.4571 1.4573	X6CrNiMoTi 17-12-2 *X10CrNiMoTi 18-12	Arosta 318	Limarosta 316L Vertarosta 316L	Type 316L, TÜV approval for services temperatures up to 400°C (intergranular corrosion)
1.4577 1.4580 1.4581 1.4583	X3CrNiMoTi 25-25 X6CrNiMoNb 17-12-2 *GX5CrNiMoNb 18-10 *X10CrNiMoNb 18-12	Jungo 4465 Arosta 318 Vertarosta 316L	Arosta 316L Limarosta 316L Vertarosta 316L	Arosta 4439, when weld metal ferrite should not exceed <0,5%
1.4585 1.4586	GX7CrNiMoCuNb18-18 X5NiCrMoCuNb22-18	Jungo 4500	NiCro 31/27	

COVERED ELECTRODE SELECTION TABLE FOR STAINLESS STEEL AND NICKEL BASE ALLOYS

Material number	EN Code	Electrode type		Remarks
		First choice	Second choice	
Heat resistant steels				
1.4712 1.4713 1.4724 1.4742 1.4746 1.4762	X10CrSi 6 X10CrAl 7 X10CrAl 13 X10CrAl 18 X8CrTi 25 X10CrAl 24	Jungo 309L Arosta 309S Limarosta 309S	Arosta 329	Arosta 329, when low Ni-content is required, for heavy material only the capping layer
1.4821 1.4822 1.4823	X20CrNiSi 25-4 GX40CrNi 24-5 GX40CrNiSi 27-4	Arosta 329	Arosta 309S Limarosta 309S	
1.4825 1.4826 1.4828 1.4832 1.4833	GX25CrNiSi 18-9 GX40CrNiSi 22-9 X15CrNiSi 20-12 GX25CrNiSi 20-14 X7CrNi 23-14	Arosta 309H	NiCro 70/15Mn NiCro 70/15 NiCro 70/19	NiCro depends on service temperature
1.4837	GX40CrNiSi 25-12	NiCro 70/15/ NiCro 70/19	Arosta 309H	Arosta 309H depends on service temperature
1.4840 1.4841 1.4845 1.4847	GX15CrNi 25-20 X15CrNiSi 25-20 X12CrNi 25-21 X8CrNiAlTi 20-20	Intherma 310		
1.4846 1.4848 1.4849	X40CrNi 25-21 GX40CrNiSi 25-20 GX40NiCrSiNb 38-18	NiCro 70/15*	NiCro 70/15Mn*	
1.4850	X15NiCrNb 32-21		NiCro 70/15	
1.4852 1.4855 1.4857	GX40NiCrNb 35-25 GX30CrNiSiNb 24-24 GX40NiCrSi 35-25	NiCro 70/15*	NiCro 70/15Mn*	
1.4859 1.4861	GX10NiCrNb 32-20 X10NiCr 32-20		NiCro 70/15*	
1.4864 1.4865	X12NiCrSi 36-16 GX40NiCrSi 36-18	NiCro 70/15	NiCro 70/19 NiCro 70/15Mn	
1.4876	X10NiCrAlTi 32-20	NiCro 60/20	NiCro 70/15 NiCro 70/19	
1.4878	X12CrNiTi 18-9	Arosta 309H	Arosta 347	

*for repair welding

COVERED ELECTRODE SELECTION TABLE FOR NICKEL BASE ALLOYS

Material number	EN Code	Electrode type		Remarks
		First choice	Second choice	
Creep resistant chromium-nickel steels				
1.6901 1.6902 1.6905 1.6907	GX8CrNi 18-10 GX6CrNi 18-10 GX5CrNiNb 18-10 X3CrNiN 18-10	NiCro 70/19	-	
Nickel-Copper-Iron-alloys				
2.4360 2.4361 2.4365 2.4375	NiCu30Fe LC-NiCu30Fe G-NiCu30Nb NiCu30Al	NiCu 70/30	-	
Nickel-Chromium-Molybdenum-Iron-Alloys				
2.4602	NiCr21Mo14W(alloy C22)	NiCroMo 59/23 NiCroMo 60/16	-	
2.4605	NiCr23Mo16Al (alloy C59)	NiCroMo 59/23	-	
2.4610	NiMo16Cr16Ti (alloy C4)	NiCroMo 59/23 NiCroMo 60/16	-	
2.4618 2.4619 2.4641	NiCr22Mo6Cu NiCr22Mo7Cu NiCr21Mo6Cu	NiCro 60/20		
2.4816 2.4817	NiCr15Fe LC-NiCr15Fe	NiCro 70/15 NiCro 70/15Mn	NiCro 60/20	
2.4819	NiMo16Cr15W (alloy C276)	NiCroMo 59/23 NiCroMo 60/16	-	
2.4851	NiCr23Fe	NiCro 70/19	NiCro 60/20	
2.4856	NiCr22Mo9Nb	NiCro 60/20	NiCroMo 59/23	NiCroMo 59/23 only higher corrosion resistance
2.4858	NiCr21Mo	NiCro 60/20	-	
2.4867 2.4869 2.4951 2.4952	NiCr60 15 NiCr80 20 NiCr20Ti NiCr20TiAl	NiCro 70/15 NiCro 70/15Mn	-	
2.4975 2.4976	NiFeCr12Mo NiCr20Mo	NiCro 60/20	-	

Type	EN code	W.nr.	NiCrFe alloys	High temperature CrNi-steel	Stainless CrNiMo-steel	Stainless CrNi-steel	Ferritic Cr-steel	Creep resistant steels with Mo/Cr Mo/Cr Mo V			C-Mn-steel Yield strength 360-500 N/mm²	C-steel Yield strength <360 N/mm²
								10CrMo9-10 12CrMo19-5	13CrMo4-5 14MoV63	16Mo3	S420-500	S235-S355 P235-355
Un-alloy steel Re<360N/mm²	S235-S355 P235- P355		NiCr 70/15 NiCr 70/15Mn NiCr 70/19	X9CrNiSi 20 12 X9CrNiSi 25 20 Arosta 309S NiCr 70/15 NiCr 60/20	X5CrNiMo 17-12-2 X2CrNiMo 18-14-3 X10CrNiMoNb 18-12 Nichroma Arosta 309S Arosta 309Mo NiCro 70/19	X5CrNi 18-10 X2CrNi 19-11 X6CrNiNb 18-10 Nichroma Arosta 309S Arosta 309Mo Arosta 307	X12Cr13 X6Cr17 X10CrAl24 Nichroma Arosta 309Mo Arosta 309S Arosta 307	X20CrMoV12 1 X24CrMoV12 1 NiCro 70/15 NiCro 70/15Mn NiCro 60/20	Conarc 49C SL 12G SL 19G SL 20G	SL 19G SL 20G SL502	Conarc 49C Baso 100 Baso 120	Conarc 49C SL 12G Conarc 60G Baso 120	Conarc 49C Baso 100 Baso 120
Un-alloy fine grained steel Re>360-500N/mm²	S420-S500		NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCro 70/19 NiCro 60/20	Nichroma Arosta 309S Arosta 309Mo	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Arosta 309S Arosta 309Mo Nichroma Arosta 307	NiCro 70/15 NiCro 70/15Mn NiCro 60/20	SL 12G SL 19G SL 20G SL502	SL 12G SL 19G	SL 12G Conarc 60G	Conarc 49C SL 12G Conarc 60G Conarc 70G	
Mo-alloy steel	16Mo3	1.5415	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCro 70/19 NiCro 60/20	Nichroma Arosta 309S NiCro 70/15	Nichroma Arosta 309S Arosta 307	Nichroma Arosta 309S Arosta 307	NiCro 70/15 NiCro 70/15Mn NiCro 60/20	SL 12G SL 19G	SL 12G SL 502	SL 12G		
CrMo MoV creep resistant steel	13CrMo4-5 14MoV63 (DIN	1.7335 1.7715	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	SL 19G SL 20G	SL 19G SL 226			
CrMo creep resisting steel	10CrMo9-10 (DIN] 12CrMo19-5 (DIN]	1.7380 1.7362	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	SL 20G SL502				
Martensitic Cr-steel	X20CrMoV12-1 [DIN] X24CrMoV12-1 [DIN]	1.4922 1.4936	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20	NiCro 70/15 NiCro 70/15Mn NiCro 70/19 NiCro 60/20					
Ferritic Cr-steel	X12Cr13 X6Cr17 X10CrAl24 [DIN]	1.4006 1.4016 1.4762	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S Arosta 309Mo NiCro 70/15 NiCro 60/20	Nichroma Arosta 309S Arosta 309Mo	Nichroma Arosta 309S Arosta 309Mo	Arosta 329 Arosta 309S						
Stainless CrNi-steel	X5CrNi18-10 X2CrNi19-11 X6CrNiNb18-10	1.4301 1.4306 1.4550	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S Nichroma	Arosta 304L Arosta 316L	Arosta 304L Arosta 347							
Stainless CrNiMo-steel	X5CrNiMo17-12-2 X2 CrNiMo18-14-3 X10CrNiMoNb18-12 [DIN]	1.4401 1.4435 1.4583	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S Arosta 309Mo	Arosta 316L Arosta 318								
High temperature CrNi-steel	X15CrNiSi20-12 [DIN] X15CrNiSi 25-20 [DIN]	1.4828 1.4841	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Intherma 310 NiCro 70/19									
NiCrFe-alloys	NiCr15Fe(DIN] [Alloy 600] NiCrAlTi [DIN] [Alloy 800]	2.4816 1.4876	NiCr 70/15 NiCr 70/15Mn NiCr 60/20										

Preheating 150-250°C

Preheating and stress relieving

Base material	319.0 333.0 354.0 355.0 380.0	356.0 357.0 359.0 413.0 444.0 443.0	511.0 512.0 513.0 514.0	7005 k 7018 7021 7029 7039 710.0 711.0 712.0	6070	6061 6083 6082 6101 6201 6151 6351 6951	5456	5454	5154 5254 a 5086	5083	5052 5005 5652 a 5050	3004	2219 2519	2014 2036	1100 3003	1060 1070 1080 1350
1060 1070 1080 1350	4145 (c,i)	4043 (i,f)	5356 (c,e,i)	5356 (c,e,i)	4043 (i)	4043 (i)	5356 (c)	4043 (i)	5356 5356 (c,e,i) (c)	5356 (c)	4043 1100 (i) (c)	4043	4145	4145	1100	1188
1100 3003	4145 (c,i)	4043 (i,f)	5356 (c,e,i)	5356 (c,e,i)	4043 (i)	4043 (i)	5356 (c)	4043 (e,i)	5356 5356 (c,e,i) (c)	5356 (c)	4043 4043 (e, i) (e)	4043 (e)	4145	4145	1100 (c)	
2014 2036	4145 (g)	4145			4145	4145			4043 4043 (j)				4145 (g)	4145 (g)		
2219 2519	4145 (g,c,i)	4145 (g,c,i)	4043 (i)	4043 (i)	4043 (f,i)	4043 (f,i)	4043	4043 (i)	5654 5356 (cb) (e)	4043	4043 4043(i)	4043	2319 (c,f,i)			
3004	4043 (i)	4043 (i)	5654 (b)	5356 (e)	4043 (e)	4043 (b)	5356 (e)	5654 (b)	5654 5356 (b) (e)	5356 (e)	4043 4043 (e, i) (e)	4043 (e)				
5005 5050	4043 (i)	4043 (i)	5654 (b)	5356 (e)	4043 (e)	4043 (b)	5356 (e)	5654 (b)	5654 5356 (b) (e)	5356 (e)	4043 4043 (e, i) (e)					
5052 5652	4043 (i)	4043 (b,i)	5654 (b)	5356 (e)	5356 (b,c)	5356 (b,c)	5356 (b)	5654 (b)	5356 5356 (e) (e)	5356 (e)	5654 (a,b,c)					
5083		5356 (c,e,i)	5356 (e)	5183 (e)	5356 (e)	5356 (e)	5183 (b)	5356 (e)	5356 5356 (b) (e)	5183 (e)						
5086		5356 (c,e,i)	5356 (e)	5356 (e)	5356 (e)	5356 (e)	5356 (e)	5356 (b)	5356 5356 (b) (e)							
5154 5254 a		4043 (b,i)	5654 (b)	5356 (b)	5356 (b,c)	5356 (b,c)	5356 (b)	5654 (a)	5356 5356 (b) (e)							
5454	4043 (i)	4043 (b,i)	5654 (b)	5356 (b)	5356 (b,c)	5356 (b,c)	5356 (b)	5554 (c,e)	5654 (a,b)							
5456		5356 (c,e,i)	5356 (e)	5556 (e)	5356 (e)	5356 (e)	5356 (e)									
6061 6063 6082 6101 6201 6201 6151 6351 6951	4145 (c,i)	4043 (f,i)	5356 (b,c)	5356 (b,c,i)	4043 (b,i)	4043 (b,i)										
6070	4145 (c,i)	4043 (f,i)	5356 (c,e)	5356 (c,e,i)	4043 (e,i)											
7005 k 7018 7021 7029 7039 710.0 711.0 712.0	4043 (i)	4043 (b,i)	5356 (b)	5356 (i)												
511.0 512.0 513.0 514.0		4043 (b,i)	5654 (b,d)													
356.0 357.0 359.0 413.0 444.0 443.0	4145 (c,i)	4043 (d,i)														
319.0 333.0 354.0 355.0 380.0	4145 (d,c,i)															

All filler materials are listed in the AWS specification A5.10

a. Base metal alloys 5652 and 5254 are used for hydrogen peroxide service, 5654 filler metal is used for welding both alloys for low temperature [150°F (65°C)] service.
b. 5183, 5356, 5454, 5754, 5556 and 5654 may be used. In some cases they provide improved color match after anodizing, highest weld ductility and higher weld strength. 5554 is suitable for elevated temperature service
c. 4043 may be used for some applications.
d. Filler metal with the same analysis as the base metal is sometimes used.
e. 5183, 5356 or 5556 may be used.
f. 4145 may be used for some applications.
g. 2319 may be used for some applications.
i. 4047 may be used for some applications.
j. 1100 may be used for some applications.
k. This refers to 7005 extrusions only.

Additional Guidelines

1. Service conditions such as immersion in freshe or salt water, exposure to specific chemicals, or exposure to sustained high temperature (65°C) may limit the choice of filler metals.

Filler alloys 5356, 5183, 5556 and 5654 are not recommended for sustained elevated temperature service.

2. Guide lines in this table apply to gas shielded arc welding processes.
3. Where no filler metal is listed, the base metal combination is not recommended for welding

The serviceability of product or structure utilizing this type of information is and must be the sole responsibility of builder/user. Many variables beyond the control of Indalco Alloys affect the results obtained in applying this type of information. These variables include, but are not limited to, welding procedure, plate chemistry and temperature, weldment design, fabrication methods and service requirements

Type	Field of application	Deposit in cm³ per electrode		
		Ø 3.2	Ø 4.0	Ø 5.0
Ferrod 135T Ferrod 160T	High recovery electrodes for fillet welds and horizontal V- and X-welds. Smooth weld appearance. High welding speed through high recovery of 135, 160 %	4.7	7.1 8.5	11.6 14.2
Ferrod 165A	As Ferrod 160T. Higher welding speed. 160% recovery. Impact properties at -20°C	5.1	8.5	12.7
Universalis	Rutile type, especially for down hand fillet welding and filling in structural steel. Very smooth appearance.	2.7[1] 3.5[2]	3.9[1] 5.1[2]	
Cumulo	All positions fillet welding and filling f.i. for pipe welding (except vertical-down)	2.5	3.5	
Pantafix	Rutile all position electrode for most widely application. General construction, pipe welding, including vertical-down.	2.4	3.4	
Omnia	General purpose all position electrode. Low open circuit, small diameters for hobby market.	2.4/2.4	3.4/3.4	
Supra	All position rutile, excellent vertical down properties. Shipbuilding repairs.	2.4	3.3	4.9
Kardo	Basic electrode, low yield, low tensile, high impact.	3.0	4.4	
Baso 48SP	Rutile-basic electrode, excellent weldability, start and restart.	3.0	5.3	
Baso 100	Basic electrode for welding under difficult conditions	2.5[1]	3.7[1]	8.0
Baso 120	Basic electrode, 120% efficiency, for fast filling in all positions in difficult construction work	2.9[1] 3.9[2]	4.0[1] 5.8[2]	9.1
Baso G	Basic DC(arc) electrode, 120% efficiency, for fast filling in all positions.	3.0[1] 3.9[2]	4.5[1] 5.8[2]	9.1
Conarc 48	Basic electrode, 130% efficiency, Very good notch toughness at low temperatures.	3.2[1]	4.9[1] 6.1[2]	
Conarc 49C	Basic electrode, 115% efficiency. Very good notch toughness at low temperatures.	2.8	4.2[1] 6.1[2]	8.5
Baso 26V	Basic electrode for vertical-down welding	2.7	5.3	8.5
Conarc 51	Basic electrode. All positions. Very good notch toughness at low temperatures	2.2	3.4	9.8
Conarc L150	Basic electrode for horizontal fillet welds and filling. 150% efficiency	4.9	7.5	11.6
Conarc V180	Basic electrode with approx. 175% efficiency for high deposition rate downhand filling.	6.1	9.1	12.7

Arc time in seconds per electrode		
Ø 3.2	Ø 4.0	Ø 5.0
75	65	68
85	92 90	86 78
57[1] 69[2]	55[1] 69[2]	
66	62	
66	72	
59/65	59/72	
64	66	77
84	79	
75	95	
62[1]	64[1]	91
62[1] 74[2]	63[1] 85[2]	99
70[1] 79[2]	75[1] 96[2]	114
67[1]	83[1]	95[2]
65	75[1] 100[2]	90
51	70	86
62	71	104
84	80	75
73	70	75
	70	75

Weld metal volume per meter

Fillet size "a" in mm	Theoretical content in cm³	Formula : (a² x L) "a" in mm
3	9	
3.5	12.3	
4	16	
4.5	20.3	
5	25	
5.5	30.3	
6	36	
8	64	
10	100	

Thickness "t" in mm	Theoretical content in cm³			Formula : V50° : d (0.466d + v) L V60° : d (0.577d + v) L V70° : d (0.700d + v) L
	V50°	V60°	V70°	
6	35	39	43	
8	54	61	69	
10	77	88	100	
12	103	119	137	
14	133	155	179	
16	167	196	227	
18	205	241	281	
20	246	291	340	

Thickness "t" in mm	Theoretical content in cm³			Formula : X50° : d (0.233d + v) L X60° : d (0.228d + v) L X70° : d (0.350d + v) L
	V50°	V60°	V70°	
14	88	98	111	
16	108	122	138	
18	129	147	167	
20	153	175	200	
25	220	255	294	
30	300	349	405	
35	390	458	534	
40	493	581	680	

Thickness "t" in mm	Theoretical content in cm³	Formula : ((d-10)² x 0,27 + 12d - 73)
20	194	
25	288	
30	395	
35	516	
40	650	

DETERMINATION OF WELDING COSTS

weld content deposit per electrode	=	number of electrodes
price per electrode x number	=	costs of electrodes
number of electrodes x arc time	=	total arc time
total arc time x100 percentage duty cycle	=	total work time
total work time x hourly wage	=	wage costs
costs of electrodes + wage costs	=	total costs

Note: the percentage of duty cycle depends on practical conditions, and may vary between 15-45%
1) L = 350mm 2) L = 450mm

Ferrite Number

To facilitate international communication (specifications, certifications), the internationally accepted term Ferrite Number (FN) has been introduced to indicate a delta-ferrite content in stainless steel weld metal.

The Ferrite Number is often used as an indicator of resistance to weld metal hot cracking. This aspect and other engineering properties have been correlated with the FN value of the weld metal. For various service conditions the following typical levels reflect good experiences:

· fully austenitic weld metal:
- high corrosion resistance in severe oxidising and reducing acidic and chloride containing media: FN < 0.5
- fully austenitic CrNiMoN weld metal, non-magnetic: FN < 0.5
- low ferrite CrNiN and CrNiMoN weld metal, cryogenic applications: FN 3-6 or < 0.5

· general purpose stainless steel weld metal with corrosion resistance and high resistance to hot cracking and microfissures: FN 6-15
· buffer layer of austenitic/ferritic weld deposits for dissimilar joints and buffer layers in clad steel: FN 15-35
· austenitic/ferritic weld metal with high stress and pitting corrosion resistance as well as a balanced structure for toughness and corrosion: FN 30-70

Control of welding of constructions often requires the determination of the Ferrite Number (FN).

Ferrite Measurement

An internationally accepted standardised method to determine the ferrite content is based upon an arbitrarily defined relationship between a magnetic force and weld ferrite content. This is necessary because an absolute and correct determination of the ferrite content is not available as a result of inherent inaccuracy of metallographic examination and the nonexistence of a calibration method for the absolute ferrite content in stainless steel. The attracting force between a defined permanent magnet and weld metal, containing delta-ferrite is measured by means of a torsion balance. The values are in fact compared with the values obtained in measurements using the same magnet, attracting a carbon steel base plate with a non magnetic copper coating of a specified thickness. A calibration method provides the necessary linear relation. The principles are accepted as the international standard ISO 8249 and AWS A4.2-91. The European Standardization will adopt the ISO standard.
The range in the revised standards has been extended to 100FN (originally 0-28FN).
Coated thickness standards are available from the "U.S. National Institute of Standards and Technology" (NIST). A precision torsion balance or the commercially available "Magne Gage" (fig.3) are suitable for the determination of the Ferrite Number under laboratory conditions (horizontal position). A permanent magnet of defined dimensions and magnetic strength, according ISO 8249, shall be used.
Secondary standards for the checking and calibration of field equipment in the range 0-100FN are available from NIST.

Calculation of ferrite content

The ferrite content is estimated on the basis of calculation, using the as deposited weld metal chemical composition. The Cr- and Ni-equivalent is plotted in diagrams, based on the metallographic studies, such as:
· the Schaeffler Diagram1) , published in 1949, is considered as most suitable for a general picture of weld metal structures for a wide range of compositions, but not accurate for ferrite containing austenitic weld metals;
· the DeLong Diagram (1973)2), widely used up to 1985, for a limited range of CrNi (Mo, N)-stainless steel weld metal grades;
· the WRC 1992 Constitution Diagram (1992), published by Kotecki and Siewert (1992)3) has been based upon the WRC 1988 Constitution Diagram, earlier published by Siewert, McCowan and Olson4) as a result of a review and of more than 950 weld metal sample analyses and FN determinations (including data from Lincoln Electric). For this diagram, a better accuracy has been reported due to the accurate determination of the effect of Mn, Si, C, N and Nb.
· Also reference is made to the ESPY Diagram5) for the calculation of the ferrite content.

Application of Ferrite Diagrams

The various ferrite diagrams are suitable to estimate the Ferrite Number in weld metal. Ongoing verifications indicate that the new WRC 1992 Constitution Diagram provides the best estimate. The old Schaeffler diagram still provide useful information in a wide range of weld metal compositions. It provides guidelines for dissimilar joints and welding clad steel, calculation of composition and position of the diluted weld metal.

The following pages contain a reprint of a combination of the Schaeffler and the WRC 1992 Constitution Diagram (fig. 1) and the standard WRC 1992 Constitution Diagram on full scale (fig. 2). In using these diagrams for the estimation of weld metal structure, one should always take into account the effects of different welding conditions (temperature/time-cycles, welding parameters, surface effects) which usually influence FN values, compared with measurements on all weld metal deposit samples.

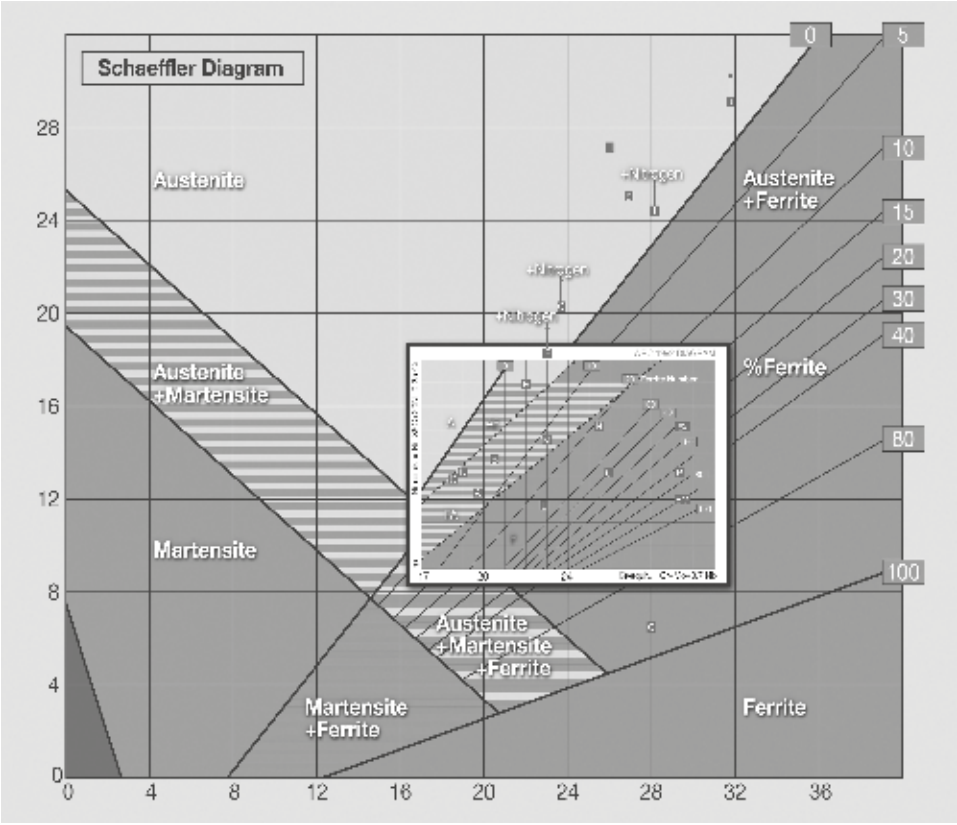


Fig. 1 Combined Schaeffler / WRC 1992 Constitution Diagram

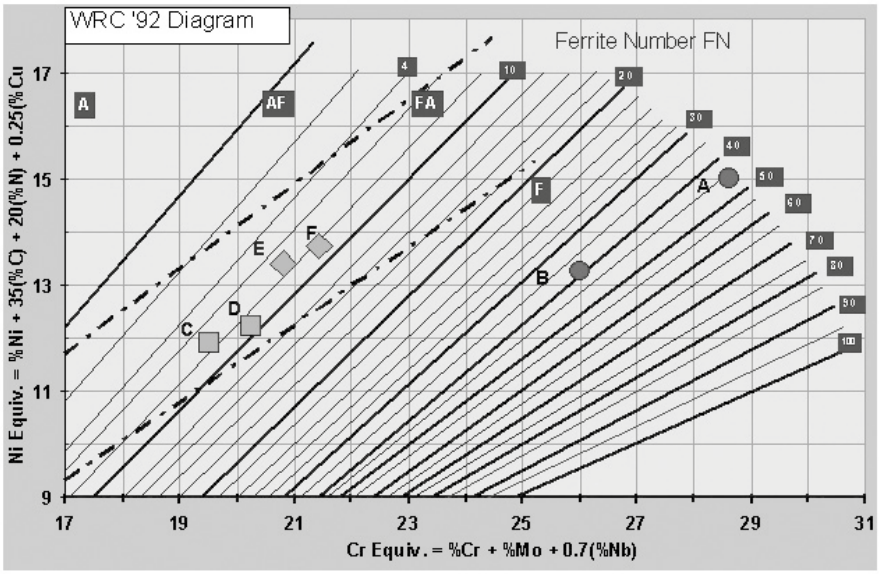


Fig. 2 WRC 1992 Constitution Diagram

Position of welding consumables

The position of representative Lincoln Electric Europe welding consumables (table 1) has been marked in the combined Schaeffler-WRC 1992 Diagram (figure 1) and in the original WRC Diagram.

Table 1 Cr- and Ni-equivalent, calculated according Schaeffler and the WRC'92 Constitution Diagram

Ident	Product	WRC'92		Schaeffler		ident	Product	WRC'92		Schaeffler	
		Cr-eq	Ni-eq	Cr-eq	Ni-eq			Cr-eq	Ni-eq	Cr-eq	Ni-eq
A	Jungo Zeron® 100X	28.6	15.0	29.1	10.5	I	Jungo 4500	25.0	27.3	26.4	26.2
B	Jungo 4462	26.0	13.3	26.9	10.9	J	Jungo 4465	27.2	25.7	28.1	25.2
C	Arosta 304L	19.5	11.9	20.6	11.0	K	NiCro 31/27	30.5	33.2	31.7	32.0
D	Arosta 347	20.3	12.2	21.4	11.3	L	Arosta 309S	23.6	14.2	24.6	13.3
E	Arosta 316L	20.8	13.4	22.0	12.5	M	Arosta 309Mo	25.4	14.5	26.7	13.5
F	Arosta 318	21.5	13.8	22.7	12.8	N	Arosta 307	17.8	13.3	18.7	14.2
G	Arosta 4439	22.6	21.3	23.8	18.2	O	Arosta 329	25.4	8.6	27.2	7.4
H	Jungo 4455	23.0	19.9	23.5	20.3	P	Limarosta 312	28.8	13.9	30.3	12.7

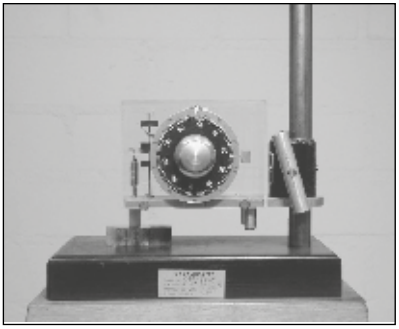


Fig. 3 Magne Gage

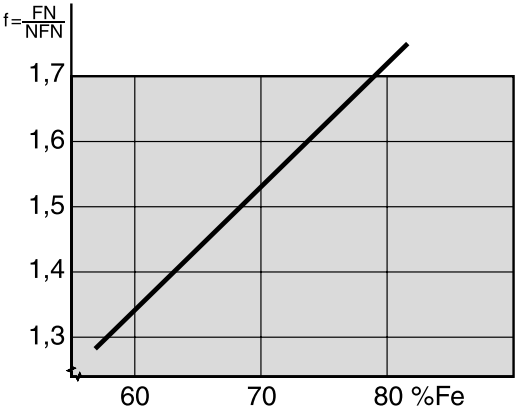


Fig. 4 Iron content versus factor f

Ferrite Number versus Ferrite Content

The Ferrite Number is not equal to the volumetric ferrite content (%). Although an absolute ferrite content can not be measured accurately, a reasonable estimate of the ferrite content can be made by dividing the Ferrite Number by the factor f (% ferrite = FN / f) which is dependant of the iron content in the weld metal as shown in figure 4.

Limitations

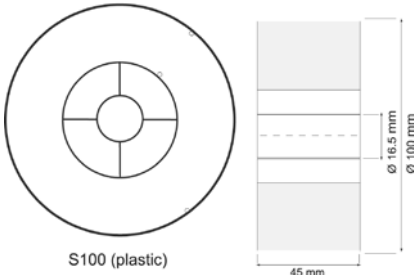
With the practice of measuring the Ferrite Number or ferrite content, welding conditions deviating from the standardised conditions have always to be taken into account. Furthermore, comparison tests showed that the accuracy between measurements in various laboratories may show differences up to +/- 10%.

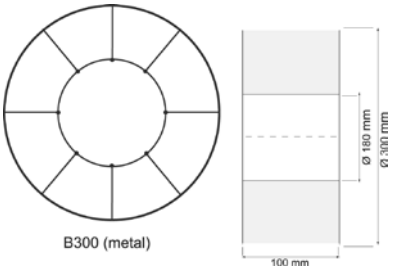
Lincoln Electric laboratories

Since 1966 the Lincoln Electric and Lincoln Smitweld R&D departments have always been involved in the international development of ferrite determinations. The laboratories are equipped with calibrated Magne Gages and on site measurement equipment. Primary coating thickness standards and secondary standards are available for contract calibration work.

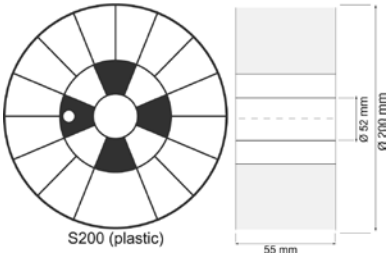
References

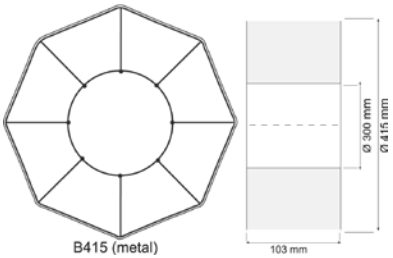
1) Schaeffler A.E., Metal Progress 56 (1949) p680-680s
2) DeLong W.T., Welding Journal 53 (1974) p273s-286s
3) Kotecki D.J., Siewert T.A., Welding Journal (1992) p171s-178s
4) Siewert T.A., McCowan C.N., Olson D.L., Welding Journal (1988) p289s-298s
5) Espy R.H., Welding Journal 61 (1982) p149s-156s



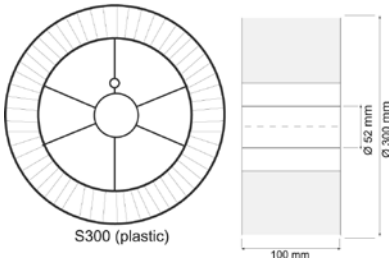


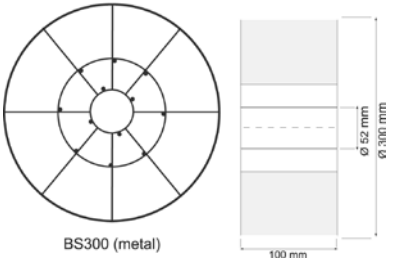
Adaptor : 2158341



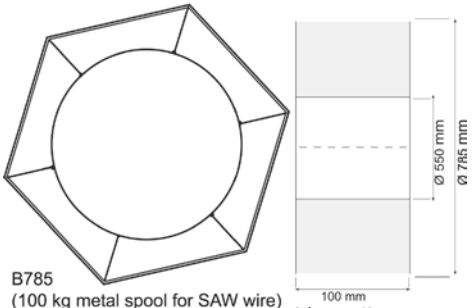


Adaptor : K299 (axis 25mm)
K1504-1 (axis 50mm)



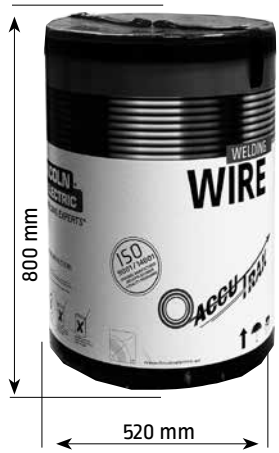


Adaptor : K10158
K10158-1 (plastic)



Adaptor : K10410

AccuTrak® EcoDrum



200/250 kg

500 kg

Advantages

- No tangles, tens of thousands of drums made.
- "Integral lifting straps" for crane or fork lift handling.
- No plastic hoods needed eliminating expensive accessories.
- Rigid cardboard construction.
- "Retaining ring" specifically designed for easy pay off.
- Drum is completely recyclable, no metal or plastic parts.

Gem-Pak™

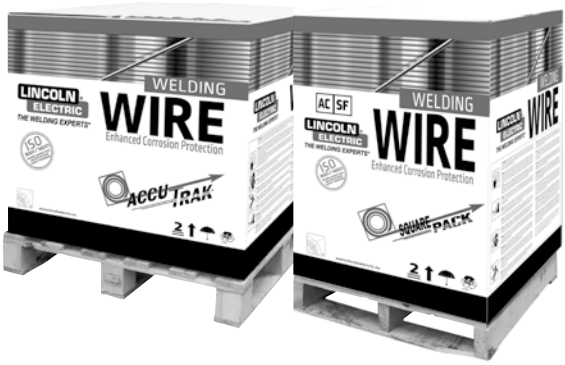
Advantages

- Tangle Free - Prevents tangling and improves feedability
- Easy to Set-up - No external payoff devices required.
- Corrugated Cardboard Pallet - Fork-lift ready mini-pallet comes attached to the box for maximum portability and is 100% recycable.

Wire Capacity (kg) : 125/136
Wire diameters (mm) : 0.9 - 1.2 - 1.6
Wire grade : 4043 (AlSi5), 5356 (AlMg5), 5356TM (AlMg5Cr),

AccuTrak® drums
600 & 1000 kg capacity

Product	Dimensions (HxWxL mm)	Wire capacity (kg)	Wire size (mm)	Wire grade
ACCUTRAK 600KG	1051 x 720 x 720 including pallet	600	1.6 to 2.4	Non & low alloy steels
ACCUTRAK 1000KG	1000 x 1000 x 1000 including pallet	1000	1.6 to 4.0	



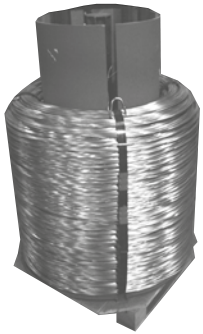
Speed-Feed drums
350, 400 & 600 kg capacity

Product	Wire capacity (kg)	Dimensions (mm)	Drums/ Pallet	Wire size (mm)	Wire grade
SPEED FEED DRUMS	350	Drum (ø x H) : 546x906 Pallet (H x W x D) : 1140x1140x1070	4	1.6 to 4.8	Non & low alloy steels
	400	Drum (ø x H) : 571x906 Pallet (H x W x D) :600x1200x1050	2		
	600	1051x720x720 including pallet	1		

Wooden reel

Wire capacity (kg)	Dimensions ø x H (mm)	Quantity/ Pallet	Wire size (mm)	Wire grade
300	750 x 290	3	2.0 to 4.8	Mild,low alloy & stainless steels

1000 kg coil



Wire capacity (kg)	Dimensions ø x H (mm)	Quantity/ Pallet	Wire size (mm)	Wire grade
1000	900 x 1100	1	2.4 to 4.8	Mild, low alloy & stainless steels

Sahara ReadyPack®: Warehouse and quiver in pocket format

Electrodes in Sahara ReadyPack® really save time and money. For these electrodes there is no need to store in a conditioned warehouse or to use redry ovens and quivers. This innovation on an industrial scale has been a success for many years now. Millions of the well known Sahara ReadyPack® have been consumed in ship building, chemical industry and in offshore projects.
The moisture resistant vacuum packaging fits well with the advantages of the remarkable EMR-Sahara® concept. EMR-Sahara® covered electrodes are designed to be low in moisture and show a very low moisture absorption. The internationally (IIW) agreed moisture resistance test demonstrates that the electrodes remain, after exposure during 24 hours at 27°C and 70% R.H., below a maximum hydrogen content of 5 ml/100g which is the criterium to call the electrodes MR: moisture resistant. Even more important is the fact that the electrodes can be consumed from an opened Sahara ReadyPack® within 12 hours, and still prove to produce a weld deposit with a very low in hydrogen content (HDM < 5 ml/100g). For a number of EMR-Sahara® electrodes the maximum HDM level is even 3 ml/100g.

A Sahara ReadyPack® actually replaces the functions of a conditioned warehouse and a redry oven, all in pocket format. Storage in a conditioned warehouse is no longer needed; most efficient is a small storage room at the job site. The use of a redry oven is not recommended. Up to the moment you open the Sahara ReadyPack®, and during the following period of 12 hours, EMR-Sahara® electrodes keep their initial quality. The convenient packages are easily carried to the welding place. The content of one or two package is usually good for one working day. A real cost saving is demonstrated in many cases, mainly because maintenance of quivers and quality control on redrying procedures is no longer needed. Not to mention the loss of unproductive time in transportation from the redry oven to the job site. The reliable Sahara ReadyPack® has indeed set a trend in the welding industry.

Properties of the Sahara ReadyPack® and its content, the EMR-Sahara® (basic) electrodes in summary:
· Diffusible hydrogen level HDM less than 5 ml/100g; a new generation provides even less than 3 ml/100g
· Low moisture pick-up of the EMR-Sahara electrode coating; 12 hours after opening of the Sahara ReadyPack® still provides electrodes with a hydrogen content of maximum 5 and 3 ml/100g respectively
· Storage does not need a conditioned warehouse
· Intermediate storage in a dry cabinet or quiver is not needed, even not recommended
· No mix-up of electrodes, as may happen with electrodes outside the packaging for redrying
· A most efficient handling procedure; cost savings can easily be calculated.

The range of electrodes in the Sahara ReadyPack®

Currently the following moisture resistant very low hydrogen electrodes (basic EMR-Sahara® electrodes) can be supplied in Sahara ReadyPack® :

Type	H_{DM} max. 5 ml/100 g	H_{DM} max. 3 ml/100 g
Baso G		*
Conarc 49C		*
Conarc 51		*
Conarc L150	*	
Conarc V180		*
Kardo		*
Conarc 55CT		*
Conarc 60G		*
Conarc 70G		*
Conarc 80		*
Conarc 85		*
SL12G	*	
SL19G	*	
SL20G	*	
SL22G	*	
SL502	*	
SL9r(P91)	*	

Type	H_{DM} max. 5 ml/100 g	H_{DM} max. 3 ml/100 g
Kryo 1		*
Kryo 1P		*
Kryo 1-180		*
Kryo 2		*
Kryo 3		*
Kryo 4		*
Arosta 304L		
Arosta 316L		
Arosta 4462		
Jungo 4462		
Limarosta 304L		
Limarosta 309S		
Limarosta 312		
Limarosta 316L		
Limarosta 316L-130		
Nyloid 2		

1. Scope

Covered arc welding electrodes, manufactured by Lincoln Electric Europe, delivered in their original packaging.
The packaging consists of either:
A cardboard boxes in outer carton;
B foil protected cardboard boxes in outer carton;
C plastic (PE) boxes with sealed cap, suitable for reclosing;
D hermetically sealed metal tin (LINC CAN™) in outercarton;
E hermetically vacuum sealed foil packs (MINI-PACK) in outercarton;
F hermetically vacuum sealed foil packs (Sahara ReadyPack®) in outer carton.

	Packaging type					
Electrode grades	**A**	**B**	**C**	**D**	**E**	**F**
Mild steel	X	X	X	X		X
Low alloy high strength steel		X		X		X
Low temperature fine grain steel		X		X	X	X
Creep resistant steel		X				X
Stainless steel		X	X	X	X	X
Duplex and Superduplex stainless steel		X				X
Nickel base electrodes			X			X
Hardfacing-; maintenance and repair electrodes			X			

2. Storage

2a. Storage of electrodes in cardboard boxes requires humidity and temperature controlled storage areas.
General recommended storage conditions include:
- temperature 17-27°C, relative humidity ≤60%
- temperature 27-37°C, relative humidity ≤50%.
- electrode boxes may be stored in layers to a maximum of 7.

2b. Plastic boxes require storage conditions suitable to cardboard boxes

2c. No temperature and humidity requirements are applicable for electrodes in Linc-Can Mini-Pack and Sahara ReadyPacks, providing that (vacuum) seal is present in undamaged packs.
General recommended storage conditions include:
- Sahara ReadyPacks & Mini-Pack in outer cartons may be stored in layers to a maximum of 7;
- Linc Can in outerboxes may be stored in layers to a maximum of 5;
- Prevent damage and heating above 60°C for Linc-Can and Sahara ReadyPacks;
- Prevent damage and heating above 40°C for Mini-Pack.

3. Handling

3a. Re-drying and subsequential holding, as recommended in table 1, is required for products in the following conditions
- rutile electrodes, being humidified for any reason;
- basic low hydrogen electrodes in cardboard boxes;
- basic low hydrogen electrodes, returned from shop floor or damaged Sahara ReadyPacks, Mini-Pack or Linc Can;
- stainless steel and Ni-base electrodes after long and unknown storage conditions (deviating from recommendations);
- Wearshield electrodes in plastic (PE) boxes, stored for more than 1 year under conditions as described under section 2a. or earlier when the condition deviates from those recommended.

3b. Electrodes in Sahara ReadyPack and Linc-Can can be used without re-drying, providing that vacuum or seal is present in the undamaged packaging. The electrodes can be consumed in the as received condition, direct from the packaging within a period of 8 hours after opening under the conditions of ≤35°C and ≤90% RH, with the electrodes remaining in the opened packaging and protected against excessive conditions as condensation, rain, etc. This time can be extended to 12 hours under the conditions of ≤27°C and ≤70% RH. Once opened Linc-Cans should be closed during welding operations using the plastic lid that is supplied with the tin. If vacuum or seal is not present, the electrodes shall follow the re-dry and holding procedure as recommended in table 1 for the EMR-Sahara® Range. Electrodes in Mini-Pack can be used without re-drying, provided that the vacuum is present in the undamaged packaging. The electrodes can be consumed in the as received condition, direct from the packaging within a period of 4 hours after opening under the conditions of ≤35°C and ≤90% RH, with the electrodes remaining in the opened packaging and protected against excessive conditions as condensation, rain, etc

REDRYING AND HOLDING RECOMMENDATIONS

Covered electrodes that have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods of time cannot be restored in their original condition and should be discarded.

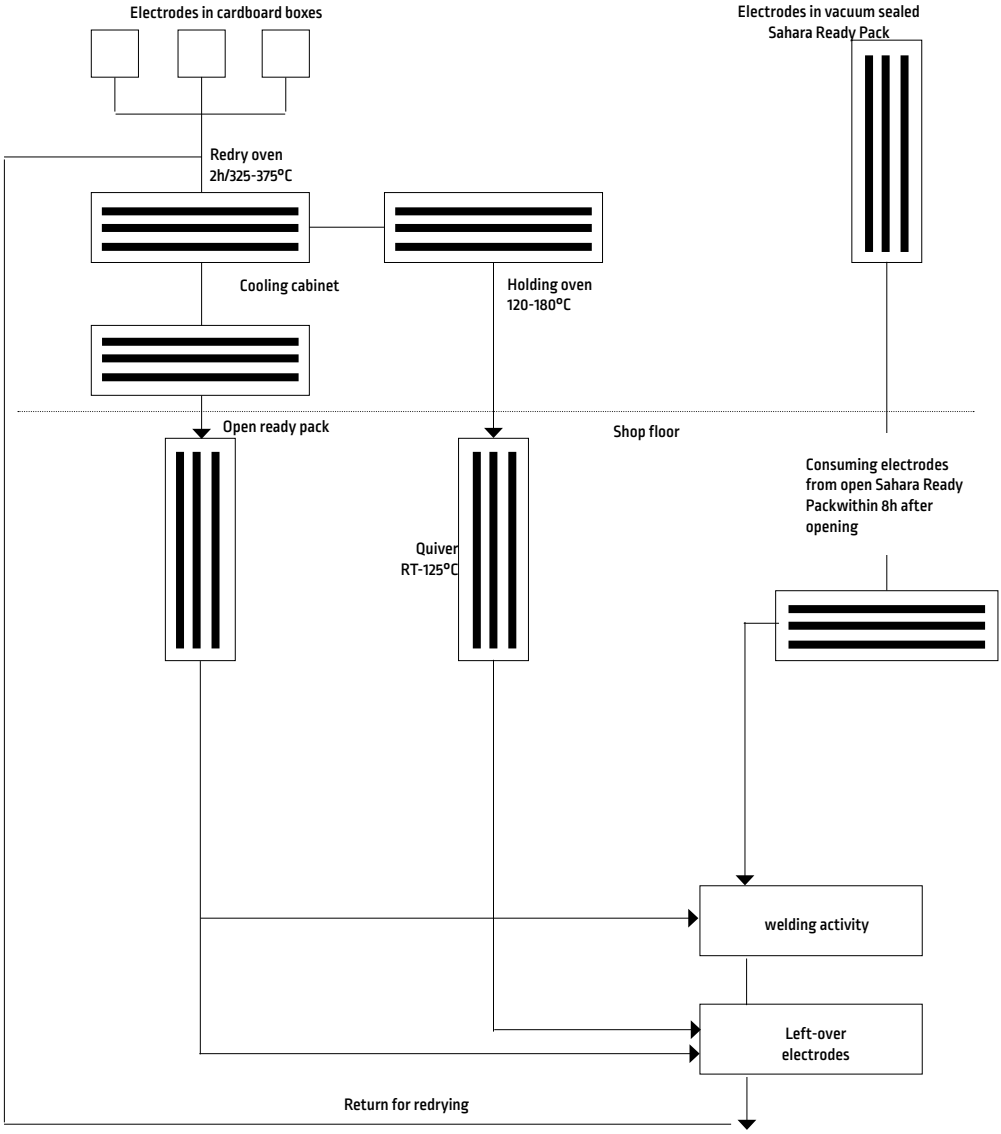
Electrode product groups	Re-drying Time (h)*	Temp (°C)	Holding
Mild steel: - rutile E6013 - rutile E6012, E7024	0.5-1h 1-2h	70-80 100-120	Cabinet 10-20°C above ambient temperature
- basic low hydrogen (HDM <8 ml/100g) - basic very low hydrogen*	2-6h 2-6h	250-375 325-375	a. Holding oven max. one year at 120-180°C b. Quiver max. 10h at RT-125°C (see illustration fig. 1) c. Plastic (PE) box max. 2 weeks workshop conditions
Low alloy: - basic very low hydrogen**	2-6h	325-375	
Hardfacing-; maintenance & repair electrodes			
Stainless steel: - non EMR-SAHARA electrodes - EMR-SAHARA range	1-6h 1-6h	200-300 125-300	Holding oven unlimited time at 75-125°C quiver max. 10h at RT-125°C
Ni-base	1-6h	200-300	

* Re-drying can be repeated twice within the indicated max. time of 6h. Re-drying of electrodes should be carried out by taking them out of the packaging and place the electrodes in approx. 3 cm thick layers in a temperature controlled air-circulation oven.

** If these EMR-SAHARA electrodes are redried a maximum content HDM of ≤5ml/100g is valid.

Figure 1:

Recommended handling procedure of EMR-SAHARA® electrodes after removal either from a regular cardboard box or vacuum sealed Sahara ReadyPack®



FLUX-CORED WIRES

1. Scope

Tubular cored wires with the following trade names are supplied in various spooling and packaging:

Product family	Packaging
OUTERSHIELD®	- spool in plastic bag in cardboard box - spool in Al/PE vacuum packaging in cardboard outerbox or - spool in plastic protection on pallet - Accutrack® drums
INNERSHIELD® /LINCORE®	spool in cardboard box or plastic bucket or hermetically sealed cans
COR-A-ROSTA®	spool in Al/PE vacuum bag in cardboard box

2. Storage

Exposure to a humid environment with only a relative thin plastic foil shall be prevented.
Tubular wire, packed in the original foil and cardboard box or drum require controlled warehouse conditions such as:

- temperature 17-27°C, relative humidity: ≤60%;
- temperature 27-37°C, relative humidity: ≤50%.

INNERSHIELD wires in plastic buckets or in hermetically sealed cans and OUTERSHIELD as well as COR-A-ROSTA in Al/PE bags under vacuum, if applicable, do not require measures against moisture pick-up. Damage of the packaging shall be prevented..

3. Handling

3a. Outershield, Innershield xxx-H types and Cor-A-Rosta
Spools outside the protective packaging allow exposure to normal workshop conditions during ≤72 hours.
Drums fitted with the original lid or recommended drum hood allow exposure to normal workshop conditions during 2 weeks

3b. Innershield, non xxx-H types:
Spools outside the protective packaging allow 2 weeks exposure to normal workshop conditions

In all cases the products require protection against contamination with moisture, dirt and oil products. During interruption of the production process for more than 8 hours, wire spools shall be stored in their plastic bag in the above-mentioned storage conditions

4. Deteriorated product

Cored electrode products that are rusty, have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods of time cannot be restored in their original condition and should be discarded.

MIG WIRES & TIG RODS

1. Scope

Solid wires and rods can be supplied in various packaging units in tubes, spools and drums

2. Storage

Exposure to a humid environment shall be prevented.
The following storage conditions are recommended.
Solid wire in the original packaging require controlled warehouse conditions such as:
- temperature 17-27°C, relative humidity ≤60%
- temperature 27-37°C, relative humidity ≤50%

3. Handling

Rods and spools outside the protective packaging allow 2 weeks of exposure to normal workshop conditions.
In all cases, the products require protection against contamination with moisture, dirt and oil products.
During interruption of the production process for more than 8 hours, wire spools shall be stored in their plastic bag in the above mentioned storage conditions.
Damage of packaging should be avoided

4. Deteriorated product

Products that are oxidized, have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods, cannot be restored in their original condition and should be discarded.

1. Scope

Trade name: 761, 780, 781, 782, 802, 839, 842-H, 860, 880, 882, 888, 960, 980, 995N, 998N, 8500, P223, P230, P240, P2000, P2007, P2000S, SPX-80X, WTX, 708GB.

Packaging: plastic bags, bulk bag, sealed metal drums and Sahara ReadyBag™

2. Storage

The following storage conditions are recommended:
Welding fluxes, packed in plastic bags, require controlled warehouse conditions such as:
- temperature 17-27°C, relative humidity: ≤60%
- temperature 27-37°C, relative humidity: ≤50%

Product in metal drums does not require special storage conditions but rust and damage of the packaging shall be prevented.

3. Handling

Product characteristics as specified for the original condition, are retained if the product is treated in accordance with the following recommendations:

	Storage conditions	
Packaging	**0-6 months, temperature ≤37°C or rel. humidity <50%**	**>6 months or temperature >37°C or relative humidity 50-90%***
Plastic bags	use as is**	redry 1-2h / 300-375°C
Sahara Ready Bag	use as is	use as is
Metal drums	use as is	use as is

* if storage conditions include a relative humidity over 90% the flux may have been deteriorated so that re-drying becomes ineffective.
** if a severe application is considered (HAZ or weld metal hardness HV10 >350, heavy restraint, etc.) re-drying 1-2h / 300-375°C is recommended.
Re-drying is carried out with the product removed from the original packaging and treated in an oven with an even temperature. It is recommended to have either an oven atmosphere circulation over a maximum flux height of 3 cm or to have the flux moving.
The re-drying operation can be repeated to a maximum of 4 times.
Redried flux and flux handled in the welding operation, shall be kept dry, preferably at a temperature of 50-120°C above ambient temperature, time unlimited.

4. Deteriorated product

Welding fluxes that have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods of time cannot be restored in their original condition and should be discarded

5. Recycling

Non consumed flux collected from the weld shall be cleaned from slag, metal and/or other contamination. Damage of the flux by heavy impingement in the transport system shall be prevented. Prevent separation of the different grain fraction in cyclones or in "dead" corners. Add new flux in the hopper in a circulation system before a level of 25% of the full hopper is reached.

STICK ELECTRODES

Fleetweld® 5P+

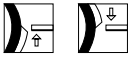
CLASSIFICATION

AWS A5.1	E6010	**A-Nr**	1
ISO 2560-A	E 42 3 C 2 5	**F-Nr**	3
		9606 FM	1

GENERAL DESCRIPTION

Cellulosic coated electrode for pipe and general welding
Gives high ductility root welds
Very deep penetration ensures sound root pass
Easy striking, easy slag release
High volume of generated gas eliminates porosity
Reduces problems from dirt and oil on surface

WELDING POSITIONS (ISO/ASME)



PH/5Gu **PJ/5Gd**

CURRENT TYPE

DC +

APPROVALS

ABS

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.20	0.56	0.17

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C/-30°C
Required: AWS A5.1	AW	min. 330	min. 430	min. 22	min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values		471	586	24	56

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Linc Can™	**Pieces / unit**	304	180	130	83
	Net weight/unit (kg)	5.1	4.7	5.1	5.1

Identification Imprint: 6010/FW5P+ Tip Color: none

Fleetweld® 5P+: rev. C-EN29-01/02/16

Fleetweld® 5P+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
EN 10208-1	L 210, L 240
EN 10208-2	L 240 , L 290, L 360
EN 10216-1 / 10217-1	P 235, P 275, P 355
API 5LX	X42, X46, X52
Gaz de France	X42, X46, X52

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
2.5x350	40-70	DC+	15.8
3.2x350	65-130	DC+	26.2
4.0x350	90-175	DC+	40.0
5.0x350	140-225	DC+	62.5

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions	
	PH/5G up	PJ/5G down
2.5	55A	65A
3.2	90A	110A
4.0	130A	150A
5.0	150A	165A

REMARKS / APPLICATION ADVICE

Preheating pipe material L360 (X52) required (acc. EN 1011-1)
Pipeclamps to be removed after finishing root pass, start welding hot pass (within 5 min) after root pass
Use electrodes directly from metal Metal cans

Supra®

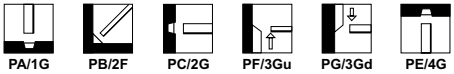
CLASSIFICATION

AWS A5.1	E6012	**A-Nr**	1
ISO 2560-A	E 38 0 RC 1 1	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

All position rutile electrode with excellent vertical down welding properties
Shipbuilding repairs
Excellent on painted or rustcovered steel
Recommended for bridging wide gaps
Weldable in all positions with one current setting

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	RMRS	TÜV
2	2	2	2	2	2	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.12	0.5	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 330	min. 430	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	min. 47
Typical values	AW	470	550	23	56

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Carton + PE foil	**Pieces / unit**	145	180	120	80
	Net weight/unit (kg)	2.8	5.0	5.0	5.2

Identification Imprint: 6012 / SUPRA Tip Color: none

Supra®: rev. C-EN24-01/02/16

Supra®

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Fine grained steels	
EN 10025 part 3	S275
EN 10025 part 4	S275

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	70-90	AC	47	109	0.8	17.5	90	1.58
3.2x350	95-130	AC	64	175	1.1	27.6	53	1.45
4.0x350	130-170	AC	66	330	1.4	41.1	39	1.61
5.0x350	170-250	AC	77	534	1.8	63.6	26	1.63

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G
2.5	85A	115A	80A	80A	80A	80A
3.2	115A	115A	120A	120A	120A	120A
4.0	155A	170A	155A	160A	180A	155A
5.0	190A	220A			240A	190A

REMARKS / APPLICATION ADVICE

Weldable in all positions with one current setting

Omnia®

CLASSIFICATION

AWS A5.1	E6013	**A-Nr**	1
ISO 2560-A	E 42 0 RC 1 1	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

Rutile general purpose, all position electrode, including vertical down
Applicable for "clean" structural steel
Smaller diameters excellent for hobby market
Very suitable for low open circuit voltage transformers

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PG/3Gd** **PE/4G**

CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	GL	LR	RMRS	DNV
2	2	2	2	2	2

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.07	0.5	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 330	min. 430	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	520	550	26	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	155	155	120
	Net weight/unit (kg)	2.8	4.8	5.4

Identification Imprint: 6013/OMNIA Tip Color: none

Omnia®: rev. C-EN24-01/02/16

Omnia®

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290
EN 10208-2	L240, L290
API 5LX	X42, X46
EN 10216-1/EN10217-1	P235, P275
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295
Fine grained steels	
EN 10025 part 3	S275
EN 10025 part 4	S275

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	65-90	AC	52	108	0.8	18.5	85	1.59
3.2x350	95-130	AC	65	229	1.0	31.1	53	1.67
4.0x350	130-160	AC	72	333	1.3	43.6	37	1.61

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G
2.5	80A	75A	75A	75A	75A	75A
3.2	120A	115A	125A	115A	125A	115A
4.0	175A	165A	160A	160A	170A	160A

REMARKS / APPLICATION ADVICE

Vertical down only applicable for "clean" structural steel

Pantafix®

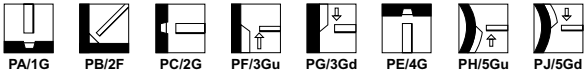
CLASSIFICATION

AWS A5.1	E6013	**A-Nr**	1
ISO 2560-A	E 38 0 RC 1 1	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

Rutile general purpose, all position electrode, including vertical down
Soft arc therefore suitable for relative thin plates and bridging wide gaps
Excellent in pipe welding and construction
Good start and restart behaviour
Also weldable with low Open Circuit Voltage transformers (min. OCV 42V)
Good X-ray soundness

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PG/3Gd** **PE/4G** **PH/5Gu** **PJ/5Gd**

CURRENT TYPE

AC / DC -

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.09	0.5	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 330	min. 430	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	min. 47
Typical values	AW	500	540	24	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0
	Length (mm)	300	350	350	350
Carton + PE foil	**Pieces / unit**	235	145	155	120
	Net weight/unit (kg)	2.4	2.8	4.8	5.4

Identification Imprint: 6013 / PANTAFIX Tip Color: none

Pantafix®: rev. C-EN25-01/02/16

Pantafix®

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290
EN 10208-2	L240, L290
API 5LX	X42, X46
EN 10216-1/EN10217-1	P235, P275
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295
Fine grained steels	
EN 10025 part 3	S275
EN 10025 part 4	S275

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0x300	40-75	AC	41	58	0.5	10.4	178	1.98
2.5x350	50-90	AC	60	130	0.7	17.8	88	1.57
3.2x350	70-130	AC	66	206	1.0	29.5	53	1.58
4.0x350	130-175	AC	72	333	1.3	43.6	37	1.61

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G
2.5	80A	75A	75A	75A	75A	75A
3.2	120A	115A	125A	115A	125A	115A
4.0	175A	165A	160A	160A	170A	160A

REMARKS / APPLICATION ADVICE

Vertical down only applicable for “clean” structural steel

Omnia® 46

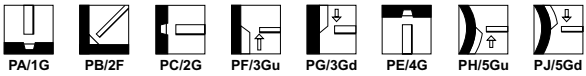
CLASSIFICATION

AWS A5.1	E6013	**A-Nr**	1
ISO 2560-A	E 38 0 R 11	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

Rutile general purpose, all positions electrode
Applicable for "clean" structural steel (2.0, 2.5, 3.2 mm)
Smaller diameters excellent for hobby market
Very suitable for low open circuit voltage transformers (min. OCV 42 V)

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G PH/5Gu PJ/5Gd

CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
2	2	2	2	2	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.06	0.5	0.45

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 330	min. 430	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	min. 47
Typical values	AW	460	540	27	65

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.6	2.0	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	250	300	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	130	370	250	175	150	110	95	55
	Net weight/unit (kg)	0.8	4.2	4.8	5.3	6.2	5.0	5.9	5.8
Unit : Linc Pack	**Pieces / unit**	-	89	54	33	-	22	-	-
	Net weight/unit (kg)	-	1.0	1.0	1.0	-	1.0	-	-

Identification Imprint: 6013-OMNIA 46 Tip Color: yellow

Omnia® 46: rev. C-EN27-01/02/16

Omnia® 46

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290
EN 10208-2	L240, L290
API 5LX	X42, X46
EN 10216-1/EN10217-1	P235, P275
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295
Fine grained steels	
EN 10025 part 3	S275
EN 10025 part 4	S275

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0x300	50-60	AC	43	57	0.5	11.4	154	1.68
2.5x350	70-90	AC	68	134	0.6	19.2	84	1.60
3.2x350	90-125	AC	80	220	0.9	30.3	50	1.51
3.2x450	100-135	AC	102	303	0.9	41.3	38	1.56
4.0x350	140-190	AC	74	323	1.5	45.5	33	1.49
4.0x450	150-200	AC	95	456	1.5	62.1	26	1.58
5.0x450	180-240	AC	115	662	1.8	105.5	17	1.75

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G	PH/5Gup	PJ/5Gdown
2.0	55A	55A	55A	50A	55A		50A	55A
2.5	80A	85A	85A	80A	85A	85A	80A	85A
3.2	110A	115A	115A	110A	115A	110A	110A	115A
4.0	170A	175A	175A	175A	180A	175A	175A	180A
5.0	220A	230A		230A				

Numal

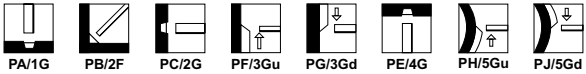
CLASSIFICATION

AWS A5.1	E6013	**A-Nr**	1
ISO 2560-A	E 38 0 R 11	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

Rutile general purpose, all positions electrode
Applicable for "clean" structural steel
Smaller diameters excellent for hobby market
Very suitable for low open circuit voltage transformers (min. OCV 42 V)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
2	2	2	2	2	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.06	0.5	0.45

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 331	min. 414	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	430	480	26	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	5.0
	Length (mm)	300	350	350	450	350	450
Carton + PE foil	**Pieces / unit**	180	275	195	150	110	55
	Net weight/unit (kg)	2.0	5.2	5.67	6.2	5.0	5.8

Identification Imprint: 6013-NUMAL Tip Color: yellow

Numal: rev. C-EN04-01/02/16

Numal

MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290
EN 10208-2	L240, L290
API 5LX	X42, X46
EN 10216-1/EN10217-1	P235, P275
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295
Fine grained steels	
EN 10025 part 3	S275
EN 10025 part 4	S275

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	70-90	AC	68	134	0.6	19.2	84	1.60
3.2x350	90-125	AC	80	220	0.9	30.3	50	1.51
4.0x350	140-190	AC	74	323	1.5	45.5	33	1.49

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G	PH/5Gup	PJ/5Gdown
2.5	80A	85A	85A	80A	85A	85A	80A	85A
3.2	110A	115A	115A	110A	115A	110A	110A	115A
4.0	170A	175A	175A	175A	180A	175A	175A	180A

Cumulo®

CLASSIFICATION

AWS A5.1	E6013	**A-Nr**	1
ISO 2560-A	E 38 0 R 12	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

Rutile, all position electrode (except vertical down)
Excellent for pipe welding and construction work
Smooth side wall wetting
Good X-ray soundness

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PH/5Gu** **PE/4G**

CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
2	2	2	2	2,2Y	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.1	0.5	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 330	min. 430	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	min. 47
Typical values	AW	500	540	25	55

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	150	175	115
	Net weight/unit (kg)	2.9	5.2	5.3

Identification Imprint: 6013 / CUMULO Tip Color: none

Cumulo: rev. C-EN25-01/02/16

Cumulo®

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290
EN 10208-2	L240, L290
API 5LX	X42, X46
EN 10216-1/EN10217-1	P235, P275
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295
Fine grained steels	
EN 10025 part 3	S275
EN 10025 part 4	S275

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	65-90	AC	52	120	0.8	18.7	86	1.61
3.2x350	85-130	AC	66	181	1.1	29.7	51	1.53
4.0x350	130-180	AC	62	345	1.6	46.5	36	1.69

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	95A	85A	85A	75A	75A	75A
3.2	135A	135A	120A	120A	120A	120A
4.0	160A	160A	155A	140A	140A	

Universalis®

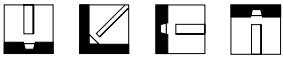
CLASSIFICATION

AWS A5.1	E6013	**A-Nr**	1
ISO 2560-A	E 42 0 RR 1 2	**F-Nr**	2
		9606 FM	1

GENERAL DESCRIPTION

Rutile electrode, especially for down hand welding in structural steel
Smaller sizes (2.0 & 2.5 mm) most versatile for thin plate material
Very smooth appearance
Self releasing slag

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
2Y	2Y	2Y	2Y	2Y	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.1	0.6	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 330	min. 430	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	480	560	26	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0
	Length (mm)	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	200	130	140	125	80
	Net weight/unit (kg)	2.4	2.8	4.8	5.8	5.9

Identification Imprint: 6013 / UNIVERSALIS Tip Color: none

Universalis®: rev. C-EN25-01/02/16

Universalis®

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52, X60
EN 10216-1/EN10217-1	P235, P275, P355
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295, P355
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0x300	40-65	AC	41	58	0.5	11.4	178	2.0
2.5x350	70-100	AC	51	134	0.8	21.1	93	1.96
3.2x350	100-140	AC	57	281	1.3	39.3	47	1.85
3.2x450	100-140	AC	69	341	1.5	49.6	36	1.79
4.0x450	150-200	AC	69	483	2.1	66.9	25	1.67

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PE/4G
2.0	50A			
2.5	100A	95A	85A	85A
3.2	130A	120A	115A	105A
4.0	185A	185A	160A	130A

REMARKS / APPLICATION ADVICE

Best choice for welding thin plates.
High yield strength steels such as S355, L360, P355 and X60 preheat according EN 1011-1

Rental

CLASSIFICATION

AWS A5.1	E7024	**A-Nr**	1
ISO 2560-A	E 38 0 RR 7 3	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Rutile electrode for fillet welds and horizontal V- and X-welds
190% recovery
Very high welding speed
Smooth weld appearance
Self releasing slag
A very smooth and stable arc with very little spatter
Very neat finely rippled weld

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC / DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.07	0.8	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 399	min. 490	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	min. 47
Typical values	AW	440	510-560	24	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
Carton	**Pieces / unit**	40	24	16
	Net weight/unit (kg)	2.7	2.4	2.6

Identification Imprint: 7024 RENTAL Tip Color: rental

Rental: rev. C-EN01-01/02/16

Rental

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to DH36
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295, P355
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

REMARKS / APPLICATION ADVICE

High yield strength steels such as S355, P355 and DH36 preheat according EN 1011-1

Ferrod® 165A

CLASSIFICATION

AWS A5.1	E7024-1	**A-Nr**	1
ISO 2560-A	E 42 2 RA 7 3	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Rutile-acid coated electrode with brittle slag, for fillet welds and horizontal V- and X-welds
160% recovery, high welding speed
Good X-ray soundness
Even in narrow gaps and rusty materials easy slag release
Class 3 approved

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	DNV	GL	LR	TÜV
3, 3Y	3	3	3, 3Y	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.07	0.95	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -10°C	Impact ISO-V(J) -18°C/-20°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	475	520	26	70	67

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Carton + PE foil	**Pieces / unit**	99	60	41
	Net weight/unit (kg)	6.1	5.6	6.0

Identification Imprint: 7024-1 / FERROD 165A Tip Color: none

Ferrod 165A® : rev. C-EN24-01/02/16

Ferrod® 165A

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295, P355
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	125-155	AC	75	326	1.9	62.9	25	1.39
4.0x450	140-235	AC	65	527	3.6	96.5	15	1.39
5.0x450	210-330	AC	68	853	5.3	144.9	10	1.39

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
3.2	160A	150A	150A
4.0	220A	200A	195A
5.0	310A	290A	

REMARKS / APPLICATION ADVICE

High yield strength steels such as S355, P355 and DH36 preheat according EN 1011-1

Ferrod® 135T

CLASSIFICATION

AWS A5.1	E7024	**A-Nr**	1
ISO 2560-A	E 38 0 RR 5 3	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Rutile electrode for fillet welds and horizontal V- and X-welds
High welding speed
Smooth weld appearance
Self releasing slag
High recovery (140%)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	RMRS	TÜV
2Y	2Y	2Y	2Y	2Y	2Y	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.08	0.5	0.35

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 400	min. 490	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	47
Typical values	AW	460	530	25	54

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Carton + PE foil	**Pieces / unit**	90	65	45
	Net weight/unit (kg)	5.5	5.7	5.9

Identification Imprint: 7024-FERROD 135T Tip Color: none

Ferrod® 135T: rev. C-EN26-01/02/16

Ferrod® 135T

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275,S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10013-2	GP240R
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295, P355
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
			- per electrode at max. current -					
3.2x450	130-150	AC	85	344	1.6	61.3	27	1.67
4.0x450	180-200	AC	92	515	2.2	87.7	18	1.67
5.0x450	275-300	AC	86	735	3.7	129.9	11	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
3.2	150A	140A	140A
4.0	200A	190A	190A
5.0	290A	280A	

REMARKS / APPLICATION ADVICE

High yield strength steels such as S355, P355 and DH36 preheat according EN 1011-1

Ferrod® 160T

CLASSIFICATION

AWS A5.1	E7024	**A-Nr**	1
ISO 2560-A	E 42 0 RR 7 3	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Rutile electrode for fillet welds and horizontal V- and X-welds
Very high welding speed
Smooth weld appearance, very good slag release
High recovery (160% for 3.2 and 4.0 mm electrodes, and 180% for 5.0 mm electrodes)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	DNV	GL	LR	RMRS	TÜV
2Y	2Y	2Y	2Y	2Y	2Y	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.07	0.9	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 400	min. 490	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	450	570	26	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Carton + PE foil	**Pieces / unit**	85	60	40
	Net weight/unit (kg)	5.6	6.3	6.1

Identification Imprint: 7024/FERROD 160T Tip Color: none

Ferrod® 160T: rev. C-EN27-01/02/16

Ferrod® 160T

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275,S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10013-2	GP240R
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295, P355
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	130-160	AC						
4.0x350	180-220	AC	90	554	2.6	92.7	15	1.43
5.0x450	280-300	AC	78	897	5.4	166.7	9	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F
3.2	150A	140A
4.0	210A	200A
5.0	300A	280A

REMARKS / APPLICATION ADVICE

High yield strength steels such as S355, P355 and DH36 preheat according EN 1011-1

Gonia 180

CLASSIFICATION

AWS A5.1	E7024	**A-Nr**	1
ISO 2560-A	E 42 0 RR 7 3	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Rutile electrode for fillet welds and horizontal V- and X-welds
190% recovery
Very high welding speed
Smooth weld appearance
Self releasing slag

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC / DC -

APPROVALS

ABS	BV	CRS	DNV	GL	LR	RINA	RMRS
2	2Y	2Y	2	2Y	2	2	2

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si
0.07	1.0	0.35

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 399	min. 490	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	450	525	27	75

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	4.0	5.0	6.3
	Length (mm)	450	450	450
Carton + PE foil	**Pieces / unit**	55	35	23
	Net weight/unit (kg)	5.8	5.8	5.7

Identification Imprint: 7024/ GONIA 180 Tip Color: blue

Gonia 180: rev. C-EN24-01/02/16

Gonia 180

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to DH36
Boiler & pressure vessel steels	
EN 10028-2	P235, P265, P295, P355
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
4.0x450	200-240	AC	78	515	3.4	100.0	14	1.35
5.0x450	280-300	AC	85	816	4.9	157.7	9	1.35
6.3x450	350-375	AC	102	1320	6.5	248.0	6	1.35

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
4.0	210A	200A	200A
5.0	300A	280A	
6.3	390A	360A	

REMARKS / APPLICATION ADVICE

High yield strength steels such as S355, P355 and DH36 preheat according EN 1011-1

Baso® 48SP

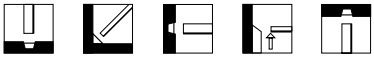
CLASSIFICATION

AWS A5.1	E7018-1 H8	**A-Nr**	1
ISO 2560-A	E 46 3 B 3 2 H10*	**F-Nr**	4
* also complies to E 46 3 BR 3 2 H10		**9606 FM**	1

GENERAL DESCRIPTION

Rutile basic coated electrode with excellent start- and restart properties
Weldable on AC and DC
Stable arc, also at low amperage
Popular at welding schools
Min. 60 Volt is recommended
Good mechanical and impact properties down to -30°C (>47 J)
Low hydrogen content (HDM < 8 ml/100g)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

ø 2.5 AC / DC + / -
ø 3.2 AC / DC +
ø 4.0 AC / DC +
ø 5.0 AC / DC

APPROVALS

ABS	BV	DNV	LR	TÜV
3YH10	HHH	3YH5	3,3YH10	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.075	1.4	0.45	7 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-30°C	-46°C
Required: AWS A5.1		min. 400	min. 490	min. 22			min. 27
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	590	640	25	90	60	

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0
	Length (mm)	350	350	450	350	450
Carton + PE foil	**Pieces / unit**	125	78	78	50	50
	Net weight/unit (kg)	2.5	2.6	3.3	2.5	3.4
SRP	**Pieces / unit**	44	51	-	27	-
	Net weight/unit (kg)	0.9	1.8	-	1.4	-

Identification Imprint: 7018-1-BASO 48SP Tip Color: green

Baso® 48SP•: rev. C-EN25-12/05/16

Baso® 48SP

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	50-85	AC	48	104	0.9	19.4	82	1.6
3.2x450	85-135	AC	75	273	1.1	41.0	42	1.72
4.0x450	135-190	AC	95	487	1.6	64.6	24	1.55

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	80A	85A	85A	85A	80A
3.2	120A	115A	115A	115A	110A
4.0	170A	180A	180A	180A	160A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Basic 7018

CLASSIFICATION

AWS A5.1	E7018 H4	**A-Nr**	1
ISO 2560-A	E 42 4 B 4 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Electrode producing crack-free welded joints with good toughness properties even on steels with a carbon content upto 0,4 %.
Recovery 120%
Excellent weldability even in positional welding
Good impact values down to -40°C
Suitable for depositing buffer layers on steels having a higher carbon content

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE

DC +

APPROVALS

BV	DNV	LR	DB	GL	TÜV
3YH5	3YH5	3YH10	+	3YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.05	1.3	0.4	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -46°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47	
Typical values	AW	475	540	27	105	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	205	125	125	85	85	55
	Net weight/unit (kg)	4.6	4.5	5.9	4.6	6.0	5.8

Identification Imprint: 7018 / BASIC 7018 Tip Color: none

Basic 7018: rev. C-EN02-01/02/16

Basic 7018

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Baso® 51P

CLASSIFICATION

AWS A5.1	E7018-1	**A-Nr**	1
ISO 2560-A	E 46 3 B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic low hydrogen electrode
Excellent for tube welding and root passes
Very good weldability, in all positions
Stable arc, also at low amperage
Easy puddle control and wetting
Good slag release and flat bead appearance
Good mechanical and impact properties down to -30°C
Excellent X-ray soundness

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PH/5Gu** **PE/4G**

CURRENT TYPE

AC / DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.06	1.3	0.5	0.015	0.010	5 ml/100g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength [N/mm²]	Tensile strength [N/mm²]	Elongation [%]	Impact ISO-V(J) -20°C	-30°C	-46°C
Required: AWS A5.1		min. 400	min. 490	min. 22			min. 27
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	510	600	27	90	70	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	5.0
	Length (mm)	450
Carton + PE foil	**Pieces / unit**	55
	Net weight/unit (kg)	5.5

Identification Imprint: 7018-1/ BASO 51P Tip Color: none

Baso® 51P: rev. C-EN26-01/02/16

Baso® 51P

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	50-100	DC+	48	104	0.9	19.4	82	1.6
3.2x450	75-140	DC+	75	273	1.1	41.0	42	1.72
4.0x450	140-190	DC+	95	487	1.6	64.6	24	1.55
5.0x450	180-280	DC+						

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	90A	90A	80A	85A	80A	85A
3.2	130A	130A	130A	115A	110A	115A
4.0	180A	175A	170A	160A		
5.0	230A	240A	230A			

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

LINCOLN 7016 DR

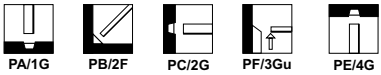
CLASSIFICATION

AWS A5.1	E7016	**A-Nr**	1
ISO 2560-A	E 42 2 B 1 2 H10	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Double Coated Basic Electrode
Stable arc and smooth welds
Ideal for pipe welding in both root pass and filling
Excellent gap bridging
Good X-ray soundness and start/restart behaviour

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC/DC +

APPROVALS

TÜV

Pending

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.08	1.2	0.6	5 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -30°C
Required: AWS A5.1		min. 400	min. 490	min. 22		27
ISO 2560-A		min. 420	500-640	min. 20	47	
Typical values	AW	455	560	28	70	45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0
	Length (mm)	350	350	450	450
Carton + PE foil	**Pieces / unit**	205	137	134	81
	Net weight/unit (kg)	4.1	4.3	5.5	5.2

Identification Imprint: Tip Color: none

LINCOLN 7016 DR: rev. C-EN01-01/02/16

LINCOLN 7016 DR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3/4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90							
3.2x350	95-150							
3.2x450	95-150							
4.0x350	140-190							

*Stub end 35mm

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Baso® 100

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7016 H4R	**A-Nr**	1
ISO 2560-A	E 42 3 B 1 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic very low hydrogen electrode (HDM< 5 ml/100g)
Excellent for general purpose welding
Will run on low open circuit voltage (min. OCV 55 V)
Good side wall wetting
Impact toughness down to -30°C
Popular at welding schools

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PH/5Gu** **PE/4G**

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	TÜV
3H,3Y	3,3YHH	3YH5	3,3YH5	3,3YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.08	1.0	0.5	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°/-30°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	555	600	26	120	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Carton + PE foil	**Pieces / unit**	136	120	90	65
	Net weight/unit (kg)	2.5	4.3	4.8	6.3

Identification Imprint: 7016 / BASO 100 Tip Color: Light blue

Baso® 100: rev. C-EN26-01/02/16

Baso® 100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-80	AC	53	116	0.8	19.1	85	1.63
3.2x350	75-115	AC	62	229	1.2	36.1	50	1.81
4.0x350	120-160	AC	64	337	1.6	50.1	34	1.72
5.0x450	160-240	AC	91	578	2.4	96.7	16	1.58
5.0x450	160-240	DC+	93	591	2.6	96.7	15	1.44

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	90A	85A	85A
3.2	130A	125A	140A	120A	115A	120A
4.0	165A	160A	165A	150A	140A	
5.0	230A	220A	210A	200A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Baso® 120

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7018 H4R	**A-Nr**	1
ISO 2560-A	E 42 3 B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic very low hydrogen electrode (HDM< 4ml/100g)
Recovery 120%
Excellent weldability even on AC in all positions
Good impact values down to -30°C
Excellent X-ray soundness

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PH/5Gu** **PE/4G**

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	TÜV
3H,3Y	3,3YH	3YH5	3,3YH5	3YH	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.08	1.2	0.5	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°/-30°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	540	600	26	150	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	135	120	120	85	85	55
	Net weight/unit (kg)	2.5	4.5	6.0	4.6	5.9	6.0

Identification Imprint: 7018 / BASO 120 Tip Color: silver

Baso® 120: rev. C-EN26-01/02/16

Baso® 120

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-80	AC	55	121	0.8	19.1	85	1.61
3.2x350	90-140	AC	62	229	1.3	37.1	44	1.64
3.2x450	90-140	AC	74	275	1.5	50.1	33	1.67
4.0x350	120-160	AC	63	338	1.8	54.4	32	1.72
4.0x450	120-160	DC+	85	391	1.9	69.5	22	1.52
5.0x450	160-240	AC	99	616	2.6	108.8	14	1.54
5.0x450	160-240	DC+	100	625	2.6	108.8	14	1.52

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	80A	80A	85A	85A	80A
3.2	145A	120A	140A	120A	125A
4.0	175A	155A	170A	165A	145A
5.0	235A	220A	210A	195A	

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Baso® G

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7018-1 H4R	**A-Nr**	1
ISO 2560-A	E 42 5 B 32 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic all position extremely low hydrogen electrode
115 - 120% recovery
AC/DC welding in all positions especially pipe
Excellent for site welding applications
Good pipe welding
Good impact values down to -50°C
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	DB	DNV	LR	GL	RINA	RMRS	TÜV
3H,3Y	3,3YH	3YH5	3,3YH5	3YH10	4YH5	3-3YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.05	1.3	0.4	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-46°C	-50°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27	
ISO 2560-A		min. 420	500-640	min. 20			min. 47
Typical values	AW	490	575	28	200	130	100

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	135	120	120	85	85	55
	Net weight/unit (kg)	2.8	4.4	5.8	4.7	5.9	6.0
SRP	**Pieces / unit**	69	50	50	28	28	23
	Net weight/unit (kg)	1.4	2.0	2.5	1.6	2.0	2.6

Identification Imprint: 7018-1/ BASO G+ Tip Color: blue

Baso® G: rev. C-EN27-01/02/16

Baso® G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0x300	35-55	DC+	50	61	0.5	11.7	149	1.75
2.5x350	55-90	DC+	59	107	0.8	20.3	78	1.59
3.2x350	75-120	DC+	70	234	1.2	36.5	42	1.54
3.2x450	75-120	DC+	79	265	1.4	45.4	33	1.47
4.0x350	120-180	DC+	75	358	1.7	50.9	28	1.45
4.0x450	120-180	DC+	96	473	1.7	69.3	22	1.52
5.0x450	160-240	DC+	114	671	2.2	106.2	14	1.54

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PF/5Gup
2.0						45A
2.5	80A	80A	85A	90A	80A	80A
3.2	145A	120A	150A	120A	115A	120A
4.0	160A	145A	170A	150A	145A	145A
5.0	220A	210A	215A	170A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Baso® 26V

CLASSIFICATION

AWS A5.1	E7048 H8	**A-Nr**	1
ISO 2560-A	E 42 3 B 1 5 H10	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic low hydrogen electrode
Specially developed for vertical down welding on shipyards and light general construction works
Complete fusion in open root passes
Good tack weldability
Good slag removal, smooth bead appearance

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PG/3Gd** **PE/4G**

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	RMRS
3Y	3Y	3YH10	3,3YH10	3YH10	3,3YH10

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.09	1.1	0.7	6 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°C/-30°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	580	630	26	130	

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Carton + PE foil	**Pieces / unit**	150	100	70
	Net weight/unit (kg)	6.1	6.2	6.7

Identification Imprint: 7048 / BASO 26V Tip Color: dark green

Baso® 26: rev. C-EN25-01/02/16

Baso® 26V

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	110-140	DC+	51	181	1.5	34.0	48	1.62
4.0x450	155-185	DC+	70	315	2.1	59.7	24	1.44
5.0x450	195-225	DC+	86	435	2.7	92.9	15	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PG/3Gdown	PE/4G
3.2	130A	130A	125A
4.0	145A	175A	165A
5.0	220A	220A	200A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Vandal

PROTECH™ VACUUM PACK

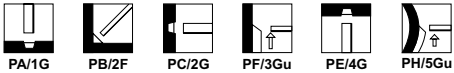
CLASSIFICATION

AWS A5.1	E7018-1 H4	**A-Nr**	1
ISO 2560-A	E 42 4 B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic coated low-hydrogen welding electrode with very good welding properties giving a tough, crack resistant weld metal. Suitable for welding structural steel and high tensile ship plate with a minimum tensile strength of 500N/mm2. Smooth and stable arc.
The electrode is well suited for positional welding particularly vertical and overhead). Good slag removal even in narrow gaps.
The weld metal provides high crack resistance and excellent impact toughness down to temperatures of - 40°C.

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +

APPROVALS

ABS	BV	DNV	GL	TÜV	RINA
3H5, 3Y	3,3Y H	3 YH5	3YH5	+	3,3Y H

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.07	1.2	0.5	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -46°C
Required: AWS A5.1		min. 399	min. 482	min. 22		27
ISO 2560-A		min. 420	500-640	min. 20	47	
Typical values	AW	436	533	29	100	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Unit : Carton + PE foil	**Pieces / unit**	118	73	73	55	55	32
	Net weight/unit (kg)	2.69	2.51	3.285	2.81	3.66	3.36
Unit : Protech®	**Pieces / unit**	96	60	60	40	40	30
	Net weight/unit (kg)	2.16	2.09	2.75	2.05	2.73	3.13

Identification Imprint: 7018-1 VANDAL Tip Color: none

Vandal: rev. C-EN04-01/02/16

Vandal

MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235 J0 / J2 / JR, S275 J0 / J2 / JR, S355 J0 / J2 / JR /K2
Ship plates	
ASTM A 131	Grade A, B, D, E, AH32 up to and including EH36
Cast steels	
EN 10213-2	GP 240 GH, GP 280 GH
Pipe material	
EN 10208-1	L210 GA, L235 GA, L245 GA, L290 GA, L360 GA
EN 10208-2	L245 MB / NB, L290 MB / NB, L360 MB / NB / QB, L415 MB / NB /QB
API 5LX	X42, X46, X52, X56, X60, X65
EN 10216-1	P195 TR1 / TR2, P235 TR1 / TR2, P265 TR1 / TR2
EN 10216-2	P195 GH, P235 GH, P265 GH
EN 10216-3	P275 NL1 / NL2, P355 N / NH / NL1 / NL2
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275 N / NL, S355 N / NL, S420 N / NL
EN 10025 part 4	S275 M / ML, S355 M / ML, S420 M / ML
Others	Steel grades with equivalent requirements as per above classified per ASTM, JIS etc

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current max. (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	70-90	110	DC+	44	137	1,0	22,8	83	1,90
3.2x350	100-130	140	DC+	56	216	1,3	34,4	50	1,72
3.2x450	100-135	140	DC+	68	269	1,4	45	37	1,67
4.0x350	130-180	200	DC+	59	312	1,8	51,1	34	1,76
4.0x450	130-190	200	DC+	77	421	1,9	66,5	24	1,62
5.0x450	220-260	280	DC+	88	709	2,6	105	16	1,67

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	80A	85A	85A	85A	80A
3.2	120A	115A	115A	115A	110A
4.0	170A	180A	180A	180A	160A
5.0	240A	250A	250A	250A	230A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25ºC after removal from cardboard boxes

Conarc® 48

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7018-1 H4R	**A-Nr**	1
ISO 2560-A	E 46 4 B 4 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic very low hydrogen electrode (HDM< 5 ml/100g)
Recovery 130%
Excellent weldability on DC+ in all positions, especially overhead and vertical up
Excellent impact toughness down to -40°C
Excellent X-ray soundness

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PG/3Gd** **PE/4G**

CURRENT TYPE

DC +

APPROVALS

DNV

4YH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.05	1.3	0.3	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -46°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 460	530-680	min. 20	min. 47	
Typical values	AW	470	570	27	103	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	450	450	450
Carton + PE foil	**Pieces / unit**	146	110	110	82	58
	Net weight/unit (kg)	1.9	2.5	5.7	6.0	6.3

Identification Imprint: 7018-1 / CONARC 48 Tip Color: orange

Conarc® 48: rev. C-EN26-01/02/16

Conarc® 48

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0x300	50-80	DC+	53		0.6	14.3	123	1.76
2.5x350	80-110	DC+	64		0.8	23.1	67	1.55
3.2x350	95-150	DC+	67		1.3	40.0	40	1.60
3.2x450	95-150	DC+	-		-	-	-	-
4.0x350	125-210	DC+	83		1.7	57.6	26	1.50
4.0x450	125-210	DC+	95		1.8	73.4	21	1.54
5.0x450	190-270	DC+						

*Stub end 35mm

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 49

PROTECH™ VACUUM PACK

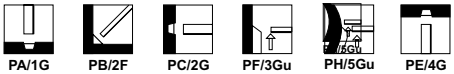
CLASSIFICATION

AWS A5.1	E7018 H4	**A-Nr**	1
ISO 2560-A	E 46 3 B 4 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic very low hydrogen electrode (HDM< 5 ml/100g)
Most suitable universal basic electrode for shipbuilding and light general construction work
Welding characteristics come very close to the welders ideal electrode
Almost no spatter, nice wetting and full weld pool control
One current setting for all positions possible
Perfect welding and 120% recovery contributes to high productivity
Also available in Protech™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PH/5Gu PE/4G

CURRENT TYPE

DC +

APPROVALS

ABS	BV	DNV	LR	GL	RMRS	RINA	TÜV
3H5, 3Y	3,3YH5	3YH5	3,3YH5	3YH5	3,3YH5	3,3YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.09	1.1	0.6	0.015	0.010	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-30°C	-40°C
Required: AWS A5.1		min. 400	min. 483	min. 22		min. 27	27
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	480	560	28	140	120	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	118	120	115	93	93	62
	Net weight/unit (kg)	2.7	4.5	5.2	5.0	6.3	6.7
Protech™	**Pieces / unit**	88	59	-	42	-	-
	Net weight/unit (kg)	2.0	2.2	-	2.2	-	-

Identification Imprint: 7018 H4/ CONARC 49 Tip Color: none

Conarc® 49: rev. C-EN30-01/02/16

Conarc® 49

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60, X65
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	70-80	DC+	58	120	0.85	23.1	73	1.7
3.2x350	110-130	DC+	68	194	1.3	36.8	41	1.5
4.0x450	140-180	DC+	98	429	1.8	69.5	20	1.4
5.0x450	160-240	DC+	117	619	2.3	107.3	13	1.4

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	95A	95A	90A	90A	85A	85A
3.2	140A	130A	130A	120A	120A	110A
4.0	180A	180A	180A	160A	150A	160A
5.0	230A	230A	230A	180A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 49C

EMR SAHARA®

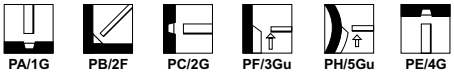
CLASSIFICATION

AWS A5.1	E7018-1 H4R	**A-Nr**	1
ISO 2560-A	E 46 4 B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic extremely low hydrogen electrode
Reliable impact toughness -40°C, good CTOD at -10°C
The off-shore electrode when Ni-alloying is not allowed
100 - 120% recovery
Good pipe welding properties
Excellent X-ray soundness
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC/DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	RMRS	TÜV
3H,3Y	3YHH	3YH5	3,3YH5	3YH10	3,3YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.06	1.4	0.3	0.015	0.010	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-50°C	-46°/-50°C
Required: AWS A5.1		min. 400	min. 490	min. 22			min. 27
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	480	580	28	200	170	100

Suitable for both As Welded and Stress Relieve (PWHT) conditions
CTOD value at -10°C > 0.25mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.0	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	135	80	120	120	85	85	55
	Net weight/unit (kg)	2.7	2.4	4.4	5.8	4.7	5.9	6.0
SRP	**Pieces / unit**	70	-	50	50	28	28	23
	Net weight/unit (kg)	1.4	-	2.0	2.5	1.6	2.0	2.6

Identification Imprint: 7018-1/CONARC 49C Tip Color: grey

Conarc® 49C: rev. C-EN27-12/05/16

Conarc® 49C

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-80	DC+	55	99	0.78	19.6	84	1.65
3.0x350	70-110	DC+	53	193	1.2	30.4	58	1.77
3.2x350	80-130	DC+	65	217	1.2	37.9	45	1.69
4.0x350	120-160	DC+	75	348	1.6	54.2	30	1.61
4.0x450	120-160	DC+	100	444	1.7	70.4	21	1.47
5.0x450	180-240	DC+	90	632	2.6	105.6	15	1.60

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	85A	80A	80A
3.0	110A	110A	115A	110A	105A	110A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A
5.0	220A	210A	210A	170A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes.
Best choice : 3.0 x 350mm for rootlayer welding in pipes.

Conarc® ONE

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7018-1 H4R	**A-Nr**	1
ISO 2560-A	E 42 5 B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic extremely low hydrogen electrode
Reliable impact toughness -40°C, good CTOD at -10°C
The off-shore electrode when Ni-alloying is not allowed
115 - 120% recovery
Good pipe welding properties
Excellent X-ray soundnessA
Iso available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PH/5Gu PE/4G

CURRENT TYPE

AC/DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	RMRS	RINA	TÜV
3H,3Y	3YHH	3YH5	3,3YH5	3YH10	3,3YH5	4YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.05	1.3	0.4	0.015	0.010	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-46°C	-50°C
Required: AWS A5.1		min. 400	min. 490	min. 22			min. 27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47		
Typical values	AW	480	575	28	200	120	100	80

CTOD value at -10°C > 0.25mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	450	450	450
Carton + PE foil	**Pieces / unit**	110	120	85	55
	Net weight/unit (kg)	7.5	7.7	8.3	8.2
SRP	**Pieces / unit**	60	50	28	23
	Net weight/unit (kg)	1.4	2.5	2.0	2.5

Identification Imprint: 7018-1 / CONARC ONE Tip Color: blue

Conarc® ONE: rev. C-EN04-01/02/16

Conarc® ONE

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-100	DC+	60	138	0.83	23.1	72	1.67
3.2x450	90-145	DC+	93	337	1.27	50.8	30	1.54
4.0x450	110-160	DC+	103	464	1.65	71.2	21	1.52
5.0x450	160-250	DC+	177	717	2.24	108.8	14	1.49

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	90A	90A	85A	90A	85A	80A
3.2	140A	140A	150A	120A	115A	120A
4.0	175A	175A	170A	150A	145A	145A
5.0	230A	230A	215A	170A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 50

EMR SAHARA®

PROTECH™ VACUUM PACK

CLASSIFICATION

AWS A5.1	E7018-1 H4	**A-Nr**	1
ISO 2560-A	E 46 5 B 4 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic very low hydrogen electrode
Excellent for general purpose welding
Good impact values down to -50°C
Also available in Protech™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +

APPROVALS

ABS	BV	DNV/ GL	LR	TÜV
4Y40H5	4Y40HHH	4Y40H5	4Y40H5	Pending

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	HDM
0.05	1.0	0.3	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	-40°C	-46°C	-50°C
Required: AWS A5.1		min. 400	min. 482	min. 22			min. 27	
ISO 2560-A		min. 460	530-680	min. 20		min. 47		
Typical values	AW	500	600	27	150	120	100	90
	SR:1h/600°C	480	580	29	120		50	

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	195	135	135	92	92	66
	Net weight/unit (kg)	4.3	4.7	6.1	4.7	5.9	6.7
Protech™	**Pieces / unit**	90	58	58	45	45	33
	Net weight/unit (kg)	2.0	2.0	2.6	2.3	3.0	3.3

Identification Imprint: 7018-1 H4 / CONARC 50 Tip Color: none

Conarc® 50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	70-90	-	-	-	-	-	-	-
3.2x350	100-130	-	-	-	-	-	-	-
3.2x450	100-135	-	-	-	-	-	-	-
4.0x350	130-180	-	-	-	-	-	-	-
4.0x450	130-190	-	-	-	-	-	-	-
5.0x450	220-260	-	-	-	-	-	-	-

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	85A	85A	85A	80A	85A
3.2	120A	115A	115A	115A	110A	115A
4.0	170A	180A	180A	180A	160A	
5.0	240A	250A	250A	250A	230A	

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 51

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7016-1 H4R	**A-Nr**	1
ISO 2560-A	E 42 4 B 1 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic extremely low hydrogen electrode
Good impact values down to -40 °C
Good CTOD at -10°C, meets offshore requirements
Excellent root pass electrode (diam. 2.5 and 3.2 mm)
Also available in vacuum sealed Sahara ReadyPack®(SRP): HDM< 3 ml/100g)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC/DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	TÜV
3H,3Y	3,3YHH	3YH5	3,3YH5	3YH10	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.06	1.4	0.5	0.015	0.010	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-46°C
Required: AWS A5.1		min. 400	min. 490	min. 22			min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47	
Typical values	AW	520	575	28	115	80	60

CTOD value at -10°C > 0.25mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	136	150	-	100	-	-
	Net weight/unit (kg)	2.7	4.7	-	4.6	-	-
SRP	**Pieces / unit**	70	56	56	-	30	23
	Net weight/unit (kg)	1.4	1.8	2.3	-	1.8	2.6

Identification Imprint: 7016-1 / CONARC 51 Tip Color: gold

Conarc® 51: rev. C-EN27-01/02/16

Conarc® 51

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	40-80	DC+	53	123	0.8	19.6	86	1.68
3.2x350	70-120	DC+	62	178	1.0	30.8	57	1.74
3.2x450	70-120							
4.0x350	100-160	DC+	71	306	1.4	48.0	37	1.78
4.0x450	100-160							
5.0x450	180-240	DC+	104	702	2.6	103.0	13	1.36

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	75A	70A	75A	70A	75A
3.2	100A	110A	100A	100A	100A
4.0	150A	140A	130A	125A	125A
5.0	220A	220A	180A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 52

EMR SAHARA®

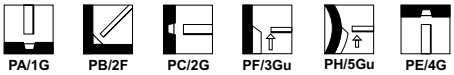
CLASSIFICATION

AWS A5.1	E7016	**A-Nr**	1
ISO 2560-A	E 42 2 B 1 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Designed for vertical up root pass welding of pipes up to and including X80 and similar steel
Suitable for fill and cap pass welding for up to and including X65
Excellent low temperature impact properties down to -30°C
Good directed arc even at very low current makes welding easier, especially in critical pipe welding applications
Superior crack resistance, excellent stability in all welding positions
Open gap root pass welding with 2.5 and 3.2 mm electrodes using DC - / + polarity

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PH/5Gu PE/4G

CURRENT TYPE

AC/DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.06	1.2	0.4	0.015	0.010	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°/-30°C
Required: AWS A5.1		min. 400	min. 490	min. 22	27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	510	560	28	100	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	148	157	87
	Net weight/unit (kg)	2.7	4.8	4.4

Identification Imprint: 7016-1 / CONARC 52 Tip Color: black

Conarc® 52: rev. C-EN06-01/02/16

Conarc® 52

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	50-80	DC+	59	100.6	0.71	18.5	86	1.59
3.2x350	60-120	DC+	68	179.9	1.02	30.3	52	1.57
4.0x350	120-170	DC+	77	258.7	1.50	48.7	31	1.51

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	85A	85A	85A	75A	85A	75A
3.2	120A	115A	115A	115A	115A	115A
4.0	170A	170A	170A	140A	140A	140A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Lincoln® 7018-1

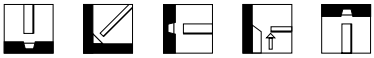
CLASSIFICATION

AWS A5.1	E7018-1	**A-Nr**	1
ISO 2560-A	E 42 4 B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Basic very low hydrogen electrode
Excellent for general purpose welding
Good impact values down to -46°C

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC + / -

APPROVALS

ABS	BV	DNV	LR	GL	RINA	TÜV
4Y40H5	4Y40HHH	4Y40H5	4Y40H5	+	4Y40H5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S
0.05	1.0	0.3	0.015	0.010

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -46°C
Required: AWS A5.1		min. 400	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47	
Typical values	AW	436	533	29	100	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	175	115	115	80	80	55
	Net weight/unit (kg)	3.9	4.0	5.2	4.1	5.3	5.6
Protech™	**Pieces / unit**	90	58	-	40	-	-
	Net weight/unit (kg)	2.0	2.0	-	2.0	-	-

Identification Imprint: 7018-1 / LINCOLN 7018-1 Tip Color: none

Lincoln® 7018-1: rev. C-EN26-01/02/16

Lincoln® 7018-1

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	70-90	DC+	59	132	0.9	22.3	71	1.59
3.2x350	100-130	DC+	65	221	1.2	34.8	48	1.66
3.2x450	100-135	DC+	75	272	1.4	45.2	36	1.61
4.0x350	130-180	DC+	64	313	1.9	51.3	29	1.51
4.0x450	130-190	DC+	77	410	2.2	66.3	21	1.41
5.0x450	220-260	DC+	84	657	3.0	101.8	14	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	80A	85A	85A	85A	80A
3.2	120A	115A	115A	115A	110A
4.0	170A	180A	180A	180A	160A
5.0	240A	250A	250A	250A	230A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® L150

CLASSIFICATION

AWS A5.1	E7028 H4R	**A-Nr**	1
ISO 2560-A	E 42 2 B 5 3 H5	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Basic low hydrogen electrode (HDM< 5 ml/100g)
150% recovery
Easy slag release
Fillet welds and horizontal V- and X-welds
Excellent weldability on AC and DC
Transformers with OCV > 70V recommended
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC/DC + / -

APPROVALS

ABS	BV	DNV	LR	GL	TÜV
3H,3Y	3,3YH	3YH5	3,3YH15	3YH10	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.07	0.95	0.4	0.015	0.010	4 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -18°C/-20°C
Required: AWS A5.1		min. 400	min. 490	min. 22	min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	540	580	27	75

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Carton + PE foil	**Pieces / unit**	90	55	35
	Net weight/unit (kg)	5.9	5.3	5.2
SRP	**Pieces / unit**	-	21	-
	Net weight/unit (kg)	-	2.1	-

Identification Imprint: 7028 / CONARC L150 Tip Color: yellow

Conarc® L150: rev. C-EN26-01/02/16

Conarc® L150

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	140-160	AC/DC+	84	375	1.7	64.8	26	1.67
4.0x450	175-220	AC/DC+	80	555	2.6	97.8	17	1.69
5.0x450	275-325	AC/DC+	75	838	4.4	155.7	11	1.72
6.0x450	325-350	AC/DC+	85	1260	5.4	209.4	8	1.64

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
3.2	150A	150A	140A
4.0	210A	200A	190A
5.0	310A	280A	
6.0	360A	300A	

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes Transformers with OCV > 70 V recommended

Conarc® V180

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E7028 H4R	**A-Nr**	1
ISO 2560-A	E 42 4 B 7 3 H5	**F-Nr**	1
		9606 FM	1

GENERAL DESCRIPTION

Basic extremely low hydrogen electrode (HDM< 3 ml/100g)
175% recovery and easy slag release
Fillet welds and horizontal V- and X-welds
Reliable impact toughness down to -40°C, good CTOD at -10°C
Excellent X-ray quality
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G

CURRENT TYPE

AC/DC + / -

APPROVALS

ABS	BV	DNV	LR	GL	RINA	RMRS
3YH5	3,3YHH	3YH5	3,3YH5	3YH10	3YH5	3-3YH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.08	1.2	0.3	0.015	0.010	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -18°C/-20°C	Impact ISO-V(J) -40°C
Required: AWS A5.1		min. 400	min. 490	min. 22	min. 27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	440	510	30	130	80

CTOD value at -10°C > 0.25mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0	6.3
	Length (mm)	450	450	450	450
Carton + PE foil	**Pieces / unit**	-	60	40	23
	Net weight/unit (kg)	-	6.0	6.1	5.4
SRP	**Pieces / unit**	27	23	19	-
	Net weight/unit (kg)	2.0	2.4	2.8	-

Identification Imprint: 7028 / CONARC V180 Tip Color: white

Conarc® V180: rev. C-EN24-01/02/16

Conarc® V180

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415, L445
API 5LX	X42, X46, X52, X60
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	130-160	AC	73	337	2.3	68.9	21	1.47
4.0x450	170-240	AC	70	538	3.6	101.0	14	1.45
5.0x450	275-330	AC	75	780	4.9	149.7	10	1.45
6.3x450	280-425	AC	83	1171	7.0	230.4	6	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
3.2	160A	140A	140A
4.0	230A	190A	190A
5.0	300A	230A	230A
6.3	390A	280A	

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes Transformers with OCV > 70 V recommended

Kardo®

EMR SAHARA®

CLASSIFICATION

AWS A5.1	E6018 [1]	**A-Nr**	1
ISO 2560-A	E 35 2 B 3 2 H5	**F-Nr**	4
[1]according to classification 1966		**9606 FM**	1

GENERAL DESCRIPTION

Basic extremely low hydrogen electrode (HDM< 3 ml/100g)
Repairs and tie-ins in oil and gas transport pipe lines
Low yield and ultimate tensile strength, high impact toughness
Buffer layer electrode for internally cladded stainless steel
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC/DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	HDM
0.03	0.4	0.25	0.015	0.010	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -18°C/-20°C
Required: AWS A5.1		min. 331	min. 414	min. 22	min. 27
ISO 2560-A		min. 355	440-570	min. 22	
Typical values	AW	390	450	28	>200

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
SRP	**Pieces / unit**	23	17	28
	Net weight/unit (kg)	0.5	0.7	1.5

Identification Imprint: KARDO Tip Color: black

Kardo®: rev. C-EN25-01/02/16

Kardo®

EXAMPLES OF MATERIALS TO BE WELDED

Weld the buffer layer of CrNi- and CrNiMo-stainless clad steel with one side welding.
High strength Fine grained steels as S460 for NH_3 storage tanks, to weld very soft, ferritic cap layers
Pipe line steel grades, to weld low yield strength fillet welds in split-T-joints (system Nederlandse Gasunie)
API 5L: X52 - X65 (EN 10208: L360 to L460).

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-80	DC+	81	173	0.5	19.7	81	1.60
3.2x350	90-120	DC+	84	252	1.0	36.5	43	1.58
4.0x350	120-160	DC+	79	448	1.6	53.0	29	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	85A	80A	80A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A

REMARKS / APPLICATION ADVICE

Use electrodes directly from Sahara ReadyPack.
Restrict dilution on stainless steel root runs.

Shield Arc® HYP+

CLASSIFICATION

AWS A5.5	E 7010-P1	**A-Nr**	1
ISO 2560-A	E 42 2 Mo C 2 5	**F-Nr**	3
		9606 FM	1

GENERAL DESCRIPTION

Cellulosic electrode for vertical down pipe welding
Suitable for pipe with strengths X52 trough X65
Cleaner weld puddle
Very low tendency to peel or flake off under high electrode pressure in tight joints
Low susceptibility to wagon tracks, windows and pinholes
Very low spatter and smoother arc action

APPROVALS

TÜV	ABS
+	+

WELDING POSITIONS (ISO/ASME)

PJ/5Gd

CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Mo	V
0.13-0.17	0.49-0.63	0.08-0.18	0.27-0.31	<0.01

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°C
Required: AWS A5.5		min. 415	min. 490	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47	
Typical values	AW	435-525	525-635	24		50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	355	355	355
Metal can	**Pieces / unit**	873	561	388
	Net weight/unit (kg)	22.7	22.7	22.7

Identification Imprint: 7010-P1 Tip Color: none

Shield Arc® HYP+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
EN 10208-2	L360 , L415, L445
EN 10216-1 / 10217-1	P355
API 5LX	X52, X56, X60, X65
Gaz de France	X52, X63

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
3.2x355	75-130	DC+	26
4.0x355	90-185	DC+	40.4
4.8x355	140-225	DC+	58.5

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	75-130A
4.0	90-185A
4.8	140-225A

REMARKS / APPLICATION ADVICE

Preheating pipe material from L380 to L450 (X56 to X65) required (acc.EN 1011-1).
Pipeclamps to be removed after finishing root pass,start welding hot pass (within 5 min) after root pass
Use electrodes directly from metal Metal cans
Use Fleetweld 5P+ for lower hardness in the root pass.

Shield Arc® 70+

CLASSIFICATION

AWS A5.5	E8010-G	**A-Nr**	10
ISO 2560-A	E 46 4 1Ni C 2 5	**F-Nr**	3
		9606 FM	2

GENERAL DESCRIPTION

Cellulosic coated electrode for vertical down pipe welding
Suitable for pipe with strengths in the range of X56 - X70
Metal can be used for root, fill and capping passes
Low susceptibility to wagon tracks, windows and pinholes
Good impact values
Metal can be used for silicon-killed steels

WELDING POSITIONS (ISO/ASME)

PJ/5Gd

CURRENT TYPE

DC +

APPROVALS

TÜV	ABS
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Ni	Cr	Mo	V
0.13-0.17	0.6-1.2	0.05-0.3	0.75-0.97	0.01-0.2	0.05-0.15	0.02-0.04

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C	-40°C	-46°C
Required: AWS A5.5		min. 460	min. 550	min. 19			
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	460-620	585-680	24	75		60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	355	355	355
Metal can	**Pieces / unit**	873	561	388
	Net weight/unit (kg)	22.7	22.7	22.7

Identification Imprint: 8010-G Tip Color: none

Shield Arc 70+: rev. C-EN27-01/02/16

Shield Arc® 70+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
EN 10208-2	L360 , L415, L445, L480
EN 10216-1 / 10217-1	P355
API 5LX	X56, X60, X65, X70
Gaz de France	X52, X63

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
3.2x355	75-130	DC+	26
4.0x355	90-185	DC+	40.4
4.8x355	140-225	DC+	58.5

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	75-130A
4.0	90-185A
4.8	140-225A

Conarc® 55CT

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E8018-W2-H4R [1]	**A-Nr**	10	[1]Deviation,see remarks - [2]Nearest classification
ISO 2560-A	E 46 5 Mn1Ni B 3 2 H5 [2]	**F-Nr**	4	
		9606 FM	2	

GENERAL DESCRIPTION

All position electrode for welding weather resistant steel like Cor-Ten, Patinax etc...
Basic extremely low hydrogen electrode
Excellent mechanical properties (impact down to -50°C)
Also available in vacuum sealed Sahara ReadyPack®(SRP): HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC +/-

APPROVALS

LR

4Y42H5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Cu	HDM
0.05	1.5	0.4	0.010	0.015	0.9	0.4	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -18°C	-20°C	-40°C	-50°C
Required: AWS A5.5		min. 460	min. 550	min. 19	min. 27			
ISO 2560-A		min. 460	530-680	min. 20				min. 47
Typical values	AW	540	610	25		115	100	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	140	120	-
	Net weight/unit (kg)	2.7	4.5	-
SRP	**Pieces / unit**	69	50	27
	Net weight/unit (kg)	1.4	1.9	1.5

Identification Imprint: CONARC 55CT Tip Color: black

Conarc® 55CT: rev. C-EN28-01/02/16

Conarc® 55CT

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Weather resisting steels	
EN 10025-5	S235 J0W
	S235 J2W
	S355 J0W
	S355 J2W
	S355 K2G1W

Weather resistant steels like Cor-Ten®,Patinax®-F,Patinax®-37 and similar Ni- and Cu-alloyed steels

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-85	DC+	53	81	0.77	19.7	88	1.74
3.2x350	80-145	DC+	70	223	1.2	36.9	43	1.60
4.0x350	120-185	DC+	77	355	1.6	54.1	29	1.59
5.0x450	180-270	DC+	104	784	2.4	105.2	15	1.53

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	110A	110A	115A	110A	105A	110A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A
5.0	220A	210A	210A	170A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25ºC after removal from cardboard boxes

Deviations:chemical composition:

Mn = 1.4 - 1.9%	AWS:Mn = 0.50 - 1.30%
Si = 0.15 - 0.60%	AWS:Si = 0.35 - 0.80%
Cr = 0.1%	AWS:Cr = 0.45 - 0.70%
Ni = 0.7 - 1.0%	AWS: Ni = 0.40 - 0.80%
Cu = 0.3 - 0.5%	EN:Cu max.0.3%

Conarc® 60G

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E9018M-H4	**A-Nr**	10
ISO 18275-A	E 55 4 Z B 32 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic all position extremely low hydrogen electrode (HDM< 2 ml/100g)
For welding high strength steel grades (UTS 540-640 N/mm2)
Good impact values down to -51°C DC welding preferred
115 - 120% recovery
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
3Y	4Y50	4Y50H5	4YH10	+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Mo	HDM
0.06	1.0	0.4	0.015	0.010	1.6	0.3	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-51°C
Required: AWS A5.5		540-620*	min. 620	min. 24			min. 27
ISO 18275-A		min. 550	610-780	min. 18		min. 47	
Typical values	AW	600	670	25		98	
	SR:1h/620°C	550	640	24	90		40

* Dia.2.5 mm max 655 N/mm2

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Carton + PE foil	**Pieces / unit**	-	-	85	55
	Net weight/unit (kg)	-	-	4.6	5.8
SRP	**Pieces / unit**	65	50	28	23
	Net weight/unit (kg)	1.4	2.0	1.5	2.6

Identification Imprint: 9018-M / CONARC 60G Tip Color: red

Conarc® 60G: rev. C-EN25-01/02/16

Conarc® 60G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S355
Pipe material	
EN 10208-2	L360, L415, L445, L480
API 5LX	X52, X56, X60, X65, X70
EN 10216-1/EN10217-1	P235T1, P235T2, P275T1, P275T2, P355N
Fine grained steels	
EN 10025 part 4	S420M (L), S460M (L), S420N (L), S460N (L)
EN 10025 part 6	S460, S500
Weather resisting steels	
EN 10155	S235 J0W
	S235 J2W
	S355 J0W
	S355 J2W
	S355 K2G1W

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-100	DC+	63	114	0.7	23.5	77	1.80
3.2x350	80-130	DC+	69	231	1.3	38.3	40	1.52
4.0x350	120-180	DC+	72	324	1.7	55.8	30	1.66
5.0x450	160-240	DC+	119	760	2.2	105.2	14	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	75A	80A	85A	75A	75A
3.2	130A	120A	135A	120A	115A	120A
4.0	155A	145A	160A	145A	140A	140A
5.0	225A	220A	210A			

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 70G

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E9018-G-H4R	**A-Nr**	10
ISO 18275-A	E 55 4 1NiMo B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic all position extremely low hydrogen electrode (HDM< 2 ml/100g)
For high strength steel grades (UTS 640-735 N/mm2), root passes in HY 100 steel
Good impact values down to -40°C DC welding preferred
115 - 120% recovery
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

DNV	TÜV
4Y50H5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Mo	HDM
0.06	1.2	0.4	0.014	0.009	1.0	0.4	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-46°C
Required: AWS A5.5		min. 530	min. 620	min. 17	not required		
ISO 18275-A		min. 550	610-780	min. 18		min. 47	
Typical values	AW	600	655	24		90	60
	SR:15h/580°C	550	640	24	90		50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
Carton + PE foil	**Pieces / unit**	110	120	85	-	55
	Net weight/unit (kg)	2.5	4.6	4.6	-	5.8
SRP	**Pieces / unit**	64	50	28	28	23
	Net weight/unit (kg)	1.5	2.0	1.5	2.0	2.4

Identification Imprint: 9018-G / CONARC 70G Tip Color: light green

Conarc® 70G: rev. C-EN24-01/02/16

Conarc® 70G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Boiler & pressure vessel steels (Reactor steels incl. Q & T steels)	
DIN	20MnMoNi5-5, 22NiMoCr3-7
	15NiCuMoNb5-6-4
	GS-18NiMoCr3-7
ASTM	A508CL2, A508CL3
	A533CL.1Gr.B / C
	A533CL.2Gr.B / C
Creep resistant steels	
	15NiCuMoNb-5 (WB36) 1.6368
	17MnMoV6-4(WB35) 1.5403
Pipe material	
EN 10208-2	L480, L550
API 5LX	X65, X70 (X80 root run)
Fine grained steels	
EN 10025 part 6	S460, S500, S550
	Root runs and fillet welds in S620 and S690

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-100	DC+	67	121	0.7	19.5	75	1.47
3.2x350	80-130	DC+	70	234	1.3	37.5	41	1.56
4.0x350	120-180	DC+	74	343	1.7	55.4	29	1.59
5.0x450	160-240	DC+	106	573	2.5	106.4	14	1.43

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	75A	80A	85A	75A	75A
3.2	130A	120A	135A	120A	115A	120A
4.0	155A	145A	160A	145A	140A	140A
5.0	225A	220A	210A			

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 74

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E8018-G-H4R	**A-Nr**	10
ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

The basic all position pipeline and offshore electrode with max. 1% Ni
Excellent mechanical properties (impact down to -60°C)
Extremely low hydrogen content
110 - 120% recovery
Weldable on AC and DC

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

NAKS

Pending

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.05	1.5	0.5	0.010	0.005	0.95	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -60°C
Required: AWS A5.5		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	550	640	24	140	80

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	450
Carton + PE foil	**Pieces / unit**	120	85
	Net weight/unit (kg)	4.7	5.9

Identification Imprint: 8018-G / CONARC 74 Tip Color: white

Conarc® 74: rev. C-EN05-01/02/16

Conarc® 74

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65
EN 10216-1/EN 10217-1	P275T1, P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460
EN 10025 part 6	S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-80	DC+	59	85	0.72	19.3	86	1.65
3.2x350	80-145	DC+	66	220	1.2	37.7	48	1.79
4.0x350	120-185	DC+	77	355	1.6	54.1	29	1.59
4.0x450	120-185	DC+	90	450	1.8	68.4	23	1.56
5.0x450	180-240	DC+	104	784	2.4	105.2	15	1.53

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	80A	80A	80A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 80

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E11018M-H4	**A-Nr**	10
ISO 18275-A	E 69 5 Z B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic all position extremely low hydrogen electrode (HDM< 2 ml/100g)
Weldable on AC and DC
110 - 115% recovery
Good impact values down to -51°C
Meets the requirements of military specifications
Suitable for welding submarines high strength steels (UTS up to 800 N/mm2)
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	LR	CCS
+	4Y69H5	4Y69H5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Mo	HDM
0.06	1.5	0.4	0.015	0.01	2.2	0.4	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	-50°C	-51°C
Required: AWS A5.5		680-760*	min. 760	min. 20			min. 27
ISO 18275-A		min. 690	760-960	min. 17		min. 47	
Typical values	AW	750	785	22	100	80	80

* Diam.2.5 max.795 N/mm²
SR:14h/620°C

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Carton + PE foil	**Pieces / unit**	-	120	90	60
	Net weight/unit (kg)	-	4.5	5.0	6.3
SRP	**Pieces / unit**	70	50	28	23
	Net weight/unit (kg)	1.4	1.9	1.5	2.5

Identification Imprint: 11018-M / CONARC 80 Tip Color: gold

Conarc® 80: rev. C-EN25-12/01/16

Conarc® 80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X70, X75
Fine grained steels	
EN 10025 part 6	S620, S690 Root runs and fillet welds in S890

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-80	DC+	55	99	0.8	19.5	82	1.61
3.2x350	80-130	DC+	78	261	1.1	36.5	43	1.55
4.0x350	120-180	DC+	75	356	1.6	53.2	30	1.59
5.0x450	160-240	DC+	116	627	2.3	105.1	14	1.45

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	75A	75A	75A	80A	75A	80A
3.2	130A	120A	135A	120A	115A	120A
4.0	145A	145A	155A	140A	140A	140A
5.0	225A	230A	210A			

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Conarc® 85

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E12018-G-H4R	**A-Nr**	10
ISO 18275-A	E 69 5 Mn2NiCrMo B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic all position extremely low hydrogen electrode (HDM< 2 ml/100g)
For steels with a tensile strength UTS of max. 835 N/mm²
For high strength steels such as T1, HY 100, Naxtra 70, HRS 650, Dillimax. 690
Good impact values down to -50°C
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	DNV	CCS
+	4Y69H5	4Y69H5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Mo	Cr	HDM
0.06	1.4	0.3	0.010	0.010	2.0	0.4	0.4	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²))	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.5		min. 740	min. 830	min. 14	not required	
ISO 18275-A		min. 690	760-960	min. 17		min. 47
Typical values	AW	840	890	21	80	60
	SR:1h/620°C	780	840	20	75	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
SRP	**Pieces / unit**	68	50	28	28	23
	Net weight/unit (kg)	1.4	1.9	1.5	1.9	2.5

Identification Imprint: 12018-G / CONARC 85 Tip Color: light blue

Conarc® 85 rev. C-EN29-12/051/16

Conarc® 85

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X70, X75, X80
Fine grained steels	
EN 10025 part 6	S690 Root runs and fillet welds in S890

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x350	80-130	DC+	69	219	1.0	37.5	50	1.89
4.0x350	120-180	DC+	68	321	1.5	53.2	35	1.87
5.0x450	160-240	DC+	106	632	2.0	106.7	17	1.81

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	75A	75A	75A	80A	75A	80A
3.2	135A	130A	140A	120A	120A	120A
4.0	155A	145A	155A	140A	140A	140A
5.0	225A	220A	215A			

Kryo® 1

EMR SAHARA®

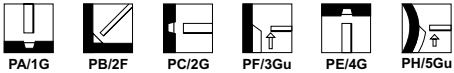
CLASSIFICATION

AWS A5.5	E7018-G-H4R [1]	**A-Nr**	10
ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5	**F-Nr**	4
[1] meet also AWS A5.5:E8018-G-H4R		**9606 FM**	2

GENERAL DESCRIPTION

The basic all position offshore electrode with max. 1% Ni
Excellent mechanical properties (impact down to -60°C)
Good CTOD down to -10°C
Extremely low hydrogen content
110 - 120% recovery
Weldable on AC and DC, also available in vacuum sealed Sahara ReadyPack® (SRP): HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	RINA	RMRS	TÜV
3Y	UP	5Y46H5	5Y40H5	6Y46H10	4YH5	3-3YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.05	1.5	0.4	0.010	0.010	0.9	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -60°C
Required: AWS A5.5		min. 390	min. 480	min. 25	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	550	640	24	150	90
	SR:580°C/15h	460	550	24		90

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.0	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	135	-	130	120	85	85	-
	Net weight/unit (kg)	2.7	-	4.7	5.8	4.4	5.9	-
SRP	**Pieces / unit**	70	54	50	50	28	28	23
	Net weight/unit (kg)	1.4	1.5	1.9	2.4	1.5	2.0	2.5

Identification Imprint: 7018-G / KRYO 1 Tip Color: purple

Kryo® 1: rev. C-EN26-12/05/16

Kryo® 1

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460
EN 10025 part 6	S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-80	DC+	59	85	0.72	19.3	86	1.65
3.0x350	70-110	DC+	74	256	0.93	30.2	52	1.58
3.2x350	80-140	DC+	66	220	1.2	37.7	48	1.79
3.2x450	80-140	DC+	78	259	1.3	48.7	35	1.72
4.0x350	120-170	DC+	77	355	1.6	54.1	29	1.59
4.0x450	120-170	DC+	90	450	1.8	68.4	23	1.56
5.0x450	180-240	DC+	104	784	2.4	105.2	15	1.53

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	80A	80A	80A
3.0	110A	110A	115A	110A	105A	110A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A
5.0	220A	210A	210A	170A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Kryo® 1N

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E8016-G-H4R	**A-Nr**	10
ISO 2560-A	E 50 6 Mn1Ni B 1 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

The basic all position offshore electrode with max. 1% Ni
Thin coated electrode, easy weld pool control
Excellent mechanical properties (impact down to -60°C)
Good CTOD at -10°C
Extremely low hydrogen content
Weldable on AC and DC
Only available in vacuum sealed Sahara ReadyPack® (SRP): HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.07	1.7	0.5	0.020	0.005	0.9	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -60°C
Required: AWS A5.5		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	570	650	24	95	60

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	450	450	450
SRP	**Pieces / unit**	45	56	30	23
	Net weight/unit (kg)	0.9	2.3	1.9	2.3

Identification Imprint: 8016-G / KRYO 1N Tip Color: red

Kryo® 1N: rev. C-EN25-01/02/16

Kryo® 1N

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460
EN 10025 part 6	S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-95	DC+	50	106	0.82	19.2	90	1.71
3.2x450	80-145	DC+	68	256	1.2	40.1	43	1.73
4.0x450	120-190	DC+	82	436	1.7	63.6	26	1.65
5.0x450	175-230							

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	75A	70A	75A	70A	75A	80A
3.2	100A	110A	100A	100A	100A	110A
4.0	150A	140A	130A	125A	125A	120A

Kryo® 1P

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E 8018-G-H4R	**A-Nr**	10
ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

The basic all position offshore electrode with max. 1% Ni
Excellent mechanical properties (impact down to -60°C)
Good CTOD at -10°C
Extremely low hydrogen content
110 - 120% recovery
Weldable on AC and DC
Vacuum sealed Sahara ReadyPack®: HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.05	1.5	0.5	0.010	0.005	0.95	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -60°C
Required: AWS A5.5		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	550	640	24	140	80
	SR:580°C/15h	460	550	24	150	90

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
SRP	**Pieces / unit**	70	50	50	28	28	23
	Net weight/unit (kg)	1.4	1.9	2.4	1.5	2.0	2.5

Identification Imprint: 8018-G / KRYO 1P Tip Color: purple

Kryo® 1P: rev. C-EN26-01/02/16

Kryo® 1P

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460
EN 10025 part 6	S460

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-85	DC+	59	85	0.72	19.3	86	1.65
3.2x350	80-145	DC+	66	220	1.2	37.7	48	1.79
3.2x450	80-145	DC+	78	259	1.3	48.7	35	1.72
4.0x350	120-185	DC+	77	355	1.6	54.1	29	1.59
4.0x450	120-185	DC+	90	450	1.8	68.4	23	1.56
5.0x450	180-270	DC+	104	784	2.4	105.2	15	1.53

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	80A	80A	80A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A
5.0	220A	210A	210A	170A		

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Kryo® 1-145

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E8018-G-H4R	**A-Nr**	10
ISO 2560-A	E 50 6 Mn1Ni B 5 3 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic electrode with max. 1%Ni to meet NACE MR0175 standard
Extremely low hydrogen content: HDM< 2 ml/100g
Up to 145% recovery, easy slag release, weldable on AC and DC
Filling horizontal V- and X-grooves
Excellent X-ray quality
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE

AC / DC +/-

APPROVALS

DNV

5Y46H5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.06	1.5	0.5	0.010	0.010	0.9	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C
Required: AWS A5.5		460	550	19	
ISO 2560-A		500	560-720	18	min. 47
Typical values	AW	570	630	23	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
SRP	**Pieces / unit**	48	25	21
	Net weight/unit (kg)	2.5	2.0	2.6

Identification Imprint: 8018-G / KRYO 1-145 Tip Color: Orange

Kryo® 1-145: rev. C-EN01-12/05/16

Kryo® 1-145

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, E, AH32 up to and including EH40
Cast steels	
EN 10213-2	GP 240 GH, GP 280 GH
Pipe material	
EN 10216-1	P195 TR1 / TR2, P 235 TR1 / TR2, P265 TR1 / TR2
EN 10216-2	P195 GH, P235 GH, P265 GH
EN 10216-3	P275 NL1 / NL2, P355 N / NH / NL1 / NL2, P 460 N / NH / NL1 / NL2
EN 10208-1	L210 GA, L235 GA, L245 GA, L290 GA, L360 GA
EN 10208-2	L245 MB / NB, L290 MB / NB, L360 MB / NB / QB, L415 MB / NB /QB, L450 MB / QB
API 5L	X42, X46, X52, X56, X60, X65, X70
Boiler & pressure vessel steel	
EN 10028-2	P235 GH, P265 GH, P295 GH, P355GH
Fine grained steels	
EN 10025 part 3	S275 N / NL, S355 N / NL, S420 N / NL, S460 N / NL
EN 10025 part 4	S275 M / ML, S355 M / ML, S420 M / ML, S460 M / ML
EN 10025 part 6	S460 / S460 Q/QL/QL1, S500 Q/QL/QL1 0, S500
Others	
Steel grades with equivalent requirements as per above classified per ASTM, JIS etc	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	90-150	DC+	82	271	1,6	54,4	27	1,47
4.0x450	150-190	DC+	95	433	2,2	82,2	18	1,48
5.0x450	180-270	DC+	98	688	3,3	127,4	12	1,53

*Stub end 45mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
3.2	130 A	130 A	130 A
4.0	170 A	160 A	160 A
5.0	235 A	225 A	225 A

Kryo® 1-180

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E 8018-G-H4R	**A-Nr**	10
ISO 2560-A	E 50 5 1Ni B 7 3 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic electrode with max. 1%Ni
Extremely low hydrogen content
Approx. 175% recovery, easy slag release, weldable on AC and DC
Filling horizontal V- and X-grooves
Excellent X-ray quality
Also available in vacuum sealed Sahara ReadyPack®(SRP): HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G

CURRENT TYPE

AC / DC + / -

APPROVALS

DNV	LR
4Y46H5	4YH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.07	1.2	0.3	0.02	0.0010	0.9	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.5		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	550	640	26	90	60
	SR:600°C/4h	540	620	24	100	85

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
SRP	**Pieces / unit**	27	23	19
	Net weight/unit (kg)	2.0	2.4	2.8

Identification Imprint: 8018-G / KRYO 1-180 Tip Color: pink

Kryo® 1-180: rev. C-EN25-01/02/16

Kryo® 1-180

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S275, S355
Ship plates	
ASTM A 131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460
EN 10025 part 6	S460, S500

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x450	130-160							
4.0x450	170-240	AC	73	537	3.5	102.0	14	1.43
5.0x450	250-300	AC	78	772	5.0	156.7	9	1.45

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
4.0	230A	190A	190A
5.0	300A	230A	230A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Kryo® 2

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E9018-G-H4R	**A-Nr**	10
ISO 18275-A	E 55 6 Z B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic all position offshore electrode for high strength steels
110 - 120% recovery
Extremely low hydrogen content
Excellent impact toughness down to -60°C
Good CTOD at -15°C
Also available in vacuum sealed Sahara ReadyPack®(SRP): HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.05	1.6	0.3	0.015	0.01	1.5	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	-50°C	-60°C
Required: AWS A5.5		min. 530	min. 620	min. 17	not required		
ISO 18275-A		min. 550	610-780	min. 18			min. 47
Typical values	AW	570	650	22	140	110	60
	SR:620°C/1h	530	620	22			

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	450	450
SRP	**Pieces / unit**	70	50	28
	Net weight/unit (kg)	1.4	2.4	2.0

Identification Imprint: 9018-G / KRYO 2 Tip Color: green

Kryo® 2: rev. C-EN27-01/02/16

Kryo® 2

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S355
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445, L480
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460
EN 10025 part 6	S460, S500
Low temperature steels	
EN 10028-4	11MnNi5-3, 13 MnNi6-3, 15NiMn 6
EN 10222-3	13MnNi6-3, 15NiMn 6

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-85	DC+	59	85	0.72	19.4	86	1.65
3.2x450	80-140	DC+	80	268	1.2	46.8	36	1.70
4.0x450	120-170	DC+	89	445	1.8	70.0	22	1.52

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	85A	80A	80A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A

REMARKS / APPLICATION ADVICE

Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

Kryo® 3

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E8018-C1-H4	**A-Nr**	10
ISO 2560-A	E 46 8 3Ni B 32 H5*	**F-Nr**	4
* Nearest equivalent		**9606 FM**	1

GENERAL DESCRIPTION

The basic all position offshore electrode with approx. 2.5% Ni
115 - 120% recovery
Excellent impact toughness down to -80°C
Good CTOD at -10°C
Extremely low hydrogen content
Also available in vacuum sealed Sahara ReadyPack®(SRP): HDM< 3 ml/100g

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	RINA	TÜV
+	UP	5YH10	5Y40H	6Y42H10	5YH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.05	0.7	0.3	0.015	0.01	2.5	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C	Impact ISO-V(J) -80°C
Required: AWS A5.5	SR[1]	min. 460	min. 550	min. 19	min. 27	
ISO 2560-A		min. 460	530-680	min. 20		min. 47
Typical values	AW	520	600	26	120	60
	SR:610°C/2h	500	590	29	90	

CTOD value at -10°C > 0.25 mm
Stress relieved:SR[1] = 605±14°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Carton + PE foil	**Pieces / unit**	135	120	-	85	85	55
	Net weight/unit (kg)	2.7	4.2	-	4.4	5.9	5.7
SRP	**Pieces / unit**	70	50	50	28	28	23
	Net weight/unit (kg)	1.4	1.9	2.4	1.5	2.0	2.5

Identification Imprint: 8018-C1 / KRYO 3 Tip Color: silver

Kryo® 3: rev. C-EN26-01/02/16

Kryo® 3

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025	S355
Pipe material	
EN 10208-2	L360, L415, L445
API 5LX	X52, X56, X60, X65
Fine grained steels	
EN 10025 part 3	S355, S420, S460
EN 10025 part 4	S355, S420, S460
Low temperature steels	
EN 10028-4	11MnNi5-3, 13MnNi6-3, 15NiMn6 (12Ni14G1, G2)
EN 10222-3	13MnNi6-3, 15NiMn6

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	55-80	DC+	57	103	0.72	19.5	88	1.71
3.2x350	80-140	DC+	65	218	1.3	37.4	44	1.64
3.2x450	80-140	DC+	79	263	1.4	48.5	33	1.59
4.0x350	120-170	DC+	74	344	1.6	52.7	30	1.57
4.0x450	120-170	DC+	100	463	1.7	69.8	21	1.45
5.0x450	180-240	DC+	103	723	2.5	104.8	14	1.48

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	85A	80A	80A
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A
5.0	220A	210A	210A	170A		

REMARKS / APPLICATION ADVICE

Deviations:chemical composition:
Ni = 2.25 - 2.75% ISO: Ni = 2.6 - 3.8%

Kryo® 4

EMR SAHARA®

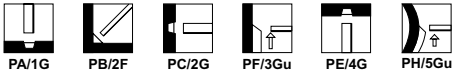
CLASSIFICATION

AWS A5.5	E7016-C2L-H4R	**A-Nr**	10
ISO 2560-A	E 38 8 3Ni B 3 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

The basic all position offshore electrode with approx. 3.5% Ni
Excellent impact toughness down to -80°C in as welded condition and -100°C after PWHT
Extremely low hydrogen content
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	HDM
0.03	0.6	0.4	0.01	0.005	3.6	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -80°C	Impact ISO-V(J) -101°C
Required: AWS A5.5	PWHT[1)]	min. 390	min. 480	min. 25		min. 27
ISO 2560-A	AW	min. 380	470-600	min. 20	47	
Typical values	AW	490	570	30	90	
	PWHT[1)]	420	510	30	120	90

[1)] 605±14°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	350	350
SRP	**Pieces / unit**	70	58
	Net weight/unit (kg)	1.4	1.8

Identification Imprint: 7016-C2 / KRYO 4 Tip Color: silver

Kryo® 4: rev. C-EN27-01/02/16

Kryo® 4

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
General structural steels	
EN 10025-2	S355
Pipe material	
EN 10208-2	L360, L415
API 5LX	X52, X56, X60
Fine grained steels	
EN 10025 part 3	S355, S420
EN 10025 part 4	S355, S420
Low temperature steels	
EN 10028-4	11MnNi5-3, 13MnNi6-3, 15NiMn6 (12Ni14G1, G2)
EN 10222-3	13MnNi6-3, 15NiMn6
ASTM A203	Grade A, B
ASTM A333	Grade 3
ASTM A334	Grade 3
ASTM A350	Grade LF3, CL1 & 2
ASTM A420	Grade WPC3

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	60	85	0.75	14.7	100	1.43
3.2x350	80-140	DC+	72	207	1.1	30.8	48	1.45

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	75A	70A	75A	70A	75A	80A
3.2	110A	120A	110A	100A	100A	100A

SL® 12G

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E7018-A1-H4R	**A-Nr**	2
ISO 3580-A	E Mo B 3 2 H5	**F-Nr**	4
		9606 FM	1/3

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM< 5 ml/100g)
For welding creep resisting and Fine grained steels
Service temperature from -40 up to 500°C
DC-welding preferred
115 - 120% recovery
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

DB	DNV	TÜV
+	0,3 Mo	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Mo	HDM
0.05	0.8	0.6	0.020	0.010	0.55	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.5	SR[1]	min. 390	min. 490	min. 25	not required	
ISO 3580-A	SR[2]	min. 355	min. 510	min. 22	min. 47	
Typical values	SR[3]	560	620	25	140	50
	AW	550	610	25	160	70

Stress relieved: SR[1] = 620±14°C/1h, SR[2] = 570-620°C/1h, SR[3] = 620°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Carton + PE foil	**Pieces / unit**	110	120	85	55
	Net weight/unit (kg)	2.5	4.5	4.7	6.0
SRP	**Pieces / unit**	67	50	28	23
	Net weight/unit (kg)	1.4	2.0	1.5	2.6

Identification Imprint: 7018-A1 / SL 12 G Tip Color: blue

SL® 12G: rev. C-EN26-12/05/16

SL® 12G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	P295GH, P355GH, 16Mo3 & similar alloys
EN 10222-2	17Mo3, 14Mo6 & similar alloys
ASTM A335	Grade P1
ASTM A209	Grade T1
ASTM A250	Grade T1
ASTM A336	Grade F1
ASTM A204	Grade A, B, C
ASTM A217	Grade WC1
ASTM A352	Grade LC1
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CREEP DATA

Test temperature °C	400	450	500	550
Yield strength Rp-0,2% (N/mm²)	420	380	330	
Creep strength Rm/1000 (N/mm²)		360	300	(200)
Creep strength Rm/10.000 (N/mm²)		320	180	(80)
Creep resistance Rp1%/10.000 (N/mm²)		230	150	(65)

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	65	118	0.7	22.8	84	1.92
3.2x350	80-130	DC+	69	230	1.3	37.9	42	1.59
4.0x350	120-180	DC+	81	373	1.6	54.8	28	1.56
5.0x450	160-240	DC+	106	799	2.4	107.4	14	1.52

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	85A	80A	85A	80A	80A
3.2	130A	120A	130A	120A	120A	120A
4.0	150A	145A	140A	140A	140A	140A
5.0	225A	225A	210A			

REMARKS / APPLICATION ADVICE

Recommended tempering heat treatment range:580 - 630°C (time depends on material thickness)
Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

SL® 19G

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E8018-B2-H4	**A-Nr**	3
ISO 3580-A	E CrMo1 B 3 2 H5	**F-Nr**	4
		9606 FM	3

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM< 5 ml/100g)
For welding creep and hydrogen resistant CrMo-steels
Maximum service temperature 550°C
DC-welding preferred
115 - 120% recovery
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

AC / DC +/-

APPROVALS

BV	DNV	RINA	TÜV
C1M	1Cr0,5Mo	C1M	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Cr	Mo	HDM
0.06	0.75	0.6	0.015	0.010	1.1	0.5	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.5	SR[1]	min. 460	min. 550	min. 19	not required	
ISO 3580-A	SR[2]	min. 355	min. 510	min. 20	min. 47	
Typical values	SR[3]	570	640	24	180	100

Stress relieved: SR[1] = 690±14°C/1h, SR[2] = 660-700°C/1h, SR[3] = 700°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Carton + PE foil	**Pieces / unit**	120	120	85	55
	Net weight/unit (kg)	2.6	4.6	4.7	6.1
SRP	**Pieces / unit**	67	50	28	-
	Net weight/unit (kg)	1.4	2.0	1.5	-

Identification Imprint: 8018-B2 / SL 19 G Tip Color: red

SL® 19G: rev. C-EN25-12/05/16

SL® 19G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	13CrMo4-5 & similar alloys
EN 10083-1	25CrMo4 &similar alloys
EN 10222-2	14CrMo4-5 & similar alloys
ASTM A387	Grade 11 & 12
ASTM A182	Grade F1 & F12
ASTM A217	Grade WC6 & WC11
ASTM A234	Grade WP11 & WP12
ASTM A199	Grade T11
ASTM A200	Grade T11
ASTM A213	Grade T11 & T12
ASTM A335	Grade P11 & P12
Tool steel	
DIN 17210	16MnCr5 & similar alloys

CREEP DATA

Test temperature °C	400	450	500	550	600
Yield strength Rp-0,2% (N/mm²)	460	440	430		
Creep strength Rm/1000 (N/mm²)			300	140	(80)
Creep strength Rm/10.000 (N/mm²)		350	240	110	(50)
Creep resistance Rp1%/10.000 (N/mm²)		250	170	80	(35)

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	63	114	0.71	21.0	80	1.67
3.2x350	80-130	DC+	68	227	1.3	37.9	41	1.56
4.0x350	120-180	DC+	79	367	1.6	54.9	29	1.59
5.0x450	160-240	DC+	103	777	2.5	106.9	14	1.52

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	85A	80A	85A	80A	80A
3.2	130A	120A	130A	120A	120A	120A
4.0	150A	145A	140A	140A	140A	140A
5.0	225A	225A	210A			

REMARKS / APPLICATION ADVICE

Recommended preheat temperature:200 - 250°C
Recommended tempering heat treatment range:660 - 700°C (time depends on material thickness)
Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

SL® 20G

EMR SAHARA®

CLASSIFICATION

AWS A5.5	E9018-B3-H4	**A-Nr**	4
ISO 3580-A	E CrMo2 B 3 2 H5	**F-Nr**	4
		9606 FM	3

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM< 5 ml/100g)
For welding creep and hydrogen resistant CrMo-steels
Maximum service temperature 600°C
DC-welding preferred
115 - 120% recovery
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +/-

APPROVALS

RINA	TÜV
C2M1	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Cr	Mo	HDM
0.06	0.8	0.6	0.015	0.010	2.3	1.0	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -10°C
Required: AWS A5.5	SR[1]	min. 530	min. 620	min. 17	not required	
ISO 3580-A	SR[2]	min. 400	min. 500	min. 18	min. 47	
Typical values	SR[3]	530	650	22	150	90

Stress relieved: SR[1] = 690±14°C/1h, SR[2] = 690-750°C/1h, SR[3] = 695°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	110	120	85
	Net weight/unit (kg)	2.6	4.7	4.8
SRP	**Pieces / unit**	67	50	28
	Net weight/unit (kg)	1.4	2.0	1.5

Identification Imprint: 9018-B3 / SL 20 G Tip Color: white

SL® 20G: rev. C-EN27-12/05/16

SL® 20G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	10CrMo9-10 & similar alloys
EN 10222-2	12CrMo9-10 & similar alloys
ASTM A387	Grade 21 & 22
ASTM A182	Grade F22
ASTM A217	Grade WC9
ASTM A234	Grade WP22
ASTM A199/A200	Grade T21 & T22
ASTM A213	Grade T22
ASTM A335	Grade P22

CREEP DATA

Test temperature °C	400	450	500	550	600
Yield strength Rp-0,2% (N/mm²)	480	460	430		
Creep strength Rm/1000 (N/mm²)			240	160	(100)
Creep strength Rm/10.000 (N/mm²)			210	110	(60)
Creep resistance Rp1%/10.000 (N/mm²)			160	85	(45)

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	63	114	0.72	21.0	79	1.67
3.2x350	80-130	DC+	70	233	1.3	37.6	40	1.49
4.0x350	120-180	DC+	75	348	1.7	56.7	28	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	85A	80A	85A	80A	80A
3.2	130A	120A	130A	120A	120A	120A
4.0	150A	145A	140A	140A	140A	140A

REMARKS / APPLICATION ADVICE

Recommended preheat temperature:200 - 300°C
Recommended tempering heat treatment range:690 - 750°C (time depends on material thickness)
Redry electrodes 2-4h 350 ±25°C after removal from cardboard boxes

SL® 22G

EMR SAHARA®

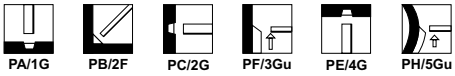
CLASSIFICATION

AWS A5.5	E8018-B1-H4	**A-Nr**	3
ISO 3580-A	E Z B 3 2 H5	**F-Nr**	4
		9606 FM	3

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM< 5 ml/100g)
For welding creep resistant CrMoV-steels
Maximum service temperature 550°C
DC-welding preferred
115 - 120% recovery
Only available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +/-

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Cr	Mo	HDM
0.06	0.8	0.6	0.020	0.010	0.5	0.5	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -10°C
Required: AWS A5.5	SR[1]	min. 460	min.550	min. 19	not required	
Typical values	SR[2]	570	640	24	180	110

Stress relieved: SR[1] = 690±14°C/1h, SR[2] = 1h/730°C

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
SRP	**Pieces / unit**	67	50	28	23
	Net weight/unit (kg)	1.4	2.0	1.5	2.6

Identification Imprint: 8018-B1 / SL 22 G Tip Color: orange

SL®22G: rev. C-EN24-01/02/16

SL® 22G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Creep resistant steels	
DIN	14MoV6-3
	17MnMoV6-4
	10CrSiMoV7
	24CrMoV5-5

CREEP DATA

Test temperature °C	400	450	500	550	575
Yield strength Rp-0,2% (N/mm²)	480	470	450		
Creep strength Rm/1000 (N/mm²)			270	170	150
Creep strength Rm/10.000 (N/mm²)			250	150	130
Creep resistance Rp1%/10.000 (N/mm²)			210	130	110

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	64	115	0.7	21.0	82	1.69
3.2x350	80-130	DC+	71	238	1.2	37.5	41	1.54
4.0x350	120-180	DC+	76	353	1.6	55.8	30	1.64
5.0x450	160-220	DC+	101	762	2.6	106.6	14	1.49

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	85A	80A	85A	80A	80A
3.2	130A	120A	130A	120A	120A	120A
4.0	150A	145A	140A	140A	140A	140A
5.0	225A	225A	210A			

REMARKS / APPLICATION ADVICE

Recommended preheat temperature:200 - 300°C
Recommended tempering heat treatment range:700 - 730°C (time depends on material thickness)

SL® 502

EMR SAHARA®

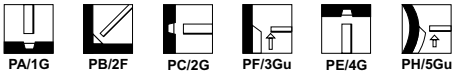
CLASSIFICATION

AWS A5.5	E8018-B6-H4R	**A-Nr**	4
ISO 3580-A	E CrMo5 B 3 2 H5	**F-Nr**	4
		9606 FM	4

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM< 5 ml/100g)
For welding creep and hydrogen resistant 5% Cr-0.5% Mo-steels
Maximum service temperature 550°C
Developed for the petrochemical industry
Only available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +/-

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Cr	Mo	HDM
0.07	0.8	0.6	0.020	0.010	5.3	0.6	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.5	SR[1]	min. 460	min. 550	min. 19	not required
ISO 3580-A	SR[2]	min. 400	min. 590	min. 17	min. 47
Typical values	SR[3]	580	680	22	110

Stress relieved: SR[1]= 740 ±14°C/1h, SR[2]= 730-760°C/1h, SR[3]= 750°C/2h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
SRP	**Pieces / unit**	67	52	29
	Net weight/unit (kg)	1.4	1.9	1.6

Identification Imprint: 8018-B6 / SL 502 Tip Color: brown

SL® 502: rev. C-EN25-01/02/16

SL® 502

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Creep resistant steels	
DIN	
ASTM	A182 F5 A213 T5 A335 P5 A336 F5 A369 FP5 A387 Grade 5

CREEP DATA

Test temperature °C	400	450	500	550	600
Yield strength Rp-0,2% (N/mm²)	480	440	380		
Creep strength Rm/1000 (N/mm²)			160	174	(80)
Creep strength Rm/10.000 (N/mm²)			130	90	(60)
Creep resistance Rp1%/10.000 (N/mm²)			100	50	(30)

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	55	95	0.82	20.8	80	1.67
3.2x350	85-130	DC+	66	237	1.1	35.4	50	1.79
4.0x350	130-180	DC+	76	331	1.5	51.8	32	1.64

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	75A	70A	70A	70A
3.2	130A	130A	125A	120A	120A	120A
4.0	140A	140A	135A	135A	135A	135A

REMARKS / APPLICATION ADVICE

Recommended preheat temperature:200 - 300°C
Postweld heat treatment 730 - 760°C (time depends on material thickness)

SL® 9Cr(P91)

EMR SAHARA®

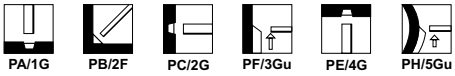
CLASSIFICATION

AWS A5.5	E9016-B9-H4	**A-Nr**	5
ISO 3580-A	E CrMo91 B 3 2 H5	**F-Nr**	4
		9606 FM	4

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM< 5 ml/100g)
For welding creep and hydrogen resistant 9% Cr-1% Mo steels
Maximum service temperature 650°C
Developed for power plants and the petrochemical industry
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +/-

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Cr	Mo	Ni	Nb	V	N	Mn+Ni	HDM
0.09	0.6	0.2	0.01	0.01	9.0	1.0	0.6	0.04	0.2	0.04	1.2	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.5	SR[1]	min. 530	min. 620	min. 11	not required
ISO 3580-A	SR[2]	min. 415	min. 585	min. 17	min. 47
Typical values	SR[3]	570	710	21	80

Stress relieved: SR[1] = 740 ±14°C/1h, SR[2] = 750-770°C/1h, SR[3] = 2h/730-760°C

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
SRP	**Pieces / unit**	66	50	28
	Net weight/unit (kg)	1.4	1.8	1.5

Identification Imprint: 9016-B9 / SL 9 Cr(P91) Tip Color:dark green

SL® 9Cr(P91): rev. C-EN24-01/02/16

SL® 9Cr(P91)

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type	Code	Type
Creep resistant steels			
EN 10222-2 / EN 10302	X10CrMoVNb9-1 (1.4903)		
ASTM	A199 Grade T91 A200 Grade T91 A213 Grade T91/P91 A335 Grade P91 A336 Grade F91	ASME	SA 182-F91 SA 213-T91 SA 335-P91 SA 336-F91 SA 369-FP91 SA 387-Grade 91

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+	57	88	0.7	19.3	92	1.78
3.2x350	85-130	DC+	65	172	1.0	34.8	59	2.04
4.0x350	130-175	DC+	66	263	1.5	50.8	36	1.81

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	75A	70A	70A	70A
3.2	130A	130A	125A	120A	120A	120A
4.0	140A	140A	135A	135A	135A	135A

REMARKS / APPLICATION ADVICE

Recommended preheat temperature:200 - 300°C
Postweld heat treatment 730 - 760°C (time depends on material thickness)

Arosta® 304L

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E308L-16	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 3581-A	E 19 9 L R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+350°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

Rutile basic all position stainless steel electrode for 304L or equivalent steels
Excellent corrosion resistance in oxidizing environments such as nitric acid
High resistance to intergranular corrosion
Smooth bead appearance
Easy slag release
Strong electrode coating
Weldable on AC and DC

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC + / -

APPROVALS

BV	TÜV	DB
304L	+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.02	0.8	0.8	19.5	9.7	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -196°C
Required: AWS A5.4		not required	min. 520	min. 35	not required		
ISO 3581-A		min. 320	min. 510	min. 30	not required		
Typical values	AW	440	580	43	70	60	24

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	350
Carton + PE foil	**Pieces / unit**	225	135	150	85	65
	Net weight/unit (kg)	2.3	2.6	4.8	4.9	4.8
SRP	**Pieces / unit**	-	69	56	-	-
	Net weight/unit (kg)	-	1.4	1.9	-	-

Identification Imprint: 308L-16 / AROSTA 304 L Tip Color: light blue

Arosta® 304L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0 x 300	30-50	DC+	43	45	0.55	10.4	154	1.59
2.5 x 350	40-75	DC+	51	88	0.86	19.2	82	1.59
3.2 x 350	60-110	DC+	57	158	1.3	32.2	49	1.59
4.0 x 350	80-150	DC+	65	245	1.7	47.3	32	1.52
5.0 x 350	140-220	DC+	66	390	2.7	76.7	20	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.0		45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

For root pass, DC- is recommended

Limarosta® 304L

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E308L-17	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 3581-A	E 19 9 L R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+350°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode for 304L or equivalent steels
Mirror like bead appearance
Self releasing slag
Excellent side wall wetting, no undercut
High resistance to porosity
Weldable on AC and DC
Also available in vacuum sealed Sahara ReadyPack® (SRP)
Arosta® 304L, diam. 2.5 mm, is recommended for welding root pass

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC + / -

APPROVALS

DNV	GL	LR	RMRS	TÜV
308LH10	4550	304L	304L	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	0.75	0.95	19.0	9.7	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
ISO 3581-A		min. 320	min. 510	min. 30	not required	
Typical values	AW	440	600	45	75	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	125	125	135	85	55
	Net weight/unit (kg)	2.3	2.7	4.7	5.8	5.8
SRP	**Pieces / unit**	-	65	52	28	22
	Net weight/unit (kg)	-	1.4	1.8	2.0	2.4
Linc Can™	**Pieces / unit**	-	203	124	78	48
	Net weight/unit (kg)	-	4.4	4.3	5.3	3.5

Identification Imprint: 308L-17 / LIMAROSTA 304 L Tip Color: light blue

Limarosta® 304L: rev. C-EN25-01/02/16

Limarosta® 304L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0 x 300	35 - 50	DC+	40	51	0.59	11.6	151	1.75
2.5 x 350	45 - 80	DC+	51	103	0.88	21.7	81	1.75
3.2 x 350	80 - 115	DC+	57	177	1.3	34.3	48	1.64
4.0 x 450	100 - 155	DC+	83	373	1.8	68.0	24	1.64
5.0 x 450	150 - 220	DC+	85	577	2.7	106.2	16	1.67

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.0		45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A			
5.0	180A	180A				

Vertarosta® 304L

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E308L-15	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 3581-A	E 19 9 L R 2 1	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+350°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode for 304L or equivalent steels
Specially developed for vertical down welding on DC
Root pass in grooves with root opening
High corrosion resistance in oxidizing environments

WELDING POSITIONS (ISO/ASME)

PG/3Gd

CURRENT TYPE

DC +

APPROVALS

TÜV	DB
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.02	0.8	0.7	20.0	9.8	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -120°C
Required: AWS A5.4		not required	min. 520	min. 35	not required		
ISO 3581-A		min. 320	min. 510	min. 30	not required		
Typical values	AW	440	600	40	70	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	300	300
Carton + PE foil	**Pieces / unit**	190	130
	Net weight/unit (kg)	2.9	3.1

Identification Imprint: 308L-15 / VERTAROSTA 304 L Tip Color: grey

Vertarosta® 304L: rev. C-EN24-01/02/16

Vertarosta® 304L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	60-70	DC+	44	65	0.81	15.0	101	1.52
3.2 x 300	80-110	DC+	51	117	1.2	23.5	59	1.39

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PG/3Gdown
2.5	70A
3.2	100A

Jungo® 304L

CLASSIFICATION

AWS A5.4	E308L-15	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 3581-A	E 19 9 L B 2 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+350°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

Basic coated electrode for low temperature applications
Low carbon content, good impact properties down to -196°C
Good weldability and smooth bead appearance
High resistance against oxidation up to 800°C
Welding on DC electrode + is recommended

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	1.8	0.4	19.0	10.0	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
ISO 3581-A		min. 320	min. 510	min. 30	not required	
Typical values	AW	400	600	40	80	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	120	150	100
	Net weight/unit (kg)	2.4	4.8	4.8

Identification Imprint: 308L-15 / JUNGO 304 L Tip Color: dark blue

Jungo® 304L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	55-65	DC+	50	86	0.82	19.1	88	1.89
3.2 x 350	70-90	DC+	51	135	1.3	31.6	53	1.72
4.0 x 350	90-120	DC+	66	206	1.7	47.0	32	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	60A	60A	60A	60A	60A
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A

Arosta® 347

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E347-16	**A-Nr**	8	**Mat-Nr**	1.4551
ISO 3581-A	E 19 9 Nb R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+400°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

Rutile-basic all position stainless steel electrode
For Ti or Nb stabilized 304 or equivalent steels (AISi 321 and 347)
High resistance to intergranular corrosion
Easy slag release and smooth bead appearance
Strong electrode coating
Weldable on AC and DC
Also available in vacuum sealed Sahara ReadyPack®(SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC + / -

APPROVALS

TÜV	DB
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Nb	FN (acc.WRC 1992)
0.03	0.8	0.8	19.5	9.8	0.35	6-12

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -60°C
Required: AWS A5.4		not required	min. 550	min. 25	not required		
ISO 3581-A		min. 350	min. 550	min. 25	not required		
Typical values	AW	500	630	35	70	50	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	120	130	90
	Net weight/unit (kg)	2.6	4.7	4.9
SRP	**Pieces / unit**	69	52	-
	Net weight/unit (kg)	1.4	1.8	-

Identification Imprint: 347-16 / AROSTA 347 Tip Color: gold

Arosta™347: rev. C-EN24-01/02/16

Arosta® 347

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710
				302	
Non stabilized					
	X4CrNi18-10		1.4301	(TP)304	S30400
	X2CrNi19-11		1.4306	(TP)304L	S30403
		GX5CrNi19-10	1.4308	CF-8	J92600
			1.4312		
				(TP)304H	S30409

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40-75	DC+	52	78	0.87	20.7	80	1.66
3.2 x 350	60-110	DC+	54	119	1.4	34.9	48	1.67
4.0 x 350	80-150	DC+	64	210	1.7	49.0	33	1.61

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

For root pass, DC- is recommended

Jungo® 347

CLASSIFICATION

AWS A5.4	E347-15	**A-Nr**	8	**Mat-Nr**	1.4551
ISO 3581-A	E 19 9 Nb B 2 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+400°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

Basic coated all position stainless steel electrode
For Ti or Nb stabilized 304 or equivalent steels (AISi 321 and 347)
High resistance to intergranular corrosion
Easy slag release and smooth bead appearance
Strong electrode coating

WELDING POSITIONS (ISO/ASME)

PA/1G | PB/2F | PC/2G | PF/3Gu | PE/4G | PH/5Gu

CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Nb	FN (acc.WRC 1992)
0.02	1.6	0.5	20.0	10.0	0.40	6-12

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -120°C
Required: AWS A5.4		not required	min. 520	min. 30	not required		
ISO 3581-A		min. 350	min. 550	min. 25	not required		
Typical values	AW	500	630	35	80	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	150	100	75
	Net weight/unit (kg)	2.6	4.8	4.4

Identification Imprint: 347-15 / JUNGO 347 Tip Color: brown

Jungo® 347: rev. C-EN27-01/02/16

Jungo® 347

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710
				302	
Non stabilized					
	X4CrNi18-10		1.4301	(TP)304	S30400
	X2CrNi19-11		1.4306	(TP)304L	S30403
		GX5CrNi19-10	1.4308	CF-8	J92600
			1.4312		
				(TP)304H	S30409

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	80 - 100	DC+	51	135	1.3	32.4	53	1.72
4.0 x 350	100 - 130	DC+	66	206	1.7	44.4	32	1.56
5.0 x 450	130 - 160	DC+	69	378	2.3	90.9	23	1.92

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A
5.0	150A	150A				

Arosta® 316L

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E316L-16	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

Rutile-basic all position stainless steel electrode for 316L or equivalent steels
Molybdenum level min. 2.7 %
High resistance to general and intergranular corrosion
Smooth weld appearance
Easy slag release
Strong electrode coating
Weldable on AC and DC
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

AC / DC + / -

APPROVALS

ABS	BV	DNV	GL	LR	RINA	RMRS	TÜV	DB
+	316L	316L	4571	316L	316L	316L	+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.02	0.8	0.8	18.0	11.5	2.85	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -120°C
Required: AWS A5.4		not required	min. 490	min. 30	not required		
ISO 3581-A		min. 320	min. 510	min. 25			
Typical values	AW	450	580	39	not required	60	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.5	2.0	2.5	3.2	4.0	5.0
	Length (mm)	250	300	350	350	350	350
carton box	**Pieces / unit**	140	200	135	150	90	65
	Net weight/unit (kg)	0.7	2.3	2.7	4.9	4.8	5.0
SRP	**Pieces / unit**	-	-	69	56	-	-
	Net weight/unit (kg)	-	-	1.4	1.8	-	-
Linc Can™	**Pieces / unit**	-	-	217	134	80	-
	Net weight/unit (kg)	-	-	4.7	4.4	4.2	-

Identification Imprint: 316L-16 / AROSTA 316 L Tip Color: pink

Arosta® 316L: rev. C-EN27-12/05/16

Arosta® 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
1.5 x 250	20 - 40	DC+	25	19	0.44	5.8	330	1.92
2.0 x 300	30 - 50	DC+	42	44	0.58	10.7	150	1.61
2.5 x 350	40 - 75	DC+	50	86	0.88	19.9	82	1.61
3.2 x 350	60 - 110	DC+	57	157	1.3	32.9	49	1.61
4.0 x 350	80 - 150	DC+	64	240	1.7	49.2	32	1.59
5.0 x 350	140 - 220	DC+	67	396	2.6	77.1	20	1.59

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
1.5	30A	35A	35A			
2.0	40A	45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

For root pass, DC- is recommended

Limarosta® 316L

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E316L-17	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode for 316L or equivalent steels
Molybdenum level min. 2.7 %
Mirror like bead appearance
Self releasing slag
Good side wall fusion, no undercut
High resistance to porosity
Weldable on AC and DC
Also available in vacuum sealed Sahara ReadyPack® (SRP)
Arosta® 316L is recommended for welding root pass

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC + / -

APPROVALS

DNV	LR	RMRS	TÜV
316LH10	316L	316L	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.02	0.8	1.0	18.0	11.5	2.8	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -105°C
Required: AWS A5.4		not required	min. 490	min. 30	not required		
ISO 3581-A		min. 320	min. 510	min. 25	not required		
Typical values	AW	450	580	40	70	60	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.5	2.0	2.5	3.2	4.0	5.0
	Length (mm)	250	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	140	200	125	135	85	55
	Net weight/unit (kg)	0.7	2.3	2.7	4.8	5.9	5.9
SRP	**Pieces / unit**	-	57	65	52	28	22
	Net weight/unit (kg)	-	0.6	1.5	1.8	2.0	2.4
Linc Can™	**Pieces / unit**	-	-	195	124	79	-
	Net weight/unit (kg)	-	-	4.3	4.3	5.3	-

Identification Imprint: 316L-17 / LIMAROSTA 316 L Tip Color: pink

Limarosta® 316L: rev. C-EN25-01/02/16

Limarosta® 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
1.5 x 250	20-40							
2.0 x 300	35-50	DC+	39	49	0.59	11.4	155	1.79
2.5 x 350	45-80	DC+	46	92	0.95	21.5	83	1.79
3.2 x 350	80-115	DC+	51	157	1.5	35.3	48	1.69
4.0 x 450	100-155	DC+	75	339	1.9	69.2	24	1.69
5.0 x 450	150-220	DC+	85	577	2.7	107.8	16	1.69

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
1.5	30A	35A	35A			
2.0	40A	45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A			
5.0	180A	180A				

Vertarosta® 316L

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E316L-15	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L R 2 1	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -60...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode for 316L or equivalent steels
Molybdenum level min. 2.7 %
Specially developed for vertical down welding on DC
Root passes in grooves with root opening
High general corrosion resistance

WELDING POSITIONS (ISO/ASME)

PG/3Gd

CURRENT TYPE

AC/DC +

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
+	316L	316L	4429	316L	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.02	0.7	0.85	18.0	11.5	2.8	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -60°C
Required: AWS A5.4		not required	min. 490	min. 30	not required		
ISO 3581-A		min. 320	min. 510	min. 25	not required		
Typical values	AW	500	620	35	50	45	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	300	300
Carton + PE foil	**Pieces / unit**	190	130
	Net weight/unit (kg)	2.9	3.1

Identification Imprint: 316L-15 / VERTAROSTA 316 L Tip Color: brown

Vertarosta® 316L: rev. C-EN24-01/02/16

Vertarosta® 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	60-70	DC+	44	71	0.83	14.9	98	1.47
3.2 x 300	80-110	DC+	47	118	1.3	23.9	59	1.41

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PG/3Gdown
2.5	70A
3.2	100A

Jungo® 316L

CLASSIFICATION

AWS A5.4	E316L-15	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L B 2 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

Basic coated electrode for low temperature applications
Good impact values down to -196°C
Good weldability and smooth bead appearance
Low carbon content
High resistance against general and intercristalline corrosion

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

DC +

APPROVALS

BV

316LBT

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.025	1.6	0.4	18.5	11.0	2.7	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.4		not required	min. 490	min. 30	not required	
ISO 3581-A		min. 320	min. 510	min. 25	not required	
Typical values	AW	450	650	35	100	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	135	150	100
	Net weight/unit (kg)	2.7	4.8	4.8
SRP	**Pieces / unit**	-	56	30
	Net weight/unit (kg)	-	1.8	1.4

Identification Imprint: 316L-15 / JUNGO 316 L Tip Color: red

Jungo®316L: rev. C-EN26-01/02/16

Jungo® 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	50-70	DC+	50	86	0.82	19.2	88	1.89
3.2 x 350	60-90	DC+	51	135	1.3	31.3	53	1.72
4.0 x 350	80-120	DC+	66	206	1.7	47.6	32	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	60A	60A	60A	60A	60A
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A

Limarosta® 316L-130

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E316L-17	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L R 5 3	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode for 316L or equivalent steels
Molybdenum level min. 2.7 %
High recovery (130%) providing high welding speed
Excellent side wall fusion, no undercut
Only for down hand position
Excellent for fillet welds and filling V- and X-grooves
Weldable on AC and DC+ polarity
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G

PB/2F

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.02	0.65	1.0	18.0	11.5	2.8	4-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -105°C
Required: AWS A5.4		not required	min. 490	min. 30	not required		
ISO 3581-A		min. 320	min. 510	min. 25	not required		
Typical values	AW	450	580	40	70	60	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
SRP	**Pieces / unit**	29	23	19
	Net weight/unit (kg)	1.7	2.0	2.3

Identification Imprint: 316L-17 / LIMAROSTA 316 L-130 Tip Color: pink

Limarosta® 316L-130: rev. C-EN24-01/02/16

Limarosta® 316L-130

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 450	90-120	DC+	68	227	1.9	60.4	28	1.67
4.0 x 450	120-160	DC+	78	376	2.5	91.0	18	1.67
5.0 x 450	160-200	DC+	81	577	3.7	143.7	12	1.72

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F
3.2	110A	105A
4.0	155A	150A
5.0	175A	175A

Arosta® 318

CLASSIFICATION

AWS A5.4	E318-16	**A-Nr**	8	**Mat-Nr**	1.4576
ISO 3581-A	E 19 12 3 Nb R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -60...+400°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

Rutile basic all position stainless steel electrodes for welding Ti or Nb stabilized 316 or equivalent steels
High resistance to general and intergranular corrosion
Smooth bead appearance
Easy slag release
Strong electrode coating
Weldable on AC and DC

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

AC / DC + / -

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Nb	FN (acc.WRC 1992)
0.03	0.8	0.85	18.0	11.5	2.7	0.35	6-12

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -60°C
Required: AWS A5.4		not required	min.550	min. 25	not required		
ISO 3581-A		min. 350	min. 550	min. 25	not required		
Typical values	AW	500	630	38	60	50	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	135	140	90
	Net weight/unit (kg)	2.8	5.0	4.8

Identification Imprint: 318-16 / AROSTA 318 Tip Color: white

Arosta®318: rev. C-EN25-01/02/16

Arosta® 318

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40-90	DC+	46	82	0.98	20.3	80	1.64
3.2 x 350	70-110	DC+	52	137	1.4	32.1	48	1.54
4.0 x 350	90-140	DC+	61	212	1.9	48.6	31	1.49

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A		
3.2	100A	100A	100A	70A	60A	60A
4.0	140A	140A	140A	80A	70A	70A

Jungo® 4465

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E310Mo-15*	**A-Nr**	9	**Mat-Nr**	1.4465
ISO 3581-A	E 25 22 2 N L B 2 2*	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

TEMPERATURE RANGE

Pressurized parts : -40...+400°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A basic high CrNiMo-alloyed fully austenitic all position electrode
Excellent corrosion resistance in strong oxydizing and slightly reducing media
Especially developed for urea and nitric acid plants
High resistance to intergranular corrosion
Excellent performance in the Huey-test
Weldable on DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	N	FN (acc.WRC 1992)
0.03	4.5	0.4	25.0	22.0	2.2	0.13	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.4		not required	min. 550	min. 30	not required	
ISO 3581-A		min. 320	min. 510	min. 25	not required	
Typical values	AW	400	620	35	90	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	135	150	100
	Net weight/unit (kg)	2.8	4.8	4.9

Identification Imprint: JUNGO 4465 Tip Color: yellow

Jungo® 4465: rev. C-EN24-01/02/16

Jungo® 4465

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM / ACI A240/A312/A351	UNS
Fully austenitic CrNiMo corrosion resistant steels				
	X1CrNiMoN25-25-2	1.4465		
	X3CrNiMoTi25-25	1.4577		
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
			310S	S31008

Also very well applicable for build-up welding on low alloy steel, such as pipe plates
Buffer layers for applications from -196°C to +350°C

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	50 - 75	DC+	50	86	0.82	21.5	88	1.89
3.2 x 350	70 - 105	DC+	51	135	1.3	32.5	53	1.72
4.0 x 350	100 - 135	DC+	66	206	1.7	48.5	32	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	60A	60A	60A	60A	60A
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A

REMARKS / APPLICATION ADVICE

Deviations: chemical composition:

Cr = 24.5 - 26.0%
AWS: Cr = 25.0 - 28.0%

Ni = 21.5 - 22.5%
AWS: Ni = 20.0 - 22.0%

Mn = 4.5 - 5.3%
AWS: Mn = 1.0 - 2.5%
EN: Mn = 1.0 - 5.0%

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

Jungo® 4500

CLASSIFICATION

AWS A5.4	E385-16*	**A-Nr**	9	**Mat-Nr**	1.4519
ISO 3581-A	E 20 25 5 Cu N L R 1 2	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

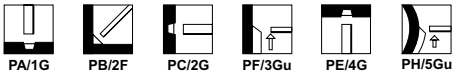
TEMPERATURE RANGE

Pressurized parts : -60...+400°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic fully austenitic all position electrode
Smooth bead appearance
Easy slag release
Especially developed for applications in phosphoric acid and sulphuric acid and paper mill equipment
Designed for welding alloy 904L
World wide reputation for reliability
Weldable on DC+ polarity

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Cu	FN (acc.WRC 1992)
0.02	1.2	0.9	20.0	25.0	5.0	1.5	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -40°C	Impact ISO-V(J) -60°C
Required: AWS A5.4		not required	min. 520	min. 30	not required		
ISO 3581-A		min. 320	min. 510	min. 25	not required		
Typical values	AW	410	620	40	100	80	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	145	185	125
	Net weight/unit (kg)	2.9	5.7	5.9

Identification Imprint: JUNGO 4500 Tip Color: black

Jungo® 4500: rev. C-EN25-01/02/16

Jungo® 4500

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr
Fully austenitic NiCrMoCu and CrNiMoCu steels			
		GX7NiCrMoCuNb25-20	1.4500
	X5NiCrMoCuTi20-18		1.4506
		GX2NiCrMoCuN20-18	1.4531
		GX2NiCrMoCuN25-20	1.4536
	X1NiCrMoCu25-20-5	(Alloy 904L)	1.4539
		GX7CrNiMoCuNb18-18	1.4585
	X5NiCrMoCuNb22-18		1.4586

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40 - 75	DC+	43	72	0.96	19.9	79	1.59
3.2 x 350	60 - 105	DC+	53	133	1.3	32.1	52	1.69
4.0 x 350	80 - 145	DC+	61	220	1.8	48.0	32	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	80A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

REMARKS / APPLICATION ADVICE

Deviations: chemical composition:
Si = max. 1.0% AWS: Si = max. 0.9%
Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

Arosta® 4462

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E2209-16*	**A-Nr**	8	**Mat-Nr**	1.4462
ISO 3581-A	E 22 9 3 N L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -40...+250°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic all position electrode for duplex stainless steel welding
Excellent weldability for filling as well as for root runs
Applicable up to a service temperature of 250°C
High resistance to general corrosion, pitting and stress corrosion (PREN ~35)
High yield strength > 500 N/mm²
Weldable on AC and DC
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC/DC + /-

APPROVALS

BV	DNV	GL	RINA	TÜV
2209	+	4462	2209	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	N	FN (acc.WRC 1992)
0.02	0.8	1.0	22.5	9.5	3.2	0.16	30-55

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -30°C	Impact ISO-V(J) -40°C
Required: AWS A5.4		not required	min. 690	min. 20	not required		
ISO 3581-A		min. 450	min. 550	min. 20	not required		
Typical values	AW	650	800	27	60	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Carton + PE foil	**Pieces / unit**	120	152	95	-
	Net weight/unit (kg)	2.6	5.0	4.8	-
SRP	**Pieces / unit**	69	52	29	24
	Net weight/unit (kg)	1.5	1.8	1.6	2.0

Identification Imprint: 2209-16 / AROSTA 4462 Tip Color: white

Arosta® 4462: rev. C-EN26-01/02/16

Arosta® 4462

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2/-4	Mat. Nr	ASTM / ACI A240	UNS
Duplex stainless steels				
	X2CrNiMoN22-5-3	1.4462		S31803
		1.4417		S31500
	X3CrNiMoN27-5-2	1.4460		S31200
	X2CrNiN23-4	1.4362		S32304
	X2CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloy steel to duplex stainless steel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
			- per electrode at max. current -					
2.5 x 350	40 - 75	DC+	61	127	0.73	20.6	81	1.67
3.2 x 350	80 - 110	DC+	56	184	1.4	34.3	46	1.59
4.0 x 350	80 - 150	DC+	59	205	2.0	51.5	30	1.52
5.0 x 350	140 - 220		65	357	2.8	77.4	20	1.61

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	80A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C
Deviations chemical composition:
Si = 0,4-1,2 AWS = max 1,00

Jungo® 4462

CLASSIFICATION

AWS A5.4	E2209-15	**A-Nr**	8	**Mat-Nr**	1.4462
ISO 3581-A	E 22 9 3 N L B 2 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -50...+250°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A basic electrode for 22% Cr duplex stainless steel welding
Excellent weldability for filling as well as for root runs
Applicable up to a service temperature of 250°C
High resistance to general corrosion, pitting and stress corrosion (PREN ~35)
High yield strength > 500 N/mm²
Weldable on DC+ polarity
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

DC +

APPROVALS

DNV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	N	FN (acc.WRC 1992)
0.025	1.6	0.5	23.5	9.0	3.0	0.15	30-60

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	-20°C	-40°C	-50°C
Required: AWS A5.4		not required	min. 690	min. 20	not required			
ISO 3581-A		min. 450	min. 550	min. 20	not required			
Typical values	AW	650	800	28	80	75	70	45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
SRP	**Pieces / unit**	69	55	30
	Net weight/unit (kg)	1.4	1.8	1.5

Identification Imprint: 2209-15 / JUNGO 4462 Tip Color: red

Jungo® 4462

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2/-4	Mat. Nr	ASTM / ACI A240	UNS
Duplex stainless steels				
	X2CrNiMoN22 -5-3	1.4462		S31803
		1.4417		S31500
	X3CrNiMoN27-5-2	1.4460		S31200
	X2CrNiN23-4	1.4362		S32304
	X2CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloy steel to duplex stainless steel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	50-80	DC+	74	101	0.62	21.0	78	1.64
3.2 x 350	70-110	DC+	84	219	0.88	33.8	49	1.64
4.0 x 350	100-140	DC+	80	304	1.4	50.8	32	1.61

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	60A	60A	60A	60A	60A
3.2	85A	80A	90A	80A	80A	80A
4.0	120A					

REMARKS / APPLICATION ADVICE

Interpass temperature depends on construction (max. 150°C)

Jungo® 309L

CLASSIFICATION

AWS A5.4	E309L-16	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 3581-A	E 23 12 L B 2 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A basic high CrNi alloyed buffer electrode
For welding stainless steel to mild steel and root passes in clad steel
Applicable for root passes in N alloyed AISI 304LN steels
Outstanding mechanical properties
High resistance to embrittlement
Weldable on AC and DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

AC/DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	1.5	0.4	23.0	13.0	10-20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -196°C
Required: AWS A5.4		not required	min.520	min. 30	
ISO 3581-A		min. 320	min. 510	min. 25	
Typical values	AW	470	570	40	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	4.0	5.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	117	97	60
	Net weight/unit (kg)	2.4	4.8	4.8

Identification Imprint: 309L-15 / JUNGO 309 L Tip Color:

Jungo®309L: rev. C-EN07-01/02/16

Jungo® 309L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)
Build-up welding on mild and low alloy steel
Buffer layer CrNi-cladsteel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40-75	DC+	50	88	0.93	21.0	77	1.61
4.0 x 350	80-150	DC+	64	241	1.8	48.3	31	1.49

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A80A	60A	60A
4.0	140A	140A	140A			

Arosta® 309S

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E309L-16	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 3581-A	E 23 12 L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic high CrNi alloyed buffer electrode
For welding stainless steel to mild steel and root runs in clad steel
Applicable for root passes in N alloyed AISI 304LN steels
Excellent weldability and self releasing slag
High resistance to embrittlement
Weldable on AC and DC+ polarity
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

APPROVALS

ABS	BV	RMRS	TÜV
+	309L	SS/CMn	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.02	0.8	0.8	23.5	12.5	12-20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -120°C
Required: AWS A5.4		not required	min. 520	min. 30	not required		
ISO 3581-A		min. 320	min. 510	min. 25	not required		
Typical values	AW	480	560	40	60	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Carton + PE foil	**Pieces / unit**	135	150	100	65
	Net weight/unit (kg)	2.8	5.0	5.0	5.0
SRP	**Pieces / unit**	69	56	-	-
	Net weight/unit (kg)	1.4	1.9	-	-

Identification Imprint: 309L-16 / AROSTA 309 S Tip Color: sea green

Arosta®309S: rev. C-EN25-01/02/16

Arosta® 309S

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)
Build-up welding on mild and low alloy steel
Bufferlayer CrNi-cladsteel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40 - 75	DC+	50	88	0.93	21.0	77	1.61
3.2 x 350	60 - 110	DC+	58	160	1.3	32.5	46	1.49
4.0 x 350	80 - 150	DC+	64	241	1.8	48.3	31	1.49
5.0 x 350	140 - 220	DC+	68	372	2.8	78.0	19	1.49

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

Limarosta® 309S

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E309L-17	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 3581-A	E 23 12 L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -20...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic all position CrNi over-alloyed buffer electrode
Developed for welding stainless steel to mild steel and for clad steel
Self releasing slag
Excellent side wall wetting, no undercut, mirror like bead appearance
High resistance to porosity
Weldable on AC and DC+ polarity
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

APPROVALS

DNV	GL	LR	RMRS	TÜV
309L	4432	SS/CMn	SS/CMn	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.02	0.8	1.0	23.0	12.5	10-20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 520	min. 30	not required	
ISO 3581-A		min. 320	min. 510	min. 25	not required	
Typical values	AW	480	560	40	55	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	200	125	135	85	55
	Net weight/unit (kg)	2.3	2.8	4.9	5.9	6.0
SRP	**Pieces / unit**	-	65	50	28	-
	Net weight/unit (kg)	-	1.5	1.8	2.0	-
Linc Can™	**Pieces / unit**	-	197	127	79	-
	Net weight/unit (kg)	-	4.4	4.5	5.4	-

Identification Imprint: 309L-17 / LIMAROSTA 309 S Tip Color: sea green

Limarosta® 309S

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)
Build-up welding on mild and low alloy steel
Bufferlayer CrNi-cladsteel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0 x 300	35-55	DC+	38	49	0.66	11.3	142	1.59
2.5 x 350	45-80	DC+	48	95	0.99	22.1	77	1.69
3.2 x 350	80-115	DC+	56	160	1.4	35.1	46	1.59
4.0 x 350	100-155	DC+	76	317	2.0	69.9	23	1.64
5.0 x 350	150-220	DC+	84	575	2.9	108.0	15	1.59

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.0		45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A			
5.0	180A	180A				

Arosta® 309Mo

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E309LMo-16	**A-Nr**	8	**Mat-Nr**	1.4459
ISO 3581-A	E 23 12 2 L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -60...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A high CrNiMo alloyed all position rutile-basic electrode
High corrosion resistance
Specially developed for welding stainless steel to mild steel and root runs in cladding
max. plate thickness in butt welds ~ 12mm
Suitable for repair welding in dissimilar joints and steels difficult to weld
Weldable on AC and DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

APPROVALS

ABS	BV	DNV	GL	LR	RINA	RMRS	TÜV	DB
+	309Mo	309Mo	4459	SS/CMn	309Mo	SS/CMn	+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.02	0.8	0.8	23.0	12.5	2.7	15-25

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C	Impact ISO-V(J) -60°C
Required: AWS A5.4		not required	min. 520	min. 30	not required		
ISO 3581-A		min. 350	min. 550	min. 25	not required		
Typical values	AW	580	700	30	57	50	45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	450
Carton + PE foil	**Pieces / unit**	180	110	120	85	55
	Net weight/unit (kg)	2.4	2.6	4.7	4.8	5.4

Identification Imprint: 309LMo-16 / AROSTA 309 Mo Tip Color: light blue

Arosta® 309Mo

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
First layer in CrNiMo claddings					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X10CrNiMoTi17-3		1.4573	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
		GX5CrNiMo19-11	1.4408		

Welding dissimilar metals: mild steel or low alloy steel to stainless CrNiMo-steel up to max. thickness of 12 mm.
Build-up welding on mild and low alloy steel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0 x 300	30 - 60	DC+	44	46	0.54	10.8	149	1.61
2.5 x 350	40 - 80	DC+	52	90	0.91	20.4	76	1.54
3.2 x 350	60 - 80	DC+	58	122	1.4	33.2	45	1.49
4.0 x 350	80 - 150	DC+	64	259	1.9	51.6	30	1.54
5.0 x 450	140 - 190	DC+	99	549	2.6	98.7	14	1.38

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.0		45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

Nichroma

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E308LMo-16	**A-Nr**	8	**Mat-Nr**	1.4431
ISO 3581-A	E 20 10 3 R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -20...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic all position electrode for welding dissimilar joints
The general purpose electrode for repair welding
Suitable for hobby and professional applications
Easy slag release and smooth bead appearance
Also applicable for joining steels difficult to weld
Weldable on AC and DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

AC/DC +

APPROVALS

BV	DNV	GL	TÜV	DB
UP	308Mo	4431	+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.025	0.8	1.0	20.0	9.5	2.3	20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
ISO 3581-A		min. 400	min. 620	min. 20	not required	
Typical values	AW	500	720	30	70	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	135	150	100
	Net weight/unit (kg)	2.7	4.9	5.0

Identification Imprint: 308LMo-16 / NICHROMA Tip Color: purple

Nichroma: rev. C-EN27-01/02/16

Nichroma

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
First layer in CrNiMo claddings					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X10CrNiMoTi17-3		1.4573	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
		GX5CrNiMo19-11	1.4408		

Welding dissimilar metals: mild steel and low alloy steel to stainless CrNi and CrNiMo-steel
Build-up welding on mild and low alloy steel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40 - 75	DC+	54	99	0.86	19.8	78	1.54
3.2 x 350	60 -110	DC+	52	132	1.5	33.4	46	1.54
4.0 x 350	80 - 150	DC+	62	234	1.9	49.6	30	1.49
5.0 x 450	140 - 220	DC+	66	365	2.8	78.4	19	1.52

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

Nichroma 160

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E309Mo-26	**A-Nr**	8	**Mat-Nr**	1.4459
ISO 3581-A	E 23 12 2 LR 53*	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

TEMPERATURE RANGE

Pressurized parts : -20...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic synthetic high recovery (160%) electrode for shipbuilding
For welding carbon steel to stainless steel in the down hand position
Excellent for fillet welding
High resistance to porosity on primed plate
Higher welding current Metal can be used
High deposition rates
Smooth bead appearance and easy slag release
Weldable on AC and DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F**

CURRENT TYPE

AC/DC +

APPROVALS

ABS	BV	DNV	GL	RINA	RMRS
+	UP	309Mo	4431	309Mo	SS/CMn

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.05	0.7	1.0	23.7	12.8	2.4	15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 550	min. 30	not required	
ISO 3581-A		min. 350	min. 550	min. 25	not required	
Typical values	AW	550	740	28	50	45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	450	450
Carton + PE foil	**Pieces / unit**	90	55
	Net weight/unit (kg)	6.1	5.9

Identification Imprint: 309Mo-26 / NICHROMA 160 Tip Color: sea green

Nichroma 160: rev. C-EN25-01/02/16

Nichroma 160

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
First layer in CrNiMo claddings					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
	CF-3M	J92800			
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X10CrNiMoTi17-3		1.4573	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
		GX5CrNiMo19-11	1.4408		

Welding dissimilar metals: mild steel or low alloy steel to stainless CrNiMo-steel up to max. thickness of 12 mm.
Build-up welding on mild and low alloy steel

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 450	140-170	DC+	86	409	1.9	68.1	22	1.52
4.0 x 450	180-230	DC+	80	644	3.0	105.5	15	1.59

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F
3.2	175A	140A
4.0	200A	180A

REMARKS / APPLICATION ADVICE

Deviations: chemical composition
C = max. 0.05% EN: C = max. 0.04%

Limarosta® 312

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E312-17	**A-Nr**	8	**Mat-Nr**	1.4337
ISO 3581-A	E 29 9 R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -10...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic high CrNi-alloyed all position electrode
Excellent for repair welding
Especially developed for steels difficult to weld, such as armour plates, austenitic Mn-steels and high C-steels
Excellent weldability and self releasing slag
Weldable on AC and DC+ polarity
Also available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

APPROVALS

DB

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni
0.11	0.9	1.0	29.0	9.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS 5.4		not required	min. 660	min. 22	not required
ISO 3581-A		min. 450	min. 650	min. 15	not required
Typical values	AW	700	800	20	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0
	Length (mm)	300	350	350	350
Carton + PE foil	**Pieces / unit**	175	125	150	100
	Net weight/unit (kg)	2.2	2.6	5.0	5.0
SRP	**Pieces / unit**	-	69	52	31
	Net weight/unit (kg)	-	1.5	1.8	1.5
Linc Pack	**Pieces / unit**	-	48	30	-
	Net weight/unit (kg)	-	1.0	1.0	-

Identification Imprint: 312-17 / LIMAROSTA 312 Tip Color: black

Limarosta®312: rev. C-EN26-01/02/16

Limarosta® 312

EXAMPLES OF MATERIALS TO BE WELDED

Various steel grades, such as:

- Armour plate
- Hardenable steels including steels difficult to weld
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Dissimilar steel grades (CMn-steels to stainless steel) up to max. thickness of 12 mm

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.0 x 300	40-55	DC+	41	45	0.59	12.0	150	1.80
2.5 x 350	50-70	DC+	57	91	0.73	20.7	87	1.79
3.2 x 350	70-100	DC+	60	126	1.1	33.0	52	1.72
4.0 x 350	100-130	DC+	72	273	1.4	49.7	35	1.72

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	90A	100A	65A	65A	65A
4.0	130A	125A	130A	80A		

Arosta® 307

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E307-16*	**A-Nr**	8	**Mat-Nr**	1.4370
ISO 3581-A	E 18 8 Mn R 1 2	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

TEMPERATURE RANGE

Pressurized parts : -60...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile- basic all position 5%Mn-alloyed stainless steel electrode
Especially developed for steels difficult to weld, such as armour lates and austenitic high Mn-steels
Often used as a buffer layer in hardfacing applications
Weldable on AC and DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

APPROVALS

TÜV	DB
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.09	5.0	0.6	18.5	8.5	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -60°C
Required: AWS A5.4		not required	min. 590	min. 30	not required	
ISO 3581-A		min. 350	min. 500	min. 25	not required	
Typical values	AW	450	650	35	110	75

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	125	135	85
	Net weight/unit (kg)	2.6	4.7	4.6

Identification Imprint: AROSTA 307 Tip Color: dark blue

Arosta®307: rev. C-EN23-01/02/16

Arosta® 307

EXAMPLES OF MATERIALS TO BE WELDED

Various steel grades, such as:
- Armour plate
- Hardenable steels including steels difficult to weld
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Dissimilar joints
- Problem steels

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	70-80	DC+	52	108	0.74	20.4	94	1.92
3.2 x 350	90-120	DC+	56	148	1.2	34.7	54	1.87
4.0 x 350	110-140	DC+	84	251	1.3	53.6	33	1.77

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	80A	80A	80A	80A	80A	80A
3.2	100A	100A	100A	90A		
4.0	140A	115A	130A	110A		

REMARKS / APPLICATION ADVICE

Deviations: chemical composition
Mn = 4.5 - 6.0% AWS: Mn = 3.30 - 4.75%

Arosta® 307-160

CLASSIFICATION

AWS A5.4	E307-26*	**A-Nr**	8	**Mat-Nr**	1.4370
ISO 3581-A	E 18 8 Mn R 5 3	**F-Nr**	5		
* Nearest classification,see remarks		**9606 FM**	5		

GENERAL DESCRIPTION

A rutile 6%Mn-alloyed stainless steel electrode
Especially developed for steels difficult to weld, such as armour lates and austenitic high Mn-steels
Often used as a buffer layer in hardfacing applications
Weldable on DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G

PB/2F

CURRENT TYPE

AC/DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni
0.06	6.0	1.0	18.0	8.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -10°C
Required: AWS A5.4		not required	min. 590	min. 30	not required	
ISO 3581-A		min. 350	min. 500	min. 25	not required	
Typical values	AW	425	650	35	85	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	450
Carton + PE foil	**Pieces / unit**	94	62
	Net weight/unit (kg)	4.7	6.0

Identification Imprint: AROSTA 307-160 Tip Color: red

Arosta™307-160: rev. C-EN06-01/02/16

Arosta® 307-160

EXAMPLES OF MATERIALS TO BE WELDED

Various steel grades, such as:

- Armour plate
- Hardenable steels including steels difficult to weld
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Dissimilar steel grades (CMn-steels to stainless steel)

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
			- per electrode at max. current -					
3.2 x 350	110-150	DC+	53	132	1.4	29.1	48	1.39
4.0 x 450	140-200	DC+	86	264	1.7	55.9	25	1.41

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
3.2	150A	140A	140A
4.0	200A	180A	160A

REMARKS / APPLICATION ADVICE

Deviations: chemical composition

Mn = 4.5 - 7.5%
Cr = 17.0 - 20.0%
Ni = 7.0 - 10.0%

AWS: Mn = 3.30 - 4.75%
AWS: Cr = 18.0 - 21.5%
AWS: Ni = 9.0 - 10.7%

Jungo® 307

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E307-15*	**A-Nr**	8	**Mat-Nr**	1.4370
ISO 3581-A	E 18 8 Mn B 2 2	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A fully basic all position 5%Mn-alloyed stainless steel electrode
Especially developed for steels difficult to weld, such as armour lates and austenitic high Mn-steels
Often used as a buffer layer in hardfacing applications
Weldable on DC+ polarity

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni
0.08	5.5	0.3	19.0	8.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -120°C
Required: AWS A5.4		not required	min. 590	min. 30	not required	
ISO 3581-A		min. 350	min. 500	min. 25	not required	
Typical values	AW	500	650	35	100	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	450
Carton + PE foil	**Pieces / unit**	170	110
	Net weight/unit (kg)	5.0	6.5
SRP	**Pieces / unit**	56	-
	Net weight/unit (kg)	1.8	-

Identification Imprint: JUNGO 307 Tip Color: silver

Jungo®307- rev. C-EN27-01/02/16

Jungo® 307

EXAMPLES OF MATERIALS TO BE WELDED

Various steel grades, such as:
· Armour plate
· Hardenable steels including steels difficult to weld
· Non-magnetic austenitic steels
· Work hardening austenitic manganese steels
· Dissimilar joints
· Problem steels

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	70 - 100	DC+	53	132	1.4	29.1	48	1.39
4.0 x 450	100 - 130	DC+	86	264	1.7	55.9	25	1.41

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup
3.2	90A	90A	90A	70A
4.0	140A	115A	130A	95A

REMARKS / APPLICATION ADVICE

Deviations: chemical composition
Mn = 4.5 - 6.5%
Ni = 7.5 - 9.5%

AWS: Mn = 3.30 - 4.75%
AWS: Ni = 9.0 - 10.7%

Arosta® 304H

CLASSIFICATION

AWS A5.4	E308H-16	**A-Nr**	8	**Mat-Nr**	1.4829
ISO 3581-A	E 19 9 H R 12	**F-Nr**	5		
		9606 FM	5		

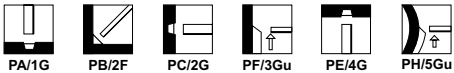
TEMPERATURE RANGE

Pressurized parts : -20...+730°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode
Specially developed for high temperature applications (up to 730°C) - e.g. AISI 304H or Mat. Nr 1.4948
Low sensitivity to precipitation of intermetallic phases
Weldable on AC and DC
Petrochemical and chemical industry

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC/DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.05	0.75	0.85	18.5	9.5	3-7

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 550	min. 35	not required	
ISO 3581-A		min. 350	min. 550	min. 30	not required	
Typical values	AW	450	600	44	85	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	145	150	100
	Net weight/unit (kg)	2.8	4.8	4.9

Identification Imprint: 308H-16 / AROSTA 304 H Tip Color: green

Arosta® 304H: rev. C-EN25-01/02/16

Arosta® 304H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Medium carbon (C >0.03%)					302
	X4CrNi18-10		1.4301	(TP)304	S30400
				(TP)304H	S30409
		GX5CrNi19-10	1.4308	CF8	J92600
			1.4948		
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40 - 75	DC+	51	89	0.99	19.4	79	1.54
3.2 x 350	60 - 110	DC+	58	121	1.3	31.5	48	1.52
4.0 x 350	80 - 150	DC+	64	258	1.8	48.0	32	1.54

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

Arosta® 309H

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E309H-16*	**A-Nr**	8	**Mat-Nr**	1.4829
ISO 3581-A	E 23 12 R 3 2*	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

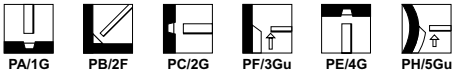
TEMPERATURE RANGE

Pressurized parts : -10...+400°C
Oxidation resistance : to 1100°C

GENERAL DESCRIPTION

A rutile basic all position stainless steel electrode
Specially developed for high temperature applications like industrial furnaces (ovens)
High resistance to oxidation up to 1050°C
Weldable on AC and DC

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC/DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.10	0.8	1.6	22.0	11.0	3-8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.4		not required	min. 550	min. 30	not required
ISO 3581-A		min. 350	min. 550	min. 25	not required
Typical values	AW	500	700	30	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	350	350
Carton + PE foil	**Pieces / unit**	120	130
	Net weight/unit (kg)	2.6	4.8

Identification Imprint: AROSTA 309 H Tip Color: yellow

Arosta® 309H: rev. C-EN25-01/02/16

Arosta® 309H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
		GX30CrSi6	1.4710		
	X10CrAl7		1.4713	502	
	X10CrAl13		1.4724	410/414-TP405-CA15	
		GX40CrSi13	1.4729		
		GX40CrSi17	1.4740		
	X10CrAl18		1.4742	430-TP430-CB30	
	X10CrAl24		1.4762	TP443	
		GX25CrNiSi18-9	1.4825		J92502
		GX40CrNiSi22-9	1.4826		
	X15CrNiSi20-12		1.4828	TP309	S30900
		GX25CrNiSi20-14	1.4832		
	X12CrNiTi18-9				

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	40-110	DC+	47	71	1.1	19.7	73	1.44
3.2 x 350	60-120	DC+	58	140	1.5	31.9	42	1.33

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A

REMARKS / APPLICATION ADVICE

Deviations: chemical composition

Si = max. 2.0%
Cr = 20.0 - 23.0%
Ni = 10.0 - 13.0%

AWS: Si = max. 1.0%
AWS: Cr = 22.0 - 25.0%
AWS: Ni = 12.0 - 14.0%

EN: Si = max. 1.2%

Intherma® 310

EMR SAHARA®

CLASSIFICATION

AWS A5.4	E310-16	**A-Nr**	9	**Mat-Nr**	1.4842
ISO 3581-A	E 25 20 R 1 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -20...+400°C
Oxidation resistance : to 1200°C

GENERAL DESCRIPTION

Rutile basic electrode for all position welding except vertical down
Fully austenitic weld metal with high Cr and Ni content for very high service temperature
High resistance against oxidation and scaling up to 1200°C
Weldable on AC and DC

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC/DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.12	2.5	0.5	26.0	20.5	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.4		not required	min. 550	min. 30	not required
ISO 3581-A		min. 350	min. 550	min. 20	not required
Typical values	AW	440	600	30	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	145	150	100
	Net weight/unit (kg)	3.0	5.1	5.1

Identification Imprint: 310-16 / INTHERMA 310 Tip Color: dark green

Intherma®310: rev. C-EN25-01/02/16

Intherma® 310

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A351	UNS
Heat resisting steels					
	X10CrAl24		1.4762		
		GX25CrNiSi18-9	1.4825		
		GX40CrNiSi22-9	1.4826		
	X15CrNiSi20-12		1.4828		
		GX25CrNiSi20-14	1.4832		
	X15CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12CrNi25-21		1.4845		
		GX40CrNiSi25-20	1.4848	HK40	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	80-110	DC+	50	84	0.74	18.9	97	1.83
3.2 x 350	90-140	DC+	56	155	1.31	31.8	49	1.56
4.0 x 350	130-175	DC+	72	233	1.55	50.7	32	1.64

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	100A	100A	100A	90A	90A	90A
3.2	130A	120A	130A	110A	110A	110A
4.0	160A	160A	160A	140A		

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 100°C

Intherma® 310B

CLASSIFICATION

AWS A5.4	E310-15*	**A-Nr**	9	**Mat-Nr**	1.4842
ISO 3581-A	E 25 20 B 1 2	**F-Nr**	5		
*:Deviation,see remarks		**9606 FM**	5		

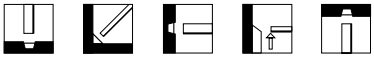
TEMPERATURE RANGE

Pressurized parts : -20...+400°C
Oxidation resistance : to 1200°C

GENERAL DESCRIPTION

Basic coated electrode for all position welding except vertical down
Fully austenitic weld metal with high Cr and Ni content for very high service temperature
High resistance against oxidation and scaling up to 1200°C
Avoid service temperatures between 650 - 850°C
Weldable on DC only

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.1	3.0	0.3	25.0	21.0	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.4		not required	min. 550	min. 30	not required
ISO 3581-A		min. 350	min. 550	min. 20	not required
Typical values	AW	440	600	30	100

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Carton + PE foil	**Pieces / unit**	135	150	100
	Net weight/unit (kg)	2.4	4.3	4.3

Identification Imprint: INTHERMA 310 B Tip Color: dark green

Intherma®310B: rev. C-EN24-01/02/16

Intherma® 310B

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A351	UNS
Heat resisting steels					
	X10CrAl24		1.4762		
		GX25CrNiSi18-9	1.4825		
		GX40CrNiSi22-9	1.4826		
	X15CrNiSi20-12		1.4828		
		GX25CrNiSi20-14	1.4832		
	X15CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12CrNi25-21		1.4845		
		GX40CrNiSi25-20	1.4848	HK40	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)
2.5 x 350	60-70
3.2 x 350	80-90
4.0 x 350	110-130

*Stub end 35mm

REMARKS / APPLICATION ADVICE

Deviations: chemical composition
Mn = max. 5.0% AWS: Mn = 1.0 - 2.5%
Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 100°C

Linox P 308L

PROTECH™ VACUUM PACK

CLASSIFICATION

AWS A5.4	E308L-16	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 3581-A	E 19 9 L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+350°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

A rutile stainless steel electrode for 304L or equivalent steels
All positional welding including fixed pipework
Smooth weld appearance
Minimum spatter and high resistance to porosity
Good side wall wetting, no undercut
Easy slag removal
Weldable on AC and DC
Also available in PROTECH™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)

PA/1G | PB/2F | PC/2G | PF/3Gu | PE/4G | PH/5Gu

CURRENT TYPE

AC / DC +

APPROVALS

ABS	TÜV
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	0.8	0.6	19.0	9.5	3-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -100°C
Required: AWS A5.4		not required	min. 520	min. 35	
ISO 3581-A		min. 310	min. 510	min. 30	
Typical values	AW	450	590	45	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0
	Length (mm)	300	350	350	450
Carton + PE foil	**Pieces / unit**	194	119	82	55
	Net weight/unit (kg)	2.13	2.38	2.7	3.59
Protech™	**Pieces / unit**	158	110	70	46
	Net weight/unit (kg)	1.74	2.2	2.33	3.0

Identification Imprint: 308L-16 / LINOX P 308L Tip Color: none

Linox P 308L: rev. C-EN01-01/02/16

Linox P 308L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.0		45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

Linox 308L

PROTECH™ VACUUM PACK

CLASSIFICATION

AWS A5.4	E308L-17	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 3581-A	E 19 9 L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -196...+350°C
Oxidation resistance : to 800°C

GENERAL DESCRIPTION

A rutile stainless steel electrode for 304L or equivalent steels
Smooth weld appearance
Minimum spatter and high resistance to porosity
Good side wall wetting, no undercut
Easy slag removal
Weldable on AC and DC
Also available in PROTECH™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE

AC / DC +

APPROVALS

ABS	DNV	TÜV
+	Pending	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	0.8	0.8	19.0	9.5	3-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
ISO 3581-A		min. 310	min. 510	min. 30	not required	
Typical values	AW	450	590	45	70	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	196	120	80	55	32
	Net weight/unit (kg)	2.3	2.53	2.78	3.69	3.43
Protech™	**Pieces / unit**	160	110	69	45	30
	Net weight/unit (kg)	1.84	2.32	2.4	3.09	3.2

Identification Imprint: 308L-17 / LINOX 308 L Tip Color: none

Linox308L: rev. C-EN03-01/02/16

Linox 308L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.0		45A	45A	40A	40A
2.5	70A	70A	70A	60A	60A
3.2	100A	100A	100A	70A	70A
4.0	140A	140A	140A		
5.0	180A	180A			

Linox P 316L

PROTECH™ VACUUM PACK

CLASSIFICATION

AWS A5.4	E316L-16	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L R 3 2	**F-Nr**	5		
		9606 FM	5		

TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile stainless steel electrode for 316L or equivalent steels
All positional welding including fixed pipework
Smooth weld appearance
Minimum spatter and high resistance to porosity
Good side wall wetting, no undercut
Easy slag removal
Weldable on AC and DC
Also available in PROTECH™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC +

APPROVALS

ABS	TÜV
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.025	0.8	0.6	19.0	12.0	2.5	3-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -105°C
Required: AWS A5.4		not required	min. 520	min. 30	not required	
ISO 3581-A		min. 320	min. 510	min. 25	not required	
Typical values	AW	480	580	41	70	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	195	119	79	55	32
	Net weight/unit (kg)	2.15	2.41	2.7	3.62	3.29
Protech™	**Pieces / unit**	159	110	70	46	28
	Net weight/unit (kg)	1.75	2.21	2.34	3.05	3.11

Identification Imprint: 316L-16 / LINOX P 316L Tip Color: none

Linox P 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.0	40A	45A	45A	40A	40A	40A
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

Linox 316L

PROTECH™ VACUUM PACK

SMAW

CLASSIFICATION

AWS A5.4	E316L-17	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 3581-A	E 19 12 3 L R 3 2	**F-Nr**	5		
		9606 FM	5		

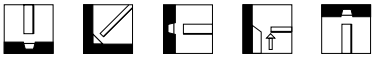
TEMPERATURE RANGE

Pressurized parts : -120...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile-basic stainless steel electrode for 316L or equivalent steels
Smooth weld appearance
Minimum spatter and high resistance to porosity
Good side wall wetting, no undercut
Easy slag removal
Weldable on AC and DC
Also available in PROTECH™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE

AC / DC +

APPROVALS

ABS	DNV	TÜV
+	Pending	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
0.025	0.8	0.8	18.0	12.0	2.5	3-10

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -105°C
Required: AWS A5.4		not required	min. 490	min. 30	not required	
ISO 3581-A		min. 320	min. 510	min. 25	not required	
Typical values	AW	480	600	42	70	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	450	450
Carton + PE foil	**Pieces / unit**	196	120	80	55	31
	Net weight/unit (kg)	2.3	2.53	2.78	3.75	3.41
Protech™	**Pieces / unit**	160	110	69	46	28
	Net weight/unit (kg)	1.84	2.32	2.4	3.12	3.08

Identification Imprint: 316L-17 / LINOX 316 L Tip Color: none

Linox316L: rev. C-EN03-01/02/16

Linox 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		GX5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.0	40A	45A	45A	40A	40A
2.5	70A	70A	70A	60A	60A
3.2	100A	100A	100A	70A	70A
4.0	140A	140A	140A		
5.0	180A	180A			

Linox P 309L

PROTECH™ VACUUM PACK

CLASSIFICATION

AWS A5.4	E309L-16	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 3581-A	E 23 12 L R 3 2	**F-Nr**	5		
		9606 FM	5		

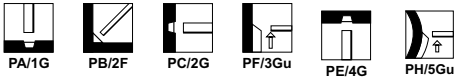
TEMPERATURE RANGE

Pressurized parts : -20...+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile all position CrNi over-alloyed buffer electrode
All positional welding including fixed pipework
Suitable for welding stainless steel to mild and low alloy steels, stainless steel cladding
Smooth weld appearance
Minimum spatter and high resistance to porosity
Good side wall wetting, no undercut
Easy slag removal
Weldable on AC and DC
Also available in PROTECH™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC/DC +

APPROVALS

ABS	TÜV
+	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	0.8	0.6	23.5	13.0	8-20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 520	min. 30	not required
ISO 3581-A		min. 320	min. 510	min. 25	not required
Typical values	AW	495	595	41	45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	450
Carton + PE foil	**Pieces / unit**	119	80	55
	Net weight/unit (kg)	2.49	2.8	3.76
Protech™	**Pieces / unit**	110	70	46
	Net weight/unit (kg)	2.31	2.42	3.15

Identification Imprint: 309L-17 / LINOX P 309L Tip Color: none

Linox P 309L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)
Build-up welding on mild and low alloy steel
Bufferlayer CrNi-cladsteel

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

Linox 309L

PROTECH™ VACUUM PACK

CLASSIFICATION

AWS A5.4	E309L-17	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 3581-A	E 23 12 L R 3 2	**F-Nr**	5		
		9606 FM	5		

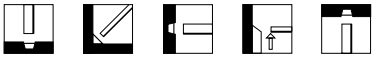
TEMPERATURE RANGE

Pressurized parts : -20...+300°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

A rutile all position CrNi over-alloyed buffer electrode
Suitable for welding stainless steel to mild and low alloy steels, stainless steel cladding
Smooth weld appearance
Minimum spatter and high resistance to porosity
Good side wall wetting, no undercut
Easy slag removal
Weldable on AC and DC
Also available in PROTECH™ Vacuum Pack

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE

AC/DC +

APPROVALS

ABS	DNV	TÜV
+	Pending	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
0.025	0.7	0.7	24.0	12.5	8-20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.4		not required	min. 520	min. 30	not required	
ISO 3581-A		min. 320	min. 510	min. 25	not required	
Typical values	AW	500	620	40	55	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	450
Carton + PE foil	**Pieces / unit**	120	80	58
	Net weight/unit (kg)	2.59	2.9	4.12
Protech™	**Pieces / unit**	110	69	45
	Net weight/unit (kg)	2.37	2.5	3.2

Identification Imprint: 309L-17 / LINOX 309 L Tip Color: none

Linox309L: rev. C-EN02-01/02/16

Linox 309L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)
Build-up welding on mild and low alloy steel
Bufferlayer CrNi-cladsteel

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	70A	70A	70A	60A	60A
3.2	100A	100A	100A	70A	70A
4.0	140A	140A	140A		

NiCro 31/27

CLASSIFICATION

AWS A5.4	E383-16*	**A-Nr**	9	**Mat-Nr**	1.4563
ISO 3581-A	E 27 31 4 Cu L R 1 2	**F-Nr**	5		
* nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

A rutile-basic all position fully austenitic NiCrMoCu electrode
Especially for phosphoric and sulphuric acid plants
Designed for Mo and Cu alloyed high NiCr-alloyed grades
Very smooth bead appearance and easy slag release
Also approved for welding dissimilar metals for service up to 450°C
High resistance to pitting (PREN ~40)

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE

AC/DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Cu	Fe	FN (acc.WRC 1992)
0.02	0.8	0.9	27.1	31.0	3.5	0.9	bal.	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.4		not required	min. 520	min. 30	not required
ISO 3581-A		min. 240	min. 500	min. 25	not required
Typical values	AW	440	640	38	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
PE-Tube	**Pieces / unit**	91	66	45
	Net weight/unit (kg)	1.8	2.0	2.0

Identification Imprint: NICRO 31/27 Tip Color: orange

NiCro 31/27: rev. C-EN26-01/02/16

NiCro 31/27

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type	Mat. Nr	ASTM/ACI	UNS
Copper alloyed CrNiMo and NiCrMo steels					
	EN 10088-1/-2	X1NiCrMoCu31-27-4	1.4563	Alloy 28	N08028
		X1NiCrMoCu25-20-5	1.4539	Alloy 904L	N08904

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	45-70	DC+	52	95	0.84	21.3	83	1.75
3.2 x 350	70-95	DC+	56	132	1.3	31.2	48	1.49
4.0 x 350	110-150	DC+	53	198	2.0	46.0	34	1.56

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	65A	70A	70A	70A	60A	60A
3.2	95A	95A	95A	95A	80A	80A
4.0	120A	120A				

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

NiCro 60/20

CLASSIFICATION

AWS A5.11	ENiCrMo-3	**A-Nr**	-	**Mat-Nr**	2.4621
ISO 14172	E Ni 6625 (NiCr22Mo9Nb)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Fully basic Ni-base high CrMoNb alloyed austenitic all position electrode
Extreme high resistance to general and intergranular corrosion, pitting and crevice corrosion and stress corrosion cracking
Suitable for welding dissimilar joints; high resistance to hot cracking
High resistance to high temperature oxidation (max. 1200°C) and carburization
Good impact values at low temperatures (down to -196°C), suitable for 9% Ni steel

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Nb	Fe
0.03	0.5	0.35	22.0	62.0	9.0	3.4	0.9

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 760	min. 30	not required
ISO 14172		min. 420	760	min. 27	not required
Typical values	AW	510	770	44	92

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
PE-Tube	**Pieces / unit**	94	61	45
	Net weight/unit (kg)	1.6	1.7	2.1

Identification Imprint: NiCrMo-3 / NICRO 60/20 Tip Color: green

NiCro 60/20: rev. C-EN23-01/02/16

NiCro 60/20

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	DIN/EN	Mat. Nr	ASTM/ACI	UNS
NiCrMo-steel type alloy 625 and welding dissimilar high NiCrMo-steels for corrosion and heat resisting purposes				
	X1NiCrMoCuN25-20-6	1,4529	Alloy 925	N08925
	X1NiCrMoCu25-20-5	1,4539	Alloy 904L	N08904
	X1CrNiMoCuN20-18-7	1,4547	Alloy 254	S31254
	X2NiCrAlTi32-20	1,4558	Alloy 800L	N08800
	G-X10NiCrNb32-20	1,4859		
	X10NiCrAlTi32-20	1,4876	Alloy 800/800H	N08800/-10
	NiCr22Mo6Cu	2,4618	Alloy G	N06007
	NiCr22Mo7Cu	2,4619	Alloy G-3	N06985
	NiCr21Mo6Cu	2,4641	Alloy 825hMo	N08821
	NiCr20CuMo	2.4660	Alloy 20	N08020
	NiCr15Fe	2,4816	B168-Alloy 600	N06600
	NiCr22Mo9Nb	2,4856	B443-Alloy 625	N06625
	NiCr21Mo	2,4858	B424-Alloy 825	N08825
	NiCr20Ti	2,4951	Alloy 75	N06075
	NiCr20TiAl	2,4952	Alloy 80A	N07080
Low alloy steels				
	10Ni14 (3.5% Ni)	1,5637	ASTM A333 Grade 3	-
	12Ni19, X12Ni5	1.5680	-	K41583
9% Ni steel for LNG storage tanks				
	X8Ni9 (9% Ni)	1,5662	A353/A353M	-
	X8Ni9 (9% Ni)	1,5662	A553/A553M Type I	-
	(8% Ni)		A553/A553M Type II	K71340

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	45-70	DC+	44	80	0.95	17.2	87	1.51
3.2 x 300	70-100	DC+	44	101	1.5	26.8	55	1.48
4.0 x 350	100-130	DC+	53	215	2.2	46.4	30	1.41

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	55A	60A	60A	60A	60A
3.2	90A	80A	85A	80A	80A	80A
4.0	120A	120A				

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

NiCro 70/15

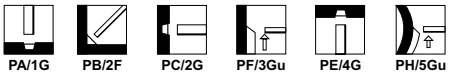
CLASSIFICATION

AWS A5.11	ENiCrFe-2*	**A-Nr**	-	**Mat-Nr**	2.4807
ISO 14172	E Ni 6182* (NiCr15Fe6Mn)	**F-Nr**	43		
*:Deviation,see remarks		**9606 FM**	6		

GENERAL DESCRIPTION

Fully basic all position NiCr electrode
High creep resistance up to 815°C
High resistance to embrittlement
High toughness at low temperature (-196°C)
For welding, Ni base alloys (as Alloy 600) and dissimilar joints
High resistance to carburization

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Nb	Fe
0.02	4.4	0.45	18.0	bal.	1.9	6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 550	min. 30	not required	
ISO 14172		min. 360	min. 550	min. 27	not required	
Typical values	AW	430	680	40	145	130

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
PE-Tube	**Pieces / unit**	90	57	43
	Net weight/unit (kg)	1.6	1.9	2.0

Identification Imprint: NICRO 70/15 Tip Color: silver

NiCro 70/15: rev. C-EN24-01/02/16

NiCro 70/15

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	BS 3076	DIN 17742 SEW 470/595	Mat. Nr	ASTM / ACI B366	UNS
Ni base on Cr alloyed steels for high and low temperature service					
		LC-NiCr15Fe	2.4817		N06600
	NA14	NiCr15Fe	2.4816	Alloy600/B168	N06600
		NiCr23Fe	2.4851	Alloy601(H)	N06601
		NiCr60-15	2.4867		N06004
		NiCr80-20	2.4869		N06003
		NiCr20Ti	2.4951	Alloy75	N06075
		NiCr20TiAl	2.4952	Alloy80A	N07080
	NA17	X12NiCrSi36-16	1.4864	330	N08330
		G-X10NiCrNb32-20	1.4859		
	NA15	X10NiCrAlTi32-20	1.4876	Alloy800/800H	N08800/ N08810

Suitable for welding dissimilar metals:
· Mild- and low alloy steel to stainless steel
· Mild- and low alloy steel to Ni base alloys
· Stainless steel to low alloy creep resisting steel
Not sensitive for embrittlement after heat treatment

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	45-60	DC+	44	63	0.9	17.5	91	1.59
3.2 x 300	70-100	DC+	52	107	1.3	29.2	52	1.54
4.0 x 350	90-160	DC+	61	214	2.0	51.0	29	1.47

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	55A	60A	60A	60A	60A
3.2	90A	80A	85A	80A	80A	80A
4.0	120A	120A				

REMARKS / APPLICATION ADVICE

Deviations: chemical composition
Mn = 3.0 - 6.0%
Cr = max. 18.0%
AWS: Mn = 1.0 - 3.5%
AWS: Cr = max. 17.0%
ISO: Mn = 5.0 - 10%
ISO: Cr = max. 17%
Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

NiCro 70/15Mn

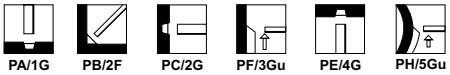
CLASSIFICATION

AWS A5.11	ENiCrFe-3	**A-Nr**	-	**Mat-Nr**	2.4620
ISO 14172	E Ni 6182 (NiCr15Fe6Mn))	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Fully basic all position NiCr electrode
For welding Ni-base alloys (as Alloy 600), claddings and dissimilar metals
High creep resistance up to 815°C
High resistance to embrittlement
High toughness also at low temperature (-196°C)
High resistance to carburization
Extra alloyed with ~6% Mn to provide hot cracking resistance

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Nb	S	Fe
0.025	5.5	0.4	16.0	bal.	2.0	0.01	6.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 550	min. 30	not required
ISO 14172		min. 360	min. 550	min. 27	not required
Typical values	AW	400	630	40	125

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
PE-Tube	**Pieces / unit**	91	57	39
	Net weight/unit (kg)	1.6	1.7	1.9

Identification Imprint: NiCrFe-3 / NICRO 70/15Mn Tip Color: yellow

NiCro 70/15Mn: rev. C-EN24-01/02/16

NiCro 70/15Mn

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	BS 3076	DIN 17742 SEW 470/595	Mat. Nr	ASTM / ACI B366	UNS
Ni base on Cr alloyed steels for high and low temperature service					
		LC-NiCr15Fe	2.4817		N06600
	NA14	NiCr15Fe	2.4816	Alloy600/B168	N06600
		NiCr23Fe	2.4851	Alloy601(H)	N06601
		NiCr60-15	2.4867		N06004
		NiCr80-20	2.4869		N06003
		NiCr20Ti	2.4951	Alloy75	N06075
		NiCr20TiAl	2.4952	Alloy80A	N07080
	NA17	X12NiCrSi36-16	1.4864	330	N08330
		GX10NiCrNb32-20	1.4859		
	NA15	X10NiCrAlTi32-20	1.4876	Alloy800/800H	N08800/ N08810

Suitable for welding dissimilar metals:
· Mild- and low alloy steel to stainless steel
· Mild- and low alloy steel to Ni base alloys
· Stainless steel to low alloy creep resisting steel
Not sensitive for embrittlement after heat treatment

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	40-70	DC+	80	119	0.52	17.4	86	1.49
3.2 x 300	70-100	DC+	77	193	0.84	29.0	56	1.61
4.0 x 350	90-140	DC+	74	289	1.7	50.9	29	1.47

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	55A	60A	60A	60A	60A
3.2	90A	80A	90A	80A	80A	80A
4.0	120A	120A				

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 100°C

NiCro 70/19

CLASSIFICATION

AWS A5.11	ENiCrFe-2*	**A-Nr**	-	**Mat-Nr**	2.4648
ISO 14172	E Ni 6082 (NiCr20Mn3Nb)	**F-Nr**	43		
*:Deviation,see remarks		**9606 FM**	6		

GENERAL DESCRIPTION

Fully basic NiCr alloyed all position electrode
For welding high Ni alloyed material such as Alloy 600 and Alloy 601
Also applicable for welding dissimilar joints and for CMn- and low alloy clad steel
High resistance to oxidation at high temperature
High impact values at low temperature (-196°C)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

DC +

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Nb	Fe
0.03	4.7	0.6	19.0	bal.	1.5	1.9	4.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 550	min. 30	not required	
ISO 14172		min. 360	min. 600	min. 22	not required	
Typical values	AW	400	650	40	110	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	300	300	350	450
PE-Tube	**Pieces / unit**	76	57	31	45
	Net weight/unit (kg)	1.5	1.7	1.8	4.5

Identification Imprint: NICRO 70/19 Tip Color: blue

NiCro 70/19

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	BS3076	DIN 17744/17465 SEW 595	Mat. Nr	ASTM/ACI B366	UNS
Ni base to CrNi alloyed steel for composition in highly corrosive environments					
	NA 14	NiCr15Fe	2.4816	B168-Alloy 600	N06600
		LC-NiCr15Fe	2.4817	Alloy 600L	N06600
		NiCr20Ti	2.4951	Alloy 75	
		NiCr20TiA1	2.4952	Alloy 80A	N07080
	NA 15	X10NiCrAlTi32-20	1.4876	Alloy 800/800H	N08800/10
		NiCr23Fe	2.4851	Alloy 601(H)	N06601
	NA 17	X12NiCrSi36-16	1.4864	330	N08330
		GX40NiCrNb35-25	1.4852		
		GX40NiCrSi35-25	1.4857	HP	

Suitable for welding dissimilar metals:
· Mild- and low alloy steel to stainless steel
· Mild- and low alloy steel to Ni base alloys
· Stainless steel to low alloy creep resisting steel
Not sensitive for embrittlement after heat treatment

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	45-65	DC+	41	61	0.95	19.3	92	1.79
3.2 x 300	70-95	DC+	59	127	1.2	32.7	51	1.64
4.0 x 350	100-140	DC+	75	314	1.7	59.3	29	1.72

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	60A	55A	60A	60A	60A	60A
3.2	90A	80A	90A	80A	80A	80A
4.0	120A	120A				

REMARKS / APPLICATION ADVICE

Deviations: chemical composition
Mn = 2.0 - 6.0% AWS: Mn = 1.0 - 3.5%
Cr = 18.0 - 22.0% AWS: Mn = 13.0 - 17%
Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

Nyloid 2

CLASSIFICATION

AWS A5.11	ENiCrMo-6	**A-Nr**	-
ISO 14172	E Ni 6620 (NiCr14Mo7Fe)	**F-Nr**	43
		9606 FM	6

GENERAL DESCRIPTION

Basic high recovery all position electrode for welding low temperature steels
Recovery of approximately 150%, providing high deposition rates
Especially developed for welding 9% Ni steel
Linear expansion coefficient equivalent to that of 9% Ni steel
Excellent impact toughness at -196°C, reliable 0.2%-Yield strength
Weldable on AC as well as DC+ polarity
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +

APPROVALS

GL	TÜV
5680	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Nb	Fe	W
0.05	3	0.4	13	bal.	6.0	1.5	6	1.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 620	min. 20	not required	
ISO 14172		min. 350	min. 620	min. 32	not required	
Typical values	AW	475	725	40	100	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
SRP	**Pieces / unit**	62	52	27
	Net weight/unit (kg)	1.7	2.2	1.8

Identification Imprint: NiCrMo-6 / NYLOID 2 Tip Color: white

Nyloid 2: rev. C-EN25-01/02/16

Nyloid 2

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10028-4	Mat. Nr	ASTM	UNS
9% Ni steel for LNG storage tanks				
	X8Ni9	1.5662	A353/A353M	
	X8Ni9 (9% Ni)	1.5662	A553/A553M Type I	
	(8% Ni)		A 553/A553M Type II	K71340
Low alloy steel for cryogenic applications				
	X12Ni5 (12Ni19)	1.5680		K41583
	10Ni14 (3.5% Ni)	1.5637	A333 Grade 3	
	12Ni14 (3.5% Ni)	1.5637	A203 Grade E	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	70-100	AC	54	128	1.3	26.5	53	1.39
3.2 x 350	85-145	AC	63	229	1.8	43.6	31	1.37
4.0 x 350	140-190	AC	73	355	2.4	65.8	21	1.33
5.0 x 450	180-280	AC	94	764	3.7	133.5	10	1.35

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	90 - 100A	90 - 100A	90 - 100A	90 - 100A	90 - 100A	80 - 100A
3.2	135 - 145A	135 - 145A	135 - 145A	125 - 135A	125 - 135A	120 - 135A
4.0	170 - 185A	170 - 185A	170 - 185A	140 - 165A		
5.0	220 - 270A	220 - 280A				

REMARKS / APPLICATION ADVICE

Recommended Heat-Input for plate thickness:
≤ 15 mm: 1.4 kJ/mm
15 - 20 mm: 1.6 kJ/mm
> 20 mm: 2.0 kJ/mm

Nyloid 4

CLASSIFICATION

AWS A5.11	ENiCrMo-6	**A-Nr**	-
ISO 14172	E Ni 6620 (NiCr14Mo7Fe)	**F-Nr**	43
		9606 FM	6

GENERAL DESCRIPTION

Basic high recovery all position electrode for welding low temperature steels
Especially developed for performing in the PE/4G position (High resistance to porosity)
Especially developed for welding 9% Ni steel
Linear expansion coefficient equivalent to that of 9% Ni steel
Excellent impact toughness at -196°C, reliable 0.2%-Yield strength
Weldable on AC as well as DC+ polarity
Only available in vacuum sealed Sahara ReadyPack® (SRP)

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

AC / DC +

APPROVALS

DNV	GL	BV
Pending	Pending	Pending

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni	Mo	Nb	Fe	W
0.05	3.0	0.4	13	bal.	6.0	1.5	6.0	1.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 620	min. 20		
ISO 14172		min. 350	min. 620	min. 32		min. 47
Typical values	AW	490	770	33	100	85

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
SRP	**Pieces / unit**	69	36	30
	Net weight/unit (kg)	1.3	1.1	1.7

Identification Imprint: NiCrMo-6 / NYLOID 4 Tip Color: Yellow

Nyloid 4: rev. C-EN02-01/02/16

Nyloid 4

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10028-4	Mat. Nr	ASTM/ICA	UNS
9%-Ni steel for LNG applications				
	X8Ni9	1.5662	A353/A353M NN+T	
	X8Ni9 (9% Ni)	1.5662	A553/A553M Type I	
	(8% Ni)		A553/A553M Type II	K71340
Low alloy steel for cryogenic applications				
	X12Ni5 (12Ni9)	1.5680		K41583
	10Ni14 (3.5% Ni)	1.5637	A333 Grade 3	
	12Ni14 (3.5% Ni)	1.5637	A203 Grade E	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	50-70	AC	52	88	0.9	77	1.47
3.2 x 300	70-110	AC	60	146	1.3	46	1.50
4.0 x 350	110-140	AC	75	234	1.9	25	1.41

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	60 - 70A	60 - 70A	55 - 70A	55 - 70A	55 - 65A
3.2	90 - 105A	90 - 105A	80 - 95A	70 - 90A	85 - 95A

REMARKS / APPLICATION ADVICE

Recommended heat-Input :
≤ 15 mm: 1.4 kJ/mm
15 - 20 mm: 1.6 kJ/mm
> 20 mm: 2.0 kJ/mm

AlMn

CLASSIFICATION

AWS A5.3 E3003*
ISO 18273 Al 3103 (AlMn1)
F-Nr 21
Mat-Nr 3.0516
*:Deviation,see remarks

GENERAL DESCRIPTION

Especially for welding forged and cast aluminium-magnesium alloys and aluminium-manganese alloys
Good weldability, no porosity

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Al	Mn	Si	Zn	Fe	Cu	Mg	Others
bal.	0.9-1.2	0.3 max.	0.09 max.	0.6 max.	0.02 max.	0.15 max	0.15 max.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	AW	40	110	20

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	350	350
Metal can	**Pieces / unit**	-	-
	Net weight/unit (kg)	2.0	2.0

AlMn: rev. C-EN24-12/05/16

AlMn

EXAMPLES OF MATERIALS TO BE WELDED

Aluminium manganese alloys and Aluminium magnesium alloys	Mat. Nr
AlMn1	3.0515
AlMn1Mg1	3.0526
AlMg1	3.3315

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
2.5 x 350	40-70	DC+	9.2
3.2 x 350	60-90	DC+	14.0

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PF/3Gup
2.5	60A	60A	55A
3.2	80A	80A	75A

REMARKS / APPLICATION ADVICE

Deviations:chemical composition
Cu = max.0.02% AWS:Cu = 0.05 - 0.20%
Mn = 0.9 - 1.2% AWS:Mn = 1.0 - 1.5%
If the thickness is more than 10 mm,it is advisable to preheat at 150 - 250°C

AlSi5

CLASSIFICATION

AWS A5.3	E4043	**F-Nr**	23
ISO 18273	Al 4043A* (AlSi5(A))	**Mat-Nr**	3.2245

*:Deviation,see remarks

GENERAL DESCRIPTION

Especially for welding forged and cast aluminium alloys containing less than 5% Si as main alloying element
Good weldability, no porosity

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Al	Si
bal.	5.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	AW	90	160	15

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Metal can	**Pieces / unit**	-	-	-
	Net weight/unit (kg)	2.0	2.0	2.0

AlSi5: rev. C-EN23-12/05/16

AlSi5

EXAMPLES OF MATERIALS TO BE WELDED

Aluminium-silicon alloys and dissimilar of several aluminium alloys. With restriction : precipitation hardening alloys such as :	Mat. Nr
AlCuMg1	3.1325
AlMgSi1	3.2315
AlZn4.5Mg1	3.4335

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
2.5 x 350	40-70	DC+	9.2
3.2 x 350	60-90	DC+	14.0
4.0 x 350	80-120	DC+	20.4

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	 PB/2F	 PF/3Gup
2.5	60A	60A	55A
3.2	80A	80A	75A
4.0	110A	110A	105A

REMARKS / APPLICATION ADVICE

If the thickness is more than 10 mm, it is advisable to preheat at 150 - 250°C
Welding with short arc preferable
Electrode with 90°angle on material

AlSi12

CLASSIFICATION

ISO 18273 Al 4047A (AlSi12(A))
*:Deviation,see remarks

F-Nr 23*
Mat-Nr 3.2585

GENERAL DESCRIPTION

Especially for welding forged and cast aluminium alloys containing more than 7% Si as main alloying element
Also applicable as surfacing electrode
Good weldability, no porosity
Applicable when Al-properties are unknown

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Al	Si
bal.	12.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	AW	80	180	5

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Metal can	**Pieces / unit**	-	-	-
	Net weight/unit (kg)	2.0	2.0	2.0

AlSi12: rev. C-EN23-12/05/16

AlSi12

EXAMPLES OF MATERIALS TO BE WELDED

Aluminium cast alloys with silicon level up to approx. 12%, like	Mat. Nr
G-AlSi 10Mg	3.2381
G-AlSi 12	3.2581

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
2.5 x 350	40-70	DC+	8.8
3.2 x 350	60-90	DC+	13.2
4.0 x 350	80-120	DC+	19.6

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions		
	PA/1G	PB/2F	PF/3Gup
2.5	60A	60A	55A
3.2	80A	80A	75A
4.0	110A	110A	105A

REMARKS / APPLICATION ADVICE

If the thickness is more than 15 mm, it is advisable to preheat at 150 - 250°C
Welding with short arc preferable
Electrode with 90°angle on material

Wearshield® BU-30

CLASSIFICATION

DIN 8555 E1-UM-350-GP
EN 14700 E Fe1

GENERAL DESCRIPTION

Can be used both downhand and out of position, although the flat position is preferred
Arc characteristics are excellent with very low spatter levels
The electrode coating permits the use of the drag or contact welding technique
Good arc restriking

WELDING POSITIONS (ISO/ASME) (ISO/ASME)

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Mo
0.2	0.8	1.0	1.5	0.5

STRUCTURE

In the as welded condition the microstructure consists mainly of martensite with some bainite

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	31 HRc (295 HB)
2 Layers	35 HRc (330 HB)
3 Layers	38 HRc (350 HB)

Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
PE-Tube	**Pieces / unit**	65	44	23
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD BU-30 Tip Color: black

Wearshield®BU-30: rev. C-EN24-01/02/16

Wearshield® BU-30

APPLICATION

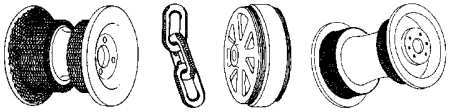
Wearshield BU-30 produces a crack-free wear resistant deposit with a hardness of 31-38 HRc (295-350 HB) depending on dilution and number of layers. It is particularly suitable under conditions of moderate abrasion and friction, combined with resistance to impact. Ideally suitable for applications involving rolling, sliding and metal to metal wear. It may also be used as a final overlay on parts which need to be machined or as a build-up layer for other hardfacing materials.

Typical applications include:

Buildup:
Shovel and bucket lips
Pump impellers and housings
Dredge and shovel bucket teeth
Mill and crushing hammers

Hardfacing:

Crane and mine car wheels
Tractor rolls, idlers, links and sprockets
Cable drums
Roller guides



ADDITIONAL INFORMATION

When welding with Wearshield BU-30, DC+ is preferred for most applications, although AC provides satisfactory results too. The bead width should be limited to between 12 - 20mm for all electrode diameters when applying a weaving technique. Narrow stringer beads are preferred for edge and corner buildup.

All work-hardened base material should be removed prior to applying Wearshield BU-30 in order to prevent embrittlement and cracking.

A preheat and interpass temperature of 150-250°C is necessary to prevent cracking, especially on large complex or high restrained components.The component should be completed without interruptions, however, if interruptions are unavoidable the component should be preheated again prior to welding.

The deposited weld metal can be machined to exact dimensions using high speed or carbide cutting tools.

There is no limit to the deposit build-up with this electrode.

Wearshield BU-30 exhibits good resistance to spalling and peeling and moderate resistance to gouging and galling. If gouging is severe then Wearshield Mangjet or Wearshield 15CrMn would be more appropriate because of the higher work hardening effect. If galling is more severe then Wearshield MM or Wearshield MM 40 would be preferred.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	90-130	DC+	62	229	1.3	37.1	44	1.64
4.0 x 350	140-180	DC+	63	338	1.8	54.4	32	1.72
5.0 x 450	180-260	DC+	99	616	2.6	108.8	14	1.54

COMPLEMENTARY PRODUCTS

Lincore® 33

Wearshield® Mangjet (e)

CLASSIFICATION

AWS A5.13	EFeMn-A	**F-Nr**	71
DIN 8555	E7-UM-200-KP		
EN 14700	E Fe9		

GENERAL DESCRIPTION

A low hydrogen hardfacing electrode designed for heavy impact properties
Exhibits excellent arc striking characteristics, clean slag detachability and low spatter
The electrode coating permits out of position welding
140% recovery

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Cr
0.7	15	3.7

STRUCTURE

In the as deposited condition, the microstructure consists of a soft manganese alloy austenite which rapidly work hardens under impact loading.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As deposited	18 HRc (210 HB)
Work hardened	47 HRc (450 HB)

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	450
PE-Tube	**Pieces / unit**	53	24
	Net weight/unit (kg)	2.5	2.5

Identification Imprint: WEARSHIELD Mangjet Tip Color: violet

Wearshield® Mangjet: rev. C-EN24-01/02/16

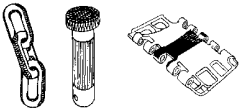
Wearshield® Mangjet (e)

APPLICATION

Wearshield Mangjet produces a 14% Mn deposit that rapidly work hardens under heavy impact and battering. Ideally suited for applications to high impact and gouging coupled with moderate abrasion.

Typical applications include:

Jaw and cone crushers
Heavy rock moving plant
Hammer drills
Crusher screens
Dredge parts
Shovel tracks
Rail crossovers, frogs and switches



ADDITIONAL INFORMATION

When welding with Wearshield Mangjet, DC+ is preferred for most applications especially positional work, although AC and DC - are also satisfactory. The weld width should be limited to 12-20mm for all electrode diameters when employing a weaving technique. Narrow stringer beads are preferred for edge and corner buildup.
All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
No preheat is required on austenitic manganese steels although a preheat of between 150-200°C may be necessary on carbon and low alloy steels to prevent pullout.
It is important to avoid excessive heat build up in the base material. Temperatures above 260°C should be avoided as this can cause embrittlement.
For joint welding of manganese steel Wearshield 15CrMn or Jungo 307 are preferred. Small thickness can be welded with Arosta 307 as well. There is no definite limitation to the number of passes that may be deposited, however, it is good practise to peen each pass immediately after welding to minimise internal stresses and possible distortion and cracking.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Dep. rate H(kg/h)
3.2 x 350	95-105	DC+	1.1
4.0 x 350	130-140	DC+	1.6

COMPLEMENTARY PRODUCTS

Lincore® M
Wire/flux combination : Lincore M / 801 or 802

Wearshield® 15CrMn

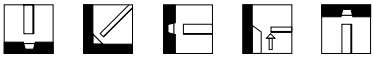
CLASSIFICATION

DIN 8555 E7-UM-250-KP
EN 14700 E Fe9

GENERAL DESCRIPTION

A rutile hardfacing electrode designed for applications of light impact wear, high gouging wear
Easy slag detachability, good arc restriking and low spatter
The electrode coating permits out of position welding
Designed for applications of high impact wear and high gouging wear
Gives moderate abrasion resistance

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr
0.35	14	0.6	15

STRUCTURE

In the as deposited condition, the microstructure consists of a soft manganese alloy austenite which rapidly work hardens under impact loading.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As deposited	18 - 24 HRc (210-250 HB)
Work hardened	40 - 50 HRc (375-490 HB)

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	355	355	455
PE-Tube	**Pieces / unit**	49	33	24
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD 15CrMn Tip Color: none

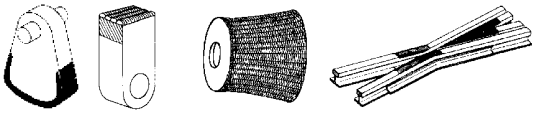
Wearshield® 15CrMn: rev. C-EN24-01/02/16

Wearshield® 15CrMn

APPLICATION

Wearshield 15CrMn produces a premium austenitic chromium-manganese deposit. The term premium is used because the weld metal has sufficient alloy content to produce a single pass austenitic deposit on ordinary carbon steel. The deposit rapidly work hardens under impact making it particularly suitable for applications of high impact and gouging, coupled with moderate abrasion. In addition to surfacing, the high crack resistance of this alloy design makes Wearshield 15CrMn an ideal electrode for joining manganese steel to itself or carbon steels with minimal risk of centreline cracking.

Typical applications include:
Railroad frogs
Track ends
Crusher hammers and screens
Earth moving equipment
Rebuilding of austenitic manganese plates and components
Construction equipment



ADDITIONAL INFORMATION

When welding with Wearshield 15CrMn a short arc or contact drag technique is preferred. The weld width should be limited to 12-20mm for all electrode diameters. Narrow stringer beads are preferred for edge and corner build up.
All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
No preheat is required on austenitic manganese steels although a preheat of between 150-200°C may be necessary on carbon and low steels to prevent heat affected zone cracking.
It is important to avoid excessive heat build up in the base material. High heat input welds and interpass temperatures above 260°C should be avoided as this can cause embrittlement.
There is no definite limitation to the number of passes that may be deposited, however, it is good practise to peen each pass immediately after welding to minimise internal stresses and possible distortion and cracking.
Wearshield 15CrMn deposits workharden rapidly making them difficult to machine. For best results carbide or ceramic cutting tools and rigid tooling should be used. Grinding can also be successfully employed.
For applications involving severe impact and abrasion, a buildup of Wearshield 15CrMn coupled with a single pass of Wearshield 60 or Lincore 60-O should be employed.
The Wearshield 15CrMn deposit can not be cut using the Oxy-fuel process due to the high chromium content, however, plasma arc and air carbon arc processes are appropriately.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	140-160
4.0 x 355	130-140
4.8 x 455	220-250

COMPLEMENTARY PRODUCTS

Lincore® 15CrMn

Wearshield® MM 40

CLASSIFICATION

DIN 8555 E1-UM-400-G*
EN 14700 E Fe1
* Nearest classification

GENERAL DESCRIPTION

An all position rutile/basic coated electrode that produces a machinable martensitic deposit if weld metal is not quenched
Designed for rolling, sliding and metal to metal wear resistance
Good restriking and low spatter
The electrode can be used with the drag or contact welding technique as well as out of position

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Mo
0.2	0.5	1.3	3.4	0.5

STRUCTURE

In the as welded condition the microstructure consists mainly of martensite

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	39-42 HRc (360-400 HB)
2 Layers	40-45 HRc (375-425 HB)
3 Layers	42-45 HRc (400-425 HB)

Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
PE-Tube	**Pieces / unit**	66	43	22
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD MM40 Tip Color: red

Wearshield® MM40: rev. C-EN24-01/02/16

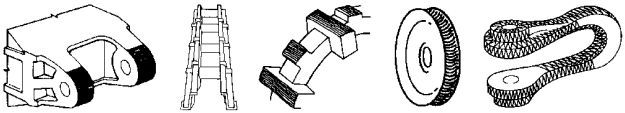
Wearshield® MM 40

APPLICATION

Wearshield MM 40 produces a crack-free wear resistant deposit with a hardness of 42-45 HRc depending on upon material dilution and number of layers. It is particularly suitable for applications involving sliding, rolling and metal to metal wear, combined with resistance to mild abrasion.

Typical applications include:

Buckets links, bucket bases
Guide rolls
Tractor rolls
Crane wheels



ADDITIONAL INFORMATION

When welding with Wearshield MM 40 the bead width should be limited to 12 - 20mm for all electrode diameters when using a weaving technique. For edge and corner build-up narrow stringer beads are preferred.
A preheat between 150-250°C is necessary to prevent cracking in situations of high restraint and/or heavy thicknesses.
The deposited weld metal is machinable, therefore, tempering and annealing are not generally necessary but may be carried out to decrease hardness and increase toughness. Annealing at 760°C for several hours and slow cooling followed by tempering at 520°C will reduce the hardness. This deposit can subsequently be flame hardened or furnace hardened.
The build up is usually limited to 4 layers.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	90-130	DC+	71	175	1.3	36.6	41	1.57
4.0 x 350	140-180	DC+	83	312	1.5	56.6	28	1.61
5.0 x 450	170-220	DC+	108	640	2.5	114.1	13	1.50

COMPLEMENTARY PRODUCTS

Lincore® 40-O

Wearshield® MM

CLASSIFICATION

DIN 8555 E2-UM-55-G*
EN 14700 E Fe2
* Nearest classification

GENERAL DESCRIPTION

An all position rutile/basic coated electrode that produces a non machinable martensitic deposit (only by grinding)
Designed for rolling, sliding and metal to metal wear resistance
Good restriking and low spatter
The electrode can be used with the drag or contact welding technique as well as out of position

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Mo	W
0.55	0.5	1.5	4.5	0.5	0.5

STRUCTURE

In the as welded condition the microstructure consists mainly of martensite with carbides.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	45-55 HRc
2 Layers	52-57 HRc

Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
PE-Tube	**Pieces / unit**	66	45	22
	Net weight/unit (kg)	2.5	2.5	2.5
Linc Pack	**Pieces / unit**	26	18	-
	Net weight/unit (kg)	1.0	1.0	-

Identification Imprint: WEARSHIELD MM Tip Color: purple

Wearshield®MM: rev. C-EN24-01/02/16

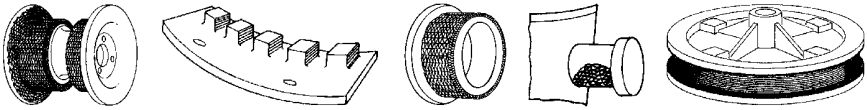
Wearshield® MM

APPLICATION

Wearshield MM produces a crack-free wear resistant deposit with a hardness of 55-57 Rc depending on dilution and number of layers. It is particularly suitable for applications involving sliding, rolling and metal to metal wear, combined with resistance to mild abrasion.

Typical applications include:

Crane and mine car wheels
Sprockets and gear teeth
Skip guides
Dredger buckets
Scrapper blades
Transfer tables
Cable sheaves



ADDITIONAL INFORMATION

When welding with Wearshield MM the bead width should be limited to 12 - 20mm for all electrode diameters when using a weaving technique. For edge and corner buildup narrow stringer beads are preferred.
A preheat between 200-350°C is necessary to prevent cracking with interpass temperatures of up to 400°C in situations of high restraint and/or heavy thicknesses. After welding the component should be covered and slowly cooled.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The deposit can be tempered at about 425°C to toughen the weld metal resulting in a hardness of approximately 50 HRc. Annealing at 760°C for several hours and slow cooling will reduce the hardness to approximately 30 HRc. This deposit can be readily machined. Rehardening is archieved by heating to about 950°C for several hours to dissolve all carbides and homogenise the structure, followed by either water or oil quench (thin sections may be air cooled). After quenching the component should be tempered.
Flame hardening is also possible after annealing, although full hardness may not be archieved due to the inability to homogenize the steel in the short heating cycle.
The build up is usually limited to 4 layers.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	90-130	DC+	75	186	1.2	39.0	42	1.62
4.0 x 350	140-180	DC+	87	343	1.4	55.8	30	1.65
5.0 x 450	170-220	DC+	112	516	2.3	115.2	14	1.62

COMPLEMENTARY PRODUCTS

Lincore® 55

Wearshield® T&D

CLASSIFICATION

AWS A5.13	E Fe6*	**F-Nr**	71
DIN 8555	E4-UM-60-SZ		
EN 14700	E Fe4		

* Nearest classification

GENERAL DESCRIPTION

A basic coated electrode that produces a high speed steel deposit similar to M-1 tool steel
The deposited weld metal is air hardening
Resists metal-to-metal abrasion
Excellent arc characteristics, good restriking, low spatter and weld quality
The electrode coating permits the use of the drag or contact welding technique

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Mo	W	V
0.65	0.4	0.5	4.0	6.5	2.6	1.1

STRUCTURE

In the as welded condition the microstructure consists mainly of martensite with some carbides.

After tempering the microstructure consists of tempered martensite with secondary carbides

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As Welded	58-62 HRc
Tempered at 540-600°C	63-65 HRc

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
PE-Tube	**Pieces / unit**	85	56	35
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD T&D Tip Color: none

Wearshield® T&D: rev. C-EN24-01/02/16

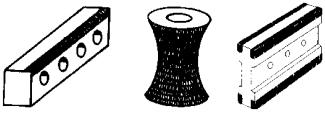
Wearshield® T&D

APPLICATION

Wearshield T&D produces a crack-free wear resistant tool steel deposit with a hardness of 58-62 HRc. This hardness can be further increased to between 63-65HRc after tempering (540-600°C). It is particularly suitable for applications involving severe metal to metal wear coupled with elevated temperatures (up to 540°C). Ideally suited to the buildup of worn steel dies, cutting tools or the applications of wear resistant surfaces to carbon and low alloy steels.

Typical applications include:

Punch and forging dies
Shear blades
Trimmers
Cutting tools



ADDITIONAL INFORMATION

When welding with Wearshield T&D the weld width should be limited to between 12 - 25mm for all electrode diameters when employing a weaving technique. For edge and corner buildup narrow stringer beads are preferred. A preheat and interpass temperature of 325°C, or higher (up to 540°C), is necessary to avoid cracking. It is important to ensure that an adequate "soak" is achieved prior to the welding operation. After welding, the component should be covered and slow cooled down to room temperature. Once cooled, the deposited weldment should be post weld heat treated to temper the martensite and toughen the deposit. Tempering at 540-600°C normally produces the optium combination of hardness and toughness.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
Annealing at 850°C for several hours and slow cooling will reduce the hardness to approximately 30 HRc. This deposit can be readily machined. Rehardening is achieved by heating to about 1200°C for several hours to dissolve all carbides and homogenise the steel, followed by air cooling and tempering (540-600°C).
The deposit thickness is usually limited to 4 layers.
Wearshield T&D cannot be cut by the oxy-fuel processes. Plasma arc and air-carbon arc processes can be used to both cut and gouge the weld deposit. Preheat temperature similar to those for welding may be necessary to prevent cracking along the cut edge.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)
2.5 x 350	80-100
3.2 x 350	110-130
4.0 x 350	130-160

COMPLEMENTARY PRODUCTS

Lincore® T&D

Wearshield® MI (e)

CLASSIFICATION

AWS A5.13	E Fe6
DIN 8555	E6-UM-60-GPS
EN 14700	E Fe6

GENERAL DESCRIPTION

A basic coated electrode that produces a martensitic deposit with a considerable amount of retained austenite
All position welding, except vertical down
Excellent arc characteristics, good restriking, low spatter and weld quality
Designed for applications with impact and metal-to-metal wear

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr
0.5	0.4	1.8	9.0

STRUCTURE

In the as welded condition the microstructure consists of a mixed structure of martensite and austenite.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	45-55 HRc
2 Layers	50-58 HRc

Welded on Mild Steel Plate

PWHT : 4H/480°C / 52HRc

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	450	450
PE-Tube	**Pieces / unit**	117	69	38	25
	Net weight/unit (kg)	2.5	2.5	2.5	2.5

Identification Imprint: WEARSHIELD MI (E) Tip Color: violet

Wearshield® MI (E): rev. C-EN24-01/02/16

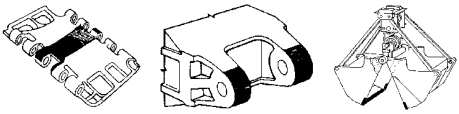
Wearshield® MI (e)

APPLICATION

Wearshield MI produces a wear resistant martensite/austenite deposit with a hardness of 45-58 HRc. It can be used to surface a variety of carbon, carbon manganese and alloy steels. The martensite/austenite deposit makes Wearshield MI particularly suitable for Applications involving impact, metal to metal wear and mild abrasion such as by limestone. This deposit tends to cross check.

Typical applications include:

Dipper lips
Construction equipment
Earth moving equipment
Rock crushers
Hammer mills
Conveyor screws
Ditcher teeth
Agricultural equipment



ADDITIONAL INFORMATION

A preheat and interpass temperature of over 200°C is preferred to help reduce check cracking and avoid chipping and fragmentation.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The Wearshield MI deposit tends to cross check and is therefore usually limited to 2 layers to avoid chipping and fragmentation.
Wearshield MI cannot be cut by the oxy-fuel processes. Plasma arc and air-carbon arc processes can be used to both cut and gouge the weld deposit.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Dep. rate H(kg/h)
2.5 x 350	60-70	0.76
3.2 x 350	70-120	1.1
4.0 x 350	110-150	1.45
5.0 x 450	150-200	2.0

COMPLEMENTARY PRODUCTS

Solid wire LNM 420 FM and flux-cored wire Lincore 420

Wearshield® ABR

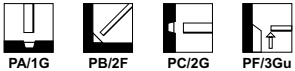
CLASSIFICATION

DIN 8555 : E10-UM-50-GPZ
EN 14700 : E Fe6

GENERAL DESCRIPTION

A graphite coated electrode that produces a primary austenite and austenite-eutectic weld deposit.
Wearshield ABR is the most versatile product within the Wearshield range
Good resistance to both abrasion and impact, as well as hot-forging properties

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Mo
2.1	1.1	0.75	6.5	0.40

STRUCTURE

In the as welded condition the microstructure consists of primary austenite and a eutectic of austenite plus carbides

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	24-53 HRc
2 Layers	28-53 HRc
3 Layers	28-55 HRc

Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	355	355	355
PE-Tube	**Pieces / unit**	85	54	38
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD ABR Tip Color: none

Wearshield® ABR: rev. C-EN23-01/02/16

Wearshield® ABR

APPLICATION

Wearshield ABR produces an abrasion and impact resistant deposit with a hardness of 28-55HRc depending on base metal chemistry, dilution and number of layers. The combination of abrasion and impact resistance coupled with hot forging properties makes Wearshield ABR particularly suitable for applications involving transportation of abrasive media under heavy variable loading. Wearshield ABR is also suitable for metal to metal wear applications.

ADDITIONAL INFORMATION

When welding with Wearshield ABR a short arc should be employed. The weld width should be limited to between 12-20mm for all electrode diameters when employing a weaving technique. For edge and corner build up narrow stringer beads are preferred.
Preheat is not necessary when surfacing austenitic substrates such as stainless and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels. For low alloy and carbon steels a preheat of 200°C is usually sufficient, but is dependent on material thickness and chemistry. For optimum abrasion resistance the interpass temperature should be limited to 320°C.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
To obtain a deposit that can be machined by carbide cutting tools, the component should be heated to 750°C for one hour followed by air cooling to room temperature. For maximum machinability the component should be heated to 875-900°C for one hour, furnace cooled to 650°C at a rate not exceeding 10°C per hour, followed by furnace or air cooling to room temperature. The abrasion resistance can be restored by heating to 800°C, quenching and tempering at 200°C.
The deposit thickness is usually limited to 2 layers.
For applications requiring thicker deposits, an intermediate layer of an austenitic material such as Wearshield 15CrMn should be used and each layer peened to relieve residual stresses.
For maximum resistance to spalling one or more layers of Wearshield 15CrMn should be used as buildup.
There is no flux cored equivalent to Wearshield ABR.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	40 - 150
4.0 x 355	75-200
4.8 x 355	110-250

COMPLEMENTARY PRODUCTS

The closest product is Lincore® 50, however, the deposit varies significantly to Wearshield ABR.

Wearshield® ME (e)

CLASSIFICATION

DIN 8555 E10-UM-60-GRZ
EN 14700 E Fe14

GENERAL DESCRIPTION

A heavily coated rutile electrode that produces a near eutectic mix of chromium carbides and austenite, with limited primary carbides
Weld deposit 170% recovery
Designed for metal to earth application to provide abrasion resistance
The electrode coating permits the use of a light drag or contact welding technique.

WELDING POSITIONS (ISO/ASME)


PA/1G


PB/2F

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Cr	Si
3.0	33.0	1.0

STRUCTURE

In the as welded condition the microstructure consists of a near eutectic mix of chromium carbides and austenite, with limited primary carbides

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	55 HRc
2 Layers	60 HRc

Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
PE-Tube	**Pieces / unit**	37	23	15
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD ME (E) Tip Color: violet

Wearshield® ME (E): rev. C-EN25-01/02/16

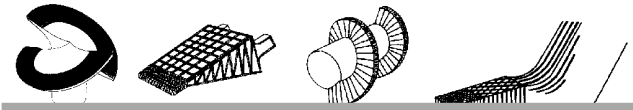
Wearshield® ME (e)

APPLICATION

Wearshield ME produces an abrasion resistant deposit with a hardness range of 55-60HRc.
The intended use of Wearshield ME is to provide a combination of abrasion and impact resistance at service temperatures up to 600°C.

Typical applications include:

Ingot tongs
Scrapper blades
Rolling mill guides
Screw flights
Coal mining chutes
Plough shares, scrapper blades and cultivator sweeps
Pulleys and chain links



ADDITIONAL INFORMATION

When welding with Wearshield ME the weld width should be limited to 20mm. Since wide weaves generally increase the check crack spacing which can result in deposit spalling on multiple layers. For edge, corner and general buildup, narrow stringer beads are preferred.
Wearshield ME generally check cracks except for single layers on thin base material. Stringer beads tend to produce a consistent crack spacing of between 12-25mm.
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels, For low alloy and carbon steels a preheat of 200°C is usually sufficient, but is dependent on base material thickness and chemistry. The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The deposit thickness is usually limited to 2-3 layers to avoid spalling.
To minimise the risk of spalling, stringer beads should be employed to produce closely spaced check cracks.
The resultant weld metal microstructure is determined by the level of dilution and base material chemistry. Low dilution welds on carbon and low alloy steels results in a microstructure that is a near eutectic mix of chromium carbides and austenite, with limited primary carbides. High dilution weld deposit produce a microstructure of primary austenite and eutectic resulting in higher toughness and lower abrasion resistance.
For maximum spalling resistance on carbon and low alloy steels, a buffer layer of Wearshield MM 40 or Arosta 307-160 should be applied prior to the Wearshield ME.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Dep. rate H(kg/h)
3.2 x 450	100-140	DC+	1.15
4.0 x 450	130-190	DC+	1.70
5.0 x 450	160-260	DC+	2.25

COMPLEMENTARY PRODUCTS

There is no flux cored equivalent to Wearshield ME. The closest product is Lincore® 60-O, however, the deposit varies significantly to Wearshield ME.

Wearshield® 60 (e)

CLASSIFICATION

DIN 8555 E10-UM-60-GR
EN 14700 E Fe15

GENERAL DESCRIPTION

A basic coated downhand 200% recovery electrode that produces a primary carbide weld deposit
The electrode coating facilitates easy arc control and arc visibility whilst maintaining a short arc
Designed for severe abrasion applications

WELDING POSITIONS (ISO/ASME)


PA/1G


PB/2F

CURRENT TYPE

AC / DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Cr	Si
5.0	35	4

STRUCTURE

In the as welded condition the microstructure consists of primary chromium carbides in an austenite - carbide eutectic matrix.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	57-60 HRc
2 Layers	60-62 HRc

Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	3.2	4.0	4.0
	Length (mm)	350	450	350	450
PE-Tube	**Pieces / unit**	48	37	32	23
	Net weight/unit (kg)	2.5	2.5	2.5	2.5

Identification Imprint: WEARSHIELD 60 (E) Tip Color: violet

Wearshield®60 (e) rev. C-EN25-01/02/16

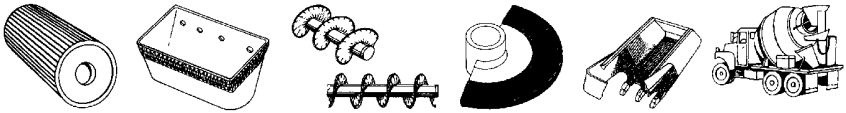
Wearshield® 60 (e)

APPLICATION

Wearshield 60 produces an primary carbide deposit with a hardness range of 60-62 HRc.
The primary carbide microstructure makes Wearshield 60 ideally suitable for applications of severe abrasion

Typical applications include:

Crusher rolls, plates and jaws
Conveyor screws and sleaves
Shovel lips
Brick & coke machinery
Cement mill parts



ADDITIONAL INFORMATION

When welding with Wearshield 60 stringer beads should be employed. Weaving is not advised since wide weaves generally increase the check crack spacing which can result in deposit spalling.
The as-welded deposit readily check cracks.
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels.
The deposited weld metal is not machinable.
The deposit thickness is usually limited to 2 layers.
For applications requiring build-ups in excess of 2 layers, buttering layers of Arosta 307-160, Wearshield BU-30 or Wearshield Mangjet (manganese steels) should be used prior to Wearshield 60. Alternatively, a preheat of 650°C can be used to eliminate the formation of check cracks.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Dep. rate H(kg/h)
3.2 x 450	110-150	DC+	1.75
4.0 x 450	140-180	DC+	2.2

COMPLEMENTARY PRODUCTS

Lincore® 60-O and Lincore® 60-S with flux 801 or 802

Wearshield® 70

CLASSIFICATION

DIN 8555 E10-UM-65-GRZ
EN 14700 E Fe16

GENERAL DESCRIPTION

A highly alloyed basic-graphite coated downhand hardfacing electrode that produces a "premium" carbide weld deposit. Designed for high stress, severe abrasion and and abrasion at elevated temperatures Recovery 240%.

WELDING POSITIONS (ISO/ASME)


PA/1G


PB/2F

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Si	Cr	Mo	Nb	W
4.2	2.7	18	8.5	9.0	7.0

STRUCTURE

The microstructure consists mainly of primary chromium carbides with premium carbides of molybdenum, niobium, tungsten and vanadium in an austenite - carbide eutectic matrix.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
1 Layer	62-67 typical 65 HRc
Welded on Mild Steel Plate	

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
PE-Tube	**Pieces / unit**	28	18	12
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD 70 Tip Color: violet

Wearshield®70 rev. C-EN24-01/02/16

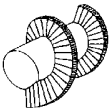
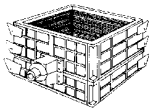
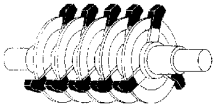
Wearshield® 70

APPLICATION

Wearshield 70 produces a "premium" carbide weld deposit with a hardness range of 62-70HRc.
The premium carbide microstructure makes Wearshield 70 ideally suitable for applications of high stress abrasion (crushing of abrasive particles), severe abrasion and abrasion at elevated temperatures (>760°C)

Typical applications include:

Blast furnace bells (burden area)
Hoppers and screens
Sinter plants
Cement mill parts

ADDITIONAL INFORMATION

When welding with Wearshield 70 stringer beads are preferred, although weld widths up to 50mm by weaving are acceptable. A short welding arc is preferred and the drag technique is not recommended.
In the as welded condition readily check cracks and the spacings between the cracks are small even at slow travel speeds
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels.
The deposited weld metal is not machinable or forgeable.
The deposit thickness is usually limited to 2 layers.
Optimum spalling resistance is achieved using austenitic substrates. For service conditions below 260°C an austenitic manganese substrate is preferred.
For high temperature applications >260°C, an austenitic stainless steel substrate should be used. (i.e. Arosta 307-160)
Wearshield 70 will perform standard primary carbide electrodes (such as Wearshield 60) under either low stress or high temperature abrasion conditions.

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	120 - 160	AC	156	699	1.28	67	18	1.21
4.0 x 350	180 - 220	AC	172	1011	1.50	100	14	1.40
5.0 x 350	230 - 300	AC	194	1630	2.06	155	9	1.39

COMPLEMENTARY PRODUCTS

There is no flux cored equivalent to Wearshield 70. The closest product is Lincore® 65-O, however, the deposit varies significantly to Wearshield 70.

Wearshield® 420

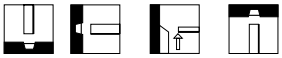
CLASSIFICATION

DIN 8555 E6-UM-55-RZ*
EN 14700 E Fe8

GENERAL DESCRIPTION

Heavily coated electrode that produces a martensitic deposit similar to AISI 420 stainless steel
Designed for abrasion resistance under high corrosion conditions
The electrode coating permits the use of the drag or contact welding technique as well as positional welding if required.

WELDING POSITIONS (ISO/ASME)



PA/1G PC/2G PF/3Gu PE/4G

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Si	Mn	Cr	Mo	V
0.5	0.4	0.3	12.4	0.4	1.3

STRUCTURE

Ferrite and martensite

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Typical hardness values
55 HRc (560HB)

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
PE-Tube	**Pieces / unit**	51	36	22
	Net weight/unit (kg)	2.5	2.5	2.5

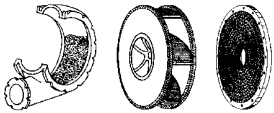
Identification Imprint: WEARSHIELD 420 Tip Color: brown

Wearshield®420 rev. C-EN24-01/02/16

Wearshield® 420

APPLICATION

Wearshield 420 electrodes are intended to provide abrasion resistance under conditions of high corrosion, abrasion and impact.
The electrode can be used on carbon steels, low alloy steel and martensitic steel.
Typical applications include:
Sand pumps
Dredging equipment
Fans
Valve seats in steam and liquid pipes



ADDITIONAL INFORMATION

All work-hardened base material and previously deposited hardfacing material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking. Areas that contain irregularaties such as cracks and deep gouges can be repaired locally using Wearshield BU-30 or Wearshield 15CrMn prior to hardfacing with Wearshield 420. Preheat would be needed if the welding is done over either highly restrained material or martensitic stainless base metal.
A preheat and interpass temperature in the range of 200-300°C can be used depending on the nature of the material to be welded.
Under conditions of low dilution, the microstructure is similar to that of AISI 420 martensitic stainless steel. This structure provides good abrasion resistance under conditions of severe corrosion and high impact. At higher dilutions, when overlaid on mild steel or low alloy steel, the weld metal microstructure will retain its martensitic stainless structure. But the reduced chromium level might adversely affect the corrosion resistance of the deposit.

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter	Welding positions			
(mm)	PA/1G	PC/2F	PF/3Gup	PE/4G
3.2	130A	130A	130A	130A
4.0	160A	160A	160A	150A
5.0	220A		200A	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2 x 350	90 - 130	DC+	88	217	1.2	45.6	33	1.51
4.0 x 350	120 - 170	DC+	114	544	1.4	70.2	23	1.59
5.0 x 450	170 - 270	DC+	193	1187	1.4	109.8	14	1.49

COMPLEMENTARY PRODUCTS

Lincore® 420.

RepTec Cast 1

CLASSIFICATION

AWS A5.15 ENi-CI
ISO 1071 E C Ni-CI

GENERAL DESCRIPTION

Ni-electrode for repair welding of lamellar cast iron, malleable cast iron and cast iron to steel
Produces a soft malleable weld deposit
Hardness weld deposit ~ 175 HB
Preferable welding on DC-, gives pulsed arc welding, deep penetration, smooth surface, no lack of fusion
Welding on AC, lowest heat input, important at filling
Best choice for multilayer welding

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Fe	Ni
0.7	2.0	97

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB10
Required: AWS A5.15		262-414	276-448	3-6	135-218
ISO 1071		200	250	3	
Typical values	AW	270	445	8	175

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	400
PE-Tube	**Pieces / unit**	146	76	44
	Net weight/unit (kg)	2.5	2.5	2.5
Linc Pack	**Pieces / unit**	58	30	-
	Net weight/unit (kg)	1.0	1.0	-

Identification Imprint: REPTEC CAST 1 Tip Color: black

RepTec Cast 1: rev. C-EN24-01/02/16

RepTec Cast 1

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	DIN1691	DIN 1692	DIN 1693
For welding and repair			
	GG-10	GTS-35-10	GGG-40
	GG-15	GTS-45-06	GGG-50
	GG-20	GTS-55-4	GGG-60
	GG-25	GTW-35-04	
	GG-30	GTW-40-05	
	GG-35	GTW-45-07	
		GTW-S-38-12	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	50-100	DC-	176	268	0.24	19.1	84	1.61
3.2 x 350	70-130	DC-	145	303	0.48	32.6	52	1.52
4.0 x 400	90-150	DC-	262	647	0.55	56.7	25	1.41

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter	Welding positions				
(mm)	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	70A	70A	70A	70A	70A
3.2	100A	100A	100A	100A	100A
4.0	120A	120A	120A	110A	110A

REMARKS / APPLICATION ADVICE

Residual stresses are decreased by peening after each layer
Cold welding, interpass temperature (Ti<100°C)
Heavy parts preheat (to max. 300°C)

COMPLEMENTARY PRODUCTS

LNM NiTi
LNT NiTi

RepTec Cast 3

CLASSIFICATION

AWS A5.15 ENiFe-CI
ISO 1071 E C NiFe-CI 1

GENERAL DESCRIPTION

Basic graphite coated stick electrode with nickel iron core for cold welding of cast iron, malleable cast iron and joint welding to steel
Specially developed for good peen- and machinable seams e.g. for thick joints
In order to introduce as little heat into the work piece as possible, it is advisable to weld with DC positive

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G

CURRENT TYPE

AC / DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Fe	Ni
0.6	40	bal.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB10
Required: AWS A5.5		296-434	400-579	6-18	165-218
ISO 1071		250	350	6	
Typical values	AW	300	460	10	175

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
PE-Tube	**Pieces / unit**	155	95	54
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: REPTEC CAST 3 Tip Color: black

RepTec Cast 3: rev. C-EN23-01/02/16

RepTec Cast 3

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	DIN1691	DIN 1692	DIN 1693
For welding and repair			
	GG-10	GTS-35	GGG-40
	GG-15	GTS-45	GGG-50
	GG-20	GTS-55	GGG-60
	GG-25	GTW-35	GGG-70
	GG-30	GTW-40	GGG-80
	GG-35	GTW-45	
	GG-40	GTW-S-38	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy - per electrode at max. current - E(kJ)	Dep. rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	50-70	AC	58	106	0.76	15.9	82	1.3
3.2 x 300	70-90	AC	69	161	1.24	30.8	42	1.3
4.0 x 350	100-120	AC	75	234	1.78	46.2	27	1.2

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	60A	60A	60A	60A	70A
3.2	80A	80A	80A	75A	80A
4.0	110A	110A	110A	105A	110A

REMARKS / APPLICATION ADVICE

Welding of short beads is recommendable.
Peening (with a ball hammer) immediately after welding eliminates shrinkage stresses.
Perlitic cast iron often needs 200°C preheating.

COMPLEMENTARY PRODUCTS

LNM NiFe

RepTec Cast 31

CLASSIFICATION

AWS A5.15 ENiFe-CI
ISO 1071 E C NiFe-CI 1

GENERAL DESCRIPTION

Electrode for repair welding of cast iron, malleable cast iron and cast iron to steel
The nickel-iron weld deposit is easily machineable
Particularly applicable for nodular cast iron
Hardness weld deposit ~ 180 HB
Excellent current carrying capacity due to bi-metal core wire
Welding on AC and DC- polarity
Best choice welding DC -

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC / DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Fe	Ni
0.7	45	bal.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB10
Required: AWS A5.5		296-434	400-579	6-18	165-218
ISO 1071		250	350	6	
Typical values	AW	300	460	10	180

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	400
PE-Tube	**Pieces / unit**	154	82	47
	Net weight/unit (kg)	2.5	2.5	2.5
Linc Pack	**Pieces / unit**	62	33	-
	Net weight/unit (kg)	1.0	1.0	-

Identification Imprint: REPTEC CAST 31 Tip Color: black

RepTec Cast 31: rev. C-EN24-01/02/16

RepTec Cast 31

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	DIN1691	DIN 1692	DIN 1693
For welding and repair			
	GG-10	GTS-35-10	GGG-40
	GG-15	GTS-45-06	GGG-50
	GG-20	GTS-55-4	GGG-60
	GG-25	GTW-35-04	
	GG-30	GTW-40-05	
	GG-35	GTW-45-07	
		GTW-S-38-12	

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 300	70-100	DC-	124	211	0.32	19.1	91	1.72
3.2 x 350	90-150	DC-	123	328	0.62	29.4	47	1.37
4.0 x 400	100-180	DC	168	714	0.74	55.7	30	1.45

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	80A	80A	80A	80A	80A
3.2	110A	110A	110A	110A	110A
4.0	150A	160A	160A	150A	150A

REMARKS / APPLICATION ADVICE

Residual stresses are decreased by peening after each layer
Cold welding, interpass temperature (Ti<100°C)
Heavy parts preheat (to max. 300°C)

COMPLEMENTARY PRODUCTS

LNM NiFe

MIG/MAG WIRES

MIG/MAG WIRES

LNM 25
SupraMig®
SupraMig® CF
SupraMig® HD
SupraMig Ultra®
SupraMig Ultra® HD
UltraMag®
UltraMag® SG3

Diameter, polarity, Shielding gas	CTWD[1] (mm)	Wire Feed Speed (m/min)	Voltage (V)	Approx. Current (A)	Melt-off rate (kg/hr)
0.6 mm, DC+					
Short Circuit Transfer 100% CO_2	9-12	2.5 6.4	17 19	35 80	0.4 0.9
0.8 mm, DC+					
Short Circuit Transfer 100% CO_2	9-12	1.9 3.8 7.6	17 18 22	35 70 130	0.4 0.8 1.6
1.0 mm, DC+					
Short Circuit Transfer 100% CO_2	9-12	2.5 3.8 6.4	18 19 22	80 120 175	0.7 1.1 1.8
Spray Transfer 90% Ar/10% CO^2	12-19	9.5 12.7 15.2	23 29 30	195 230 275	2.7 3.6 4.4
1.2 mm, DC+					
Short Circuit Transfer 100% CO_2[2]	12-19	3.2 3.8 5.1	19 20 21	145 165 200	1.5 1.8 2.5
Spray Transfer 80% Ar/20% CO^2	12-19	8.9 12.1 12.7	27 30 30	285 335 340	4.2 5.7 6.0
1.4 mm, DC+					
Spray Transfer 80% Ar/20% CO^2	12-19	7.6 8.1 12.3	30 30 32	300 320 430	4.8 5.2 7.8
1.6 mm, DC+					
Spray Transfer 80% Ar/20% CO^2	12-25	5.3 6.0 7.4	25 27 28	325 350 430	4.8 5.4 6.7

[1] CTWD (Contact Tip to Work Distance). Subtract 6.4 mm to calculate Electrical Stickout.
[2] Procedures in these areas are procedures for short circuiting mode using 100% CO_2. When using 80% Argon, 20% CO_2 for short circuit transfer, reduce voltage by 1 to 2 volts

LNM 25

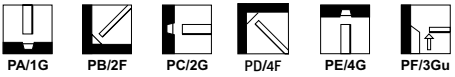
CLASSIFICATION

AWS A5.18	ER70S-3	**A-Nr**	1	**Mat-Nr**	1.5112
EN ISO 14341-A	G 42 4 M 2Si	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid wire for welding general construction in mild steel
High impact values
Stable arc and excellent feedability

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

GMAW

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	CE
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.1	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Typical values	M21	AW	490	544	28	149

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
15 kg spool B300	X	X	X
250 kg Accutrak® Drum			X

Other sizes and packaging on request

LNM 25: rev. C-EN25-01/02/16

UltraMag®

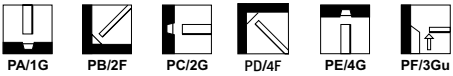
CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5125
EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid wire for semi-automatic and automatic welding applications
Good feedability, consistent welding performance
Very good weldability, stable arc, and low spatter
High productivity

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	CE
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.078	1.4	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	502	574	28		102
	C1	AW	486	570	29	71	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
5 kg plastic spool S200	X		X	
15 kg spool B300			X	X
15 kg spool BS300		X	X	X
15 kg spool S300			X	X
250 kg Accutrak® Drum		X	X	
500 kg Accutrak® Drum		X	X	X

Other sizes and packaging on request

Ultramag® :rev. C-EN26-01/02/16

UltraMag® G4Si1

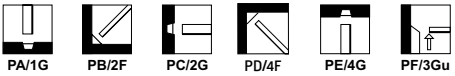
CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5130
EN ISO 14341-A	G 46 5 M 4Si1 / G 46 3 C 4Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Coppered solid wire for semi-automatic and automatic welding applications
Good feedability, consistent welding performance
Very good weldability, stable arc, and low spatter
High productivity

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

ABS	BV	DNV	GL	LR	CE	TÜV
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.70	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Typical values	M21	AW	490	590	27		90
	C1	AW	460	560	25	70	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420, S460
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460, P460, S460ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
15 Kg spool B300	X	X	X	X
15 Kg spool BS300	X	X	X	X
15 kg spool S300	X	X	X	X
250 kg Accutrak® Drum	X	X	X	
500 kg Accutrak® Drum	X	X	X	X

Other sizes and packaging on request

Ultramag® G4Si1 :rev. C-EN26-01/02/16

SupraMig®

CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5125
EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid wire for welding of structural steels
Excellent feedability and very consistent welding performance
No adjustments of welding parameters
Tight and stable arc with extremely low spatter
Better bead profile and appearance
Ultimate GMAW wire for robotics and hard automation
Also provided in Accutrak®

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	DB	CE
+	+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.40	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	502	574	28		102
	C1	AW	486	570	29	71	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
15 Kg spool B300	X	X		X
15 kg spool S300	X	X	X	X
250 kg Accutrak® Drum	X	X	X	X
500 kg Accutrak® Drum		X	X	X

Other sizes and packaging on request

Supramig® :rev. C-EN26-01/02/16

SupraMig® CF

CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5125
EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Uncoppered solid wire for welding of structural steels
Excellent feedability and very consistent welding performance
No adjustments of welding parameters
Tight and stable arc with extremely low spatter
Better bead profile and appearance
Ultimate GMAW wire for robotics and hard automation
Also provided in Accutrak®

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	DB	CE
+	+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.40	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	502	574	28		102
	C1	AW	486	570	29	71	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
15 Kg spool B300	X	X	X	X
15 Kg spool BS300		X	X	
15 kg spool S300	X	X	X	
250 kg Accutrak® Drum	X	X	X	X
500 kg Accutrak® Drum		X	X	X

Supramig® CF : rev. C-EN01-01/02/16

SupraMig® HD

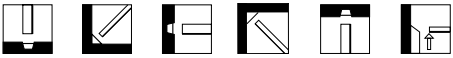
CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5125
EN ISO 14341-A	G 46 4 M 3Si1 / G 42 3 C 3Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid wire for welding of structural steels
Excellent feedability and very consistent welding performance
Self releasing silicate islands
Tight and stable arc with extremely low spatter
Deep root penetration and improved fatigue life
Ultimate GMAW wire for heavy duty high deposition applications

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	CE	DB
+	+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.40	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	502	574	28		102
	C1	AW	486	570	29	71	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
15 Kg spool B300	X	X	X	X
15 Kg spool BS300	X	X	X	X
15 kg spool S300	X	X	X	X
250 kg Accutrak® Drum	X	X	X	
500 kg Accutrak® Drum	X	X	X	X

Other sizes and packaging on request

Supramig® HD :rev. C-EN04-01/02/16

SupraMig Ultra®

CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5130
EN ISO 14341-A	G 50 5 M 4Si1 / G 46 3 C 4Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid wire with increased manganese for semi-automatic welding and robotic applications
Excellent feedability and very consistent welding performance
Tight and stable arc with extremely low spatter
Also provided in Accutrak® drum

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

GMAW

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	CE
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.70	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C
Typical values	M21	AW	500	650	26	80	80	70
	C1	AW	490	620	30	60	50	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420, S460
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460, P460, S460ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0
15 Kg spool B300	X	X
15 Kg spool BS300		X
15 kg spool S300		X
250 kg Accutrak® Drum	X	X
500 kg Accutrak® Drum		X

Supramig® Ultra: rev. C-EN26-01/02/16

SupraMig Ultra® CF

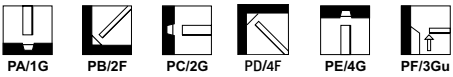
CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5130
EN ISO 14341-A	G 50 5 M 4Si1 / G 46 3 C 4Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Uncoppered solid wire with increased manganese for semi-automatic welding and robotic applications
Excellent feedability and very consistent welding performance
Tight and stable arc with extremely low spatter
Also provided in Accutrak® drum

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

ABS	BV	DNV	GL	LR	TÜV	CE
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.70	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	500	650	26	80	80
	C1	AW	490	620	30	60	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420, S460
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460, P460, S460ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0
15 Kg spool B300	X	X
15 Kg spool BS300		X
15 kg spool S300		X
250 kg Accutrak® Drum	X	X
500 kg Accutrak® Drum		X

Other sizes and packaging on request

Supramig® Ultra CF: rev. C-EN01-01/02/16

SupraMig Ultra® HD

CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5130
EN ISO 14341-A	G 50 5 M 4Si1 / G 46 3 C 4Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid wire with increased manganese for semi-automatic welding and robotic applications
Excellent feedability and very consistent welding performance
Good weld bead aspect
Tight and stable arc with extremely low spatter
Ultimate GMAW wire for heavy duty high deposition applications

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

GMAW

APPROVALS

ABS	BV	DNV	GL	LR	CE	TÜV
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.70	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	500	650	26	80	80
	C1	AW	490	620	30	60	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420, S460
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460, P460, S460ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.4	1.6
15 Kg spool B300	X		X
15 Kg spool BS300	X		
15 kg spool S300	X	X	X
250 kg Accutrak® Drum	X	X	X
500 kg Accutrak® Drum	X	X	X

Other sizes and packaging on request

Supramig® Ultra HD: rev. C-EN02-01/02/16

LNM 28

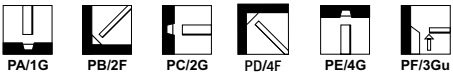
CLASSIFICATION

AWS A5.28	ER80S-G	**A-Nr**	10
EN ISO 16834-A	G Z Mn3 Ni1 Cu*	**F-Nr**	6
* Nearest classification		**9606 FM**	2

GENERAL DESCRIPTION

Solid wire special for welding of weather resisting steels
Contains a small percentage of copper to help preventing further oxidation of the weld bead

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cu
0.1	1.4	0.75	0.8	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -40°C
Typical values	M21	AW	570	620	26	90	70

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Weather resisting steels	EN 10155	S 235 J 0 W S 235 J 2 W S 355 J 0 W S 355 J 2 W S 355 K 2 G 1 W

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 Kg spool B300	X	X

Other sizes and packaging on request

LNM 28: rev. C-EN23-01/02/16

LNM MoNi

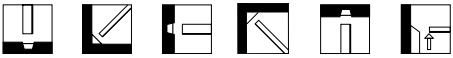
CLASSIFICATION

AWS A5.28	ER100S-G	**A-Nr**	12
EN ISO 16834-A	G 62 4 M Mn3NiCrMo	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Solid wire for welding high strength steels with a yield up to 620 Mpa
Good impact values at -40 °C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo	Cu
0.10	1.65	0.75	0.55	0.60	0.30	0.08

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-60°C
Typical values	M21	AW	635	770	19	100	90	70

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Pipe material	API-5LX	X65, X70, X80
	EN 10208-2	L480, L550
Fine grained steels	EN 10025 part 6	S460, S500, S550, S620 S690
		S620Gl1, S600MC, TstE620, Weldox 500, Hardox

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 Kg spool B300	X	X

Other sizes and packaging on request

LNM MoNi rev. C-EN24-01/02/16

LNM MoNiVa

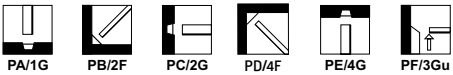
CLASSIFICATION

AWS A5.28	ER110S-G	**A-Nr**	12
EN ISO 16834-A	G 69 4 M Mn3Ni1CrM	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Solid wire for welding high strength steels with yield strength up to 690 N/mm²
Good impact values at -40°C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2

GMAW

APPROVALS

ABS	DB	TÜV	CE
+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo	V	Cu
0.08	1.7	0.44	1.35	0.23	0.3	0.08	0.25

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Typical values	M21	AW	710	790	20	70

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Pipe material	API-5LX	X65, X70, X80
	EN 10208-2	L480, L550
Fine grained steels	EN 10025 part 6	S460, S500, S550, S620 S690
		S620Gl1, S600MC, TstE620, Weldox 500, Hardox

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
15 Kg spool B300	X	X	X

Other sizes and packaging on request

LNM MoNiVa rev. C-EN27-21/04/16

LNM MoNiCr

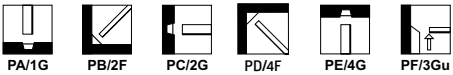
CLASSIFICATION

AWS A5.28	ER120S-G	**A-Nr**	12
EN ISO 16834-A	G 89 4 M Mn4Ni2CrMo	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Solid wire for welding high strength steels with yield strength up to 890MPa
Can be used as well as for welding grade S960 (undermatching)
Good impact toughness value down to -60°C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO_2

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo
0.09	1.8	0.80	2.20	0.30	0.55

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -60°C
Typical values	M21	AW	>890	950	>15	70	>50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Fine grained steels	EN 10025 part 6 S960 (undermatching)	S890

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 Kg spool B300	X

Other sizes and packaging on request

LNM MoNiCr : rev. C-EN06-01/02/16

LNM Ni1

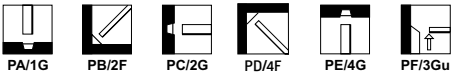
CLASSIFICATION

AWS A5.28	ER80S-Ni1	**A-Nr**	10
EN ISO 14341-A	G 46 5 M 3Ni1	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Solid wire for welding fine grained and low alloy nickel steels
High impact value at low temperature (-60°C)
Typical offshore applications
Stable arc and excellent feedability

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO_2

GMAW

APPROVALS

DB	TÜV
+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni
0.09	1.2	0.6	0.9

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C
Typical values	M21	AW	480	580	30	60

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S275, S355
Ship plates	ASTM A131	ASTM A131
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L290 GA, L360GA
	EN 10208-2	L290, L360, L415
	API 5LX	X42, X46, X52, X60, X65
	EN 10216-1	P275T1
	EN 10217-1	P275 T2, P355 N
Fine grained steels	EN 10025 part 3/4	S275, S355, S420, S460
	EN 10028	P355NL-1, P460NL-1

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
5 kg plastic spool S200	X	
15 Kg spool B300	X	X

Other sizes and packaging on request

LNM Ni1 :rev. C-EN27-01/02/16

LNM Ni2.5

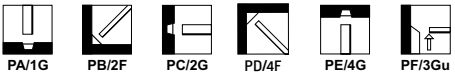
CLASSIFICATION

AWS A5.28	ER80S-Ni2	**A-Nr**	10
EN ISO 14341-A	G 46 6 M 2Ni2	**F-Nr**	6
		9606 FM	1/2

GENERAL DESCRIPTION

Solid wire for welding fine grained and low alloy nickel steels
High impact value at low temperature (-60°C as welded and -90°C after stress relieving 15h/580°C).
Typical offshore applications

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2

GMAW

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	**Mn**	**Si**	**Ni**
0.1	1.1	0.55	2.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C
Typical values	M21	AW	490	580	24	85

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	**Standard**	**Type**
General structural steels	EN 10025	S355
Pipe material	API-5LX	X52, X56, X60, X65
	EN 10208-2	L360, L415, L445
Fine grained steels	EN 10025 part 3/4	S355, S420, S460
Low temperature steels	EN 10028-4	11 MnNi 5-3, 13 MnNi 6-3, 15 NiMn 6 (12 Ni 14 G 1, G 2)
	EN 10222-3	13 MnNi 6-3, 15 NiMn 6

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.0**	**1.2**
15 Kg spool B300	X	X

Other sizes and packaging on request

LNM Ni2.5: rev. C-EN25-01/02/16

LNM 12

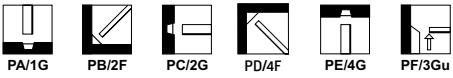
CLASSIFICATION

AWS A5.28	ER70S-A1	**A-Nr**	2	**Mat-Nr**	1.5424
EN ISO 14341-A	G 46 3 M 2Mo	**F-Nr**	6		
		9606 FM	1/3		

GENERAL DESCRIPTION

Solid wire for welding creep resistant 0.5%Mo steels and Fine grained steels for low temperature applications in the as welded condition with service temperatures in range -30°C to +500°C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Mo
0.1	1.12	0.6	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Typical values	M21	AW	503	606	24	130	74

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Elevated temperature steel	EN 10028-2	P295 G H, P355 G H, 16 Mo 2
EN 10222-2	17 Mo 3, 14 Mo 6	
Fine grained steels	EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460	

APPLICATION ADVICE

Preheating welding joint acc.EN 1011-1
Stress relieving 580-650°C if necessary

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
15 Kg spool B300	X	X	X

Other sizes and packaging on request

LNM 12:rev. C-EN26-01/02/16

LNM 19

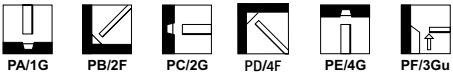
CLASSIFICATION

AWS A5.28	ER80S-B2*	**A-Nr**	3	**Mat-Nr**	1.7339
ISO 21952-A	G CrMo1Si	**F-Nr**	6		
* Nearest classification		**9606 FM**	3		

GENERAL DESCRIPTION

Solid wire for welding creep and hydrogen resistant Cr-Mo steels (1,25Cr - 0,5Mo)
Service temperature up to 550°C

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2 Mixed gas
M13	Mixed gas Ar+ >5-25% CO_2

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	**Mn**	**Si**	**Cr**	**Mo**
0.1	1.0	0.5	1.2	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	**Condition**	**Yield strength (N/mm²)**	**Tensile strength (N/mm²)**	**Elongation (%)**	**Impact ISO-V(J) +20°C**
Typical values	M21	PWHT 700°C/1h	530	635	23	160

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	**Standard**	**Type**
Elevated temperature steel	EN 10028-2	13 CrMo4-5
EN 10083-1	25 CrMo 4	
EN 10222-2	14 CrMo 4-5	
Tool steel	DIN 17210	16 MnCr 5

APPLICATION ADVICE

Preheating welding joint acc.EN 1011-1,200-250°C
Post weld heat treatment at 660-700°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.0**	**1.2**
15 Kg spool B300	X	X

Other sizes and packaging on request

LNM 19 rev. C-EN26-01/02/16

LNM 20

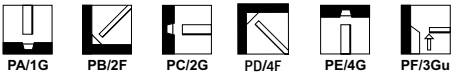
CLASSIFICATION

AWS A5.28	ER90S-B3*	**A-Nr**	4	**Mat-Nr**	1.7384
ISO 21952-A	G CrMo2Si	**F-Nr**	6		
* Nearest classification		**9606 FM**	3		

GENERAL DESCRIPTION

Solid wire for welding creep and hydrogen resistant Cr-Mo steels (2,25Cr - 1Mo)
Service temperature up to 600°C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2
M13	Mixed gas Ar+ >0-3% CO_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Mo
0.08	0.9	0.6	2.5	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	M21	PWHT 690°C/1h	560	680	20	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Creep and hydrogen resistant steels	EN 10028-2	10CrMo 9-10
EN 10222-2	12CrMo 9-10Inm 304l	

APPLICATION ADVICE

Preheating welding joint acc. EN 1011-1, 200-250°C
Post weld heat treatment at 690-740°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 Kg spool B300	X	X

Other sizes and packaging on request

LNM 20 rev. C-EN26-01/02/16

LNM 304LSi

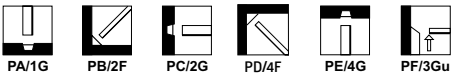
CLASSIFICATION

AWS A5.9	ER308LSi	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 14343-A	G 19 9 L Si	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire with extra low carbon for welding austenitic CrNi-steels
With increased silicon for improved wettability

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.02	1.9	0.8	20	10	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -196°C
Typical values	M12	AW	394	568	40	85	41

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19-11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
5 kg plastic spool S200	X	X	X
15 kg spool BS300	X	X	X
250 kg Accutrak® Drum			X

Other sizes and packaging on request

LNM 304LSi: rev. C-EN24-01/02/16

LNM 304L

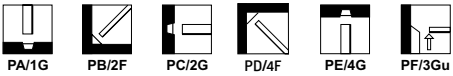
CLASSIFICATION

AWS A5.9	ER308L	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 14343-A	G 19 9 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire with extra low carbon for welding austenitic CrNi-steels
High resistance to intergranular corrosion and oxidizing environments

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.01	1.6	0.4	20	10	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	M12	AW	390	590	35	120	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19-11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 304L: rev. C-EN24-01/02/16

LNM 347Si

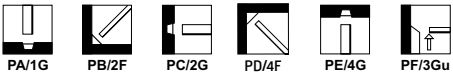
CLASSIFICATION

AWS A5.9	ER347Si	**A-Nr**	8	**Mat-Nr**	1.4551
ISO 14343-A	G 19 9 NbSi	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding Ti or Nb stabilized stainless CrNi-steels
High resistance to intergranular corrosion and oxidizing environments

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

APPROVALS

TÜV	DB
+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Nb
0.05	1.4	0.7	19.2	9.9	0.1	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	M12	AW	460	650	35	100	40

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-,Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347h	S34709
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710
Non stabilized					
				302	
	X4CrNi18-10		1.4301	(TP)304	S30400
	X2CrNi19-11		1.4306	(TP)304L	S30403
		GX5 CrNi 19-10	1.4308	CF-8	J92600
			1.4312		
				(TP)304H	S30409

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
15 kg spool BS300	X	X	X

Other sizes and packaging on request

LNM 347Si :rev. C-EN23-01/02/16

LNM 316LSi

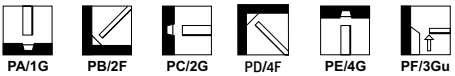
CLASSIFICATION

AWS A5.9	ER316LSi	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 14343-A	G 19 12 3 LSi	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire with extra low carbon for welding stainless CrNiMo-steels
See also LNM 316L, high silicon for improved wettability

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

APPROVALS

ABS	BV	DNV	GL	LR	TÜV
+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.01	1.8	0.8	18.5	12.2	2.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -120°C	Impact ISO-V(J) -196°C
Typical values	M12	AW	452	580	30	150	70	44

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
	GX5CrNiMo19-11		1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316 Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316 Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	Other sizes and packaging on request
5 kg plastic spool S200	X	X		
15 kg spool BS300	X	X	X	

LNM 316LSi: rev. C-EN24-01/02/16

LNM 318Si

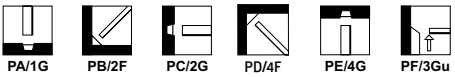
CLASSIFICATION

AWS A5.9	ER318*	**A-Nr**	8	**Mat-Nr**	1.4576
ISO 14343-A	G 19 12 3 NbSi	**F-Nr**	6		
* Nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

Solid wire for welding Ti or Nb stabilized stainless CrNiMo-steels
High resistance to intergranular corrosion and general corrosion conditions

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**Nb**
0.05	1.4	0.7	18.6	11.7	2.5	0.7

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	**Condition**	**0.2% proof strength (N/mm²)**	**Tensile strength (N/mm²)**	**Elongation (%)**	**Impact ISO-V(J) +20°C**
Typical values	M12	AW	410	630	35	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	**EN 10088-1/-2**	**EN 10213-4**	**Mat. Nr**	**ASTM/ACI A240/A312/A351**	**UNS**
Extra low carbon (C < 0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		G-X5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316 Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		G-X5CrNiNb 19-10	1.4552	Cf-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.0**	**1.2**
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 318Si: rev. C-EN23-01/02/16

LNM 4439Mn

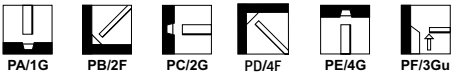
CLASSIFICATION

		A-Nr	9*	**Mat-Nr**	1.4453
ISO 14343-A	G 18 16 5 N L*	**F-Nr**	6*		
* Nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

Solid wire for welding AISI 317L, 317LN or equivalent stainless steels
For welding 316L if increased molybdenum content is important
High resistance to pitting, intergranular and stress corrosion
Fully austenitic weld metal

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.01	5.2	0.4	19	17	4.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	M12	AW	400	600	30	70	32

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Fully austenitic CrNiMo corrosion resistant steels					
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429	(TP)316LN	S31653
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMo18-15-4		1.4438	317L	S31725
	X2CrNiMoN17-13-5		1.4439	317LN	S31726
	G-X2CrNiMoN17-13-4	G-X2CrNiMo17-13-4	1.4446		
	G-X6CrNiMo17-13	G-X6CrNiMo17-13	1.4448		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool BS300	X

Other sizes and packaging on request

LNM 4439Mn: rev. C-EN24-01/02/16

LNM 4455

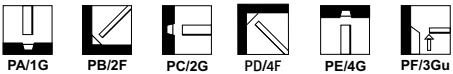
CLASSIFICATION

AWS A5.9	ER316LMn	**A-Nr**	9*	**Mat-Nr**	1.4455
ISO 14343-A	G 20 16 3 Mn L	**F-Nr**	6*		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding fully austenitic CrNiMnMo stainless steels and low temperature steels
Not susceptible for hot cracking

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.015	7	0.4	20	16	3.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -196°C
Typical values	M12	AW	400	600	30	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
N-alloyed stainless CrNi-and CrNiMo steels					
	EN 10088-1/-2	X2CrNiN18-10	1.4311	(TP)304LN	S30453
		X2CrNiMoN17-11-2	1.4406	(TP)316LN	S31653
		X2CrNiMoN17-13-3	1.4429		
		X2CrNiMoN17-13-5	1.4439	317LN	S31726
Austenitic anti-magnetic steels					
	SEW 390	X2CrNiMoN22-15	1.3951		
		X2CrNiMoN18-14-3	1.3952		
		X2CrNiMo18-15	1.3953		
		X8CrMnNi18-8	1.3965		
Low temperature steels					
	SEW 685	G-X6CrNi18-10	1.6902		
		G-X5CrNiNb18-10	1.6905		
	EN 10028-4	12 Ni 14	1.5637		
		X12Ni5	1.5680		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 4455: rev. C-EN22-01/02/16

LNM 4362

CLASSIFICATION

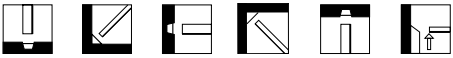
No EN or AWS standard

A-Nr	9*	**Mat-Nr**	1.4362
F-Nr	6*		
9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding Lean Duplex stainless steels
Corrosion resistance is equal to 316L in most applications

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.01	1.4	0.6	23	7	0.3	0.14

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Typical values	M12	AW	525	710	25	170	150

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
Duplex stainless steels	X2CrNiMoN21-5-1	1.4162	S32101
	X2CrNiN23-4	1.4362	S32304

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
15 kg spool BS300	X

Other sizes and packaging on request

LNM 4362 : rev. C-EN05-01/02/16

LNM 4462

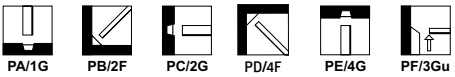
CLASSIFICATION

AWS A5.9	ER2209	**A-Nr**	8	**Mat-Nr**	1.4462
ISO 14343-A	G 22 9 3 N L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding duplex stainless steels
High resistance to general corrosion, pitting and stress corrosion conditions

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

APPROVALS

BV	GL	TÜV
2209	4462S	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.01	1.3	0.5	23	8.5	3.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -46°C
Typical values	M12	AW	621	803	29	110	40

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
Duplex stainless steels			
	X2CrNiMoN22-5-3	1.4462	S31803
		1.4417	S31500
	X2CrNiN23-4	1.4362	S32304
	X3CrNiMoN27-5-2	1.4460	S31200
	X2CrNiMoN21-5-1	1.4162	S32101

Dissimilar joints such as un- and low alloy steel to duplex stainless steel

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	0.9	1.2	1.6
15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

LNM 4462: rev. C-EN25-12/05/16

LNM 4500

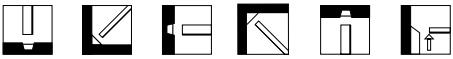
CLASSIFICATION

AWS A5.9	ER385	**A-Nr**	9	**Mat-Nr**	1.4519
ISO 14343-A	G 20 25 5 Cu L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding of fully austenitic steels of type 20%Cr / 25%Ni / 4.5%Mo / 1.5%Cu
Highly corrosion resistant in sulphuric and phosphoric acid

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**Cu**
0.01	1.7	0.3	20	25	4.4	1.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	**Condition**	**0.2% proof strength (N/mm²)**	**Tensile strength (N/mm²)**	**Elongation (%)**	**Impact ISO-V(J) +20°C**
Typical values	M12	AW	350	610	35	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	**EN 10088-1/-2**	**EN 10213-4**	**Mat. Nr**
Fully austenitic NiCrMoCu and CrNiMoCu steels			
		G-X7NiCrMoCuNb25-20	1.4500
	X5NiCrMoCuTi20-18		1.4506
		G-X2NiCrMoCuN20-18	1.4531
		G-X2NiCrMoCuN25-20	1.4536
	X1NiCrMoCuN25-20-5		1.4539
		G-X7CrNiMoCuNb18-18	1.4585
	X5NiCrMoCuNb22-18		1.4586

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool BS300	X

Other sizes and packaging on request

LNM 4500 rev. C-EN23-01/02/16

LNM 2507

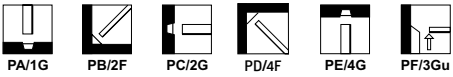
CLASSIFICATION

AWS A5.9	ER2594	**A-Nr**	8
ISO 14343-A	G 25 9 4 N L	**F-Nr**	6
		9606 FM	5

GENERAL DESCRIPTION

The Superduplex 2507 is used when good corrosion resistance, stress corrosion cracking and pitting corrosion are a concern. It is used for welding austenitic-ferrritic stainless alloys of the 25%Cr 7%Ni 4%Mo low-C types.

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Cu	Nb	P	S	V	W	N
0.03	2.5	1.0	24.0-27.0	8.0-10.5	2.5-4.5	0.05	0.03	0.03	0.02	0.1	1.0	0.20-0.30

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Typical values	M12	AW	650	850	23	55

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	ASTM	UNS
25%Cr Superduplex		
	A182 F53, F55	S32750, S32760
	BS EN 10088-2 X2CrNiMoN25-7-4 (1.4410)	
	SAF 2507(Sandvik/Avesta)	
	Uranus 47N(CLI)	
Casting		
	A890 Gr5A, 6A	J93404
	ACI CE3MN	

APPLICATION ADVICE

Offshore Oil/Gas, chemical and petrochemical process industries, pipework systems, flowlines, paper industry, manifolds, etc. Preheat is not generally required. Interpass temperature 150º max is recommended. Heat input in the range 1.0-2.0KJ/mm, depending on material thickness should be acceptable but most codes restrict the max to 1.5 or 1.75kJ/mm.

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0
15 kg spool B300	X

Other sizes and packaging on request

LNM 2507: rev. C-EN01-01/02/16

LNM 309LSi

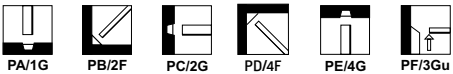
CLASSIFICATION

AWS A5.9	ER309LSi	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 14343-A	G 23 12 LSi	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding stainless steel to carbon steel
With high silicon for improved wettability

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

APPROVALS

ABS	BV	DB	DNV	GL	LR	TÜV
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.02	1.8	0.8	23.3	13.8	0.14

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) +20°C
Typical values	M12	AW	436	582	37	80	87

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to stainless steel)
Build-up welding on mild and low alloy steel

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X
250 kg Accutrak® Drum		X	X	

Other sizes and packaging on request

LNM 309LSi: rev. C-EN22-01/02/16

LNM 307

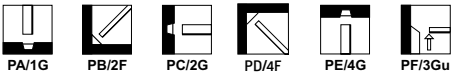
CLASSIFICATION

AWS A5.9	ER307*	**A-Nr**	8	**Mat-Nr**	1.4370
ISO 14343-A	G 18 8 Mn	**F-Nr**	6		
* Nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

Solid wire for welding austenitic and ferritic stainless steels with difficult weldability
Often used as a buffer layer for hardfacing applications

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni
0.07	7.1	0.8	18.6	8.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	M12	AW	400	630	40	80

EXAMPLES OF MATERIALS TO BE WELDED

Various steel grades, such as:
- Armour plate
- Hardenable steels including steels difficult to weld
- Non-magnetic steels
- Work hardening austenitic manganese steels
- Dissimilar joints (CMn-steels to stainless steels)
- Exhaust systems

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
15 kg spool BS300	X	X	X
250 kg Accutrak® Drum			X

Other sizes and packaging on request

LNM 307 rev. C-EN23-01/02/16

LNM 304H

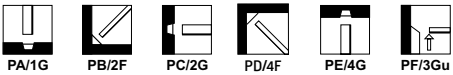
CLASSIFICATION

AWS A5.9	ER308H	**A-Nr**	8	**Mat-Nr**	1.4948
ISO 14343-A	G 19 9 H	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding austenitic CrNi-steels
Especially for high temperature applications (up to 730°C)
Low sensitivity to precipitation of intermetallic phases

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.07	1.9	0.4	20	9.2	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	M12	AW	370	590	34

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Medium carbon (C > 0.03%)					302
	X4CrNi18-10		1.4301	(TP)304	S30400
				(TP)304H	S30409
		G-X5CrNi19-10	1.4308	CF 8	J92600
			1.4948		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 304H :rev. C-EN23-01/02/16

LNM 309H

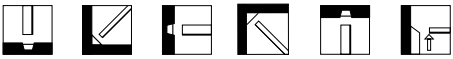
CLASSIFICATION

AWS A5.9	ER309	**A-Nr**	8	**Mat-Nr**	1.4829
		F-Nr	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for high temperature applications like industrial furnaces
High resistance to oxidation up to 1050°C
High carbon content

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.08	1.8	0.4	23.6	13.2	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	M12	AW	400	640	35	110

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
		G-X30CrSi6	1.4710		
	X10CrAl7		1.4713	502	
	X10CrAl13		1.4724	410/414-TP405-CA15	
		G-X40CrSi13	1.4729		
		G-X40CrSi17	1.4740		
	X10CrAl18		1.4742	430-TP430-CB30	
	X10CrAl24		1.4762	TP443	
		G25CrNiSi18-9	1.4825		J92502
		G-X40CrNiSi22-9			
	X15CrNiSi20-12		1.4828	TP309	S30900
		G-X25CrNiSi20-14	1.4832		
	X12CrNiTi18-9		1.4878		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 309H: rev. C-EN22-01/02/16

LNM 310

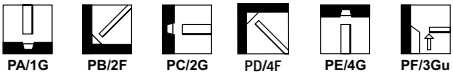
CLASSIFICATION

AWS A5.9	ER310	**A-Nr**	9	**Mat-Nr**	1.4812
ISO 14343-A	G 25 20	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding heat resistant Cr- and CrNi-steels (25%Cr-20%Ni)
High resistance to oxidation and scaling up to approx. 1100°C

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.1	1.7	0.45	26	21	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	M12	AW	355	610	35	110

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
	X10CrAl24		1.4762		
		G-X25CrNiSi18-9	1.4825		
		G-X40CrNiSi22-9	1.4826		
	X15CrNiSi20-12		1.4828		
		G-X25CrNiSi20-14	1.4832		
	X15CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12CrNi25-21		1.4845		
		G-X40CrNiSi 25-20	1.4848	HK40	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 310: rev. C-EN23-01/02/16

LNM 312

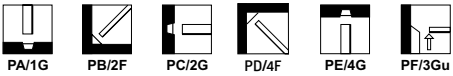
CLASSIFICATION

AWS A5.9	ER312	**A-Nr**	8	**Mat-Nr**	1.4337
ISO 14343-A	G 29 9	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding heat resistant Cr- and CrNi-steels (25%Cr-20%Ni)
High resistance to oxidation and scaling up to approx. 1100°C

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO_2
M13	Mixed gas Ar+ 0.5-3% O_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni
0.1	1.8	0.4	30.7	8.9

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	M12	AW	355	610	35	110

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
	X10CrAl24		1.4762		
		G-X25CrNiSi18-9	1.4825		
		G-X40CrNiSi22-9	1.4826		
	X15CrNiSi20-12		1.4828		
		G-X25CrNiSi20-14	1.4832		
	X15CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12CrNi25-21		1.4845		
		G-X40CrNiSi 25-20	1.4848	HK40	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM 312: rev. C-EN02-01/02/16

LNM NiCro 31/27

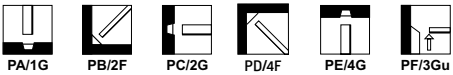
CLASSIFICATION

AWS A5.9	ER383	**A-Nr**	9	**Mat-Nr**	1.4563
ISO 14343-A	G 27 31 4 Cu L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid wire for welding of Cu-alloyed NiCrMo-steels
Excellent resistance to general corrosion, pitting and stress corrosion in acid and alkaline environments
Especially for applications in phosphoric and sulphuric acid

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo	Cu
0.01	1.6	1.0	31	27	3.5	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	440	640	38	100	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/2	Mat. Nr	ASTM/ACI	UNS
Copper alloy CrNiMo and NiCrMo-steels				
	X1NiCrMoCu31-27-4	1.4563		N08028
	X1NiCrMoCu25-20-5	1.4539	Alloy 904L	N08904
	DIN 17744			
	NiCr 21 Mo	2.4858	Alloy 825	N08825
	NiCr 21 Mo 6Cu	2.6410	Alloy 825 h Mo	N08821
	X3NiCrCuMoTi27-23	1.4503		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
15 kg spool BS300	X

Other sizes and packaging on request

LNM NiCro 31/27: rev. C-EN23-01/02/16

LNM NiCro 60/20

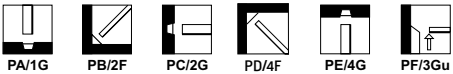
CLASSIFICATION

AWS A5.14	ERNiCrMo-3	**A-Nr**	-	**Mat-Nr**	2.4831
ISO 18274	S Ni 6625 (NiCr22Mo9Nb)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Solid wire for welding of nickel alloys
Extreme resistance to various corrosion forms
High chromium and molybdenum content

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo	Nb	Fe
0.02	0.06	0.07	64	21.9	9	3.5	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	520	770	34	80	60

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	DIN/EN	Mat. Nr	ASTM/ACI	UNS
NiCrMo-steel Type alloy 625 and welding dissimilar high NiCrMo-steels for corrosion and heat resisting purposes				
	X1NiCrMoCuN25-20-6	1.4529	Alloy 925	N08925
	X1NiCrMoCu25-20-5	1.4539	Alloy 904L	N08904
	X1CrNiMoCuN20-18-7	1.4547	Alloy 254	S31254
	X2NiCrAlTi32-20	1.4558	Alloy 800L	N08800
	G-X10NiCrNb32-20	1.4859		
	X10NiCrAlTi32-20	1.4876	Alloy 800/800H	N08800/-10
	NiCr22Mo6Cu	2.4618	Alloy G	N06007
	NiCr22Mo7Cu	2.4619	Alloy G-3	N06985
	NiCr21Mo6Cu	2.4641	Alloy 825hMo	N08821
	NiCr20CuMo	2.4660	Alloy 20	N08020
	NiCr15Fe	2.4816	B168-Alloy 600	N06600
	NiCr22Mo9Nb	2.4856	B443-Alloy 625	N06625
	NiCr21Mo	2.4858	B424-Alloy 825	N08825
	NiCr20Ti	2.4951	Alloy 75	N06075
	NiCr20TiAl	2.4952	Alloy 80A	N07080
Low alloy steels				
	10Ni14 (3.5% Ni)	1.5637	ASTM A333 Grade 3	-
	12Ni19, X12Ni5	1.5680	-	K41583
9% Ni-steel for LNG storage tanks				
	X8Ni9	1.5662	A353/A353M	-
	X8Ni9 / 8%Ni	1.5662	A553/A553M Type I/II	- / K71340

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
15 kg spool BS300	X	X	X

LNM NiCro 60/20: rev. C-EN23-01/02/16

LNM NiCro 70/19

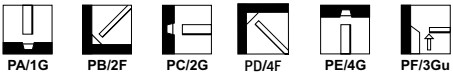
CLASSIFICATION

AWS A5.14	ERNiCr-3	**A-Nr**	-	**Mat-Nr**	2.4806
ISO 18274	S Ni 6082 (NiCr20Mn3Nb)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Solid wire for welding nickel based alloys, dissimilar metals and cladding
High resistance to oxidation and high impact toughness at low temperature

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Nb	Cu	Fe
0.03	3.1	0.08	72.5	20.5	2.6	0.01	0.8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	390	640	35	150	50

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	BS3076	DIN 17744/17465 SEW 595	Mat. Nr	ASTM/ACI B366	UNS
Ni-base high Cr alloy steel for low and high corrosion searching application					
	Na 14	NiCr15Fe	2.4816	B168-Alloy 600	N06600
		LC-NiCr15Fe	2.4817	Alloy 600L	N06600
		NiCr20Ti	2.4951	Alloy 75	
		NiCr20TiA1	2.4952	Alloy 80A	N07080
	Na 15	X10NiCrAlTi32-20	1.4876	Alloy 800/800H	N0800/10
		NiCr23Fe	2.4851	Alloy 601(H)	N06601
	Na 17	X12NiCrSi36-16	1.4864	330	N08330
		G-X40NiCrNb35-25	1.4852		
		G-X40NiCrSi35-25	1.4857	HP	

Un- and low alloy heat and creep resistant steel to stainless steel

APPLICATION ADVICE

Limit heat-input (HI<1.5kJ/mm) and interpass temperature (Ti<150°C)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
15 kg spool BS300	X	X

Other sizes and packaging on request

LNM NiCro 70/19: rev. C-EN23-01/02/16

LNM NiTi

CLASSIFICATION

AWS A5.14	ERNi1	**A-Nr**	-	**Mat-Nr**	2.4155
ISO 18274	S Ni 2061 (NiTi3)	**F-Nr**	41		
		9606 FM	6		

GENERAL DESCRIPTION

Solid wire for welding pure nickel and nickel alloys and joining these materials with unalloy/low alloy steel
Suitable for surfacing carbon steels

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	**Mn**	**Si**	**Ni**	**Ti**	**Fe**
0.02	0.4	0.2	bal.	3.1	0.06

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	**Condition**	**0.2% proof strength (N/mm²)**	**Tensile strength (N/mm²)**	**Elongation (%)**	**Impact ISO-V(J) +20°C**
Typical values	I1	AW	250	460	35	120

EXAMPLES OF MATERIALS TO BE WELDED

DIN-classification	**Mat. Nr**	**ASTM/ACI**
Ni 99.6	2.4060	
Ni 99.8	2.4050	
Ni 99.6Si	2.4056	
Ni 99.4Fe	2.4062	
Ni 99.2	2.4066	Alloy 200
LC-Ni 99	2.4068	Alloy 201
LC-Ni 99.6	2.4061	Alloy 205
NiMn 10	2.4108	
NiMn 5	2.4116	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool BS300	X

Other sizes and packaging on request

LNM NiTi; rev. C-EN23-01/02/16

LNM NiFe

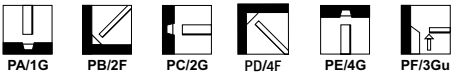
CLASSIFICATION

AWS A5.15	ENiFe-CI	**A-Nr**	-	**Mat-Nr**	2.4560
ISO 1071	S NiFe-CI	**F-Nr**	-		
		9606 FM	6		

GENERAL DESCRIPTION

Solid wire for butt welds and hardfacing application in cast iron
Suitable for dissimilar joints cast iron/steel
Hardness approximately 200HB
Optimal welding characteristics

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cu	Fe
0.05	0.83	0.14	55	0.4	bal.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness value
2 layers, AW	approx. 200 HB

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool BS300	X

Other sizes and packaging on request

LNM NiFe; rev. C-EN22-01/02/16

LNM CuAl8

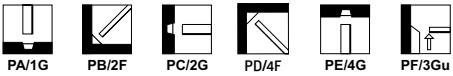
CLASSIFICATION

AWS A5.7	ERCuAl-A1	**A-Nr**	-	**Mat-Nr**	2.0921
EN 14640	S Cu 6100 (CuAl8)	**F-Nr**	36		
		9606 FM	-		

GENERAL DESCRIPTION

Solid wire for welding copper-aluminium alloys, as aluminium bronze
High resistance to corrosion and wear

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	Al	Mn
bal.	8	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB
Typical values	I1	AW	185	430	30	95

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades	Standard	Type	Mat. Nr
Copper-aluminium wrought alloys	DIN 17665	CuAl5As	2.0918
		CuAl8	2.0920
Copper-aluminium cast alloys	DIN 1714	G-CuAl8Mn	2.0962

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
12 kg spool B300	X	X	X	X

Other sizes and packaging on request

LNM CuAl8Ni6

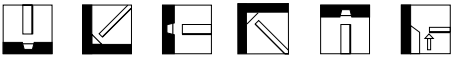
CLASSIFICATION

AWS A5.7	ERCuNiAl	**A-Nr**	-	**Mat-Nr**	2.0923
EN ISO 24373	S Cu 6328 (CuAl9Ni5)	**F-Nr**	37		
		9606 FM	-		

GENERAL DESCRIPTION

Solid wire for welding of cast and wrought, nickel-aluminium-bronze
High resistance to corrosion and wear (cavitation)

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	Al	Mn	Ni	Fe
bal.	9.0	2.5	5.0	4.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB
Typical values	I1	AW	380	500	20	150

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades as copper-aluminium alloys and copper-nickel-aluminium alloys with 7-9% Al

Typical applications :

- Ship fittings and propellers
- Power plant valves
- Intake screens
- Oil recovery pumps
- Propeller gear housings
- Marine propulsion systems
- Piping systems

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**
12 kg spool BS300	X

Other sizes and packaging on request

LNM CuNi30

CLASSIFICATION

AWS A5.7	ERCuNi	**A-Nr**	-	**Mat-Nr**	2.0837
EN 14640	S Cu 7158 (CuNi30)	**F-Nr**	34		
		9606 FM	-		

GENERAL DESCRIPTION

Solid wire for welding copper-nickel alloys containing 10-30%Ni

WELDING POSITIONS (ISO/ASME)


PA/1G


PB/2F


PC/2G


PD/4F


PE/4G


PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	Ni	Mn
bal.	31	0.8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Hardness HB
Typical values	I1	AW	220	380	30	70

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades	Standard	Type	Mat. Nr	UNS
Copper-nickel wrought alloys				
DIN 17664	CuNi10Fe1Mn	2.0872	C 70600	
	CuNi30Mn1Fe	2.0882	C 71500	
	CuNi30Fe2Mn2	2.0883	C 71600	
Copper-nickel cast alloys				
DIN 17658	G-CuNi10	2.0815		
	G-CuNi30	2.0835		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool BS300	X

Other sizes and packaging on request

LNM CuNi30: rev. C-EN25-01/02/16

LNM CuSn

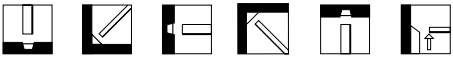
CLASSIFICATION

AWS A5.7	ERCu	**A-Nr**	-	**Mat-Nr**	2.1006
EN 14640	Cu 1898 (CuSn1)	**F-Nr**	31		
		9606 FM	-		

GENERAL DESCRIPTION

Solid wire for GMA-welding of copper

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	Mn	Si	Sn	Ni
bal.	0.2	0.3	0.8	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB
Typical values	I1	AW	100	220	60	35

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades	Standard	Type	Mat. Nr
Copper			
	DIN 1787	OF-Cu	2.0040
		SE-Cu	2.0070
		SW-Cu	2.0076
		SF-Cu	2.0090
Wrought low alloy copper alloys			
	DIN 17666	CuFe2P	2.1310
		CuSP	2.1498
		CuTeP	2.1546

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.0**	**1.2**
12 kg spool B300	X	X

LNM CuSn: rev. C-EN25-01/02/16

LNM CuSi3

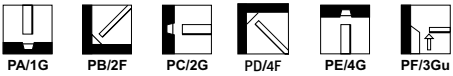
CLASSIFICATION

AWS A5.7	ERCuSi-A	**A-Nr**	-	**Mat-Nr**	2.1461
EN ISO 24373	S Cu 6560 (CuSi3Mn1)	**F-Nr**	32		
		9606 FM	-		

GENERAL DESCRIPTION

Solid wire for GMA-welding of low alloy copper grades
High temperature and corrosion resistant

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	Sn	Mn	Si	Zn
bal.	0.1	1.0	3.0	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yiield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Hardness HB	Impact ISO-V(J) +20°C
Typical values	I1	AW	120	350	40	95	60

EXAMPLES OF MATERIALS TO BE WELDED

Copper, low alloy copper and copper-zinc alloys

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
5 kg plastic spool S200	X		
12 kg spool BS300	X	X	X

Other sizes and packaging on request

LNM CuSi3: rev. C-EN03-01/02/16

SuperGlaze® MIG 1070

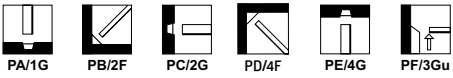
CLASSIFICATION

ISO 18273	S Al 1070 (Al99.7)	**A-Nr**	-
		F-Nr	21
		Mat-Nr	3.0259

GENERAL DESCRIPTION

Highly resistant to chemical corrosion and good crack resistance
Suitable for electrical and chemical applications utilizing aluminium base metal with little or no alloying elements
Like all 1xxx filler alloys. Al 1070 is one of the softest aluminium MIG wire and requires extra care to ensure good feeding

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	V	Ti	Be
min. 99.7	max. 0.2	max. 0.25	max. 0.04	max. 0.03	max. 0.03	0	max. 0.04	max. 0.05	max. 0.03	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.03%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range : 647 - 658°C
Density : approximately 2700 kg/m³

APPLICATIONS

Joining 1xxx alloys to themselves or other alloys
Bus Bars
Electrical Boxes
Heat Exchangers
Metallizing
Electro-technical. Chemical. Construction and Food Industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
125 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Superglaze® MIG 1070: rev. C-EN02-01/02/16

SuperGlaze® MIG 1100

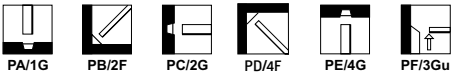
CLASSIFICATION

AWS 5.10	ER1100	**A-Nr**	-
ISO 18273	S Al 1100 (Al99.0Cu)	**F-Nr**	21
EN 573.3	EN AW-Al99.0Cu	**Mat-Nr**	-

GENERAL DESCRIPTION

Highly resistant to chemical corrosion and good crack resistance
Suitable for electrical and chemical applications utilizing aluminium base metal with little or no alloying elements
Like all 1xxx filler alloys. Al 1100 is one of the softest aluminium MIG wire and requires extra care to ensure good feeding

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
min. 99.0	A	A	0.05-0.20	max. 0.05	0	0	max. 0.10	0	max. 0.0003

Notes : A = Si+Fe max. 0.95
Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range : 647 - 658°C
Density : approximately 2700 kg/m³

APPLICATIONS

Joining 1xxx alloys to themselves or other alloys
Bus Bars
Electrical Boxes
Heat Exchangers
Metallizing
Electro-technical. Chemical. Construction and Food Industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
125 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Superglaze® MIG 1100: rev. C-EN02-01/02/16

SuperGlaze® MIG 2319

CLASSIFICATION

AWS 5.10	ER2319	**A-Nr**	-
ISO 18273	S Al 2319 (AlCu6MnZrTi)	**F-Nr**	25
EN 573.3	EN AW-AlCu6Mn	**Mat-Nr**	-

GENERAL DESCRIPTION

Primarily used where weld joints are capable of being heat treated to high strength.
Provides higher strength and better ductility than 4xxx filler alloys when welding on 2xxx base materials
Provides superior resistance to stress corrosion cracking were high temperature properties are required

WELDING POSITIONS (ISO/ASME)

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.2	max. 0.3	5.8-6.8	0.2-0.4	max. 0.02	-	max. 0.1	0.1-0.2	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	160-180	240-270	Approx. 3

PHYSICAL PROPERTIES

Melting range : 543 - 643°C
Density : approximately 2768 kg/m³

APPLICATIONS

Aircraft applications
Spacecraft industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6
7.26 kg spool S300	X	X	X	X
7.0 kg spool BS300	X	X	X	X

Other sizes and packaging on request

SuperGlaze® MIG 4043

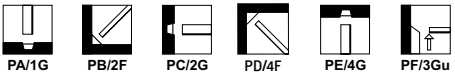
CLASSIFICATION

AWS 5.10	ER4043	**A-Nr**	-
ISO 18273	S Al 4043A (AlSi5)	**F-Nr**	23
EN 573.3	EN AW-AlSi5	**Mat-Nr**	3.2245

GENERAL DESCRIPTION

Designed for welding heat treatable base alloys and more specifically 6xxx Series Alloys
Lower melting point and fluidity that 5xxx series filler alloys
Low sensitivity to weld cracking with 6xxx base alloys
Suitable for sustained elevated temperature service. i.e. above 65ºC

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

GMAW

APPROVALS

ABS	DB	TÜV
+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	4.5-6.0	max. 0.6	max. 0.3	max. 0.05	max. 0.05	-	max. 0.1	max. 0.2	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	20-40	120-165	3-18

PHYSICAL PROPERTIES

Melting range : 573 - 625ºC
Density : approximately 2680 kg/m3

APPLICATIONS

For welding 6XXX alloys. and most casting alloys
Automotive components such as frame and drive shafts
Bicycle frames

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	0.9	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X		X	X	X	
7.26 kg spool S300	X		X	X	X	X
7.0 kg spool BS300	X		X	X	X	X
23-27 kg wooden reel			X	X	X	X
125kg Gem-Pak		X		X	X	
159kg wooden reel			X	X	X	X
227 kg wooden reel			X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 4043: rev. C-EN24-01/02/16

SuperGlaze® MIG 4047

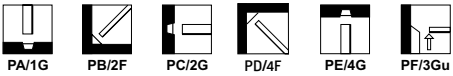
CLASSIFICATION

AWS 5.10	ER4047	**A-Nr**	-
ISO 18273	S Al 4047 (AlSi12)	**F-Nr**	23
EN 573.3	EN AW-AlCu6Mn	**Mat-Nr**	3.2585

GENERAL DESCRIPTION

Lower melting point and higher fluidity than 4043 wires
Can be used as a substitute for 4043 to increase silicon content in the weld metal and minimize hot cracking and produce higher fillet weld shear strength
Can be used as a brazing alloy

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	11-13	max. 0.8	max. 0.30	max. 0.15	0.10	0	max. 0.20	0	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	60-80	130-190	5-20

PHYSICAL PROPERTIES

Melting range : 573 - 585°C
Density : approximately 2680 kg/m^3

APPLICATIONS

For welding 6XXX alloys. and most casting alloysCryogenic tanks
Automotive components , radiators and air conditionning

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
136 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5087: rev. C-EN03-01/02/16

SuperGlaze® MIG 5087

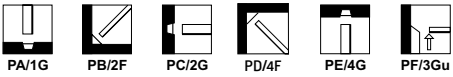
CLASSIFICATION

		A-Nr	-
ISO 18273	S Al 5087 (AlMg4,5MnZr)	**F-Nr**	22
EN 573.3	EN AW-AlMg4,5MnZr	**Mat-Nr**	3.3546

GENERAL DESCRIPTION

Designed to meet the tensile strength requirements of high magnesium alloys
For base metals with a max. of 5% Mg
The presence of Zirconium produces a fine-grained weld metal structure
Reduced tendency of solidification cracking in highly restrained welds

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

GMAW

APPROVALS

GL	LR	DB	TÜV	WIWeb
+*	+*	+	+	+

**(Valid for I1 and I3 gases)*

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Be
bal.	max. 0.25	max. 0.4	max. 0.05	0.7-1.1	4.5-5.2	0.05-0.25	max. 0.25	max. 0.15	0.10-0.20	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	125-140	275-300	17-30

PHYSICAL PROPERTIES

Melting range : 568 - 638°C
Density : approximately 2660 kg/m^3

APPLICATIONS

Marine fabrication and repair
Cryogenic tanks
Shipbuilding and other high strength structural aluminium applications
Railway Industry
Automotive Industry
Trailer Industry and Offshore

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
136 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5087: rev. C-EN03-01/02/16

SuperGlaze® MIG 5183

CLASSIFICATION

AWS 5.10	ER5183	**A-Nr**	-
ISO 18273	S Al 5183 (AlMg4.5Mn0.7(A))	**F-Nr**	22
EN 573.3	EN AW-AlMg4.5Mn	**Mat-Nr**	3.3548

GENERAL DESCRIPTION

Designed to meet the tensile strength requirements of magnesium alloys
For base materials 5083 and 5654

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

APPROVALS

ABS	GL	LR	DB	TÜV	DNV	BV	WIWeb
+	+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.4	max. 0.4	max. 0.1	0.5-1.0	4.3-5.2	0.05-0.25	max. 0.25	max. 0.15	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	125-165	270-290	16-25

PHYSICAL PROPERTIES

Melting range : 568 - 638°C
Density : approximately 2660 kg/m³

APPLICATIONS

Marine fabrication and repair
Cryogenic tanks
Shipbuilding and other high strength structural aluminium applications
Military Industry
Railway & Automotive Industry
Trailer Industry and Offshore

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
136 kg Accupak				X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5183: rev. C-EN24-01/02/16

SuperGlaze® MIG 5356

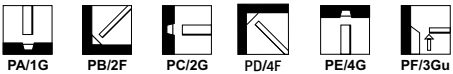
CLASSIFICATION

AWS 5.10	ER5356	**A-Nr**	-
ISO 18273	S Al 5356 (AlMg5Cr(A))	**F-Nr**	22
EN 573.3	EN AW-AlMg5	**Mat-Nr**	3.3556

GENERAL DESCRIPTION

General purpose filler alloy for welding 5XXX series alloys when 276 MPa tensile strength is not required.
Excellent colour match after anodizing

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

GMAW

APPROVALS

ABS	GL	LR	DB	TÜV	DNV	BV
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.25	max. 0.4	max. 0.1	0.05-0.2	4.5-5.5	0.05-0.20	max. 0.1	0.06-0.2	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	110-120	240-296	17-26

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2640 kg/m³

APPLICATIONS

Structural frames in the shipbuilding industry
Furniture. Storage tanks
Railway Industry
Automotive and trailer Industry
Formed truck panels
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	0.9	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X		X	X	X	
7.26 kg spool S300	X		X	X	X	X
7.0 kg spool BS300	X		X	X	X	X
23-27 kg wooden reel			X	X	X	X
136kg Gem-Pak		X		X	X	
159kg wooden reel			X	X	X	X
227 kg wooden reel			X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5356: rev. C-EN24-01/02/16

SuperGlaze® MIG 5356 TM™

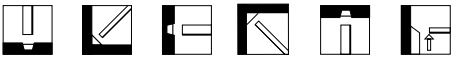
CLASSIFICATION

AWS 5.10	ER5356	**A-Nr**	-
ISO 18273	S Al 5356 (AlMg5Cr)	**F-Nr**	22

GENERAL DESCRIPTION

Superior Wetting – Unparalleled bead profile and appearance which are critical for groove and fillet welds on aluminium trailer beds.
Enhanced Puddle Clarity and Control
Maximum Arc Performance and Stability

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

APPROVALS

DB	TÜV	CWB
+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.25	max. 0.4	max. 0.1	0.05-0.2	4.5-5.5	0.05-0.20	max. 0.1	0.06-0.2	max. 0.0008

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	110-120	240-296	17-26

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2640 kg/m³

APPLICATIONS

High speed groove welds on formed truck panels
Multi-pass fillet and lap welds on 6XXX series base materials
Robotic fillet welds on trailer tanks requiring minimal post-weld clean up

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.9	1.2	1.6
7.0 kg spool BS300	X	X	X
136kg Gem-Pak	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5356TM™: rev. C-EN02-01/02/16

SuperGlaze® MIG 5556

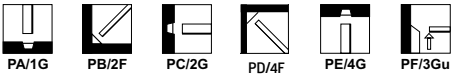
CLASSIFICATION

AWS 5.10	ER5556	**A-Nr**	-
ISO 18273	S Al 5556 (AlMg5Mn1Ti)	**F-Nr**	22

GENERAL DESCRIPTION

Contains Increased amounts of magnesium and manganese.
Provides weld deposits matching tensile strengths for the 5xxx series alloys such as 5083 and 5684
The weld metal is sea water resistant

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PD/4F PE/4G PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

GMAW

APPROVALS

ABS
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.25	max. 0.4	max. 0.1	0.5-1.0	4.7-5.5	0.05-0.20	max. 0.25	0.05-0.20	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	125-145	275-295	17-25

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2660 kg/m³

APPLICATIONS

Structural frames in the shipbuilding industry
Furnitures. Storage tanks
Railway Industry
Automotive and trailer Industry
Formed truck panels
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
136 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5556: rev. C-EN02-01/02/16

SuperGlaze® MIG 5556A

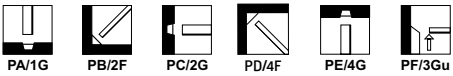
CLASSIFICATION

ISO 18273	S Al 5556A (AlMg5Mn)	**A-Nr**	-
EN 573.3	EN AW AlMg5Mn	**F-Nr**	22

GENERAL DESCRIPTION

High Magnesium alloyed wire
The elements are controlled to obtain increased weld strength over the 5356 alloy
Good ductility and improved crack resistance

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.25	max. 0.4	max. 0.1	0.6-1.0	5.0-5.5	0.05-0.20	max. 0.2	0.05-0.20	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation %)
Typical values	I1	AW	125-140	275-300	15-17

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2660 kg/m³

APPLICATIONS

Aircraft and Military Industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
136 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5556A: rev. C-EN02-01/02/16

SuperGlaze® MIG 5754

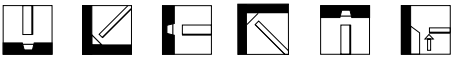
CLASSIFICATION

		A-Nr	-
ISO 18273	S Al 5754 (AlMg3)	**F-Nr**	22
EN 573.3	EN AW AlMg3	**Mat-Nr**	3.3536

GENERAL DESCRIPTION

Magnesium alloyed aluminium for welding of alloys with a maximum of 3.5% Mg
Good corrosion resistance and excellent colour match after anodizing
Suitable for a wide range of applications in general construction and structural industry

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PD/4F** **PE/4G** **PF/3Gu**

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He
Flow rate	14.2 - 23.6L/min

GMAW

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be	Mn+Cu
bal.	max. 0.4	max. 0.4	max. 0.1	max. 0.5	2.6-3.6	max. 0.3	max. 0.20	max. 0.15	max. 0.0003	0.10-0.6

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	70-80	180-200	15-20

PHYSICAL PROPERTIES

Melting range : 580 - 642°C
Density : approximately 2660 kg/m3

APPLICATIONS

General Construction Industry
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
0.5 kg plastic spool S100	X	X	X	X	
7.26 kg spool S300	X	X	X	X	X
7.0 kg spool BS300	X	X	X	X	X
23-27 kg wooden reel		X	X	X	X
136 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227 kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5754: rev. C-EN02-01/02/16

LNM 420FM

CLASSIFICATION

EN 14700 S Fe8 **Mat-Nr** 1.4718

GENERAL DESCRIPTION

Solid wire for wear resistant overlays
High resistance against corrosion, abrasion and impact deformation
Hardness approximately 55-60HRc
Optimal weldability
Ferritic and martensitic structure

WELDING POSITIONS (ISO/ASME)

SHIELDING GASES (ACC. ISO 14175)

M21 : Mixed gas Ar+ >15-25% CO_2

GMAW

CHEMICAL COMPOSITION (W%) TYPICAL WIRES

C	Mn	Cr	Si
0.5	0.4	9.0	3.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
2 Layers, AW	: approx. 60 HRc
heat resistant to 450°C	

APPLICATION

Dies
Matrix
Parts for agricultural machinery
Transport rolls
Sand pumps

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.0**	**1.2**
15 kg spool B300	X	X

Other sizes and packaging on request

LNM 4M

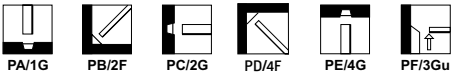
CLASSIFICATION

EN 14700 S Fe2 **Mat-Nr** 1.8405

GENERAL DESCRIPTION

Solid wire for hardfacing applications
Hardness approximately HB 325-375
Optimal welding characteristics
Martensitic structure

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21 : Mixed gas Ar+ >15-25% CO_2

CHEMICAL COMPOSITION (W%) TYPICAL WIRES

C	Mn	Si	Cr
0.7	1.9	0.5	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
2 Layers, AW	: approx. 38 HRc

APPLICATION

Forming dies
Dies
Impact resistance tools

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Other sizes and packaging on request

TIG RODS

LNT 25

CLASSIFICATION

AWS A5.18	ER70S-3	**A-Nr**	1	**Mat-Nr**	1.5112
EN ISO 636-A	W 42 5 W2Si	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid rod for welding general construction in mild steel
High impact values

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV	CE
+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.1	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -50°C
Typical values	I1	AW	450	560	26	170	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	Note : Cut length = 1000 mm
5 kg PE-Tube	X	X	X	X	

LNT 25: rev. C-EN25-01/02/16

LNT 26

CLASSIFICATION

AWS A5.18	ER70S-6	**A-Nr**	1	**Mat-Nr**	1.5125
EN ISO 636-A	W 42 5 W3Si1	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Solid rod for welding general construction in mild steel
Smooth bead appearance

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV	CE
+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.1	1.5	0.9

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-30°C	-50°C
Typical values	I1	AW	460	580	26	170	170	120

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
	API 5LX	X42, X46, X52, X60
	EN 10216-1	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT 26: rev. C-EN25-01/02/16

LNT 28

CLASSIFICATION

AWS A5.28	ER80S-G	**A-Nr**	10
		F-Nr	6
		9606 FM	2

GENERAL DESCRIPTION

Solid rod for welding of weather resisting steels
Excellent mechanical properties

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

CE
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cu
0.1	1.4	0.75	0.8	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C
Typical values	I1	AW	570	620	26	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Weather resisting steels	EN 10155	S 235 J 0 W S 235 J 2 W S 355 J 0 W S 355 J 2 W S 355 K 2 G 1 W

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.4**	**Note : Cut length = 1000 mm**
5 kg PE-Tube	X	

LNT Ni1

CLASSIFICATION

AWS A5.28	ER80S-Ni1	**A-Nr**	12
EN ISO 636-A	W 42 6 W3Ni1	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Solid rod for welding fine grained and low alloy nickel steels
High impact value at low temperature (-60°C)
Typical offshore applications

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

GL	TÜV	CE	DNV
+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni
0.1	1.2	0.6	0.9

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C
Typical values	I1	AW	480	580	30	60

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S275, S355
Ship plates	ASTM A131	Grade A, B, D, E, AH32 to EH36
Cast steels	EN 10213-2	GP240R
Pipe material	EN 10208-1	L290 GA, L360GA
EN 10208-2	L290, L360, L415	
API 5LX	X42, X46, X52, X60, X65	
EN 10216-1	P275T1	
EN 10217-1	P275 T2, P355 N	
Fine grained steels	EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275, S355, S420, S460	
EN 10028	P355NL-1, P460NL-1	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.0
5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT Ni1: rev. C-EN28-01/02/16

LNT NiMo1

CLASSIFICATION

AWS A5.28	ER100S-G	**A-Nr**	2
ISO 16834-A	W Mn3Ni1Mo	**F-Nr**	-
		9606 FM	2

GENERAL DESCRIPTION

Alloy TIG rod suitable for welding high tensile strength steels
Excellent mechanical properties

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Mo	Ti
0.08	1.7	0.7	0.9	0.35	0.17

GTAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	760	800	18

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Pipe material	EN 10208-2	L480, L550
API 5LX	X65, X70, X80	
Fine grained steels	EN 10025 part 6	S460, S500, S550, S620

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
5 kg PE-Tube	X	X

LNT NiMo1 : rev. C-EN03-01/02/16

LNT Ni2.5

CLASSIFICATION

AWS A5.28	ER80S-Ni2	**A-Nr**	10
EN ISO 636-A	W2 Ni2	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Solid rod for welding fine grained and low alloy nickel steels
High impact value at low temperature (-60°C as welded and -90°C after stress relieving 15h/580°C).
Typical offshore applications

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

APPROVALS

TÜV	CE
+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni
0.1	1.1	0.55	2.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -62°C	Impact ISO-V(J) -90°C
Typical values	I1	AW	525	605	28	280	133

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steels	EN 10025	S355
Pipe material	EN 10208-2	L360, L415, L445
API 5 LX	X52, X56, X60, X65	
Fine grained steels	EN 10025 part 3	S355, S420, S460
EN 10025 part 4	S355, S420, S460	
Low temperature steels	EN 10028-4 (12 Ni 14 G 1, G 2)	11 MnNi 5-3, 13 MnNi 6-3, 15 NiMn 6
EN 10222-3	13 MnNi 6-3, 15 NiMn 6	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.0
5 kg PE-Tube	X	X

Note : Cut length = 1000 mm

LNT Ni2.5: rev. C-EN26-01/02/16

LNT 12

CLASSIFICATION

AWS A5.28	ER70S-A1	**A-Nr**	2	**Mat-Nr**	1.5424
ISO 21952-A	W MoSi	**F-Nr**	6		
		9606 FM	1/3		

GENERAL DESCRIPTION

Solid rod for welding creep resistant 0.5%Mo steels and Fine grained steels for low temperature applications in the as welded condition with service temperatures in range -20°C to +500°C

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV	DNV	GL	DB
+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Mo
0.1	1.2	0.6	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Typical values	I1	AW	635	670	22	170	110

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Elevated temperature steel	EN 10028-2	P295 G H, P355 G H, 16 Mo 2
EN 10222-2	17 Mo 3, 14 Mo 6	
Fine grained steels	EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420	

APPLICATION ADVICE

Preheating welding joint acc.EN 1011-1
Stress relieving 580-650°C if necessary

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.0
5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT 12: rev. C-EN25-01/02/16

LNT 19

CLASSIFICATION

AWS A5.28	ER80S-B2*	**A-Nr**	3	**Mat-Nr**	1.7339
ISO 21952-A	W CrMo1Si	**F-Nr**	6		
* Nearest classification		**9606 FM**	3		

GENERAL DESCRIPTION

Solid rod for welding creep and hydrogen resistant Cr-Mo steels (1,25Cr - 0,5Mo)
Service temperature up to 550°C

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Mo
0.1	1.0	0.6	1.2	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	PWHT 700°C/1h	540	640	22	250

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Elevated temperature steel	EN 10028-2	13 CrMo4-5
EN 10083-1	25 CrMo 4	
EN 10222-2	14 CrMo 4-5	
Tool steel	DIN 17210	16 MnCr 5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.0
5 kg PE-Tube	X	X	X

Note : Cut length = 1000 mm

LNT 19: rev. C-EN26-01/02/16

LNT 20

CLASSIFICATION

AWS A5.28	ER90S-B3*	**A-Nr**	4	**Mat-Nr**	1.7384
ISO 21952-A	W CrMo2Si	**F-Nr**	6		
* Nearest classification		**9606 FM**	4		

GENERAL DESCRIPTION

Solid rod for welding creep and hydrogen resistant Cr-Mo steels (2,25Cr - 1Mo)
Service temperature up to 600°C

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Mo
0.08	1.0	0.6	2.5	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	PWHT 700°C/1h	560	640	22	140

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Creep and hydrogen resistant steels	EN 10028-2	10CrMo 9-10
EN 10222-2	12CrMo 9-10	

APPLICATION ADVICE

Preheating welding joint acc. EN 1011-1, 200-250°C
Post weld heat treatment at 690-740°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.0**	**2.4**
5 kg PE-Tube	X	X

Note : Cut length = 1000 mm

LNT 20: rev. C-EN26-01/02/16

GTAW

LNT 502

CLASSIFICATION

AWS A5.28	ER80S-B6	**A-Nr**	4	**Mat-Nr**	1.7373
ISO 21952-A	W CrMo5Si*	**F-Nr**	6		
* Nearest classification		**9606 FM**	4		

GENERAL DESCRIPTION

Solid rod for welding of creep and hydrogen resistant 5%Cr, 0.5%Mo steels
Service temperature up to 550°C

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Mo
0.09	0.6	0.3	5.7	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	PWHT 750°C/1h	560	650	20	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Creep and hydrogen resistant steels	SEW 028	12CrMo 19-5 and corresponding steels
ASTM A182	F5	
ASTM A213	T5	
ASTM A335	P5	
ASTM A336	F5	
ASTM A369	FP5	
ASTM A387	Grade 5	

APPLICATION ADVICE

Recommended preheat and interpass temperature 200-300°C
Recommended post weld heat treatment at range 675-750°C (time depending on material thickness)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.4**	*Note : Cut length = 1000 mm*
5 kg PE-Tube	X	

LNT 502: rev. C-EN26-01/02/16

LNT 9Cr(P91)

CLASSIFICATION

AWS A5.28	ER90S-B39	**A-Nr**	5
ISO 21952-A	W CrMo91	**F-Nr**	6
		9606 FM	4

GENERAL DESCRIPTION

Solid rod for welding of creep and hydrogen resistant 9% Cr, 1% Mo steels
Service temperature up to 650°C

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Mo	Ni	Nb	V	Cu
0.11	0.8	0.25	8.9	1.0	0.5	0.06	0.2	0.06

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C
Typical values	I1	SR 750°C/3h	500	700	18	70

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type	Standard	Type
Creep and hydrogen resistant steels	EN 10222-2	X10CrMo V9-1 steels		
	ASTM	A199 Grade T91	ASME	SA 182-F91
		A200 Grade T91		
		A213 Grade T91		SA 213-T91
		A335 Grade P91		SA 335-P91
		A336 Grade F91		SA 336-F91
				SA 369-FP91
				SA 387-Grade 91
				SA 387-Grade 91

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	*Note : Cut length = 1000 mm*
5 kg PE-Tube	X	X	

LNT 9Cr(P91) : rev. C-EN26-12/05/16

LNT 304LSi

CLASSIFICATION

AWS A5.9	ER308LSi	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 14343-A	W 19 9 L Si	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod with extra low carbon for welding austenitic CrNi-steels
With increased silicon for improved wettability

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

DNV	TÜV	CE	DB
+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.02	2.0	0.8	20	10	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	467	622	37	147	67

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19-11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		G-X5CrNi19-10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb18-10		1.4550	(TP)347	S34700
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2	1.6	2.0	2.4	3.2	*Note : Cut length = 1000 mm*
5 kg PE-Tube	X	X	X	X	X	X	

LNT 304LSi: rev. C-EN23-01/02/16

LNT 304L

CLASSIFICATION

AWS A5.9	ER308L	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 14343-A	W 19 9 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod with extra low carbon for welding austenitic CrNi-steels
High resistance to intergranular corrosion and oxidizing environments

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

CE
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.01	1.7	0.4	20	10	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	472	692	34	120	91

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19-11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		G-X5CrNi19-10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X	X

Note : Cut length = 1000 mm

LNT 304L: rev. C-EN24-01/02/16

LNT 347Si

CLASSIFICATION

AWS A5.9	ER347Si	**A-Nr**	8	**Mat-Nr**	1.4551
ISO 14343-A	W 19 9 NbSi	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding Ti or Nb stabilized stainless CrNi-steels
High resistance to intergranular corrosion and oxidizing environments

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

APPROVALS

TÜV	CE	DB
+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Nb
0.05	1.4	0.7	19.5	9.5	0.01	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	400	650	35	80	45

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-,Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347h	S34709
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710
Non stabilized					
				302	
	X4CrNi18-10		1.4301	(TP)304	S30400
	X2CrNi19-11		1.4306	(TP)304L	S30403
		G-X5CrNi19-10	1.4308	CF-8	J92600
			1.4312		
				(TP)304H	S30409

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT 347Si : rev. C-EN24-01/02/16

LNT 316LSi

CLASSIFICATION

AWS A5.9	ER316LSi	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 14343-A	W 19 12 3 LSi	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod with extra low carbon for welding stainless CrNiMo-steels
See also LNT 316L, high silicon for improved wettability

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

DNV	TÜV	DB	CE	ABS
+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.03	1.9	0.8	18.5	12.0	2.7

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	484	624	32	100	82

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNiMo1712-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		G-X5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316 Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316 Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2	1.6	2.0	2.4	3.2	Note : Cut length = 1000 mm
5 kg PE-Tube	X	X	X	X	X	X	

LNT 316LSi: rev. C-EN24-01/02/16

LNT 316L

CLASSIFICATION

AWS A5.9	ER316L	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 14343-A	W 19 12 3 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod with extra low carbon for welding austenitic CrNiMo-steels
High resistance to intergranular corrosion and general corrosion conditions

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.01	1.5	0.5	18.5	12	2.7

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -120°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	400	620	35	100	80	40

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		G-X5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316 Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316 Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X

LNT 316L: rev. C-EN25-01/02/16

LNT 318Si

CLASSIFICATION

AWS A5.9	ER318*	**A-Nr**	8	**Mat-Nr**	1.4576
ISO 14343-A	W 19 12 3 NbSi	**F-Nr**	6		
* Nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

Solid rod for welding Ti or Nb stabilized stainless CrNiMo-steels
High resistance to intergranular corrosion and general corrosion conditions

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Nb
0.05	1.4	0.7	18.7	11.7	2.5	0.7

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	420	680	35	70	45

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		G-X5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316 Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316 Cb	S31640
	X6CrNiNb18-10		1.4550	(TP)347	S34700
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X

LNT 318Si: rev. C-EN24-01/02/16

LNT 4439Mn

CLASSIFICATION

		A-Nr	9*	**Mat-Nr**	1.4453
ISO 14343-A	W 18 16 5 N L*	**F-Nr**	-		
* Nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

Solid rod for welding AISI 317L, 317LN or equivalent stainless steels
For welding 316L if increased molybdemum content is important
High resistance to pitting, intergranular and stress corrosion
Fully austenitic weld metal

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.02	7	0.4	18	16	4.5	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -196°C
Typical values	I1	AW	440	650	35	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Fully austenitic CrNiMo corrosion resistant steels					
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429	(TP)316LN	S31653
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMo18-15-4		1.4438	317L	S31725
	X2CrNiMoN17-13-5		1.4439	317LN	S31726
	G-X2CrNiMoN17-13-4	G-X2CrNiMo17-13-4	1.4446		
	G-X6CrNiMo17-13	G-X6CrNiMo17-13	1.4448		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.0**	**2.4**
5 kg PE-Tube	X	X

LNT 4439Mn: rev. C-EN23-01/02/16

LNT 4500

CLASSIFICATION

AWS A5.9	ER385	**A-Nr**	9
ISO 14343-A	W 20 25 5 Cu L	**F-Nr**	6
		9606 FM	5

GENERAL DESCRIPTION

Solid rod for welding of fully austenitic steels of type 20%Cr / 25%Ni / 4.5%Mo / 1.5%Cu
Highly corrosion resistant in sulphuric and phosphoric acid

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Cu
0.01	1.7	0.4	20	25	4.5	1.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -196°C
Typical values	I1	AW	380	560	35	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr
Fully austenitic NiCrMoCu and CrNiMoCu steels			
		G-X7NiCrMoCuNb25-20	1.4500
	X5NiCrMoCuTi20-18		1.4506
		G-X2NiCrMoCuN20-18	1.4531
		G-X2NiCrMoCuN25-20	1.4536
	X1NiCrMoCuN25-20-5		1.4539
		G-X7CrNiMoCuNb18-18	1.4585
	X5NiCrMoCuNb22-18		1.4586

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
5 kg PE-Tube	X	X

LNT 4500: rev. C-EN24-01/02/16

LNT 4462

CLASSIFICATION

AWS A5.9	ER2209	**A-Nr**	8	**Mat-Nr**	1.4462
ISO 14343-A	W 22 9 3 N L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding duplex stainless steels
High resistance to general corrosion, pitting and stress corrosion conditions

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.01	1.6	0.5	22.5	8.5	3.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C
Typical values	I1	AW	675	829	27	200

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
Duplex stainless steels			
	X2CrNiMoN22-5-3	1.4462	S31803
		1.4417	S31500
	X2CrNiN23-4	1.4362	S32304
	X3CrNiMoN27-5-2	1.4460	S31200
	X2CrNiMoN21-5-1	1.4162	S32101

Dissimilar joints such as un- and low alloy steel to duplex stainless steel

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT 4462: rev. C-EN24-01/02/16

LNT Zeron® 100X

CLASSIFICATION

AWS A5.9	ER2594	**A-Nr**	8
ISO 14343-A	W 25 9 4 N L	**F-Nr**	6
		9606 FM	5

GENERAL DESCRIPTION

Solid rod for welding Zeron® 100 and other super duplex stainless steel grades
High resistance to pitting and crevice corrosion in seawater

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Cu	W	N
0.02	0.6	0.23	25	9.3	3.6	0.6	0.6	0.22

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -50°C
Typical values	I1	AW	655	934	42	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	UNS		
Regular and super duplex stainless steels					
	X2CrNiMoN25-7-4		1.4410		
	X4CrNiMoN27-5-2		1.4460		
	X2CrNiMoN22-5-3		1.4462	2205	S31803
		GX6 CrNiMo 24-8-2	1.4463		
				CD-4MCu	S32550
				Zeron® 100	S32760

Super duplex stainless Steel grades: chemical composition approximately:
24-27% Cr, 6-9% Ni, 3-4% Mo, 0.10-0.25% N alloyed also with Cu and/or W

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	*Note : Cut length = 1000 mm*
5 kg PE-Tube	X	X	X	X	

LNT Zeron® 100X: rev. C-EN25-01/02/16

LNT 309LHF

CLASSIFICATION

AWS A5.9	ER309L	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 14343-A	W 23 12 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding stainless steel to carbon steel
Low susceptability to embrittlement
Minimum 18FN ferrite in weldmetal

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.02	2.0	0.35	24	13	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength(N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) +40°C
Typical values	I1	AW	488	608	33	167	171

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to stainless steel)
Build-up welding on mild and low alloy steel

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0
5 kg PE-Tube	X	X

LNT 309LHF rev. C-EN25-01/02/16

LNT 309LSi

CLASSIFICATION

AWS A5.9	ER309LSi	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 14343-A	W 23 12 LSi	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding stainless steel to carbon steel
With high silicon for improved wettability

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

APPROVALS

TÜV	CE
+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.02	2.0	0.8	23.5	13	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -120°C
Typical values	I1	AW	400	600	35	65

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to stainless steel)
Build-up welding on mild and low alloy steel

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT 309LSi: rev. C-EN24-01/02/16

LNT 309L

CLASSIFICATION

AWS A5.9	ER309L	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 14343-A	W 23 12 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding stainless steel to carbon steel

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

APPROVALS

CE
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.01	1.65	0.5	24	13	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	390	600	35

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
		CF-3	J92500	
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to stainless steel)
Build-up welding on mild and low alloy steel

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4
5 kg PE-Tube	X	X	X

LNT 309L: rev. C-EN04-01/02/16

LNT 304H

CLASSIFICATION

AWS A5.9	ER308H	**A-Nr**	8	**Mat-Nr**	1.4948
ISO 14343-A	W 19 9 H	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding austenitic CrNi-steels
Especially for high temperature applications (up to 730°C)
Low sensitivity to precipitation of intermetallic phases

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.07	1.9	0.4	20	9.2	0.1

GTAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	AW	370	600	35	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Medium carbon (C > 0.03%)					302
	X4CrNi18-10		1.4301	(TP)304	S30400
				(TP)304H	S30409
		G-X5CrNi19-10	1.4308	CF 8	J92600
			1.4948		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
5 kg PE-Tube	X	X

LNT 304H rev. C-EN23-01/02/16

LNT 310

CLASSIFICATION

AWS A5.9	ER310	**A-Nr**	9	**Mat-Nr**	1.4812
ISO 14343-A	W 25 20	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Solid rod for welding heat resistant Cr- and CrNi-steels (25%Cr-20%Ni)
High resistance to oxidation and scaling up to approx. 1100°C

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo
0.1	1.7	0.5	26	21	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	AW	360	600	35	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
	X10CrAl24		1.4762		
		G-X25CrNiSi18-9	1.4825		
		G-X40CrNiSi22-9	1.4826		
	X15CrNiSi20-12		1.4828		
		G-X25CrNiSi20-14	1.4832		
	X15CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12CrNi25-21		1.4845		
		G-X40CrNiSi25-20	1.4848	HK40	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4
5 kg PE-Tube	X	X	X

LNT 310 : rev. C-EN23-01/02/16

LNT NiCro 60/20

CLASSIFICATION

AWS A5.14	ERNiCrMo-3	**A-Nr**	-	**Mat-Nr**	2.4831
ISO 18274	S Ni 6625 (NiCr22Mo9Nb)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Solid rod for welding of nickel alloys
Extreme resistance to various corrosion forms
High chromium and molybdenum content

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo	Nb	Fe
0.03	0.1	0.1	bal.	22	9	3.5	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	520	800	35	130	100

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	DIN/EN	Mat. Nr	ASTM/ACI	UNS
NiCrMo-steel Type alloy 625 and welding dissimilar high NiCrMo-steels for corrosion and heat resisting purposes				
	X1NiCrMoCuN25-20-6	1.4529	Alloy 925	N08925
	X1NiCrMoCu25-20-5	1.4539	Alloy 904L	N08904
	X1CrNiMoCuN20-18-7	1.4547	Alloy 254	S31254
	X2NiCrAlTi32-20	1.4558	Alloy 800L	N08800
	G-X10NiCrNb32-20	1.4859		
	X10NiCrAlTi32-20	1.4876	Alloy 800/800H	N08800/-10
	NiCr22Mo6Cu	2.4618	Alloy G	N06007
	NiCr22Mo7Cu	2.4619	Alloy G-3	N06985
	NiCr21Mo6Cu	2.4641	Alloy 825hMo	N08821
	NiCr20CuMo	2.4660	Alloy 20	N08020
	NiCr15Fe	2.4816	B168-Alloy 600	N06600
	NiCr22Mo9Nb	2.4856	B443-Alloy 625	N06625
	NiCr21Mo	2.4858	B424-Alloy 825	N08825
	NiCr20Ti	2.4951	Alloy 75	N06075
	NiCr20TiAl	2.4952	Alloy 80A	N07080
Low alloy steels				
	10Ni14 (3.5% Ni)	1.5637	ASTM A333 Grade 3	-
	12Ni19, X12Ni5	1.5680	-	K41583
9% Ni-steel for LNG storage tanks				
	X8Ni9	1.5662	A353/A353M	-
	X8Ni9 / 8%Ni	1.5662	A553/A553M Type I/II	- / K71340

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
2.5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT NiCro 60/20: rev. C-EN23-01/02/16

GTAW

LNT NiCro 70/19

CLASSIFICATION

AWS A5.14	ERNiCr-3	**A-Nr**	-	**Mat-Nr**	2.4806
ISO 18274	S Ni 6082 (NiCr20Mn3Nb)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Solid rod for welding nickel based alloys, dissimilar metals and cladding
High resistance to oxidation and high impact toughness at low temperature

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Nb	Cu	Fe
0.03	3.0	0.2	bal.	20	2.5	0.1	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -196°C
Typical values	I1	AW	400	680	40	150	120

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	BS3076	DIN 17744/17465 SEW 595	Mat. Nr	ASTM/ACI B366	UNS
Ni-base high Cr alloyed steel for low and high corrosion searching application					
	Na 14	NiCr15Fe	2.4816	B168-Alloy 600	N06600
		LC-NiCr15Fe	2.4817	Alloy 600L	N06600
		NiCr20Ti	2.4951	Alloy 75	
		NiCr20TiA1	2.4952	Alloy 80A	N07080
	Na 15	X10NiCrAlTi32-20	1.4876	Alloy 800/800H	N0800/10
		NiCr23Fe	2.4851	Alloy 601(H)	N06601
	Na 17	X12NiCrSi36-16	1.4864	330	N08330
		G-X40NiCrNb35-25	1.4852		
		G-X40NiCrSi35-25	1.4857	HP	

Un- and low alloy heat and creep resistant steel to stainless steel

APPLICATION ADVICE

Limit heat-input (HI<1.5kJ/mm) and interpass temperature (Ti<150°C)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2
2.5 kg PE-Tube	X	X	X

Note : Cut length = 1000 mm

LNT NiCro 70/19: rev. C-EN24-01/02/16

LNT NiCroMo 59/23

CLASSIFICATION

AWS A5.14	ERNiCrMo-13	**A-Nr**	-	**Mat-Nr**	2.4607
ISO 18274	S Ni 6059 (NiCr23Mo16)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Solid rod for welding nickel base alloys with high CrMo content
Excellent resistance against pitting, stress, and crevice corrosion in acid sulfur phosphorus and chlorine surroundings
Suitable for dissimilar joints

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Cr	Mo	Al	Fe
0.015	0.5	0.06	59	23	16	0.4	1.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	AW	400	700	25	90

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	DIN 17744	Mat. Nr	ASTM / ACI	UNS
Ni-base high CrMo steel				
	NiCr23Mo16	2.4605		N06059
	NiMo16Cr16Ti	2.4610	C-4	N06455
	NiMo16Cr15Ti	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiCr22Mo9Nb	2.4856	625	N06625
High Mo stainless steel for high corrosion environments				
	EN 10088-1/-2			
	X1NiCrMoCuN25-20-7	1.4529	904hMo	N08925
	X1CrNiMoCuN20-18-7	1.4547		S31254

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	*Note : Cut length = 1000 mm*
2.5 kg PE-Tube	X	X	X	

LNT NiCroMo 59/23: rev. C-EN23-01/02/16

LNT NiCu 70/30

CLASSIFICATION

AWS A5.14	ERNiCu-7	**A-Nr**	-	**Mat-Nr**	2.4377
ISO 18274	S Ni 4060 (NiCu30MnTi)	**F-Nr**	42		
		9606 FM	6		

GENERAL DESCRIPTION

Solid rod for welding Monel and NiCu-alloys to mild and low alloy steels
Can be used as well for welding mild and low alloy steels to NiCu alloys
High resistance to seawater corrosion

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	**Mn**	**Si**	**Ni**	**Cu**	**Fe**	**Ti**
0.06	3.5	0.5	65	30	1.1	2.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	**Condition**	**Yield strength (N/mm²)**	**Tensile strength (N/mm²)**	**Elongation (%)**	**Impact ISO-V(J) +20°C**	**Impact ISO-V(J) -196°C**
Typical values	I1	AW	350	560	40	160	140

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	**BS3076**	**DIN 17743**	**Mat. Nr**	**ASTM/ACI**	**UNS**
	NA 13	NiCu30Fe	2.4360	Monel 400	N04400
		G-NiCu30Nb	2.4365		
	NA 18	NiCu30Al	2.4375	Monel K500	N05500

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**	**2.0**	**2.4**	**3.2**
2.5 kg PE-Tube	X	X	X	X

Note : Cut length = 1000 mm

LNT NiTi

CLASSIFICATION

AWS A5.14	ERNi1	**A-Nr**	-	**Mat-Nr**	2.4155
ISO 18274	S Ni 2061 (NiTi3)	**F-Nr**	41		
		9606 FM	6		

GENERAL DESCRIPTION

Solid wire for welding pure nickel and nickel alloys and joining these materials with non alloy/low alloy steel
Suitable for surfacing carbon steels

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Ti	Fe
0.03	0.5	0.4	bal.	2.8	0.06

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	AW	250	460	30	120

EXAMPLES OF MATERIALS TO BE WELDED

DIN-classification	Mat. Nr	ASTM/ACI
Ni 99.6	2.4060	
Ni 99.8	2.4050	
Ni 99.6Si	2.4056	
Ni 99.4Fe	2.4062	
Ni 99.2	2.4066	Alloy 200
LC-Ni 99	2.4068	Alloy 201
LC-Ni 99.6	2.4061	Alloy 205
NiMn10	2.4108	
NiMn5	2.4116	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	*Note : Cut length = 1000 mm*
2.5 kg PE-Tube	X	X	

LNT NiTi: rev. C-EN24-01/02/16

LNT CuNi30

CLASSIFICATION

AWS A5.7	ERCuNi	**A-Nr**	-	**Mat-Nr**	2.0837
EN 14640	S Cu 7158 (CuNi30)	**F-Nr**	34		
		9606 FM	-		

GENERAL DESCRIPTION

Solid rod for welding copper-nickel alloys containing 10-30%Ni

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Ni	Si	Ti	Fe
bal.	0.75	30	0.05	0.35	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB	Impact ISO-V(J) +20°C
Typical values	I1	AW	250	400	30	70	100

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades	Standard	Type	Mat. Nr	UNS
Copper-nickel wrought alloys				
	DIN 17664	CuNi10Fe1Mn	2.0872	C 70600
		CuNi30Mn1Fe	2.0882	C 71500
		CuNi30Fe2Mn2	2.0883	C 71600
Copper-nickel cast alloys				
	DIN 17658	G-CuNi10	2.0815	
		G-CuNi30	2.0835	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4
2.5 kg PE-Tube	X	X	X

LNT CuSn6

CLASSIFICATION

AWS A5.7	ERCuSn-A	**A-Nr**	-	**Mat-Nr**	2.1022
EN ISO 24373	S Cu 5180 (CuSn6P)	**F-Nr**	33		
		9606 FM	-		

GENERAL DESCRIPTION

Solid rod for welding of copper-tin alloys

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Sn	P
bal.	6.0	0.2

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2 proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB	Impact ISO-V(J) +20°C
Typical values	I3	AW	150	260	20	75	80

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades	Standard	Type	Mat. Nr
Copper-tin wrought alloys			
	DIN 17662	CuSn4	2.1016
		CuSn6	2.1020
		CuSn8	2.1030
Copper-tin cast alloys			
	DIN 1705	G-CuSn2ZnPb	2.1098
		G-CuSn5ZnPb	2.1096
		G-CuSn6ZnNi	2.1093

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2
2.5 kg PE-Tube	X	X	X

LNT CuSn6: rev. EN 27-01/02/16

LNT CuSi3

CLASSIFICATION

AWS A5.7	ERCuSi-A	**A-Nr**	-	**Mat-Nr**	2.1461
EN ISO 24373	S Cu 6560 (CuSi3Mn1)	**F-Nr**	32		
		9606 FM	-		

GENERAL DESCRIPTION

Solid rod for GTA-welding of low alloy copper grades
High temperature and corrosion resistant

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Sn	Mn	Si	Zn
bal.	0.1	1.0	3.0	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB	Impact ISO-V(J) +20°C
Typical values	I1	AW	120	350	40	95	60

EXAMPLES OF MATERIALS TO BE WELDED

Copper, low alloy copper and copper-zinc alloys

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
2.5 kg PE-Tube	X	X

SuperGlaze® TIG 1070

CLASSIFICATION

		A-Nr	-
ISO 18273	S Al 1070 (Al99.7)	**F-Nr**	21
		Mat-Nr	3.0259

GENERAL DESCRIPTION

Highly resistant to chemical corrosion and good crack resistance
Suitable for electrical and chemical applications utilizing aluminium base metal with little or no alloying elements
Like all 1xxx filler alloys. Al 1070 is one of the softest aluminium MIG wire and requires extra care to ensure good feeding

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	V	Ti	Be
min. 99.7	max. 0.2	max. 0.25	max. 0.04	max. 0.03	max. 0.03	0	max. 0.04	max. 0.05	max. 0.03	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.03%

GTAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range : 647 - 658°C
Density : approximately 2700 kg/m³

APPLICATIONS

Joining 1xxx alloys to themselves or other alloys
Bus Bars
Electrical Boxes
Heat Exchangers
Metallizing
Electro-technical. Chemical. Construction and Food Industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2
5 kg cardboard box	X	X	X

Note : Cut length = 1000 mm

Superglaze® TIG 1070: rev. C-EN02-01/02/16

SuperGlaze® TIG 1100

CLASSIFICATION

AWS 5.10	R1100	**A-Nr**	-
ISO 18273	S Al 1100 (Al99.0Cu)	**F-Nr**	21
EN 573.3	EN AW-Al99.0Cu	**Mat-Nr**	-

GENERAL DESCRIPTION

Highly resistant to chemical corrosion and good crack resistance
Suitable for electrical and chemical applications utilizing aluminium base metal with little or no alloying elements
Like all 1xxx filler alloys. Al 1100 is one of the softest aluminium MIG wire and requires extra care to ensure good feeding

SHIELDING GASES (ACC. ISO 14175)

I1	Inert gas Ar (100%)
Flow rate	14.2 - 23.6L/min

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
min. 99.0	A	A	0.05-0.20	max. 0.05	0	0	max. 0.10	0	max. 0.0003

Notes : A = Si+Fe max. 0.95
Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range	: 647 - 658°C
Density	: approximately 2700 kg/m³

APPLICATIONS

Joining 1xxx alloys to themselves or other alloys
Bus Bars
Electrical Boxes
Heat Exchangers
Metallizing
Electro-technical. Chemical. Construction and Food Industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0
5 kg cardboard box	X	X	X	X	X

Note : Cut length = 1000 mm

SuperGlaze® TIG 4043

CLASSIFICATION

AWS 5.10	R4043	**A-Nr**	-
ISO 18273	S Al 4043A (AlSi5)	**F-Nr**	23
EN 573.3	EN AW-AlSi5	**Mat-Nr**	3.2245

GENERAL DESCRIPTION

Designed for welding heat treatable base alloys and more specifically 6xxx Series Alloys
Lower melting point and fluidity that 5xxx series filler alloys
Low sensitivity to weld cracking with 6xxx base alloys
Suitable for sustained elevated temperature service. i.e. above 65ºC

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)
Flow Rate : 14.2 - 23.6 L/min

APPROVALS

ABS	DB	TÜV
+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	4.5-6.0	max. 0.6	0.05-0.020	max. 0.05	0	-	max. 0.1	0	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	20-40	120-165	3-18

PHYSICAL PROPERTIES

Melting range : 573 - 625ºC
Density : approximately 2680 kg/m3

APPLICATIONS

For welding 6XXX alloys. and most casting alloys
Automotive components such as frame and drive shafts
Bicycle frames

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**	**2.0**	**2.4**	**3.2**	**4.0**	**4.8**
5 kg cardboard box	X	X	X	X	X	X

Note : Cut length = 1000 mm

Superglaze® TIG 4043: rev. C-EN22-01/02/16

SuperGlaze® TIG 4047

CLASSIFICATION

AWS 5.10	R4047	**A-Nr**	-
ISO 18273	S Al 4047 (AlSi12)	**F-Nr**	23
EN 573.3	EN AW-AlSi12	**Mat-Nr**	3.2585

GENERAL DESCRIPTION

Lower melting point and higher fluidity than 4043 wires
Can be used as a substitute for 4043 to increase silicon content in the weld metal and minimize hot cracking and produce higher fillet weld shear strength
Can be used as a brazing alloy

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)
Flow Rate : 14.2 - 23.6 L/min

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	11-13	max. 0.8	max. 0.30	max. 0.15	0.10	0	max. 0.20	0	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	60-80	130-190	5-20

PHYSICAL PROPERTIES

Melting range : 573 - 585°C
Density : approximately 2680 kg/m3

APPLICATIONS

For welding 6XXX alloys. and most casting alloys
Automotive components , radiators and air conditionning

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
5 kg cardboard box	X	X	X	X

Note : Cut length = 1000 mm

Superglaze® TIG 4047: rev. C-EN22-01/02/16

SuperGlaze® TIG 5087

CLASSIFICATION

		A-Nr	-
ISO 18273	S Al 5087 (AlMg4,5MnZr)	**F-Nr**	22
		Mat-Nr	3.3546

GENERAL DESCRIPTION

Designed to meet the tensile strength requirements of high magnesium alloys
For base metals with a max. of 5% Mg
The presence of Zirconium produces a fine-grained weld metal structure
Reduced tendency of solidification cracking in highly restrained welds

SHIELDING GASES (ACC. ISO 14175)

I1 : Inert gas Ar (100%)
I3 : Inert gas Ar+ 0.5-95% He

Flow Rate : 8 - 15 L/min

APPROVALS

GL	LR	DB	TÜV	WIWeb	
+*	+*	+	+	+	**(Valid for I1 and I3 gases)*

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Be
bal.	max. 0.25	max. 0.4	max. 0.05	0.7-1.1	4.5-5.2	0.05-0.25	max. 0.25	max. 0.15	0.10-0.20	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	125-140	275-300	17-30

PHYSICAL PROPERTIES

Melting range : 568 - 638°C
Density : approximately 2660 kg/m3

APPLICATIONS

Marine fabrication and repair
Cryogenic tanks
Shipbuilding and other high strength structural aluminium applications
Railway Industry
Automotive Industry
Trailer Industry and Offshore

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
5 kg cardboard box	X	X	X	X	X	X

SuperGlaze® TIG 5183

CLASSIFICATION

AWS 5.10	R5183	**A-Nr**	-
ISO 18273	S Al 5183 (AlMg4.5Mn0.7(A))	**F-Nr**	22
EN 573.3	EN AW-AlMg4.5Mn	**Mat-Nr**	3.3548

GENERAL DESCRIPTION

Designed to meet the tensile strength requirements of magnesium alloys
For base materials 5083 and 5654

SHIELDING GASES (ACC. ISO 14175)

I1 : Inert gas Ar (100%)
I3 : Inert gas Ar+ 0.5-95% He

Flow Rate : 8 - 15 L/min

APPROVALS

ABS	GL	LR	DB	TÜV	DNV	BV	WIWeb
+	+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.4	max. 0.4	max. 0.1	0.5-1.0	4.3-5.2	0.05-0.25	max. 0.25	max. 0.15	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	125-165	270-290	16-25

PHYSICAL PROPERTIES

Melting range : 568 - 638°C
Density : approximately 2660 kg/m3

APPLICATIONS

Marine fabrication and repair
Cryogenic tanks
Shipbuilding and other high strength structural aluminium applications
Military Industry
Railway & Automotive Industry
Trailer Industry and Offshore

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0
5 kg cardboard box	X	X	X	X	X

Superglaze® TIG 5183: rev. C-EN23-01/02/16

SuperGlaze® TIG 5356

CLASSIFICATION

AWS 5.10	R5356	**A-Nr**	-
ISO 18273	S Al 5356 (AlMg5Cr(A))	**F-Nr**	22
EN 573.3	EN AW-AlMg5	**Mat-Nr**	3.3556

GENERAL DESCRIPTION

General purpose filler alloy for welding 5XXX series alloys when 276 MPa tensile strength is not required.
Excellent colour match after anodizing

SHIELDING GASES (ACC. ISO 14175)

I1 : Inert gas Ar (100%)
I3 : Inert gas Ar+ 0.5-95% He

Flow Rate : 8 - 15 L/min

APPROVALS

ABS	GL	LR	DB	TÜV	DNV	BV
+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.25	max. 0.4	max. 0.1	0.05-0.2	4.5-5.5	0.05-0.20	max. 0.1	0.06-0.2	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	110-120	240-296	17-26

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2640 kg/m3

APPLICATIONS

Structural frames in the shipbuilding industry
Furniture. Storage tanks
Railway Industry
Automotive and trailer Industry
Formed truck panels
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**	**2.0**	**2.4**	**3.2**	**4.0**	**5.0**
5 kg cardboard box	X	X	X	X	X	X

Note : Cut length = 1000 mm

Supergaze® TIG 5356 rev. C-EN22-01/02/16

SuperGlaze® TIG 5554

CLASSIFICATION

AWS 5.10	R5554	**A-Nr**	-
ISO 18273	Al 5554	**F-Nr**	
		Mat-Nr	

GENERAL DESCRIPTION

SHIELDING GASES (ACC. ISO 14175)

I1 : Inert gas Ar (100%)
I3 : Inert gas Ar+ 0.5-95% He

Flow Rate : 8 - 15 L/min

APPROVALS

ABS

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.25	max. 0.4	max. 0.1	0.5-1.0	4.7-5.5	0.05-0.20	max. 0.25	0.05-0.20	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)
Typical values	I1	AW	125-145	275-295	17-25

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2660 kg/m3

APPLICATIONS

Structural frames in the shipbuilding industry
Furnitures. Storage tanks
Railway Industry
Automotive and trailer Industry
Formed truck panels
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4
5 kg cardboard box	X	X	X

SuperGlaze® TIG 5754

CLASSIFICATION

AWS 5.10	Al 5754	**A-Nr**	-
ISO 18273	S Al 5754 (AlMg3)	**F-Nr**	22
		Mat-Nr	3.3536

GENERAL DESCRIPTION

Magnesium alloyed aluminium for welding of alloys with a maximum of 3.5% Mg
Good corrosion resistance and excellent colour match after anodizing
Suitable for a wide range of applications in general construction and structural industry

SHIELDING GASES (ACC. ISO 14175)

I1 : Inert gas Ar (100%)
I3 : Inert gas Ar+ 0.5-95% He

Flow Rate : 8 - 15 L/min

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Al	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be
bal.	max. 0.4	max. 0.4	max. 0.1	max. 0.5	2.6-3.6	max. 0.3	max. 0.20	max. 0.15	max. 0.0003

Notes : Unspecified elements should not exceed a total of 0.15%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	70-80	180-200	15-20

PHYSICAL PROPERTIES

Melting range : 580 - 642°C
Density : approximately 2660 kg/m3

APPLICATIONS

General Construction Industry
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**	**2.0**	**2.4**	**3.2**	**4.0**	**Note : Cut length = 1000 mm**
5 kg cardboard box	X	X	X	X	X	

Superglaze® TIG 5754: rev. C-EN01-01/02/16

LNG I

CLASSIFICATION

AWS 5.2	R45*	**A-Nr**	1	**Mat-Nr**	1.0324
EN 12536	O I	**F-Nr**	6		
* Nearest classification		**Mat-Nr**	-		

GENERAL DESCRIPTION

Rods for oxy-acetylene gas welding of general construction steel
Suitable for mild steel
Max. design temperature 350°C

CHEMICAL COMPOSITION (W%) TYPICAL WIRES

C	Mn	Si	P	S	Cr	Ni	Mo
0.07	0.5	0.1	0.01	0.01	0.04	0.03	0.01

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	AW	280	390	16	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Type
Pipe material	L210 up to L290
General structural steels	S185 up to S275

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	3.0
5 kg cardboard box	X	X

LNG I: rev. C-EN23-01/02/16

LNG II

CLASSIFICATION

AWS 5.2	R60*	**A-Nr**	1	**Mat-Nr**	1.0349
EN 12536	O II	**F-Nr**	6		
* Nearest classification		**Mat-Nr**	-		

GENERAL DESCRIPTION

Rods for oxy-acetylene gas welding of general construction steel
Suitable for mild steel
max. design temperature 350°C
Higher strength than LNG I

CHEMICAL COMPOSITION (W%) TYPICAL WIRES

C	Mn	Si	P	S
0.10	1.1	0.15	0.01	0.01

GTAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	AW	320	430	17	60

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Type
Pipe material	L210 up to L290
General structural steels	S185 up to S275

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.5	3.0	4.0
5 kg cardboard box	X	X	X	X	X

LNG II: rev. C-EN23-01/02/16

LNG IV

CLASSIFICATION

AWS 5.2	R65*	**A-Nr**	2	**Mat-Nr**	1.5425
EN 12536	O IV	**F-Nr**	6		
* Nearest classification		**Mat-Nr**	-		

GENERAL DESCRIPTION

Rods with 0.5% Mo for oxy-acetylene gas welding of fine grained and creep resisting steel
Design temperature max. 500°C

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRES

C	Mn	Si	P	S	Mo
0.09	1.0	0.19	0.01	0.01	0.50

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	AW	380	500	22	60

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Pipe material	EN 10208-2	L210 up to L290
General structural steels		S185 up to S275
Boiler and pressure vessel steel		P295, P355, 16Mo3

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.5	3.0	4.0
5 kg cardboard box	X	X	X	X

LNG IV: rev. C-EN23-01/02/16

FLUX-CORED WIRES

Outershield® MC700

CLASSIFICATION

AWS A5.18	E70C-6M H8	**A-Nr**	1
EN ISO 17632-A	T 46 2 M M 2 H10	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

All position high efficiency gas shielded metal cored wire
Excellent arc characteristics give outstanding operator appeal
Very few silicates, virtually no spatter, fast travel speed, excellent wire feeding
Superior product consistency with optimal alloy control

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
M21	0.05	1.35	0.6	0.015	0.023	5 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -30°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	
Typical values	M21	AW	475	560	24	75	45

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

FCAW

Outershield® MC700

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Short arc	15	230	100	15	1.1	1.10
			320	120	16	1.4	1.10
			400	150	17	1.9	1.10
1.2	Spray arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A	230-380A	230-300A	130-170A	140-175A
	26-36V	26-36V	26-30V	15-17V	16-17V

Outershield® MC710-H

CLASSIFICATION

AWS A5.18	E70C-6M H4	**A-Nr**	1
EN ISO 17632-A	T 46 3 M M 2 H5 (ø1.2 and 1.6 mm)	**F-Nr**	6
	T 46 2 M M 2 H5 (ø2.0 and 2.4 mm)	**9606 FM**	1

GENERAL DESCRIPTION

All position high efficiency gas shielded metal cored wire
Excellent arc characteristics give outstanding operator appeal
Very few silicates, virtually no spatter, fast travel speed, excellent wire feeding
Superior on scaled plate, good resistance to porosity
Very good mechanical properties (CVN >47J at -30°C)
Superior product consistency with optimal alloy control

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DB	DNV	GL	LR	RINA	RMRS	TÜV
M21	3YSAH5	SA3YMH5	+	IIIYMS(H5)	3YH5S	3YSH5	3YS	3YSH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
M21	0.05	1.35	0.6	0.015	0.023	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°C/-30°C	Impact ISO-V(J) -40°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27	
EN ISO 17632-A (1.2-1.6)			min. 460	530-680	min. 20		min. 47	
Typical values	M21	AW	495	570	26	90	60	
	M21	SR	430	530	28		105	75

SR : 15h/580°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2	1.4	1.6
5 kg plastic spool S200	X	X		
15 kg spool B300	X	X	X	X
25 kg wire reel B435			X	X
200 kg Accutrak® Drum	X	X	X	X
270 kg metal coil				X

Outershield® MC710-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Short arc	15	230	100	15	1.1	1.10
			320	120	16	1.4	1.10
			400	150	17	1.9	1.10
1.2	Spray arc	20	940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10
			445	170	27-29	2.5	1.10
1.4	Spray arc	25	890	270	29-32	5.0	1.10
			1400	355	32-34	8.1	1.10
			635	325	29-32	5.0	1.10
1.6	Spray arc	25	890	400	34-37	7.0	1.10
			1145	460	36-38	9.1	1.10
			320	290	25-27	3.7	1.05
2.0	Spray arc	28	510	385	28-31	6.1	1.05
			760	510	32-35	9.3	1.05
				400	28-32		
2.4	Spray arc	30		475	28-32		
				550	30-34		

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-380A 26-36V	230-380A 26-36V	230-300A 26-30V	130-170A 15-17V	140-175A 16-17V
1.4	240-385A 26-36V	240-385A 26-36V	240-340A 26-31V	160-180A 14-15V	175-185A 15-16V
1.6	280-460A 28-36V	280-460A 28-36V	270-300A 28-30V		
2.0	300-510A 28-33V	300-510A 28-33V			
2.4	400-550A 32-36V	400-550A 32-36V			

Outershield® MC710C-H

CLASSIFICATION

AWS A5.18	E70C-6C H4	**A-Nr**	1
EN ISO 17632-A	T 46 3 M C 2 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

All position high efficiency CO_2 shielded metal cored wire
Excellent arc characteristics give outstanding operator appeal
Few silicates and virtually no spatter, fast travel speed, excellent wire feeding
Superior on primed or scaled plate, high resistance to porosity on primed plate
Very good mechanical properties (CVN >47J at -30°C)
Superior product consistency with optimal alloy control

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
C1 : Active gas 100%
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DNV	GL	LR	RINA	TÜV
C1	3YSAH5	3YH5	III YMS	3YH5	3YH5	3YSh5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
C1	0.05	1.35	0.6	0.015	0.023	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°C/-30°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20		min. 47
Typical values	C1	AW	490	585	27	90	70

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

FCAW

Outershield® MC710C-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Short arc	15	230	100	15	1.1	1.10
			320	120	16.5	1.4	1.10
			400	150	17	1.9	1.10
1.2	Spray arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-380A 26-36V	230-380A 26-36V	230-300A 26-30V	100-170A 16-17V	140-175A 16-17V

Outershield® MC715-H

CLASSIFICATION

AWS A5.18	E70C-6M H4	**A-Nr**	1
EN ISO 17632-A	T 46 4 M M 2 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Metal cored gas shielded wire for all positions
Few silicates and virtually no spatter, fast travel speed, excellent wire feeding
Excellent arc characteristics give outstanding operator appeal
Excellent mechanical properties (CNV >47J at -40°C)
Superior product consistency with optimal alloy control
Depending on application good alternative for basic flux cored wires

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	BV	DB	DNV	GL	RINA
M21	SA3,3YMHH	+	IV Y40H5	4Y40H5S	4YSH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
M21	0.04	1.5	0.4	0.012	0.020	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	-40°C	-50°C
Required: AWS A5.18			min. 400	min. 480	min. 22			
EN ISO 17632-A			min. 460	530-680	min. 20		min. 47	
Typical values	M21	AW	480	580	27	120	110	80
	M21	SR	430	485	30		120	90

SR : 2h/640°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2	1.4	1.6
5 kg plastic spool S200	X	X		
15 kg spool B300	X	X	X	X
200 kg Accutrak® Drum	X	X	X	X

Outershield® MC715-H: rev. C-EN28-12/05/16

FCAW

Outershield® MC715-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB, L445
API 5LX	X42, X46, X52, X60, X65
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M,S460ML

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Short arc	15	230	100	15	1.1	1.10
			320	120	16	1.4	1.10
			400	150	17	1.9	1.10
1.2	Spray arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10
1.4	Short arc	15	205	105	14.5	1.2	1.10
			255	125	15.0	1.5	1.10
			280	135	15.5	1.6	1.10
1.4	Spray arc	20	445	170	27-29	2.5	1.10
			890	270	29-32	5.0	1.10
			1400	355	32-34	8.1	1.10
1.6	Short arc	18	180	145	15	1.5	1.10
			205	160	16	1.7	1.10
			230	170	18	1.9	1.10
1.6	Spray arc	25	380	235	25-26	2.9	1.10
			635	325	29-32	5.0	1.10
			890	400	34-37	7.0	1.10
			1145	460	36-38	9.1	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-380A	230-380A	230-300A	130-170A	140-175A
	26-36V	26-36V	26-30V	15-17V	16-17V
1.4	240-385A	240-385A	240-340A	160-180A	175-185A
	26-36V	26-36V	26-31V	14-15V	15-16V
1.6	280-460A	280-460A	270-300A		
	28-36V	28-36V	28-30V		

Outershield® MC715Ni1-H

CLASSIFICATION

AWS A5.28	E80C-Ni1M H4	**A-Nr**	10
EN ISO 17632-A	T 46 5 1Ni M M 2 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Gas shielded 1%Ni alloyed metal cored wire for offshore and similar application
Excellent arc characteristics give outstanding operator appeal
Virtually no spatter, high travel speed and excellent wire feeding
Excellent mechanical properties (CVN >47J at -50°C)
Superior product consistency with optimal alloy control
Ni content is controlled to meet "sour service" oilfield requirements such as NACE MR0175

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	HDM
M21	0.05	1.35	0.45	0.020	0.020	0.95	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -40°C	-50°C	-60°C
Required: AWS A5.28			min. 470	min. 550	min. 24	min. 27		
EN ISO 17632-A			min. 460	530-680	min. 20		min. 47	
Typical values	M21	AW	530	600	25	100	80	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
14 kg S300 (alu bag)	X	X
15 kg spool B300	X	

Outershield® MC715Ni1-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355, S460
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Short arc	15	230	100	15	1.1	1.10
			320	120	16	1.4	1.10
			400	150	17	1.9	1.10
1.2	Spray arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10
1.6	Short arc	18	180	145	15	1.5	1.10
			205	160	16	1.7	1.10
			230	170	18	1.9	1.10
1.6	Spray arc	25	380	235	25-26	2.9	1.10
			635	325	29-32	5.0	1.10
			890	400	34-37	7.0	1.10
			1145	460	36-38	9.1	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-380A 26-36V	230-380A 26-36V	230-300A 26-30V	130-170A 15-17V	140-175A 16-17V
1.6	280-460A 28-36V		270-300A 28-30V		

Outershield® MC420N-H

CLASSIFICATION

AWS A5.28	E70C-GM H4	**A-Nr**	10
EN ISO 17632-A	T 38 Z Z M M 2 H5	**F-Nr**	6
		9606 FM	1

Note: the above mentioned classifications are an indication of the weld metal properties in the as welded condition. However, the Outershield MC420N-H is designed to be used only in the normalized condition. As neither AWS nor EN has included weld metal properties in the normalized condition, the wire cannot be classified for the condition it is designed for.

GENERAL DESCRIPTION

All position high efficiency mix gas shielded metal cored wire
Excellent arc characteristics, few silicates and virtually no spatter, excellent wire feeding
High resistance to porosity
Designed to withstand normalizing treatment (4h 900°C)
Mechanical properties after normalizing meet base material requirements
Only to be used in normalized condition!

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Cr	Ni	HDM
M21	0.03	0.6	0.45	0.017	0.023	0.03	2.9	**3 ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -50°C
Typical values	M21	N	353	493	32	57

N = 900°C/4h

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**
15 kg spool B300	X
200 kg Accutrak® Drum	X

Outershield® MC420N-H: rev. C-EN27-01/02/16

Outershield® MC420N-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
EN 10028-3	P275N, P355N
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL

The wire is only applicable for materials that will be normalized after welding

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Spray arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10
1.6	Spray arc	25	380	235	25-26	2.9	1.10
			635	325	29-32	5.0	1.10
			890	400	34-37	7.0	1.10
			1145	460	36-38	9.1	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-380A 26-36V	230-380A 26-36V	230-300A 26-30V	130-170A 15-17V	140-175A 16-17V

Outershield® MC460VD-H

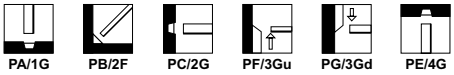
CLASSIFICATION

AWS A5.18	E70C-6M H4	**A-Nr**	10
EN ISO 17632-A	T 46 2 M M 1 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Metal cored wire for fillet welding with high efficiency
Especially for vertical down welding in thin plate
Excellent arc characteristics give outstanding operator appeal
No slag, only some silicate islands, very good wire feeding
High resistance to porosity on primed plate
Superior product consistency with optimal alloy control

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC -
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DNV	GL	LR
M21	3YSA,H5	SA3YMHHH	IIIYMSH5	3YH5S	3S,3YSH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
M21	0.05	1.25	0.6	0.015	0.015	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	
Typical values	M21	AW	510	600	25	90	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
15 kg spool B300	X

FCAW

Outershield® MC460VD-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB, L445
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S355N, S420N
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	635	180	28-30	2.7	1.10
		940	275	31-34	4.8	1.10
		1420	340	35-38	6.8	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions			
	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	250-300A 26-30V	250-300A 26-30V	200-220A 21-24V	200-220A 23-25V

Outershield® 70-H

CLASSIFICATION

AWS A5.20	E70T-1C-H4 / E70T-1M-H4	**A-Nr**	1
EN ISO 17632-A	T 46 0 R C 3 H5 / T 46 0 R M 3 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Gas shielded flux cored wire for semi-automatic or mechanized downhand welds
Low spatter, good slag removal, smooth appearance, excellent operator appeal
High deposition rate and deep penetration, good resistance to scale and rust
Reliable weld metal properties
Excellent wire feeding
Superior product consistency with optimal alloy control

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	**DB**
M21	+
C1	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	**C**	**Mn**	**Si**	**P**	**S**	**HDM**
M21	0.06	1.70	0.35	0.015	0.010	< 5 ml/100 g
C1	0.06	1.30	0.50	0.015	0.010	< 5 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	**Condition**	**Yield strength (N/mm^2)**	**Tensile strength (N/mm^2)**	**Elongation (%)**	**Impact ISO-V(J) 0°C**	**-18°C**	**-30°C**
Required: AWS A5.20			min. 400	min. 480	min. 22		min. 27	
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47		
Typical values	C1	AW	480	560	26	80		50
	M21	AW	530	610	27	70		40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.4**
25 kg wire reel B435	X
270 kg wooden reel	X

Outershield® 70-H: rev. C-EN24-01/02/16

FCAW

Outershield® 70-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
2.4	28	320	340	24-27	4.5	1.15
		510	450	28-31	7.3	1.15
		635	510	30-32	9.1	1.15
		700	535	31-34	10.0	1.15
		825	585	33-35	11.8	1.15

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS 100% CO_2

Diameter (mm)	Welding positions PA/1G	PB/2F
2.4	410-560A 27-34V	410-510A 28-32V

Outershield® 71E-H

CLASSIFICATION

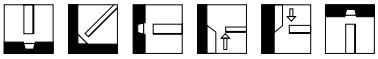
AWS A5.20	E71T-1M-JH4 / E71T-1C-H4	**A-Nr**	1
EN ISO 17632-A	T 46 3 P M 1 H5 / T 42 0 P C 1 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

All position gas shielded flux cored wire for high quality welding
Excellent operator appeal due to superior welding characteristics
Full out-of-position capability with higher deposition rates
Exceptional mechanical properties (CVN > 47J at -30°C with M21 shielding gas))
Superior product consistency with optimal alloy control
Excellent wire feeding
Very suitable for welding of root runs on ceramic backing
Designed for use with M21 Ar+15-25%CO_2 shielding gas. Suitable for use with C1 100%CO_2

2

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DB	DNV	GL	LR	RINA	RMRS	TÜV
M21	3YSAH5	SA3YMH5	+	IIIYMS(H5)	3YH5S	3YSH5	3YSH5	3YSH5	+
C1	2YSA H5			IIYMS(H5)		2YS H5			

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
M21	0.04	1.4	0.6	0.013	0.010	3 **ml/100 g**
C1	0.05	1.3	0.6	0.015	0.010	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C	-20°C	-30°C	-40°C
Required: AWS A5.20			min. 400	min. 480	min. 22				min. 27
EN ISO 17632-A			min. 460	530-680	min. 20			min. 47	
Typical values	M21	AW	570	620	25		90	65	40
	C1	AW	520	575	24	80			

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
5 kg plastic spool S200	X	
15 kg spool B300	X	X
15 kg spool S300	X	X
200kg Accutrak® Drum	X	

Outershield® 71E-H: rev. C-EN31-01/02/16

FCAW

Outershield® 71E-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
API 5LX	X42, X46, X52, X60, X65
ISO 3183	X42 - X60; L245-L415N, L245-L450Q, L245M - L450M
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235-355 GH
EN 10028-3	P235-460 N, NH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.3	1.20
		950	220	25-27	3.2	1.20
		1270	265	27-29	4.3	1.20
		1590	305	30-32	5.4	1.20
1.6	20	320	160	20-22	2.2	1.20
		510	230	21-24	3.3	1.20
		635	280	23-25	4.2	1.20
		760	300	24-26	5.0	1.20
		890	340	26-28	5.8	1.20
		1015	360	27-29	6.5	1.20
		1080	390	28-30	7.0	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G
1.2	230-260A 26-32V	230-260A 26-32V	200-240A 25-30V	200-240A 25-28V	160-220A 23-26V	160-220A 26-28V

Outershield® 71M-H

CLASSIFICATION

AWS A5.20	E71T-1/9C-H4 / E71T-1/9M-H4	**A-Nr**	1
EN ISO 17632-A	T 46 3 P C 1 H5 /T 46 2 P M 2 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Rutile gas shielded flux cored wire for high deposition and quality welding
Excellent operator appeal due to superior welding characteristics and premium slag system
Specially developed for welding with 100% CO_2 and optimised for Ar/CO_2 mix gas; smooth arc with low spatter
Suitable for welding coated plate
Perfect root pass welding on ceramic backing
Good mechanical properties (CVN > 47J at -30°C for 100% CO_2)
High current capacity, especially in positional welding
Stable mechanical properties over the wider range of heat input

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Ar + (15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DNV	GL	LR	RINA	PRS
C1	3YSAH5	SA3YMH5	3YH5S	IIIYMS(H5)	3YH5S	3YSH5	3YSH5
M21	3Y400SAH5	SA3Y40MH5	3Y40H5S	IIIY40MS(H5)	3Y40MS(H5)	3Y40SH5	3Y40SMH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
C1	0.05	1,3	0.4	0.015	0.009	3 **ml/100 g**
M21	0.05	1,47	0.5	0.015	0.009	4 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -30°C
Required: AWS A5.20			min. 400	min. 480	min. 22		
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	min. 47
Typical values	C1	AW	530	590	25		70
	M21	AW	595	650	26	80	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
5 kg spool S200	X	
15 kg spool B300	X	X
15 kg spool S300	X	X

Outershield® 71M-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025	S185, S235, S275
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

CALCULATION DATA, C1 AND M21 SHIELDING GASES

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	21-23	1,75	1.16
		700	170	22-24	2,54	1.16
		955	220	25-27	3,45	1.16
		1270	260	27-29	4,73	1.16
		1590	290	30-32	6,2	1.16
1.6	20	320	180	21-23	2,2	1.16
		510	255	22-25	3,3	1.16
		635	300	24-26	4,2	1.16
		760	335	25-27	5,0	1.16
		890	370	27-29	5,8	1.16
		1015	395	28-30	6,5	1.16
		1080	415	29-30	7,0	1.16

WELDING PARAMETERS, OPTIMUM FILL PASSES IN C1 AND M21 SHIELDING GASES

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A	160-220A
	26-32V	26-32V	25-30V	25-28V	23-26V	26-28V
1.6	250-380A	250-380A	230-280A	220-260A	170-240A	170-240A
	24-32V	24-32V	24-30V	22-28V	22-28V	22-28V

Outershield® 71MS-H

CLASSIFICATION

AWS A5.20	E71T-9C-JH4	**A-Nr**	1
EN ISO 17632-A	T 46 4 P C 2 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Rutile gas shielded flux cored wire for high deposition and quality welding
Superior arc direction and welding characteristics
Perfect root pass welding on ceramic backing
Outstanding mechanical properties (CVN > 47J at -40°C)
High current capacity, especially in out of position welding
Stable mechanical properties over the wider range of heat input

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	DNV
C1	4YSA H5	IVY40MS(H5)

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Ni	Si	P	S	HDM
C1	0.05	1.35	0.4	0.4	0.015	0.010	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.20			min. 400	min. 480	min. 22	
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47
Typical values	C1	AW	540	610	25	75

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
5 kg spool S200	X	
15 kg spool B300	X	X
15 kg spool S300	X	X

Outershield® 71MS-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN10027-1	S235 - S460; J2, K2, N and NL, M and ML
Ship plates	
ASTM, ABS, DNV	Grade A, D, EH32 to 40; NV A,D,E 32-40; NV A,D,E 420-460
Pipe material	
ISO 3183	L210, L240, L290, L360
API 5LX	X42, X46, X52, X60, X65
Boiler & pressure vessel steels	
EN 10028-2	P235-355GH
EN 10028-3	P235-460, N, NH, NL
Fine grained steels	
EN 10025 -2, -3, -4	S235, S275; S355, S420, S420, S460, S460, S460, S460 N, NL, M, ML
EN 10025	S355G, S420G grades
EN 10025-6	S460Q, QL

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	21-23	1.75	1.16
		700	170	22-24	2.54	1.16
		955	220	25-27	3.45	1.16
		1270	260	27-29	4.73	1.16
		1590	290	30-32	6.2	1.16

WELDING PARAMETERS, OPTIMUM FILL PASSES IN CO_2 SHIELDING GAS

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	160-280A 24-32V	160-280A 24-32V	160-230A 24-30V	200-240A 24-27V	150-220A 23-28V

Outershield® T55-H

CLASSIFICATION

AWS A5.20	E71T-5C-JH4 / E71T-5M-JH4	**A-Nr**	1
EN ISO 17632-A	T 42 4 B C 2 H5 / T 42 4 B M 2 H5	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

All position gas shielded basic flux cored wire
Good weldability, also vertical up (3G)
Exceptional mechanical properties (CVN >47J at -50°C)
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC -
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DB	DNV	GL	LR	RINA
M21	3SA,3YSA	SA3,3YMHH	+	IVYMSH5	4YH10S	4Y40SH15	
C1	3SA,3YSA	SA3,3YMHH	+	IVYMSH5	4YH10S	4Y40SH15	3YS

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	HDM
C1	0.05	1.5	0.55	0.012	0.010	3 ml/100 g
M21	0.06	1.5	0.6	0.012	0.010	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.20			min. 400	min. 480	min. 22		min. 27	
EN ISO 17632-A			min. 420	500-640	min. 20		min. 47	
Typical values	M21	AW	480	570	27	130	85	60
SR : 15h/580°C		SR	425	550	27		80	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**	**1.6**
15 kg spool B300	X	X

Outershield® T55-H : rev. C-EN28-01/02/16

Outershield® T55-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	510	130	25-27	1.6	1.20
		760	185	26-28	2.5	1.20
		1015	225	27-29	3.3	1.20
		1270	260	28-30	4.1	1.20
		1525	290	29-31	5.0	1.20
		1780	310	30-32	5.8	1.20
1.6	20	380	170	24-26	2.5	1.15
		510	225	25-27	3.1	1.15
		760	310	27-29	4.7	1.15
		1015	380	29-31	6.3	1.15
		1270	430	31-33	7.9	1.15

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions			
	PA/1G	PB/2F	PC/2G	PF/3Gup
1.2	215-290A	215-290A	215-250A	110-150A
	28-34V	28-34V	28-30V	17-20V
1.6	320-390A	320-390A	280-350A	130-180A
	28-34V	28-34V	28-32V	18-22V
2.4	350-550A	350-550A		
	30-34V	30-34V		

Outershield® 81Ni1-H

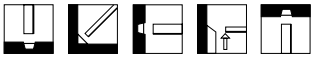
CLASSIFICATION

AWS A5.29	E81T1-Ni1M-JH4 (all diameters)	**A-Nr**	10
EN ISO 17632-A	T 50 5 1Ni P M 2 H5 (only diameter 1.2 mm)	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 1% Ni flux cored wire, offshore and similar applications
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -50°C)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meets NACE MR-0175 requirements
For PWHT, use Outershield 81Ni1-HSR

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	RINA	BV	DNV	GL	LR
M21	4YSH5	SA3,3YMHH	IVYMSH5	4YH10S	4Y40SH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	HDM
M21	0.05	1.4	0.2	0.013	0.010	0.95	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-A			min. 500	560-720	min. 18		min. 47
Typical values	M21	AW	530	600	24	90	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2	1.4	1.6	2.0
4.5 kg plastic spool S200	X	X			
14 kg S300 (alu bag)		X	X	X	X
15 kg spool B300		X		X	
15 kg spool BS300		X			

Outershield® 81Ni1-H: rev. C-EN29-19/04/16

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Outershield® 81Ni1-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-32V	24-32V	24-32V	24-28V	22-28V

Outershield® 81Ni1-HSR

CLASSIFICATION

AWS A5.29	E81T1-Ni1M-JH4	**A-Nr**	10
EN ISO 17632-A	T 50 5 1Ni P M 2 H5 T	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 1% Ni flux cored wire, offshore and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -50°C)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meets NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G** **PH/5Gu**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	BV	DNV	GL	LR
M21	4YSDH5	IVYMSH5	4YH5S	4YSH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	HDM
M21	0.05	1.4	0.2	0.013	0.010	0.95	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-A			min. 500	560-720	min. 18		min. 47
Typical values	M21	AW	530	600	24	90	60
		SR	525	590	25		70

SR 1h/600°C, 3G up - V45°

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**	**1.6**
14 kg S300 (alu bag)	X	X
15 kg spool B300	X	

Outershield® 81Ni1-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML S460ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter	Welding positions				
(mm)	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-32V	24-32V	24-32V	24-28V	22-28V

Outershield® 81Ni1C-H

CLASSIFICATION

AWS A5.29	E81T1-Ni1C-JH4	**A-Nr**	10
EN ISO 17632-A	T 50 4 1Ni P C 2 H5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position 100% CO_2 gas shielded 1% Ni flux cored wire, offshore and similar applications
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -40°C)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meets NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	HDM
C1	0.05	1.4	0.2	0.013	0.010	0.95	4 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47
Typical values	C1	AW	530	600	24	80

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® 81Ni1C-H: rev. C-EN03-01/02/16

Outershield® 81Ni1C-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

Outershield® 81K2-H

CLASSIFICATION

AWS A5.29	E81T1-K2M-JH4 (all diameters)	**A-Nr**	10
EN ISO 17632-A	T 50 6 1.5Ni P M 2 H5 (only diameter 1.2 mm)	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 1.5% Ni, Ti and B alloyed flux cored wire
Used in off-shore and similar applications
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >80J at -60°C)
Superior product consistency with optimal alloy control
Excellent wire feeding
For PWHT, use Outershield 81K2-HSR

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	RINA	LR	RMRS	CWB
M21	IVY46MSH5	4YS	4Y40SH5	4Y50SH5	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	HDM
M21	0.04	1.4	0.2	0.012	0.010	1.4	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	-50°C	-60°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27		
EN ISO 17632-A			min. 500	560-720	min. 18			min. 47
Typical values	M21	AW	590	630	23	130	100	80

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
4.5 kg plastic spool S200	X	
14 kg S300 (alu bag)	X	
15 kg spool B300	X	
25 kg wire reel B435		X

Outershield® 81K2-H: rev. C-EN27-01/02/16

Outershield® 81K2-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL, S460QL1, S500S, S500QL, S500QL1

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-32V	24-32V	24-32V	24-28V	22-28V

Outershield® 81K2-HSR

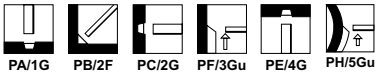
CLASSIFICATION

AWS A5.29	E81T1-K2M-JH4	**A-Nr**	10
EN ISO 17632-A	T 50 6 1.5Ni P M 2 H T	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 1.5% Ni alloyed flux cored wire for offshore and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties (CVN >80J at -60°C)
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	HDM
M21	0.06	1.3	0.3	0.012	0.010	1.4	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	-50°C	-60°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27		
EN ISO 17632-A			min. 500	560-720	min. 18			min. 47
Typical values	M21	AW	590	630	23	140	100	80
		SR	570	620	23			85

SR 1h/600°C, 3G up - V45°

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
4.5 kg plastic spool S200	X
15 kg spool B300	X

Outershield® 81K2-HSR: rev. C-EN27-12/05/16

FCAW

Outershield® 81K2-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL, S460QL1, S500S, S500QL, S500QL1

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

Outershield® 91Ni1-HSR

CLASSIFICATION

AWS A5.29	E91T1-GM-H4	**A-Nr**	10
ISO 18276-A	T 55 4 1NiMo P M 2 H5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 1% Ni and 0.4%Mo alloyed flux cored wire for offshore, pipeline and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures
Meets NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo	HDM
M21	0.05	1.4	0.2	0.013	0.010	0.95	0.4	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 540	620-760	min. 17	
ISO 18276-A			min. 550	640-820	min. 18	min. 47
Typical values	M21	AW	640	700	19	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
14 kg spool S300	X
15 kg spool B300	X

Outershield® 91Ni1-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70, X80
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH, P460GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL1, S500Q, S500QL1, S550Q, S550QL1

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

Outershield® 91K2-HSR

CLASSIFICATION

AWS A5.29	E91T1-GM-H4	**A-Nr**	10
ISO 18276-A	T 55 4 1,5NiMo P M 2 H5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 1.5% Ni and 0.4%Mo alloyed flux cored wire for offshore, pipeline and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo	HDM
M21	0.05	1.4	0.2	0.013	0.010	1.4	0.4	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 540	620-760	min. 17	
ISO 18276-A			min. 550	640-820	min. 18	min. 47
Typical values	M21	AW	640	700	19	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
4.5 kg plastic spool S200	X
14 kg spool S300	X
15 kg spool B300	X

Outershield® 91K2-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steels	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70, X80
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH, P460GH
Fine grained steels	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL1, S500Q, S500QL1, S550Q, S550QL1

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

Outershield® 101Ni1-HSR

CLASSIFICATION

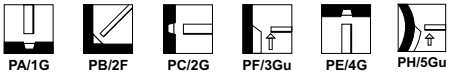
AWS A5.29 E101T1-G-H4

A-Nr 11
F-Nr 6
9606 FM 2

GENERAL DESCRIPTION

Rutile micro alloyed flux-cored wire for welding in all positions, special of high carbon containing low alloy high strength steels such as SAE 4130
Specific design for stress relieved applications
Outstanding operator appeal
Excellent mechanical properties (CVN >50J at -40°C)
Superior product consistency with optimal alloy control
Good wire feeding
Meets NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo	HDM
M21	0.06	2.0	0.3	0.013	0.010	0.95	0.4	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.29			min. 610	830	min. 16		min. 27
Typical values	M21	AW	750	810	17	60	40
		SR	690	780	18		50

SR: 4h/645°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
14 kg spool S300	X

Outershield® 101Ni1-HSR: rev. C-EN06-12/05/16

Outershield® 101Ni1-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Fine grained steels	
EN 10025 part 6	S500Q to S620QL1
AISi/SAE	4130-4140
ASTM A1031	Grade 4130
ASTM A519	Grade 4130

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-30V

Outershield® 690-H

CLASSIFICATION

AWS A5.29	E111T1-K3M-JH4	**A-Nr**	10
ISO 18276-A	T 69 4 Z P M 2 H5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded rutile flux cored wire, for high strength steel grades like grade S690
Outstanding operator appeal
Excellent mechanical properties (CVN >70J at -40°C)
Superior product consistency with optimal alloy control
Good wire feeding

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	DNV	LR	GL	RINA
M21	4YQ690H5	IVY69SH5	4Y69SH5	4Y69H5S	4Y69SH5

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo	HDM
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.3	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C	-40°C	-46°C
Required: AWS A5.29			min. 680	760-900	min. 15	min. 27		
ISO 18276-A			min. 690	770-940	min. 17		min. 47	
Typical values	M21	AW	780	810	18	85	80	65

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
4.5 kg plastic spool S200	X	
14 kg S300 (alu bag)		X
15 kg spool B300	X	X

Outershield® 690-H: rev. C-EN28-12/05/16

Outershield® 690-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Fine grained steels	
EN 10025 part 6	S500Q to S690QL1
API 5L	X100
MIL-S-162164	HY100
ASTM A514	Grade F
ASTM A517	Grade A, B, F, H, D
ASTM A709	Grade 690 type F, grade 100W type F

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-29V	24-29V	24-28V	24-26V	22-26V

Outershield® 690-HSR

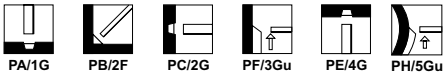
CLASSIFICATION

AWS A5.29	E111T1-K3M-JH4	**A-Nr**	10
ISO 18276-A	T 69 4 Z P M 2 H5 T	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded rutile flux cored wire, for high strength steel grades like grade S690
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Outstanding operator appeal
Excellent mechanical properties (CVN >50J at -40°C)
Superior product consistency with optimal alloy control
Good wire feeding

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo	HDM
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.5	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C/-30°C	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 680	760-900	min. 15	min. 27	
ISO 18276-A			min. 690	770-940	min. 17		min. 47
Typical values	M21	AW	740	790	19	75	70
		SR	720	770	20		60

SR: 1h/580°C, 3G up - V60°

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
15 kg spool B300	X	X

Outershield® 690-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Fine grained steels	
EN 10025 part 6	S500Q to S690QL1
API 5L	X100
MIL-S-162164	HY100
ASTM A514	Grade F
ASTM A517	Grade A, B, F, H, D
ASTM A709	Grade 690 type F, grade 100W type F

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-29V	24-29V	24-28V	24-26V	22-26V

Outershield® 500CT-H

CLASSIFICATION

AWS A5.29	E81T1-GM-H4	**A-Nr**	10
ISO 18276-A	T 50 5 Z P M 2 H5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 0.8% Ni and 0.4% Cu flux cored wire, for welding weather resistant steel (CorTen)
For welding in all positions
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -50°C)
Superior product consistency with optimal alloy control
Excellent wire feeding
For welding applications with higher service temperatures (i.e chimneys), Outershield 555CT-H is recommended.

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Cu	HDM
M21	0.04	1.3	0.2	0.014	0.010	0.84	0.39	4 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	not required
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47
Typical values	M21	AW	580	610	23	80

FCAW

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® 500CT-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Weather resisting steels	
EN 10025 part 5	S235 J0W, S235 J2W, S355 J0WP, S355 J2WP, S355 J0W, S355 J2W, S355 K2W
ASTM A242	Type 1
ASTM A588	Grade A, B, C
ASTM A595	All weather resistant steels according A595
ASTM A709	Grade HPS 50W & HPS 70W
ISO 5952	HSA 235W, 245W, 355W1, 355W2, 365W

Weather resistant steels like Cor-Ten®, Patinax®-F, Patinax®-37 and similar Ni- and Cu-alloyed steels

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

Outershield® 555CT-H

CLASSIFICATION

AWS A5.29	E81T1-W2M-JH4	**A-Nr**	2
ISO 18276-A	T555T1-1MA-NCC1-UH5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

All position gas shielded 0.6% Ni, 0,5Cr and 0.5% Cu alloyed flux cored wire, for welding weather resistant steel (CorTen)
For welding in all positions
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -50°C)
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Cr	Cu	HDM
M21	0.03	1.1	0.4	0.015	0.010	0.60	0.55	0.55	**4 ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-B			min. 460	550-740	min. 17		min. 47
Typical values	M21	AW	600	660	20	140	100

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® 555CT-H: rev. C-EN03-01/02/16

Outershield® 555CT-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Weather Resisting Steel	
EN 10025 part 5	S235 J0W, S235 J2W, S355 J0WP, S355 J2WP, S355 J0W, S355 J2W, S355 K2W
ASTM A242	Type 1
ASTM A588	Grade A, B, C
ASTM A595	All weather resistant steels according A595
ASTM A709	Grade HPS 50W & HPS 70W
ISO 5952	HSA 235W, 245W, 355W1, 355W2, 365W

Weather resistant steels like Cor-Ten®, Patinax®-F, Patinax®-37 and similar Ni- and Cu-alloyed steels

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

Outershield® MC555CT-H

CLASSIFICATION

AWS A5.28	E80C-W2 H4	**A-Nr**	2
EN ISO 17632-B	T554T15-0MA-NCC1-UH5	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Gas shielded 0,5%Ni-0,5%Cu-0,5%Cr alloyed metal cored wire for welding weather resistant (CorTen) steel grade
Excellent arc characteristics give outstanding operator appeal
Virtually no spatter, high travel speed and excellent wire feeding
Excellent mechanical properties (CVN >47J at -40°C)
Superior product consistency with optimal alloy control

APPROVALS

Shielding gas	TUV
M21	+

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Cr	Cu	HDM
M21	0.03	1.3	0.4	0.015	0.020	0.55	0.55	0.55	**3 ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	-40°C	-50°C
Required: AWS A5.28			min. 470	min. 550	min. 19	min. 27		
EN ISO 17632-B			min. 460	550-740	min. 17		min. 47	
Typical values	M21	AW	650	680	22	80	70	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® MC555CT-H: rev. C-EN02-01/02/16

FCAW

Outershield® MC555CT-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Weather resisting steels	
EN 10155 / 100025-5	S235 J0W, S235 J2W, S355 J0W, S 355 J0WP, S 355 J2 W, S 355 J2WP, S 355 J2G1W, S 355 J2G2W, S 355 K2G1W, S 355 K2G2W
ASTM A242	Type 1
ASTM A588	Grade A, B, C, K
ASTM A709	Grade HPS 50 & WHPS 70W
ISO 5952	HSA 235W, 245W, 355W1, 355W2, 365W
Without classification:	Specified yield up to 550 MPa Specified CVN down to -50°C

CALCULATION DATA

Diameter (mm)	Arc mode	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	Short arc	15	230	100	15	1.1	1.10
			320	120	16	1.4	1.10
			400	150	17	1.9	1.10
	Spray Arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-380A 26-36V	230-380A 26-36V	230-300A 26-30V	130-170A 15-17V	140-175A 16-17V

Outershield® 12-H

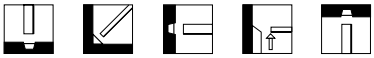
CLASSIFICATION

AWS A5.29	E81T1-A1M-H4	**A-Nr**	2
ISO 17634-A	T MoL P M 2 H5	**F-Nr**	6
		9606 FM	1/3

GENERAL DESCRIPTION

All position mix gas shielded 0.5% Mo-alloyed rutile cored wire
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	TÜV
M21	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Mo	HDM
M21	0.065	0.8	0.2	0.014	0.010	0.46	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.29		SR[1]	min. 470	550-690	min. 19	not required	
ISO 17634-A		SR[2]	min. 355	min. 510	min. 22	min. 47	
Typical values	M21	SR[3]	540	600	27	160	79

Stress relieving: SR[1] = 620 ± 15°C/1h, SR[2] = 570-620°C/1h, SR[3] = 1h/620°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® 12-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	P295GH, P355GH, 16Mo3 & similar alloys
EN 10222-2	17Mo3, 14Mo6 & similar alloys
ASTM A335	Grade P1
ASTM A209	Grade T1
ASTM A250	Grade T1
ASTM A336	Grade F1
ASTM A204	Grade A, B, C
ASTM A217	Grade WC1
ASTM A352	Grade LC1
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

REMARKS/APPLICATION ADVICE

Recommended tempering heat treatment range: 570-630°C
Time depends on material thickness

Outershield® 19-H

CLASSIFICATION

AWS A5.29	E 81T1-B2M-H4	**A-Nr**	3
ISO 17634-A	T CrMo1 P M 2 H5	**F-Nr**	6
		9606 FM	3

GENERAL DESCRIPTION

All position mix gas shielded 1.25% Cr 0.5% Mo-alloyed rutile cored wire
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	TÜV
M21	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Cr	Mo	HDM
M21	0.07	0.74	0.24	0.013	0.010	1.24	0.52	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.29		SR[1]	min. 470	550-690	min. 19	not required	
ISO 17634-A		SR[2]	min. 355	min. 510	min. 20	min. 47	
Typical values	M21	SR[3]	545	635	21	150	80

Stress relieving: SR[1] = 690 ± 15°C/1h, SR[2] = 660-700°C/1h, SR[3] = 1h/690°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® 19-H: rev. C-EN25-01/02/16

Outershield® 19-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	13CrMo4-5 & similar alloys
EN 10083-1	25CrMo4 &similar alloys
EN 10222-2	14CrMo4-5 & similar alloys
ASTM A387	Grade 11 & 12
ASTM A182	Grade F1 & F12
ASTM A217	Grade WC6 & WC11
ASTM A234	Grade WP11 & WP12
ASTM A199	Grade T11
ASTM A200	Grade T11
ASTM A213	Grade T11 & T12
ASTM A335	Grade P11 & P12
Tool steel	
DIN 17210	16MnCr5 & similar alloys

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

REMARKS/APPLICATION ADVICE

Recommended preheat temperature: 200 - 250°C
Recommended tempering heat treatment range: 660-700°C
Time depends on material thickness

Outershield® 20-H

CLASSIFICATION

AWS A5.29	E 91T1-B3M-H4	**A-Nr**	4
ISO 17634-A	T CrMo2 P M 2 H5	**F-Nr**	6
		9606 FM	3

GENERAL DESCRIPTION

All position mix gas shielded 2.25% Cr 1% Mo-alloyed rutile cored wire
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	TÜV
M21	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Cr	Mo	HDM
M21	0.07	0.75	0.21	0.013	0.008	2.23	1.09	3 **ml/100 g**

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.29		SR[1]	min. 540	620-760	min. 17	not required	
ISO 17634-A		SR[2]	min. 400	min. 500	min. 18	min. 47	
Typical values	M21	SR[3]	570	680	19	150	60

Stress relieving: SR[1] = 690 ± 15°C/1h, SR[2] = 690-750°C/1h, SR[3] = 1h/690°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool B300	X

Outershield® 20-H: rev. C-EN26-01/02/16

Outershield® 20-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	10CrMo9-10 & similar alloys
EN 10222-2	12CrMo9-10 & similar alloys
ASTM A387	Grade 21 & 22
ASTM A182	Grade F22
ASTM A217	Grade WC9
ASTM A234	Grade WP22
ASTM A199/A200	Grade T21 & T22
ASTM A213	Grade T22
ASTM A335	Grade P22

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V

REMARKS/APPLICATION ADVICE

Recommended preheat temperature: 200 - 250°C
Recommended tempering heat treatment range: 690-750°C
Time depends on material thickness

Innershield® NR®152

CLASSIFICATION

AWS A5.20	E71T-14	**A-Nr**	1
AWS A5.36	E71T-14S	**F-Nr**	6
EN ISO 17632-A	T 42 Z Z N 5	**9606 FM**	1

GENERAL DESCRIPTION

Designed for high speed welding of specially coated steels
Soft, consistent arc
Porosity resistant
Excellent overlapping capabilities
Ideal for robotic applications

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al	Ti	N
0.30	0.99	0.24	0.013	0.007	1.63	0.003	0.051

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)
Required: AWS A5.20		not required	480	not required	not required
Typical values	AW		525*		

* Flat tensile test specimen

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.6**
22.68 kg coil 50C	X

Innershield® NR®152

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.6	13	75	90	13	0.55	1.11
		125	150	15	0.9	1.11
		280	250	19	2.0	1.11

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions PA/1G PB/2F	PC/2G	PG/3G down
1.6	Wire feed speed (cm/min)	180	150	200
	Current (A)	205	170	220
	Voltage (V)	16.5	18.5	19.5

REMARKS/APPLICATION ADVICE

Spot welds on 0.75mm to 1.5mm thick material
These procedures include automatic processes where excellent striking is required
Galvanized or zinc coated steel may be welded with Innershield NR-152 at travel speeds of 75 to 100 cm/min. The joint design must permit the zinc oxide vapor to diffuse through the molten puddle or to the atmosphere

Innershield® NR®203 NiC

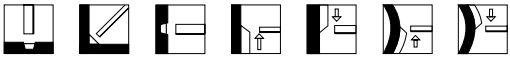
CLASSIFICATION

AWS A5.29	E61T8-K6	**A-Nr**	1
		F-Nr	6
		9606 FM	1

GENERAL DESCRIPTION

Self shielded: easiest equipment arrangement
All position welding
Easy to weld in vertical up position
All passes
Good impact and CTOD toughness

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC -

APPROVALS

ABS	DNV	LR
3SA	IIIMSH15	3SH15

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Cr	Al	V	Mo
0.06	0.83	0.05	0.004	0.003	0.57	0.08	0.73	<0.1	<0.1

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.29		min. 340	410-550	22	27
Typical values	AW	400	490	29	95

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
6.35 kg coil 14C	X
22.68 kg coil 50C	X

Innershield® NR®203 NiC rev. C-EN22-01/02/16

Innershield® NR®203 NiC

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
2.0	19	125	145	16	1.10	1.32
		230	235	20	1.95	1.32
		280	275	21	2.40	1.32

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions				
		PA/1G PB/2F	PC/2G	PF/3Gup PH/5Gup	PG/3Gdown PJ/5Gdown	PE/4G
2.0	Wire feed speed (cm/min)	280	230	200	200	200
	Current (A)	275	235	215	215	215
	Voltage (V)	21	20	19	18	19

REMARKS/APPLICATION ADVICE

For mild and higher strength steel not exceeding the yield strength range
Roundabout groove welds, especially for large diameter heavy tubular constructions
General plate fabrication, including bridge construction, hull plate and stiffener welding on ships and barges, off-shore

Innershield® NR®203 Ni1

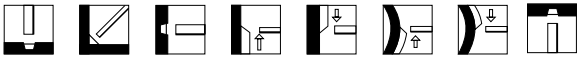
CLASSIFICATION

AWS A5.29	E71T8-Ni1	**A-Nr**	10
AWS A5.36	E71T8-A2-Ni1-H16	**F-Nr**	6
EN ISO 17632-A	T 42 4 1Ni Y N 1 H10	**9606 FM**	1

GENERAL DESCRIPTION

Designed to produce a nickel bearing weld deposit
Capable of producing weld deposits with impact toughness capable of exceeding 27 J at -29°C
Color match on weathering steels
Handles poor fit-up
Root bead capability

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PH/5Gu PJ/5Gd PE/4G

CURRENT TYPE

DC -

APPROVALS

ABS	BV	DNV	GL	LR	RINA
3SA,3YSA	SA3YMHH	IIIYMSH10	3YSH10	3S,3YSH15	3S,3YS

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Al
0.08	1.1	0.27	0.008	0.003	0.9	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.29		min. 400	480-620	20	27
Typical values	AW	465	540	26	115

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
6.35 kg coil 14C	X	
22.68 kg coil 50C	X	X

Innershield® NR®203 Ni1

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
2.0	19	125	145	16	1.10	1.30
		230	235	20	1.95	1.30
		355	310	23	3.15	1.30
2.4	19	125	215	18	1.60	1.20
		240	315	21	3.25	1.20
		330	385	24	4.30	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions						
		PA/1G	PB/2F	PC/2G	PF/3Gup	PH/5Gup	PG/3Gdown PJ/5Gdown	PE/4G
2.0	Wire feed speed (cm/min)	280	330	230	200	200	200	200
	Current (A)	255	300	235	215	215	215	215
	Voltage (V)	21	22	20	19	19	18	19
2.4	Wire feed speed (cm/min)	280	280	215	180			
	Current (A)	345	345	290	250			
	Voltage (V)	22	22	19.5	19			

REMARKS/APPLICATION ADVICE

For mild and higher strength steel, not exceeding the yield strength range of the electrode weld deposit
General plate fabrication, including bridge construction, hull plate and stiffener welding on ships and barges, off-shore
For semi- and full automatic welding

Innershield® NR®211 MP

CLASSIFICATION

AWS A5.20	E71T-11	**A-Nr**	1
AWS A5.36	E71T-11-AZ-CS3	**F-Nr**	6
EN ISO 17632-A	T 42 Z Z N 1 H10	**9606 FM**	1

GENERAL DESCRIPTION

Versatile welding capability on a variety of base materials
High operator appeal and good bead appearance
Easy slag removal
Fast freezing characteristics accommodate poor fit-up

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G PJ/5Gd

CURRENT TYPE

DC -

APPROVALS

BV	LR
+	AWS

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al
0.21	0.65	0.25	0.010	0.003	1.3

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)
Required: AWS A5.20		min. 400	480	20	not required
Typical values	AW	450	610	22	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.9	1.2	1.7	2.0
6.35 kg coil 14C	X	X	X	X
11.34 kg coil 22RR	X	X		
22.68 kg coil 50C			X	X

Innershield® NR®211 MP: rev. C-EN03-11/05/16

Innershield® NR®211 MP

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
0.9	10	125	30	14	0.3	1.22
		230	90	16	0.6	1.22
		280	120	16.5	0.8	1.22
1.1	14	180	120	15	0.5	1.22
		280	160	17	1.0	1.22
		330	170	18	1.2	1.22
1.7	19	100	120	15	0.8	1.22
		190	190	18	1.5	1.22
		440	320	23	3.5	1.22
2.0	19	130	180	16	1.4	1.09
		190	250	18	2.2	1.09
		380	350	22	4.3	1.09
2.4	19	130	235	16	2.0	1.10
		140	250	18	2.3	1.10
		250	370	20	4.2	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions PA/1G PB/2F	PC/2G	PF/3Gup	PG/3Gdown PJ/5Gdown	PE/4G
0.9	Wire feed speed (cm/min)	180	180	150	230	230
	Current (A)	65	65	50	85	85
	Voltage (V)	15	15	14.5	16	16
1.1	Wire feed speed (cm/min)	230	230	200	280	280
	Current (A)	140	140	130	160	160
	Voltage (V)	16	16	16	17	17
1.7	Wire feed speed (cm/min)	440	250	190	300	300
	Current (A)	320	230	190	280	280
	Voltage (V)	23	19.5	18	21	21
2.0	Wire feed speed (cm/min)	330	190		230	190
	Current (A)	320	250		320	250
	Voltage (V)	21	18		19.5	18
2.4	Wire feed speed (cm/min)	230	180		230	140
	Current (A)	350	275		350	250
	Voltage (V)	19.5	19		19.5	18

Innershield® NR®232

CLASSIFICATION

AWS A5.20	E71T-8	**A-Nr**	1
AWS A5.36	E71T8-A2-CS3-H16	**F-Nr**	6
EN ISO 17632-A	T 42 2 Y N 2 H10	**9606 FM**	1

GENERAL DESCRIPTION

Self shielded: easiest equipment arrangement
Deposit rate up to 3 kg/h, out of position
Excellent low temperature impact toughness
Ideal for fillet welding and filling
For single and multi-pass welds
Size diam. 1.7mm suitable for contaminated or primed plate

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC -

APPROVALS

ABS	BV	DNV	LR	RINA	TÜV	NKK
3SA,3YSAH15	SA3YMH	IIIYMSH15	3S,3YSH15	3YS	+	KSW53NH10

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al
0.18	0.65	0.27	0.006	0.004	0.55

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -29°C
Required: AWS A5.20		min. 400	480	22		27
Typical values	AW	490	590	26	65	35

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.7	1.8	2.0
6.12 kg coil 14C	X	X	X
22.68 kg coil 50C	X	X	X

Innershield® NR®232

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.7	12-25	280	170	19	1.7	1.33
		430	250	21	2.7	1.33
		810	400	26	5.1	1.33
2.0	12-25	200	130	17	1.5	1.22
		430	250	21	2.9	1.22
		730	350	24	5.0	1.22
2.4	12-25	150	130	16	1.3	1.22
		330	250	21	2.8	1.22
		550	350	25	4.6	1.22

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.7	Wire feed speed (cm/min)	635	495		380	380
	Current (A)	310	275		225	225
	Voltage (V)	23	23		19.5	19.5
1.8	Wire feed speed (cm/min)	635	510	430	390	430
	Current (A)	355	290	255	240	255
	Voltage (V)	11	21	21	20	21
2.0	Wire feed speed (cm/min)	460	380		330	380
	Current (A)	315	285		250	285
	Voltage (V)	23	22		21	22

REMARKS/APPLICATION ADVICE

Designed for the semi-automatic welding of 5mm and thicker steel
Recommended for single and multi-pas welds
Size diam. 1.7mm, is recommended for welds where it is necessary to produce wider passes (weave technique) and for welding plate with contaminations such as oil, rust, paint or primer
Size diam. 1.8mm is recommended to obtain the fastest travel speed on single pass fillet weld
Size diam. 2.0mm is recommended for overhead position

Innershield® NR®233

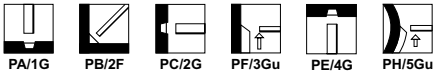
CLASSIFICATION

AWS A5.20	E71T-8	**A-Nr**	1
AWS A5.36	E71T8-A2-CS3-H16	**F-Nr**	6
EN ISO 17632-A	T 42 3 Y N 2 H10	**9606 FM**	1

GENERAL DESCRIPTION

Self shielded: easiest equipment arrangement
Due to new production technology and formulation: welder friendly wire with wide range of parameter settings
Forgiving arc, with increased penetration gives better quality welds with great bead appearance
High deposition rate, even in out of position welding
Good impact values
NR-233 has been developed to minimize gas marking, even after the electrode has been exposed to the atmosphere

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PF/3Gu PE/4G PH/5Gu

CURRENT TYPE

DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al
0.16	0.65	0.21	0.010	0.003	0.60

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.20		min. 400	480	22	27
Typical values	AW	440	570	26	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	1.8
5.7 kg plastic spool	X	
11.3 kg plastic spool	X	X

FCAW

Innershield® NR®233

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.6	13-32	380	220	17-19	1.9	1.26
		510	245	19-21	2.5	1.31
		640	270	21-23	3.0	1.35
		760	295	23-25	3.5	1.35
		890	315	25-27	4.3	1.31
1.8	19.25	250	185	17-18	1.6	1.25
		380	250	18-19	2.5	1.24
		510	295	20-21	3.2	1.25
		640	330	22-23	4.0	1.26
		760	355	23-24	4.8	1.26

REMARKS/APPLICATION ADVICE

Vertical up fillet and grove welds
Overhead fillet and groove welds
Seismic structural steel erection
General structural steels erection
Ship and barge fabrication

Innershield® NR®207-H

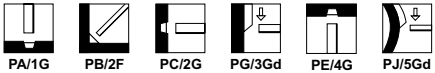
CLASSIFICATION

AWS A5.29	E71T8-K6	**A-Nr**	10
		F-Nr	6
		9606 FM	1

GENERAL DESCRIPTION

Self shielded: easiest equipment arrangement
Vertical down semi-automatic pipe welding
High quality construction welding in all positions
Good impact and CTOD toughness
Low hydrogen weld metal H

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al	Ni
0.07	0.9	0.2	0.005	0.003	1.0	0.85

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.29		min. 400	480-620	20	27
Typical values	AW	420	535	25	110

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.7**
6.35 kg coil 14C	X

Innershield® NR®207-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.7	19	230	205	17.5	1.5	-
		270	220	18.5	1.8	-
		300	245	19.5	2.0	-

REMARKS/APPLICATION ADVICE

Where low hydrogen weld metal is required
High productivity welding
Where arctic mechanical properties are required in general construction welding
Semi-automatic pipe welding

Innershield® NR®208-H

CLASSIFICATION

AWS A5.29	E91T8-G	**A-Nr**	1
		F-Nr	6
		9606 FM	2

GENERAL DESCRIPTION

Self shielded: easiest equipment arrangement
Semi-automatic fill and cap pass welding of X-80 pipe steel in vertical down position
Excellent low temperature toughness
Low hydrogen content (HDM < 8 ml/100g)

WELDING POSITIONS (ISO/ASME)

PJ/5Gd

CURRENT TYPE

DC -

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al	Ni
0.05	1.65	0.25	0.007	<0.003	0.85	0.8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C
Required: AWS A5.29		min. 540	620-760	17	
Typical values	AW (1G)	585	650	26	115

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.7**	**2.0**
6.35 kg coil 14C	X	X

Innershield® NR®208-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Pipe material	
API 5LX	X60, X70
EN 10208-2	L 415, L445, L480, L550

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.7	19	150	145	15.5	1.0	-
		205	180	17.5	1.3	-
		270	215	18.5	1.8	-
		370	255	20.5	2.4	-

REMARKS/APPLICATION ADVICE

Preheat and interpass temperature depending on steel quality
For root pass welding of X-60 to X-80 the Innershield NR-204-H electrode is recommended

Innershield® NR®305

CLASSIFICATION

AWS A5.20	E70T-6	**A-Nr**	1
AWS A5.36	E70T6-A2-CS3-H16	**F-Nr**	6
EN ISO 17632-A	T 42 0 W N 3 H15	**9606 FM**	1

GENERAL DESCRIPTION

NR-305 is a self-shielded flux cored wire
Not intended for out-of-position welding, but can be used on 15° max. downhill and 5° max. uphill applications
High deposit rates and fast travel speed
Easy handling
Recommended for maximum productivity, downhand welding

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F**

CURRENT TYPE

DC -

APPROVALS

ABS	BV	DNV
2SA,2YSA	SA2YMH	IIYMS

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al
0.09	0.9	0.2	0.007	0.008	0.80

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.20		min. 400	480	22	27
Typical values	AW	470	550	25	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.7**	**2.0**	**2.4**
22.68 kg coil 50C	X	X	X

Innershield® NR®305

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.7	12-25	510	275	24	3.75	1.22
		635	325	25	4.60	1.22
		890	390	27	6.35	1.22
2.0	19-25	510	360	22.5	4.50	1.22
		635	410	25	5.90	1.22
		1140	545	32.5	11.10	1.22
2.4	38-65	405	330	21	5.00	1.23
		610	425	24	7.55	1.23
		1015	525	33	12.70	1.23

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions PA/1G	PB/2F
1.7	Wire feed speed (cm/min)	635	635
	Voltage (V)	25	25
2.0	Wire feed speed (cm/min)	890	635
	Voltage (V)	25	24
2.4	Wire feed speed (cm/min)	710	610
	Voltage (V)	27	24

REMARKS/APPLICATION ADVICE

Typical applications include bridge, ship, barge or offshore drilling rig construction and machinery, structural and general fabrication.
NR-305 can be used for single and multiple pass fillet and lap welds and for deep groove butt welds in the flat position.

Innershield® NR®311

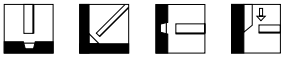
CLASSIFICATION

AWS A5.20	E70T-7	**A-Nr**	1
AWS A5.36	E70T7-AZ-CS3	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Self shielded: easiest equipment arrangement
Good penetration, as in column butt welds and narrow gap welds
Fast travel speed
High deposition rates

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al
0.27	0.4	0.08	0.007	0.005	1.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Required: AWS A5.20		min. 400	480	22
Typical values	AW	430	590	24

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
6.35 kg coil 14C	X	
22.68 kg coil 50C		X

Innershield® NR®311

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
2.0	32	255	190	21	2.2	1.28
		405	275	25	3.6	1.28
		760	410	28	7.1	1.28

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions			
		PA/1G	PB/2F	PC/2G	PG/3G down
2.0	Wire feed speed (cm/min)	610	510	410	380
	Current (A)	355	320	280	260
	Voltage (V)	26	26	25	25

REMARKS/APPLICATION ADVICE

Horizontal butt welds such as column structural connections.
Fillet and lap welds in the flat horizontal and downhill positions.
Deep groove welds. The penetration and extremely easy slag removal permit using a narrow gap and small bevel angle to minimize the total Flow rate of weld metal needed to fill the joint.

Innershield® NR®400

CLASSIFICATION

AWS A5.29	E71T8-K6	**A-Nr**	10
		F-Nr	6
EN ISO 17632-A	T 42 6 1Ni Y N 2 H10	**9606 FM**	1

GENERAL DESCRIPTION

Self shielding: easiest equipment arrangement
Higher strength level, overmatching StE 355
Excellent impact toughness at -40°C
CTOD tested, offshore constructions
All positions, all passes

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC -

APPROVALS

BV	LR	TÜV
SA3YMHH	3S,3YSH15	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al	Ni	Cr
0.06	0.74	0.17	0.004	0.002	0.74	0.75	0.13

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -60°C
Required: AWS A5.29		min. 400	480-620	20	27
Typical values	AW	435	525	26	100

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
6.35 kg coil 14C	X
22.68 kg coil 50C	

Innershield® NR®400

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steels	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
2.0	19	150	150	16.5	1.20	1.37
		230	225	19.5	1.85	1.37
		280	265	20.5	2.35	1.37

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions			
		PA/1G PB/2F	PC/2G	PF/3G up PF/5G up	PE/4G
2.0	Wire feed speed (cm/min)	280	230	200	200
	Current (A)	265	225	190	190
	Voltage (V)	20	19	18	18

REMARKS/APPLICATION ADVICE

Off-shore oil equipment, piping, storage tanks
General plate fabrication including bridge construction on ships and barges
Circumferential groove welds for heavy wall, large diameter tubular construction

Innershield® NS®3M

CLASSIFICATION

AWS A5.20	E70T-4	**A-Nr**	1
AWS A5.36	E70T4-AZ-CS3	**F-Nr**	6
EN ISO 17632-A	T 46 Z V N 3	**9606 FM**	1/2

GENERAL DESCRIPTION

NS-3ME is a self shielded wire for high deposition rate flat and horizontal welding where impact properties are not required
Recommended for heavy sections or crack-sensitive applications
Can be used for rail joint welding

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Al
0.23	0.45	0.25	0.006	0.006	1.40

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Required: AWS A5.20		460	530-670	22
Typical values	AW	470	640	27

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.0
6.35 kg coil 14C	X		
12.5 kg coil 25RR	X		
22.68 kg coil 50C	X	X	X

FCAW

Innershield® NS®3M

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steels	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240, L290, L360, L415
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
2.0	50	500	250	29	5.0	1.18
		635	290	30	6.3	1.18
		760	320	31	7.6	1.18
2.4	70	280	250	28	3.8	1.16
		580	400	31	8.1	1.16
		700	450	32	10.0	1.16
3.0	70	380	400	28	7.7	1.23
		450	450	29	9.0	1.23
		570	550	31	12.0	1.23

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions PA/1G	PB/2F
2.0	Wire feed speed (cm/min)	635	635
	Current (A)	290	290
	Voltage (V)	30	30
2.4	Wire feed speed (cm/min)	580	580
	Current (A)	400	400
	Voltage (V)	31	31
3.0*	Wire feed speed (cm/min)	440	440
	Current (A)	445	445
	Voltage (V)	29	29
3.0**	Wire feed speed (cm/min)	760	
	Current (A)	550	
	Voltage (V)	37	

* Stick-out 70mm - ** Stick-out 95mm

REMARKS/APPLICATION ADVICE

Multi-pass fillet and lap welds.
Single passes 4.5 to 9mm fillet and lap welds (1F).
Crack resistant fillets on higher strength steels where required joint strength can be obtained by using the proper fillet size.
Joint welding of rail steel profiles with placed copperbacking.

Cor-A-Rosta® 304L

CLASSIFICATION

AWS A5.22	E308LT0-1/-4	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 17633-A	T 19 9 L R C/M 3	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored stainless steel wire electrode for downhand welding
Stable arc, low spatter and good slag removal
Excellent wire feeding and operator appeal
Bright appearance of weld metal

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	LRS	TÜV
M21	+		+
C1	+	+	

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
M21 /C1	0.03	1.3	0.7	19.5	10	8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -110°C
Required: AWS A5.22			not required	min.520	min. 35		
ISO 17633-A			min. 320	min. 510	min. 30		
Typical values	M21/C1	AW	400	560	42	80	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool S300	X

Cor-A-Rosta® 304L : rev. C-EN28-19/05/16

FCAW

Cor-A-Rosta® 304L

EXAMPLES OF EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		G-X5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
1.2	100-250A	100-250A	100-200A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P304L

Cor-A-Rosta® P304L

CLASSIFICATION

AWS A5.22	E308LT1-1/-4	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 17633-A	T 19 9 L P C/M 2	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored stainless steel wire electrode for positional welding
Stable arc, low spatter and good slag removal
Excellent wire feeding and operator appeal
Bright appearance of weld metal

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	TÜV
M21	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
M21 /C1	0.03	1.3	0.7	19.5	10	8

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -110°C
Required: AWS A5.22			not required	min.520	min. 35		
ISO 17633-A			min. 320	min. 510	min. 30		
Typical values	M21/C1	AW	400	560	42	80	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool S300	X

Cor-A-Rosta® P304L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNi19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2CrNiN18-10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4CrNi18-10		1.4301	(TP)304	S30409
		G-X5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3G up
1.2	100-250A	100-250A	100-200A	100-180A

REMARKS/APPLICATION ADVICE

For downhand welding, use Cor-A-Rosta 304L

Cor-A-Rosta® 347

CLASSIFICATION

AWS A5.22	E347T0-1/4	**A-Nr**	8	**Mat-Nr**	1.4551
ISO 17633-A	T 19 9 Nb R C/M 3	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Rutile gas shielded stainless steel wire electrode for downhand welding
For Ti or Nb stabilized 304 or equivalent steels
Excellent resistance in oxidizing environments such as nitric acid
High resistance to intergranular corrosion
Easy slag release and smooth bead appearance

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Nb	FN (acc.WRC 1992)
M21	0.05	1.4	0.6	19.5	10	0.5	5

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.22			not required	min.520	min. 30	
ISO 17633-A			min. 350	min. 550	min. 25	
Typical values	M21	AW	435	600	42	90

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool S300	X

Cor-A-Rosta® 347 : rev. C-EN26-01/02/16

Cor-A-Rosta® 347

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-, Nb stabilized					
	X6CrNiTi18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6CrNiNb18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710
Non stabilized					
				302	
	X4CrNi18-10		1.4301	(TP)304	S30400
	X2CrNi19-11		1.4306	(TP)304L	S30403
		G-X5CrNi19-10	1.4308	CF-8	J92600
			1.4312		
				(TP)304H	S30409

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G
1.2	100-250A	100-250A	100-200A

Cor-A-Rosta® 316L

CLASSIFICATION

AWS A5.22	E316LT0-1/ -4	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 17633-A	T 19 12 3 L R C/M 3	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored stainless steel wire electrode for downhand welding
Stable arc, low spatter and good slag removal
Excellent wire feeding and operator appeal
Bright appearance of weld metal

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	LRS	TÜV
M21	+	+
C1	+	

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
M21 /C1	0.03	1.3	0.5	19	12	2.7	8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -110°C
Required: AWS A5.22			not required	min. 485	min. 30		
ISO 17633-A			min. 320	min. 510	min. 25		
Typical values	M21/C1	AW	440	580	38	70	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool S300	X

Cor-A-Rosta® 316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		G-X5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F
1.2	100-250A	100-250A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P316L

Cor-A-Rosta® P316L

CLASSIFICATION

AWS A5.22	E316LT1-1/ -4	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 17633-A	T 19 12 3 L P C/M 2	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored stainless steel wire electrode for positional welding
Stable arc, low spatter and good slag removal
Excellent wire feeding and operator appeal
Bright appearance of weld metal

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	DNV	TÜV
M21	+	+	+
C1	+	+	

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
M21 /C1	0.03	1.3	0.5	19	12	2.7	6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -110°C
Required: AWS A5.22			not required	min. 485	min. 30		
ISO 17633-A			min. 320	min. 510	min. 25		
Typical values	M21/C1	AW	440	580	38	70	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
5 kg plastic spool S200	X
15 kg spool S300	X

FCAW

Cor-A-Rosta® P316L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2CrNiMo17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2		1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4CrNiMo17-12-2		1.4401	(TP)316	S31600
	X4CrNiMo17-13-3		1.4436		
		G-X5CrNiMo19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6CrNiMoTi17-12-2		1.4571	316Ti	S31635
	X6CrNiMoNb17-12-2		1.4580	316Cb	S31640
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions			
	PA/1G	PB/2F	PC/2G	PF/3G up
1.2	100-250A	100-250A	100-200A	100-200A

REMARKS/APPLICATION ADVICE

For downhand welding, use Cor-A-Rosta 316L

Cor-A-Rosta® 309L

CLASSIFICATION

AWS A5.22	E309LT0-1/-4	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 17633-A	T 23 12 L R C/M 3	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored high CrNi alloyed wire electrode for downhand welding
For welding stainless to mild steel and buffer layers in clad steel
Excellent weldability and self releasing slag
High resistance to embrittlement

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	LRS	TÜV
M21	+	+
C1	+	

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
M21 /C1	0.03	1.4	0.6	24	12.5	15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.22			not required	min. 520	min. 30		
ISO 17633-A			min. 320	min. 510	min. 25		
Typical values	M21/C1	AW	445	560	36	45	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
5 kg plastic spool S200	X
15 kg spool S300	X

FCAW

Cor-A-Rosta® 309L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/G
1.2	100-250A	100-250A	100-200A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P309L

Cor-A-Rosta® P309L

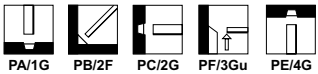
CLASSIFICATION

AWS A5.22	E309LT1-1/-4	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 17633-A	T 23 12 L P C/M 2	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored high CrNi alloyed wire electrode for positional welding
For welding stainless to mild steel and buffer layers in clad steel
Excellent weldability and self releasing slag
High resistance to embrittlement

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	DNV	LRS	TÜV
M21	+	+	+	+
C1	+	+	+	

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc.WRC 1992)
M21 /C1	0.04	1.3	0.6	24	12.5	15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C	Impact ISO-V(J) -20°C
Required: AWS A5.22			not required	min. 520	min. 30		
ISO 17633-A			min. 320	min. 510	min. 25		
Typical values	M21/C1	AW	445	560	36	45	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
5 kg plastic spool S200	X
15 kg spool S300	X

Cor-A-Rosta® P309L : rev. C-EN27-19/05/16

Cor-A-Rosta® P309L

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiN18-10	1.4311	(TP)304LN	S30453
	X2CrNi19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4CrNi18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloy steel to CrNi or CrNiMo stainless steel)

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/G
1.2	100-250A	100-250A	100-200A

REMARKS/APPLICATION ADVICE

For downhand welding, use Cor-A-Rosta 309L

Cor-A-Rosta® 309MoL

CLASSIFICATION

AWS A5.22	E309LMoT0-1/-4	**A-Nr**	8
ISO 17633-A	T 23 12 2 L R C/M 3	**F-Nr**	6
		9606 FM	5

GENERAL DESCRIPTION

Gas shielded flux cored high CrNiMo alloyed wire electrode for downhand welding
High Corrosion resistant deposit
Specially developed for welding stainless steel to mild steel and buffer layers in cladding
Maximum plate thickness in butt welds ~ 12 mm
Suitable for repair welding in dissimilar joints and steels difficult to weld

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
M21 /C1	0.03	1.3	0.7	23	12.8	2.3	20

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.22			not required	min. 520	min. 25	
ISO 17633-A			min. 350	min. 550	min. 25	
Typical values	M21/C1	AW	550	700	30	50

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.2**
15 kg spool S300	X

Cor-A-Rosta® 309MoL

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiMo17-12-2	1.4404	(TP)316L	S31603
			CF-3M	J92800
	X2CrNiMo18-14-3	1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2	1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3	1.4429		
	X4CrNiMo17-13-3	1.4436		
	X6CrNiMoTi17-12-2	1.4571	316Ti	S31635
	X10CrNiMoTi17-3	1.4573	316Ti	S31635
	X6CrNiMoNb17-12-2	1.4580	316Cb	S31640

Welding dissimilar metals: mild steel or low alloy steel to stainless CrNi or CrNiMo-steel up to max. thickness of 12 mm.

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/G
1.2	100-250A	100-250A	100-200A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P309MoL

Cor-A-Rosta® P309MoL

CLASSIFICATION

AWS A5.22	E309LMoT1-1/-4	**A-Nr**	8
ISO 17633-A	T 23 12 2 L P C/M 2	**F-Nr**	6
		9606 FM	5

GENERAL DESCRIPTION

Gas shielded flux cored high CrNi alloyed wire electrode for positional welding
High corrosion resistant deposit
Specially developed for welding stainless steel to mild steel and buffer layers in cladding
Maximum plate thickness in butt welds ~ 12 mm
Suitable for repair welding in dissimilar joints and steels difficult to weld

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	LRS
M21	+
C1	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc.WRC 1992)
M21 /C1	0.03	0.8	0.6	22.7	12.5	2.3	20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.22			not required	min. 520	min. 25	
ISO 17633-A			min. 350	min. 550	min. 25	
Typical values	M21/C1	AW	525	675	34	45

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
15 kg spool S300	X

Cor-A-Rosta® P309MoL

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2CrNiMo17-12-2	1.4404	(TP)316L	S31603
			CF-3M	J92800
	X2CrNiMo18-14-3	1.4435	(TP)316L	S31603
	X2CrNiMoN17-11-2	1.4406	(TP)316LN	S31653
	X2CrNiMoN17-13-3	1.4429		
	X4CrNiMo17-13-3	1.4436		
	X6CrNiMoTi17-12-2	1.4571	316Ti	S31635
	X10CrNiMoTi17-3	1.4573	316Ti	S31635
	X6CrNiMoNb17-12-2	1.4580	316Cb	S31640

Welding dissimilar metals: mild steel or low alloy steel to stainless CrNi or CrNiMo-steel up to max. thickness of 12 mm.

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/G	PF/3G up
1.2	100-250A	100-250A	100-200A	100-200A

REMARKS/APPLICATION ADVICE

For downhand welding, use Cor-A-Rosta 309MoL

Cor-A-Rosta® 4462

CLASSIFICATION

AWS A5.22	E2209T0-1/-4	**A-Nr**	8	**Mat-Nr**	1.4462
ISO 17633-A	T 22 9 3 N L R C/M 3	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored wire electrode for duplex stainless steel welding in downhand position
Excellent weldability
Applicable up to a service temperature of 250°C
High resistance to general corrosion, pitting and stress corrosion conditions
High yield strength > 500 N/mm²
M21 shielding gas is recommended

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
C1 : Active gas 100% CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV
C1	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Mo	N	FN (acc.WRC 1992)
M21	0.03	1.2	0.7	23	9.2	3.1	0.12	40

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -50°C
Required: AWS A5.22			not required	min. 520	min. 25		
ISO 17633-A			min. 450	min. 550	min. 25		
Typical values	M21/C1	AW	630	800	29	50	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
15 kg spool S300	X

Cor-A-Rosta® 4462

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Duplex stainless steels				
	X2CrNiMoN22-5-3	1.4462		S31803
		1.4417		S31500
	X3CrNiMoN27-5-2	1.4460		S31200
	X2CrNiN23-4	1.4362		S32304
	X2CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloy steel to duplex stainless steel

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/G
1.2	100-250A	100-250A	100-200A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P4462
Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Cor-A-Rosta® P4462

CLASSIFICATION

AWS A5.22	E2209T1-1/-4	**A-Nr**	8	**Mat-Nr**	1.4462
ISO 17633-A	T 22 9 3 N L P M 2	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Gas shielded flux cored wire electrode for positional welding of duplex stainless steel
Excellent weldability
Applicable up to a service temperature of 250°C
High resistance to general corrosion, pitting and stress corrosion conditions
High yield strength > 500 N/mm²

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PE/4G**

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	LRS
M21	+
C1	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Cr	Ni	Mo	N	FN (acc.WRC 1992)
M21	0.03	1.2	0.7	23	9.2	3.1	0.12	40

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -50°C
Required: AWS A5.22			not required	min. 690	min. 25		
ISO 17633-A			min. 450	min. 550	min. 25		
Typical values	M21	AW	630	800	29	65	55

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
15 kg spool S300	X

Cor-A-Rosta® P4462

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Duplex stainless steels				
	X2CrNiMoN22-5-3	1.4462		S31803
		1.4417		S31500
	X3CrNiMoN27-5-2	1.4460		S31200
	X2CrNiN23-4	1.4362		S32304
	X2CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloy steel to duplex stainless steel

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/G	PF/3G up
1.2	100-250A	100-250A	100-200A	130-180A

REMARKS/APPLICATION ADVICE

For downhand welding, use Cor-A-Rosta 4462
Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Lincore® 33

CLASSIFICATION

EN 14700 T Fe1

GENERAL DESCRIPTION

Delivers tough machinable deposits for build-up or final overlay intended for metal-to-metal wear
Use for build-up of steel mill parts such as rougher couplings
Build-up deposit on carbon steel and low alloy steel base metals
It is ideal for rebuilding worn parts to near final dimensions before applying final hardfacing layers which are more wear resistant
Unlimited layer

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Al
0.15	2.0	0.7	2.0	1.6

STRUCTURE

In the as welded condition the microstructure consists mainly of a mixture of ferrite and bainite

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
Layer 1	21-30 HRc (230-290HB)
Layer 2	26-32 HRc (260-300HB)
Layer 3	28-34 HRc (250-330HB)

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.1	1.6	2.0	2.8
6.35 kg coil 14C			X	
11.34kg coil 22RR	X	X	X	
22.68 kg coil 50C			X	X

Lincore® 33: rev. C-EN23-01/02/16

Lincore® 33

APPLICATION

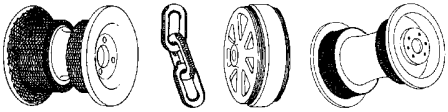
Lincore 33 produces a crack-free wear resistant deposit with a hardness range of 25-35 HRc depending on material dilution and number of layers. Designed primarily as a final overlay on steel parts which need to be machined or as a build-up layer of other hardfacing materials. It is particularly suitable of conditions of moderate abrasion and friction, coupled with resistance to impact such as applications involving rolling, sliding and metal to metal wear.

Typical applications include:

Buildup:
Shovel and bucket lips
Pump impellers and housings
Dredge and shovel bucket teeth
Mill and crushing hammers

Hardfacing:

Crane and mine car wheels
Tractor rolls, idlers, links and sprockets
Cable drums
Roller guides
Shafts



ADDITIONAL INFORMATION

All work-hardened base material should be removed prior to applying Lincore 33 to prevent embrittlement and cracking.
Preheat and postweld heat treatment is not generally necessary on C/Mn steels, however, preheat up to 260ºC may be necessary on high carbon steels or large complex or restrained components.
The deposited weld metal can be machined to exact dimensions using high speed or carbide cutting tools.
There is no limit to the deposit build-up with this electrode.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	Efficiency (%)
1.1	5.1-12.7	80-150	25-31	1.5-3.9	80-85
1.6	3.8-8.9	125-225	26-32	2.1-5.0	79-84
2.0	3.2-6.4	200-325	23-29	3.1-6.1	87-86
2.8	3.4-6.0	360-470	26-30	5.7-9.6	

COMPLEMENTARY PRODUCTS

Wearshield® BU30

Lincore® 40-O

CLASSIFICATION

EN 14700 T Fe1

GENERAL DESCRIPTION

Higher hardness for metal-to-metal wear and mild abrasion
Used on transfer rollers and guides, crane wheels and shafts
Can be used on low carbon and low alloy steels
Unlimited layers with proper preheat and interpass temperatures and procedures

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Al	Mo
0.2	1.5	0.7	3.5	1.8	0.4

STRUCTURE

Martensitic

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
Layer 1	ca. 36 HRc (340HB)
Layer 2	ca. 41 HRc (380HB)

FCAW

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.0**
11.34kg coil 22RR	X

Lincore® 40-O: rev. C-EN23-01/02/16

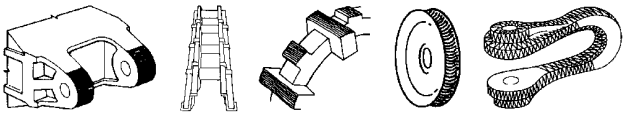
Lincore® 40-O

APPLICATION

This electrode provides an overlay hardfacing deposit on carbon and low alloy steels that resists rolling, sliding and metal-to-metal wear under heavy impact conditions. The deposit has a hardness of about 40 HRc which fills in the rather large hardness gap between the ferritic barnite buildup deposit of Lincore 33 and the martensitic deposit from Lincore 55 designed for metal-to-metal wear. Although the electrode is designed to provide a hardfacing deposit by itself, it could be used as a build-up electrode to provide a base on which harder deposits could be over-laid.

Typical applications include:
Tractor rolls
Mine car wheels
Guide rollers
Bucket links and bases
Actuating cams

Mine car wheels



ADDITIONAL INFORMATION

The area to be hardfaced should be clean and free of rust, scale, oil, grease or dirt of any kind. Any previous hardfacing deposit that has been embrittled by severe work hardening should also be removed. Irregularities such as cracks, low spots etc. should be properly repaired before hardfacing. Cold parts should be preheated to at least 40°C. Larger parts, and those made of higher alloy or higher carbon steel, should be preheated to the 100-150°C range.
Lincore 40-O deposits normally have good resistance to cross-checking. Special precautions, however, should be taken with any buildup or hardfacing product on applications thast are inherently crack sensitive. These applications include the facing of high carbon or alloy steels, previously faced parts and highly stressed parts. The facing of heavy cylinders, massive parts and parts having complex shapes are all examples of applications producing high internal stresses that may result in delayed cracking.
These applications may require one or more of the following:
1. Higher preheat temperature (150-260°C).
2. Higher interpass temperatures.
3. Controlled slow cooling between passes and/or layers
Interpass temperatures in the range of 150-200°C will not significantly affect the hardness of weld deposits produced by Lincore 40-O.
The weld deposited, can be machined with carbide tools or can be finished by grinding.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	Efficiency (%)
2.0	3.2-6.4	200-325	23-29	3.1-6.1	87-86

COMPLEMENTARY PRODUCTS

Wearshield® MM40

Lincore® 50

CLASSIFICATION

EN 14700 T Fe8

GENERAL DESCRIPTION

Delivers an abrasion resistant deposit, even under conditions of moderate impact
Larger wire diameter sizes may be used for the submerged arc process
Can be used on low carbon, medium carbon, low alloy, manganese and stainless steels
Limited to 4 layers

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Al	Mo
2.2	1.2	1.0	11.0	0.6	0.5

STRUCTURE

In the as welded condition the microstructure consists mainly of primary austenite with an austenite-carbide eutectic

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
Layer 1	34-41 HRc (320-380HB)
Layer 2	44-53 HRc (415-530HB)
Layer 3	48-56 HRc (460-584HB)

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.1**	**1.2**	**1.6**	**2.0**	**2.8**
11.34kg coil 22RR	X		X	X	
22.68 kg coil 50C		X	X	X	X

Lincore® 50: rev. C-EN23-01/02/16

Lincore® 50

APPLICATION

Lincore 50 produces an abrasion and impact resistant deposit with a hardness range of 34-56HRc depending on base metal chemistry, material dilution and number of layers. The combination of abrasion and impact resistance coupled with hot forging properties makes Lincore 50 particularly suitable for applications involving transportation of abrasive media under heavy variable loading.

Typical applications include:
Crusher rolls
Dredge cutter teeth
Ore chute baffles
Muller plows and tires
Coal mining cutting teeth

ADDITIONAL INFORMATION

All work-hardened base material and previously deposited hardfacing material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking. Areas that contain irregularaties such as cracks and deep gouges can be repaired locally using Wearshield BU30 or Wearshield 15CrMn prior to hardfacing with Lincore 50.
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels.
For low alloy and carbon carbon steels a preheat of 200°C is usually sufficient, but is dependent on material thickness and chemistry.
The weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
Lincore 50 cannot be cut by the oxy-fuel processes. Plasma arc and air-carbon arc processes can be used to both cut an gouge the weld deposit. Preheat temperatures similar to those for welding may be necessary to prevent cracking along the cut edge.
Lincore 50 may also be used in corrosive, cavitation and erosion situations such as the chemical, paper mill, food processing industry, glass manufacturing, power generation and tool manufacturing.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
1.1	5.1-15.2	120-250	20-28	1.9-5.8
1.6	3.8-8.9	175-365	23-33	2.7-7.9
2.0	3.2-6.4	210-380	27-23	3.4-6.8
2.8	2.0-3.3	315-450	26-29	3.9-6.4

COMPLEMENTARY PRODUCTS

There is no direct equivalent to Lincore 50 although Wearshield® ABR and Wearshield® 44 are the nearest.

Lincore® 55

CLASSIFICATION

EN 14700 T Fe2

GENERAL DESCRIPTION

Delivers a deposit which resists metal-to-metal rolling or sliding wear as well as mild abrasion
To be used on carbon steel, low alloy steel and manganese steel
Unlimited layers with proper preheat and interpass temperatures and procedures

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Al	Mo
0.45	1.4	0.55	5.3	1.4	0.8

STRUCTURE

In the as welded condition the microstructure consists mainly of martensite with some retained austenite

FCAW

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
Layer 1	50 - 59 HRc
Layer 2	50 - 59 HRc

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

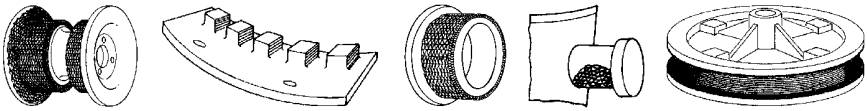
Diameter (mm)	**1.1**	**1.6**	**2.0**	**2.8**
6.35 kg coil 14C			X	
11.34kg coil 22RR	X	X	X	
22.68 kg coil 50C			X	X

Lincore® 55

APPLICATION

Lincore 55 produces a martensitic and some retained austenite deposit with a hardness range of 50-59HRc. This microstructure makes Lincore 55 particularly suitable for applications involving sliding, rolling and metal to metal wear, coupled with resistance to mild abrasion.

Typical applications include:
Crusher rolls
Dredge cutter teeth
Ore chute baffles
Muller plows and tires
Coal mining cutting teeth



ADDITIONAL INFORMATION

All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
A preheat of up to 250°C is necessary to prevent cracking in situations of high restraint and/or heavy thicknesses.
Interpass temperatures between 150 - 300°C do not adversely effect deposit hardness.
The deposit thickness is usually limited to 2 layers on high carbon or alloy steels and/or situations of high restraint and heavy sections due to the risk of cracking. Higher preheat and interpass temperatures coupled with slow cooling will minimise the risk of cracking.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The deposit can be softened by annealing at 875°C for one hour and slow cooling (air cool 22- 43HRc, furnace cool 15-17HRc). The hardness can be restored by heating at 875°C followed by water quenching (50-59HRc). The component should then be tempered at 150-200°C for one hour (54-59HRc) to retain some toughness.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	Efficiency (%)
1.1	5.1-12.7	85-165	25-31	1.6-4.3	80-85
1.6	3.8-8.9	125-245	26-32	2.2-5.5	79-84
2.0	3.2-6.4	190-330	24-30	3.2-6.2	87-86
2.8	2.3-4.4	280-420	25-30	3.8-7.3	

COMPLEMENTARY PRODUCTS

Wearshield® MM and Wearshield® MI(e)

Lincore® 60-O

CLASSIFICATION

EN 14700 T Fe15

GENERAL DESCRIPTION

Deposits feature higher alloy levels than to resist both abrasion and moderate impact
Can be used at temperatures up to 704°C
To be used on carbon, low alloy, manganese and stainless steels and cast iron
Deposit is limited to two layers.

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Al
4.2	1.6	1.3	25.4	0.6

STRUCTURE

In the as welded condition the microstructure consists of primary carbides in an austenite - carbide eutectic matrix

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
Layer 1	55 - 60 HRc
Layer 2	58 - 60 HRc

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

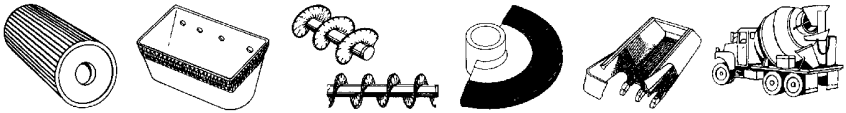
Diameter (mm)	**1.1**	**1.6**	**2.0**
11.34kg coil 22RR	X	X	X

Lincore® 60-O

APPLICATION

Lincore 60-O produces an primary carbide weld deposit with a hardness range of 55-60HRc. The primary carbide microstructure makes Lincore 60-O ideally suitable for applications of severe abrasion.

Typical applications include:
Bucket lips
Crusher hammers
Ore chutes
Dozer blades
Ripper teeth



ADDITIONAL INFORMATION

When welding with Lincore 60-O stringer beads should be employed. Weaving is not advised since wide weaves generally increase the check crack spacing which can result in deposit spalling. Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels. For low alloy and high carbon steels a preheat of 200°C is necessary to prevent heat affected zone cracking.
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels. For low alloy and high carbon steels a preheat of 200°C is necessary to prevent heat affected zone cracking.
The weld metal is not machinable or forgeable and it readily check cracks. The deposit thickness is usually limited to 2 layers, as excessive build-up will result in chipping and fragmentation.
For applications requiring build-ups in excess of 2 layers, buttering layers of Lincore 33, Wearshield BU30 or RepTec 126
Alternatively, a preheat of 650°C can be used to eliminate the formation of check cracks

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
1.1	5.1-12.7	125-210	21-27	1.9-4.7
1.6	5.1-11.4	240-350	28-33	3.4-7.5
2.0	3.2-.4	250-400	25-32	3.4-6.9

COMPLEMENTARY PRODUCTS

Complementary products include Wearshield® 60.

Lincore® T&D

CLASSIFICATION

EN 14700 T Fe8

GENERAL DESCRIPTION

Delivers a deposit similar to H12 tool steel
For build-up of tool steel dies and edges, or applying wear resistance surface on carbon or low alloy steels
To be used on carbon steel, low alloy steel or tool steel

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Al	Mo	W
0.65	1.5	0.8	7.0	1.8	1.4	1.6

STRUCTURE

In the as welded condition the microstructure consists mainly of martensite with some carbides. After tempering the microstructure consists of tempered martensite with secondary carbides

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As welded	48 - 55 HRc
Tempered at 540°C	55 - 65 HRc

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

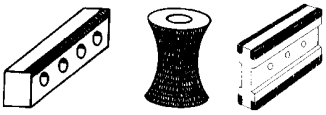
Diameter (mm)	**1.6**
11.34kg coil 22RR	X

Lincore® T&D

APPLICATION

Lincore T&D produces a crack-free wear resistant tool steel deposit with a hardness range of 48- 55HRc. The hardness can be further increased to between 55-65HRc after tempering. It is particularly suitable for applications involving severe metal to metal wear coupled with elevated temperatures (up to 540°C). Ideally suited to the build up of worn steel dies, cutting tools or the APL of wear resistant surfaces to carbon and low alloy steels.

Typical applications include:
Punch dies
Shear blades



ADDITIONAL INFORMATION

A preheat and interpass temperature of 325°C, or higher (up to 540°C), are necessary to avoid cracking. It is important to ensure that an adequate "soak" is achieved prior to the welding operation. After welding, the component should be covered and slow cooled down to room temperature. Once cooled, the weldment should be post weld heat treated to temper the martensite and toughen the deposit. Tempering at 540°C normally produces the optimum combination of hardness and toughness.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
Annealing at 850°C for several hours and slow cooling will reduce the hardness to approximately 30HRc. This deposit can be readily machined. Rehardening is achieved by heating to about 1200°C for several hours to dissolve all carbides and homogenise the steel, followed by air cooling and tempering.
Lincore T&D cannot be cut by the oxy-fuel processes. Plasma arc and air-carbon arc processes can be used to both cut and gouge the weld deposit. Preheat temperatures similar to those for welding may be necessary to prevent cracking along the cut edge.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
1.6	3.8-8.9	170-300	22-26	2.4-5.4

COMPLEMENTARY PRODUCTS

Complementary products include Wearshield® T&D

Lincore® 15CrMn

CLASSIFICATION

EN 14700 T Fe9

GENERAL DESCRIPTION

Provides an austenitic manganese deposit which exhibits very good crack resistance
Work-hardens for overlay or joining austenitic manganese steel to itself or to carbon steel
Can be used as a build-up layer before capping with abrasion resistant alloys
Can be used in open arc mode for joining austenitic manganese steel to carbon steel, low alloy steel, austenitic manganese steel, or stainless steel
Unlimited layers with proper preheat and interpass temperatures and procedures

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr
0.4	15.0	0.25	16.0

STRUCTURE

In the as welded condition, the microstructure consists of a soft chromium manganese alloy austenite which rapidly work hardens under impact loading

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As deposited	18 - 22 HRc (210-235 HB)
Work Hardened	40 - 50 HRc (375-490HB)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.0**	**2.8**
11.34kg coil 22RR		X
22.68 kg coil 50C	X	

FCAW

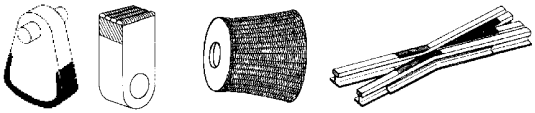
Lincore® 15CrMn rev. C-EN23-01/02/16

Lincore® 15CrMn

APPLICATION

Lincore 15CrMn produces a premium austenitic chromium-manganese deposit. The term premium is used because the weld metal has sufficient alloy content te produce a single pass austenitic deposit on ordinary carbon steel. The deposit rapidly work hardens under impact making it particularly suitable for applications of high impact and gouging coupled with moderate abrasion. In addition to surfacing, the high crack resistance of this alloy design makes Lincore 15CrMn an ideal electrode for joining manganese steel to itself or carbon steels with minimal the risk of centerline cracking. Joining by the SAW process, however, is not recommended.

Typical applications include:
Spreader Cones
Crusher Hammers
Austenitic manganese parts



ADDITIONAL INFORMATION

All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking. No preheat is required on austenitic manganese steels although a preheat of between 150-200°C may be necessary on carbon and low steels to prevent heat affected zone cracking.
Narrow stringer beads are preferred to avoid excessive heat build up in the base material. High heat input welds and interpass temperatures above 260°C causes manganese carbide precipitation resulting in embrittlement.
There is no definite limitation to the number of passes that may be deposited, however, it is good practise to peen each pass immediately after welding to minimise internal stresses and possible distortion and cracking.
Lincore 15CrMn deposits work harden rapidly making them difficult to machine. For best results carbide or ceramic cutting tools and rigid tooling should be used. Grinding can also be successfully employed.
For applications involving severe impact and abrasion, a build-up of Lincore 15CrMn coupled with a single pass of Wearshield 60 or Lincore 60-O should be employed.
The Lincore 15CrMn deposit can not be cut using the oxy-fuel process due to the high chromium content, however, plasma arc and air carbon arc processes are appropriate.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
2.0	3.2-8.9	210-380	26-32	3.3-9.7
2.8	1.9-4.4	250-380	26-30	2.5-7.5

COMPLEMENTARY PRODUCTS

Complementary products include Wearshield® 15CrMn

Lincore® 420

GENERAL DESCRIPTION

Metal-cored wire that is most widely used for caster roll rebuilding

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr
0.2	1.2	0.5	12.0

STRUCTURE

In the as welded condition, the microstructure consists of a soft chromium manganese alloy austenite which rapidly work hardens under impact loading

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
Layer 1	52 HRc
Layer 2	51 HRc
Layer 3	53 HRc

Welded on Mild Steel Plate (12mm)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	4.0
272.2 kg speed Feed® Drum	X

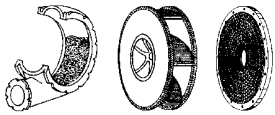
FCAW

Lincore® 420

APPLICATION

Lincore 420 is martensitic stainless hardfacing electrode designed to provide overlay deposits that resists metal wear under corrosion.

Typical applications include:
Caster rolls



ADDITIONAL INFORMATION

All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
Areas that contain irregularaties such as cracks and deep gouges can be repaired locally using Wearshield® BU30 or Wearshield® 15CrMn prior to hardfacing with Lincore 420.
Preheat would be needed if the welding is done over either highly restrained material or martensitic stainless base metal.
A preheat and interpass temperature in the range of 200-300°C can be used depending on the nature of the material to be welded.
Under conditions of low dilution, the microstructure is similar to that of AISI 420 martensitic stainless steel. This structure provides good abrasion resistance under conditions of severe corrosion and high impact. At higher dilutions, when overlaid on mild steel or low alloy steel, the weld metal microstructure will retain it's martensitic stainless structure. But the reduced chromium level might adversely affect the corrosion resistance of the deposit.
The Lincore 15CrMn deposit can not be cut using the oxy-fuel process due to the high chromium content, however, plasma arc and air carbon arc processes are appropriate.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
4.0	1.4-2.9	475-800	27-32	5.9-12.4

Lincore® M

CLASSIFICATION

EN 14700 T Fe9

GENERAL DESCRIPTION

Deposit resists severe impact as well as moderate abrasion
Produces an austenitic manganese deposit that work-hardens
Recommended for build-up and repair of Hadfield-type austenitic manganese materials as well as carbon and low alloy steels
Unlimited layers with proper preheat and interpass temperatures and procedures

WELDING POSITIONS (ISO/ASME)

PA/1G

CURRENT TYPE

DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Cr	Ni
0.6	13.0	0.4	4.9	0.5

STRUCTURE

Martensitic + ferretic

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As deposited	18-28 Rc
Work Hardened	30-48 Rc

FCAW

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**1.1**	**1.6**	**2.0**	**2.8**
11.34kg coil 22RR	X	X	X	
22.68 kg coil 50C			X	X
272.2 kg speed Feed® Drum				X

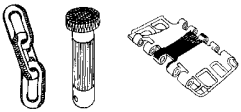
Lincore® M rev. C-EN24-01/02/16

Lincore® M

APPLICATION

Lincore M is designed for rebuilding and hardfacing of manganese steel, carbon steel and low alloy steel parts

Typical applications include:
Hammers
Dredge parts
Crushers
Breaker bars
Buckets



ADDITIONAL INFORMATION

All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
No preheat is required on austenitic manganese steels although a preheat of between 150-200°C may be necessary on carbon and low steels to prevent heat affected zone cracking.
Narrow stringer beads are preferred to avoid excessive heat build up in the base material. High heat input welds and interpass temperatures above 260°C causes manganese carbide precipitation resulting in embrittlement.
There is no definite limitation to the number of passes that may be deposited, however, it is good practise to peen each pass immediately after welding to minimise internal stresses and possible distortion and cracking.
Lincore M deposits work harden rapidly making them difficult to machine. For best results carbide or ceramic cutting tools and rigid tooling should be used. Grinding can also be successfully employed.

CALCULATION DATA

Diameter (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
1.1	5.1-12.7	80-185	22-26	1.5-4.4
1.6	3.8-8.9	130-250	23-27	2.2-5.6
2.0	3.2-6.4	240-360	24-29	2.9-6.2
2.8	1.9-3.8	240-395	25-28	3.5-7.5

COMPLEMENTARY PRODUCTS

Complementary products include Wearshield® Mangjet(e)

SUBMERGED ARC CONSUMABLES

L-60

CLASSIFICATION

AWS A5.17	EL12	**A-Nr**	1
ISO 14171-A	S1	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

A low carbon, low manganese, low silicon general purpose wire
Provides low hardness and is best suited for use with the 700 series of active fluxes

APPROVALS

	GL	TÜV	BV	ABS	LR	DNV	RINA
782		X					
860	X	X					
780		X	X	X	X	X	X
781		X					
761		X					

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si
0.09	0.5	0.06

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0
15 kg stein basket	X				
25 kg stein basket B415+VCI	X	X	X	X	X
100 kg stein basket B785				X	X
300 kg wooden reel					X
350 kg Speed Feed® Drum		X	X	X	X
400 kg Speed Feed® Drum		X	X	X	X
600 kg Accutrak® Drum		X	X		
1000 kg Accutrak® Drum		X	X	X	X

L-60: rev. C-EN03-01/02/16

L-61

CLASSIFICATION

AWS A5.17	EM12K	**A-Nr**	1
ISO 14171-A	S2Si	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Industry standard for submerged arc welding applications
A low carbon, medium manganese, low silicon general purpose submerged arc wire
A good choice for a wide range of applications with single or multiple pass subarc welding

APPROVALS

	ABS	TÜV	BV	DNV	GL	LRS	RINA	RMRS	CRS	PRS
761	X	X	X	X	X	X	X	X	X	X
780		X	X	X	X	X	X	X	X	X
8500					X					
888		X								
860	X	X	X	X	X	X	X	X	X	
P230	X	X				X	X			
781		X								

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si
0.1	1.0	0.25

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
25 kg stein basket B415+VCI	X	X	X	X	X	X
100 kg stein basket B785		X	X	X	X	X
200 kg Speed Feed® Drum		X				
300 kg wooden reel		X	X	X	X	
350 kg Speed Feed® Drum	X	X				
400 kg Speed Feed® Drum			X	X	X	
600 kg Speed Feed® Drum			X		X	
600 kg Accutrak® Drum	X	X	X			
1000 kg Accutrak® Drum		X	X	X	X	
1000 kg coil liftable		X			X	

LNS 135

CLASSIFICATION

AWS A5.17	EM12	**A-Nr**	1
ISO 14171-A	S2	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

A low carbon, medium manganese, low silicon general purpose wire
Provides low hardness and is best suited for use with the 700 and 800 series of active fluxes

APPROVALS

	GL	TÜV
782		X
860	X	X
761		X
780		X
P230		X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si
0.1	1.0	0.10

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	4.0	4.8
25 kg stein basket B415+VCI	X	X	X	
300 kg wooden reel	X	X		
400 kg Speed Feed® Drum			X	
1000 kg Accutrak® Drum			X	
1000 kg coil liftable		X	X	X

LNS 135 rev. C-EN03-01/02/16

L-50M (LNS 133-U)

CLASSIFICATION

AWS A5.17	EH12K	**A-Nr**	1
ISO 14171-A	S3Si	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

A low carbon, high manganese, low silicon general purpose submerged arc wire
Suitable for both single and multiarc subarc applications
Provides extra mechanical properties compared to an EM12K wire grade

APPROVALS

	ABS	TÜV	BV	DNV	LRS	RINA	CRS
782	X		X	X		X	
8500	X		X	X	X		
P230		X	X	X	X		
P240	X	X	X	X	X		X
780		X					
781	X		X	X	X	X	

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si
0.1	1.6	0.25

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0
15 kg stein basket B415	X	X			
25 kg stein basket B415+VCI	X	X	X	X	X
100 kg stein basket B785					X
300 kg wooden reel	X		X		X
350 kg Speed Feed® Drum		X			
400 kg Speed Feed® Drum		X	X	X	X
600 kg Accutrak® Drum			X		
1000 kg Accutrak® Drum	X				
1000 kg coil liftable			X		X

L-50M rev. C-EN03-01/02/16

L-70

CLASSIFICATION

AWS A5.17	EA1	**A-Nr**	2	**Mat-Nr**	1.5424
ISO 14171-A	S2 Mo	**F-Nr**	6		
		9606 FM	1/3		

GENERAL DESCRIPTION

A 0,5%Mo wire to be used on steel grades such as 16Mo3 or on non alloy steels to improve impact properties when welding in 2-run technique

APPROVALS

	ABS	TÜV	BV	DNV	GL	LRS	RINA	RMRS	PRS
761	X	X	X	X	X	X	X	X	X
780		X				X			X
8500	X				X			X	
860		X	X	X	X	X			
P230	X		X		X	X	X	X	
P223		X							

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Mo
0.1	0.9	0.10	0.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0	4.8
25 kg stein basket B415+VCI	X	X	X	X	X
100 kg stein basket B785			X		X
350 kg Speed Feed® Drum	X		X	X	
400 kg Speed Feed® Drum			X	X	
600 kg Speed Feed® Drum				X	
1000 kg coil liftable			X		

LNS 133TB

CLASSIFICATION

AWS A5.13	EG	**A-Nr**	-
ISO 14171-A	SZ	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Titanium and boron micro alloy wire to achieve optimum impact properties with the 2-run technique, especially with pipe mill fluxes
Exclusively for as-welded applications

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ti	B
0.08	1.55	0.25	0.15	0.015

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	3.2	4.0
25 kg stein basket B415+VCI	X	X
350 kg metal reel		X
350 kg Speed Feed® Drum	X	X
400 kg Speed Feed® Drum	X	X
600 kg Speed Feed® Drum	X	X
1000 kg Accutrak® Drum	X	X
1000 kg coil liftable	X	X

LNS 140A

CLASSIFICATION

AWS A5.23	EA2	**A-Nr**	2	**Mat-Nr**	1.5424
ISO 14171-A	S2 Mo	**F-Nr**	6		
ISO 24598-A	S Mo	**9606 FM**	1/3		

GENERAL DESCRIPTION

A 0,5%Mo wire to be used on steel grades such as 16Mo3 or on non alloy steels to improve impact properties when welding in 2-run technique

APPROVALS

	ABS	TÜV	BV	DNV	GL	LRS	RINA	RMRS	PRS
761	X	X	X	X	X	X	X	X	X
780		X				X			X
8500	X				X			X	
860		X	X	X	X	X			
P230	X	X	X		X	X	X	X	

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Mo
0.1	1.0	0.10	0.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
15 kg stein basket B415		X	X			
25 kg stein basket B415+VCI		X	X	X	X	X
100 kg stein basket B785				X	X	
250 kg Speed Feed® Drum				X		
300 kg wooden reel		X	X	X		
350 kg metal reel					X	
350 kg Speed Feed® Drum		X		X	X	X
400 kg Speed Feed® Drum				X	X	
600 kg Speed Feed® Drum					X	
600 kg Accutrak® Drum		X				
1000 kg Accutrak® Drum				X	X	
1000 kg coil liftable	X		X	X	X	

LNS 140TB

CLASSIFICATION

AWS A5.23	EA2TiB	**A-Nr**	2
ISO 14171-A	S2MoTiB	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Titanium and boron micro alloy wire to achieve optimum impact properties with the 2-run technique, especially with pipe mill fluxes
Exclusively for as-welded applications

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Mo	Ti	B
0.06	1.1	0.20	0.5	0.13	0.02

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	3.5	4.0	4.8
25 kg stein basket B415+VCI	X	X		X	X
100 kg stein basket B785				X	
300 kg wooden reel		X			
300 kg Speed Feed® Drum					X
350 kg metal reel				X	X
350 kg Speed Feed® Drum		X		X	
400 kg Speed Feed® Drum				X	
600 kg Speed Feed® Drum		X		X	
1000 kg Accutrak® Drum	X		X	X	
1000 kg coil liftable			X	X	

LNS 150

CLASSIFICATION

AWS A5.23	EB2	**A-Nr**	3	**Mat-Nr**	1.7339
ISO 24598-A	S Cr Mo1	**F-Nr**	6		
		9606 FM	3		

GENERAL DESCRIPTION

A 1,25%Cr/0,5%Mo wire for creep resistant steels such as 13CrMo4-5
Maximal operating temperature is 550°C
To be used with basic fluxes such as 8500, P240, 888 or MIL800-H

APPROVALS

	TÜV
780	X
860	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Mo	Cr	P
0.13	0.8	0.15	0.5	1.2	<0.010

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X	X
100 kg stein basket B785	X	X		
350 kg Speed Feed® Drum	X			
1000 kg Accutrak® Drum			X	

LNS 151

CLASSIFICATION

AWS A5.23	EB3	**A-Nr**	4	**Mat-Nr**	1.7339
ISO 24598-A	S Cr Mo2	**F-Nr**	6		
		9606 FM	3		

GENERAL DESCRIPTION

A 2,5%Cr/1%Mo wire for creep resistant steels such as 10CrMo 9-10
Maximal operating temperature is 600°C
To be used with basic fluxes such as 8500, P240, 888 or MIL800-H
Also usable with active fluxes such as 780, 781, 782 for heat exchanger fillet weld application

APPROVALS

	TÜV
780	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	**Mn**	**Si**	**Mo**	**P**	**Cr**
0.10	0.6	0.12	1.0	<0.010	2.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.0**	**2.4**	**3.2**	**4.0**
25 kg stein basket B415+VCI	X	X	X	X
400 kg Speed Feed® Drum				X
1000 kg Accutrak® Drum			X	

LNS 151 rev. C-EN03-01/02/16

LNS 160

CLASSIFICATION

AWS A5.23	ENi1	**A-Nr**	10
ISO 14171-A	S2 Ni1	**F-Nr**	6
		9606 FM	1/2

GENERAL DESCRIPTION

A 1%Ni wire for application requiring good impact toughness down to -60°C
Optimum results obtained with the multipass technique

APPROVALS

	TÜV
P230	X
P240	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni
0.10	1.1	0.15	1.0

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X
100 kg stein basket B785			X

LNS 162

CLASSIFICATION

AWS A5.23	ENi2	**A-Nr**	10
ISO 14171-A	S2 Ni2*	**F-Nr**	6
* Nearest classification		**9606 FM**	1/2

GENERAL DESCRIPTION

A 2%Ni wire for application requiring excellent impact toughness down to -60°C
Optimum results obtained with the multipass technique

APPROVALS

	TÜV
P230	X
P240	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni
0.10	1.1	0.15	2.2

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI		X	X	X
300 kg wooden reel	X			

LNS 163

CLASSIFICATION

AWS A5.23	EG	**A-Nr**	10
ISO 14171-A	S2 Ni1Cu	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Submerged arc wire with Cu and Ni addition dedicated to weathering steel assembly like Cor-Ten grades
Matching corrosion resistance as well as colour
To be used with 960, 860 or P230 flux in most of the applications
Can be used in butt welds single run or multi runs as well as in fillet welds

APPROVALS

	TÜV
860	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cu	Cr	S	P
0.11	1.0	0.25	0.7	0.5	0.2 max	0.2 max	0.2 max

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X	X
350 kg Speed Feed® Drum		X		
400 kg Speed Feed® Drum	X	X	X	X

LNS 163 rev. C-EN03-01/02/16

LNS 164

CLASSIFICATION

AWS A5.23	EF3	**A-Nr**	10
ISO 14171-A	S3 Ni1Mo	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Nickel and Molybdenium alloy wire to reach both high yield/ tensile properties and good impact toughness at low temperatures
Optimum results obtained with the multipass technique
Meets NACE requirement

APPROVALS

	TÜV
P230	X
P240	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Mo
0.10	1.75	0.10	0.9	0.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X
300 kg wooden reel			X
350 kg Speed Feed® Drum	X		X
400 kg Speed Feed® Drum		X	X

LNS 164 rev. C-EN03-01/02/16

LNS 165

CLASSIFICATION

AWS A5.23	ENi5	**A-Nr**	10
ISO 14171-A	SZ	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Nickel and Molybdenium alloyed wire to reach both high yield/ tensile properties and good impact toughness at low temperatures
Optimum results obtained with the multipass technique

APPROVALS

	TÜV	ABS	DNV	LRS
P240	X	X	X	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Mo
0.08	1.4	0.20	1.0	0.2

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0	4.8
25 kg stein basket B415+VCI	X	X	X	X	X
100 kg stein basket B785				X	
400 kg Speed Feed® Drum			X		
1000 kg Accutrak® Drum				X	

LNS 168

CLASSIFICATION

		A-Nr	12
ISO 26304-A	S 3Ni2.5CrMo	**F-Nr**	6
		9606 FM	2

GENERAL DESCRIPTION

Low alloy solid wire dedicated to high strength steel grades (Re>690MPa)
Good impact properties guaranteed down to -40°C when combined with a basic flux

APPROVALS

	LRS
P240	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	**Mn**	**Si**	**Ni**	**Mo**	**Cr**
0.10	1.6	0.15	2.3	0.6	0.7

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.5**	**3.2**	**4.0**	**5.0**
25 kg stein basket B415+VCI	X	X	X	X
1000 kg coil		X	X	

LNS 175

CLASSIFICATION

AWS A5.23	ENi3	**A-Nr**	10
ISO 14171-A	S2Ni3	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

A 3,5Ni wire used on cryogenic steels such as SA203Gr or 12Ni14

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni
0.08	1.0	0.1	3.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	3.2	4.0
25 kg stein basket B415+VCI	X	X

LNS 175: rev. C-EN02-01/02/16

LNS T55

CLASSIFICATION

AWS A5.17	EC1 H4	**A-Nr**	1
ISO 14171-A	TZ	**F-Nr**	6
		9606 FM	1/2

GENERAL DESCRIPTION

Unalloy basic flux cored wire for subarc applications.
Higher deposition compared to equivalent solid wire size
Good impact properties at low temperatures when combined with P230 flux.

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	P	S
0.06	1.5	0.6	<0.020	0.015

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.8
25 kg stein basket B415+VCI	X
250 kg metal coil	X

LNS 304L

CLASSIFICATION

AWS A5.9	ER308L	**A-Nr**	8	**Mat-Nr**	1.4316
ISO 14343-A	S 19 9 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Low carbon austenitic stainless steel wire suitable for 304L base material grade or 321 grade in some applications Recommended with P2007 and P2000 fluxes.

APPROVALS

	TÜV	ABS	LRS
P2000	X		
P2007	X	X	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Cr	Ni	Mo
0.015	1.8	0.4	20	10	0.1

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X	X

LNS 304L: rev. C-EN03-01/02/16

LNS 304H

CLASSIFICATION

AWS A5.9	ER308H	**A-Nr**	8	**Mat-Nr**	1.4948
ISO 14343-A	S 19 9 H	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

High carbon austenitic stainless steel wire for high temperature applications (up to 730°C). Suitable for 304 base material grade
Recommended with P2007 and P2000 fluxes

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr
0.05	1.2	0.6	10.5	20.1

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2
25 kg stein basket B415+VCI	X	X

LNS 304H: rev. C-EN02-01/02/16

LNS 307

CLASSIFICATION

AWS A5.9	ER307*	**A-Nr**	8	**Mat-Nr**	1.4370
ISO 14343-A	S 18 8Mn	**F-Nr**	6		
* Nearest classification		**9606 FM**	5		

GENERAL DESCRIPTION

Stainless steel wire for high manganese content base materials, difficult-to-weld steels such as armour plates, and dissimilar joints
Weld deposit features strain hardenability
Recommended with P2007 and P2000 fluxes

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Cr	Ni
0.07	7.0	0.6	19	8.9

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X

LNS 307: rev. C-EN03-01/02/16

LNS 309L

CLASSIFICATION

AWS A5.9	ER309L	**A-Nr**	8	**Mat-Nr**	1.4332
ISO 14343-A	S 23 12 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Low carbon austenitic stainless steel wire suitable for dissimilar welding applications
Recommended with P2007 and P2000 fluxes

APPROVALS

	TÜV	ABS	LRS
P2000S	X		X
P2007	X	X	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr	Mo
0.01	1.8	0.4	13.8	23.4	0.07

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X	X

LNS 316L

CLASSIFICATION

AWS A5.9	ER316L	**A-Nr**	8	**Mat-Nr**	1.4430
ISO 14343-A	S 19 12 3 L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Low carbon stainless steel wire suitable for 316L base material and similar grades
Recommended with P2007 and P2000 fluxes

APPROVALS

	TÜV	ABS	LRS
P2000	X		X
P2007	X	X	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Cr	Ni	Mo
0.015	1.75	0.4	18.5	12	2.75

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X	X

LNS 316L: rev. C-EN03-01/02/16

LNS 318

CLASSIFICATION

AWS A5.9	ER318	**A-Nr**	8	**Mat-Nr**	1.4576
ISO 14343-A	S 19 12 3 Nb	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Stabilized stainless steel wire suitable for 316Ti and similar grades
Recommended with P2007 and P2000 fluxes

APPROVALS

	TÜV
P2000	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr	Mo	Nb
0.04	1.7	0.4	11.3	19.5	2.6	0.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X	X

LNS 318: rev. C-EN02-01/02/16

LNS 347

CLASSIFICATION

AWS A5.9	ER347	**A-Nr**	8	**Mat-Nr**	1.4551
ISO 14343-A	S 19 9 Nb	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Stabilized stainless steel wire suitable for 347, 321 and similar grades
Recommended with P2007 and P2000 fluxes

APPROVALS

	TÜV
P2000	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr	Mo	Nb
0.03	1.6	0.4	9.7	19.5	0.1	0.6

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	4.0
25 kg stein basket B415+VCI	X	X	X
300 kg Speed Feed Drum	X		

LNS 347: rev. C-EN04-11/05/16

LNS 4455

CLASSIFICATION

		A-Nr	9	**Mat-Nr**	1.4455
ISO 14343-A	S 20 16 3 Mn L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Fully austenitic stainless steel wire
To be used for cryogenic application or with non magnetic stainless steels
Recommended with P2007, P2000 and P7000 fluxes

APPROVALS

	TÜV
P2000	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**N**
0.01	7.0	0.4	20	16	2.7	0.16

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	**2.4**	**3.2**
25 kg stein basket B415+VCI	X	X

LNS 4455: rev. C-EN02-01/02/16

LNS 4462

CLASSIFICATION

AWS A5.9	ER2209	**A-Nr**	9	**Mat-Nr**	1.4462
ISO 14343-A	S 22 9 3 N L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Duplex stainless steel wire suitable for 1.4462 base material and similar grades
Recommended with P2007 and P2000 fluxes

APPROVALS

	TÜV	ABS	LRS
P2000S	X		
P2007	X	X	X

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr	Mo	N
0.015	1.6	0.5	8.6	23	3.1	0.16

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2
25 kg stein basket B450	X	X

LNS 4462: rev. C-EN02-01/02/16

LNS 4500

CLASSIFICATION

AWS A5.9	ER385	**A-Nr**	9	**Mat-Nr**	1.4519
ISO 14343-A	G 20 25 5 Cu L	**F-Nr**	6		
		9606 FM	5		

GENERAL DESCRIPTION

Fully austenitic stainless steel wire
To be used for cryogenic application or with non magnetic stainless steels
Recommended with P2007, P2000 and P7000 fluxes

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Cr	Ni	Mo	Cu
0.01	1.8	0.3	20	25.2	4.6	1.5

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4
25 kg stein basket B450	X

LNS 4500: rev. C-EN02-01/02/16

LNS Zeron® 100X

CLASSIFICATION

AWS A5.9	ER2594	**A-Nr**	8
ISO 14343-A	S 25 9 4 N L	**F-Nr**	6
		9606 FM	5

GENERAL DESCRIPTION

Superduplex stainless steel wire suitable for Zeron® 100 base material and similar grades
Recommended with P2007, P2000 or P7000 flux

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr	Mo	N	Cu	W
0.02	0.7	0.3	9.3	25	3.7	0.23	0.6	0.6

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.4
25 kg stein basket B415+VCI	X	X

LNS Zeron® 100X: rev. C-EN02-01/02/16

LNS NiCro 60/20

CLASSIFICATION

AWS A5.14	ERNiCrMo-3	**A-Nr**	-	**Mat-Nr**	2.4831
ISO 18274	G 20 25 5 Cu L	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Ni-base solid wire for welding nickel alloys
Excellent resistance to various corrosion forms
Also used for 9%Ni applications
Recommended with P2007 flux

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Cr	Ni	Mo	Nb	Fe
0.05	0.02	0.1	22	65	8.7	3.7	0.1

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4
25 kg stein basket B450	X	X	X

LNS NiCro 70/19

CLASSIFICATION

AWS A5.14	ERNiCr-3	**A-Nr**	-	**Mat-Nr**	2.4806
ISO 18274	S Ni 6082 (NiCr20Mn3Nb)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Ni-base solid wire for welding high Ni alloyed materials such as alloy 600 and alloy 601
High resistance to oxidation at high temperatures
Recommended with P2007 flux

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Cr	Ni	Nb	Fe
0.03	3.1	0.08	20.5	72.5	2.6	0.8

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4
25 kg stein basket B450	X

LNS NiCroMo 60/16

CLASSIFICATION

AWS A5.14	ERNiCrMo-4	**A-Nr**	-	**Mat-Nr**	2.4886
ISO 18274	S Ni 6276 (NiCr15Mo16Fe6W4)	**F-Nr**	43		
		9606 FM	6		

GENERAL DESCRIPTION

Ni-base solid wire for welding CrMoW alloyed nickel alloys
Extreme resistance to corrosion environments containing sulphuric acid and chlorides
Also used for 9%Ni applications
Recommended with P2007 flux

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Cr	Mo	W	Fe
0.006	0.5	0.04	58	16	16	3.6	5.8

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.4
25 kg stein basket B415+VCI	X	X

761 / 761-CG

CLASSIFICATION

Flux			Flux/wire	
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A CS/MS 1 88 AC H5	**761 / L-60**	F7A2-EL12	S 38 2 CS/MS S1	
	761 / L-61	F7A2-EM12K	S 42 2 CS/MS S2Si	S 4T 0 CS/MS S2Si
	761 / LNS 140A	F9A0-EA2-G	S 50 0 CS/MS S2Mo	S 4T 2 CS/MS S2Mo
	761 / L-70	F9A0-EA1-G	S 50 0 CS/MS S2Mo	S 4T 2 CS/MS S2Mo

GENERAL DESCRIPTION

High current capacity
Active flux for limited pass welding
High restraint cracking resistant
Suitable for rusty/dirty plates (at high current)
Applicable for low quality steels
Coarse grain flux more suitable with the most rusty and dirty plates

APPROVALS

Wire grade	ABS	BV	CRS	DNV	PRS	GL	LRS	RINA	RMRS	TÜV
L-60										✔
LNS 135										✔
L-61	3YM/2YT	3YM/2YT	3YM/2YT	2YT	3YM/2YT	3YM/2YT	3YM/2YT	3YM/2YT	2YT	✔
LNS 140A (L-70)	3Y40M/3Y40T	3Y40M/3Y40T		3Y40M/3Y40T	3Y40M/2Y40T	3Y40M/3Y40T	3Y40M/3Y40T	3Y40M/3Y40T	3Y40M/3Y40T	✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo
L-60	0.05	1.5	0.7	<0.03	<0.025	
L-61	0.08	1.7	0.9	<0.03	<0.025	
LNS 140A (L-70)	0.06	1.7	0.8	<0.03	<0.025	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C	Impact ISO-V(J) -20°C
L-60	MR	380	500	28	80	50
L-61	MR	440	530	28	100	50
	TR	>420	>540		65	
LNS 140A (L-70)	MR	480	600		80	40
	TR	>440	>540		100	55

* MR : Multirun - TR : Two-run

761 / 761-CG

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type/ Steel grades	Limited passes		
		L-60	L-61	LNS 140A (L-70)
Ship plates				
	A to D, A (H) 32 to D(H) 36	✔	✔	✔
General structural steels				
EN 10025 part 6	500 A			✔
EN 10025 part 3/part 4	S275 to S420, N,M	✔	✔	✔
EN 10149	S315 to S420, MC	✔	✔	✔
	S315 to S420, NC	✔	✔	✔
	S460, MC & NC			✔
EN 10025 part 2	S185 to S355, E295 to E360, JR(G1 & G2), J0, J2 (G3&G4)	✔	✔	✔
Boiler & pressure vessel steels				
EN 10028	P235 to P420, GH N, NH, M, Q & QH	✔	✔	✔
	P235 to P460, GH, N, NH, M, Q & QH	✔	✔	✔
	P500, GH, N, NH, M, Q & QH, P235 S, P265 S	✔	✔	✔
	A37 to A52, CP, AP	✔	✔	✔

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	0.8
Solidification speed	Low, viscous slag
Density (kg/dm^3)	1.2
Grain size (ISO 14174)	761 : 1 -16 / 761-CG : 1 - 20

SUGGESTIONS FOR USE

Wire	Characteristics
L-60	To prevent defects from organic components
L-61	Reliable properties
LNS 140A (L-70)	For good impact toughness in two-run as welded

Applications
Flat fillet, large throat
Butt joints in two passes, in medium and thick plates
Flux backing, modified series arc welding

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Metal drum	250
Big Bag	500 / 1000

780 / 780-CG / 780-FG

CLASSIFICATION

Flux		Flux/wire		
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A AR/AB 1 78 AC H5	**780 / L-60**	F7A0-EL12	S 42 0 AR/AB S1	S 4T 0 AR/AB S1
	780 / L-61	F7A2-EM12K	S 42 0 AR/AB S2Si	S 4T 2 AR/AB S2Si
	780 / LNS 140A	F8A2-EA2-G		S 4T 2 AR/AB S2Mo
	780 / L-70	F8A2-EA1-G		S 4T 2 AR/AB S2Mo

GENERAL DESCRIPTION

Active flux for limited pass welding
Good general purpose flux, including semi-automatic
High speed on dirty plate
Good resistance to porosity on rust and primer
Good slag removal, good bead shape
Product also available in a fine grain and coarse formula
Fine grain formula preferably used on high speed fillet welds applications
Good on circumferential welds on small diameters with low voltage

APPROVALS

Wire grade	BV	ABS	LRS	DNV	GL	RINA	PRS	RMRS	CRS	TÜV
L-60	A2YT	2YT	2YT	2YT	3YT	2YT				✔
LNS 135										✔
L-61	A3YT		2YM/3YT	2YM/3YT	3YT	3YT	2YM/3YT	3YT	3YT	✔
L-50-M (LNS 133U)										✔
LNS 140A (L-70)			3YT				3YT			✔
LNS 150										✔
LNS 151										✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo
L-60	0.07	1.4	0.6	<0.03	<0.025	
L-61	0.07	1.6	0.7	<0.03	<0.025	
LNS 140A (L-70)	0.07	1.6	0.6	<0.03	<0.025	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C	Impact ISO-V(J) -20°C
L-60	MR	>420	510	28	50	
L-61	TR	>420	>540	28		50
LNS 140A (L-70)	TR	>420	>550	25		60

* MR : Multirun - TR : Two-run

780 / 780-CG / 780-FG

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type/ Steel grades	Limited passes		
		L-60	L-61	LNS 140A (L-70)
Ship plates				
	A to D, A (H) 32 to D(H) 36	✔	✔	✔
General structural steels				
EN 10025 part 6	500 A			✔
EN 10025 part 3/part 4	S275 to S420, N,M	✔	✔	✔
EN 10149	S315 to S420, MC	✔	✔	✔
	S315 to S420, NC	✔	✔	✔
	S460, MC & NC			✔
EN 10025 part 2	S185 to S355, E295 to E360, JR(G1 & G2), J0, J2 (G3&G4)	✔	✔	✔
Boiler & pressure vessel steels				
EN 10028	P235 to P420, GH N, NH, M, Q & QH	✔	✔	✔
	P235 to P460, GH, N, NH, M, Q & QH	✔	✔	✔
	P500, GH, N, NH, M, Q & QH, P235 S, P265 S	✔	✔	✔
	A37 to A52, CP, AP	✔	✔	✔

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	0.7
Solidification speed	High
Density (kg/dm³)	1.4
Grain size (ISO 14174)	780 : 1 - 20 / 780-CG : 2 - 20 / 780-FG : 1 - 16

SUGGESTIONS FOR USE

Wire	Characteristics
L-60	To prevent defects from organic components
L-61	Reliable properties
LNS 140A (L-70)	For good impact toughness in two-run as welded

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Metal drum	250
Big Bag	500 / 1000

781

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : TR**
S A ZS 1 87 AC H5	**781 / L-60**	F7A0-EL12	
	781 / L-61	F7A0-EM12K	S 4T 0 ZS S2Si
	781 / L-50M (LNS 133U)		S 4T 2 ZS S3Si
	761 / LNS 140A		S 4T 2 ZS S2Mo

GENERAL DESCRIPTION

Active flux for limited pass welding
Very high speed on sheet metal
Good impact in two-run technique
High speed fillet weld with very good bead profile
Shiny and smooth appearance

APPROVALS

Wire grade	BV	ABS	LRS	DNV	RINA	TÜV
L-50M (LNS 133U)	A3Y40T	3Y400T	3Y40T	3Y40T	3Y40T	✔
L-60						✔
L-61						✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo
L-61	0.05	1.3	0.9	<0.03	<0.02	
L-50M (LNS 133U)	0.06	1.6	1.0	<0.03	<0.02	
LNS 140A (L-70)	0.06	1.3	0.9	<0.03	<0.02	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Impact ISO-V(J) -20°C
L-61	TR	>420	>540	50
L-50M(LNS 133U)	TR	>450	>560	60
LNS 140A (L-70)	TR	>490	>580	65

* MR : Multirun - TR : Two-run

781

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type/ Steel grades	Limited passes		
		L-60	L-61	LNS 140A
Ship plates				
	A to D, AH32 to DH40	✔	✔	✔
	A to E, AH32 to EH40			✔
General structural steels				
EN 10025 part 6	500 & 500 A	✔	✔	✔
	500 & 550 A & AL			✔
EN 10025 part 3/part 4	S275 to S460 N/M	✔	✔	✔
	S275 to S460 all qualities			✔
EN 10149	S315 to S600 MC & NC	✔	✔	✔
EN 10025 part 2	S185 to S360 all qualities	✔	✔	✔
Boiler & pressure vessel steels				
EN 10028	P235 to P460, (GH, N NH, M, ML1)	✔	✔	✔
	P235 to P460 all qualities			✔
EN 10207	P235 to P275 S	✔	✔	✔
A36-601 & NF A36-605	A37 to A52 (CP, AP)	✔	✔	✔
	A37 to A52 (CP, AP, FP)			✔

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	0.7
Solidification speed	Fast, fluid slag
Density (kg/dm³)	1.5
Grain size (ISO 14174)	1 -16

SUGGESTIONS FOR USE

Wire	Characteristics
L-60	High speeds on clean plate
L-61	Very high speeds

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Metal drum	250

782 / 782-FG

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A AR/AB 1 76 AC H5	**782 / L-60**		S 42 A AR/AB S1	S 4T A AR/AB S1
	782 / LNS 135	F7AZ-EM12		S 4T 0 AR/AB S2
	782 / L-61	F7AZ-EM12K	S 46 0 AR/AB S2Si	S 4T 0 AR/AB S2Si
	782 / L-50M (LNS133U)		S 46 0 AR/AB S3Si	S 5T 2 AR/AB S3Si
	761 / LNS 140A (L-70)		S 46 0 AR/AB S2Mo	S 5T 2 AR/AB S2Mo

GENERAL DESCRIPTION

Active flux for limited pass welding
Good bead shape with optimum wetting
High speed on thin plates
Single & multi-wire welding; butt and fillet welds
Optimal flux for tin-tube welding, especially with the fine grain formulation

APPROVALS

Wire grade	BV	ABS	DNV	RINA	TÜV
L-50M (LNS 133U)	3Y40T	3Y400T	4Y40T	3Y40T	
LNS 135					✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo
L-60	0.07	1.0	0.6	<0.03	<0.025	
LNS 135	0.07	1.15	0.7	<0.03	<0.025	
L-61	0.07	1.15	0.8	<0.03	<0.025	
L-50M (LNS 133U)	0.06	1.7	1.0	<0.03	<0.025	
LNS 140A (L-70)	0.07	1.2	0.7	<0.03	<0.025	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Impact ISO-V(J) 0°C	Impact ISO-V(J) -20°C
L-60	TR	>420	>520	45	
LNS 135	TR	>420	>520	55	
L-61	TR	>420	>520	60	
L-50M (LNS 133U)	TR	>460	>550	65	50
LNS 140A (L-70)	TR	>460	>600	70	50

* MR : Multirun - TR : Two-run

782 / 782-FG

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Limited passes	
		LNS 135	L-61
Ship plates			
	A, AH32 to AH40		✔
General structural steels			
EN 10149	S315 to S460 MC	✔	✔
EN 10025 part 2	S185 to S355 quality, JR(G1&G2	✔	✔
	S185 to S355 quality, JR(G1&G2), J10		✔
	E2956 to E360	✔	✔
Boiler & pressure vessel steels			
EN 10028	P235 to 275 GH		✔
	P355 to P460M		✔
A36-601 & NF A36-605	A37 to A52 (CP)		✔

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	0.4
Solidification speed	High
Density (kg/dm³)	1.4
Grain size (ISO 14174)	782 : 1 - 20 / 782-FG : 1 - 16

SUGGESTIONS FOR USE

Wire	Characteristics
LNS 135	Limited hardness
L-61	Good properties
L-50M (LNS 133U)	Very high speeds

Applications

Fillet weld, lap joint
- truck wheels
- gas bottles
- Tube to fin fillet weld
- Boiler tubes

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Metal drum	250
Big Bag	500 / 1000

708GB

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.23**	**ISO 14171-A**
S A AR 1 99 AC H10	**708GB / L-60**	F7A0 - EL12	S 42 0 AR S1
	708GB / L-61	F7A0 - EM12K	S 42 0 AR S2Si

GENERAL DESCRIPTION

Agglomerated flux for submerged arc welding, with Mn and Si additions
Excellent weldability, slag removal, resistance to porosity and cracks, and very good appearance of weld bead.
It is a good choice for square edge welding joints, fillet welds and lap welds.
Recommended for limited amount of passes.

CHEMICAL COMPOSITION (W%), ALL WELD METAL

Wire grade	C	Mn	Si	P	S
L-60	0.08	1.4	0.75	0.023	0.02
L-61	0.09	1.6	0.90	0.023	0.02

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -18°C
L-60	MR	470	570	33	30
L-61	MR	570	645	30	50

APPLICATION

It is typically used for welding gas bottles,truck wheels,structural shapes, joining plates,pieces of small diameter.

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Limited passes L-61
Gas cylinders		
EN 10120	P245NB	✔
	P265NB	✔
	P310NB	✔
	P355NB	✔

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25

708GB: rev. C-EN03-24/06/16

802

CLASSIFICATION

Flux	Flux/wire	
ISO 14174 S A CS 1 55 DC H5	Hardfacing flux cored wire Hardfacing solid wire	no AWS and EN classification no AWS and EN classification

GENERAL DESCRIPTION

Neutral flux for hardfacing applications in combination with flux cored wire as Lincore 102W, Lincore 423L and Lincore 423Cr.
Weld metal with min. 0.2% Si and additional V, Nb, Ti and higher Cr-content when combined with previous mentionned Lincore wires.
Excellent slag removal and good bead appearance
Very suitable for hardfacing applications on plates and caster rolls

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	Cr	Ni	Mo	V	W
LINCORE 102W	0.28	1.5	0.4	6.5		1.0	0.15	1.0
LINCORE 423L	0.15	1.2	0.4	11.5	2.0	1.0	0.15	
LINCORE 423Cr	0.15	1.2	0.4	13.5	2.0	1.0	0.15	

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		2 hours postweld tempering at				
Wire grade	AW	426°C	482°C	538°C	593°C	649°C
LINCORE 102W	51	50	50	51	40	35
LINCORE 423L	43	42	46	38	33	32
LINCORE 423Cr	46	45	46	38	34	32

Hardness: HRc in 6 layers hardfacing application

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Metal drum	200

802: rev. C-EN23-01/02/16

839

CLASSIFICATION

Flux 839	ISO 14174:	S A FB 1 66 AC H5

Flux/Wire	AWS A5.17/A5.23
839/L60	F6A2-EL12
839/LNS135	F6A4-EM12
839/L-61	F7A5-EM12K / F6P6-EM12K
839/L-50M	F7A6-EH12K / F7P8-EH12K
839/LNS140A	F7A4-EA2-A2
839/LNS164	F9A0-EF3-F3 / F9P4EF3-F3

GENERAL DESCRIPTION

Basic flux with excellent slag detachability
To be used in combination of mild steel or low alloy grades for multirun application
Suitable for single arc and tandem arc
Good resistance on primer coating
Also suitable with stainless 308L, 309L, 316L and 307

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni
L-60	0.04	0.85	0.2	<0.01	<0.01		
LNS 135	0.05	1.2	0.2	<0.015	<0.01		
L-61	0.07	1.2	0.3	<0.015	<0.01		
L-50M	0.07	1.7	0.3	<0.015	<0.01		
LNS 140A	0.06	1.2	0.2	<0.015	<0.01	0.45	
LNS 164	0.07	1.7	0.3	<0.015	<0.01	0.45	0.80

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

					Impact ISO-V(J)			
Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	-20°C	-40°C	-50°C	-60°C
L-60	AW	390	470	30	100			
LNS 135	AW	410	490		100	50		
L-61	AW	440	530	29	130	80		
	SR	400	510	31		115	65	
L-50M	AW	470	570	258		100		
	SR	415	520	29		140		110
LNS 140A	AW	460	560	26		80		
LNS 164	AW	650	710	20	50			
	SR	590	670	24	100	65		

AW : As welded - SR : Stress relieved

839: rev. C-EN03-18/06/15

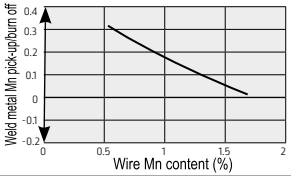
839

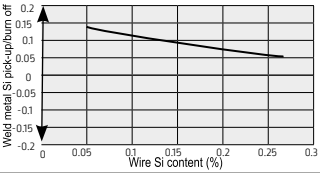
EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multirun								
		L-60	LNS 135	L-61	L-50M (LNS 133U)		LNS 140A (L-70)		LNS 164 (L-84)	
		AW	AW	AW	AW	SR	AW	SR	AW	SR
Ship plates										
	A to D	✔	✔	✔	✔		✔			
	AH(32),DH(36), DH(40)	✔			✔	✔	✔	✔		
General structural steels										
EN 10025 part 2	S185, S235, S275	✔	✔	✔	✔	✔				
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cast steels										
EN 10213-2	GP240R	✔	✔	✔	✔	✔				
Pipe materials										
EN 10208-2	L210, L240, L290	✔	✔	✔	✔	✔				
	L360	✔	✔	✔	✔	✔	✔	✔		
	L415				✔		✔	✔		
	L445, L480						✔	✔		
API 5LX	X42, X46	✔	✔	✔	✔	✔				
	X52	✔	✔	✔	✔	✔	✔	✔		
	X56, X60				✔		✔	✔	✔	✔
	X65, X70						✔	✔	✔	✔
EN 10216-1/10217-1	P235, P275	✔	✔	✔	✔	✔				
	P355	✔	✔	✔	✔	✔	✔	✔	✔	✔
Boiler & pressure vessel steels										
EN 10028-1	P235GH, P265GH, P295GH	✔	✔	✔	✔	✔	✔	✔		
	P355GH	✔	✔	✔	✔	✔	✔		✔	✔
Fine grained steels										
EN 10025 part 3/part 4	S275	✔	✔	✔	✔	✔				
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔
	S420				✔		✔	✔	✔	✔
	S460						✔		✔	✔
High yield strength steels										
EN 10025 part 6	S460, S500						✔		✔	

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	2.4
Solidification speed	Medium
Density (kg/dm³)	1.2
Grain size (ISO 14174)	2-20





PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25

Lincolnweld® 842-H™

CLASSIFICATION

Flux	Flux/wire	
ISO 14174		**AWS A5.17 / A5.23**
S A FB 1 55 AC H4	**Lincolnweld® 842-H™ / L-61**	F7A6/F6P8-EM12K-H4
	Lincolnweld® 842-H™ / L-50M (LNS 133U)	F7A8/F7P8-EH12K-H4
	Lincolnweld® 842-H™ / LNS 164 (LA 84)	F9A8/ F9P8-EF3-F3-H4
	Lincolnweld® 842-H™ / LNS 165 (LA 85)	F8A8/ F8P8-ENi5-Ni5-H4
	Lincolnweld® 842-H™ / LNS 140A	F8A4/ F7P4-EA2-A2-H4

GENERAL DESCRIPTION

Designed to meet the specific welding requirements of the offshore construction industry where consistency in operability, impact toughness, and diffusible hydrogen is critical.
Ultra-Low Diffusible Hydrogen – Less than 3 mL/100g of deposited weld metal in DC and AC polarities.
Consistent impact toughness capable of exceeding CVN values of 160 J at -60° C in the body and cap pass for consistent CTOD toughness.
Excellent AC and DC operation – High current capacity for single or multiple arc configurations.
High Operator Appeal – Excellent slag detachment and wash-out.

APPROVALS

Wire grade	ABS	DNV	LR	GL	TÜV	DB
L-50M (LNS 133U)	5YQM420 H5 (AC)	V YM42 H5 (AC)	5Y42M H5 (AC)	6Y42M H5 (AC)	✔	✔
LNS 164 (LA 84)	5YQM550 H5 (AC)	V YM55 H5 (AC)	5Y55M H5 (AC)	6Y55M H5 (AC)	✔	
LNS 165 (LA 85)	5YQM500 H5 (AC	V YM50 H5 (AC)	5Y50M H5 (AC)	6Y50M H5 (AC)	✔	

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni
L-61	0.09	1.0	0.20	<0.02	<0.015		
L-50M (LNS 133U)	0.10	1.5	0.30	<0.02	<0.015		
LNS 164 (LA 84)	0.10	1.6	0.25	<0.02	<0.015	0.5	0.8
LNS 165 (LA 85)	0.06	1.35	0.2	<0.02	<0.015	0.2	0.9
LNS 140A (L70)	0.06	0.9	0.2	<0.02	<0.015	0.4	

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	-51°C	-60°C
L-61	AW	430	520	33		300	
	SR	360	480	38			350
L-50M (LNS 133U)	AW	480	580	31			190
	SR	420	550	32			160
LNS 164 (LA 84)	AW	640	710	25			140
	SR	610	690	27			120
LNS 165 (LA 85)	AW	530	610	29			185
	SR	530	620	30			150
LNS 140A (L70)	AW	470	550	27	90		
	SR	440	530	30	80		

AW : As welded - SR : Stress relieved

Lincolnweld® 842-H™

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multirun								
		L-61	L-50M (LNS 133U)		LNS 164 (LA 84)		LNS 165 (LA 85)		LNS 140A (L 70)	
		AW	AW	SR	AW	SR	AW	SR	AW	SR
Ship plates										
	A to E	✔	✔	✔						
	AH(32),DH(36), EH(36)	✔	✔	✔	✔	✔	✔	✔	✔	✔
General structural steels										
EN 10025 part 2	S185, S235, S275	✔	✔	✔						
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cast steels										
EN 10213-2	GP240R	✔	✔	✔						
Pipe materials										
EN 10208-2	L210, L240, L290	✔	✔	✔						
	L360	✔	✔	✔	✔	✔	✔	✔	✔	✔
	L415		✔				✔	✔	✔	✔
	L445, L480						✔	✔		
API 5LX	X42, X46	✔	✔	✔						
	X52	✔	✔	✔	✔	✔	✔	✔	✔	✔
	X56, X60		✔		✔	✔	✔	✔	✔	✔
	X65, X70				✔	✔	✔	✔		
EN 10216-1/10217-1	P235, P275	✔	✔	✔						
	P355	✔	✔	✔	✔	✔	✔	✔	✔	✔
Fine grained steels										
EN 10025 part 3/part 4	S275	✔	✔	✔						
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔
	S420		✔		✔	✔	✔	✔	✔	✔
	S460				✔	✔	✔	✔	✔	
	S500				✔	✔	✔			

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	2.3
Solidification speed	Medium
Density (kg/dm³)	1.3
Grain size (ISO 14174)	2 - 20

SUGGESTIONS FOR USE

Suitable for deep groove
Low temperatures requirements
Highly restrained constructions
Single and multi-wire systems
Off-shore and on-shore applications
Nuclear components

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Plastic pail	22.7

8500

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A FB 1 54 AC H5	**8500 / L-61**	F7A6/F6P8-EM12K	S 38 4 FB S2Si	S 4T 0 FB S2Si
	8500 / L-50M (LNS 133U)	F7A6/F7P8-EH12K	S 42 6 FB S3Si	S 4T 2 FB S3Si
	8500 / LNS 140A	F8A6-EA2-A2	S 46 4 FB S2Mo	
	8500 / LNS 160	F7A8/P8-ENi1-Ni1	S 42 5 FB S2Ni1*	
	8500 / LNS 162	F7A8/P8-ENi2-Ni2	S 42 6 FB S2Ni2*	
	8500 / LNS 165 (LA85)	F8A8/F7P8-ENi5-Ni5	S 50 6 FB SZ	
	8500 / LNS T55		S 50 5 FB TZ	

* Nearest classification

GENERAL DESCRIPTION

Basic flux designed for carbon and low alloy steels
Excellent welding characteristics over a wide range of welding procedures
Superior mechanical properties
Impact properties are consistent throughout the weld joint, including the cap location
Excellent CTOD values

APPROVALS

Wire grade	BV	ABS	LRS	DNV	GL	RMRS
L-61					3YM/2YT	
L-50M (LNS 133U)	A3YT/A5YM	3YT/5YM	5Y40M/3Y40T	5Y40M/3Y40T		
LNS 140A (L-70)		3YM			3Y40M/4Y40T	3YM/4YT

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni
L-61	0.08	1.0	0.2	<0.02	<0.015		
L-50M (LNS 133U)	0.07	1.4	0.3	<0.02	<0.015		
LNS 140A (L-70)	0.08	0.9	0.2	0.03	<0.025	0.4	
LNS 160	0.07	1.0	0.1	0.02	0.015		1.0
LNS 162	0.08	1.0	0.1	0.02	0.015		2.0
LNS 165 (LA 85)	0.07	1.3	0..2	0.02	0.015	0.2	0.9
LNS T55	0.08	1.7	0.7	<0.015	<0.015		

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-60°C
L-61	MR	430	510	28	150	100	50
L-50M (LNS 133U)	MR	440	540	28		110	
	SR	>420	>500	30		150	
LNS 140A (L-70)	MR	440	540	28		55	
LNS 160	AW	430	510	30		150	50
	SR	400	510	30		150	50
LNS 162	AW	470	560			150	50
	SR	450	530			150	50
LNS 165 (LA 85)	AW	530	600	25		120	50
	SR	480	580	30		120	50
LNS T55	AW	530	620		120	80	
	SR	500	570			70	

* MR : Multirun - TR : Two-run - AW : As welded - SR : Stress relieved

8500: rev. C-EN24-01/02/16

8500

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multirun												
		L-61	L-50M (LNS 133U)		LNS 140A (L-70)		LNS 160		LNS 162		LNS 165		LNS T55	
		AW	AW	SR	AW	SR	AW	SR	AW	SR	AW	SR	AW	SR
Ship plates														
	A to E	✔	✔	✔									✔	✔
	AH(32),DH(36), EH(36)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
General structural steels														
EN 10025 part 2	S185, S235, S275	✔	✔	✔									✔	✔
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cast steels														
EN 10213-2	GP240R	✔	✔	✔									✔	✔
Pipe materials														
EN 10208-2	L210, L240, L290	✔	✔	✔									✔	✔
	L360	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	L415		✔		✔	✔					✔	✔	✔	✔
	L445, L480										✔	✔		
API 5LX	X42, X46	✔	✔	✔										
	X52	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	X56, X60		✔		✔	✔					✔	✔	✔	✔
	X65, X70										✔	✔		
EN 10216-1/10217-1	P235, P275	✔	✔	✔									✔	✔
	P355	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Boiler & pressure vessel steels														
EN 10028-1	P235GH, P265GH, P295GH	✔	✔	✔	✔	✔								
Fine grained steels														
EN 10025 part 3/4	S275	✔	✔	✔									✔	✔
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	S420		✔		✔	✔					✔	✔	✔	✔
	S460										✔	✔		

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	2.8
Solidification speed	Medium
Density (kg/dm^3)	1.3
Grain size (ISO 14174)	2 - 20

SUGGESTIONS FOR USE

Suitable for deep groove
Low temperatures requirements
Highly restrained constructions
Single and multi-wire systems
Off-shore and on-shore applications
Nuclear components

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Metal drum	250

860

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A AB 1 56 AC H5	**860 / L-60**	F6A2-EL12	S 35 2 AB S1	
	860 / LNS 135	F6A2-EM12	S 35 2 AB S2	S 3T 0 AB S2
	860 / L-61	F7A2-EM12K	S 38 2 AB S2Si	S 3T 0 AB S2Si
	860 / L-50M (LNS 133U)	F7A2/F7P2-EH12K	S 42 2 AB S3Si	
	860 / L-70	F7A2-EA1-A2	S 42 2 AB S2Mo	S 4T 2 AB S2Mo
	860 / LNS 140A	F7A2-EA2-A2	S 42 2 AB S2Mo	S 4T 2 AB S2Mo
	860 / LNS 163	F7A4-EG-G	S 42 4 AB S2Ni1Cu	
	860 / LNS T55	F7A2/F7P4-EC1	S 50 3 AB SZ	

GENERAL DESCRIPTION

Multi purpose neutral agglomerated flux
Good impact values in both multi-run (with L-60/L-61/L-50M) and two-run (with LNS 140A) techniques
High restraint cracking resistant

APPROVALS

Wire grade	BV	ABS	LRS	DNV	GL	RMRS	RINA	CRS	TÜV
L-60									✔
LNS 135					3M/3T				✔
L-61	A3YM/A2YT	YM/2YT	3YM/2YT	3YM/2YT	3YM/2YT	3YM/2YT	3M/3YM/2YT	3YM/2YT	✔
LNS 140A (L-70)	A3YTM		3Y40M/3YT	3Y40TM	3YM/2YT				✔
LNS 150									✔
LNS 163									✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo
L-60	0.05	1.0	0.25	<0.025	<0.020	
LNS 135	0.06	1.3	0.3	<0.025	<0.020	
L-61	0.10	1.2	0.3	<0.025	<0.020	
L-50M (LNS 133U)	0.07	1.7	0.5	<0.025	<0.020	
LNS 140A (L-70)	0.05	1.3	0.3	<0.025	<0.020	0.4
LNS T55	0.06	1.8	0.7	<0.020	<0.015	

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C	Impact ISO-V(J) -20°C
L-60	AW	360	480	30	80	50
LNS 135	AW	390	490	33	100	50
L-61	AW	430	510	32	100	60
	SR	400	505	32		115
L-50M (LNS 133U)	AW	460	530	28	120	80
	SR	420	520			115
LNS 140A (L-70)	AW	520	570	26		70
	SR	510	580	30		50
LNS T55	AW	520	610			70
	SR	470	560			70
LNS 163	AW	460	540	27		55

* AW : As welded - SR : Stress relieved

860: rev. C-EN24-01/02/16

860

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multirun								
		L-60	LNS 135	L-61	L-50M (LNS 133U)		LNS 140A (L-70)		LNS T55	
		AW	AW	AW	AW	SR	AW	SR	AW	SR
Ship plates										
	A to D	✔	✔	✔	✔		✔			
	AH(32),DH(36), DH(40)	✔			✔	✔	✔	✔	✔	✔
General structural steels										
EN 10025 part 2	S185, S235, S275	✔	✔	✔	✔	✔				
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cast steels										
EN 10213-2	GP240R	✔	✔	✔	✔	✔				
Pipe materials										
EN 10208-2	L210, L240, L290	✔	✔	✔	✔	✔				
	L360	✔	✔	✔	✔	✔	✔	✔	✔	✔
	L415				✔		✔	✔	✔	✔
	L445, L480						✔	✔		
API 5LX	X42, X46	✔	✔	✔	✔	✔				
	X52	✔	✔	✔	✔	✔	✔	✔	✔	✔
	X56, X60				✔		✔	✔	✔	✔
	X65, X70						✔	✔		
EN 10216-1/10217-1	P235, P275	✔	✔	✔	✔	✔				
	P355	✔	✔	✔	✔	✔	✔	✔	✔	✔
Boiler & pressure vessel steels										
EN 10028-1	P235GH, P265GH, P295GH	✔	✔	✔	✔	✔	✔	✔	✔	✔
	P355GH	✔	✔	✔	✔					
Fine grained steels										
EN 10025 part 3/4	S275	✔	✔	✔	✔	✔				
	S355	✔	✔	✔	✔	✔	✔	✔	✔	✔
	S420				✔		✔	✔	✔	✔
	S460						✔			
High yield strength steels										
EN 10025 part 6	S460, S500						✔			

FLUX CHARACTERISTICS

Current type	DC/AC
Basicity (Boniszewski)	1.1
Solidification speed	High
Density (kg/dm^3)	1.4
Grain size (ISO 14174)	1 - 16

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	1000

888

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**
S A FB 1 66 AC H5	**888 / L-61**	F7A6-EM12K	S 38 5 FB S2Si
	888 / L-50M (LNS 133U)	F7A8/F6P8-EH12K	S 42 6 FB S3Si
	888 / LNS 140A	F8A4-EA2-A2	S 46 4 FB S2Mo
	888 / L-70	F8A4-EA1-A2	S 46 4 FB S2Mo
	888 / LNS 160	F7A8/P8-ENi1-Ni1	S 42 5 FB S2Ni1*
	888 / LNS 162	F7A8/F7P8-ENi2-Ni2	S 42 6 FB S2Ni2*
	888 / LNS 164	F9A6/F9P4-EF3-F3	S 50 4 FB S3Ni1Mo
	888 / LNS 165	F8A6/F7P8-ENi5-Ni5	S 50 4 FB Sz
	888 / LNS 150	F7P6-EB2-B2	S 50 2 FB CrMo1
	888 / LNS 151	F8P6-EB3-B3	
	888 / LA-100	**F10A4-EM2-M2**	**S 50 4 FB SZ**

GENERAL DESCRIPTION

Basic flux designed for carbon and low alloy steels
Easy slag removal in deep groove
Robust mechanical properties including CTOD values
Bruscato factor typically below 12 ppm with LNS150 & LNS151 wires
Excellent in multi arc configurations
Only available in Sahara ReadyBag™

APPROVALS

Wire grade	TÜV
L-61	✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Ni	Mo	Cr	Bruscato factor
L-61	0.08	1.05	0.37	<0.02	<0.015				
L-50M (LNS 133U)	0.07	1.45	0.55	<0.02	<0.015				
LNS 140A (L-70)	0.07	1.0	0.35	<0.02	<0.015		0.4		
LNS 160	0.07	1.2	0.4	<0.02	<0.015	0.95			
LNS 162	0.07	1.1	0.4	<0.02	<0.015	2.1			
LNS 164	0.08	1.7	0.5	<0.02	<0.01	0.9	0.5		
LNS 165	0.06	1.50	0.5	<0.02	<0.015	0.97	0.2		
LNS 150	0.069	0.90	0.5	<0.02	<0.015		0.56	1.34	<10 ppm
LNS 151	0.062	0.85	0.3	<0.02	<0.015		0.93	2.15	<10 ppm
LA-100	0.06	1.60	0.7	<0.02	<0.015	1.8	0.42	0.08	

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C	-60°C
L-61	AW	415	515	31		135	100	
L-50M (LNS 133U)	AW	480	580	29			90	70
	SR	430	550	31		105		65
LNS 160	AW	470	550	26		115		
	SR	410	510	27		160		120
LNS 162	AW	500	580	25		100		55
	SR	440	550	25		160		120
LNS 164	AW	650	750	21		65		30
	SR	610	700	23		65		30
LNS 165	AW	530	620	26		70		40
	SR	495	595	27				70
LNS 150	SR	420	580	26	100			
LNS 151	SR	530	645	23				
LA-100	AW	680	760	25		50		

* AW : As welded - SR : Stress relieved

All information in this data sheet is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.eu for any updated information.
Fumes: Safety Data Sheets (SDS) are available on our website.

888: rev. C-EN26-01/02/16

888

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type	Multirun													
		L-61	L-50M (LNS 133U)		L-70	LNS 164	LNS 165		LNS 150	LNS 151	LNS 160		LNS 162		LA 100
		AW -50°C	AW -60°C	SR-60°C	AW	AW-40°C	AW-40°C	SR-60°C	SR-50°C	SR-50°C	AW	SR	AW	SR	AW-40°C
Ship plates															
	A to E	✔	✔	✔											
	AH(32),DH(36), EH(36)	✔	✔	✔		✔	✔	✔			✔	✔	✔	✔	
General structural steels															
EN 10025 part 2	S185, S235, S275	✔	✔	✔											
	S355	✔	✔	✔		✔	✔	✔			✔	✔	✔	✔	
Cast steels															
EN 10213-2	GP240R	✔	✔	✔											
Pipe materials															
EN 10208-2	L210, L240, L290	✔	✔	✔											
	L360	✔	✔	✔		✔	✔	✔			✔	✔	✔	✔	
	L415		✔			✔	✔	✔							
	L445, L480					✔	✔	✔							
EN 10216-1/10217-1	P235, P275	✔	✔	✔											
	P355	✔	✔	✔		✔	✔	✔			✔	✔	✔	✔	
Boiler & pressure vessel steels															
EN 10028-1	P235GH, P265GH, 295GH	✔	✔	✔											
EN 10028-2 (High temperature steel)	16 Mo 3				✔										
	13CrMo 4-5								✔	✔					
	10CrMo 9-10								✔	✔					
EN 10028-4/10222-3 (Low temperature steel)	11MnNi5-3, 13MnNi6-3						✔	✔			✔	✔	✔	✔	✔
Fine grained steels															
EN 10025 part 3/4	S275	✔	✔	✔											
	S355	✔	✔	✔		✔	✔	✔			✔	✔	✔	✔	
	S420		✔			✔	✔	✔					✔	✔	
	S460					✔	✔	✔							
High yield strength steels															
EN 10025 part 6	S460, S500					✔	✔	✔			✔	✔	✔	✔	

FLUX CHARACTERISTICS

Current type	AC / DC
Basicity (Boniszewski)	2.3
Solidification speed	High
Grain size (ISO 14174)	2 - 20

SUGGESTIONS FOR USE

Boiler and pressure vessels
Off-shore applications
Wind towers
Structural fabrications

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25

960

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A AB 1 66 AC H5	**960 / L-61**	F7A2-EM12K	S 38 2 AB S2Si	S 3T 2 AB S2Si
	960 / L-50M (LNS133 U)	F7A2-EH12K	S 38 2 AB S3Si	S 3T 2 AB S3Si
	960 / LNS 163	F7A4-EG-G	S 42 4 AB S2Ni1Cu	

GENERAL DESCRIPTION

General purpose neutral flux
Attractive as the "one-flux" in the shop
Very good results in semi-automatic submerged arc welding
Very good operating characteristics (deslagging - wash in - aspect)

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S
L-61	0.07	1.3	0.4	<0.03	<0.025
L-50M(LNS 133U)	0.07	1.6	0.6	<0.03	<0.025

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -40°C
L-61	AW	420	510	28	50	
L-50M(LNS 133U)	AW	430	530	28	70	
LNS 163	AW	460	540	27		55

* AW : As welded

960: rev. C-EN24-01/02/16

960

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multirun		Two-run	
		L-61	L-50M (LNS 133U)	L-61	L-50M (LNS 133U)
Ship plates					
	A to E	✔	✔	✔	✔
	AH(32),DH(36), EH(36)	✔	✔	✔	✔
General structural steels					
EN 10025 part 2	S185, S235, S275	✔	✔	✔	✔
	S355	✔	✔	✔	✔
Cast steels					
EN 10213-2	GP240R	✔	✔	✔	✔
Pipe materials					
EN 10208-2	L210, L240, L290	✔	✔	✔	✔
	L360	✔	✔	✔	✔
	L415		✔		
API 5LX	X42, X46	✔	✔	✔	✔
	X52	✔	✔	✔	✔
	X56, X60		✔		
EN 10216-1/10217-1	P235, P275	✔	✔	✔	✔
	P355	✔	✔	✔	✔
Boiler & pressure vessel steels					
EN 10028-1	P235GH, P265GH, P295GH	✔	✔	✔	✔
	P355GH	✔	✔	✔	✔
Fine grained steels					
EN 10025 part 3/4	S275	✔	✔	✔	✔
	S355	✔	✔	✔	✔
	S420		✔		

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	1.0
Solidification speed	high
Density (kg/dm³)	1.4
Grain size (ISO 14174)	1 -16

SUGGESTIONS FOR USE

Wire	Characteristics
L-61	General purpose
L-50M(LNS 133U)	For dirty plates

Applications
Butt welds (single pass and multi-run)
Fillet welds

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

980

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A AR/AB 1 57 AC H5	**980 / L-61**	F7A2-EM12K	S 38 2 AR/AB S2Si	S 3T 2 AR/AB S2Si
	980 / L-50M (LNS 133U)	F7A2-EH12K	S 38 2 AR/AB S3Si	S 4T 2 AR/AB S3Si

GENERAL DESCRIPTION

Outstanding slag removal, also in narrow grooves
Multi purpose flux
Suitable for semi-automatic submerged arc welding
Attractive as the "one-flux" in the shop

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S
L-61	0.06	1.5	0.3	<0.02	<0.02
L-50M(LNS 133U)	0.07	1.7	0.4	<0.02	<0.02

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C
L-61	MR	420	520	29	50
L-50M(LNS 133U)	MR	460	550	29	60

* MR : Multirun

980: rev. C-EN25-01/02/16

980

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multirun	
		L-61	L-50M (LNS 133U)
Ship plates			
	A to E	✔	✔
	AH(32),DH(36), EH(36)	✔	✔
General structural steels			
EN 10025 part 2	S185, S235, S275	✔	✔
	S355	✔	✔
Cast steels			
EN 10213-2	GP240R	✔	✔
Pipe materials			
EN 10208-2	L210, L240, L290	✔	✔
	L360	✔	✔
	L415		✔
API 5LX	X42, X46	✔	✔
	X52	✔	✔
	X56, X60		✔
EN 10216-1/10217-1	P235, P275	✔	✔
	P355	✔	✔
Boiler & pressure vessel steels			
EN 10028-1	P235GH, P265GH, P295GH	✔	✔
	P355GH	✔	✔
Fine grained steels			
EN 10025 part 3/part 4	S275	✔	✔
	S355	✔	✔
	S420		✔

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	0.6
Solidification speed	high
Density (kg/dm^3)	1.4
Grain size (ISO 14174)	1 -16

SUGGESTIONS FOR USE

Wire	**Applications**
L-61	Lower cost combination
L-50M(LNS 133U)	For the best operating characteristics
	For the best impact values in multi-pass

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25

995N

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.23**	**ISO 14171-A : TR**
S A AB 1 67 AC H5	**995N / LNS 140A**		S 4T 2 AB S2Mo
	995N / LNS 140TB (LA-81)	F9TA6-G-EA2TiB	S 5T 5 AB S2MoTiB
	995N / LNS 133TB	F9TA6-G-EG	

GENERAL DESCRIPTION

Neutral agglomerated flux designed for longitudinal multi-arc welding pipe mill station
High end pipe mill applications up to X80
Outstanding welding characteristics and bead profile
Better results on pipe thickness over 12mm
Nitrogen controlled weld metal providing good impact toughness on arctic grade pipes
Very low diffusible hydrogen level in the weld deposit

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Base material	Wire grade	C	Mn	Si	P	S	Mo	Ti	B	N
X65	LNS 140A (L-70)	0.07	1.45	0.3	<0.025	<0.025	0.2	-	-	0.005
X80	LNS 140TB (LA-81)	0.06	1.6	0.35	<0.025	<0.025	0.2	0.015	0.002	0.004

Remark: the chemical composition from butt welds in pipe depends on the chemical composition of base material.
Proced : tandem AC/AC application on X65 plate 12,7 mm thick.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C	-60°C	Hardness
Procedure 1									
LNS 140A (L-70)	TR	580	680	30	95	65			230
LNS 140TB (LA-81)	TR	630	700	27	115	75	50		235
Procedure 2									
LNS 140TB (LA-81)	TR	600	720	25	100	65		45	220-235
Procedure 3									
LNS 133TB	TR	600	700	27		120		90	

Remark: the mechanical properties from butt welds in pipe depends on the chemical composition of base material.
Procedure 1: tandem in 12,5mm X65; Procedure 2: multiwire weld (4/5 wires) in 19-25mm X65 ; Procedure 3 : AWS test plate

* TR : Two-run

995N

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Two-run		
		LNS 140TB (LA-81)	LNS 140A (L-70)	LNS 133TB
Ship plates				
	A to E	✔	✔	✔
	A 32 to FH40	✔	✔	✔
General structural steels				
EN 10137	500 to 550 A & AL	✔	✔	✔
EN 10025 part 3/4	S275 to S460 all qualities	✔	✔	✔
EN 10149	S315 to S650 all qualities	✔	✔	✔
EN 10025 part 2	S185 to S355 all qualities	✔	✔	✔
	E295 to E360	✔	✔	✔
Boiler & pressure vessel steels				
EN 10028	P235 to P460G all qualities	✔	✔	✔
	P235 to P275		✔	✔
	A37 to A52 all qualities	✔	✔	✔
	PF24 to PF36 all qualities	✔	✔	✔
	P265 to P460 all qualities	✔	✔	✔
	A37 to A52, CP	✔	✔	✔
	X42 to X70	✔	✔	✔
	X42 to X80	✔		✔

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	1.3
Solidification speed	Medium
Density (kg/dm³)	1.0
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

One run on each side in one or multi wire systems for high welding speed and excellent mechanical properties.

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	500 / 600 / 1000

998N / 998N-P

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.23**	**ISO 14171-A : TR**
S A AB 1 67 AC H5	**998N / LNS 140A**		S 4T 2 AB S2Mo
	998N / LNS140TB (LA-81)	F9TA6-G-EA2TiB	S 5T 5 AB S2MoTiB
	998N / LNS133TB	F9TA6-G-EG	

GENERAL DESCRIPTION

Flux designed for longitudinal multi-arc welding pipe mill station also suitable for spiral welds
High end pipe mill applications up to X80
Superior resistance to undercuts on thin metal sheet work at high speed
Designed to operate on all the range of pipe thickness (6 to 50 mm)
Nitrogen controlled weld metal providing good impact toughness on arctic grade pipes
Superior resistance to surface defects
Very low diffusible hydrogen level in the weld deposit
998N-P is a coarser size distribution of 998N for flux consumption reduction

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Base material	Wire grade	C	Mn	Si	P	S	Mo	Ti	B	N
X65	LNS 140TB (LA-81)	0.067/0.076	1.41/1.51	0.28/0.34	0.017/0.020	0.003/0.004	0.22/0.27	0.024/0.034	0.0028/0.0036	0.005/0.01
X80	LNS 140TB (LA-81)	0.045/0.06	1.6/1.64	0.35/0.4	0.016/0.017	0.004/0.005	0.3/0.35	0.031/0.034	0.0029/0.0032	0.005/0.006

Remark: the chemical composition from butt welds in pipe depends on the chemical composition of base material.
Proced1: triple arc application on X65 plate 15,9 mm thick; Proced2: tandem applications on X80 plate 12,7mm thick.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C	-60°C	Hardness
Procedure 1									
LNS 140A (L-70)	AW	570	680	27					230
LNS 140TB (LA-81)	AW	610	700	27	115	75	50		235
Procedure 2									
LNS 140TB (LA-81)	AW	640	730	24	160	120	90	70	220-235
Procedure 3									
LNS 133TB	TR	610	730	26			120	80	

Remark: the mechanical properties from butt welds in pipe depends on the chemical composition of base material.
Procedure 1: tandem in 12,5mm X65; Procedure 2: multiwire weld (4/5 wires) in 19-25mm X65 ; Procedure 3 : AWS test plate

* AW : As welded

998N: rev. C-EN24-01/02/16

998N / 998N-P

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Two-run		
		LNS 140TB (LA-81)	LNS 140A (L-70)	LNS 133TB
Ship plates				
	A to E	✔	✔	✔
	A 32 to FH40	✔	✔	✔
General structural steels				
EN 10137	500 to 550 A & AL	✔	✔	✔
EN 10025 part 3/4	S275 to S460 all qualities	✔	✔	✔
EN 10149	S315 to S650 all qualities	✔	✔	✔
EN 10025 part 2	S185 to S355 all qualities	✔	✔	✔
	E295 to E360	✔	✔	✔
Boiler & pressure vessel steels				
EN 10028	P235 to P460G all qualities	✔	✔	✔
	P235 to P275	✔	✔	✔
	A37 to A52 all qualities	✔	✔	✔
	PF24 to PF36 all qualities	✔	✔	✔
	P265 to P460 all qualities	✔	✔	✔
	A37 to A52, CP	✔	✔	✔
	X42 to X70	✔	✔	✔
	X42 to X80	✔		

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	1.3
Solidification speed	fast
Density (kg/dm^3)	1.3
Grain size (ISO 14174)	2 -20

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Metal drum	200
Big Bag	500 / 600 / 1000

P223

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : TR**
S A AB 1 67 AC H5	**P223 / L-61**	F7A4-EM12K	S 4T 2 AB S2Si
	P223 / L-50M (LNS 133U)	F7A5-EH12K	S 4T 2 AB S3Si
	P223 / LNS 140A	F8A4-EA2-A2	S 4T 4 AB S2Mo
	P223 / LNS 133TB	F8TA4-G-EG	

GENERAL DESCRIPTION

Aluminate basic agglomerated flux
Good impact values in two-run and multi-run technique
Low hydrogen content
Very suitable for longitudinal and spiral pipe welding
Usable up to 3 wire systems
Fine grain version available for the thinest wall and fastest welding speed

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni
L-61	0.08	1.4	0.2	<0.02	<0.015		
L-50M (LNS 133U)	0.07	1.7	0.3	<0.02	<0.015		
LNS 140A (L-70)	0.08	1.4	0.2	0.03	<0.025	0.4	
LNS 160	0.07	1.3	0.25	0.02	0.015		1.0
LNS 162	0.08	1.3	0.25	0.02	0.015		2.0
LNS 165 (LA-85)	0.07	1.5	0.3	0.02	0.015	0.2	0.9
LNS T55	0.08	1.7	0.7	<0.015	<0.015		

Remark: the chemical composition from butt welds in pipe depends on the chemical composition of base material.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Impact ISO-V(J) -20°C	Impact ISO-V(J) -40°C
L-61	TR	450	550	60	
L-50M (LNS 133U)	TR	470	570	80	
LNS 140A (L-70)	TR	500	600		50
LNS 133TB	TR	510	610		60

* TR : Two-run

P223: rev. C-EN23-11/05/16

P223

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Two-run	
		LNS 140A (L-70)	LNS 133TB
General structural steels			
EN 10025 part 6	500A	✔	✔
EN 10025 part 3/part 4	S275 to 460 N, NL	✔	✔
EN 10149	S315 to S500MC & NC	✔	✔
EN 10025 part 2	S185, S235, S275, S355	✔	✔
Pipe material			
API 5LX	X 42 to X70	✔	✔
Boiler & pressure vessel steels			
EN 10028-1	P235 to P460 all qualities	✔	✔
EN 10207	P235 to P275 S & SL	✔	✔
A36-601 & NF A36-605	A37 to A52 CP, AP & F	✔	✔
EN 10222	P285 & P420 all qualities	✔	✔
Offshore plates			
A36-212	PF 24 to PF 36 all qualities	✔	✔

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	1.6
Solidification speed	High
Density (kg/dm³)	1.2
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

Single/ multi wire welding
Longitudinal and spiral pipe welding.

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	500
Big Bag	600
Big Bag	100

P230

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**	**ISO 14171-A : TR**
S A AB 1 67 AC H5	**P230 / LNS 135**	F7A4/F7P6-EM12	S 38 4 AB S2	S 4T 2 AB S2
	P230 / L-61	F7A4/F6P5-EM12K	S 38 4 AB S2Si	
	P230 / L-50M (LNS 133U)	F7A5/F7P5-EH12K	S 46 5 AB S3Si	
	P230 / LNS 140A	F8A4-EA2-G	S 46 4 AB S2Mo	S 4T 4 AB S2Mo
	P230 / L-70	F8A4-EA1-G	S 46 4 AB S2Mo	S 4T 4 AB S2Mo
	P230 / LNS 160	F7A8/F7P8-ENi1-Ni1	S 46 4 AB S2Ni1*	
	P230 / LNS 162	F7A8/F7P8-ENi2-Ni2	S 46 6 AB S2Ni2*	
	P230 / LNS T55	F7A4/F7P5-EC1	S50 4 AB Tz	

GENERAL DESCRIPTION

Aluminate basic agglomerated flux
Low hydrogen content
One flux to combine with a wide range of wire electrodes
Good impact values in two-run and multi-run technique
Selection of wires provides application possibilities from -40 to +400°C

APPROVALS

Wire grade	BV	ABS	LRS	DNV	GL	RMRS	RINA	TÜV
L-61		4YTM	4YTM				4YTM	X
L-50M (LNS 133U)	A4YM/A3YT		4Y40M/3Y40T	4YM				X
LNS 140A (L-70)	A4YTM	4YTM/2YT	4YM		4Y40TM	3YTM	4YTM	X
LNS 135								X
LNS 160								X
LNS 162								X
LNS T55								X

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni
L-61	0.06	1.4	0.4	<0.03	<0.02		
LNS 135	0.07	1.4	0.25	<0.03	<0.02		
L-50M (LNS 133U)	0.08	1.8	0.5	<0.03	<0.02		
LNS 140A (L-70)	0.07	1.4	0.3	<0.03	<0.02	0.5	
LNS 160	0.07	1.4	0.3	<0.03	<0.02		1.1
LNS 162	0.08	1.2	0.3	<0.03	<0.02		2.1
LNS T55	0.07	1.8	0.8	0.02	0.015		

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-60°C
LNS 135	AW	400	500	30	50		
L-61	AW	450	520	30	100		
	SR	400	490	30	140	80	
L-50M (LNS 133U)	AW	480	580	30		80	
	SR	460	540	28		70	
LNS 140A (L-70)	MR	540	620	28	70		
	TR		620			60	
LNS 160	AW	490	570	28		120	45
	SR	430	550	28		140	75
LNS 162	AW	500	590	28		120	50
	SR	460	570	28		150	80
LNS T55	AW	540	630	28	90	60	
	SR	520	610	28	80	50	

* MR : Multirun - TR : Two-run - AW : As welded - SR : Stress relieved

P230-1: rev. C-EN25-11/05/16

P230

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multi-run			
		LNS 135	L-61	L-50M (LNS 133U)	LNS 140A (L-70)
Ship plates					
	A to D	✔	✔	✔	✔
	AH(32),DH(40)	✔	✔	✔	✔
General structural steels					
EN 10025 part 6	500A				✔
EN 10025 part 3/part 4	S275 to 460 N, NL	✔	✔	✔	✔
	S275 to 420 N, NL, M & ML		✔	✔	✔
	S275 to 460 N, NL, M & ML			✔	✔
EN 10149	S315 & S355 MC & NC	✔	✔	✔	✔
	S315 to S420MC & NC		✔	✔	✔
	S315 to S460MC & NC			✔	✔
	S315 to S500MC & NC				✔
Boiler & pressure vessel steels					
EN 10028-2	P295GH, P355GH, 16Mo3	✔	✔		
EN 10022-2	17Mo3, 14Mo6	✔	✔		

FLUX CHARACTERISTICS

Current type	DC (+/-)/AC
Basicity (Boniszewski)	1.6
Solidification speed	High
Density (kg/dm³)	1.2
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

Excellent multi application flux on the shop floor
Excellent welding behaviour in single arc and tandem application
Very good mechanical properties at low temperature in either two-run or multi run technique.

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

P230

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A / ISO 26304**	**ISO 21952-A**
S A AB 1 67 AC H5	**P230 / LNS 150**	F8P2-EB2-B2R		S CrMo1
	P230 / LNS 151	F9PZ-EB3-B3R		S CrMo2
	P230 / LNS 163		S 38 4 AB S2 NiCu	
	P230 / LNS 164	F9A6-EF1*-F3	S 50 4 AB S3NiMo1	
	P230 / LNS 168		S 69 4 AB S3Ni2.5CrMo	

GENERAL DESCRIPTION

Aluminate basic agglomerated flux
Low hydrogen content
One flux to combine with a wide range of wire electrodes
Good impact values in two-run and multi-run technique
Selection of wires provides application possibilities from -40 to +400°C

APPROVALS

Wire grade	TÜV
LNS 164	✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni	Cr	Cu
LNS 150	0.08	1.1	0.3	<0.02	<0.01	0.5		0.9	
LNS 151	0.12	0.8	0.3	<0.02	<0.01	1.0		2.6	
LNS 163	0.07	1.1	0.6	<0.02	0.02		0.7		0.7
LNS 164	0.07	1.5	0.3	<0.02	<0.01	0.5	1.0		
LNS 168	0.09	1.7	0.4	<0.02	<0.02	0.4	2.4	0.25	

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C	-20°C	-40°C
LNS 150	SR	535	620	25	70	90**	60**
LNS 151	SR	560	640	24		30	
LNS 163	AW	450	600	20	60	70	
LNS 164	AW	630	710	22	90	80	50
	SR	630	710	24	70	60	35
LNS 168	AW	710	840	20		65	min. 47

* SR : Stress relieved - AW : As welded - **SR = 2h/720°C

P230-2: rev. C-EN25-11/05/16

P230

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	LNS 150	LNS 151	LNS 164	LNS 168
Pipe materials					
EN 10208-2	L415			✔	
	L445, L480			✔	
API 5LX	X56, X60			✔	
	X65, X70			✔	
Gaz de France	X63			✔	
Boiler & pressure vessel steels					
EN 10028-2	13CrMo 4-5	✔	✔		
High temperature steel	10CrMo 9-10	✔	✔		
EN 10028-4/10222-3	13MnNi6-3				
Low temperature steel	11MnNi5-3				
Fine grained steels					
EN 10025 part 3/part 4	S420			✔	
EN 10025 part 6	S460			✔	
High yield strength steels					
EN 10025 part 6	S460, S690				✔

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	1.6
Solidification speed	High
Density (kg/dm³)	1.2
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

Excellent multi application flux on the shop floor
Excellent welding behaviour in single arc and tandem application
Very good mechanical properties at low temperature in either two-run or multi run technique.

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

P240

CLASSIFICATION

Flux	Flux/wire		
ISO 14174		**AWS A5.17 / A5.23**	**ISO 14171-A : MR**
S A FB 1 55 AC H5	**P240 / L-61 (LNS129)**	F7A6-EM12K	S 42 4 FB S2Si
	P240 / L-50M (LNS133U)	F7A8/P8-EH12K	S 42 6 FB S3Si
	P240 / LNS 160	F7A10/P10-ENi1-Ni1	S 46 6 FB S2Ni1*
	P240 / LNS 162	F7A10/P10-ENi2-Ni2	S 46 6 FB S2Ni2*
	P240 / LNS 165 (LA-85)	F8A8/P8-ENi5-Ni5	S 50 6 FB Sz
	P240 / LNS 150 (LA-92)	F8P2-EB2-B2R	
	P240 / LNS 151 (LA-93)	F9P0-EB3-B3R	
	P240 / LNS 168	F10A5-EM2-M2	S 69 4 FB S3NiCr2.5Mo

GENERAL DESCRIPTION

Highly basic fluoride agglomerated flux
Good impact values suitable for offshore constructions
Consistently good CTOD values with CMn and Ni-alloyed wires
Low hydrogen content
Suitable for single/multi wire welding

APPROVALS

Wire grade	BV	ABS	LRS	DNV	CRS	TÜV
L-50M (LNS 133U)	A5YM	5YM	5YM	5YM	5YM	✔
LNS 162						✔
LNS 160						✔
LNS 164						✔
LNS 165		5Y46M	5Y46M	5Y46M		
LNS 168			4Y69			

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	P	S	Mo	Ni	Cr
L-61	0.08	1.0	0.35	< 0.010	< 0.010			
L-50M (LNS 133U)	0.08	1.6	0.35	< 0.020	< 0.015			
LNS 160	0.08	1.0	0.25	< 0.020	< 0.015		1.0	
LNS 162	0.08	1.01.3	0.25	< 0.020	< 0.015		2.2	
LNS 165	0.08	1.2	0.35	< 0.020	< 0.015	0.15	0.9	
LNS 150	0.08	0.7	0.3	< 0.015	< 0.010	0.15		1.1
LNS 151	0.10	1.5	0.3	< 0.015	< 0.010	1.0		2.5
LNS 168	0.08		0.4	< 0.015	< 0.015	0.4	2.4	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C	-60°C
L-61	AW	440	530	30	115	75		
L-50M (LNS 133U)	AW	460	560	28				40
	SR	420	540	28				40
LNS 160	AW	470	550	28				80
	SR	430	490	32				100
LNS 162	AW	480	560	26				100
	SR	460	530	30				140
LNS 165	AW	520	600	25				60
	SR	510	580	24				60
LNS 150	SR	520	610	24				100
LNS 151	SR	550	640	24				50
LNS 168	AW	720	800	20			55	

AW : As welded - SR : Stress relieved

P240: rev. C-ENZ76-11/05/16

P240

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Multi-run					
		L-50M (LNS 133U)	LNS 160	LNS 162	LNS 165	LNS 150	LNS 151
Ship plates							
	A to E	✔	✔	✔	✔		
	AH32 to EH40	✔	✔	✔	✔		
General structural steels							
EN 10025 part 6 [A 36-204)	500 A & AL				✔		
EN 10025 part 3/part 4	S275 to S460 all qualities	✔	✔	✔	✔		
EN 10149 (A36-231)	S315 & S355 MC & NC	✔	✔	✔	✔		
	S315 to S500 MC & NC				✔		
EN 10025 part 2	S185 to E360 all qualities	✔	✔	✔	✔		
Boiler & pressure vessel steels							
EN 10028 [A 36-205)	P235 to P460 all qualities	✔	✔	✔	✔		
EN 10207 [A36-220)	P235 to P275 all qualities	✔	✔	✔	✔		
A36-601 & NF A36-605	A37 to A52 all qualities	✔	✔	✔	✔		
EN 10028-2	13CrMo 4-5					✔	✔
(Elevated temperature steel)	10CrMo 9-10					✔	✔
Steel for dangerous material transportation							
A 36-215	P265 to P460 all qualities	✔	✔	✔	✔		
Low temperature steels							
A 36-215	P285 to P420 all qualities	✔	✔	✔	✔		

FLUX CHARACTERISTICS

Current type	DC / AC
Basicity (Boniszewski)	3.0
Density (kg/dm³)	1.1
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

Boiler and pressure vessels
Off-shore applications
Nuclear components
Low temperature applications
Highly restraint constructions

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25

P2000

CLASSIFICATION

Flux	Wire					
ISO 14174		**ISO 14343-A**	**AWS A5.9/A5.9M**		**ISO 18274**	**AWS A5.14/ A5.14M**
S A AF 2 64 DC H5	**LNS 304L**	S 19 9 L	ER308L	**LNS NiCro 60/20**	S Ni 6625	ERNiCrMo-3
	LNS 309L	S 24 12 L	ER309L	**LNS NiCroMo 60/16**	S Ni 6276	ERNiCrMo-4
	LNS 316L	S 19 12 3 L	ER316L	**LNS NiCro 70/19**	S Ni 6082	ERNiCr-3
	LNS 4462	S 22 9 3 N L	ER2209			
	LNS 318	S 19 12 3 Nb	ER318			
	LNS 347	S 19 9 Nb	ER347			
	LNS Zeron® 100X	S 25 9 4 N L	ER2594			
	LNS 4455	S 20 16 3 Mn L	ER316LMn			
	LNS 4500	S 20 25 5 Cu L	ER385			
	LNS 304H	S 19 9 H	ER308H			
	LNS 307	S 18 8 Mn	ER307*			

GENERAL DESCRIPTION

Stainless steel welding flux
Excellent slag release
Low flux consumption
Favorite choice with duplex and stabilized grades

APPROVALS

Wire grade	TÜV
LNS 304L	✔
LNS 316L	✔
LNS 318L	✔
LNS 347	✔
LNS 4455	✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	Cr	Ni	Mo	N	Nb	Cu	W	FN
LNS 304L	0.015	1.5	0.5	19	10						08-10
LNS 309L	0.015	1.5	0.5	23	13						10-20
LNS 316L	0.015	1.5	0.5	18	12	2.5					08-10
LNS 4462	0.015	1.5	0.5	22	8	3.0	0.1				40-60
LNS 318	0.04	1.5	0.5	19	11	2.5		0.5			08-10
LNS 347	0.03	1.4	0.5	19	10			0.6			08-10
LNS Zeron® 100X	0.03	0.6	0.5	25	9.5	3.6		0.2	0.7	0.6	30-60
LNS NiCro 60/20	0.006	0.1	0.4	21.5	64.5	8.7	3.8			0.8	
LNS 4455	0.025	6	0.5	18.5	15	2.6	0.15				
LNS 4500	0.03	1.5	0.6	19	25	4.1			1.2		

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)			
					+20°C	-20°C	-40°C	-196°C
LNS 304L	AW	380	550	35		80		
LNS 309L	AW	425	580	33			80	
LNS 316L	AW	425	560	33				50
LNS 4462	AW	550	800	27			50	
LNS Zeron® 100X	AW	670	880	21		70	45	
LNS NiCro 60/20	AW	520	780	40				100
LNS 347	AW	470	620	30	90			35
LNS 4455	AW	360	640	30				
LNS 310	AW	440	600	28				

AW : As welded

P2000: rev. C-EN25-10/01/16

P2000

EXAMPLES OF MATERIALS TO BE WELDED

AISI	Mat.nr.	EN 10088-1/2	ASTM/ACI	UNS	Wire
304L	1.4306	X2CrNi19-11	(TP) 304L	S30403	LNS 304L
304LN	1.4311	X2CrNiN18-10	(TP) 304LN	S30453	LNS 304L
316LN	1.4406	X2CrNiMoN17-11-2	(TP) 316LN	S31653	LNS 316L
316L	1.4404	X2CrNiMo17-12-2	(TP) 316L	S31603	LNS 316L
316L	1.4435	X2CrNiMo18-14-3	(TP) 316L	S31603	LNS 316L
316LN	1.4429	X2CrNiMoN17-13-3			LNS 316L
304	1.4301	X4CrNi18-10	(TP) 304	S30409	LNS 304L
321	1.4541	X6CrNiTi18-10	(TP) 321	S32100	LNS 304L/347
316	1.4401	X4CrNiMo17-12-2	(TP) 316	S31600	LNS 316L
316	1.4436	X4CrNiMo17-13-3			LNS 316L
347	1.4550	X6CrNiNb18-10	(TP) 347	S34700	LNS 304L/347
318	1.4580	X6CrNiMoNb17-12-2	316Cb	S31640	LNS 316L/318
318	1.4583	X10CrNiMoNb18-12(DIN)			LNS 316L/318
317LN	1.4439	X2CrNiMoN17-13-5	316LN	S31726	4439Mn
	1.4539	X1NCriMoCu25-20-5			4500
	1.3952	X2CrNiMoN18-14-3(DIN)			4455
	1.4462	X2CrNiMoN22-5-3			4462
			Zeron® 100	S32760	LNS Zeron® 100 X
	2.4856	NiCr22Mo9Nb(DIN)		N06625	LNS NiCro 60/20
	1.5637	12Ni14 (DIN)			LNS NiCro 60/20
	1.5680	12Ni19 (DIN)			LNS NiCro 60/20
	1.5662	X8Ni9 (DIN)			LNS NiCro 60/20

FLUX CHARACTERISTICS

Current type	DC
Basicity (Boniszewski)	1.6
Solidification speed	High
Density (kg/dm³)	1.2
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

General stainless steel welding flux
Applicable in the boiler and pressure vessel industry as well as pipe fabrication
Due to low Si-content very good impact toughness at low temperature

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25

P2007

CLASSIFICATION

Flux	Wire					
ISO 14174		**ISO 14343-A**	**AWS A5.9/ A5.9M**		**ISO 18274**	**AWS A5.14/ A5.14M**
S A AF 2 64 AC H5	**LNS 304L**	S 19 9 L	ER308L	**LNS NiCro 60/20**	S Ni 6625	ERNiCrMo-3
	LNS 309L	S 24 12 L	ER309L	**LNS NiCroMo 60/16**	S Ni 6276	ERNiCrMo-4
	LNS 316L	S 19 12 3 L	ER316L	**LNS NiCro 70/19**	S Ni 6082	ERNiCr-3
	LNS 4462	S 22 9 3 N L	ER2209			
	LNS 318	S 19 12 3 Nb	ER318			
	LNS 347	S 19 9 Nb	ER347			
	LNS Zeron® 100X	S 25 9 4 N L	ER2594			
	LNS 4455	S 20 16 3 Mn L	ER316LMn			
	LNS 4500	S 20 25 5 Cu L	ER385			
	LNS 304H	S 19 9 H	ER308H			
	LNS 307	S 18 8 Mn	ER307*			

GENERAL DESCRIPTION

Stainless steel welding flux
Excellent slag release
Homogeneous stainless steel colour bead appearance
Straight edges on butt welds applications
Excellent behaviour on 9% Nickel steel
Suitable in AC current

APPROVALS

Wire grade	ABS	LRS	TÜV
LNS 304L	✔	✔	
LNS 309L	✔	✔	
LNS 316L	✔	✔	
LNS 4462	5YQ550	S31803	✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	Cr	Ni	Mo	N	Nb	Cu	W	FN
LNS 304L	0.015	1.5	0.5	19	10						08-10
LNS 309L	0.015	1.5	0.5	23	13						10-20
LNS 316L	0.015	1.5	0.5	18	12	2.5					08-10
LNS 4462	0.015	1.5	0.5	22	8	3.0	0.1				40-60
LNS 318	0.04	1.5	0.5	19	11	2.5		0.5			08-10
LNS 347	0.03	1.4	0.5	19	10			0.6			08-10
LNS Zeron® 100X	0.03	0.6	0.5	25	9.5	3.6		0.2	0.7	0.6	30-60
LNS NiCro 60/20	0.006	0.1	0.4	21.5	64.5	8.7	3.8			0.8	
LNS 4455	0.025	6	0.5	18.5	15	2.6	0.15				
LNS 4500	0.03	1.5	0.6	19	25	4.1			1.2		

AW : As welded

P2007: rev. C-EN04-01/02/16

P2007

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C	-196°C
LNS 304L	AW	390	550	35	80	75		40
LNS 309L	AW	400	580	33		70		
LNS 316L	AW	400	560	33	75	70		45
LNS 347	AW	400	650	34			65	
LNS 4462	AW	585	765	27		75		
LNS Zeron® 100X	AW	670	880	21	70	45		
LNS NiCro 60/20	AW	520	780	40				100
LNS 4439Mn		375	630	33				

EXAMPLES OF MATERIALS TO BE WELDED

AISI	Mat.nr.	EN 10088-1/2	ASTM/ACI	UNS	Wire
304L	1.4306	X2CrNi19-11	(TP) 304L	S30403	LNS 304L
304LN	1.4311	X2CrNiN18-10	(TP) 304LN	S30453	LNS 304L
316LN	1.4406	X2CrNiMoN17-11-2	(TP) 316LN	S31653	LNS 316L
316L	1.4404	X2CrNiMo17-12-2	(TP) 316L	S31603	LNS 316L
316L	1.4435	X2CrNiMo18-14-3	(TP) 316L	S31603	LNS 316L
316LN	1.4429	X2CrNiMoN17-13-3			LNS 316L
304	1.4301	X4CrNi18-10	(TP) 304	S30409	LNS 304L
321	1.4541	X6CrNiTi18-10	(TP) 321	S32100	LNS 304L/347
316	1.4401	X4CrNiMo17-12-2	(TP) 316	S31600	LNS 316L
316	1.4436	X4CrNiMo17-13-3			LNS 316L
347	1.4550	X6CrNiNb18-10	(TP) 347	S34700	LNS 304L/347
318	1.4580	X6CrNiMoNb17-12-2	316Cb	S31640	LNS 316L/318
318	1.4583	X10CrNiMoNb18-12(DIN)			LNS 316L/318
317LN	1.4439	X2CrNiMoN17-13-5	316LN	S31726	4439Mn
	1.4539	X1NCriMoCu25-20-5			4500
	1.3952	X2CrNiMoN18-14-3(DIN)			4455
	1.4462	X2CrNiMoN22-5-3			4462
			Zeron® 100	S32760	LNS Zeron® 100 X
	2.4856	NiCr22Mo9Nb(DIN)		N06625	LNS NiCro 60/20
	1.5637	12Ni14 (DIN)			LNS NiCro 60/20
	1.5680	12Ni19 (DIN)			LNS NiCro 60/20
	1.5662	X8Ni9 (DIN)			LNS NiCro 60/20

FLUX CHARACTERISTICS

Current type	DC (+/-)
Basicity (Boniszewski)	1.6
Solidification speed	High
Density (kg/dm³)	1.2
Grain size (ISO 14174)	2 -20

SUGGESTIONS FOR USE

General stainless steel welding flux
Applicable in the boiler and pressure vessel industry as well as pipe fabrication
Due to low Si-content very good impact toughness at low temperature

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25
Drum	40

P2000S

CLASSIFICATION

Flux	Wire	
ISO 14174		**ISO 14343-A**
S A AF 2 64Cr DC H5	**LNS 309L**	S 24 12 L
	LNS 4462	S 22 9 3 N L
	LNS Zeron® 100X	S 25 9 4 N L

GENERAL DESCRIPTION

Compensates Cr-burn off and increases the Cr-content in the weldmetal
Welding stainless steel to carbon steel
To be used to weld first layers in carbon steel with over-alloyed wires
Applicable where a higher weldmetal ferrite is needed

APPROVALS

Wire grade	TÜV
LNS 309L	✔
LNS 4462	✔

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Wire grade	C	Mn	Si	Cr	Ni	Mo	N	Cu	W	FN
LNS 309L	0.015	1.5	0.5	25	13					15-20
LNS 4462	0.015	1.5	0.5	24	8	3.0	0.1			40-60
LNS Zeron® 100X	0.02	0.5	0.4	26	9	3.7	0.2	0.7	0.6	30-60

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
LNS 309L	450	600	33	80
LNS 4462	700	850	27	50
LNS Zeron® 100X	670	880	25	45

P2000S: rev. C-EN23-01/02/16

P2000S

EXAMPLES OF MATERIALS TO BE WELDED

Dissimilar
Duplex

SUGGESTIONS FOR USE

Especially developed for welding stainless steel to carbon steel. Also to be used in welding root runs in clad steel as well as root runs in Nitrogen alloyed fully austenitic steels to avoid hot cracking

FLUX CHARACTERISTICS

Current type	DC (+/-)
Basicity (Boniszewski)	1.6
Solidification speed	High
Density (kg/dm³)	1.2
Grain size (ISO 14174)	1-16

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

PIPELINER® RANGE

Pipeliner® 6P+

CLASSIFICATION

AWS A5.1	E6010	**A-Nr**	1
ISO 2560-A	E 42 3 C 2 5	**F-Nr**	3
		9606 FM	1

GENERAL DESCRIPTION

All-position cellulosic pipe electrode designed for all position pipe welding, including vertical down root pass welding
Designed for root pass welding of pipe up to and including X80, fill and cap pass welding up to and including X60
Light slag with little slag interference for easy arc control
Easy slag release and smooth bead appearance
Deep penetration with maximum dilution
X-ray quality welds, even out of position

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PF/3Gu PG/3Gd PE/4G PH/5Gu PJ/5Gd

CURRENT TYPE

DC +/-

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S
0.11	0.55	0.18	0.009	0.009

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C/-30°C
Required: AWS A5.1		min. 331	min. 430	min. 22	min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	450	570	27	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	350
Metal can	**Net weight/unit (kg)**	4.7	4.5	4.5

Identification Imprint: 6010 Tip Color: none

Pipeliner®6P+: rev. C-EN23-01/02/16

Pipeliner® 6P+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60
EN 10208-2	L290 up to L415

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
2.5x300	50-85	DC+/-
3.2x350	75-135	DC+/-
4.0x350	100-175	DC+/-

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions	
	PH/5Gup	PJ/5Gdown
3.2	90A	110A
4.0	130A	150A

REMARKS / APPLICATION ADVICE

Preheating pipe material L415 (X56-X60) required (acc. EN 1011-2).
Pipeclamps to be removed after finishing root pass, start welding hot pass (within 5 min) after root pass
Use electrodes directly from Metal cans

Pipeliner® 7P+

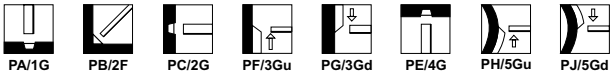
CLASSIFICATION

AWS A5.1	E7010-P1	**A-Nr**	1
ISO 2560-A	E 42 3 Z C 2 5	**F-Nr**	3
		9606 FM	1

GENERAL DESCRIPTION

Cellulosic electrode for vertical down pipe welding
Suitable for hot, fill and cap pass of up to X60 grade pipe
Clean, visible weld puddle
Deep penetration and excellent puddle control
Root pass welding up to X80 grade pipe

WELDING POSITIONS (ISO/ASME)



PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PG/3Gd** **PE/4G** **PH/5Gu** **PJ/5Gd**

CURRENT TYPE

DC +

APPROVALS

ABS
+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Mo
0.15	0.6	0.1	0.015	0.015	0.85	0.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C	Impact ISO-V(J) -40°C
Required: AWS A5.1		min. 415	min. 490	min. 22	27	
ISO 2560-A		min. 420	500-640	min. 20	47	
Typical values	AW	470	570	24	80	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
Metal can	**Net weight/unit (kg)**	22.7	22.7	22.7

Identification Imprint: 7010-P1 Tip Color:

Pipeliner®7P+: rev. C-EN02-01/02/16

Pipeliner® 7P+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60
EN 10208-2	L290 up to L415

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
3.2x350	65-130	DC+
4.0x350	100-165	DC+
5.0x450	130-210	DC+

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	110A
4.0	150A
5.0	165A

REMARKS / APPLICATION ADVICE

Preheating pipe material L360-L415 (X52-X60) required (acc. EN 1011-2).
Pipeclamps to be removed after finishing root pass, start welding hot pass (within 5 min) after root pass
Use electrodes directly from Metal cans

Pipeliner® 8P+

CLASSIFICATION

AWS A5.5	E8010-P1	**A-Nr**	10
ISO 2560-A	E 46 4 1Ni C 2 5	**F-Nr**	3
		9606 FM	1

GENERAL DESCRIPTION

Designed for vertical down welding of pipes up to and including X70
Excellent resistance to porosity, X-ray quality welds
High stacking efficiency: fill joints in fewer passes
Exceptional mechanical properties
Root pass welding up to X80 grade pipe

WELDING POSITIONS (ISO/ASME)

PA/1G **PB/2F** **PC/2G** **PF/3Gu** **PG/3Gd** **PE/4G** **PH/5Gu** **PJ/5Gd**

CURRENT TYPE

DC +

APPROVALS

ABS
+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	Ni	Mo	P	S
0.17	0.7	0.25	0.8	0.2	0.01	0.01

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -29°C	-40°C	-46°C
Required: AWS A5.5		min. 460	min. 550	min. 19	min. 27		
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	495	590	24	80	60	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
Metal can	**Net weight/unit (kg)**	4.5	4.5	4.5

Identification Imprint: 8010-P1 PIPELINER 8P+ Tip Color: none

Pipeliner®8P+: rev. C-EN22-01/02/16

PIPELINER

Pipeliner® 8P+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X56, X60, X65, X70
EN 10208-2	L360 up to L485

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
3.2x350	65-120	DC+
4.0x350	100-165	DC+
5.0x350	130-210	DC+

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PH/5Gup	PJ/5Gdown
3.2	90A	110A
4.0	130A	150A
5.0	150A	165A

REMARKS / APPLICATION ADVICE

Preheating pipe material L360 - L485 (X56 - X70) required (acc. EN 1011-2).
Pipeclamps to be removed after finishing root pass, start welding hot pass (within 5 min) after root pass
Use electrodes directly from Metal cans
Use PIPELINER 6P+ for lower hardness in the root pass when required

Pipeliner® 16P

CLASSIFICATION

AWS A5.1	E7016 H4	**A-Nr**	1
ISO 2560-A	E 42 3 B 1 2 H5	**F-Nr**	4
		9606 FM	1

GENERAL DESCRIPTION

Designed for vertical up root pass welding of pipes up to and including X100
Suitable for hot, fill, and cap pass welding for up to and including X60
Excellent low temperature impact properties
Square burnoff makes welding easier, especially in critical pipe welding applications
Open gap root pass welding with 2.5 and 3.2 mm electrodes using DC - / + polarity

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

AC/DC+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S
0.06	1.3	0.5	0.013	0.009

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C/ -30°C	Impact ISO-V(J) -40°C
Required: AWS A5.1		min. 400	min. 490	min. 22	min. 27	
ISO 2560-A		min. 420	500-640	min. 20	min. 47	
Typical values	AW	470	590	26	120	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Metal can	**Net weight/unit (kg)**	22.7	22.7	22.7

Identification Imprint: 7016 H4 PIPELINER 16P Tip Color: none

Pipeliner®16P: rev. C-EN23-01/02/16

Pipeliner® 16P

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60
EN 10208-2	L290 up to L415

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
2.5x350	55-105	DC+
3.2x350	75-135	DC+
4.0x350	120-170	DC+

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
2.5	80A	85A	85A	85A	80A
3.2	120A	115A	115A	115A	110A
4.0	170A	180A	180A	180A	160A

REMARKS / APPLICATION ADVICE

Preheating pipe material L360 - L415 (X52 - X60) required (acc. EN 1011-2).

Pipeliner® 18P

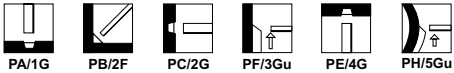
CLASSIFICATION

AWS A5.5	E8018-G-H4R	**A-Nr**	10
ISO 2560-A	E 50 6 Mn1Ni B 3 2 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Designed for vertical up fill and cap pass welding of welding of high strength pipe up to and including X70
Excellent low temperature impact properties down to -60°C
Square burnoff makes welding easier, especially in critical pipe welding applications

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni
0.05	1.5	0.5	0.010	0.009	0.95

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -60°C
Required: AWS A5.5		min. 460	min. 550	min. 19		
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	550	640	24	140	80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Metal can	**Pieces / unit**	139	75
	Net weight/unit (kg)	4.2	4.0

Identification Imprint: 8018-G H4R PIPELINER 18P Tip Color: none

Pipeliner®18P: rev. C-EN23-01/02/16

Pipeliner® 18P

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X 56, X60, X65, X70, X80
EN 10208-2	L360 up to L485

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (S)*	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weld-metal B	kg electrodes/ kg weldmetal 1/N
3.2x350	80-145	DC+	66	220	1.2	37.7	48	1.79
4.0x350	120-185	DC+	77	355	1.6	54.1	29	1.59

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PH/5Gup
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	140A	140A

REMARKS / APPLICATION ADVICE

Preheating pipe material L360 - L485 (X56 - X70) required (acc. EN 1011-2).

Pipeliner® LH-D80

CLASSIFICATION

AWS A5.5	E8045-P2 H4R	**A-Nr**	1
ISO 2560-A	E 46 4 Z B 4 5 H5	**F-Nr**	4
		9606 FM	1/2

GENERAL DESCRIPTION

Specifically designed for vertical down
Basic covered low hydrogen electrode primarily designed for vertical down hot, fill and cap pass pipe welding
Recommended for pipe grades up to and including X70
Low temperature impact properties down to -46°C.
Unique "hot start" tip helps initiate the arc and quickly establish puddle control
Slag design allows for easy control of weld puddle

WELDING POSITIONS (ISO/ASME)


PG/3Gd


PJ/5Gd

CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S
0.05	1.15	0.45	0.009	0.009

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -30°C	Impact ISO-V(J) -46°C
Required: AWS A5.5		min. 460	min. 550	min. 19	min. 27	
ISO 2560-A		min. 460	530-680	min. 20	min. 47	
Typical values	AW	490	580	27	80	50-95

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.5
	Length (mm)	350	350	350
Metal can	**Net weight/unit (kg)**	4.5	4.5	4.5

Identification Imprint: LH-D80 8018-G Tip Color: none

Pipeliner® LH-D80: rev. C-EN23-01/02/16

Pipeliner® LH-D80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X60, X65, X70
EN 10208-2	L415 up to L485

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
3.2x350	120-170	DC+
4.0x350	170-250	DC+
4.5x350	200-300	DC+

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	140-170A
4.0	180-240A
4.5	200-260A

Pipeliner® LH-D90

CLASSIFICATION

AWS A5.5	E9045-P2 H4R	**A-Nr**	10
ISO 18275-A	E 55 4 ZB 4 5 H5	**F-Nr**	4
		9606 FM	2

GENERAL DESCRIPTION

Basic covered low hydrogen electrode primarily designed for vertical down hot, fill and cap pass pipe welding
Recommended for pipe grades up to and including API 5L Grade X80
High deposition rates and excellent low temperature impact properties down to -46°C.
Unique "hot start" tip helps initiate the arc and quickly establisch puddle control
Slag design allows for easy control of weld puddle

WELDING POSITIONS (ISO/ASME)


PG/3Gd


PJ/5Gd

CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Cr	Mo
0.05	1.30	0.5	0.009	0.009	0.25	0.05	0.2

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C	-40°C	-46°C
Required: AWS A5.5		min. 530	min. 620	min. 17	min. 27		
ISO 18275-A		min. 550	610-780	min. 18		min. 47	
Typical values	AW	575	645	27	95		60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Metal can	**Net weight/unit (kg)**	4.5	4.5

Identification Imprint: LH-D90 Tip Color: none

Pipeliner® LH-D90: rev. C-EN24-01/02/16

Pipeliner® LH-D90

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X65, X70, X80
EN 10208-2	L415 up to L555

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
3.2x350	120-170	DC+
4.0x350	170-250	DC+
4.5x350	200-300	DC+

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	140-170A
4.0	180-240A
4.5	200-260A

Pipeliner® LH-D100

CLASSIFICATION

AWS A5.5	E10045-P2 H4R	**A-Nr**	10
		F-Nr	4
		9606 FM	2

GENERAL DESCRIPTION

Basic covered low hydrogen electrode primarily designed for vertical down hot, fill and cap pass pipe welding
Recommended for pipe grades up to and including API 5L Grade X90
High deposition rates and excellent low temperature impact properties down to -46°C.
Unique "hot start" tip helps initiate the arc and quickly establisch puddle control
Slag design allows for easy control of weld puddle

WELDING POSITIONS (ISO/ASME)


PG/3Gd


PJ/5Gd

CURRENT TYPE

AC / DC + / -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Mo
0.05	1.55	0.45	0.009	0.009	0.9	0.45

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C	Impact ISO-V(J) -46°C
Required: AWS A5.5		min. 600	min. 690	min. 16	min. 27	
Typical values	AW	650	730	24	100	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Metal can	**Net weight/unit (kg)**	4.5	4.5

Identification Imprint: LH-D100 10018-G Tip Color: none

Pipeliner® LH-D100: rev. C-EN24-01/02/16

Pipeliner® LH-D100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X70, X80, X90
EN 10208-2	L415 up to L620

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
3.2x350	120-170	DC+
4.0x350	170-250	DC+
4.5x350	200-300	DC+

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	20-170A
4.0	170-250A
4.5	200-300A

Pipeliner® 70S-G

CLASSIFICATION

AWS A5.18	ER70S-G	**A-Nr**	1	**Mat-Nr**	1.5112
EN ISO 14341-A	G 38 3 M G2Si / G 38 3 C G2Si	**F-Nr**	6		
		9606 FM	1		

GENERAL DESCRIPTION

Specially intended and packaged for the needs of semiautomatic and automatic root pass pipe welding
Fluid puddle provides good wash-in at the weld toes and uniform bead shape
Clean weld deposit
Foil bag packaging guards against moisture
Consistent X-ray quality welds
Primarily intended for all position welding on pipe steels such as API 5L X42 through X60
Suitable for welding root passes for up to and including API 5L X80

WELDING POSITIONS (ISO/ASME)

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2
C1	Active gas 100% CO_2

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	P	S
0.07	1.25	0.55	0.01	0.02

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Typical values	C1	AW	425	525	25	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X60
EN 10208-2	L290 up to L415

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.1	1.3
4.5 kg plastic spool S200	X	X
11.34 kg coil 22RR	X	X

PIPELINER® 70S-G: rev. C-EN24-01/02/16

Pipeliner® 80S-G

CLASSIFICATION

AWS A5.18	ER80S-G	**A-Nr**	1	**Mat-Nr**	1.5130
EN ISO 14341-A	G 50 3 M G4Si1	**F-Nr**	6		
		9606 FM	1/2		

GENERAL DESCRIPTION

Specially intended and packaged for the needs of semiautomatic and automatic root pass pipe welding
Fluid puddle provides good wash-in at the weld toes and uniform bead shape
Clean weld deposit
Foil bag packaging guards against moisture
Consistent X-ray quality welds
Primarily intended for all position welding on pipe steels such as API 5L X65 through X80

WELDING POSITIONS

ISO/ASME

SHIELDING GASES (ACC. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO_2

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	P	S
0.09	1.55	0.60	0.012	0.007

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Typical values	M21	AW	634	710	23	140

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X60
EN 10208-2	L450 up to L555

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.1	1.3
4.5 kg plastic spool S200	X	X
11.34 kg coil 22RR	X	X

Pipeliner® 80Ni1

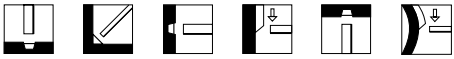
CLASSIFICATION

AWS A5.28	ER80S-G	**A-Nr**	1	**Mat-Nr**	1.5112
EN ISO 14341-A	G 3Ni1	**F-Nr**	6		
		9606 FM	1/2		

GENERAL DESCRIPTION

Pipeliner® 80Ni1 micro-alloyed MIG wire is designed for semi-automatic or automatic welding of root, hot, fill and cap passes on up to X80 grade pipe and root passes on up to X100 grade pipe. Capable of producing Charpy V-Notch impact properties of 70 J @ -50°C with M20/M21 shielding gas. Pipeliner® 80Ni1 is designed for tough pipeline jobs. For an electrode that meets the
expanding demands of higher strength pipe and severe conditions - choose Pipeliner® 80Ni1.

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PG/3Gd PE/4G PJ/5Gd

SHIELDING GASES (ACC. ISO 14175)

M20/M21	75 - 95% Argon / Balance CO_2
C1	100% CO_2

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	P	S	Ni	Mo	Ti	Al
0.07	1.55	0.70	0.11	0.10	0.90	<0.01	0.08	<0.01

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C	Impact ISO-V(J) -50°C
Required: AWS A5.28			min. 550			
	AW C1	600	665	28	80	45
	AW M20	650	730	27	110	70

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
4.5 kg plastic spool S200	X	X
11.34 kg coil 22RR	X	X

Pipeliner® 80Ni1

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60, X65, X70, X80
EN 10208-2	L290 up to L555

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
1.0	19	250-1400	105-320	19-31	1.0-5.2
1.2	19	320-1270	145-360	19-31	1.7-6.5

Pipeliner® G60M-E

CLASSIFICATION

AWS A5.20	E71T1-1M-JH4	**A-Nr**	**Mat-Nr**
AWS A5.36	E71T-1M21A4-CS1-JH4	**F-Nr**	
EN ISO 17632-A	T 46 4 P M 1 H5	**9606 FM**	

GENERAL DESCRIPTION

Flux cored wire for mechanized and semiautomatic welding with increased deposition rate (kg/h)
Perfect bead profile for fill and cap passes, easy to remove reduces cleaning time and improves operating factor
Concentrated and deeply penetrating arc helps to achieve defect free welds
Focused and clearly visible arc column offers easier welding and reduces operator training time
Stable mechanical properties over wide range of heat input, CVN > 47J at -40°C
Very low hydrogen (HDM <4 ml/100g) and long term resistance against moisture pick-up

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Amount : 15-25 l/min

APPROVALS

Shielding gas	ABS
M21	+

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	Ni	P	S	HDM
M21	0.04	1.35	0.25	0.45	0.013	0.008	3ml/100g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -20°C	-30°C	-40°C
Required: AWS A5.20			min. 400	min. 480	min. 22			
ISO 17632-A			min. 460	530-680	min. 20			min. 47
Typical values	M21	AW	485	540	23	135	120	85

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
5.0 kg plastic spool S200	X
15 Kg spool B300	X
15 Kg spool S300 Al bag	X

Pipeliner® G60ME: rev. C-EN04-11/05/16

PIPELINER

Pipeliner® G60M-E

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steels	
EN10027-1	S235 - S460; J2, K2, N and NL, M and ML
Ship plates	
ASTM, ABS, DNV	Grade A, D, EH32 to 40; NV A,D,E 32-40; NV A,D,E 420-460
Pipe material	
ISO 3183	L245-L415N, L245-L450Q, L245M - L450M
API 5LX	X42, X46, X52, X60, X65
Boiler & pressure vessel steels	
EN 10028-3	P235-460, N, NH, NL
EN 10028-2	P235-355GH
Fine grained steels	
EN 10025-2, -3, -4	S235, S275; S355, S420, S420, S460, S460, S460, S460 N, NL, M, ML
EN 10025	S355G, S420G grades
EN 10025-2, -3, -4	S235, S275; S355, S420, S420, S460, S460, S460, S460 N, NL, M, ML
EN 10025 -6	S460Q, QL

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	120	21-23	1.75	1.13
		700	160	22-24	2.54	1.13
		955	200	25-27	3.45	1.13
		1270	240	27-29	4.73	1.13
		1590	270	30-32	6.2	1.13

WELDING PARAMETERS, OPTIMUM FILL AND CAP PASSES IN SHIELDING GAS AR + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	130-280A 22-32V	150-280A 23-32V	150-230A 23-30V	160-240A 23-27V	150-220A 23-28V

Pipeliner® G70M

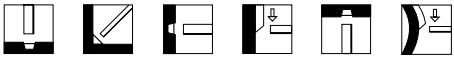
CLASSIFICATION

AWS A5.20	E71T-1M-JH8 / E71T-9M-JH8	**A-Nr**	1
EN ISO17632-A	T 46 4 P M 2 H10	**F-Nr**	6
		9606 FM	1

GENERAL DESCRIPTION

Mix gas shielded flux cored wire for semi-automatic and mechanized hot, fill and cap pass pipeline welding
Smooth, spray type arc transfer and low spatter level
Slag system provides for puddle support, good wetting and bead shape in all positions
All position single and multiple pass wire designed fo join pipe up to and including X70
Reliable weld metal properties
For the root pass, Pipeliner 70S-G is recommended
Excellent wire feeding
In diameter 1.3 mm (0.052") the wire is called PIPELINER AUTOWELD® G70M, and is designed to use with mechanized pipe welding systems.
PIPELINER AUTOWELD® G70M has tightly controlled cast and helix to assure proper wire placement every time

WELDING POSITIONS (ISO/ASME)



PA/1G PB/2F PC/2G PG/3Gd PE/4G PJ/5Gd

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Amount : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni
M21	0.05	1.45	0.40	0.013	0.011	0.35

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.20			min. 400	min. 480	min. 22	min. 27
ISO 17632-A			min. 460	530-680	min. 20	min. 47
Typical values	M21	AW	560	645	26	125

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.1	1.3
4.5 kg plastic spool S200	X	X
11.34 kg coil 22RR	X	X

Pipeliner® G70M: rev. C-EN23-01/02/16

Pipeliner® G70M

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60, X65, X70
EN 10208-2	L290 up to L485

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.1	19	440-1020	130-275	23-30	1.8-5.4	1.21
1.3	19	380-1140	155-315	22-31	1.6-4.9	1.22

Pipeliner® G70M-E

CLASSIFICATION

AWS A5.29 : E81T1-GM-H4
EN ISO 17632-A : T 50 5 Z P M 2 H5

GENERAL DESCRIPTION

All position gas shielded 1% Ni, 0.15% Mo flux cored wire
Specifically designed for pipeline applications
Superior weldability, low spatter, good bead appearance
Outstanding operators appeal
Exceptional mechanical properties (CVN >47J at -50°C)
Very low hydrogen (HDM <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Amount : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo
M21	0.06	1.5	0.2	0.013	0.010	0.95	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -20°C	-40°C	-50°C
Required: AWS A5.29			min. 470	550-690	min. 19			
ISO 17632-A			min. 500	560-720	min. 18			min. 47
Typical values	M21	AW	580	630	23	100	90	70

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
4.5 kg plastic spool S200	X
15 Kg spool B300	X

Pipeliner® G70M-E

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Pipe material	
EN 10208	L360, L360NB, L360QB, L360MB, L415MB, L415NB, L450MB, L485MB
API 5LX	X52, X60, X65, X70
Fine grained steels	
EN 10025 part 3	S275, S355, S420, S460
EN 10025 part 6	S355, S420, S460, S500N, S460NL, S500NL, S500NC, S550NC

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PJ/5Gdown	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	200-240A 25-28V	160-220A 23-28V

Pipeliner® G80M

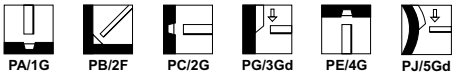
CLASSIFICATION

AWS A5.29 : E101T1-GM-H8
EN 12535 : T 62 3 P M 2 H10

GENERAL DESCRIPTION

Mix gas shielded flux cored wire for semi-automatic and mechanized hot, fill and cap pass pipeline welding
Smooth, spray type arc transfer and low spatter level
Slag system provides for puddle support, good wetting and bead shape in all positions
All position single and multiple pass wire designed fo join pipe up to and including X80
For the root pass, the use of PIPELINER 70S-G or 80S-G is recommended
Reliable weld metal properties
Excellent wire feeding
In diameter 1.3 mm (0.052") the wire is called PIPELINER AUTOWELD® G80M, and is designed to use with mechanized pipe welding systems.
PIPELINER AUTOWELD® G80M has tightly controlled cast and helix to assure proper wire placement every time

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Amount : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Cr	Mo
M21	0.04	1.75	0.4	0.015	0.01	0.95	0.11	0.25

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C/-30°C	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 605	690-825	min. 16		
EN 12535			620	700-890	min. 18	min. 47	
Typical values	M21	AW	680	720	24	55	47

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.1	1.3
4.5 kg plastic spool S200	X	X
11.34 kg coil 22RR	X	X

Pipeliner®G80M: rev. C-EN24-01/02/16

Pipeliner® G80M

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X70, X80
EN 10208-2	L485 up to L555

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.1	19	440-1020	130-275	23-30	1.8-4.1	1.21
1.3	19	380-1140	155-315	22-31	1.6-4.9	1.22

Pipeliner® G80M-E

CLASSIFICATION

AWS A5.29 : E91T1-GM-H4
EN ISO 18276-A : T 55 4 Z P M 2 H5

GENERAL DESCRIPTION

All position gas shielded 1% Ni and 0.4%Mo alloyed flux cored wire for offshore and pipeline applications
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties
Very low hydrogen (HDM <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures

WELDING POSITIONS

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Amount : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo
M21	0.06	1.4	0.3	0.013	0.01	0.95	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 540	620-760	min. 17		
EN ISO 18276-A			min. 550	640-820	min. 18	min. 47	
Typical values	M21	AW	695	740	21		65

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
4.5 kg plastic spool S200	X
15 Kg spool B300	X

Pipeliner® G80ME: rev. C-EN07-11/05/16

Pipeliner® G80M-E

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X60, X65, X70, X80
EN 10208-2	L360 up to L555

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PJ/5Gdown	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	200-240A 25-28V	160-220A 23-28V

Pipeliner® G90M-E

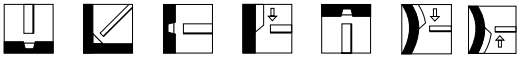
CLASSIFICATION

AWS A5.29 : E111T1-GM-H4
EN ISO 18276-A : T 69 4 Z P M 2 H5

GENERAL DESCRIPTION

All position gas shielded rutile flux cored wire, for high strength steel grades like grade X70-X80
Outstanding operator appeal
Excellent mechanical properties (CVN >50J at -40°C)
Very low hydrogen (HDM <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO_2
Amount : 15-25 l/min

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

Shielding gas	C	Mn	Si	P	S	Ni	Mo
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.29			min. 680	760-900	min. 15	
EN ISO 18276-A			min. 690	770-970	min. 17	min. 47
Typical values	M21	AW	740	790	19	65

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
4.5 kg plastic spool S200	X	
15 Kg spool B300	X	X

Pipeliner® G90ME: rev. C-EN07-11/05/16

Pipeliner® G90M-E

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X70, X80
EN 10208-2	L485 up to L555

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)	kg wire/ kg weldmetal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO_2

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	230-280A 26-32V	230-280A 26-32V	200-240A 25-32V	200-240A 25-28V	160-220A 23-28V
1.6	250-350A 24-29V	250-350A 24-29V	230-280A 24-28V	220-260A 24-26V	170-240A 22-26V

Pipeliner® NR®-207+

CLASSIFICATION

AWS A5.29 : E71T8-K6

GENERAL DESCRIPTION

Optimum performance on vertical down hot, fill and cap pass welding in pipe steels such as API 5L X42 through X70
Self-shielded, flux cored. No need for external gas or flux
Produces quality welds in moderate wind conditions with no tenting
Superior arc characteristics and feedability
Very good crack resistance, CTOD and Charpy-V impact properties.

WELDING POSITIONS (ISO/ASME)

PA/1G PB/2F PC/2G PG/3Gd PE/4G PJ/5Gd

CURRENT TYPE

DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Al
0.05	1.22	0.25	0.01	0.01	0.82	1.1

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.29		min. 400	485-620	min. 20	min. 27
Typical values	AW	435	545	30	160

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
6.35 kg coil 14C	X

Pipeliner® NR®-207+

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60, X65, X70
EN 10208-2	L290 up to L485

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
2.0	19	170-330	210-305	18-21	2.0-3.7

Pipeliner® NR®-208XP

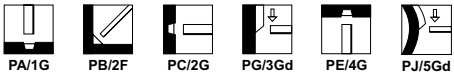
CLASSIFICATION

AWS A5.29 : E81T8-G

GENERAL DESCRIPTION

Optimum performance on vertical down hot, fill and cap pass welding in pipe steels such as API 5L X42 through X80
Self-shielded, flux cored. No need for external gas or flux
Produces quality welds in moderate wind conditions with no tenting
Great arc characteristics and superior feedability
Superior Charpy-V impact properties, consistent down to -29°C.
For cold temperature, cross country pipe applications

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC -

CHEMICAL COMPOSITION (W%), TYPICAL, ALL WELD METAL

C	Mn	Si	P	S	Ni	Cr	Mo	Al
0.02	2.15	0.12	0.005	0.002	0.75	0.04	0.02	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) -29°C
Required: AWS A5.29		min. 470	500-690	min. 19	
Typical values	AW	495	570	27	200

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
6.35 kg coil 14C	X

Pipeliner® NR®-208XP

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60, X65, X70, X80
EN 10208-2	L290 up to L555

CALCULATION DATA

Diameter (mm)	Electrical stick-out (mm)	Wire Feed Speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition rate (kg/h)
2.0	19	170-330	195-295	17-20	1.8-3.5

Where are most weld defects found?

Most weld defects are found in weld roots. If access is available from only one side of the weld, the defects are usually a result of poor fusion. In two-side welds, the defects are usually slag inclusions that result from insufficient back grinding or gouging. Grinding and gouging are themselves costly and unpleasant procedures and , of course, the metal removed must be replaced by more weld metal. If defects are found, weld roots are the most difficult and expensive regions to repair.

How can we minimise root defects?

Since defect free fully penetrated root welds can be made only by highly qualified welders if no supporting backing is used, the Lincoln Electric LNB ceramic backing strips can be your answer. LNB products are ceramic backing strips that are attached to the back of weld roots. The ceramic is formulated to provide a molten surface contact that supports the weld root and breaks free when the metal cools. The backing is not permanent and is therefor permissible where permanent backing is not admissible, because of fatigue or corrosion.

What are the major benefits of Lincoln Electric LNB backing materials?

- Weld roots can be made at higher currents, thereby ensuring good fusion.
- Quality of root welds is less dependent on welder skills.
- Minimised overhead welding. Deck welds can be made from above.
- Less re-positioning of work. Work pieces need not be moved to allow welding of the back of joints.
- Less defects. Better root fusion ensures lower defect levels.
- More tolerant of fit-up. The use of a bigger weld pool supported by the ceramic, allows larger and mis-matched gaps to be filled with sound weld metal.
- Purging with inert gas is not necessary to protect the back of the weld root.

What are the features of Lincoln Electric LNB materials?

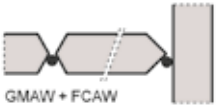
- LNB products do not absorb moisture. They are made from high density, non-hygroscopic ceramics. In combination with Lincoln Electric low hydrogen consumables, they give maximum security when welding materials are susceptible to hydrogen induced cracking.
- LNB materials are inert and do not introduce undesirable elements into the weld pool.
- LNB products control weld back reinforcement. The weld metal that cools in contact with the ceramic is smooth, slightly convex and it usually needs no further cleaning or grinding.
- LNB products are easy to attach to the back of welds, and they will withstand normal preheat temperatures. Either aluminium adhesive tape or spring steel clips hold the ceramic in firm contact with the joint. The weld metal is not adversely effected by its contact with the ceramic strips.
- LNB strips can be used with many materials, like structural steels, low-alloy and stainless steels as well as many processes such as stick electrodes and most standard solid wires for CO_2 and mixed gas metal arc welding. In combination with Outershield, Cor-A-Rosta or other flux cored wires and Innershield self shielded wires, as well as submerged arc processes, they add substantially to the already high productivity.
- LNB ceramic backing strips are made in a variety of shapes and sizes that are suitable for most welds.
- No release of disagreable gases during welding.

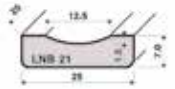
PRODUCT RANGE

Strip length 600 mm

Products		Item	Pcs/box	mtr/box
LNB 6	*tape*	*640007*	*100*	*60*
LNB 9	*tape*	*640014*	*72*	*43,2*
LNB 12	*tape*	*640021*	*60*	*36*

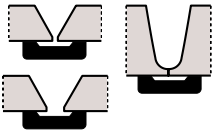
Mainly for mild steel. For general steel structures



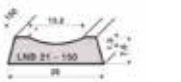


Strip length 600 mm

Products		Item	Pcs/box	mtr/box
LNB 21	*tape*	*640083*	*56*	*33.6*

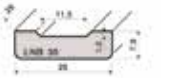


To be used with LNM solid wires and metal cored wires like Outershield MC 710-H and Outershield MC 715-H



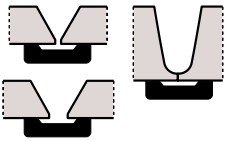
Strip length 600 mm

Products		Item	Pcs/box	mtr/box
LNB 21-150 tape		*640090*	*56*	*33.6*
LNB 21-150 rail		*640021*	*63*	*378*

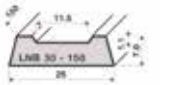


Strip length 600 mm

Products		Item	Pcs/box	mtr/box
LNB 30	*tape*	*640151*	*56*	*33.5*

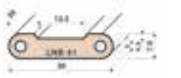


To be used with flux-cored wires like Outershield and Cor-A-Rosta



Strip length 600 mm

Products		Item	Pcs/box	mtr/box
LNB 30-150 tape		*640168*	*56*	*33.6*
LNB 30-150 rail		*640175*	*63*	*378*



Strip length 600 mm
Strip length 1000 mm

Products		Item	Pcs/box	mtr/box
LNB 40	*tape*	*640243*	*48*	*28.8*
LNB 41	*rail*	*640229*	*24*	*24*

Elements are mounted on flexible wire
Suitable for pipe and cylindrical parts
Designed to bend easily

Magnetic clamp, item 640236

PACKAGING SOLUTIONS

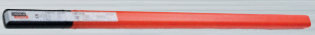
MIG & FLUX-CORED WIRES

S200

S300

BS300

B300
Requires adaptor

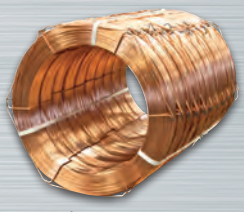


TIG rods PE tube

ACCUTRAK® drum
250/500kg

SUBMERGED ARC FLUX AND WIRES

25kg coil :
VCI packaging for optimum corrosion protection during transportation and storage



100kg coil :
High capacity packaging for column/boom applications, optimum for multi-wire applications (tandem/triple arc)

300kg
wooden reel

1000kg coil
liftable

SPEED FEED drum

ACCUTRAK® /
SPEED FEED drums
600KG/1000KG

220/250kg Steel Drum
for optimum moisture pick-up protection of flux

25kg plastic bag & moisture resistant Sahara Ready Bag
(SRB)

Big Bag, 1000 kg

LINCOLN ELECTRIC

THE WELDING EXPERTS®

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CUSTOMER ASSISTANCE POLICY

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