



WELDING CONSUMABLES

PRODUCT CATALOGUE

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LINCOLN[®]
ELECTRIC
THE WELDING EXPERTS[®]

Who We Are and What We Do

Lincoln Electric is the world leader in the design, development and manufacture of arc welding products, robotic arc welding systems, plasma and oxyfuel cutting equipment and has a leading global position in the brazing and soldering alloys market.

Innovation

Lincoln Electric provides cutting-edge products and solutions, and has a long history of innovation in new technology and processes for arc welding equipment and consumables. The Company operates the industry's most comprehensive research and product development program, supported by its R&D centers around the world.

Serving the World

Lincoln Electric's products and technologies play an important role in several fabrication industries and are used in the construction of significant infrastructures around the world. Arc welding is the dominant joining method for steel buildings and other industrial fabrication, including oil and gas pipelines, shipbuilding, oil refineries, agricultural and construction equipment. Additionally, the Company services a variety of industries that rely on arc welding, such as transportation and power generation.

Lincoln Electric delivers a wide array of products:

- ▶ Equipment
- ▶ Consumables
- ▶ Personal Protection Equipment
- ▶ Plasma Cutting Systems
- ▶ Automation
- ▶ Weld Fume Control



**LINCOLN ELECTRIC
WELDING CONSUMABLES**

**DESIGNED FOR THE MOST
DEMANDING APPLICATIONS**



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Copper alloys

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Aluminium alloys

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COVERED ELECTRODES FOR MILD AND FINE GRAINED STEEL

Product name	Chemical composition [typical values] in %					AWS	EN/ISO
	C	Mn	Si	P	S		
Fleetweld ¹ 5P+	0.15	0.50	0.25	-	-	A51	ISO 2560-A E 42 3 C 25
Supra ¹	0.12	0.5	0.6	-	-	A51	ISO 2560-A E 38 0 RC 11
Numal	0.06	0.5	0.45	-	-	A51	ISO 2560-A E 38 0 R 11
Panta ¹	0.07	0.5	0.5	-	-	A51	ISO 2560-A E 42 0 RC 11
Pantafix	0.09	0.5	0.4	-	-	A51	ISO 2560-A E 38 0 RC 11
Omnia ¹	0.07	0.5	0.5	-	-	A51	ISO 2560-A E 42 0 RC 11
Omnia ¹ 46	0.06	0.5	0.45	-	-	A51	ISO 2560-A E 38 0 R 11
Cumulo ¹	0.1	0.5	0.4	-	-	A51	ISO 2560-A E 38 0 R 12
Universalis ¹	0.1	0.6	0.4	-	-	A51	ISO 2560-A E 42 0 RR 12
Ferrod 165A	0.07	0.95	0.3	-	-	A51	ISO 2560-A E 42 2 RA 73
Ferrod 195T	0.08	0.5	0.35	-	-	A51	ISO 2560-A E 38 0 RR 53
Ferrod 160T	0.07	0.9	0.6	-	-	A51	ISO 2560-A E 42 0 RR 73
Gonia 180	0.07	1.0	0.35	-	-	A51	ISO 2560-A E 42 0 RR 73
Baso 48 SP	0.075	1.4	0.45	-	-	A51	ISO 2560-A E 46 3 B 32 H10*
Baso 49	0.09	1.1	0.6	-	-	A51	ISO 2560-A E 46 3 B 32 H5
Baso 51P	0.06	1.3	0.5	0.015	0.01	A51	ISO 2560-A E 46 3 B 32 H5
Baso 100	0.08	1.0	0.5	-	-	A51	ISO 2560-A E 42 3 B 12 H5
Baso 120	0.08	1.2	0.5	-	-	A51	ISO 2560-A E 42 3 B 32 H5
Basic One	0.05	1.3	0.4	-	-	A51	ISO 2560-A E 42 4 B 42 H5
Baso 15	0.05	1.3	0.4	-	-	A51	ISO 2560-A E 42 5 B 32 H5
Baso 26V	0.09	1.1	0.7	-	-	A51	ISO 2560-A E 42 3 B 15 H10
Vandal	0.07	1.2	0.5	-	-	A51	ISO 2560-A E 42 4 B 32 H5
Conarc ¹ 48	0.05	1.3	0.3	-	-	A51	ISO 2560-A E 46 4 B 42 H5
Conarc ¹ 49	0.09	1.1	0.6	0.015	0.010	A51	ISO 2560-A E 46 3 B 42 H5
Conarc ¹ 49C	0.06	1.4	0.3	0.015	0.010	A51	ISO 2560-A E 46 4 B 32 H5
Conarc ¹ One	0.05	1.3	0.4	0.015	0.010	A51	ISO 2560-A E 42 5 B 32 H5
Conarc ¹ 50	0.05	1.0	0.3	--	-	A51	ISO 2560-A E 46 5 B 42 H5
Conarc ¹ 51	0.06	1.4	0.5	0.015	0.010	A51	ISO 2560-A E 42 4 B 12 H5
Conarc ¹ 52	0.06	1.2	0.4	0.015	0.010	A51	ISO 2560-A E 42 2 B 12 H5
Conarc ¹ 53	0.06	1.3	0.4	0.018	0.010	A51	ISO 2560-A E 42 5 B 12 H5
LINCOLN ¹ 7018-1	0.05	1.0	0.3	0.015	0.010	A51	ISO 2560-A E 46 3 B 32 H5
Conarc ¹ L150	0.07	0.95	0.4	0.015	0.010	A51	ISO 2560-A E 42 2 B 32 H5
Conarc ¹ V180	0.08	1.2	0.3	0.015	0.010	A51	ISO 2560-A E 42 4 B 73 H5
Conarc ¹ V250	0.08	1.3	0.45	0.015	0.010	A51	ISO 2560-A E 42 4 B 73 H5
Kardo ¹	0.03	0.4	0.25	0.015	0.010	A51	ISO 2560-A E 352 B 32 H5

¹according 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 ¹ HYP+	0.12	0.40	0.15	-	-	0.50	-	0.01	-	-	-	-	A5.5	E 7010-P1	ISO 2560-A	E 42 2 Mo C 25*
Shield Arc ¹ 70+	0.12	0.90	0.20	0.85	0.10	-	-	0.03	-	-	0.012	0.03	A5.5	E 8010-G	ISO 2560-A	E 46 4 1Ni C 25
Shield Arc ¹ 8P+	0.17	0.7	0.25	0.8	0.2	0.2	-	-	-	-	0.01	0.01	A5.5	E8010-P1	ISO 2560-A	E 46 4 1Ni C 25
Conarc ¹ 55CT	0.05	1.5	0.4	0.9	-	-	0.4	-	-	-	0.010	0.015	A5.5	E8018-W2-H4R ³	ISO 2560-A	E 46 5 Mn1Ni B 32 H5
Conarc ¹ 60G	0.06	1.0	0.4	1.6	-	0.3	-	-	-	-	0.015	0.010	A5.5	E9018M-H4	EN 757	E 55 4 Z B 32 H5
Conarc ¹ 70G	0.06	1.2	0.4	1.0	-	0.4	-	-	-	-	0.014	0.009	A5.5	E9018-G-H4R	EN 757	E 55 4 1NiMo B 32 H5
Conarc ¹ 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 32 H5
Conarc ¹ 80	0.06	1.5	0.4	2.2	-	0.4	-	-	-	-	0.015	0.01	A5.5	E1018M-H4	EN 757	E 69 5 Z B 32 H5
Conarc ¹ 85	0.06	1.4	0.3	2.0	0.4	0.4	-	-	-	-	0.01	0.01	A5.5	E12018-G-H4R	EN 757	E 69 5 Mn2NiCrMo B 32 H5
Kryo ¹ 1	0.05	1.5	0.4	0.9	-	-	-	-	-	-	0.01	0.01	A5.5	E7018-G-H4R ³	ISO 2560-A	E 50 6 Mn1Ni B 32 H5
Kryo ¹ 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 12 H5
Kryo ¹ 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 32 H5
Kryo ¹ 1R																
Kryo ¹ 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 73 H5
Kryo ¹ 2	0.05	1.6	0.3	1.5	-	-	-	-	-	-	0.015	0.01	A5.5	E9018-G-H4R	EN 757	E 55 6 Z B 32 H5
Kryo ¹ 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 32 H5*
Kryo ¹ 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 32 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 32 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 32 H5
SL 19G(STC)	0.06	0.7	0.35	-	1.2	0.55	-	-	-	-	0.010	0.010	A5.5	E8018-B2-H4	ISO 3580-A	E CrMo1 B 32 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 32 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 32 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 32 H5
SL 9C(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 32 H5

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

COVERED ELECTRODES FOR STAINLESS AND HEAT RESISTANT STEEL

CHEMICAL COMPOSITION AND CLASSIFICATION

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 LR 12
Limarosta® 304L	0.025	0.75	0.95	19.0	9.7	-	-	-	-	-	A5.4 E308L-17	ISO 3581-A E 19 9 LR 12
Vertarosta® 304L	0.02	0.8	0.7	20.0	9.8	-	-	-	-	-	A5.4 E308L-15	ISO 3581-A E 19 9 LR 21
Jungo® 304L	0.025	1.8	0.4	19.0	10.0	-	-	-	-	-	A5.4 E308L-15	ISO 3581-A E 19 9 LR B22
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 LR 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 LR 12
Vertarosta® 316L	0.02	0.7	0.85	18.0	11.5	2.7	-	-	-	-	A5.4 E316L-15	ISO 3581-A E 19 12 3 LR 21
Jungo® 316L	0.025	1.6	0.4	18.5	11.0	2.8	-	-	-	-	A5.4 E316L-15	ISO 3581-A E 19 12 3 LR B22
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 LR 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® 318	0.025	1.5	0.4	18.0	11.0	2.7	0.5	-	-	-	A5.4 E318-15*	ISO 3581-A E 19 12 3 Nb B 22
Arosta® 4439	0.02	1.3	0.8	18.0	17.0	4.6	-	-	0.18	-	A5.4 E316Mn-15	ISO 3581-A E 18 16 5 N LR 32
Jungo® 4455	0.03	7.3	0.4	20.0	16.0	3.0	-	-	0.16	-	A5.4 E316Mn-15	E 20 16 3 Mn N L B 22
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*	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 E2209-15	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 LR B 22
Arosta® 309S	0.02	0.8	0.8	23.5	12.5	-	-	-	-	-	A5.4 E309L-16	ISO 3581-A E 23 12 LR 32
Limarosta® 309S	0.02	0.8	1.0	23.0	12.5	-	-	-	-	-	A5.4 E309L-17	ISO 3581-A E 23 12 LR 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 LR 32
Nichroma	0.025	0.8	1.0	20.0	9.5	2.3	-	-	-	-	A5.4 E308Mo-16	E 20 10 3 R 32
Nichroma 160	0.05	0.7	1.0	23.7	12.8	2.4	-	-	-	-	A5.4 E308Mo-26	ISO 3581-A E 23 12 LR 53*
Arosta® 329	0.08	0.7	1.2	25.0	4.5	-	-	-	-	-	ISO 3581-A E 25 4 R 12*	ISO 3581-A E 25 4 R 12*
Limarosta® 312	0.11	0.9	1.0	29.0	9.0	-	-	-	-	-	A5.4 E312-17	E 29 9 R 12
Arosta® 307	0.09	5.0	0.6	18.5	8.5	-	-	-	-	-	ISO 3581-A E 18 8 Mn R 12	ISO 3581-A E 18 8 Mn R 12
Arosta® 307-160	0.06	6.0	1.0	18.0	8.0	-	-	-	-	-	ISO 3581-A E 18 8 Mn R 53	ISO 3581-A E 18 8 Mn R 53
Jungo® 307	0.08	5.5	0.3	19.0	8.5	-	-	-	-	-	ISO 3581-A E 18 8 Mn B 22	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*	E 23 12 R 32*
Intherma® 310	0.12	2.5	0.5	26.0	20.5	-	-	-	-	-	ISO 3581-A E 25 20 R 12	ISO 3581-A E 25 20 R 12
Intherma® 310B	0.1	3.0	0.3	25.0	21.0	-	-	-	-	-	ISO 3581-A E 25 20 B 12	ISO 3581-A E 25 20 B 12
Lincox P 308L	0.025	0.8	0.6	19.0	9.5	-	-	-	-	-	ISO 3581-A E 19 9 LR 32	ISO 3581-A E 19 9 LR 32
Lincox 308L	0.025	0.8	0.8	19.0	9.5	-	-	-	-	-	ISO 3581-A E 19 9 LR 32	ISO 3581-A E 19 9 LR 32
Lincox P 316L	0.025	0.8	0.6	19.0	12.0	2.5	-	-	-	-	ISO 3581-A E 19 12 3 LR 32	ISO 3581-A E 19 12 3 LR 32
Lincox 316L	0.025	0.8	0.8	18.0	12.0	2.5	-	-	-	-	A5.4 E316L-17	E 19 12 3 LR 32
Lincox P 309L	0.025	0.8	0.6	23.5	13.0	-	-	-	-	-	ISO 3581-A E 23 12 LR 32	ISO 3581-A E 23 12 LR 32
Lincox 309L	0.025	0.7	0.7	24.0	12.5	-	-	-	-	-	A5.4 E309L-17	E 23 12 LR 32

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	31.0	3.5	0.9	-	-	-	A5.4	E 383-16 ISO 3581-A
NiCro 60/20	0.03	0.5	0.35	0.9	22	62	9	-	3.4	-	-	ENiCrMo-3 A5.11/A5.11M	E Ni 6625 (NiCr22Mo9Nb) ISO 14772
NiCro 70/15	0.02	4.4	0.45	6	18	bal.	-	-	1.9	-	-	ENiCrFe-2* A5.11/A5.11M	E Ni 6182* (NiCr15Fe6Mn)* ISO 14772
NiCro 70/15Mn	0.025	5.5	0.4	6.5	16	bal.	-	-	2.0	-	-	ENiCrFe-3 A5.11/A5.11M	E Ni 6182 (NiCr15Fe6Mn) ISO 14772
NiCro 70/19	0.03	4.7	0.6	4.0	bal.	bal.	1.5	-	1.9	-	-	ENiCrFe-2* A5.11/A5.11M	E Ni 6082 (NiCr20Mn3Nb) ISO 14772
NiCroMo 60/16	0.015	0.5	0.05	6.5	15.5	bal.	16.0	-	-	4.0	-	ENiCrMo-4 A5.11/A5.11M	E Ni 6276 (NiCr15Mo15Fe6W4) ISO 14772
NiCu 70/30	0.02	3.0	0.4	1.75	-	bal.	-	30	-	-	0.35	ENiCu-7 A5.11/A5.11M	E Ni 4060 (NiCu30Mn3Ti) ISO 14772
NYLOID 2	0.05	3.0	0.4	6	13	68	6	-	1.5	1.5	-	ENiCrMo-6 A5.11/A5.11M	E Ni 6620 (NiCr14Mo7Fe) ISO 14772
NYLOID 4	0.05	3.0	0.4	6	13	bal.	6.5	-	1.5	1.5	-	ENiCrMo-6 A5.11/A5.11M	E Ni 6620 (NiCr14Mo7Fe) ISO 14772

* 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				
Al99.8	0.02 max.	0.085 max.	0.18 max.	0.02 max.	99.8 min.	-	0.03 max.	-	0.02 max.	A5.3	E1100*	ISO 18273	Al 1080A (Al 99.8[Al])
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 (AlMn)
AlSi5	-	5.0	-	-	Bal.	-	-	-	-	A5.3	E4043	ISO 18273	Al 4043A* (AlSi5[Al])
AlSi12	-	12.0	-	-	Bal.	-	-	-	-			ISO 18273	Al 4047A (AlSi12[Al])

* 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® Mangiet (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	-	-	-	-	-	-	A513	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® T5D	0.65	0.4	0.5	4	6.5	2.6	1.1	-	-	-	A513	DIN 8555	E4-UM-60-SZ EN 14700 E Fe4
Wearshield® M1(e)	0.5	0.4	1.8	9	-	-	-	-	-	-	A513	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® 44	2.2	0.2	0.9	27	2.9	-	-	-	-	-		DIN 8555	E10-UM-45-GPZ EN 14700 E Fe14
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
Wearshield® 34	0.02	0.9	0.9	16	17	4	-	-	-	-	A511	ENICrMo-5* DIN 8555	E23-UM-200-CKPTZ EN 14700

* Nearest Classification

COVERED ELECTRODES FOR REPAIR WELDING

Product name	Chemical composition (typical values) in %							AWS	EN/ISO
	C	Mn	Si	Ni	Cr	Fe			
Rep Tec Cast 1	0.7	-	-	97	-	2.0	A515	ENi-CI ISO 1071	E C Ni-CI1
Rep Tec Cast 3	0.6	-	-	balance	-	40	A515	ENiFe-CI ISO 1071	E C NiFe-CI1
Rep Tec Cast 31	0.7	-	-	balance	-	45	A515	ENiFe-CI ISO 1071	E C NiFe-CI1

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
LNM 26	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	G 46.4 M 3Si / G 42.3 C 3Si
LNM 27	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	G 46.5 M 4Si / G 46.3 C 4Si
UltraMag®	0.078	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A G 46.3 C 3Si
UltraMag® S G3	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	G 46.5 M 4Si / G 46.3 C 4Si
SupraMIG®	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A G 46.4 M 3Si / G 42.3 C 3Si
SupraMIG® CF	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A G 46.4 M 3Si / G 42.3 C 3Si
SupraMIG® HD	0.08	1.40	0.85	A5.18/A5.18M	ER70S-6	EN ISO 14341-A G 46.4 M 3Si / G 42.3 C 3Si
SupraMIG Ultra®	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	G 50.5 M 4Si / G 46.3 C 4Si
SupraMIG Ultra® CF	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	G 50.5 M 4Si / G 46.3 C 4Si
SupraMIG Ultra® HD	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	G 50.5 M 4Si / G 46.3 C 4Si

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 Mn3NiCu*
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 ER100S-G	EN ISO 16834-A G 69.4 M Mn3NiCrMo
LNM MoNiCr	0.09	1.8	0.80	2.20	-	0.30	0.55	-	-	-	A5.28 ER70S-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 NiMo1	0.08	1.7	0.7	0.9	-	-	0.35	-	0.17	-	A5.28 ER100S-G	EN ISO 16834-A G Z Mn 3 NiMo
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*	G CrMoSi
LNM 20	0.08	0.9	0.6	-	-	2.5	1.0	-	-	-	A5.28 ER90S-B3*	ISO 21952-A G CrMo2Si
LNM 502	0.09	0.5	0.4	-	-	5.6	0.6	-	-	-	A5.28 ER80S-B6	ISO 21952-A G CrMo5Si

* Nearest classification

CHEMICAL COMPOSITION AND CLASSIFICATION

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	ISO 14343-A G 19 9 L Si
LNM 304L	0.010	1.6	0.4	20.0	10.0	0.3	-	-	-	-	-	A5.9	ISO 14343-A G 19 9 L
LNM 347Si	0.005	1.4	0.7	19.2	9.9	0.1	0.6	-	-	-	-	A5.9	ISO 14343-A G 19 9 NiSi
LNM 316LSi	0.010	1.8	0.8	18.5	12.2	2.5	-	-	-	-	-	A5.9	ISO 14343-A G 19 12 L Si
LNM 316Si	0.005	1.4	0.7	18.6	11.7	2.5	0.7	-	-	-	-	A5.9	ISO 14343-A G 19 12 NiSi
LNM 4439Mn	0.01	5.2	0.4	19.0	17.0	4.0	-	0.15	-	-	-	-	ISO 14343-A G 18 16 5 Ni L *
LNM 4455	0.015	7.0	0.4	20.0	16.0	3.0	-	0.15	-	-	-	A5.9	ISO 14343-A G 20 16 3 Mn L
LNM 4465	0.01	4.5	0.2	25.0	23.0	2.0	-	0.15	-	-	-	-	ISO 14343-A G 25 22 N L
LNM 4500	0.01	1.7	0.3	20.0	25.0	4.4	-	-	1.5	-	-	A5.9	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	ISO 14343-A G 22 9 3 N L
LNM Zeron 100X	0.015	0.7	0.3	25.0	9.8	3.6	-	0.22	0.6	-	0.7	A5.9	ISO 14343-A G 25 9 4 N L
LNM 309LSi	0.002	1.8	0.8	23.3	13.8	0.14	-	-	-	-	-	A5.9	ISO 14343-A G 23 12 L Si
LNM 307	0.007	7.1	0.8	18.6	8.0	-	-	-	-	-	-	A5.9	ISO 14343-A G 18 8 Mn
LNM 304H	0.007	1.9	0.4	20.0	9.2	0.1	-	-	-	-	-	A5.9	ISO 14343-A G 19 9 H
LNM 430LNb	0.01	0.7	0.4	18.0	-	-	0.3	-	-	-	-	-	ISO 14343-A G 18 L Nb
LNM 309H	0.008	1.8	0.4	23.6	13.2	0.1	-	-	-	-	-	A5.9	ISO 14343-A G 25 20
LNM 310	0.1	1.7	0.45	26.0	21.0	0.1	-	-	-	-	-	A5.9	ISO 14343-A G 29 9
LNM 312	0.1	1.8	0.4	30.7	8.9	-	-	-	-	-	-	A5.9	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 NiCr 31/27	0.01	1.6	1.0	31.0	27.0	3.5	1.0	-	-	-	-	A5.9	ISO 14343-A G 27 31 4 Cu L
LNM NiCr 60/20	0.02	0.06	0.07	64	21.9	9.0	-	3.5	0.4	-	-	A5.14/A5.14M	ISO 18274 S Ni 6625 [NiCr22Mo9Nb]
LNM NiCr 70/19	0.03	3.1	0.08	72.5	20.5	-	0.01	2.6	0.8	-	-	A5.14/A5.14M	ISO 18274 S Ni 6082 [NiCr20Mn3Nb]
LNM NiCrMo 60/16	0.006	0.5	0.04	58	16.0	16.0	-	-	5.8	-	3.6	A5.14/A5.14M	ISO 18274 S Ni 6275 [NiCr15Mo16Fe6W4]
LNM NiCu 70/30	0.10	3.3	0.6	64	-	-	29	-	1.5	-	-	A5.14/A5.14M	ISO 18274 S Ni 4060 [NiCu30MnTi]
LNM NiTi	0.02	0.4	0.2	bal.	-	-	-	-	0.06	-	-	A5.14/A5.14M	ISO 18274 S Ni 2061 [NiTi3]
LNM NiFe	0.05	0.83	0.14	95	-	-	0.4	-	bal.	-	-	A5.15	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 420PM	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

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	-	-	-	-	-	-	-	As.7	ERCuAl-A1
LNM CuAl8Ni2	bal.	8.7	1.5	2.1	-	-	2.0	-	-	-	-	EN ISO 24373
LNM CuAl8Ni6	bal.	9	2.5	5.0	-	-	4.0	-	-	-	As.7	ERCuNiAl
LNM CuNi30	bal.	-	0.8	31	-	-	-	-	-	-	As.7	ERCuNi
LNM CuSn	bal.	-	0.2	0.1	0.3	-	-	0.8	-	-	As.7	ERCu
LNM CuSn6	bal.	-	-	-	-	-	-	6	0.2	-	As.7	ERCuSn-A
LNM CuSn12	bal.	-	-	-	-	-	-	12	0.2	-	-	EN ISO 24373
LNM CuSi3	bal.	-	1.0	-	3.0	-	-	0.1	-	0.1	As.7	ERCuSi-A

MIG WIRES FOR ALUMINIUM

Product name	Chemical composition (typical values) in %													AWS 5.10	EN 573.3	ISO 18273
	Al	Mn	Si	Fe	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. 0.03	max. 0.25	max. 0.04	max. 0.03	-	max. 0.04	-	-	max. 0.05	ERT100	EN AW-Al99.0Cu	SAI 1070 [A99.7]
SuperGlaze® MIG 1100	min.99.0	max. 0.05	-	-	-	max. 0.10	-	-	-	0.05-0.20	max. 0.95	-	-	ER2319	EN AW-AlCu6Mn	SAI 1100 [A99.0Cu]
SuperGlaze® MIG 2319	bal.	0.2-0.4	max. 0.2	0.1-0.2	max. 0.3	max. 0.3	max. 0.1	max. 0.02	-	5.8-6.8	-	-	-	ER4043	EN AW-AlSi5	SAI 2319 [AlCu6MnZrTi]
SuperGlaze® MIG 4043	bal.	max. 0.05	4.5-6.0	max. 0.2	max. 0.2	max. 0.6	max. 0.1	max. 0.05	-	max. 0.3	-	-	-	ER4047	EN AW-AlSi2	SAI 4043 [AlSi5]
SuperGlaze® MIG 4047	bal.	max. 0.15	11-13	-	max. 0.15	max. 0.8	max. 0.2	max. 0.10	-	max. 0.3	-	-	-	ER5183	EN AW-AlMg4.5MnZr	SAI 4047 [AlSi2]
SuperGlaze® MIG 5087	bal.	0.7-11	max. 0.25	max. 0.15	max. 0.15	max. 0.4	max. 0.25	4.5-5.2	0.05-0.25	max. 0.05	-	0.10-0.20	-	ER3556	EN AW-AlMg4.5Mn	SAI 5087 [AlMg4.5MnZr]
SuperGlaze® MIG 5183	bal.	0.5-1.0	max. 0.4	max. 0.15	max. 0.15	max. 0.4	max. 0.25	4.3-5.2	0.05-0.25	max. 0.1	-	-	-	ER5356	EN AW-AlMg5	SAI 5183 [AlMg4.5Mn0.7[Al]]
SuperGlaze® MIG 5356	bal.	0.05-0.2	max. 0.25	0.06-0.2	max. 0.2	max. 0.4	max. 0.1	4.5-5.5	0.05-0.20	max. 0.1	-	-	-	ER5356	EN AW-AlMg5	SAI 5356 [AlMg5C[Al]]
SuperGlaze® MIG 5356 TM™	bal.	0.05-0.2	max. 0.25	0.06-0.2	max. 0.2	max. 0.4	max. 0.1	4.5-5.5	0.05-0.20	max. 0.1	-	-	-	ER5356	EN AW-AlMg5	SAI 5356 [AlMg5C[Al]]
SuperGlaze® MIG 5556	bal.	0.5-1.0	max. 0.25	0.05-0.2	max. 0.2	max. 0.4	max. 0.25	4.7-5.5	0.05-0.20	max. 0.1	-	-	-	ER5556	EN AW-AlMg5Mn	SAI 5556 [AlMg5MnTi3]
SuperGlaze® MIG 5556A	bal.	0.6-1.0	max. 0.25	0.05-0.2	max. 0.2	max. 0.4	max. 0.2	5.0-5.5	0.05-0.20	max. 0.1	-	-	-	EN AW AlMg5Mn	EN AW AlMg5Mn	SAI 5556A [AlMg5Mn]
SuperGlaze® MIG 5754	bal.	max. 0.5	max. 0.4	max. 0.15	max. 0.15	max. 0.4	max. 0.2	2.6-3.6	max. 0.3	max. 0.1	-	-	-	EN AW AlMg3	EN AW AlMg3	SAI 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			ER70S-3	EN/ISO 636-A W 42 5 W2Si
LNT 26	0.10	1.5	0.9			ER70S-6	EN/ISO 636-A W 42 5 W3Si

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 W1	0.10	1.2	0.6	0.9	-	-	-	-	-	-	A5.28	ER80S-Ni1
LNT NiMo1	0.08	1.7	0.7	0.4	-	-	0.35	-	-	-	A5.28	ER100S-G
LNT Ni2.5	0.10	1.1	0.55	2.4	-	-	-	-	-	-	A5.28	ER80S-Ni2
LNT 12	0.10	1.2	0.6	-	-	-	0.5	-	-	-	A5.28	ER70S-A1
LNT 19	0.10	1.0	0.6	-	-	1.2	0.5	-	-	-	A5.28	ER80S-B2*
LNT 20	0.08	1.0	0.6	-	-	2.5	1.0	-	-	-	A5.28	ER90S-BB*
LNT 502	0.09	0.6	0.3	-	-	5.7	0.6	-	-	-	A5.28	ER80S-B6
LNT 9Cr(p9)	0.11	0.8	0.25	0.5	0.06	8.9	1.0	0.2	0.06	-	A5.28	ER90S-B9

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	S50 14343-A	W 19 9 L Si
LNT 304L	0.01	1.7	0.4	20.0	10.0	0.1	-	-	-	-	-	-	A5.9	ER308L	S50 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	S50 14343-A	W 19 9 NbSi
LNT 316L	0.01	1.5	0.5	18.5	12	2.7	-	-	-	-	-	-	A5.9	ER316L	S50 14343-A	W 19 12 3 L
LNT 316LSi	0.08	1.9	0.8	18.5	12.0	2.7	-	-	-	-	-	-	A5.9	ER316LSi	S50 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*	S50 14343-A	W 19 12 3 NbSi
LNT 4439Mn	0.02	7.0	0.4	18.0	16.0	4.5	-	0.15	-	-	-	-	-	ER316L Mn	S50 14343-A	W 18 16 5 Ni *
LNT 4455	0.075	7.0	0.4	20.0	16.0	3.0	-	0.15	-	-	-	-	A5.9	ER316L Mn	S50 14343-A	W 20 16 3 Mn L
LNT 4465	0.01	4.5	0.2	25.0	23.0	2.0	-	0.15	-	-	-	-	-	ER316L Mn	S50 14343-A	W 25 22 2 N L
LNT 4500	0.01	1.7	0.4	20.0	25.0	4.5	-	-	1.5	-	-	-	A5.9	ER385	S50 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	S50 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	S50 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	S50 14343-A	W 23 12 L Si
LNT 309LHF	0.02	2.0	0.35	24	13	0.1	-	-	-	-	-	-	A5.9	ER309L	S50 14343-A	W 23 12 L
LNT 307	0.07	7.1	0.8	18.6	8.0	-	-	-	-	-	-	-	A5.9	ER307*	S50 14343-A	W 18 8 Mn
LNT 304H	0.07	1.9	0.4	20.0	9.2	0.1	-	-	-	-	-	-	A5.9	ER308H	S50 14343-A	W 19 9 H
LNT 310	0.1	1.7	0.5	26.0	21	0.1	-	-	-	-	-	-	A5.9	ER310	S50 14343-A	W 25 20
LNT 312	0.1	1.8	0.4	30.7	8.9	-	-	-	-	-	-	-	A5.9	ER312	S50 14343-A	W 29 9

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 NiCr 31/27	0.01	1.5	0.2	31.0	27.0	3.5	1.0	-	-	-	-	-	ISO 14343-A
LNT NiCr 60/20	0.03	0.1	0.1	bal.	22.0	9.0	-	3.5	0.4	-	-	-	ISO 18274
LNT NiCr 70/19	0.03	3.0	0.2	bal.	20.0	-	0.1	2.5	1.0	-	-	-	ISO 18274
LNT NiCrMo 59/23	0.015	0.5	0.06	59	23	16	-	-	1.5	0.4	-	-	ISO 18274
LNT NiCrMo 60/16	0.006	0.5	0.04	58	16.0	16.0	-	-	5.8	-	3.6	-	ISO 18274
LNT NiCu 70/30	0.06	3.5	0.5	65	-	-	30	-	11	-	-	2.0	ISO 18274
LNT NiTi	0.03	0.5	0.4	bal.	-	-	-	-	0.06	-	-	2.8	ISO 18274

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 CuAl8	bal.	8	0.3	-	-	-	-	-	-	-	-	ERCuAl-A1	EN ISO 24373
LNT CuNi30	bal.	-	0.75	30	0.05	0.35	0.5	-	-	-	-	ERCuNi	EN ISO 24373
LNT CuSn6	bal.	-	-	-	-	-	-	6	0.2	-	-	ERCuSn-A	EN ISO 24373
LNT CuSi3	bal.	-	1.0	-	3.0	-	-	0.1	-	0.1	-	ERCuSi-A	EN ISO 24373

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		EN AW-Al99,0Cu	S Al 1070 [Al99,7]
SuperGlaze® TIG 1100	min.99,0	max. 0,05	-	-	-	max. 0,10	-	-	0,05-0,20	max. 0,95	-	-	RT100	EN AW-AlCu6Mn	S Al 1100 [Al99,0Cu]
SuperGlaze® TIG 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	-	-	-	R2319	EN AW-AlCu6Mn	S Al 2319 [AlCu6MnZrTi]
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	-		EN AW-AlMg4,5MnZr	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 [AlMg4,5Mn0,7Al]
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 [AlMg5CrAl]
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	EN AW-AlMg5	S Al 5556 [AlMg5MnTi]
SuperGlaze® TIG 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® 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

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			
Outersheild ¹ 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 C3 H5 / T 46 0 R M3 H5
Outersheild ¹ 70-H	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 C3 H5 / T 46 0 R M3 H5
Outersheild ¹ 70E-H	C1/M21	0.04	1.45	0.6	0.015	0.010	-	-	-	-	A5.20/A5.20M	E70T1C-H4 / E70T-1M-H4	EN ISO 17632-A T 46 3 R C3 H5 / T 46 3 R M3 H5
Outersheild ¹ 71E-H	M21	0.05	1.25	0.7	0.015	0.015	-	-	-	-	A5.20/A5.20M	E71T1M-H8	EN ISO 17632-A T 46 3 P M1 H10
Outersheild ¹ 71E-H	M21	0.04	1.4	0.6	0.03	0.010	-	-	-	-	A5.20/A5.20M	E71T1-C-H4	EN ISO 17632-A T 42 0 P C1 H5
Outersheild ¹ 71M-H	C1	0.05	1.3	0.6	0.015	0.010	-	-	-	-	A5.20/A5.20M	E71T1-CJ-H4	EN ISO 17632-A T 46 2 P C1 H5
Outersheild ¹ 71C	C1	0.05	1.4	0.4	0.015	0.010	-	-	-	-	A5.20/A5.20M	E71T1-C-H8/E71T-9C-H8	EN ISO 17632-A T 46 3 P C1 H10
Outersheild ¹ 71S-H	C1	0.05	1.5	0.55	0.012	0.010	-	-	-	-	A5.20/A5.20M	E71T1-5C-JH4 / E71T-5M-JH4	EN ISO 17632-A T 42 4 B C2 H5 / T 42 4 B M2 H5
Outersheild ¹ 71S-H	M21	0.06	1.5	0.6	0.012	0.010	-	-	-	-	A5.20/A5.20M	E71T1-5C-JH4 / E71T-5M-JH4	EN ISO 17632-A T 42 4 B C2 H5 / T 42 4 B M2 H5
Outersheild ¹ 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 M2 H10
Outersheild ¹ 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 M2 H5 ^{1/2} / T 46 2 M M2 H5
Outersheild ¹ 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 C2 H5
Outersheild ¹ MC715Ni-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 Ni1M M2 H5
Outersheild ¹ 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 M2 H5
Outersheild ¹ MC460VO-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 M1 H5
Outersheild ¹ MC420N-H*	M21	0.03	0.6	0.45	0.017	0.023	2.9	-	-	0.03	A5.28/A5.28M	E70C-6M H4	EN ISO 17632-A T 38 Z Z M M2 H5
Outersheild ¹ MC55CT-H	M21	0.03	1.3	0.4	0.015	0.020	0.55	0.55	-	-	A5.28/A5.28M	E80C-WZ-H4	EN ISO 17632-B T554T15-0MA-NCC1-UH5
Outersheild ¹ 8NiCr-H	C1	0.05	1.4	0.2	0.03	0.010	0.95	-	-	-	A5.29/A5.29M	E81T1-NiCr-JH4 ³	EN ISO 17632-A T 50 4 Ni1P C2 H5 ⁴
Outersheild ¹ 8NiCr-H	M21	0.05	1.4	0.2	0.03	0.010	0.95	-	-	-	A5.29/A5.29M	E81T1-NiCr-JH4 ³	EN ISO 17632-A T 50 5 Ni1P M2 H5 ⁴
Outersheild ¹ 8NiCr-HSR	M21	0.05	1.4	0.2	0.03	0.010	0.95	-	-	-	A5.29/A5.29M	E81T1-NiCr-JH4 ³	EN ISO 17632-A T 50 5 Ni1P M2 H5 ⁴
Outersheild ¹ 8NiCr-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 1.5Ni1P M2 H5 ⁴
Outersheild ¹ 8NiCr-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 1.5Ni1P M2 H5 ⁴
Outersheild ¹ 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 M2 H5
Outersheild ¹ 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
Outersheild ¹ 9NiCr-HSR	M21	0.05	1.4	0.2	0.03	0.010	0.95	-	0.4	-	A5.29/A5.29M	E91T1-GM-H4	EN ISO 18276-A T 55 4 Ni1Mo P M2 H5
Outersheild ¹ 9NiCr-HSR	M21	0.05	1.4	0.2	0.03	0.010	1.4	-	0.4	-	A5.29/A5.29M	E91T1-GM-H4	EN ISO 18276-A T 55 4 1.5Ni1Mo P M2 H5
Outersheild ¹ 690-H	M21	0.06	1.5	0.2	0.015	0.010	2.0	-	0.5	-	A5.29/A5.29M	E11T1-K3M-JH4	EN ISO 18276-A T 69 4 Z P M2 H5
Outersheild ¹ 690-HSR	M21	0.06	1.5	0.2	0.015	0.010	2.0	-	0.5	-	A5.29/A5.29M	E11T1-K3M-JH4	EN ISO 18276-A T 69 4 Z P M2 H5
Outersheild ¹ 10NiCr-HSR	M21	0.06	2.0	0.3	0.013	0.010	0.95	-	0.4	-	A5.29/A5.29M	E10T1-G-H4	EN ISO 18276-A T 69 4 Z P M2 H5
Outersheild ¹ 12-H	M21	0.065	0.8	0.2	0.014	0.010	-	-	0.46	-	A5.29/A5.29M	E 81T1-A1M-H4	EN ISO 17634-A T Mol P M2 H5
Outersheild ¹ 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	EN ISO 17634-A T CrMo1 P M2 H5
Outersheild ¹ 20-H	M21	0.07	0.75	0.21	0.013	0.010	-	-	1.09	2.23	A5.29/A5.29M	E 91T1-B3M-H4	EN ISO 17634-A T CrMo2 P M2 H5

* the mentioned classifications are an indication of the weld metal properties in the as welded condition. However, the Outersheild 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

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	EN ISO 17632-A	T 42 4 1Ni Y N 1 H10
Innershield® NR-203NiTi	0.08	1.1	0.27	0.008	0.003	0.9	-	0.85	-	-	A5.29/A5.29M	E71T8-NiTi	EN ISO 17632-A	T 42 Z Z N 1 H10
Innershield® NR-211-MPE	0.21	0.65	0.25	0.010	0.003	-	-	1.30	-	-	A5.20/A5.20M	E71T-11	EN ISO 17632-A	T 42 2 Y N 2 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 3 Y N 2 H10
Innershield® NR-233	0.16	0.65	0.21	0.010	0.003	-	-	0.60	-	-	A5.20/A5.20M	E71T8-K6	EN ISO 17632-A	T 42 3 Y N 2 H10
Innershield® NR-207	0.07	0.9	0.20	0.005	0.003	0.85	-	1.0	-	-	A5.29/A5.29M	E71T8-K6	EN ISO 17632-A	T 42 0 W N 3 H15
Innershield® NR-207-H	0.07	0.9	0.20	0.005	0.003	0.85	-	1.0	-	-	A5.29/A5.29M	E71T8-K6	EN ISO 17632-A	T 42 0 W N 3 H15
Innershield® NR-208-H	0.05	1.65	0.25	0.007	<0.003	0.8	-	0.85	-	-	A5.29/A5.29M	E91T8-G	EN ISO 17632-A	T 42 0 W N 3 H15
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	EN ISO 17632-A	T 42 0 W N 3 H15
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® NR-450-H	0.07	0.26	0.06	0.004	0.002	2.44	-	0.88	-	-	A5.29/A5.29M	E71T8-NiZ [†]	EN ISO 17632-A	T 42 6 1Ni Y N 2 H10
Innershield® NS-3ME	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

[†] also meets: E61T8-NiZ

* 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

NI-BASE FLUX-CORED WIRES

Product name	Chemical composition (typical values) in %										AWS	EN/ISO
	Gas	C	Mn	Si	Cr	Ni	Nb	Mo	Fe			
Nicro-Cor P60/20	M21	0.02	0.3	0.2	21.0	66.0	3.4	8.5	1.0	A5.34	ENiCrMo3Ti-4	EN ISO 12153 T Ni 6625 P 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® 40-0	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® 60-0	4.2	1.6	1.3	25.4	-	0.6	-	-		
Lincore® T8D	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	-	-	-	-		
Lincore® 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

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 NiCu
LNS 164 (LA 84)	0.10	1.75	0.10	-	-	-	-	0.9	0.5	-	A5.23/A5.23M	EF3	ISO 14171-A S3 NiMo
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
LA 100	0.05	1.7	0.45	<0.010	<0.010	-	-	1.9	0.45	-	A5.23/A5.23M	EM2	ISO 14171-A SZ
LNS 9Cr	0.12	0.6	0.30	-	-	8/8	-	0.7	1.0	-	A5.23/A5.23M	EB9	ISO 1952-A S CrMo91
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 S 19 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 464 1 Ni 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 Mn Ni 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 464 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 554 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® 80Ni	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 3Ni
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 505 7 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 554 2 Z P M 2 H5
PIPELINER® G90M-E	0.06	1.5	0.20	2.0	0.50	0.015	0.010	-	-	-	A5.29	E11T11-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 SP+				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-MPE	5
6 Omnia 46				Innershield NR-232	6
7 Omnia 46+				Innershield NR-233	7
8 Cumulo					8
9 Universalis					9
10 Ferrod 165A			Outershield 70-H	Innershield NR-232	10
11 Ferrod 135T			Outershield 71E-H	Innershield NR-311	11
12 Ferrod 160T			Outershield 71M-H	Innershield NS-3ME	12
13 Goniat 180		LNM 25	Outershield MC700		13
14 Baso 48SP		LNM 26			14
15 Baso 49		LNM 27	Outershield MC710C-H		15
16 Baso 51P	LNT 25, LNT 26	SupraMIG	Outershield 71C		16
17 Baso 100		SupraMIG Ultra	Outershield MC715-H		17
18 Baso 120			Outershield MC460VD-H	Innershield NR-203Ni	18
19 Baso G			Outershield T55-H	Innershield NR-203NiC	19
20 Baso 26V				Innershield NR-204-H	20
21 Conarc 48				Innershield NR-207-H	21
22 Conarc 49				Innershield NR-208-H	22
23 Conarc 49C				Innershield NR-400	23
24 Conarc 51					24
25 Conarc 52					25
26 Conarc 53					26
27 Lincoln 7018-1					27
28 Conarc U150					28
29 Conarc V180					29
30 Conarc V250					30
31 Kardo				Innershield NR-203NiC	31

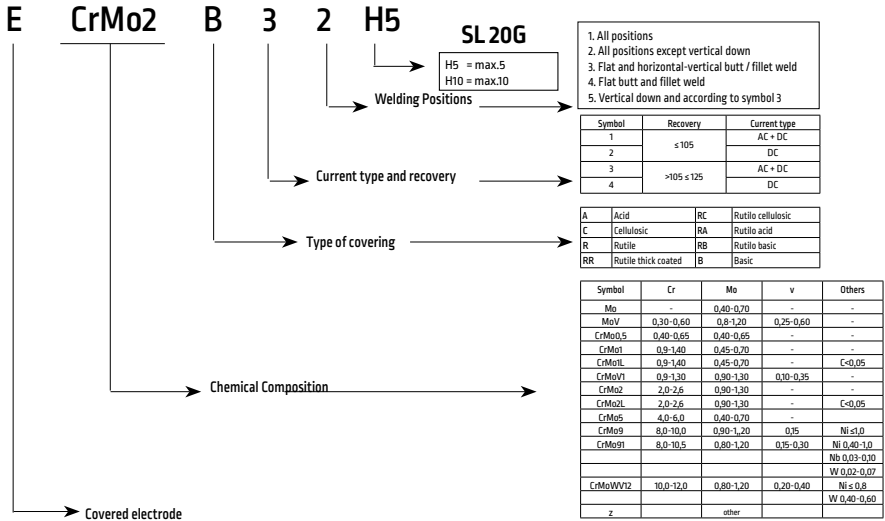
Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux
1 Shield Arc HYP+	LNT 25, LNT 26	LNM 25, LNM 26	Outershield 71E-H	Innershield NR204-H, NR208-H	LNS 135, LNS 140A (L-70) with flux 780, 860, P230
2 Shield Arc 70+	LNT Ni1	LNM Ni1	Outershield 81Ni-H/HSR	Innershield NR204-H, NR208-H	LNS 140A (L-70) with flux P230, P240, 8500, 888
3 Shield Arc 6P+					
4 Shield Arc 7P+					
5 Shield Arc 8P+					
6 Conarc 55CT	LNT 28	LNM 28	Outershield 500CT-H		LNS 163 with flux 960
7 Conarc 60G	LNT Ni1	LNM Ni1, LNM 28	Outershield 81K2-H/HSR		
8 Conarc 70G	LNT Ni2.5	LNM Ni2.5	Outershield 91K2-HSR	Innershield NR-450-H	LNS 164 with flux P240, 8500, 888
9 Conarc 74					
10 Conarc 80	-	-	Outershield 690-H/HSR		LNS 168, LNS T690 with flux P230, P240, 8500, 888
11 Conarc 85	-	LNM MoNiVa			
12 Kryo 1				Innershield NR-203Ni1	
13 Kryo 1N	LNT Ni1	LNM Ni1	Outershield 81Ni1-H/HSR	Innershield NR-203Ni1-C	LNS 160, LNS 165 with flux P230, P240, 8500, 888
14 Kryo 1P				Innershield NR-400	
15 Kryo 2	LNT Ni2.5	LNM Ni2.5	Outershield 81K2-H/HSR	Innershield NR-450-H	
16 Kryo 3	LNT Ni2.5	LNM Ni2.5	-	-	LNS 162 with flux P230, P240, 8500, 888
17 Kryo 4				-	L-70 with flux P240, 8500, 888
18 SL 12G	LNT 12	LNM 12	Outershield 12-H	-	LNS 140A with flux 860, P230
19 SL 19G	LNT 19	LNM 19	Outershield 19-H	-	LNS 150 with flux P230, P240, 8500, 888
20 SL 19G(STC)	LNT 19	LNM 19	-	-	-
21 SL 20G	LNT 20	LNM 20	Outershield 20-H	-	LNS 151 with flux P230, P240, 8500, 888
22 SL 22G	-	-	-	-	-
23 SL 502	LNT 502	-	-	-	LNS 502 with flux P230, P240, 8500
24 SL 9Cr(p91)	LNT 9Cr(p91)	-	-	-	-

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	-	1
2 Limarosta 304L	LNT 304LSi	LNM 304LSi	Cor-A-Rosta 304L	-	2
3 Vertarosta 304L	LNT 304L	LNM 304L	Cor-A-Rosta P304L	-	3
4 Jungo 304L	LNT 304LSi	LNM 304LSi	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	-	6
7 Jungo 347	LNT 347	LNM 347	Cor-A-Rosta 347	-	7
8 Arosta 316L	LNT 316LSi	LNM 316LSi	Cor-A-Rosta [P]316L	-	8
9 Limarosta 316L	LNT 316LSi	LNM 316LSi	Cor-A-Rosta 316L	-	9
10 Vertarosta 316L	LNT 316L	LNM 316L	Cor-A-Rosta P316L	-	10
11 Jungo 316L	LNT 316LSi	LNM 316LSi	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	Cor-A-Rosta 316L	-	13
14 Jungo 318L	LNT 318Si	LNM 318Si	Cor-A-Rosta 316L	-	14
15 Jungo 4439	LNT 4439Mn	LNM 4439Mn	-	-	15
16 Jungo 4455	LNT 4455	LNM 4455	-	-	16
17 Jungo 4465	LNT 4465	LNM 4465	-	-	17
18 Jungo 4500	LNT 4500	LNM 4500	-	-	18
19 Arosta 4462	LNT 4462	LNM 4462	Cor-A-Rosta [P]4462	-	19
20 Jungo 4462	LNT 4462	LNM 4462	Cor-A-Rosta [P]4462	-	20
21 Jungo 309L	LNT 309LSi	LNM 309LSi	Cor-A-Rosta [P]309L	-	21
22 Arosta 309S	LNT 309LSi	LNM 309LSi	Cor-A-Rosta 309L	-	22
23 Limarosta 309S	LNT 309LSi	LNM 309LSi	Cor-A-Rosta 309L	-	23
24 Arosta 309Mo	LNT 309LSi	LNM 309LSi	Cor-A-Rosta [P]309[Mo]	-	24
25 Nichroma	LNT 309LSi	LNM 309LSi	Cor-A-Rosta [P]309[Mo]	-	25
26 Nichroma 160	LNT 309LSi	LNM 309LSi	Cor-A-Rosta [P]309[Mo]	-	26
27 Arosta 329	LNT 309LSi	LNM 309LSi	Cor-A-Rosta [P]309[Mo]	-	27
28 Limarosta 312	LNT 309LSi	LNM 309LSi	Cor-A-Rosta [P]309[Mo]	-	28
29 Arosta 307	LNT 307	LNM 307	Cor-A-Rosta [P]307	-	29
30 Arosta 307-160	LNT 307	LNM 307	Cor-A-Rosta [P]307	-	30
31 Jungo 307	LNT 307	LNM 307	Cor-A-Rosta [P]307	-	31
32 Arosta 304-H	LNT 304-H	LNM 304-H, LNM 309-H	Cor-A-Rosta [P]304-H	-	32
33 Arosta 309-H	LNT 309-H	LNM 309-H	Cor-A-Rosta [P]309-H	-	33
34 Intherma 310 / 310B	LNT 310	LNM 310	Cor-A-Rosta [P]310	-	34

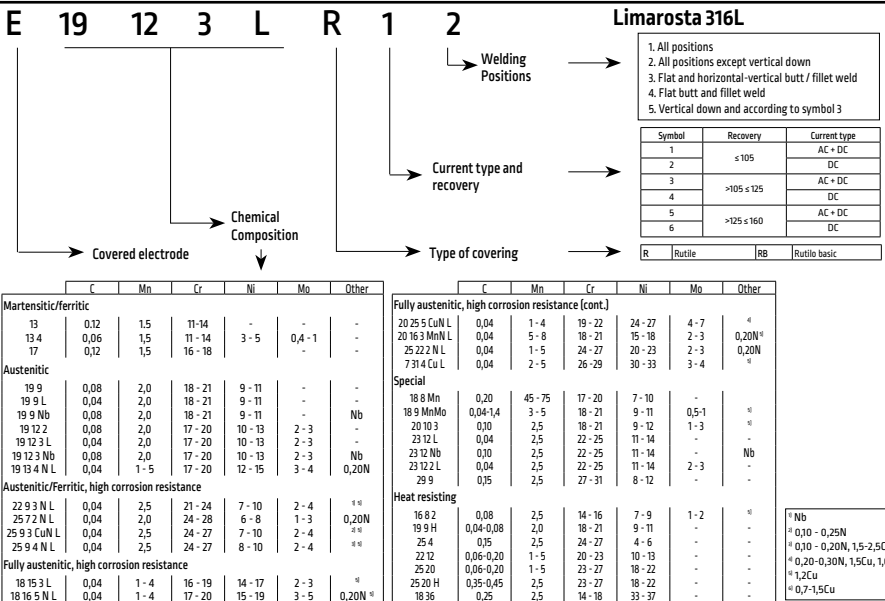
Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux
Copper & Nickel base alloys					
1 Micro 3/27	-	-	-	-	-
2 Micro 60/20	LNT Micro 60/20	LNM Micro 60/20	-	-	LNS NiCro 60/20 with flux P2007
3 Micro 70/15	-	-	-	-	-
4 Micro 70/15Mn	LNT Micro 70/19	LNM Micro 70/19	-	-	-
5 Micro 70/19	-	-	-	-	-
6 MicroMo 60/16	LNT MicroMo 60/16	-	-	-	LNS NiCroMo 60/16 with flux P2007
7 -	LNT NITi	LNM NITi	-	-	-
8 Nicu 70/30	LNT NiCu 70/30	LNM NiCu 70/30	-	-	-
9 Nylold 2	LNT Micro 60/20	LNM Micro 60/20	-	-	LNS NiCro 60/20 with flux P2007
10 -	LNT CuNi 30	LNM CuNi 30	-	-	-
11 -	-	LNM CuSn	-	-	-
12 -	LNT CuSn6	LNM CuSn6	-	-	-
13 -	-	LNM CuSm12	-	-	-
14 -	LNT CuS13	LNM CuS13	-	-	-
15 -	LNT CuAl8	LNM CuAl8	-	-	-
16 -	-	LNM CuAl8Ni2	-	-	-
17 -	-	LNM CuAl8Ni6	-	-	-
Aluminium alloys					
1 Al99.8	Superglaze TIG 1070	Superglaze MIG 1070	-	-	-
2 AlMn	-	-	-	-	-
3 -	Superglaze TIG 1070	Superglaze MIG 1070	-	-	-
4 -	Superglaze TIG 5754	Superglaze MIG 5754	-	-	-
5 -	Superglaze TIG 5356	Superglaze MIG 5356	-	-	-
6 -	Superglaze TIG 5183	Superglaze MIG 5183	-	-	-
7 -	Superglaze TIG 5087	Superglaze MIG 5087	-	-	-
8 -	Superglaze TIG 4043	Superglaze MIG 4043	-	-	-
9 -	Superglaze TIG 4047	Superglaze MIG 4047	-	-	-

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
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 M(e)	-	-	-	-	7
8 Wearshield ABR	-	-	-	Lincore 50, Lincore 55	Lincore 50 with flux 801
9 Wearshield 44	-	-	-	-	8
10 Wearshield ME(e)	-	-	-	-	9
11 Wearshield 60 (e)	-	-	-	Lincore 60-0	10
12 Wearshield 50M	-	-	-	-	11
13 Wearshield 70	-	-	-	-	12
14 Wearshield 420	-	-	-	Lincore 65-0	13
15 Wearshield 34	-	LNM 420FM	-	Lincore 420	14
Repair applications	-	-	-	-	15
Repair applications					
1 Reptec 126	-	LNM 307	-	-	LNS 307 with flux P2007, P2000S
2 Reptec Cast 1	LNT NiTi	LNM NiTi	-	-	2
3 Reptec Cast 3	-	LNM NiFe	-	-	3
4 Reptec Cast 31	-	LNM NiFe	-	-	4

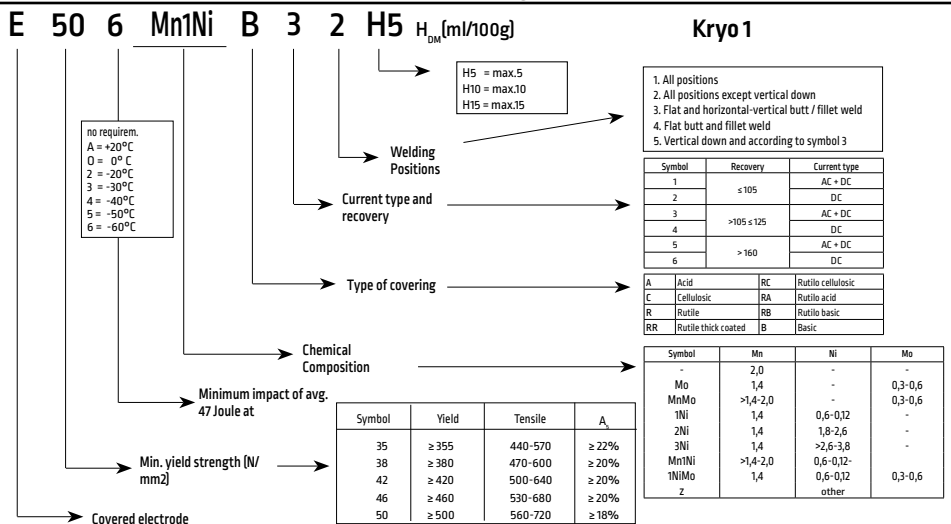
ISO 3580-A

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

ISO 3581-A

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

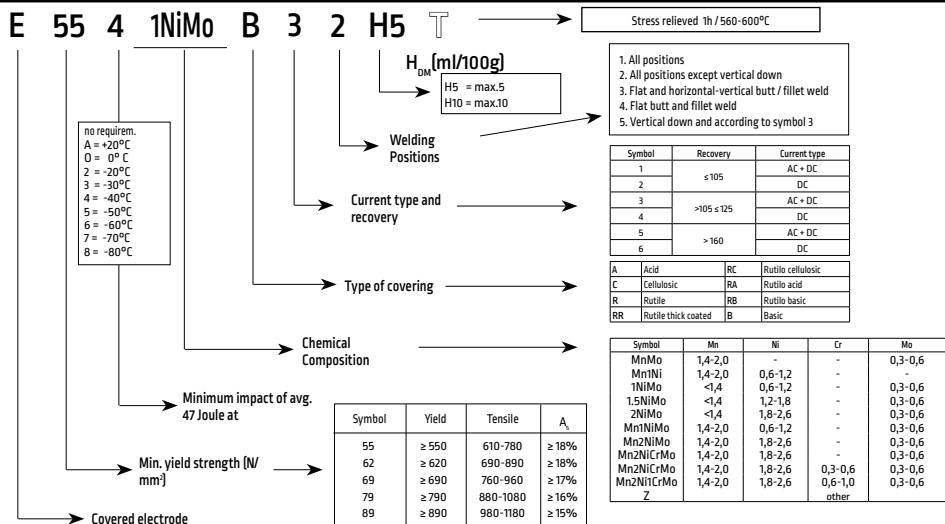
ISO 2560-A

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

EN 757

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

Conarc 70G



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

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

Chemical composition

Symbol	Si	Mn	Ni	Mo
G0				
G2Si	0,50-0,80	0,90-1,30	0,15	0,15
G3Si	10,70-1,00	1,30-1,60	0,15	0,15
G4Si	10,80-1,20	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
G3Mo	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

Type of shielding gas

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

Minimum impact of avg. 47 Joule at

Symbol	Yield	Tensile	A _k
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%

Min. yield strength (N/mm²)

Solid wire for GMAW-process

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

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

Minimum impact of avg. 47
Joule at

Z = no requirement.
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)

Symbol	Yield	Tensile	A _k
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%

GTAW-process, wire and weld metal

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 = SAWChemical
compositionClassification
Si = 0,65 - 1,2%Nb
0,10 - 0,25N
0,10 - 0,20N, 1,5-2,5Cu
0,20-0,30N, 1,5Cu, 1,0W
1,2Cu
0,7-1,5Cu

	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 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	0,08	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	0,02N
25 7 2 N L	0,04	2,0	24-28	6-8	1-3	0,20N
25 9 3 Cu N L	0,04	2,5	24-27	7-10	2-4	0,02N
25 9 4 N L	0,04	2,5	24-27	8-10	2-4	0,02N
Fully austenitic, high corrosion resistance						
18 15 3 L	0,04	1-4	16-19	14-17	2-3	0,02N
18 16 5 N L	0,04	1-4	17-20	15-19	3-5	0,20N

	C	Mn	Cr	Ni	Mo	Other
Fully austenitic, high corrosion resistance (cont.)						
20 25 5 Cu N L	0,04	1-4	19-22	24-27	4-7	0,20N
20 16 3 Mn N L	0,04	5-8	18-21	15-18	2-3	0,20N
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	0,20N
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	-
20 10 3	0,10	2,5	18-21	9-12	1-3	-
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	0,05	2,5	27-31	8-12	-	-
Heat resisting						
16 8 2	0,08	2,5	14-16	7-9	1-2	-
19 9 H	0,04-0,08	2,0	18-21	9-11	-	-
25 4	0,05	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	-	-

Solid wire for:

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

Z = no require.
A = +20°C
0 = 0°C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°CH_{DM} (ml/100g)
H5 = max.5
H10 = max.10
H15 = max.15Welding
positions

Type of shielding gas

Type of electrode core

Chemical
compositionMinimum impact of
avg. 47 Joule atMin. yield strength (N/mm²)

Flux-cored wire

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

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

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

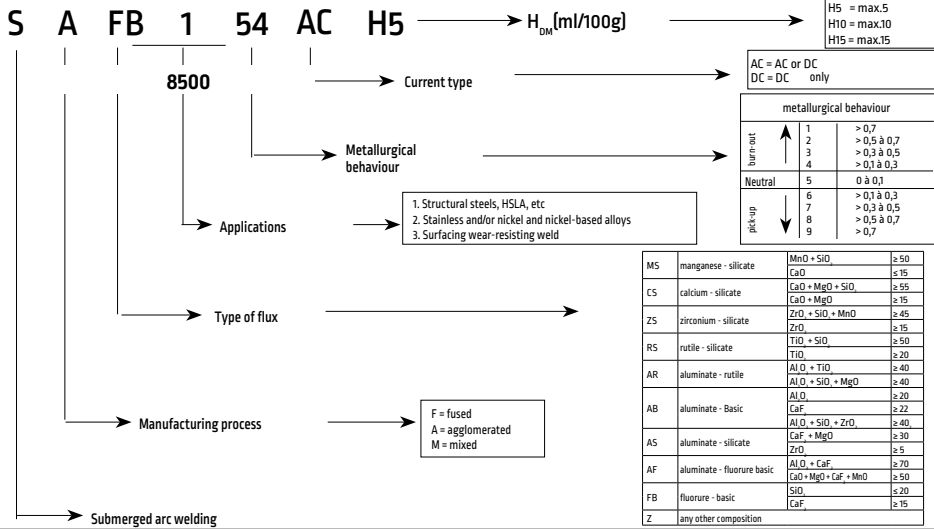
V Rutile or basic / fluoride
W Basic/fluoride, slow freezing slag
Y Basic/fluoride, fast freezing slag
S Other types

Symbol	Yield	Tensile	A
35	≥ 355	440-570	≥ 22%
38	≥ 380	470-600	≥ 20%
42	≥ 420	500-640	≥ 20%
46	≥ 460	530-680	≥ 20%
50	≥ 500	560-720	≥ 18%

Symbol	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	-
MmNi	>1,4-2,0	0,6-0,12	-
1NiMo	1,4	0,6-0,12	0,3-0,6
Z	-	other	-

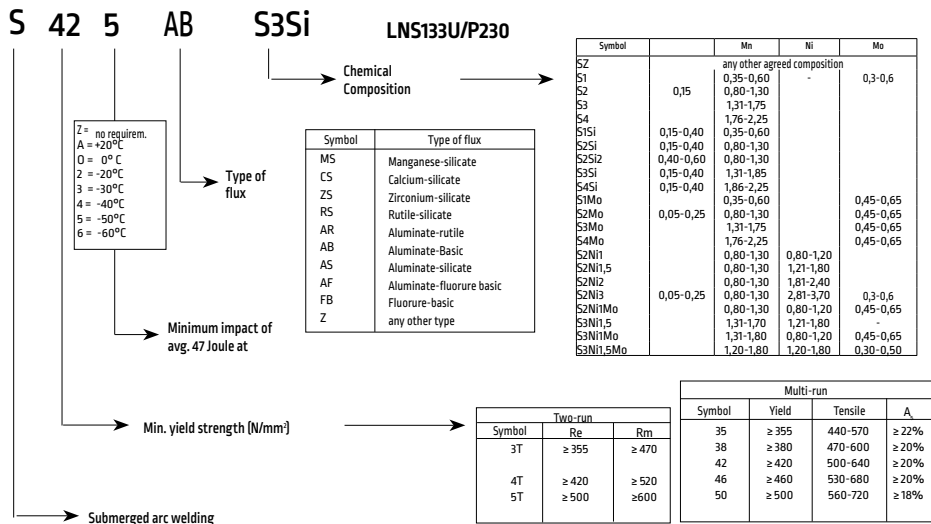
EN 760

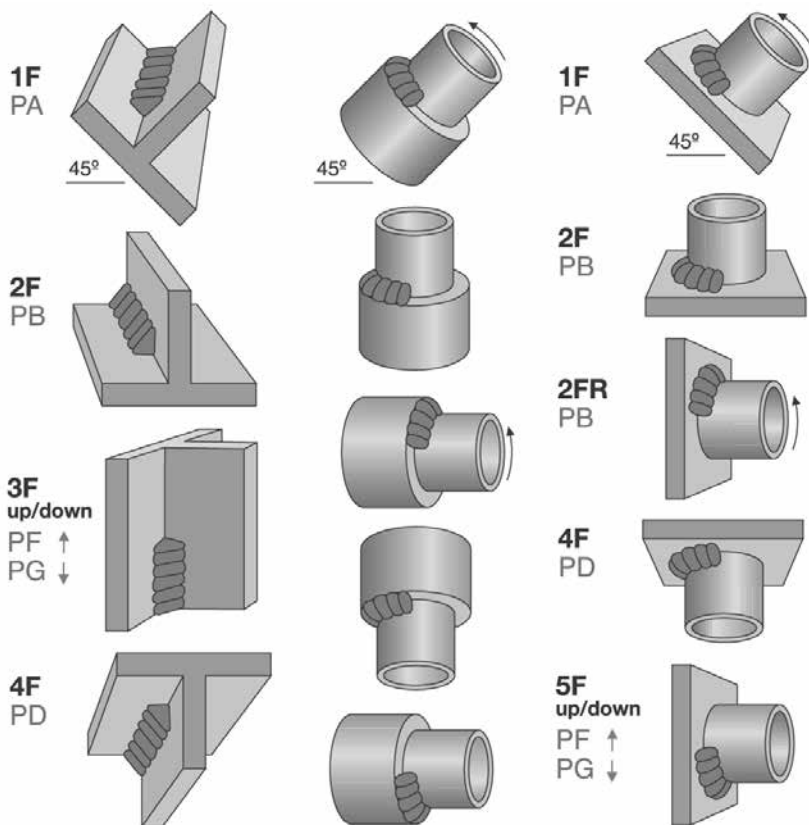
Classification of flux for submerged arc welding



ISO 14171-A

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

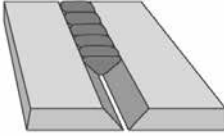
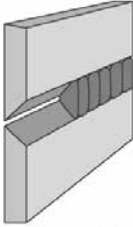
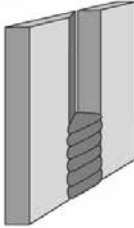
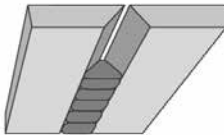
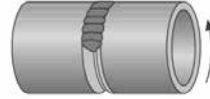
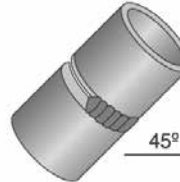
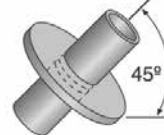




Qualification test

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
Pipe-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

1G
PA**2G**
PC**3G**
up/down
PF ↑
PG ↓**4G**
PE**1G**
PA**2G**
PC**5G**
up/down
PH ↑
PJ ↓**6Gu**
HL-045
6Gd
JL-045**6GR**

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

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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 atp]	-28	245			Base 6 Conarc 49C/57/V180	LNM 26 Supra MIG	LNT 25 LNT 26	OS MC700 (-20°) OS MC710-H OS MC715-H OS T15-H OS 81W11-H / HSR	L6i(LNS 129/860 (-20°C) LNS 139/860 (-20°C) L50M/LNS 133UP230
	Propane	-42	231	-40	233	Conarc 60G70G/80/85			OS 81K2-H / HSR OS 91K2-HSR OS 91W11-HSR	LNS 160 / P230/P240/888/8500
	CO ₂ [solid]	-78	195	-51	222	Kryo1 Kryo2	LNM N1	LNT N1		LNS 160 / P230/P240/888/8500 LNS 162 / P230/P240/888/8500
	Acetylene Ethane Ethylene	-84 -88 -104	189 185 169	-60	213	Kryo3	LNM N2.5	LNT N2.5		
X12 Ni 14		-84	189	-80	193					LNS 4455 / P 2007
		-88	185			Nyloid 2	LNM NiCro 70/19	LNT NiCro 70/19		
X12 Ni 5	Krypton Methane	-153 -161	120 112	-105	168	Nyloid 2	LNM NiCro 70/19 LNM 4455	LNT NiCro 70/19 LNT 4455		LNS NiCro60/20 / P2007 LNS 4455 / P2007
				-165	108	Nyloid 2	LNM NiCro 70/19	LNT NiCro 70/19		LNS NiCro 60/20 / P2007
X8 Ni 9 Austenitic CrNi steel AISI 304 AISI 316 LN AISI 317 LN						Jungo 304L NiCro 70/15 NiCro 70/19 NiCro 60/20	LNM 4455 LNM 304LSi LNM NiCro 70/19	LNT 4455 LNT 304L LNT NiCro 70/19	Cor-A-Rosta P304L LNS 4455 / P2007 LNS 304L / P2007	LNS 4455 / P2007 LNS 304L / P2007
	Oxygen Argon Nitrogen	-183 -186 -196	90 87 77			Arosta 4439	LNM NiCro 60/20 LNM 4439 Mn	LNT NiCro 60/20 LNT 4439 Mn		LNS NiCro 60/20 / P2007 LNM 4439Mn / P2007
				-196	77					
	Hydrogen Helium	-253 -269	-20 4	-196	77	Jungo 4455	LNM 4455	LNT 4455		LNS 4455 / P2007

Max. serv. temp.weld metal [°C]											
500	550	550	550	600	600	600	700	700	750	900	
EN	ENDIN	DIN	ENDIN	DIN	DIN	ENDIN	ENDIN	ENDIN	DIN	DIN	
P295 GH 1.0481	18CrMo4-5 1.7395	14Mo V6-3 1.7715	10CrMo9-10 1.7380	12CrMo19-5 1.7362	X12CrMo9-1 1.7386	X20CrMoV12-1 1.4922	X6CrNi18-11 1.4948	X6CrNiMo17-13 1.4919	X3CrNi18-11 1.4949	X10NiCrAlTi3220 1.4876 (Alloy 800H) NiCr 15 Fe 2.4816 (Alloy 600) NiCr 23 Fe 2.4851 (Alloy 601H)	a) 1) b) 2) 3)
P355 GH 1.0473	16CrMo4-4 1.7337	17MnMoV6-4 1.5403	12CrMo9-10 1.7375	10CrMo9-10 1.7375	X20CrMoV12-1 1.4935	X20CrMoV12-1 1.4935	X4CrNi18-10 1.4301	X3CrNiMo17-13 1.4910			
16Mo3 1.5415	22CrMo4-4 1.7350	10CrSiMoV7 1.8075	10CrSiMoV7 1.8075	10CrSiMoV7 1.8075			GX5CrNi19-10 1.4308	X4CrNiMo17-12-2 1.4401			
17Mo3 1.5415	GS-22CrMo54 1.7354		17CrMo10 1.7766			1.4949	X3CrNi18-11				
14Mo6 1.5423	25CrMo4 1.7218										
P265 GH 1.0425											
Base materials											
ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	
A285GrA/B/C	A387Gr11/12	A405Gr P24	A213Gr722	A182GrF5	A199GrT91	A200GrT91	TP304H	TP316H		B163GrN06 B163GrN08 B167Gr600 B407Gr810	2) 1) 2) 1)
A299	A213Gr12/13	A335GrP22/11	A335GrP22	A199GrT5	A200GrT5	A200GrT5	TP304	TP316			
A414GrB-F	A335GrF12/11	A515	A182GrF22	A335GrF22	A335GrF22	A335GrF22					
A515	A335GrF12/11	A515	A335GrF22	A335GrF22	A335GrF22	A335GrF22					
A516 gr. 70	A182GrF12/12	A516 gr. 70	A182GrF12/12	A182GrF12/12	A182GrF12/12	A182GrF12/12					
A662 gr. B	A335GrF12/12	A662 gr. B	A335GrF12/12	A335GrF12/12	A335GrF12/12	A335GrF12/12					
A 537 gr. 1	A335GrF12/12	A 537 gr. 1	A335GrF12/12	A335GrF12/12	A335GrF12/12	A335GrF12/12					
A161 gr. T1	A335GrF12/12	A161 gr. T1	A335GrF12/12	A335GrF12/12	A335GrF12/12	A335GrF12/12					
A182 gr. F1	A335GrF12/12	A182 gr. F1	A335GrF12/12	A335GrF12/12	A335GrF12/12	A335GrF12/12					
A204 gr. A-C	A335GrF12/12	A204 gr. A-C	A335GrF12/12	A335GrF12/12	A335GrF12/12	A335GrF12/12					
A369 gr. FP1	A335GrF12/12	A369 gr. FP1	A335GrF12/12	A335GrF12/12	A335GrF12/12	A335GrF12/12					
Products											
SMAW	SL196 SL196(STC)	SL226	SL20G SL20G(STC)	SL502	SL9Cr(P91)	SL4935	Arosta 304H		Arosta 304H	NiCr 70/15Mn NiCr 70/19 NiCr 60/20 1,2,3)	2) 3) 1,2,3)
TIG	LNT 12	LNT 19	LNT 20	LNT 502	LNT9Cr(P91)		LNT304H		LNT304H	LNT NiCr 70/19 LNT NiCr 60/20	
MIG/MAG	LNM 12	LNM 19	LNM 20	LNM 20			LNM 304H		LNM 304H	LNM NiCr 70/19 LNM NiCr 60/20	
FCAW	OS12-H	OS19-H	OS20-H	OS20-H							
SAW	LNS 140A P230	LNS 150 P240/888	LNS 151 P240/888	LNS 151 P240/888			LNS 304-H P2007/P2000		LNS 304-H P2007/P2000	LNS NiCr 60/20 P2007	
a) solution annealed, tempered at max. 600°C b) pressure vessels max. 450°C 1),2),3) corresponding base and welding materials											

Max. service temp/weld metal [°C]									
1000	1050	1100	1100	1100	1100	1100	1100	1200	
steel with approximately									
EN	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/DIN	EN/DIN	DIN	DIN	DIN	EN/DIN			
NiCr22Mo9Nb 2.4586 ¹ (Alloy 625)	X15 CrNiSi20-12 1.4828 ¹	X20 CrNiSi25-4 1.4821	GX40 CrNiSi25-20 1.4848	X12 NiCrSi36-16 1.4864	GX40 NiCrSi35-25 1.4857	X15 CrNiSi25-20 1.4841			
X2 NiCrAlTi32-20 1.4568 ² (Alloy 800L)	X12 CrNiTi18-9 1.4878 ¹	GX40 CrNi24-5 1.4822	GX40 NiCrSi25-12 1.4837	GX40 NiCrSi36-18 1.4865	GX40 NiCrSiNb38-25 1.4852	X12 CrNi26-21 1.4845			
X10 NiCrAlTi32-20 1.4876 ² (Alloy 800H)	GX40 CrNiSi22-9 1.4826 ¹ GX25 CrNiSi20-14 1.4832 ¹ GX25 CrNiSi18-9 1.4825 ¹ GX30 CrSi13 1.4710 ² GX40 CrSi13 1.4729 ² GX40 CrSi17 1.4740 ²	GX40 CrNiSi27-4 1.4823 X10 CrAl7 1.4713 X10 CrAl13 1.4724 X10 CrAl18 1.4742 X10 CrAl24 1.4762		GX40 NiCrSiNb35-25 1.4852 X15 NiCrNb32-21 1.4850	GX40 NiCrSiNb38-18 1.4849	GX15 CrNi25-20 1.4840			
ASTM	AISI	AISI	AISI	AISI	AISI	AISI			
	TP309 G ¹ TP302 B ¹ TP321 ¹	TP327	314	TP330	310	TP310 TP314			
ASTM		ASTM	ASTM	ASTM	ASTM				
	B163GrNi08 ² B407GrNi0 ²	A297GrHC A297GrH	A297GrHK A297GrHH	A297GrHU A351GrHT30	A351GrC20				
SMAW	NiCro 6020 ¹	Arosta 309H ^{1,2} Arosta 329 ²	NiCro 70/19* NiCro 70/15* NiCro 70/15Min*	NiCro 70/19* NiCro 70/15* NiCro 70/15Min*	NiCro 70/19* NiCro 70/15* NiCro 70/15Min*	Intherma 310			
TIG	LNT NiCro 6020	LNT NiCro 6020				LNT310			
MIG/ MAG	LNM NiCro 6020	LNM NiCro 6020				LNM 310			
SAW	LNS NiCro 6020 P2007	LNS NiCro 6020 P2007				LNS NiCro 6020 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	X6Cr13	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
1.4001	*X7Cr14			
1.4002	X6CrAl13			
1.4006	X12Cr13			
1.4008	*GX8CrNi13			
1.4016	*X6Cr17			
1.4021	X20Cr13			
1.4024	*X15Cr13			
1.4027	*GX20Cr14			
Martensitic chromium steel				
1.4113	X6CrMo17 1	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
1.4120	*X20CrMo13			
Austenitic chromium-nickel steel				
1.4301	X4CrNi18-10	Arosta 304L Vertarosta 304L	Arosta 347	
1.4303	X4CrNi18-12			
1.4306	X2CrNi19-11			
1.4308	GX5CrNi18-10			
1.4310	X10CrNi18-8			
1.4311	X2CrNiN18-10			
1.4312	*GX10CrNi18-8			
1.4318	X2CrNiN18-7			
1.4335	X1CrNi25-21	Jungo 4465		
1.4347	*GX8CrNi26-7		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	Arosta 4439	Arosta 4439, when weld metal ferrite should not exceed <0,5%or when an increased Mo-content is required
1.4438 1.4439 1.4446 1.4448	X2CrNiMo 18-15-4 X2CrNiMoN 17-13-5 GX2CrNiMoN 17-13-4 GX6CrNiMo 17-13	Arosta 4439		
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			

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

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/MoCr/Mo V				C-Mn-steel Yield strength 360-500 N/mm ²	C-steel Yield strength <360 N/mm ²
			NiCr55Fe (Inconel 600) NiCrAlTi (Incoloy 800)	X15CrNiSi 20 12 X15CrNiSi 25 20	X5CrNiMo 17-12-2 X2CrNiMo 18-14-3 X0CrNiMoNb 18-12	X5CrNi 18-10 X2CrNi 19-11 X6CrNiNb 18-10	X0Cr13 X6Cr17 X10CrAl24	X20CrMoV 12 1 X24CrMoV 9-5	10CrMo9-10 12CrMo9-5	T3C Mo4-5 14MoV63	16Mo3	S235-S355 P235-355	
Un-alloy steel Re-360N/mm ²			NiCr 70/15 NiCr 70/15Mn NiCr 70/19	Arosta 309S NiCr 70/15 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo NiCr 70/19	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Nichroma Arosta 309Mo Arosta 309S Arosta 307	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 60/20	SL 196 SL 205 SL 225	Conarc 49C Conarc 49C SL 126 Conarc 60G SL 126 Conarc 60G Conarc 70G	Conarc 49C B880 100 B880 120	
Un-alloy fine grained steel Re-360-500N/mm ²			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Nichroma Arosta 309Mo Arosta 309S Arosta 307	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 60/20	SL 126 SL 196 SL 205 SL 502	Conarc 49C SL 126 SL 196 SL 205 SL 502	Conarc 49C SL 126 Conarc 60G Conarc 70G	
Mo-alloy steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 60/20	Nichroma Arosta 309S NiCr 70/15	Nichroma Arosta 309S Arosta 307	Nichroma Arosta 309S Arosta 307	NiCr 70/15 NiCr 70/15Mn NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 60/20	SL 126 SL 196 SL 502	SL 126		
CrMo MoV creep resistant steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	SL 196 SL 205 SL 225	SL 196 SL 205 SL 225		
CrMo creep resisting steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	SL 205 SL 502	SL 205 SL 502		
Martensitic Cr-steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20				
Ferritic Cr-steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Nichroma Arosta 309S Arosta 309Mo Arosta 307	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20				
Stainless CrNi-steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 60/20	Arosta 304L Arosta 316L Arosta 316L Arosta 318	Arosta 304L Arosta 316L Arosta 316L Arosta 318	Arosta 304L Arosta 316L Arosta 316L Arosta 318	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20				
High temperature CrNi-steel			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20				
NiCrFe-alloys			NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	Nichroma Arosta 309S Arosta 309Mo NiCr 70/15	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20				

Preheating and stress relieving

Preheating 150-250°C

SELECTION TABLE *[Aluminium wires]*

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 5652 a	5005 5050	3004	2219 2519	2014 2036	1100 3003	1060 1070 1080 1350
1060 1070 1080 1350	4145 (c,i)	4043 (f,f)	5356 (c,e,i)	5356 (c,e,i)	4043 (i)	4043 (i)	5356 (c)	4043 (i)	5356 (c,e,i)	5356 (c)	5356 (c)	4043 (i)	1100 (c)	4043	4145	4145	1100	1188
1100 3003	4145 (c,i)	4043 (f,f)	5356 (c,e,i)	5356 (c,e,i)	4043 (i)	4043 (i)	5356 (c)	4043 (e,i)	5356 (c,e,i)	5356 (c)	5356 (c)	4043 (e,i)	4043 (e)	4043 (e)	4145	4145	1100 (c)	
2014 2036	4145 (g)	4145			4145	4145			4043 (i)	4043					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 (cb)	5356 (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 (b)	5356 (e)	5356 (e)	4043 (e,i)	4043 (e)	4043 (e)				
5005 5050	4043 (i)	4043 (i)	5654 (b)	5356 (e)	4043 (e)	4043 (b)	5356 (e)	5654 (b)	5654 (b)	5356 (e)	5356 (e)	4043 (e,i)	4043 (e)					
5052 5652	4043 (i)	4043 (b,i)	5654 (b)	5356 (e)	5356 (b,c)	5356 (b,c)	5356 (b)	5654 (b)	5356 (e)	5356 (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 (b)	5356 (e)	5183 (e)							
5086		5356 (c,e,i)	5356 (e)	5356 (e)	5356 (e)	5356 (e)	5356 (e)	5356 (b)	5356 (b)	5356 (e)								
5154 5254 a		4043 (b,i)	5654 (b)	5356 (b)	5356 (b,c)	5356 (b,c)	5356 (b)	5654 (a)	5356 (b)	5356 (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 6083 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)	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

- Service conditions such as immersion in fresh 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.
- Guide lines in this table apply to gas shielded arc welding processes.
- Where no filler metal is listed, the base metal combination is not recommended for welding

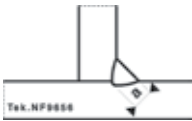
The serviceability of product or structure utilizing this type of information is and must be the sole responsibility of builder/user. Many variables beyond the control of Indalco Alloys affect the results obtained in applying this type of information. These variables include, but are not limited to,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

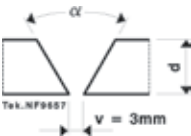
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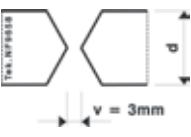
Type	Field of application	Deposit in cm ³ per electrode		
		Ø 3.2	Ø 4.0	Ø 5.0
Ferrod 135T Ferrod 160T	High recovery electrodes for fillet welds and horizontal V- and X-welds. Smooth weld appearance. High welding speed through high recovery of 135, 160 %	4.7	7.1 8.5	11.6 14.2
Ferrod 165A	As Ferrod 160T. 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/Panta	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
Conarc V250	Basic electrode with approx. 245% efficiency for fillet welds and very fast filling of horizontal grooves.		12.7	18.2

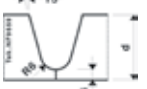
Arc time in seconds per electrode		
Ø 3.2	Ø 4.0	Ø 5.0
75	65	68
85	92	86
	90	78
57 ¹	55 ¹	
69 ²	69 ²	
66	62	
66	72	
59/65	59/72	
64	66	77
84	79	
75	95	
62 ¹	64 ¹	91
62 ¹	63 ¹	
74 ²	85 ²	99
70 ¹	75 ¹	
79 ²	96 ²	114
67 ¹	83 ¹	95 ²
65	75 ¹	
	100 ²	90
51	70	86
62	71	104
84	80	75
73	70	75
	70	75

Weld metal volume per meter

Fillet size "a" in mm	Theoretical content in cm ³	Formula : [a ² 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 cm ³			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 cm ³			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 cm ³	Formula : [(d-10) 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 x 100 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: FN < 0.5
- 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.

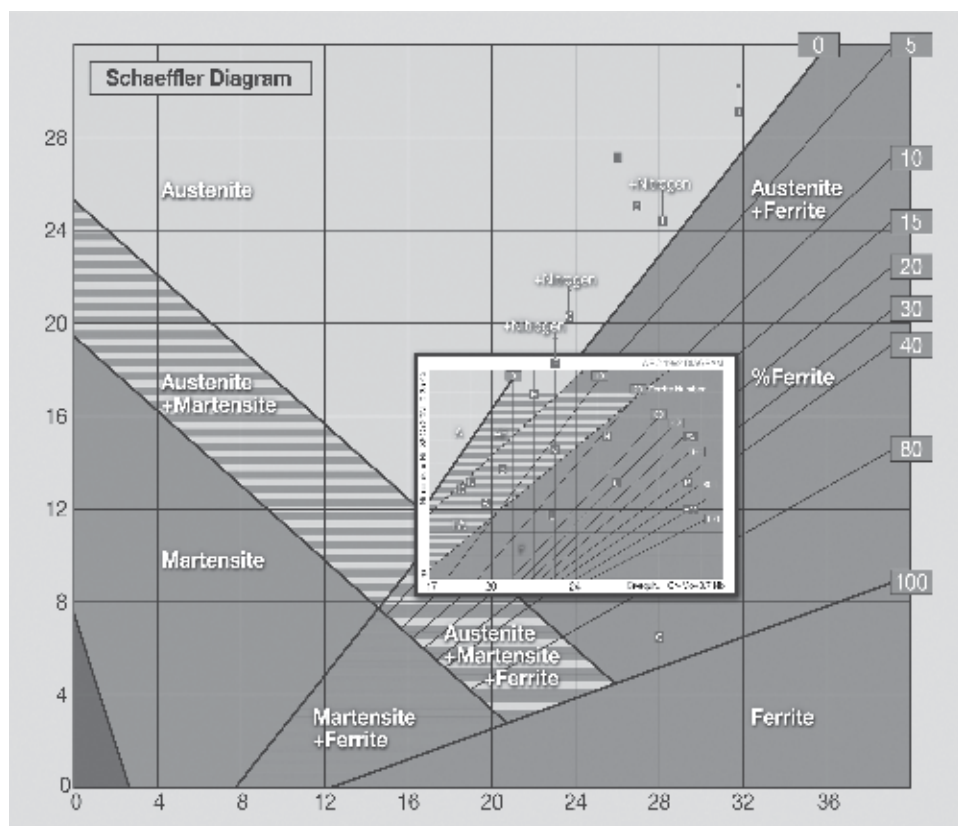


Fig. 1 Combined Schaeffler / WRC 1992 Constitution Diagram

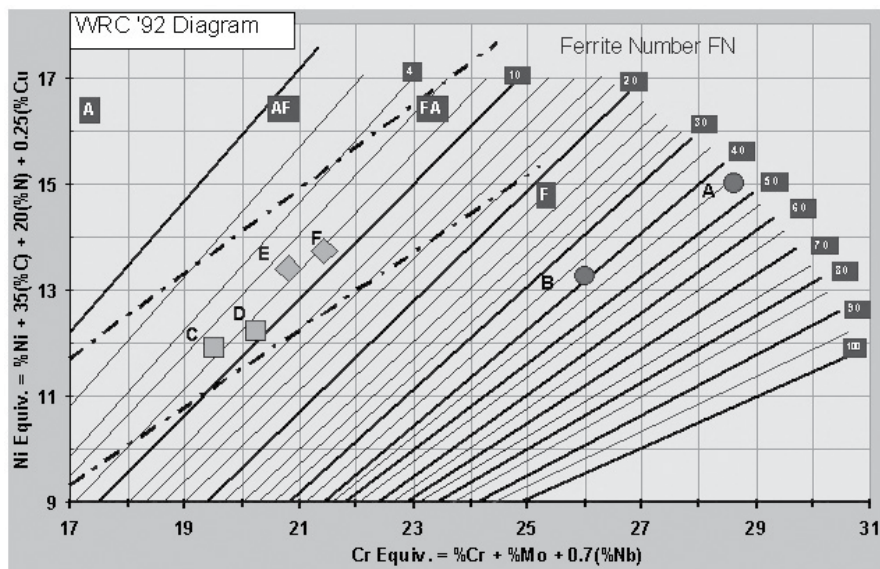


Fig. 2 WRC 1992 Constitution Diagram

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

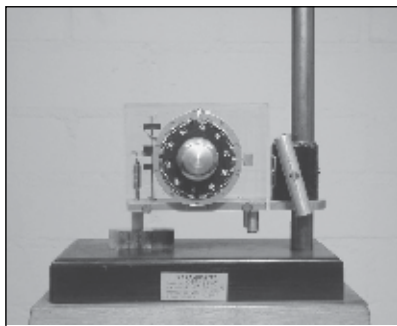


Fig. 3 Magne Gage

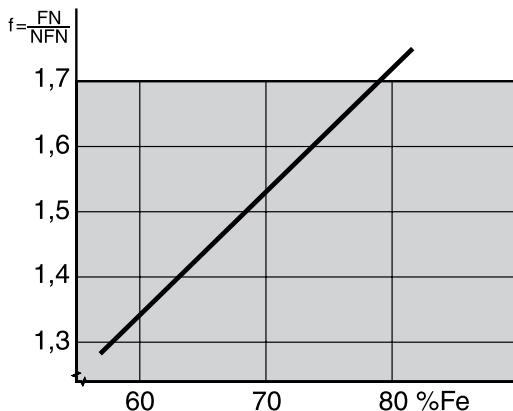


Fig. 4 Iron content versus factor f

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

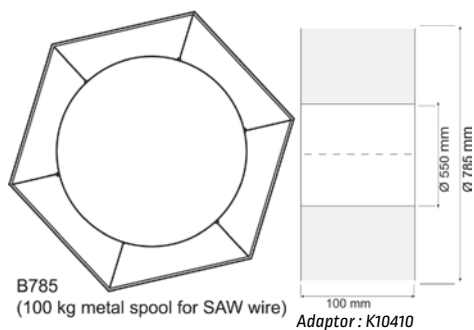
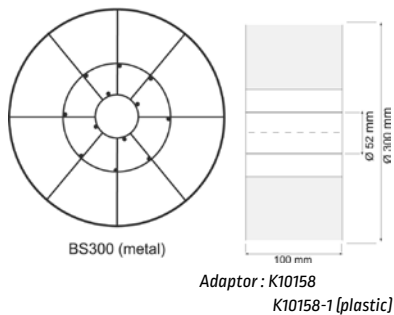
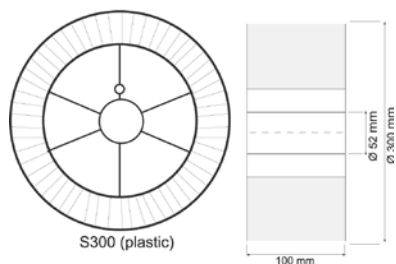
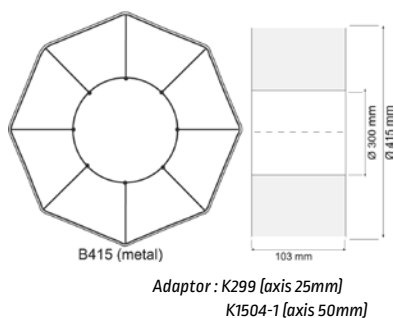
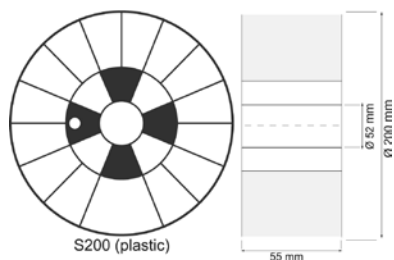
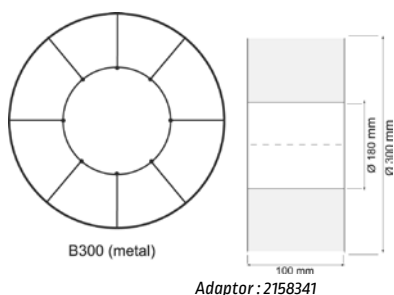
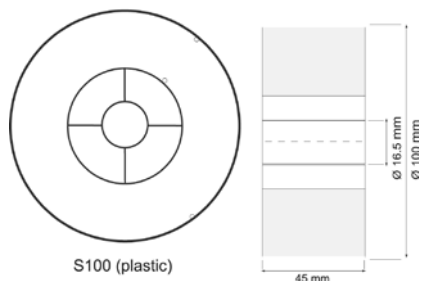
With the practice of measuring the Ferrite Number or ferrite content, welding conditions deviating from the standardised conditions have always to be taken into account. Furthermore, comparison tests showed that the accuracy between measurements in various laboratories may show differences up to +/-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

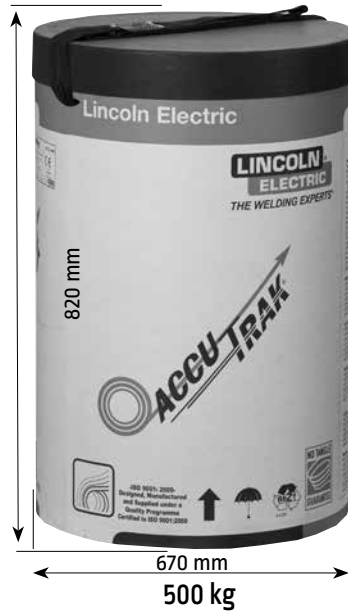
Lincoln Electric laboratories

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



AccuTrak® EcoDrum**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% recyclable.

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



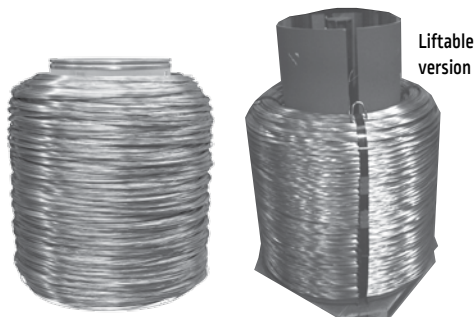
Product	Wire capacity (kg)	Dimensions (mm)	Drums/ Pallet	Wire size (mm)	Wire grade
SPEED FEED DRUMS	350	Drum (ø x H) : 546x906 Pallet (H x W x D) : 1140x1140x1070	4	1.6 to 4.8	Non & low alloy steels
	400	Drum (ø x H) : 571x906 Pallet (H x W x D) : 600x1200x1050	2		
	600	1051x720x720 including pallet	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	*	
SL19G / SL19G(STC)	*	
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:

- cardboard boxes in outer carton for rutile mild steel electrodes.
- foil protected cardboard boxes in outer carton for all other electrodes.
- plastic (PE) boxes with sealed cap, suitable for reclosing
- hermetically sealed round cans : Linc Can™
- hermetically vacuum sealed foil packs (Sahara ReadyPack®) in outer carton for
 - basic EMR-SAHARA® electrodes ^{1,2} for : mild steel
 - low alloy high strength steel
 - low temperature fine grain steel
 - creep resistant steel
 - duplex- and superduplex stainless steel electrodes ³
 - Ni-base electrodes for 5-9% Ni-steel (Nylord 2)

¹some types also packed in foil protected cardboard boxes

² for electrodes with a very low hydrogen content in the weld metal (HDM):

HDM max. 3ml/100g weld metal (only valid for electrodes in Sahara ReadyPack)

2. Storage

2a. Storage of electrodes in cardboard boxes requires humidity and temperature controlled storage areas.

In general, recommended storage conditions include:

- temperature 17-27°C, relative humidity max. 60%
- temperature 27-37°C, relative humidity max. 50%.
- Maximum storage period: 3 years.
- Electrode boxes may be stored in layers to a maximum of 5.

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

2c. No temperature and humidity requirements are applicable for electrodes in Sahara ReadyPack®, providing that vacuum is present in undamaged packs. Sahara ReadyPack® in outer cartons can be stored in layers to a maximum of 5. Prevent damage and heating above 60°C.

3. Handling

3a. Redrying 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 ReadyPack®;
- stainless steel and Ni-base electrodes after long and unknown storage conditions (deviating from recommendations).
- RepTec and Wearshield electrodes in plastic (PE) boxes, stored for more than 1 year under conditions as described under section 2a. Or earlier when the conditions deviate from those recommended.

3b. Electrodes in Sahara ReadyPack® can be used without redrying, providing that 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 8 hours after opening under the conditions of max. 35°C and max. 90% RH, with the electrodes remaining in the opened packaging and protected against excessive conditions as condensation, rain, etc.

If vacuum is not present, the electrodes shall follow the redry and holding procedure as recommended in table 1 for the EMR Sahara® Range.

REDRYING AND HOLDING RECOMMENDATIONS

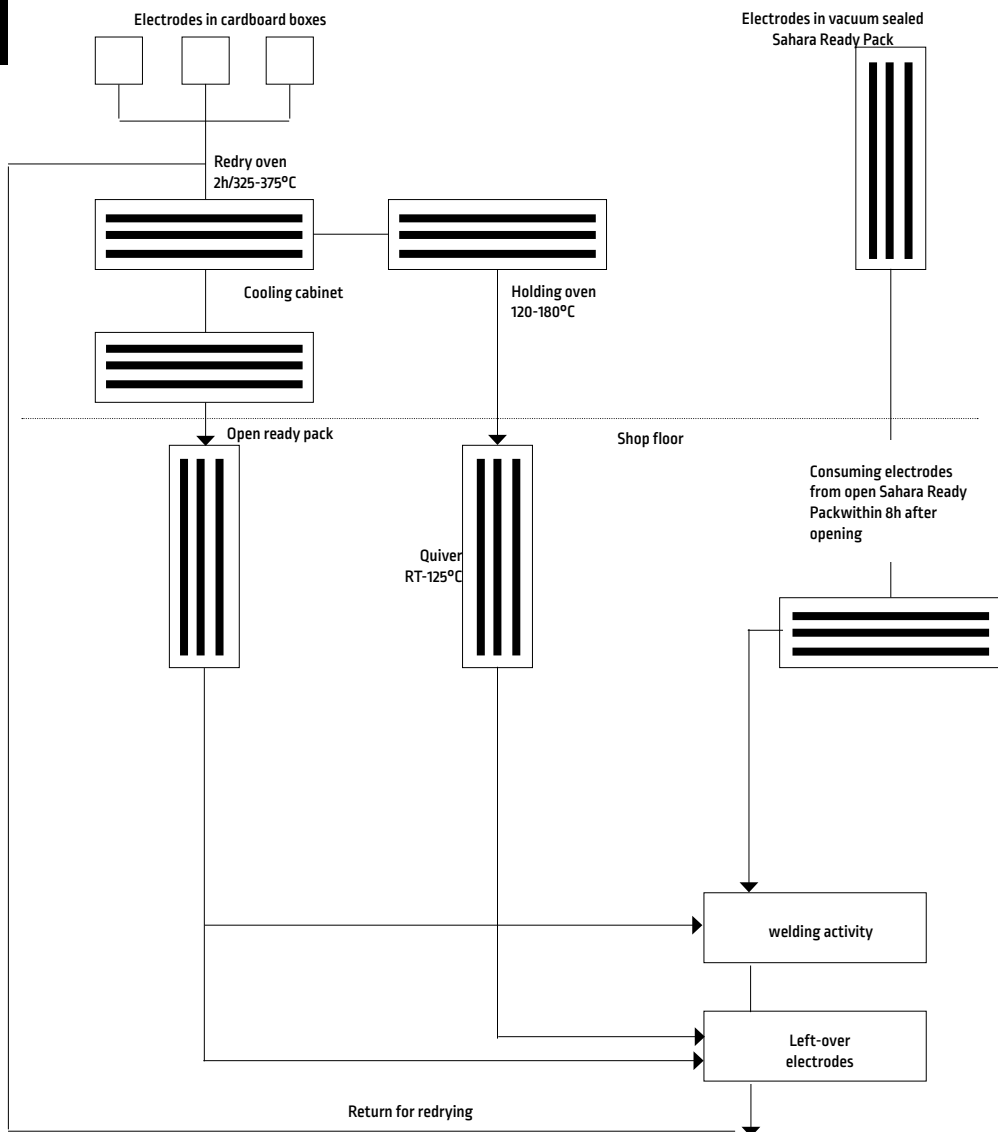
Electrode product groups	Re-drying Time (h)*	Temp [°C]	Holding
Mild steel: - rutile E6013 - rutile E6012, E7024	0.5-1h 1-2h	70-80 100-120	Cabinet 10-20°C above ambient temperature
- basic low hydrogen (HDM <8 ml/100g) - basic very low hydrogen*	2-6h 2-6h	250-375 325-375	a. holding oven unlimited time at 120-180°C b. quiver max. 10h at RT-125°C (see illustration fig. 1) c. plastic (PE) box (RepTec and Wearshield electrodes) max. 2 weeks workshop conditions
Low alloyed: - basic very low hydrogen**	2-6h	325-375	
Hardfacing (Wearshield) electrodes			
Maintenance & Repair (RepTec) 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	

* Redrying can be repeated twice within the indicated max. time of 6h. Redrying 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 hydrogen content HDM of max. 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®



1. General

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

Product family	Packaging
Outersheild	spool in plastic bag in cardboard box spool in Al/PE vacuum packaging in cardboard outerbox or spool in plastic protection on pallet
Innersheild Lincore	spool in cardboard box or plastic bucket or hermetically sealed cans
Cor-A-Rosta	spool in aluminium (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 requires controlled warehouse conditions such as:

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

Innersheild wire in plastic buckets or in hermetically sealed cans and Outersheild 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. Outersheild, Innersheild xxx-H types and Cor-A-Rosta

Spools outside the protective packaging allow exposure to normal workshop conditions during max. 72 hours;

3b. Innersheild, 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.

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.

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

2. Storage, Handling & Redrying

Lincoln flux can be used directly from its original, undamaged container. Flux that has been exposed to high humidity or condensation should be redried. To redry flux, remove the flux from its original packaging, heat temperature between 260°C and 480°C long enough to raise the entire bulk of the flux to this temperature for a minimum of one hour. One way to accomplish this is to redry the flux in shallow trays (around 5 cm deep). If using an oven, in which heating rods are inserted into the flux, care must be taken so that the temperature of the flux immediately adjacent to the rods does not exceed 480°C.

For applications requiring diffusible hydrogen control, storage, handling & redrying recommendations will depend on package type:

Steel drums and Sahara ReadyBag™

Material packaged in steel drums and Sahara ReadyBag™ does not need to be stored in a humidity controlled environment. It should however, be protected from the elements (not store outside). Material in steel drums can be stored indefinitely and be used directly from the container.

Polypropylene bag or bulk bag with polypropylene liner.

Material packaged in a polypropylene bag or in bulk bag with polypropylene liner needs to be stored in a humidity controlled environment at a humidity level of < 70% relative humidity. Material stored in this manner for a period not exceeding six months can be used directly from the package with no further treatment. Material stored longer than six months needs to be dried according the redrying process describe above.

If the diffusible hydrogen control is very strict then the flux should be redried immediately prior to use at a temperature of 425°C.

3. Recycling

Non consumed flux, collected from the weld, shall be cleaned from slag, metal and/or other type of contaminations (organic).

Damage of the flux by heavy impingements in transport systems shall be prevented. Prevent separation of different grain fractions in cyclones or in "dead" corners. Refreshment of the flux is recommended by adding 10-40% of new flux to the returned flux.

Hardfacing and repair	
Wearshield® BU-30	290
Wearshield® Mangjet [e]	292
Wearshield® 15CrMn	294
Wearshield® MM 40	296
Wearshield® MM	298
Wearshield® TSD	300
Wearshield® MI [e]	302
Wearshield® ABR	304
Wearshield® 44	306
Wearshield® ME [e]	308
Wearshield® 60 [e]	310
Wearshield® 70	312
Wearshield® 420	314
Wearshield® 34	316
RepTec Cast 1	318
RepTec Cast 3	320
RepTec Cast 31	322



PROVEN. RELIABLE. TIME & MONEY SAVING PACKAGING SOLUTION

Fleetweld® 5P+

CLASSIFICATION

AWS A5.1 : E 6010
ISO 2560-A : E 42 3 C 25

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 + / DC - (root)

APPROVALS

LR TÜV
3 +

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

C	Mn	Si
0.15	0.50	0.25

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-29°C/-30°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 330 min. 420 440	min. 430 500-640 520	min. 22 min. 20 26	70	min. 27 min. 47 65

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	355	350	350	350
Unit: Linc Can	Pieces / unit	304	180	130	83
	Net weight/unit (kg)	5.0	4.7	5.1	5.1

Identification Imprint: 6010-FW5P+ Tip Color: none

Fleetweld® 5P+ rev. EN 26

Fleetweld® 5P+

SMAW

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)
2.5x355	40-70	DC+	15.8
3.2x350	65-130	DC+	26.2
4.0x350	90-175	DC+	40.0
5.0x350	140-225	DC+	61.5

*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 cans

CLASSIFICATION

AWS A5.1 : E 6012
ISO 2560-A : E 38 0 RC 11

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PG/3Gd



PE/4G

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 ISO 2560-A Typical values	AW	min. 330 min. 380 470	min. 430 470-600 550	min. 17 min. 20 23	not required min. 47 56

PACKAGING AND AVAILABLE SIZES

Unit: carton box	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: carton box	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. EN 24

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	175	90	1.58
3.2x350	95-130	AC	64	175	1.1	276	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

Numal

SMAW

CLASSIFICATION

AWS A5.1 : E 6013
ISO 2560-A : E 38 0 R 11

GENERAL DESCRIPTION

Rutile general purpose, all positions electrode
Applicable for "clean" structural steel (2.5, 3.2, 4.0 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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 331 min. 420 430	min. 414 500-640 480	min. 17 min. 20 26	not required min. 47 60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	300	350	350	450	350	450	450
Unit: carton box	Pieces / unit	370	250	175	150	110	95	55
	Net weight/unit (kg)	4.2	4.8	5.3	6.2	5.0	5.9	5.8

Identification Imprint: 6013-NUMAL Tip Color: yellow

Numal: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

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 steel	
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 E(kJ)	Dep. rate 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				

CLASSIFICATION

AWS A5.1 : E 6013
ISO 2560-A : E 42 0 RC 11

GENERAL DESCRIPTION

Rutile general purpose, all position electrode, including vertical down
Vertical down only applicable for “clean” structural steel
Also weldable with low Open Circuit Voltage transformers (min. OCV 42V)

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	TÜV	DNV
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 ISO 2560-A Typical values	AW	min. 330 min. 420 520	min. 430 500-640 550	min. 17 min. 20 26	not required min. 47 60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	145	155	120
	Net weight/unit (kg)	2.8	4.8	5.4

Identification Imprint: 6013 / PANTA Tip Color: none

Panta®: rev. EN 23

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 steel	
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 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	110-130	AC	59	198	1.1	29.5	54	1.58
4.0x350	130-160	AC	59	301	1.7	42.4	37	1.57

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	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

CLASSIFICATION

AWS A5.1 : E 6013
ISO 2560-A : E 38 0 RC 11

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 ISO 2560-A Typical values	AW	min. 330 min. 380 500	min. 430 470-600 540	min. 17 min. 20 24	not required min. 47 60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0
	Length (mm)	300	350	350	350
Unit: carton box	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. EN 25

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 steel	
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 E(kJ)	Dep. rate 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

CLASSIFICATION

AWS A5.1 : E 6013
ISO 2560-A : E 42 0 RC 11

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)



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 ISO 2560-A Typical values	AW	min. 330 min. 420 520	min. 430 500-640 550	min. 17 min. 20 26	not required min. 47 60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	155	155	120
	Net weight/unit (kg)	2.8	4.8	5.4

Identification	Imprint: 6013/OMNIA	Tip Color: none	Omnia®: rev. EN 24
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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 steel	
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 E(kJ)	Dep. rate 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

Omnia[®] 46

SMAW

CLASSIFICATION

AWS A5.1 : E 6013
ISO 2560-A : E 38 0 R 11

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 330 min. 380 460	min. 430 470-600 540	min. 17 min. 20 27	not required min. 47 65

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	300	350	350	450	350	450	450
Unit: carton box	Pieces / unit	370	250	175	150	110	95	55
	Net weight/unit (kg)	4.2	4.8	5.3	6.2	2.0	2.3	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. EN 26

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: Material Safety Data Sheets (MSDS) are available on our website.

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 steel	
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 E(kJ)	Dep. rate 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				

CLASSIFICATION

AWS A5.1 : E 6013
ISO 2560-A : E 38 0 R 12

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 ISO 2560-A Typical values	AW	min. 330 min. 380 500	min. 430 470-600 540	min. 17 min. 20 25	not required min. 47 55

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		2.5	3.2	4.0
Length (mm)		350	350	350
Unit: carton box	Pieces / unit	150	175	115
	Net weight/unit (kg)	2.9	5.2	5.3

Identification Imprint: 6013 / CUMULO Tip Color: none

Cumulo: rev. EN 25

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 steel	
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 E(kJ)	Dep. rate 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	

CLASSIFICATION

AWS A5.1 : E6013
ISO 2560-A : E 42 0 RR 12

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)



PA/1G



PB/2F



PC/2G



PE/4G

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 ISO 2560-A Typical values	AW	min. 330 min. 420 480	min. 430 500-640 560	min. 17 min. 20 26	not required min. 47 50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	5.0
	Length (mm)	300	350	350	450	450	450
Unit: carton box	Pieces / unit	200	130	140	125	80	50
	Net weight/unit (kg)	2.4	2.8	4.8	5.8	5.9	5.5

Identification Imprint: 6013 / UNIVERSALIS Tip Color: none

Universalis®: rev. EN 25

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 steel	
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 E(kJ)	Dep. rate 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
5.0x450	180-250	AC	83	882	2.0	112.0	15	1.69

*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
5.0	260A	260A		

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

Ferrod® 165A

SMAW

CLASSIFICATION

AWS A5.1 : E7024-1
ISO 2560-A : E 42 2 RA 73

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	-18°C/-20°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 420 475	min. 490 500-640 520	min. 22 min. 20 26	70	min. 27 min. 47 67

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: carton box	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. EN 23

Ferrod[®] 165A

SMAW

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 steel	
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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.1 : E7024
ISO 2560-A : E 38 0 RR 53

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) 0°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 380 460	min. 490 470-600 530	min. 17 min. 20 25	not required 47 54

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
Length (mm)		450	450	450
Unit: carton box	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. EN 25

Ferrod® 135T

SMAW

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 steel	
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 E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
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

SMAW

CLASSIFICATION

AWS A5.1 : E7024
ISO 2560-A : E 42 0 RR 73

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 ISO 2560-A Typical values	min. 400 min. 420 450	min. 490 500-640 570	min. 17 min. 20 26	not required min. 47 70
AW				

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0	6.0
	Length (mm)	450	450	450	450
Unit: carton box	Pieces / unit	85	60	35	30
	Net weight/unit (kg)	6.4	6.3	5.8	6.5

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

Ferrod® 160T: rev. EN 25

Ferrod[®] 160T

SMAW

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 steel	
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 E(kJ)	Dep. rate 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
ISO 2560-A : E 42 0 RR 73

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)



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/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 399 min. 420 450	min. 490 500-640 525	min. 17 min. 20 27	not required min. 47 75

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	4.0	5.0	6.3
Length (mm)		450	450	450
Unit: carton box	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. EN 24

Gonia 180

SMAW

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 steel	
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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.1 : E7018-1 H8
ISO 2560-A : E 46 3 B 32 H10*
* also complies to E 46 3 BR 32 H10

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

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 ISO 2560-A Typical values	AW	min. 400 min. 460 590	min. 490 530-680 640	min. 22 min. 20 25	90	min. 47 60	min. 27

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 box	Pieces / unit	125	78	78	50	50	50
	Net weight/unit (kg)	2.5	2.6	3.3	2.5	3.4	5.5
Unit: 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. EN 24

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

Baso[®] 49

SMAW

CLASSIFICATION

AWS A5.1 : E7018 H4
ISO 2560-A : E 46 3 B 32 H5

GENERAL DESCRIPTION

Basic very low hydrogen electrode (HDM< 5 ml/100g)
Very good weldability, in all positions
Almost no spatter, nice wetting and full weld pool control
Good impact values down to -30°C
Excellent X-ray soundness

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

CURRENT TYPE

DC + / -

APPROVALS

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

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

C	Mn	Si	HDM
0.09	1.1	0.6	5 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)		
					-20°C	-29°C/-30°C	-40°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 460 550	min. 490 530-680 635	min. 22 min. 20 25	115	min. 27 min. 47 85	65

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 box	Pieces / unit	175	115	115	85	85	55
	Net weight/unit (kg)	3.9	4.0	5.2	4.6	5.7	6.0

Identification Imprint: 7018/ BASO 49 Tip Color: none

Baso[®] 49: rev. EN 24

Baso[®] 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
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
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 E(kJ)	Dep. rate 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
2.5	95A	95A	90A	90A	85A
3.2	140A	130A	130A	120A	120A
4.0	180A	180A	180A	160A	150A
5.0	230A	230A	230A	180A	

REMARKS / APPLICATION ADVICE

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

Baso[®] 51P

SMAW

CLASSIFICATION

AWS A5.1 : E7018-1
ISO 2560-A : E 46 3 B 32 H5

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					-20°C	-30°C	-46°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 460 510	min. 490 530-680 600	min. 22 min. 20 27	90	min. 47 70	min. 27 40

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 box	Pieces / unit	215	130	120	80	80	55
	Net weight/unit (kg)	4.2	4.2	5.1	4.0	5.2	5.5

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

Baso[®] 51P: rev. EN 25

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 steel	
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 E(kJ)	Dep. rate 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)	PA/1G	PB/2F	Welding positions		PE/4G	PH/5Gup
			PC/2G	PF/3Gup		
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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

Baso[®] 100

EMR
SAHARA[®]

SMAW

CLASSIFICATION

AWS A5.1 : E7016 H4R
ISO 2560-A : E 42 3 B 12 H5

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)



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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-29°/-30°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 420 555	min. 490 500-640 600	min. 22 min. 20 26	120	min. 27 min. 47 80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: carton box	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. EN 26

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

Baso[®] 120

EMR
SAHARA[®]

SMAW

CLASSIFICATION

AWS A5.1 : E7018 H4R
ISO 2560-A : E 42 3 B 32 H5

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					-20°C	-29°/-30°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 420 540	min. 490 500-640 600	min. 22 min. 20 26	150	min. 27 min. 47 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
Unit: carton box	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. EN 26

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: Material Safety Data Sheets (MSDS) are available on our website.

Baso[®] 120

SMAW

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

Basic ONE

SMAW

CLASSIFICATION

AWS A5.1 : E7018 H8
ISO 2560-A : E 42 4 B 42 H5

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



PG/3Gd



PE/4G

CURRENT TYPE

DC +

APPROVALS

RINA	BV	DNV	LR
3YH10	3YHH	3YH10	3YH10

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	-46°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 420 475	min. 490 500-640 540	min. 22 min. 20 27	min. 47 105	min. 27 150

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5
	Length (mm)	350
Unit: carton box	Pieces / unit	180
	Net weight/unit (kg)	4.4

Identification Imprint: 7018 / BASIC ONE Tip Color: none

Basic ONE: rev. EN 04

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: Material Safety Data Sheets (MSDS) are available on our website.

Basic 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 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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steels	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

SMAW

REMARKS / APPLICATION ADVICE

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

CLASSIFICATION

AWS A5.1 : E7018-1 H4R
ISO 2560-A : E 42 5 B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PG/3Gd



PE/4G

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS	BV	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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)		
					-20°C	-46°C	-50°C
Required: AWS A5.1 ISO 2560-A		min. 400 min. 420	min. 490 500-640	min. 22 min. 20		min. 27	
Typical values	AW	490	575	28	200	130	min. 47 100

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	300	350	350	450	350	450	450
Unit: carton box	Pieces / unit	180	135	120	120	85	85	55
	Net weight/unit (kg)	2.1	2.8	4.4	5.8	4.7	5.9	6.0
Unit: SRP	Pieces / unit	53	69	50	50	28	28	23
	Net weight/unit (kg)	0.6	1.4	2.0	2.5	1.6	2.0	2.6

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

Baso® G: rev. EN 24

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

Baso[®] 26V

SMAW

CLASSIFICATION

AWS A5.1 : E7048 H8
ISO 2560-A : E 42 3 B 15 H10

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					-20°C	-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
Unit: carton box	Pieces / unit	150	100	70
	Net weight/unit (kg)	6.1	6.2	6.7
Unit: SRP	Pieces / unit	-	33	26
	Net weight/unit (kg)	-	2.0	2.4

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

Baso[®] 26: rev. EN 25

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

CLASSIFICATION

AWS A5.1 : E7018-1 H4
 ISO 2560-A : E 42 4 B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
				-40°C	-46°C
Required: AWS A5.1 ISO 2560-A	min. 399 min. 420	min. 482 500-640	min. 22 min. 20	27	27
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 box	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® vacuum pack	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. EN 04

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 steel	
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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

Conarc® 48

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.1 : E7018-1 H4R
ISO 2560-A : E 46 4 B 42 H5

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					-40°C	-46°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 460 470	min. 490 530-680 570	min. 22 min. 20 27	min. 47 103	min. 27 80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.0	2.5	3.2	3.2	4.0	4.0	5.0
		300	350	350	450	350	450	450
Unit: carton box	Pieces / unit	146	110	126	110	95	82	58
	Net weight/unit (kg)	1.9	2.5	5.0	5.7	5.4	6.0	6.3

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

Conarc® 48: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

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 steel	
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

SMAW

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
2.0x300	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

Electrodes after removal from cardboard boxes redry 2-4h 350 ± 25°C

CLASSIFICATION

AWS A5.1 : E7018 H4
 ISO 2560-A : E 46 3 B 42 H5

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
				-20°C	-30°C	-40°C
Required: AWS A5.1 ISO 2560-A Typical values	min. 400 min. 460 480	min. 483 530-680 560	min. 22 min. 20 28		min. 27 min. 47 120	27 80
AW				140		

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
Unit: carton box	Pieces / unit	118	120	93	93	62
	Net weight/unit (kg)	2.7	4.5	5.0	6.3	6.7
Unit: 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. EN27

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 steel	
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 E(kJ)	Dep. rate 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

After removal from cardboard boxes, redry electrodes 2-4h 350 ± 25°C

CLASSIFICATION

AWS A5.1 : E7018-1 H4R
ISO 2560-A : E 46 4 B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PH/5Gu



PE/4G

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V[J]		
				-20°C	-40°C	-46°/-50°C
Required: AWS A5.1 ISO 2560-A Typical values	min. 400 min. 460 480	min. 490 530-680 580	min. 22 min. 20 28			
AW				200	min. 47 170	min. 27 100
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
Unit: carton box	Pieces / unit	135	80	120	120	85	85	55
	Net weight/unit (kg)	2.7	2.4	4.2	5.8	4.5	5.7	6.0
Unit: SRP	Pieces / unit	70	54	50	50	28	28	23
	Net weight/unit (kg)	1.4	1.5	2.0	2.5	1.8	2.0	2.6

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

Conarc® 49C rev. EN 26

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 steel	
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 E(kJ)	Dep. rate 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

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

CLASSIFICATION

AWS A5.1 : E7018-1 H4R
ISO 2560-A : E 42 5 B 32 H5

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)			
					-20°C	-40°C	-46°C	-50°C
Required: AWS A5.1 ISO 2560-A		min. 400	min. 490	min. 22				
Typical values	AW	min. 420 480	500-640 575	min. 20 28	200	min. 47 120	min. 27 100	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
Unit: carton box	Pieces / unit	110	120	85	55
	Net weight/unit (kg)	7.5	7.7	8.3	8.2
Unit: 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. EN 04

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

Conarc® 51

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.1 : E7016-1 H4R
ISO 2560-A : E 42 4 B 12 H5

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 ISO 2560-A Typical values	AW	min. 400 min. 420 520	min. 490 500-640 575	min. 22 min. 20 28	115	min. 47 80	min. 27 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
Unit: carton box	Pieces / unit	136	150	151	100	96	55
	Net weight/unit (kg)	2.7	4.7	6.0	4.6	6.0	6.0
Unit: SRP	Pieces / unit	70	56	56	30	30	23
	Net weight/unit (kg)	1.4	1.8	2.3	1.4	1.8	2.6

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

Conarc® 51: rev. EN 26

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.1 : E7016
ISO 2560-A : E 42 2 B 12 H5

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	-29°/-30°C
Required: AWS A5.1 ISO 2560-A Typical values	min. 400 min. 420 510	min. 490 500-640 560	min. 22 min. 20 28	27 100	min. 47 80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)		2.5		3.2		4.0		4.0	
	Length (mm)		350		350		350		450	
Unit: carton box	Pieces / unit		148		157		87		82	
	Net weight/unit (kg)		2.7		4.8		4.4		5.1	

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

Conarc® 52: rev. EN 05

Conarc® 52

SMAW

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 steel	
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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.1 : E7016-1
ISO 2560-A : E 42 5 B 12 H5

GENERAL DESCRIPTION

Basic extremely low hydrogen electrode
Good impact values down to -50°C
Excellent root pass electrode (diameters 2,5 & 3,2 mm) on pipe

WELDING POSITIONS (ISO/ASME)



PA/1G



PE/4G



PC/2G



PF/3Gu



PH/5Gu

CURRENT TYPE

AC/DC +/-

APPROVALS

NAKS

Pending

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

C	Mn	Si	P	S	HDM
0.06	1.3	0.4	0.018	0.010	3 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)		
					-20°C	-46°C	-50°C
Required: AWS A5.1 ISO 2560-A	AW	min. 400	min. 490	min. 22	140	min. 27	min. 47
Typical values		min. 420 520	500-640 575	min. 20 28		130	

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	132	158	80
	Net weight/unit (kg)	2.5	4.9	5.9

Identification Imprint: 7016-1 / CONARC 53 Tip Color: blue

Conarc® 53: rev. EN 04

Conarc® 53

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 steel	
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 E(kJ)	Dep. rate 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
4.0x350	100-160							

*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

REMARKS / APPLICATION ADVICE

After removal from cardboard boxes, redry electrodes 2-4h 350 ± 25°C

Lincoln® 7018-1

SMAW

CLASSIFICATION

AWS A5.1 : E7018-1
ISO 2560-A : E 42 4 B 32 H5

GENERAL DESCRIPTION

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

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

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

		Yield strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
Condition					-40°C	-46°C
Required: AWS A5.1 ISO 2560-A Typical values		min. 400	min. 490	min. 22		min. 27
	AW	min. 420 436	500-640 533	min. 20 29	min. 47 100	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 box	Pieces / unit	175	115	115	80	80	55
	Net weight/unit (kg)	3.9	4.0	5.2	4.1	5.3	5.6
Unit: 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. EN 26

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 steel	
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 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	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

After removal from cardboard boxes, redry electrodes 2-4h 350 ± 25°C

CLASSIFICATION

AWS A5.1 : E7018-1 H4
 ISO 2560-A : E 46 5 B 42 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PH/5Gu



PE/4G

CURRENT TYPE

DC +

APPROVALS

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

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)			
					-30°C	-40°C	-46°C	-50°C
Required: AWS A5.1 ISO 2560-A Typical values		min. 400	min. 482	min. 22			min. 27	
		min. 460	530-680	min. 20		min. 47		
	AW SR:1h/600°C	500 480	600 580	27 29	150 120	120	100 50	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 box	Pieces / unit	195	135	135	92	92	66
	Net weight/unit (kg)	4.3	4.7	6.1	4.7	5.9	6.7
Unit: Protech™	Pieces / unit	90	58	-	45	-	-
	Net weight/unit (kg)	2.0	2.0	-	2.3	-	-

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

Conarc® 50: rev. EN 03

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 steel	
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 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	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	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

After removal from cardboard boxes, redry electrodes 2-4h 350 ± 25°C

Conarc® L150

SMAW

CLASSIFICATION

AWS A5.1 : E7028 H4R
ISO 2560-A : E 42 2 B 53 H5

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

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

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0	6.0
	Length (mm)	450	450	450	450
Unit: carton box	Pieces / unit	90	55	35	-
	Net weight/unit (kg)	5.9	5.3	5.2	-
Unit: SRP	Pieces / unit	28	21	18	8
	Net weight/unit (kg)	1.9	2.1	2.7	1.6

Identification Imprint: 7028 / CONARC L150 Tip Color: yellow

Conarc®L150: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

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 steel	
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 E(kJ)	Dep. rate 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

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

Conarc® V180

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.1 : E7028 H4R
ISO 2560-A : E 42 4 B 73 H5

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	-40°C
Required: AWS A5.1 ISO 2560-A Typical values CTOD value at -10°C > 0.25mm	min. 400 min. 420 440	min. 490 500-640 510	min. 22 min. 20 30	min. 27 130	min. 47 80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0	6.3
	Length (mm)	450	450	450	450
Unit: carton box	Pieces / unit	85	60	40	23
	Net weight/unit (kg)	5.7	6.0	6.1	5.4
Unit: SRP	Pieces / unit	27	23	19	8
	Net weight/unit (kg)	2.0	2.4	2.8	1.9

Identification Imprint: 7028 / CONARC V180 Tip Color: white

Conarc® V180: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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 steel	
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 E(kJ)	Dep. rate 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

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

Conarc® V250

SMAW

CLASSIFICATION

AWS A5.1 : E7028 H4R
ISO 2560-A : E 42 4 B 73 H5

GENERAL DESCRIPTION

Basic low hydrogen electrode (HDM< 5 ml/100g)
245% recovery and easy slag release
Fillet welds and horizontal V- and X-welds
Good impact values down to -40 °C
Excellent X-ray soundness
Deposition rate is comparable with submerged arc welding

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F

CURRENT TYPE

AC/DC +/-

APPROVALS

ABS	BV	DNV	LR	GL	RINA	RMRS	TÜV
4Y400H5	3,3YHH	4Y40H5	4Y40H5	4Y40H5	4YH5	3-3YH5	+

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

C	Mn	Si	P	S	HDM
0.08	1.3	0.45	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	-40°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 420 460	min. 490 500-640 550	min. 22 min. 20 29	min. 27 100	min. 47 80

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	4.0	5.0	6.0
	Length (mm)	450	450	450
Unit: carton box	Pieces / unit	42	26	19
	Net weight/unit (kg)	5.9	5.8	5.8

Identification Imprint: 7028 / CONARC V250 Tip Color: red

Conarc® V250: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Conarc® V250

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
EN 10216-1	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
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 E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
4.0x450	190-240	AC	70	621	4.8	141	10	1.40
5.0x450	260-360	AC	73	1017	7.1	217	7	1.39
6.0x450	300-470	AC	72	1324	10.1	300	4	1.37

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions	
	PA/1G	PB/2F
4.0	230A	200A
5.0	300A	260A
6.0	390A	

REMARKS / APPLICATION ADVICE

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

CLASSIFICATION

AWS A5.1 : E 6018 ¹⁾
ISO 2560-A : E 35 2 B 32 H5
¹⁾according to classification 1966

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 clad stainless steel
Only 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 +/-

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

		Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -18°C/-20°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 331 min. 355 390	min. 414 440-570 450	min. 22 min. 22 28	min. 27 >200

PACKAGING AND AVAILABLE SIZES

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

Identification Imprint: KARDO

Tip Color: black

Kardo® rev. EN 25

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 steel as S460 for NH₃ 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].

SMAW

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	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+

SMAW

CLASSIFICATION

AWS A5.5 : E 7010-P1
ISO 2560-A : E 42 2 Mo C 25

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

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC +

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

C	Mn	Si	Mo	V
0.12	0.4	0.15	0.50	0.01

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-29°C
Required: AWS A5.5 ISO 2560-A Typical values	AW	min. 415 min. 420 450	min. 490 500-640 540	min. 22 min. 20 24	min. 47 65	min. 27 45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	350	350	350
Unit: metal can	Pieces / unit	210	135	89
	Net weight/unit (kg)	5.4	5.4	5.1

Identification Imprint: 7010-G Tip Color: none

Shield Arc® HYP+; rev. EN 05

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)
3.2x350	75-130	DC+	25.8
4.0x350	90-185	DC+	39.5
4.8x350	140-185	DC+	57.1

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
3.2	110A
4.0	150A
4.8	165A

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 cans
 Use Fleetweld 5P+ for lower hardness in the root pass.

Shield Arc® 70+

SMAW

CLASSIFICATION

AWS A5.5 : E 8010-G
ISO 2560-A : E 46 4 1Ni C 25

GENERAL DESCRIPTION

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

WELDING POSITIONS (ISO/ASME)



P/J5Gd

CURRENT TYPE

DC +

APPROVALS

TÜV

+

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

C	Mn	Si	Ni	Cr	V	P	S
0.12	0.90	0.20	0.85	0.10	0.03	0.012	0.013

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-40°C
Required: AWS A5.5 ISO 2560-A Typical values	AW	min. 460 min. 460 510	min. 550 530-680 570	min. 19 min. 20 24	not required 75	min. 47 60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	350	350	350
Unit: metal can	Pieces / unit	200	130	90
	Net weight/unit (kg)	5.1	5.1	5.1

Identification Imprint: 8010-G SA70+ Tip Color: none

Shield Arc® 70+ rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Shield Arc® 70+

SMAW

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)
3.2x350	75-130	DC+	25.8
4.0x350	90-185	DC+	39.5
5.0x350	140-225	DC+	62.3

*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 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 cans
 Use Fleetweld 5P+ for lower hardness in the root pass.

Shield Arc® 8P+

SMAW

CLASSIFICATION

AWS A5.5 : E8010-P1
ISO 2560-A : E 46 4 1Ni C 25

GENERAL DESCRIPTION

Cellulosic electrode for pipe welding
Suitable for root, fill and cap passes up to X70 grades
High resistance to porosity
Easy welding puddle control
High stacking efficiency: fill joints in fewer passes

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

DC +
DC - (diameter 4mm)

APPROVALS

TÜV	DNV
+	+

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

C	Mn	Si	Ni	Mo	Cr	P	S
0.17	0.7	0.25	0.8	0.2	0.2	0.01	0.01

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)		
						-29°C/-30°C	-40°C	-46°C
Required: AWS A5.5			min. 460	min. 550	min. 19	27		
ISO 2560-A			min. 460	530-680	min. 20		min. 47	
Typical values		AW	510	600	24	80	70	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	4.0	5.0
	Length (mm)	350	350
Unit: metal can	Pieces / unit	120	80
	Net weight/unit (kg)	4.7	5.0

Identification Imprint: 8010-P1 Shield Arc 8P+ Tip Color: none

Shield Arc® 8P+: rev. EN 05

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

Shield Arc® 8P+

SMAW

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Pipe material API 5LX	X56, X60, X65, X70

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type	Weight/ 1000 pcs (kg)
4.0x350	90-185	DC+/-	39.1
5.0x350	140-225	DC+	62.5

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PJ/5Gdown
4.0	150A
5.0	165A

REMARKS / APPLICATION ADVICE

Preheating pipe material from L360 to L480 (X56 to X70) 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 cans

Conarc® 55CT

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.5 : E8018-W2-H4R ¹⁾
ISO 2560-A : E 46 5 Mn1Ni B 32 H5
¹⁾Deviation, see remarks

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

		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				
Typical values	AW	540	610	25		115	100	min. 47 60

PACKAGING AND AVAILABLE SIZES

		Diameter (mm)	2.5	3.2	4.0	5.0
		Length (mm)	350	350	350	450
Unit: carton box	Pieces / unit	216	113	84	55	
	Net weight/unit (kg)	4.2	4.2	4.4	5.5	
Unit: SRP	Pieces / unit	69	50	27	23	
	Net weight/unit (kg)	1.4	1.9	1.5	2.5	

Identification Imprint: CONARC 55CT Tip Color: black

Conarc® 55CT: rev. EN 25

Conarc® 55CT

SMAW

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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

Deviations: chemical composition:

Mn = 1.4 - 1.9%
Si = 0.15 - 0.60%
Cr = 0.1%
Ni = 0.7 - 1.0%
Cu = 0.3 - 0.5%

AWS: Mn = 0.50 - 1.30%
AWS: Si = 0.35 - 0.80%
AWS: Cr = 0.45 - 0.70%
AWS: Ni = 0.40 - 0.80%
EN: Cu max. 0.3%

Conarc® 60G

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.5 : E9018M-H4
EN 757 : E 55 4 Z B 32 H5

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
EN 757		min. 550	610-780	min. 18		min. 47	
Typical values						98	
AW		600	670	25			
SR:1h/620°C		550	640	24	90		40

* Dia.2.5 mm max 655 N/mm2

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0	5.0
		350	350	350	450
Unit: carton box	Pieces / unit	110	120	85	55
	Net weight/unit (kg)	2.5	4.6	4.6	5.8
Unit: 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. EN 25

Conarc® 60G

SMAW

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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E9018-G-H4R
EN 757 : E 55 4 1NiMo B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J]		
					-20°C	-40°C	-46°C
Required: AWS A5.5 EN 757		min. 530 min. 550	min. 620 610-780	min. 17 min. 18	not required		
Typical values	AW SR:15h/580°C	600 550	655 640	24 24	90	min. 47 90	60 50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
Unit: carton box	Pieces / unit	110	120	85	-	55
	Net weight/unit (kg)	2.5	4.6	4.6	-	5.8
Unit: 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. EN 24

Conarc® 70G

SMAW

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Boiler & pressure vessel steel (Reactor steels incl. Q & T steels)	
DIN	20MnMoNi5-5, 22NiMoCr3-7 15NiCuMoNb5-6-4 G5-18NiMoCr3-7
ASTM	A508CL2, A508CL3 A533CL1Gr.B / C A533CL2Gr.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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E8018-G-H4R
ISO 2560-A : E 50 6 Mn1Ni B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					-40°C	-60°C
Required: AWS A5.5 ISO 2560-A	AW	min. 460	min. 550	min. 19	not required	min. 47
Typical values		min. 500 550	560-720 640	min. 18 24		

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
Unit: carton box	Pieces / unit	135	120	85	85	23
	Net weight/unit (kg)	2.7	4.7	4.4	5.9	2.4

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

Conarc® 74; rev. EN 04

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: Material Safety Data Sheets (MSDS) are available on our website.

Conarc® 74

SMAW

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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

Conarc® 80

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.5 : E11018M-H4
EN 757 : E 69 5 Z B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

CURRENT TYPE

AC / DC +/-

APPROVALS

ABS LR
+ 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 EN 757	680-760*	min. 760	min. 20			min. 27
Typical values	min. 690	760-960	min. 17		min. 47	
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
Unit: carton box	Pieces / unit	225	120	90	60
	Net weight/unit (kg)	4.4	4.5	5.0	6.3
Unit: 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. EN 24					

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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E12018-G-H4R
EN 757 : E 69 5 Mn2NiCrMo B 32 H5

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

+ 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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-40°C	-50°C
Required: AWS A5.5		min. 740	min. 830	min. 14	not required	
EN 757		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
Unit: 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. EN 27

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: Material Safety Data Sheets (MSDS) are available on our website.

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 E(kJ)	Dep. rate 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	375	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
3.2	135A	130A	140A	120A	120A	120A
4.0	155A	145A	155A	140A	140A	140A
5.0	225A	220A	215A			

CLASSIFICATION

AWS A5.5 : E7018-G-H4R¹⁾
 ISO 2560-A : E 50 6 Mn1Ni B 32 H5
¹⁾meet also AWS A5.5:E8018-G-H4R

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
				-20°C	-60°C
Required: AWS A5.5 ISO 2560-A Typical values	min. 390 min. 500 550	min. 480 560-720 640	min. 25 min. 18 24	not required 150	min. 47 90

CTOD value at -10°C > 0.25 mm

SR:15h/580°C

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.0	3.2	3.2	4.0	4.0	5.0
		350	350	350	450	350	450	450
Unit: carton box	Pieces / unit Net weight/unit (kg)	135 2.7	90 2.8	130 4.7	120 5.8	85 4.4	85 5.9	55 5.7
Unit: SRP	Pieces / unit Net weight/unit (kg)	70 1.4	54 1.5	50 1.9	50 2.4	28 1.5	28 2.0	23 2.5

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

Kryo[®] t: rev. EN 25

Kryo[®] 1

SMAW

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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

Kryo[®] 1N

EMR
SAHARA[®]

CLASSIFICATION

AWS A5.5 : E8016-G-H4R
ISO 2560-A : E 50 6 Mn1Ni B 12 H5

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)



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
0.07	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-40°C	-60°C
Required: AWS A5.5 ISO 2560-A Typical values	AW	min. 460 min. 500 570	min. 550 560-720 650	min. 19 min. 18 24	not required 95	min. 47 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
Unit: 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. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Kryo[®] 1N

SMAW

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 E(kJ)	Dep. rate 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®

SMAW

CLASSIFICATION

AWS A5.5 : E 8018-G-H4R
ISO 2560-A : E 50 6 Mn1Ni B 32 H5

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
				-40°C	-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
Unit: carton box	Pieces / unit	135	120	120	85	85	55
	Net weight/unit (kg)	2.7	4.7	5.8	4.4	5.9	5.7
Unit: 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. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Kryo[®] 1P

SMAW

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 E(kJ)	Dep. rate 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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E 8018-G-H4R
ISO 2560-A : E 50 5 1Ni B 73 H5

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-40°C	-50°C
Required: AWS A5.5 ISO 2560-A Typical values	AW SR:600°C/4h	min. 460	min. 550	min. 19	not required	min. 47
		min. 500	560-720	min. 18		
		550	640	26		
		540	620	24	90	60
					100	85

CTOD value at -10°C > 0.25 mm

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0	6.3
	Length (mm)	450	450	450	450
Unit: SRP	Pieces / unit	27	23	19	8
	Net weight/unit (kg)	2.0	2.4	2.8	1.9

Identification Imprint: 8018-G / KRYO 1-180

Tip Color: pink

Kryo[®] 1-180: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Kryo[®] 1-180

SMAW

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 E(kJ)	Dep. rate 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
6.3x450	280-390	AC	84	1171	6.9	234.6	6	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
6.3	390A	280A	

REMARKS / APPLICATION ADVICE

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E9018-G-H4R
EN757 : E 55 6 Z B 32 H5

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
				-40°C	-50°C	-60°C
Required: AWS A5.5 EN 757	min. 530	min. 620	min. 17	not required		
Typical values	min. 550	610-780	min. 18			
AW	570	650	22	140	110	min. 47
SR:620°C/1h	530	620	22			60
CTOD value at -10°C > 0.25 mm						

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	Length (mm)	2.5	3.2	4.0	5.0
Unit: carton box	Pieces / unit		135	120	85	55
	Net weight/unit (kg)		2.7	5.8	5.9	5.7
Unit: SRP	Pieces / unit		70	50	28	23
	Net weight/unit (kg)		1.4	2.4	2.0	2.5

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

Kryo[®] 2: rev. EN 25

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 E(kJ)	Dep. rate 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
5.0x450	180-240	DC+	96	598	2.6	103.8	14	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	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

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E8018-C1-H4
 ISO 2560-A : E 46 8 3Ni B 32 H5* * Nearest equivalent

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J]	
					-60°C	-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:SR¹⁾ = 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
Unit: carton box	Pieces / unit	135	120	120	85	85	55
	Net weight/unit (kg)	2.7	4.2	5.8	4.4	5.9	5.7
Unit: 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. EN 25

Kryo® 3

SMAW

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 E(kJ)	Dep. rate 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%

CLASSIFICATION

AWS A5.5 : E7016-C2L-H4R
ISO 2560-A : E 38 8 3Ni B 32 H5

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)



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
0.03	0.6	0.4	0.01	0.005	3.6	2 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Condition		0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V[J]	
					-80°C	-101°C
Required: AWS A5.5		SR ¹⁾	min. 390	min. 480	min. 25	min. 27
Typical values		AW	450	520	26	80
Typical values		SR	430	510	26	120

Stress relieved: SR¹⁾ = 605±14°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: SRP	Pieces / unit	58	30
	Net weight/unit (kg)	1.8	1.4

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

Kryo[®] 4: rev. EN 25

Kryo® 4

SMAW

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
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 E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
3.2x350	80-140	DC+	72	207	1.1	30.8	48	1.45
4.0x350	120-165	DC+	72	309	1.6	46.1	32	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
3.2	110A	120A	110A	100A	100A	100A
4.0	150A	140A	150A	140A	135A	140A

CLASSIFICATION

AWS A5.5 : E7018-A1-H4R
ISO 3580-A : E Mo B 32 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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

Stress relieved: SR¹⁾ = 620±14°C/1h, SR²⁾ = 570-620°C/1h, SR³⁾ = 620°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0	5.0
		350	350	350	450
Unit: carton box	Pieces / unit	110	120	85	55
	Net weight/unit (kg)	2.5	4.5	4.7	6.0
Unit: 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. EN 25

SL[®] 12G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Creep resistant steels	
EN 10028-2	P295GH, P355GH, 16Mo3
EN 10222-2	17Mo3, 14Mo6
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/mm ²]	420	380	330	
Creep strength Rm/1000 [N/mm ²]		360	300	[200]
Creep strength Rm/10.000 [N/mm ²]		320	180	[80]
Creep resistance Rp1%/10.000 [N/mm ²]		230	150	[65]

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	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)
Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

CLASSIFICATION

AWS A5.5 : E8018-B2-H4
 ISO 3580-A : E CrMo1 B 32 H5

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	-20°C
Required: AWS A5.5 ISO 3580-A Typical values	SR ¹ SR ² SR ³	min. 460 min. 355 570	min. 550 min. 510 640	min. 19 min. 20 24	not required min. 47 180
					100

Stress relieved: SR¹ = 690±14°C/1h, SR² = 660-700°C/1h, SR³ = 700°C/1h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: carton box	Pieces / unit	120	120	85	55
	Net weight/unit (kg)	2.6	4.6	4.7	6.1
Unit: SRP	Pieces / unit	67	50	28	23
	Net weight/unit (kg)	1.4	2.0	1.5	2.6

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

SL®19G: rev. EN 24

SL[®] 19G

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Creep resistant steels	
EN 10028-2	13CrMo4-5
EN 10083-1	25CrMo4
EN 10222-2	14CrMo4-5
Tool steels	
DIN 17210	16MnCr5

CREEP DATA

Test temperature °C	400	450	500	550	600
Yield strength Rp-0,2% [N/mm ²]	460	440	430		
Creep strength Rm/1000 [N/mm ²]			300	140	{80}
Creep strength Rm/10.000 [N/mm ²]		350	240	110	{50}
Creep resistance Rp1%/10.000 [N/mm ²]		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 E(kJ)	Dep. rate 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)

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

SL[®] 19G (STC)

EMR
SAHARA[®]

CLASSIFICATION

AWS A5.5 : E8018-B2-H4
 ISO 3580-A : E CrMo1 B 32 H5

GENERAL DESCRIPTION

Basic very low hydrogen all position electrode (HDM<5 ml/100g)
 For welding creep and hydrogen resistant CrMo-steels
 Excellent weldability for welding pipe and plate on site
 Reliable X-ray properties
 Good mechanical properties in the as welded and stress relieved condition
 Applicable for service temperature from -20 to 500°C
 SL19G(STC) meets the actual "step cool" requirements including the Bruscato factor of X<15
 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 +/-

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

C	Mn	Si	P	S	Cr	Mo	HDM
0.06	0.7	0.35	0.010	0.010	1.2	0.55	3 ml/100 g

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

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

Stress relieved: SR¹⁾= 690±14°C/1h, SR²⁾= 660-700°C/1h, SR³⁾= 700°C/1h
 Shifting CVN at 55 J(Delta T55):+10°C after "STC"(step cool treatment)

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: SRP	Pieces / unit	69	50	28
	Net weight/unit (kg)	1.4	2.0	1.5

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

SL[®] 19G(STC); rev. EN 23

SL[®] 19G (STC)

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Creep resistant steels	
EN 10028-2	13CrMo4-5
EN 10083-1	25CrMo4
EN 10222-2	14CrMo4-5
Tool steels	
DIN 17210	16MnCr5

CREEP DATA

Test temperature °C	400	450	500	550	600
Yield strength Rp-0,2% [N/mm ²]	460	440	430		
Creep strength Rm/1000 [N/mm ²]			300	140	{80}
Creep strength Rm/10.000 [N/mm ²]		350	240	110	{50}
Creep resistance Rp1%/10.000 [N/mm ²]		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 E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5x350	60-90							
3.2x350	80-145	DC+	68	227	1.3	379	41	1.56
4.0x350	120-185	DC+	79	367	1.6	54.9	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
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/interpass temperature:200 - 250°C

Recommended tempering heat treatment range:660 - 700°C (time depends on material thickness)

Stepcooling requirements:Bruscati factor X = (10 P + 5 Sb + 4 Sn + As)/100 ≤15 ppm and Mn + Si < 1.1

SL® 20G**EMR
SAHARA®**

SMAW

CLASSIFICATION

AWS A5.5 : E9018-B3-H4
ISO 3580-A : E CrMo2 B 32 H5

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)

PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J]	
					+20°C	-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: SR¹ = 690±14°C/1h, SR² = 690-750°C/1h, SR³ = 695°C/1h**PACKAGING AND AVAILABLE SIZES**

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: carton box	Pieces / unit	110	120	85	55
	Net weight/unit (kg)	2.6	4.7	4.8	6.2
Unit: SRP	Pieces / unit	67	50	28	23
	Net weight/unit (kg)	1.4	2.0	1.5	2.6

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

SL® 20G: rev. EN 25

SL[®] 20G

SMAW

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Code	Type
Creep resistant steels	
EN 10028-2	10CrMo9-10
EN 10222-2	12CrMo9-10

CREEP DATA

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

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	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
5.0x450	160-240	DC+	100	754	2.6	107.6	14	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	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:690 - 750°C (time depends on material thickness)

Electrodes after removal from cardboard boxes redry 2-4h 350 ±25°C

SL[®] 22G

EMR
SAHARA[®]

CLASSIFICATION

AWS A5.5 : E8018-B1-H4
 ISO 3580-A : E Z B 32 H5

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)



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	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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					+20°C	-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: SR¹ = 690±14°C/1h, SR² = 1h/730°C

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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/mm ²]	480	470	450		
Creep strength Rm/1000 [N/mm ²]			270	170	150
Creep strength Rm/10.000 [N/mm ²]			250	150	130
Creep resistance Rp1%/10.000 [N/mm ²]			210	130	110

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	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)

CLASSIFICATION

AWS A5.5 : E8018-B6-H4R
 ISO 3580-A : E CrMo5 B 32 H5

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)



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	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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) +20°C
Required: AWS A5.5 ISO 3580-A Typical values	SR ¹⁾	min. 460	min. 550	min. 19	not required
	SR ²⁾	min. 400	min. 590	min. 17	min. 47
	SR ³⁾	580	680	22	110

Stress relieved: SR¹⁾= 740 ±14°C/1h, SR²⁾= 730-760°C/1h, SR³⁾= 750°C/2h

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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. EN 25

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/mm ²]	480	440	380		
Creep strength Rm/1000 [N/mm ²]			160	174	[80]
Creep strength Rm/10.000 [N/mm ²]			130	90	[60]
Creep resistance Rp1%/10.000 [N/mm ²]			100	50	[30]

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	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[®]

SMAW

CLASSIFICATION

AWS A5.5 : E9016-B9-H4
ISO 3580-A : E CrMo91 B 32 H5

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)



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	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.5 ISO 3580-A Typical values	SR ¹	min. 530	min. 620	min. 11	not required min. 47 80
	SR ²	min. 415	min. 585	min. 17	
	SR ³	570	710	21	

Stress relieved: SR¹ = 740 ±14°C/1h, SR² = 750-770°C/1h, SR³ = 2h/730-760°C

PACKAGING AND AVAILABLE SIZES

Unit: SRP	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: SRP	Pieces / unit	66	50	28	23
	Net weight/unit (kg)	1.4	1.8	1.5	2.4

Identification Imprint: 9016-B9 / SL 9 Cr(P91) Tip Color: dark green

SL[®] 9Cr(P91); rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

SL[®] 9Cr(P91)

SMAW

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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.4 : E308L-16
ISO 3581-A : E 19 9 L R 12

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
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 TÜV
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	-20°C	-196°C
Required: AWS A5.4 ISO 3581-A			not required	min. 520	min. 35	not required		
Typical values		AW	min. 320 440	min. 510 580	min. 30 43	not required 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
Unit: carton box	Pieces / unit	225	135	150	85	65
	Net weight/unit (kg)	2.3	2.6	4.8	4.9	4.8
Unit: SRP	Pieces / unit	-	69	56	29	-
	Net weight/unit (kg)	-	1.4	1.9	1.5	-
Unit: Linc Can™	Pieces / unit	-	222	141	84	-
	Net weight/unit (kg)	-	4.6	4.5	4.3	-

Identification Imprint: 308L-16 / AROSTA 304 L Tip Color: light blue

Arosta® 304L: rev. EN 25

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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	(TP)304LN 302,304	S30453 S30400
Medium carbon (C > 0.03%)	X4CrNi18-10	GX5CrNi19-10	1.4301	(TP)304	S30409
			1.4308	CF 8	J92600
Ti-, Nb stabilized	X6CrNiTi18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

SMAW

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
2.0 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®

SMAW

CLASSIFICATION

AWS A5.4 : E308L-17
ISO 3581-A : E 19 9 L R 12

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 440	min. 520 min. 510 600	min. 35 min. 30 45	not required 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
Unit: carton box	Pieces / unit	125	125	135	85	55	
	Net weight/unit (kg)	2.3	2.7	4.7	5.8	5.8	
Unit: SRP	Pieces / unit	-	65	52	28	22	
	Net weight/unit (kg)	-	1.4	1.8	2.0	2.4	
Unit: Linc Can™	Pieces / unit	-	203	124	78	-	
	Net weight/unit (kg)	-	4.4	4.3	5.3	-	

Identification Imprint: 308L-17 / LIMAROSTA 304 L Tip Color: light blue

Limarosta® 304L: rev. EN 25

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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	(TP)304LN 302,304	S30453 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 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

SMAW

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
2.0 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®

SMAW

CLASSIFICATION

AWS A5.4 : E308L-15
ISO 3581-A : E 19 9 L R 21

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

+

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	-20°C	-120°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 440	min. 520 min. 510 600	min. 35 min. 30 40	not required not required 70	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	300	300
Unit: carton box	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. EN 24

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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	(TP)304LN 302,304	S30453 S30400
	X4CrNi18-10		1.4301	(TP)304	S30409
Medium carbon [C >0.03%]		GX5CrNi19-10	1.4308	CF 8	J92600
	X6CrNiTi18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
Ti-, Nb stabilized		GX5CrNiNb19-10	1.4552	CF-8C	J92710

SMAW

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	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

SMAW

CLASSIFICATION

AWS A5.4 : E308L-15
ISO 3581-A : E 19 9 L B 22

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	-196°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 400	min. 520 min. 510 600	min. 35 min. 30 40	not required not required 80	 40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	120	150	100
	Net weight/unit (kg)	2.4	4.8	4.8

Identification Imprint: 308L-15 / JUNG0 304 L Tip Color: dark blue

Jungo® 304L: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	(TP)304LN 302,304	S30453 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 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

SMAW

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 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®

SMAW

CLASSIFICATION

AWS A5.4 : E347-16
ISO 3581-A : E 19 9 Nb R 12

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

+

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	-20°C	-60°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 350 500	min. 550 min. 550 630	min. 25 min. 25 35	not required not required 70	50	35
AW						

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	120	130	90
	Net weight/unit (kg)	2.6	4.7	4.9
Unit: SRP	Pieces / unit	69	52	28
	Net weight/unit (kg)	1.4	1.8	1.4

Identification Imprint: 347-16 / AROSTA 347 Tip Color: gold

Arosta® 347: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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 302	J92710
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

SMAW

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 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

SMAW

CLASSIFICATION

AWS A5.4 : E347-15
ISO 3581-A : E 19 9 Nb B 22

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	-20°C	-120°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 350 500	min. 520 min. 550 630	min. 30 min. 25 35	not required not required 80	50	40
AW						

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
Unit: carton box	Pieces / unit	150	100	75
	Net weight/unit (kg)	4.8	4.4	6.8

Identification Imprint: 347-15 / JUNG0 347

Tip Color: brown

Jungo® 347: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

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 [TP]321H	S32100 S32109
	X6CrNiNb18-10		1.4550	[TP]347 [TP]347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C 302	J92710
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

SMAW

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
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

SMAW

CLASSIFICATION

AWS A5.4 : E316L-16
ISO 3581-A : E 19 12 3 L R 12

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
+	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	-20°C	-120°C
Required: AWS A5.4 ISO 3581-A Typical values		not required min. 320 450	min. 490 min. 510 580	min. 30 min. 25 39	not required not required 80	60	40
AW							

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
Unit: 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
Unit: SRP	Pieces / unit		-	-	69	56	29	-
	Net weight/unit (kg)		-	-	1.4	1.8	1.5	-
Unit: 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. EN 26

Arosta® 316L

SMAW

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 CF-3M	S31603 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 E(kJ)	Dep. rate 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

Arosta® 316LP

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E316L-16
ISO 3581-A : E 19 12 3 L R 12

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
Specially for welding stainless steel pipes with diameters of over 50 mm with wall thickness of about 2 mm
Welding on site in the pulp and paper industry
Easy welding in all positions, easy weld pool control, full penetration, good slag release
Molybdenum level min. 2.7 %

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	Mo	FN (acc.WRC 1992)
0.02	0.8	0.7	18.1	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
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 450	min. 490 min. 510 580	min. 30 min. 25 39	not required not required 60

PACKAGING AND AVAILABLE SIZES

Diameter (mm) Length (mm)		2.0 250	2.5 250
Unit: carton box	Pieces / unit Net weight/unit (kg)	215 1.9	150 2.0

Identification Imprint: 316L-16 Tip Color: pink

Arosta® 316LP: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Arosta® 316LP

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 CF-3M	S31603 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

SMAW

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Current type
2.0 x 300	30 - 60	DC+
2.5 x 350	30 - 70	DC+

*Stub end 35mm

Limarosta® 316L

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E316L-17
ISO 3581-A : E 19 12 3 L R 12

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	-20°C	-105°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 320 450	min. 490 min. 510 580	min. 30 min. 25 40	not required not required 70	60	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	1.5	2.0	2.5	3.2	4.0	5.0
		250	300	350	350	450	450
Unit: carton box	Pieces / unit	140	200	125	135	85	55
	Net weight/unit (kg)	0.7	2.3	2.7	4.8	5.9	5.9
Unit: SRP	Pieces / unit	-	57	65	52	28	22
	Net weight/unit (kg)	-	0.6	1.5	1.8	2.0	2.4
Unit: Linc Can™	Pieces / unit	-	-	47	28	-	-
	Net weight/unit (kg)	-	-	1.0	1.0	-	-
Unit: Linc Pack	Pieces / unit	-	-	202	124	79	-
	Net weight/unit (kg)	-	-	4.4	4.3	5.3	-

Identification Imprint: 316L-17 / LIMAROSTA 316 L Tip Color: pink

Limarosta® 316L: rev. EN 24

Limarosta® 316L

SMAW

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 CF-3M	S31603 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 E(kJ)	Dep. rate 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®

SMAW

CLASSIFICATION

AWS A5.4 : E 316L-15
ISO 3581-A : E 19 12 3 L R 21

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	-20°C	-60°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 500	min. 490 min. 510 620	min. 30 min. 25 35	not required not required 50	45	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2
	Length (mm)	300	300
Unit: carton box	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. EN 24

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 CF-3M	S31603 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

SMAW

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	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

SMAW

CLASSIFICATION

AWS A5.4 : E316L-15
ISO 3581-A : E 19 12 3 L B 22

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 intercrystalline 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	-196°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 320 450	min. 490 min. 510 650	min. 30 min. 25 35	not required not required 100	35
AW					

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: carton box	Pieces / unit	135	150	100	65
	Net weight/unit (kg)	2.7	4.8	4.8	6.6
Unit: SRP	Pieces / unit	48	56	30	-
	Net weight/unit (kg)	1.4	1.8	1.4	-

Identification Imprint: 316L-15 / JUNG0 316 L Tip Color: red

Jungo® 316L: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

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 CF-3M	S31603 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

SMAW

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 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®

SMAW

CLASSIFICATION

AWS A5.4 : E316L-17
ISO 3581-A : E 19 12 3 L R 53

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	-20°C	-105°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 450	min. 490 min. 510 580	min. 30 min. 25 40	not required not required 70	60	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: 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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Limarosta® 316L-130

SMAW

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 CF-3M	S31603 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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.4 : E318-16
 ISO 3581-A : E 19 12 3 Nb R 12

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	-20°C	-60°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 350 500	min.550 min. 550 630	min. 25 min. 25 38	not required not required 60	50	35

PACKAGING AND AVAILABLE SIZES

Unit: carton box	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	450
Unit: carton box	Pieces / unit	225	135	140	90	65
	Net weight/unit (kg)	2.4	2.8	5.0	4.8	6.7

Identification Imprint: 318-16 / AROSTA 318 Tip Color: white

Arosta® 318: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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

SMAW

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
2.0 x 300	30-60	DC+	36	36	0.65	10.7	152	1.64
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
2.0		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		

Jungo® 318

SMAW

CLASSIFICATION

AWS A5.4 : E318-15*
ISO 3581-A : E 19 12 3 Nb B 22
*:Deviation,see remarks

TEMPERATURE RANGE

Pressurized parts :-60...+400°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

Basic coated electrode for stabilized CrNiMo-steels
Service temperature up to 400°C
Good bridging properties
Specially developed for highly restrained structures

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	Cr	Ni	Mo	Nb	FN (acc.WRC 1992)
0.025	1.5	0.4	18.0	11.0	2.7	0.5	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
Required: AWS A5.4 ISO 3581-A Typical values	AW		not required min. 350 430	min. 550 min. 550 650	min. 25 min. 25 30	not required not required 90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	135	150	100
	Net weight/unit (kg)	2.6	4.8	4.6

Identification Imprint: JUNG0 318 Tip Color: red

Jungo® 318: rev. EN 23

Jungo® 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

SMAW

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 350	50-70	DC+	50	86	0.82	17.6	88	1.89
3.2 x 350	80-100	DC+	51	135	1.3	28.5	53	1.72
4.0 x 350	100-130	DC+	66	206	1.7	43.8	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:

Ni = 10.0 - 13.0% AWS:Ni = 11.0 - 14.0%

Arosta® 4439

SMAW

CLASSIFICATION

ISO 3581-A : E 18 16 5 N L R 32

TEMPERATURE RANGE

Pressurized parts :-120..+400°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

Rutile-basic fully austenitic 4.5% Mo-containing stainless steel electrode
Electrode for welding AISI 317LN or equivalent stainless steels
High resistance to pitting corrosion, intergranular corrosion and stress corrosion
Good impact values at low temperature
Easy slag release and smooth bead appearance
Non magnetic stainless steels

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

UP

+

4439

+

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

C	Mn	Si	Cr	Ni	Mo	N	FN (acc.WRC 1992)
0.02	1.3	0.8	18.0	17.0	4.6	0.18	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	-20°C	-196°C
ISO 3581-A		AW	min. 300	min. 480	min. 25	not required		
Typical values			460	650	40	70	70	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)		Length (mm)	
	3.2	4.0	350	350
Unit: carton box	Pieces / unit	140	100	
	Net weight/unit (kg)	4.7	5.1	

Identification Imprint: AROSTA 4439

Tip Color: red

Arosta® 4439: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Arosta® 4439

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
	GX2CrNiMoN17-13-4	GX2CrNiMo17-13-4	1.4446		
	GX6CrNiMo17-13	GX6CrNiMo17-13	1.4448		

SMAW

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
3.2 x 350	60-110	DC+	55	152	1.3	33.8	49	1.67
4.0 x 350	90-145	DC+	67	291	1.8	51.6	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
3.2	100A	90A	100A	65A	65A	65A
4.0	130A	125A	130A	80A		

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max.1.5 kJ/mm
Interpass temperature max.150°C

Jungo® 4455

SMAW

CLASSIFICATION

AWS A5.4 : E316LMn-15
ISO 3581-A : E 20 16 3 Mn N L B 22

TEMPERATURE RANGE

Pressurized parts :-269..+350°C
Oxidation resistance : n.a

GENERAL DESCRIPTION

Basic coated electrode for fully austenitic CrNiMo-steels
Service temperature from -269°C to 350°C
Cryogenic austenitic stainless steels
Cryogenic nickel steels and their joining
Non magnetic stainless steels

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	Cr	Ni	Mo	N	FN (acc.WRC 1992)
0.03	73	0.4	20.0	16.0	3.0	0.16	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	-196°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 320 460	min. 550 min. 510 650	min. 20 min. 25 35	not required not required 80	
AW					50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: carton box	Pieces / unit	135	150	100	70
	Net weight/unit (kg)	2.7	4.7	4.8	6.5

Identification Imprint: 316LMn-15 / JUNG0 4455 Tip Color: purple

Jungo® 4455: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

Jungo® 4455

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type	Mat. Nr	ASTM/ACI	UNS
Austenitic nitrogen alloyed 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		GX6 CrNi18-10	1.6902		
		GX5 CrNiNb18-10	1.6905		
EN 10028-4		12Ni14	1.5637		
		X12Ni5	1.5680		

SMAW

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 350	45-70	DC+	44	71	0.96	19.0	85	1.52
3.2 x 350	70-105	DC+	53	132	1.4	31.0	48	1.39
4.0 x 350	100-130	DC+	86	264	1.7	47.6	25	1.41
5.0 x 450	120-155	DC+	82	388	2.7	92.8	16	1.39

*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	90A	90A	90A	70A		
4.0	140A	115A	130A	95A		
5.0	160A	165A				

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max.1.5 kJ/mm
Interpass temperature max.150°C

Jungo® 4465

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E310Mo-15* *:Deviation,see remarks
ISO 3581-A : E 25 22 2 N L B 22*

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	-196°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 400	min. 550 min. 510 620	min. 30 min. 25 35	not required not required 90	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)		
	Length (mm)	350	450
Unit: carton box	Pieces / unit	135	100
	Net weight/unit (kg)	2.8	4.9

Identification Imprint: JUNG0 4465

Tip Color: yellow

Jungo® 4465: rev. EN 24

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

Jungo[®] 4465

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM / ACl 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 CF-3	S30403 J92500
	X2CrNi18-10	1.4311	(TP)304LN 3105	S30453 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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.4 : E385-16* *:Deviation,see remarks
ISO 3581-A : E 20 25 5 Cu N L R 12

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	-40°C	-60°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 410	min. 520 min. 510 620	min. 30 min. 25 40	not required not required 100	80	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	145	185	125
	Net weight/unit (kg)	2.9	5.7	5.9

Identification Imprint: JUNG0 4500 Tip Color: black

Jungo® 4500: rev. EN 25

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

Jungo[®] 4500

SMAW

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 E(kJ)	Dep. rate 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®

SMAW

CLASSIFICATION

AWS A5.4 : E2209-16*
ISO 3581-A : E 22 9 3 N L R 32

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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	-30°C	-40°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 450 650	min. 690 min. 550 800	min. 20 min. 20 27	not required not required 60	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0	5.0
		350	350	350	350
Unit: carton box	Pieces / unit	120	152	95	55
	Net weight/unit (kg)	2.6	5.0	4.8	4.6
Unit: 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. EN 25

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

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

SMAW

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 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

SMAW

CLASSIFICATION

AWS A5.4 : E2209-15
ISO 3581-A : E 22 9 3 N L B 22

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 ISO 3581-A Typical values	AW	not required min. 450 650	min. 690 min. 550 800	min. 20 min. 20 28	not required not required 80	75	70	45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0
		350	350	350
Unit: carton box	Pieces / unit Net weight/unit (kg)	112 2.3	152 5.0	103 5.0
Unit: SRP	Pieces / unit Net weight/unit (kg)	69 1.4	55 1.8	30 1.5

Identification Imprint: 2209-15 / JUNG0 4462

Tip Color: red

Jungo® 4462: rev. EN 25

Jungo[®] 4462

SMAW

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 E(kJ)	Dep. rate 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)

Arosta® 309S

SMAW

CLASSIFICATION

AWS A5.4 : E309L-16
ISO 3581-A : E 23 12 L R 32

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	-20°C	-120°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 480	min. 520 min. 510 560	min. 30 min. 25 40	not required not required 60	50	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0	5.0
		350	350	350	350
Unit: carton box	Pieces / unit Net weight/unit (kg)	135 2.8	150 5.0	100 5.0	65 5.0
Unit: SRP	Pieces / unit Net weight/unit (kg)	69 1.4	56 1.9	31 1.5	- -

Identification Imprint: 309L-16 / AROSTA 309 S Tip Color: sea green

Arosta®309S: rev. EN 24

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				
	X2CrNi18-10	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

SMAW

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 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			

Jungo® 309L

SMAW

CLASSIFICATION

AWS A5.4 : E 309L-15
ISO 3581-A : E 23 12 L B 22

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 ISO 3581-A Typical values	AW	not required min. 320 470	min. 520 min. 510 570	min. 30 min. 25 40	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: carton box	Pieces / unit	117	142	97	60
	Net weight/unit (kg)	2.4	4.7	4.8	4.8

Identification Imprint: 309L-15 / JUNG0 309 L

Tip Color:

Jungo®309L: rev. EN 05

Jungo® 309L

SMAW

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 E[kJ]	Dep. rate 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

*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		

Limarosta® 309S

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E309L-17
ISO 3581-A : E 23 12 L R 32

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	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 320 480	min. 520 min. 510 560	min. 30 min. 25 40	not required not required 55	 50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	Length (mm)	2.0	2.5	3.2	4.0	5.0
Unit: carton box	Pieces / unit	200	125	135	85	55	
	Net weight/unit (kg)	2.3	2.8	4.9	5.9	6.0	
Unit: SRP	Pieces / unit	60	65	50	28	-	
	Net weight/unit (kg)	0.6	1.5	1.8	2.0	-	
Unit: 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: rev. EN 24

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				
	X2CrNi18-10	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

SMAW

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
2.0 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
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SMAW

CLASSIFICATION

AWS A5.4 : E309LMo-16
ISO 3581-A : E 23 12 2 L R 32

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
+	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	-20°C	-60°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 350 580	min. 520 min. 550 700	min. 30 min. 25 30	not required not required 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
Unit: carton box	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: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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 CF-3M	S31603 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		
	X6CrNiMoTi17-11-2		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 E(kJ)	Dep. rate 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			

SMAW

CLASSIFICATION

AWS A5.4 : E308LMo-16
ISO 3581-A : E 20 10 3 R 32

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
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	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 400 500	min. 520 min. 620 720	min. 35 min. 20 30	not required not required 70	 60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0	5.0
		350	350	350	350
Unit: carton box	Pieces / unit Net weight/unit (kg)	135 2.7	150 4.9	100 5.0	65 5.0
Unit: Linc Pack	Pieces / unit Net weight/unit (kg)	50 1.0	31 1.0	- -	- -

Identification Imprint: 308LMo-16 / NICHROMA Tip Color: purple

Nichroma: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

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 CF-3M	S31603 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 E(kJ)	Dep. rate 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			

SMAW

Nichroma 160

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E309Mo-26
ISO 3581-A : E 23 12 2 LR 53* *:Deviation,see remarks

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 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	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 350 550	min. 550 min. 550 740	min. 30 min. 25 28	not required not required 50	 45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: carton box	Pieces / unit	90	55	35
	Net weight/unit (kg)	6.1	5.9	5.8

Identification Imprint: 309Mo-26 / NICHROMA 160 Tip Color: sea green

Nichroma 160: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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 CF-3M	J92800	1.4404	(TP)316L	S31603
	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	GX5CrNiMo19-11	1.4580	316Cb	S31640
			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 E(kJ)	Dep. rate 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
5.0 x 450	230-300	DC+	90	1084	4.1	162.0	10	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
5.0	230A	230A

REMARKS / APPLICATION ADVICE

Deviations: chemical composition

C = max. 0.05%

EN: C = max. 0.04%

Arosta® 329

EMR
SAHARA®

SMAW

CLASSIFICATION

ISO 3581-A : E 25 4 R 12* *:Deviation,see remarks

TEMPERATURE RANGE

Pressurized parts :-10 ...+350°C
Oxidation resistance : 1100°C

GENERAL DESCRIPTION

A rutile-basic all position stainless steel electrode
Typical applications:
• Buffer electrode, hardfacing on mild steels
• Welding Cr-steels
• High corrosion and oxidation resistant
• high proof stress and Tensile strength
A ferritic/austenitic structure
Good weldability and easy slag release
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
0.08	0.7	1.2	25.0	4.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: ISO 3581-A Typical values	Condition AW	min. 400 500	min. 600 700	min. 15 15	not required 30

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: carton box	Pieces / unit	135	150	100	65
	Net weight/unit (kg)	2.7	4.8	4.8	6.1

Identification Imprint: AROSTA 329 Tip Color: orange

Arosta® 329: rev. EN 24

Arosta® 329

SMAW

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/AISI
Base metals for high temperature applications				
		GX30CrSi6	1.4710	
	X10CrSi6		1.4712	502
	X10CrAl7		1.4713	502
				403/405-TP405-CA15
	X10CrAl13		1.4724	410/414-TP405-CA15
		GX40CrSi17	1.4740	
	X10CrAl18		1.4742	430B-TP430-CB30
		GX40CrSi23	1.4745	TP433
	X10CrAl24		1.4762	TP443
	X20CrNiSi25-4		1.4821	TP329
		GX40CrNi24-5	1.4822	TP329
		GX40CrNiSi27-4	1.4823	TP329HC

Applications at high temperature when high Ni-content is unacceptable
Also very well suitable for hard surfacing in sea water corrosion resisting applications

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 350	40-70	DC+	59	94	0.73	19.5	85	1.64
3.2 x 350	60-110	DC+	58	122	1.2	31.4	50	1.56
4.0 x 350	80-140	DC+	72	273	1.5	46.5	34	1.59
5.0 x 450	140-190	DC+	98	542	2.2	94.4	17	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
2.5	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			

REMARKS / APPLICATION ADVICE

Deviations: chemical composition

Si = max. 1.5%

EN: Si = max. 1.2%

Limarosta® 312

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E312-17
ISO 3581-A : E 29 9 R 12

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 +

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 ISO 3581-A Typical values	AW	not required min. 450 700	min. 660 min. 650 800	min. 22 min. 15 20	not required not required 50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	350
Unit: carton box	Pieces / unit	175	125	150	100	72
	Net weight/unit (kg)	2.2	2.6	5.0	5.0	5.2
Unit: SRP	Pieces / unit	-	69	52	31	24
	Net weight/unit (kg)	-	1.5	1.8	1.5	1.7
Unit: 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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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 E[kJ]	Dep. rate 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
5.0 x 350	130-140	DC+	79	313	2.4	71.5	19	1.36

*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®

SMAW

CLASSIFICATION

AWS A5.4 : E307-16*
 ISO 3581-A : E 18 8 Mn R 12 *:Deviation,see remarks

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

+

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	-60°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 350 450	min. 590 min. 500 650	min. 30 min. 25 35	not required not required 110	- 75

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)		
	2.5	3.2	4.0
Unit: carton box	Length (mm)		
	350	350	350
Unit: carton box	Pieces / unit		
	125	135	85
Unit: carton box	Net weight/unit (kg)		
	2.6	4.7	4.6

Identification Imprint: AROSTA 307 Tip Color: dark blue

Arosta® 307: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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		Current	Arc time	Energy	Dep. rate	Weight/	Electrodes/	kg electrodes/
Diam. x length	Current range	type	- per electrode at max. current -			1000 pcs	kg weldmetal	kg weldmetal
(mm)	[A]		[S]*	E[kJ]	H[kg/h]	[kg]	B	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

SMAW

CLASSIFICATION

AWS A5.4 : E307-26*
ISO 3581-A : E 18 8 Mn R 53 * Nearest classification, see remarks

GENERAL DESCRIPTION

A rutile 6%Mn-alloyed stainless steel electrode
Especially developed for steels difficult to weld, such as armour plates and austenitic high Mn-steels
Often used as a buffer layer in hardfacing applications
Weldable on DC+ polarity

WELDING POSITIONS (ISO/ASME)



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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J]	
					+20°C	-10°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 350 425	min. 590 min. 500 650	min. 30 min. 25 35	not required not required 85	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	450	450
Unit: carton box	Pieces / unit	94	62	40
	Net weight/unit (kg)	4.7	6.0	6.0

Identification	Imprint: AROSTA 307-160	Tip Color: red	Arosta®307-160: rev. EN 05
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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: Material Safety Data Sheets (MSDS) are available on our website.

Arosta® 307-160

SMAW

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		Current	Arc time	Energy	Dep. rate	Weight/	Electrodes/	kg electrodes/
Diam. x length	Current range	type	- per electrode at max. current -			1000 pcs	kg weldmetal	kg weldmetal
(mm)	[A]		[S]*	E[kJ]	H[kg/h]	[kg]	B	1/N
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
5.0 x 450	210-260	DC+	82	388	2.7	85.3	16	1.39

*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
5.0	230A	230A	

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®

SMAW

CLASSIFICATION

AWS A5.4 : E307-15*
ISO 3581-A : E 18 8 Mn B 22 *:Deviation,see remarks

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	-120°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 350 500	min. 590 min. 500 650	min. 30 min. 25 35	not required not required 100	 35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm) Length (mm)	2.5	3.2	4.0
		350	350	450
Unit: carton box	Pieces / unit	160	170	110
	Net weight/unit (kg)	2.8	5.0	6.5
Unit: SRP	Pieces / unit	70	56	-
	Net weight/unit (kg)	1.4	1.8	-

Identification Imprint: JUNG0 307 Tip Color: silver

Jungo®307- rev. EN 25

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 E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
2.5 x 350	50 - 70	DC+	44	71	0.96	17.8	85	1.52
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
								zeron 100

*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	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

SMAW

CLASSIFICATION

AWS A5.4 : E308H-16
ISO 3581-A : E 19 9 H R 12

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)



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]
0.05	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	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	not required min. 350 450	min. 550 min. 550 600	min. 35 min. 30 44	not required not required 85	 50
AW					

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: carton box	Pieces / unit	145	150	100	65
	Net weight/unit (kg)	2.8	4.8	4.9	4.8

Identification Imprint: 308H-16 / AROSTA 304 H Tip Color: green

Arosta® 304H: rev. EN 24

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		

SMAW

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 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
5.0 x 350	140 - 220	DC+	72	493	2.3	72.6	22	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	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		
5.0	180A	180A	180A			

Arosta® 309H

EMR
SAHARA®

SMAW

CLASSIFICATION

AWS A5.4 : E309H-16*
ISO 3581-A : E 23 12 R 32* *:Deviation,see remarks

TEMPERATURE RANGE

Pressurized parts :-10 ...+400°C
Oxidation resistance : 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)



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)
0.10	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 ISO 3581-A Typical values	AW	not required min. 350 500	min. 550 min. 550 700	min. 30 min. 25 30	not required not required 50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	Pieces / unit	120	130	90
	Net weight/unit (kg)	2.6	4.8	4.9

Identification Imprint: AROSTA 309 H Tip Color: yellow

Arosta® 309H: rev. EN 24

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				

SMAW

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 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
4.0 x 350	80-140	DC+	58	226	2.2	53.7	29	1.55

*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		

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®

SMAW

CLASSIFICATION

AWS A5.4 : E310-16
ISO 3581-A : E 25 20 R 12

TEMPERATURE RANGE

Pressurized parts :-20 ...+400°C
Oxidation resistance : 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 ISO 3581-A Typical values	AW	not required min. 350 440	min. 550 min. 550 600	min. 30 min. 20 30	not required not required 80

PACKAGING AND AVAILABLE SIZES

Unit: carton box	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: carton box	Pieces / unit	145	150	100	62
	Net weight/unit (kg)	3.0	5.1	5.1	5.0

Identification Imprint: 310-16 / INTHERMA 310 Tip Color: dark green

Intherma® 310: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Intherma® 310

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/AISI 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 CK20	S31008 J94202
	X12CrNi25-21		1.4845		
		GX40CrNiSi25-20	1.4848	HK40	

SMAW

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 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
5.0 x 350	165-200	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	100A	100A	100A	90A	90A	90A
3.2	130A	120A	130A	110A	110A	110A
4.0	160A	160A	160A	140A		
5.0	230A	230A	230A			

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 100°C

Intherma® 310B

SMAW

CLASSIFICATION

AWS A5.4 : E310-15* *:Deviation,see remarks
ISO 3581-A : E 25 20 B 12

TEMPERATURE RANGE

Pressurized parts :-20 ...+400°C
Oxidation resistance : 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 ISO 3581-A Typical values	AW	not required min. 350 440	min. 550 min. 550 600	min. 30 min. 20 30	not required not required 100

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: carton box	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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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 CK20	S31008 J94202
	X12CrNi25-21		1.4845		
		GX40CrNiSi25-20	1.4848	HK40	

SMAW

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

Linux P 308L

SMAW

CLASSIFICATION

AWS A5.4 : E308L-16
ISO 3581-A : E 19 9 L R 32

TEMPERATURE RANGE

Pressurized parts :-120...+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 ISO 3581-A Typical values	AW	not required min. 310 450	min. 520 min. 510 590	min. 35 min. 30 45	35

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.0	2.5	3.2	4.0
	Length (mm)	300	350	350	450
Unit: Carton box	Pieces / unit	194	119	82	55
	Net weight/unit (kg)	2.13	2.38	2.7	3.59
Unit: Protech™	Pieces / unit	158	110	70	46
	Net weight/unit (kg)	1.74	2.2	2.33	3.0

Identification Imprint: 308L-16 / LINUX P 308L Tip Color: none

Linux P308L: rev. EN 01

Linux 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 CF-3	S30403 J92500
Medium carbon (C > 0.03%)	X4CrNi18-10	GX5CrNi19-10	1.4301 1.4308	(TP)304 CF 8	S30409 J92600
Ti-, Nb stabilized	X6CrNiTi18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

SMAW

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		

Linux 308L

SMAW

CLASSIFICATION

AWS A5.4 : E308L-17
ISO 3581-A : E 19 9 L R 32

TEMPERATURE RANGE

Pressurized parts :-120...+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	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 310 450	min. 520 min. 510 590	min. 35 min. 30 45	not required not required 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
Unit: Carton box	Pieces / unit	196	120	80	58	32
	Net weight/unit (kg)	2.3	2.53	2.78	3.98	3.41
Unit: 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

Linux308L: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

Linux 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 CF-3	S30403 J92500
Medium carbon (C > 0.03%)	X4CrNi18-10	GX5CrNi19-10	1.4301 1.4308	(TP)304 CF 8	S30409 J92600
Ti-, Nb stabilized	X6CrNiTi18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C	J92710

SMAW

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			

Linux P 316L

SMAW

CLASSIFICATION

AWS A5.4 : E316L-16
ISO 3581-A : E 19 12 3 L R 32

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	-105°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 480	min. 520 min. 510 580	min. 30 min. 25 41	not required not required 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
Unit: Carton box	Pieces / unit	195	119	79	55	32
	Net weight/unit (kg)	2.15	2.41	2.7	3.62	3.29
Unit: Protech™	Pieces / unit	159	110	70	46	28
	Net weight/unit (kg)	1.75	2.21	2.35	3.03	2.88

Identification Imprint: 316L-16 / LINOX P 316L Tip Color: none

Linux P316L: rev. EN 01

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: Material Safety Data Sheets (MSDS) are available on our website.

Linux 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 CF-3M	S31603 J92800
	X2CrNiMo18-14-3		1.4435	[TP]316L	S31603
	X4CrNiMo17-12-2		1.4401	[TP]316	S31600
Medium carbon [C >0.03%]	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

SMAW

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			

Linux 316L



SMAW

CLASSIFICATION

AWS A5.4 : E316L-17
ISO 3581-A : E 19 12 3 L R 32

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J]	
					+20°C	-105°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 480	min. 490 min. 510 600	min. 30 min. 25 42	not required not required 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
Unit: Carton box	Pieces / unit	196	120	80	58	32
	Net weight/unit (kg)	2.3	2.53	2.78	3.98	3.41
Unit: Protech™	Pieces / unit	160	110	69	45	30
	Net weight/unit (kg)	1.84	2.32	2.4	3.09	3.2

Identification Imprint: 316L-17 / LINUX 316 L Tip Color: none

Linux316L: rev. EN 02

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

Linux 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 CF-3M	S31603 J92800
	X2CrNiMo18-14-3		1.4435	[TP]316L	S31603
	X4CrNiMo17-12-2		1.4401	[TP]316	S31600
Medium carbon [C >0.03%]	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

SMAW

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			

Linux P 309L

PROTECH™
VACUUM PACK

SMAW

CLASSIFICATION

AWS A5.4 : E309L-16
ISO 3581-A : E 23 12 L R 32

TEMPERATURE RANGE

Pressurized parts :-20 ...+300°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)



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	23.5	13.0	8-20

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -20°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 495	min. 520 min. 510 595	min. 30 min. 25 41	not required not required 45

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	450
Unit: Carton box	Pieces / unit	119	80	55
	Net weight/unit (kg)	2.49	2.8	3.76
Unit: Protech™	Pieces / unit	110	70	46
	Net weight/unit (kg)	2.31	2.42	3.15

Identification Imprint: 309L-17 / LINUX P 309L Tip Color: none

Linux P 309L: rev. EN 01

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: Material Safety Data Sheets (MSDS) are available on our website.

Linux 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				

SMAW

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		

Linux 309L



SMAW

CLASSIFICATION

AWS A5.4 : E309L-17
ISO 3581-A : E 23 12 L R 32

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					+20°C	-20°C
Required: AWS A5.4 ISO 3581-A Typical values	AW	not required min. 320 500	min. 520 min. 510 620	min. 30 min. 25 40	not required not required 55	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	450
Unit: Carton box	Pieces / unit	120	80	58
	Net weight/unit (kg)	2.59	2.9	4.12
Unit: Protech™	Pieces / unit	110	69	45
	Net weight/unit (kg)	2.37	2.5	3.2

Identification Imprint: 309L-17 / LINUX 309 L Tip Color: none

Linux 309L: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

Linux 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				

SMAW

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

SMAW

CLASSIFICATION

AWS A5.4 : E383-16*
ISO 3581-A : E 27 31 4 Cu L R 12
* nearest classification

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	271	31.0	3.5	0.9	bal.	0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		Condition	0.2% Proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J] +20°C
Required: AWS A5.4 ISO 3581-A Typical values	AW		not required min. 240 440	min. 520 min. 500 640	min. 30 min. 25 38	not required not required 70

PACKAGING AND AVAILABLE SIZES

Unit: PE tube	Diameter [mm]	2.5	3.2	4.0
	Length [mm]	350	350	350
	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. EN 26

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: Material Safety Data Sheets (MSDS) are available on our website.

NiCro 31/27

SMAW

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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrMo-3
ISO 14172 : E Ni 6625 (NiCr22Mo9Nb)

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

		0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation [%]	Impact ISO-V(J) -196°C
Required: AWS A5.11 ISO 14172 Typical values	Condition AW	not required min. 420 510	min. 760 760 770	min. 30 min. 27 44	not required not required 92

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
Unit: 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. EN 23

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

SMAW

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	45-70	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

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrFe-2*
ISO 14172 : E Ni 6182* (NiCr15Fe6Mn) *:Deviation,see remarks

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)



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	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	-196°C
Required: AWS A5.11 ISO 14172 Typical values	AW	not required min. 360 430	min. 550 min. 550 680	min. 30 min. 27 40	not required not required 145	130

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
Unit: PE tube	Pieces / unit	90	57	43
	Net weight/unit (kg)	1.6	1.9	2.1

Identification Imprint: NiCro 70/15 Tip Color: silver

NiCro 70/15: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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					
NA14		LC-NiCr15Fe	2.4817	Alloy600/B168	N06600
		NiCr15Fe	2.4816		N06600
		NiCr23Fe	2.4851		N06601
		NiCr60-15	2.4867		N06004
		NiCr80-20	2.4869	Alloy75	N06003
		NiCr20Ti	2.4951		N06075
		NiCr20TiAl	2.4952		N07080
NA17		X12NiCrSi36-16	1.4864	330	N08330
NA15		G-X10NiCrNb32-20	1.4859	Alloy800/800H	N08800/ N08810
		X10NiCrAlTi32-20	1.4876		

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)	PA/1G	PB/2F	Welding positions			
			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%

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

AWS: Mn = 1.0 - 3.5%

AWS: Cr = max. 17.0%

ISO: Mn = 5.0 - 10%

ISO: Cr = max. 17%

NiCro 70/15Mn

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrFe-3
ISO 14172 : E Ni 6182 (NiCr15Fe6Mn)

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)



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	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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) -196°C
Required: AWS A5.11 ISO 14172 Typical values		AW	not required min. 360 400	min. 550 min. 550 630	min. 30 min. 27 40	not required not required 125

PACKAGING AND AVAILABLE SIZES

	Diameter [mm]	2.5	3.2	4.0	5.0
	Length [mm]	300	300	350	450
Unit: PE tube	Pieces / unit	91	57	39	45
	Net weight/unit [kg]	1.6	1.9	1.9	4.5

Identification Imprint: NiCrFe-3 / NiCro 70/15Mn Tip Color: yellow

NiCro 70/15Mn: rev. EN 23

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					
NA14		LC-NiCr15Fe	2.4817	Alloy600/B168 Alloy601(H)	N06600
		NiCr15Fe	2.4816		N06600
		NiCr23Fe	2.4851		N06601
		NiCr60-15	2.4867		N06004
		NiCr80-20	2.4869	Alloy75 Alloy80A 330	N06003
		NiCr20Ti	2.4951		N06075
NA17		NiCr20TiAl	2.4952		N07080
		X12NiCrSi36-16	1.4864		N08330
NA15		GX10NiCrNb32-20	1.4859	Alloy800/800H	N08800/ N08810
		X10NiCrAlTi32-20	1.4876		

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		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
Diam. x length [mm]	Current range [A]							
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
5.0 x 450	130-160							

*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

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrFe-2*
ISO 14172 : E Ni 6082 (NiCr20Mn3Nb) *:Deviation,see remarks

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	-196°C
Required: AWS A5.11 ISO 14172 Typical values	AW	not required min. 360 400	min. 550 min. 600 650	min. 30 min. 22 40	not required not required 110	 90

PACKAGING AND AVAILABLE SIZES

	Diameter [mm]	2.5	3.2	4.0
	Length [mm]	300	300	350
Unit: PE tube	Pieces / unit	76	57	31
	Net weight/unit [kg]	1.5	1.7	1.8

Identification Imprint: NiCro 70/19 Tip Color: blue

NiCro 70/19 rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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
		X10NiCrAlTi32-20	1.4876	Alloy 800/800H	N08800/10
NA 15		NiCr23Fe	2.4851	Alloy 601[H]	N06601
		X12NiCrSi36-16	1.4864	330	N08330
NA 17		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%

Cr = 18.0 - 22.0%

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

AWS: Mn = 1.0 - 3.5%

AWS: Mn = 13.0 - 17%

NiCroMo 60/16

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrMo-4
ISO 14172 : E Ni 6276 (NiCr15Mo15Fe6W4)

GENERAL DESCRIPTION

A basic all position Ni-base CrMoW-alloyed electrode
For welding Alloy C276 and comparable compositions
Depending on the corrosion requirements also applicable for welding C-22 and C-4
Applicable for surfacing in high temperature applications (up to 1200°C)
Suitable for welding low temperature steel such as 5% and 9% Ni steel

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	Cr	Ni	Mo	W	Fe
0.015	0.5	0.05	15.5	bal.	16.0	4	6.5

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					+20°C	-196°C
Required: AWS A5.11 ISO 14172 Typical values	AW	not required min. 400 550	min. 690 min. 690 800	min. 25 min. 22 40	not required not required 60	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	350
Unit: PE tube	Pieces / unit	100	63	37
	Net weight/unit (kg)	1.7	1.8	1.9

Identification Imprint: NiCrMo-4 / NICROMO 60/16 Tip Color: grey

NiCroMo 60/16; rev. EN 24

NiCroMo 60/16

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	DIN/EN	Mat. Nr.	ASTM/ACI	UNS
Ni Base high CrMo steel for high corrosion environments				
	NiMo16Cr15W	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiMo16Cr16Ti	2.4610	C-4	N06455
9% Ni steel	X8Ni9	1.5662	A353/A353M	A553/553M Type I
			A553/553M Type II	
5% Ni steel	X12Ni5 (12Ni19)	1.5680		

NiCroMo 60/16 is developed for welding C-276 material

Can also be applied for welding C-22 and C-4, depending on the corrosion requirements

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	40-70	DC+						
3.2 x 350	70-100	DC+	61	137	1.34	32.5	44	1.43
4.0 x 350	90-140	DC+	65	219	1.92	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	85A	80A	80A	80A
4.0	130A	120A	120A	120A	120A	120A

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

NiCu 70/30

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCu-7
ISO 14172 : E Ni 4060 (NiCu30Mn3Ti)

GENERAL DESCRIPTION

Basic all position electrode for welding CuNi and NiCu-alloys
High resistance to seawater corrosion (not stagnant)
Applicable for welding NiCu-alloys to mild and low alloy steel
Very suitable for welding salt fabrication components
Excellent weldability and self releasing slag

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	Cu	Ni	Ti	Fe
0.02	3.0	0.4	30.0	bal.	0.35	1.75

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Condition		0.2% Proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(I) -196°C
Required: AWS A5.11	AW	not required	min. 480	min. 30 min. 27 40	not required not required 110
ISO 14172		min. 200	min. 480		
Typical values		300	485		

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	350
Unit: PE tube	Pieces / unit	105	61	45
	Net weight/unit (kg)	1.7	1.9	2.1

Identification Imprint: NiCu-7 / NICU 70/30 Tip Color: black

NiCu 70/30: rev. EN 24

NiCu 70/30

EXAMPLES OF MATERIALS TO BE WELDED

Steel 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

The NiCu 70/30 is also applicable for welding mild, low alloy, and stainless steels to CuNi and NiCu alloys

SMW

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	45-70	DC+	50	72	0.8	20.7	90	1.85
3.2 x 350	70-90	DC+	65	129	1.2	32.5	46	1.49
4.0 x 350	90-130	DC+	67	245	1.75	471	31	1.51

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	PA/1G	PB/2F	Welding positions			
			PC/2G	PF/3Gup	PE/4G	PH/5Gup
2.5	65A	60A	65A	55A	55A	55A
3.2	90A	85A	90A	75A	75A	75A

REMARKS / APPLICATION ADVICE

Welding with Heat-Input max. 1.5 kJ/mm
Interpass temperature max. 150°C

Nyloid 2

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrMo-6
ISO 14172 : E Ni 6620 (NiCr14Mo7Fe)

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						+20°C	-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	5.0
	Length [mm]	350	350	350	450
Unit: SRP	Pieces / unit	62	52	27	10
	Net weight/unit [kg]	1.7	2.2	1.8	1.5

Identification Imprint: NiCrMo-6 / NYLOID 2 Tip Color: white

Nyloid 2: rev. EN 24

Nyloid 2

SMW

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	K71340
	X8Ni9 (9% Ni)	1.5662	A553/A553M Type I	
	[8% Ni]		A 553/A553M Type II	
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	Current range	Current type	Arc time - per electrode at max. current -	Energy E(kJ)	Dep. rate H(kg/h)	Weight/ 1000 pcs (kg)	Electrodes/ kg weldmetal B	kg electrodes/ kg weldmetal 1/N
Diam. x length (mm)	(A)		(S)*					
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

SMAW

CLASSIFICATION

AWS A5.11/A5.11M : ENiCrMo-6
ISO 14172 : E Ni 6620 (NiCr14Mo7Fe)

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)



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	-196°C
Required: AWS A5.11 ISO 14172 Typical values	AW	not required min. 350 490	min. 620 min. 620 770	min. 20 min. 32 33	100	min. 47 85

PACKAGING AND AVAILABLE SIZES

Unit: SRP	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
Unit: 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. EN 02

Nyloid 4

SMW

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	K71340
	X8Ni9 [9% Ni]	1.5662	A553/A553M Type I	
	[8% Ni]		A553/A553M Type II	
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	Current range	Current type	Arc time	Energy	Dep. rate	Electrodes/	kg electrodes/
Diam. x length	[A]		- per electrode at max. current -	E[kJ]	H[kg/h]	kg weldmetal	kg weldmetal
[mm]			[s]*			B	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	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
4.0					

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

Al99.8

SMAW

CLASSIFICATION

AWS A5.3 : E1100*
ISO 18273 : Al 1080A [Al 99.8(A)]
*:Deviation,see
remarks

ASME IX QUALIFICATION & EN MATERIAL NO.

QW 432 : F - No. : 21
QW 442 : A - No. : N.A.
EN Material No. : 3.0286

GENERAL DESCRIPTION

Especially for welding pure aluminium
Good weldability, no porosity

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F

CURRENT TYPE

DC +

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

Al	Mn	Si	Zn	Fe	Cu	Others
99.8 min	0.02 max.	0.085 max.	0.03 max.	0.13 max.	0.02 max.	0.02 max.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	0.2% Proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	AW	30	80	30

PACKAGING AND AVAILABLE SIZES

	Diameter [mm]	2.5
	Length [mm]	350
Unit: Can	Pieces / unit	-
	Net weight/unit [kg]	2.0

Al99.8: rev. EN 23

Al99.8

EXAMPLES OF MATERIALS TO BE WELDED

Pure Aluminium like:
Al99.8 (Werkstoff-Nr. 3.0285)
Al99 (Werkstoff-Nr. 3.0205)

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

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions	
	PA/1G	PB/2F
2.5	60A	60A

REMARKS / APPLICATION ADVICE

Deviations:chemical composition

Cu = max.0.02% AWS:Cu = 0.05 - 0.20%

If the thickness is more than 10 mm,it is advisable to preheat at 150 - 250°C

AlMn

SMAW

CLASSIFICATION

AWS A5.3 : E3003*
ISO 18273 : Al 3103 [AlMn]
*:Deviation,see
remarks

ASME IX QUALIFICATION & EN MATERIAL NO.

QW 432 : F - No. : 21
QW 442 : A - No. : N.A.
EN Material No. : 3.0516

GENERAL DESCRIPTION

Especially for welding forged and cast aluminium-magnesium alloys and aluminium-manganese alloys
Good weldability, no porosity

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PF/3Gu

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	AW	40	110	20

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Can	Pieces / unit	-	-	-
	Net weight/unit (kg)	2.0	2.0	2.0

AlMn: rev. EN 23

AlMn

EXAMPLES OF MATERIALS TO BE WELDED

Aluminium manganese alloys and Aluminium magnesium alloys like:

AlMn1 (Werkstoff-Nr. 3.0515)

AlMnMg1 (Werkstoff-Nr. 3.0526)

AlMg1 (Werkstoff-Nr. 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
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

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

AISI5

SMAW

CLASSIFICATION

AWS A5.3 : E4043
ISO 18273 : Al 4043A* [AISI5(A)]
*:Deviation,see
remarks

ASME IX QUALIFICATION & EN MATERIAL NO.

QW 432 : F - No. : 23
QW 442 : A - No. : N.A.
EN Material No. : 3.2245

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)



PA/1G



PB/2F



PF/3Gu

CURRENT TYPE

DC +

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

Al	Si
bal.	5.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		0.2% Proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Condition				
Typical values	AW	90	160	15

PACKAGING AND AVAILABLE SIZES

		Diameter [mm]	2.5	3.2	4.0
		Length [mm]	350	350	350
Unit: Can	Pieces / unit	-	-	-	
	Net weight/unit [kg]	2.0	2.0	2.0	

AISI5: rev. EN 23

AlSi5

EXAMPLES OF MATERIALS TO BE WELDED

Aluminium-silicon alloys and dissimilar of several aluminium alloys. With restriction : precipitation hardening alloys such as :

AlCuMg1 (Werkstoff-Nr. 3.1325)

AlMgSi1 (Werkstoff-Nr. 3.2315)

AlZn4.5Mg1 (Werkstoff-Nr. 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

SMAW

CLASSIFICATION

ISO 18273 : Al 4047A (AlSi12[A])
*:Deviation,see remarks

ASME IX QUALIFICATION & EN MATERIAL NO.

QW 432 : F - No. : N.A.
QW 442 : A - No. : N.A.
EN Material No. : 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)



PA/1G



PB/2F



PF/3Gu

CURRENT TYPE

DC +

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

Al	Si
bal.	12.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		0.2% Proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	AW	80	180	5

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Can	Pieces / unit	-	-	-
	Net weight/unit (kg)	2.0	2.0	2.0

AlSi12: rev. EN 23

AlSi12

SMAW

EXAMPLES OF MATERIALS TO BE WELDED

Aluminium cast alloys with silicon level up to approx. 12%, like:
G-AlSi 10Mg (Werkstoff-Nr. 3.2381)
G-AlSi 12 (Werkstoff-Nr. 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

SMAW

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)



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	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
Unit: box	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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Wearshield® BU-30

APPLICATION

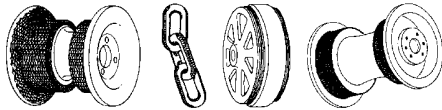
Wearshield BU-30 produces a crack-free wear resistant deposit with a hardness of 31-38 HRc (295-350 HB) depending on dilution and number of layers. It is particularly suitable under conditions of moderate abrasion and friction, combined with resistance to impact. Ideally suitable for applications involving 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 E(kJ)	Dep. rate 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	371	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)

SMAW

CLASSIFICATION

AWS A5.13 : EFeMn-A
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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

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	350
Unit: box	Pieces / unit	53	24
	Net weight/unit (kg)	2.5	2.5

Identification Imprint: WEARSHIELD Mangjet Tip Color: violet

Wearshield® Mangjet: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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

SMAW

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

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
Unit: box	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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

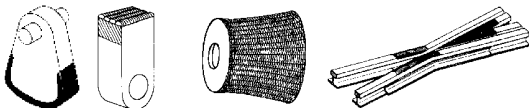
Wearshield® 15CrMn

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 appropriate.

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

SMAW

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)



PA/1G



PC/2G



PH/5Gu

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
Unit: box	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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

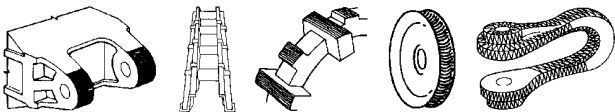
Wearshield® MM 40

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 E(kJ)	Dep. rate 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® 40-0

Wearshield® MM

SMAW

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)



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	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
Unit: box	Pieces / unit	66	45	22
	Net weight/unit (kg)	2.5	2.5	2.5
Unit: Linc Pack	Pieces / unit	26	18	-
	Net weight/unit (kg)	1.0	1.0	-

Identification Imprint: WEARSHIELD MM Tip Color: purple

Wearshield®MM: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Wearshield® MM

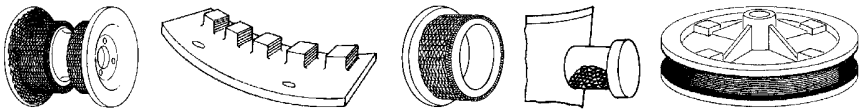
SMAW

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
- Scraper 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 achieved 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 achieved 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 E(kJ)	Dep. rate 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

SMAW

CLASSIFICATION

AWS A5.13	: E Fe6*
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)



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
Unit: box	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. EN 24
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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: Material Safety Data Sheets (MSDS) are available on our website.

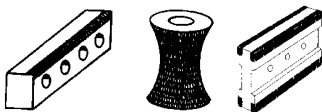
Wearshield® T&D

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 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 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)

SMAW

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)



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
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	350	450
Unit: box	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. EN 24

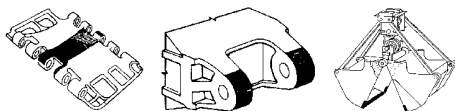
Wearshield® MI (e)

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

SMAW

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)



PA/1G



PB/2F



PC/2G



PF/3Gu

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
Unit: Carton box	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. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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® 44

SMAW

CLASSIFICATION

DIN 8555 : E10-UM-45-GPZ
EN 14700 : E Fe14

GENERAL DESCRIPTION

A heavy coated rutile electrode that produces a primary austenite-chrome carbide eutectic weld deposit
Designed for abrasion and impact resistance at service temperatures up to 600°C
Excellent arc characteristics, good restriking, complete slag coverage and low spatter
The electrode coating permits the use of the drag or contact welding technique

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE

AC / DC +

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

C	Mn	Si	Cr	Mo
2.2	0.2	0.9	27	2.9

STRUCTURE

In the as welded condition the microstructure consists of primary austenite with an interdendritic eutectic of austenite and chromium carbides

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Typical hardness values

1 Layer 42 HRc
2 Layers 49 HRc
3 Layers 48 HRc
Welded on Mild Steel Plate

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	4.0
	Length (mm)	355
Unit: box	Pieces / unit	-
	Net weight/unit (kg)	2.5

Identification Imprint: WEARSHIELD 44 Tip Color: none

Wearshield® 44: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Wearshield® 44

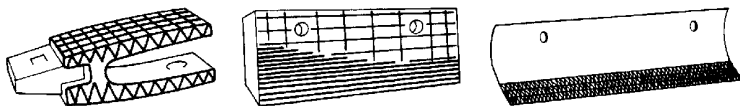
SMAW

APPLICATION

Wearshield 44 produces an abrasion and impact resistant deposit with a hardness of 42-48HRC. The intended use of Wearshield 44 is to provide a combination of abrasion and impact resistance at service temperatures up to 600°C.

Typical applications include:

- Ingot tongs
- Scraper blades
- Rolling mill guides
- Screw flights
- Coal mining chutes
- Plough shares, scraper blades and cultivator sweeps
- Pulleys and chain links



ADDITIONAL INFORMATION

When welding with Wearshield 44 the bead width should be limited to 12-20mm for all electrode diameters when employing a weaving technique. For edge and corner build up narrow stringer beads are preferred. Preheating 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 build up is usually limited to 2-3 layers.

Wearshield 44 can be deposited on small components without check cracking, however, check cracking may not be preventable on larger sections.

Wearshield 44 may also be used to overlay cast irons, however, this is not possible without check cracking. To minimise the risk of spalling, closely spaced check cracks are preferred. These are obtained by employing stringer bead welding procedures.

CALCULATION DATA

Sizes	Current range
Diam. x length (mm)	(A)
4.0 x 355	150-220

COMPLEMENTARY PRODUCTS

There is no flux cored equivalent to Wearshield 44. The closest product is Lincore® 50, however, the deposit varies significantly to Wearshield 44.

Wearshield® ME (e)

SMAW

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
Unit: box	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. EN 25

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.
Rumun: Electrode de Hardfacing pentru Soudage SMAW. Datele tehnice sunt disponibile pe site-ul nostru web.

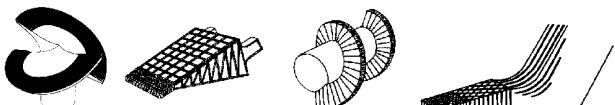
Wearshield® ME (e)

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
- Scraper blades
- Rolling mill guides
- Screw flights
- Coal mining chutes
- Plough shares, scraper 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)

SMAW

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)		Length (mm)
	3.2	4.0	
	450	450	
Unit: box	Pieces / unit	37	23
	Net weight/unit (kg)	2.5	2.5

Identification Imprint: WEARSHIELD 60 (E) Tip Color: violet

Wearshield® 60 (e) rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Wearshield® 60 (e)

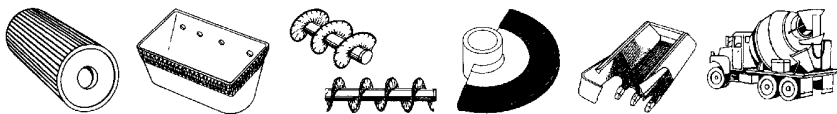
SMAW

APPLICATION

Wearshield 60 produces a 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 sleeves
- 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

SMAW

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
Unit: box	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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

Wearshield® 70

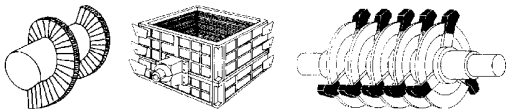
SMAW

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 E(kJ)	Dep. rate 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® 65-0, however, the deposit varies significantly to Wearshield 70.

Wearshield® 420

SMAW

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
Unit: box	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. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

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.

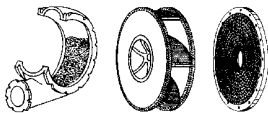
Typical applications include:

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 irregularities 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 (mm)	Welding positions			
	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 E[kJ]	Dep. rate 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.

Wearshield® 34

SMAW

CLASSIFICATION

AWS A5.11M : ENiCrMo-5*
 DIN 8555-83 : E23-UM-200-CKPTZ * Nearest classification

GENERAL DESCRIPTION

Rutile coated stick electrode - weld deposit rate 170% - for hardfacings on machine components and tools subjected to corrosion and heat.
 Weld metal comprises low iron nickel-chromium-molybdenum-tungsten-alloy.
 Smooth stable arc.
 Low dilution with the parent material.
 Slag easily removable.
 Designed for repairing damaged hot working tools

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F

CURRENT TYPE

AC / DC +

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

C	Si	Mn	Cr	Mo	W	Fe	Ni
0.02	0.9	0.9	16	17	4.0	6.5	bal.

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Typical hardness values

As deposited 225 HB
 Work hardened 400 HB

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2
	Length (mm)	350
Unit: PE tube	Pieces / unit	40
	Net weight/unit (kg)	2.5

Identification Imprint: WEARSHIELD 34 Tip Color: violet

Wearshield 34: rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

Wearshield® 34

EXAMPLES OF MATERIALS TO BE WELDED

Hardfacing on new or damaged hot working tools, such as: forging dies, forging saddles, hot-shearing blades, hot-trimming dies, hollow-forging mandrels

CALCULATION DATA

Sizes Diam. x length (mm)	Current range (A)	Weight/ 1000 pcs (kg)
3.2 x 350	110-140	59

*Stub end 35mm

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)	Welding positions PA/1G
3.2	120A

REMARKS / APPLICATION ADVICE

In the case of great hardfacing thicknesses, fill beforehand, e.g. with Limarosta 312. Heat up to 300°C with components made from parent materials susceptible to cracking
Untreated weld metal machinable

RepTec Cast 1

SMAW

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PG/3Gd



PE/4G



PH/5Gu



PJ/5Gd

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
Unit: PE tube	Pieces / unit	146	76	44
	Net weight/unit (kg)	2.5	2.5	2.5
Unit: Linc Pack	Pieces / unit	58	30	18
	Net weight/unit (kg)	1.0	1.0	1.0

Identification Imprint: REPTEC CAST 1 Tip Color: black

RepTec Cast 1: rev. EN 23

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		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
Diam. x length (mm)	Current range [A]							
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 (mm)	Welding positions				
	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

SMAW

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/mm ²]	Tensile strength [N/mm ²]	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
Unit: 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. EN 23

RepTec Cast 3

SMAW

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 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	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

SMAW

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PG/3Gd



PE/4G



PH/5Gu



PJ/5Gd

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/mm ²)	Tensile strength (N/mm ²)	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
Unit: PE tube	Pieces / unit	154	82	47
	Net weight/unit (kg)	2.5	2.5	2.5
Unit: Linc Pack	Pieces / unit	62	33	19
	Net weight/unit (kg)	1.0	1.0	1.0

Identification Imprint: REPTEC CAST 31 Tip Color: black

Rep Tec Cast 31: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

RepTec Cast 31

SMAW

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades For welding and repair	DIN1691	DIN 1692	DIN 1693
	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

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Mild Steel

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LNM 27	328
UltraMag®	329
UltraMag® G4Si1	330
SupraMIG®	331
SupraMIG® CF	332
SupraMig® HD	333
SupraMIG Ultra®	334
SupraMIG Ultra® CF	335
SupraMig Ultra® HD	336

Low Alloy Steel

LNM 28	337
LNM MoNi	338
LNM MoNiVa	339
LNM MoNiCr	340
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Nickel alloys

LNM NiCro 31/27	368
LNM NiCro 60/20	369
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Copper alloys

LNM CuAl8	375
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Aluminium alloys

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Hardfacing

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CONSISTENCY MATTERS

CHOOSE THE RIGHT WELDING WIRE
FOR YOUR APPLICATION



MIG/MAG WIRES

LNM 25	SupraMig® HD
LNM 26	SupraMig Ultra®
LNM 27	SupraMig Ultra® HD
SupraMig®	UltraMag®
SupraMig® CF	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	17	35	0.4
		6.4	19	80	0.9
0.8 mm, DC+					
Short Circuit Transfer 100% CO ₂	9-12	1.9	17	35	0.4
		3.8	18	70	0.8
		7.6	22	130	1.6
1.0 mm, DC+					
Short Circuit Transfer 100% CO ₂	9-12	2.5	18	80	0.7
		3.8	19	120	1.1
		6.4	22	175	1.8
Spray Transfer 90% Ar/10% CO ²	12-19	9.5	23	195	2.7
		12.7	29	230	3.6
		15.2	30	275	4.4
1.2 mm, DC+					
Short Circuit Transfer 100% CO ₂ ⁽²⁾	12-19	3.2	19	145	1.5
		3.8	20	165	1.8
		5.1	21	200	2.5
Spray Transfer 80% Ar/20% CO ²	12-19	8.9	27	285	4.2
		12.1	30	335	5.7
		12.7	30	340	6.0
1.4 mm, DC+					
Spray Transfer 80% Ar/20% CO ²	12-19	7.6	30	300	4.8
		8.1	30	320	5.2
		12.3	32	430	7.8
1.6 mm, DC+					
Spray Transfer 80% Ar/20% CO ²	12-25	5.3	25	325	4.8
		6.0	27	350	5.4
		7.4	28	430	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% CO₂. When using 80% Argon, 20% CO₂ for short circuit transfer, reduce voltage by 1 to 2 volts

LNM 25

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-3
EN ISO 14341-A - G 42 4 M 2Si

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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	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 steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :			
15 kg spool B300	X	X	X
250 kg Accutrak® Drum		X	X
Other sizes and packaging on request			

LNM 25: rev. EN 25

LNM 26

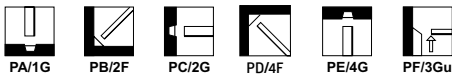
CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6
EN ISO 14341-A - G 46 4 M 3Si1 / G 42 3 C 3Si1

GENERAL DESCRIPTION

Solid wire for welding general construction in mild steel
Smooth bead appearance
Stable arc and excellent feedability

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂
C1 Active gas 100% CO₂

APPROVALS

ABS	BV	DNV	GL	LR	DB	CE	TÜV
+	+	+	+	+	+	+	+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.4	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) -30°C -40°C
Typical values	M21	AW	502	574	28	102
	C1	AW	486	570	29	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.6	0.8	1.0	1.2	1.6
Unit :	5 Kg spool S200	X	X	X	
	15 Kg spool B300		X	X	X
	15 kg spool S300	X			
	250 kg Accutrak® Drum		X	X	
	300 kg metal coil			X	

Other sizes and packaging on request

LNM 26: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.



LNM 27

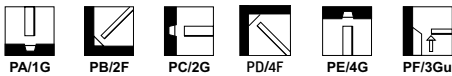
CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6
EN ISO 14341-A - G 46 5 M 4Si1 / G 46 3 C 4Si1

GENERAL DESCRIPTION

Solid wire with increased manganese content for GMA welding of structural steel

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂
C1 Active gas 100% CO₂

APPROVALS

TÜV DB
+ +

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si
0.08	1.7	0.85

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	AW	500	650	26	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit : 15 Kg spool B300	X	X	X	X

Other sizes and packaging on request

LNM 27 rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

UltraMag®

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 46 4 M 3Si1 / G 42 3 C 3Si1

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% CO₂

C1

Active gas 100% CO₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						-30°C	-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 steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :				
5 kg 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. EN26

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: Material Safety Data Sheets (MSDS) are available on our website.

LINCOLN
ELECTRIC

UltraMag® G4Si1

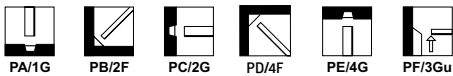
CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6
EN ISO 14341-A - G 46 5 M 4Si1 / G 46 3 C 4Si1

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)



SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-40°C	-50°C
Typical values	M21	AW	490	590	27	90	
	C1		460	560	25	70	

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :	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. EN26

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: Material Safety Data Sheets (MSDS) are available on our website.

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 46 4 M 3Si1 / G 42 3 C 3Si1

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 available 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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-30°C	-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 steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :				
15 Kg spool B300	X	X	X	X
15 Kg spool B5300		X	X	
15 kg spool S300	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. EN26

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: Material Safety Data Sheets (MSDS) are available on our website.

SupraMig® CF

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 46 4 M 3Si1 / G 42 3 C 3Si1

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 available 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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-30°C	-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 steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :				
15 Kg spool B300	X	X	X	X
15 Kg spool B5300		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. EN01

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: Material Safety Data Sheets (MSDS) are available on our website.

SupraMig® HD

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 46 4 M 3Si1 / G 42 3 C 3Si1

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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-30°C	-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 steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :				
15 Kg spool B300	X	X	X	X
15 Kg spool B5300	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. EN04

SupraMig Ultra®

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 50 5 M 4Si1 / G 46 3 C 4Si1

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 available 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% CO₂

C1

Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-40°C
Typical values	M21	AW	500	650	26	80	80
	C1		490	620	30	60	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :		
15 Kg spool B300	X	X
15 Kg spool B5300		X
15 kg spool S300		X
250 kg Accutrak® Drum	X	X
500 kg Accutrak® Drum		X

Supramig® Ultra: rev. EN25

SupraMig Ultra® CF

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 50 5 M 4Si1 / G 46 3 C 4Si1

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 available 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% CO₂

C1

Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-40°C
Typical values	M21	AW	500	650	26	80	80
	C1		490	620	30	60	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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
Unit :		
15 Kg spool B300	X	X
15 Kg spool B5300		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. EN01

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: Material Safety Data Sheets (MSDS) are available on our website.

SupraMig Ultra® HD

CLASSIFICATION

AWS A5.18/A5.18M - ER70S-6

EN ISO 14341-A - G 50 5 M 4Si1 / G 46 3 C 4Si1

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% CO₂

C1

Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-40°C
Typical values	M21	AW	500	650	26	80	80
	C1		490	620	30	60	50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	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
	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Boiler & pressure vessel steel	EN 10025 part 3	S275, S355, S420, S460
Fine grained steel	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
Unit :	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

Available on Endless Accutrak® drums

SupraMig® Ultra HD: rev. EN02

LNM 28

CLASSIFICATION

AWS A5.28 - ER80S-G

EN ISO 16834-A - G Z Mn3 Ni1 Cu*

* Nearest classification

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)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M21

Mixed gas Ar+ >15-25% CO₂

C1

Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -20°C	-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
Unit :	15 Kg spool B300	X X

Other sizes and packaging on request

LNM 28: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

LNm MoNi

CLASSIFICATION

AWS A5.28 - ER100S-G
EN ISO 16834-A - G 62 4 M Mn3NiCrMo

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)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂

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/mm ²]	Tensile strength [N/mm ²]	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 EN 10208-2	X65, X70, X80 L480, L550
Fine grained steel	EN 10025 part 6	S460, S500, S550, S620 S690 S620GH, S600MC, TstE620, Weldox 500, Hardox

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		0.8	1.0	1.2
Unit :	15 Kg spool B300	X	X	X
	250 kg Accutrak® Drum		X	X

Other sizes and packaging on request

LNm MoNi rev. EN 23

LNM MoNiVa

CLASSIFICATION

AWS A5.28 - ER100S-G

EN ISO 16834-A - G 69 4 M Mn3NiCrMo

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)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M21

Mixed gas Ar+ >15-25% CO₂

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/mm ²)	Tensile strength (N/mm ²)	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 steel	EN 10025 part 6	S460, S500, S550, S620 S690
		S620GI1, S600MC, TstE620, Weldom 500, Hardox

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.4
Unit : 15 Kg spool B300	X	X	X	
250 kg Accutrak® Drum		X	X	X
Other sizes and packaging on request				

LNM MoNiVa rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

LNM MoNiCr

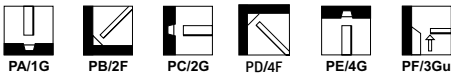
CLASSIFICATION

AWS A5.28 : ER120S-G
EN ISO 16834-A : G 89 4 M Mn4Ni2CrMo

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% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -40°C	-60°C
Typical values	M21	AW	>890	950	>15	70	>50

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Fine grained steel	EN 10025 part 6	S890 S960 (undermatching)

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
Unit :	15 Kg spool B300	X X
Other sizes and packaging on request		

LNM MoNiCr rev. EN05

LNM Ni1

CLASSIFICATION

AWS A5.28 : ER80S-Ni1
EN ISO 14341-A : G 46 5 M 3Ni1

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% CO₂

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/mm ²)	Tensile strength (N/mm ²)	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 steel	EN 10025	S275, S355
Ship plates	ASTM A131	ASTM A131
Cast steel	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 steel	EN 10025 part 3/4	S275, S355, S420, S460
	EN 10028	P355NL-1, P460NL-1

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
Unit : 5 kg plastic spool S200		X	
15 Kg spool B300	X	X	X
Other sizes and packaging on request			

LNM Ni1 rev. EN 26

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

LNM NiMo1

CLASSIFICATION

AWS A5.28 - ER100S-G
EN ISO 16834-A - G Mn3Ni1Mo

GENERAL DESCRIPTION

Solid wire for high strength, quenched and tempered fine grained construction steels
Excellent ductility and crack resistance

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

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Ni	Mo	Ti
0.08	1.7	0.7	0.9	0.35	0.17

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	-40°C
Typical values	M21	AW	760	800	18	100	62

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Pipe material	EN 10208-2	L480, L550
Fine grained steel	EN 10025 part 6	S460, S500, S550, S620

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
Unit :	15 Kg spool B300	X X
Other sizes and packaging on request		

LNM NiMo1 rev. EN 05

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

LNM Ni2.5

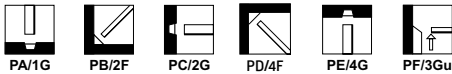
CLASSIFICATION

AWS A5.28 - ER80S-Ni2
EN ISO 14341-A - G 46 6 M 2Ni2

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% CO₂

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/mm ²)	Tensile strength (N/mm ²)	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 steel	EN 10025	S355
Pipe material	API-5LX EN 10208-2	X52, X56, X60, X65 L360, L415, L445
Fine grained steel	EN 10025 part 3/4	S355, S420, S460
Low temperature steels	EN 10028-4 EN 10222-3	11 MnNi 5-3, 13 MnNi 6-3, 15 NiMn 6 [12 Ni 14 G 1, G 2] 13 MnNi 6-3, 15 NiMn 6

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
Unit :	15 Kg spool B300	X X
Other sizes and packaging on request		

LNM Ni2.5: rev. EN 25

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



LNM 12

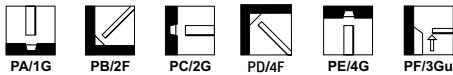
CLASSIFICATION

AWS A5.28 - ER70S-A1
EN ISO 14341-A - G 46 3 M 2Mo

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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						+20°C	-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 steel	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	1.6
Unit : 15 Kg spool B300	X	X	X	X
Other sizes and packaging on request				

LNM12 rev. EN 25

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

LNМ 19

CLASSIFICATION

AWS A5.28 - ER80S-B2*
ISO 21952-A - G CrMo1Si

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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -10°C
Typical values	M21	AW	315	610	29	97

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)	0.8	1.0	1.2	1.6
Unit : 15 Kg spool B300	X	X	X	X
Other sizes and packaging on request				

LNМ 19 rev. EN 24

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

LINCOLN
ELECTRIC

LNM 20

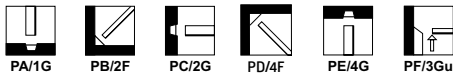
CLASSIFICATION

AWS A5.28 - ER90S-B3* * Nearest classification
ISO 21952-A - G CrMo2Si

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% CO₂
C1 Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -10°C
Typical values	M21	AW	459	605	23	145

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Creep and hydrogen resistant steels	EN 10028-2 EN 10222-2	10CrMo 9-10 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)	0.8	1.0	1.2
Unit : 15 Kg spool B300	X	X	X
Other sizes and packaging on request			

LNM 20 rev. EN 24

LNM 502

CLASSIFICATION

AWS A5.28 - ER80S-B6

ISO 21952-A - G CrMo5Si

GENERAL DESCRIPTION

Solid wire for welding of creep and hydrogen resistant 5%Cr, 0.5%Mo steels

Good feedability, consistent welding performance

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% CO₂

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Mo
0.09	0.5	0.4	5.6	0.6

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(I) +20°C
Typical values	M21	AW PWHT 750°C/1h	min.400 560	550 650	min. 17 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)	1.0	1.2
Unit :	18 Kg spool B300 X	X

Other sizes and packaging on request

LNM 502 rev. EN 23

LNM 304LSi

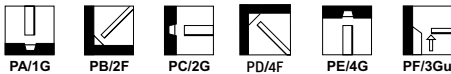
CLASSIFICATION

AWS A5.9 - ER308LSi
ISO 14343-A - G 19 9 L Si

GENERAL DESCRIPTION

Solid wire with extra low carbon for welding austenitic CrNi-steels
With increased silicon for improved wettability

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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	Tensile strength	Elongation	Impact ISO-V(J)	
			[N/mm ²]	[N/mm ²]	(%)	-20°C	-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
	X2CrNi18-10		1.4311	[TP]304LN 302, 304	S30453 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 [TP]321H	S32100 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	1.6
Unit : 5 kg plastic spool S200	X	X	X	
15 kg spool BS300	X	X	X	X
250 kg Accutrak drum	X	X	X	

LNM 304LSi: rev. EN 23

Other sizes and packaging on request



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: Material Safety Data Sheets (MSDS) are available on our website.

LNM 304L

CLASSIFICATION

AWS A5.9 - ER308L
ISO 14343-A - G 19 9 L

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)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-196°C
Typical values	M12	AW	472	629	35	95	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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	[TP]304LN 302, 304	S30453 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 [TP]321H	S32100 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
Unit :	15 kg spool BS300	X
Other sizes and packaging on request		

LNM 304L: rev. EN 23

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LNM 347Si

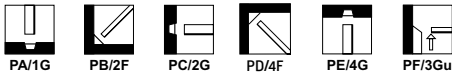
CLASSIFICATION

AWS A5.9 - ER347Si
ISO 14343-A - G 19 9 NbSi

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)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						+20°C	-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	
			1.4552	CF-8C	J92710	
Non stabilized	X4CrNi18-10		GX5 CrNi 19-10		302	
					[TP]304	S30400
	X2CrNi19-11			1.4306	[TP]304L	S30403
				GX5 CrNi 19-10	1.4308	CF-8
		1.4312				[TP]304H

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		0.8	1.0	1.2
Unit :	15 kg spool BS300	X	X	X

Other sizes and packaging on request

LNM 347Si rev. EN 23

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

LNM 316LSi

CLASSIFICATION

AWS A5.9 - ER316LSi

ISO 14343-A - G 19 12 3 LSi

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)



PA/1G

PB/2F

PC/2G

PD/4F

PE/4G

PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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	Tensile strength	Elongation	Impact ISO-V(J)		
			[N/mm ²]	[N/mm ²]	[%]	+20°C	-120°C	-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 CF-3M	S31603 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	1.6	Other sizes and packaging on request
Unit :	5 kg plastic spool S200	X	X			
	15 kg spool BS300	X	X	X	X	

LNM 316LSi: rev. EN 23

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LNM 318Si

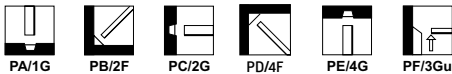
CLASSIFICATION

AWS A5.9 - ER318* * Nearest classification
ISO 14343-A - G 19 12 3 NbSi

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)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(I) +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 CF-3M	S31603 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)		0.8	1.0	1.2	1.6
Unit :	15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

LNM 318Si rev. EN 22

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

LNM 4439Mn

CLASSIFICATION

ISO 14343-A - G 18 16 5 N L* * Nearest classification

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)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J] +20°C -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)	1.0	1.2
Unit :	15 kg spool BS300 X	X
Other sizes and packaging on request		

LNM 4439Mn; rev. EN 23

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

LNM 4455

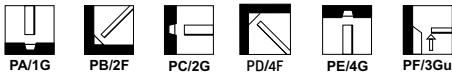
CLASSIFICATION

AWS A5.9 - ER316LMn
ISO 14343-A - G 20 16 3 Mn L

GENERAL DESCRIPTION

Solid wire for welding fully austenitic CrNiMnMo stainless steels and low temperature steels
Not susceptible for hot cracking

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	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		
		12 Ni 14	1.5637		
		X12Ni5	1.5680		
EN 10028-4					

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0	1.2
Unit :	15 kg spool BS300	X X

LNM 4455: rev. EN 22

Other sizes and packaging on request



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LNM 4465

CLASSIFICATION

ISO 14343-A - G 25 22 2 N L

GENERAL DESCRIPTION

Solid wire for welding high CrNiMo-alloyed austenitic steels of type 25/22/2
Excellent resistance to strong oxidizing and moderate reducing conditions
Especially for urea applications

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% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

APPROVALS

TÜV

+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.01	4.5	0.2	25	23	2.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) +20°C
Typical values	M12	AW	360	620	30	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI	UNS
Fully austenitic corrosion resistant CrNiMo 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 layer -120 ...+350°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.2
Unit :	15 kg spool BS300	X
Other sizes and packaging on request		

LNM 4465: rev. EN 23

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LINCOLN
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LNM 4500

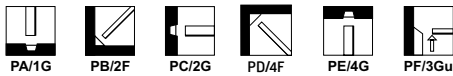
CLASSIFICATION

AWS A5.9 - ER385
ISO 14343-A - G 20 25 5 Cu L

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)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	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)	0.8	1.0	1.2
Unit : 15 kg spool BS300	X	X	X

Other sizes and packaging on request

LNM 4500 rev. EN 22

LNM 4362

CLASSIFICATION

No EN or AWS standard

GENERAL DESCRIPTION

Solid wire for welding Lean Duplex stainless steels
Corrosion resistance is equal to 316L in most applications

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% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J] +20°C	-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
Unit :	15 kg spool BS300 X

Other sizes and packaging on request

LNM 4362 rev. EN 05

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

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ELECTRIC

LNM 4462

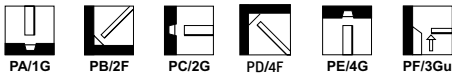
CLASSIFICATION

AWS A5.9 - ER2209
ISO 14343-A - G 22 9 3 N L

GENERAL DESCRIPTION

Solid wire for welding duplex stainless steels
High resistance to general corrosion, pitting and stress corrosion conditions

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

APPROVALS

BV	GL	TÜV
2209	44625	+

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	M12	AW	621	803	29	103

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	1.0	1.2	1.6
Unit : 15 kg spool BS300	X	X	X	X
Other sizes and packaging on request				

LNM 4462: rev. EN 24

LNM 2507

CLASSIFICATION

AWS A5.9/A5.9M - ER2594
EN ISO 14343-A - G 25 9 4 N L

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-ferritic 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% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(I) -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 BS EN 10088-2 X2CrNiMoN25-7-4 (1.4410) SAF 2507(Sandvik/Avesta) Uranus 47N(CLI)	S32750, S32760
Casting	A890 Gr5A, 6A ACI CE3MN	J93404

APPLICATION ADVICE

Offshore Oil/Gas, chemical and petrochemical process industries, pipework systems, flowlines, paper industry, manifolds, etc.
Preheat is not generally required. Interpass temperature 150° 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	1.2
Unit :	15 kg spool B300 X	X

Other sizes and packaging on request

LNM 2507: rev. EN 01

LNM Zeron 100X

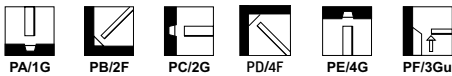
CLASSIFICATION

AWS A5.9 - ER2594
ISO 14343-A - G 25 9 4 N L

GENERAL DESCRIPTION

Solid wire for welding Zeron 100® and other super duplex stainless steel grades
High resistance to pitting and crevice corrosion in seawater

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	Cu	W	N
0.015	0.7	0.3	25	9.8	3.6	0.6	0.7	0.22

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -50°C
Typical values	M12	AW	645	860	23	60

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
		G-X6CrNiMo24-8-2	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)	0.8	1.0	1.2
Unit :	12.5 kg spool S300	X	X
Other sizes and packaging on request			

LNM Zeron100X: rev. EN 25

LNM 309LSi

CLASSIFICATION

AWS A5.9 - ER309LSi

ISO 14343-A - G 23 12 LSi

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% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						-20°C	+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	UNS
Corrosion resistant cladsteels			
	X2CrNiN18-10	1.4311	(TP)304LN
	X2CrNi19-11	1.4306	(TP)304L
			CF-3
	X4CrNi18-10	1.4301	(TP)304
			S30400
			S30403
			S30453

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
Unit :				
15 kg spool BS300	X	X	X	X
250 kg Accutrak drum		X	X	

Other sizes and packaging on request

LNM 309LSi rev. EN 22

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

LNM 307

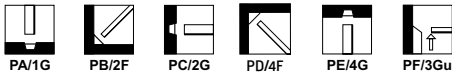
CLASSIFICATION

AWS A5.9 - ER307* * Nearest classification
ISO 14343-A - G 18 8 Mn

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% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

APPROVALS

TÜV
+

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni
0.07	71	0.8	18.6	8.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength [N/mm ²]	Tensile strength [N/mm ²]	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	1.6
15 kg spool BS300	X	X	X	X
Unit : 250 kg Accutrak drum			X	

LNM 307 rev. EN 22

Other sizes and packaging on request



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LNM 304H

CLASSIFICATION

AWS A5.9 - ER308H
 ISO 14343-A - G 19 9 H

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)



PA/1G

PB/2F

PC/2G

PD/4F

PE/4G

PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
 M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²)	Tensile strength (N/mm ²)	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
Unit : 15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 304H rev. EN 23

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



LNМ 430LNb

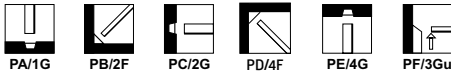
CLASSIFICATION

ISO 14343-A - G 18LNb
ISO 14343-B - G 430LNb

GENERAL DESCRIPTION

Solid wire for welding stabilized martensitic stainless steel
High resistance to scaling up to approx. 900°C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Nb
0.01	0.7	0.4	18	0.3

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	M12	AW	280	460	17

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1	Mat. Nr
EN10088-1	Mat. Nr	ASTM/A420
X3CrNb17	1.4511	AlSi430
X6CrNb17	1.4511	
X6Cr17	1.4016	
X8Cr17	1.4016	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.0
Unit :	250 kg Accutrak drum X
Other sizes and packaging on request	

LNМ 430LNb rev. EN 02

LNM 309H

CLASSIFICATION

AWS A5.9 - ER309

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% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	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
Unit : 15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 309H: rev. EN 22

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LNM 310

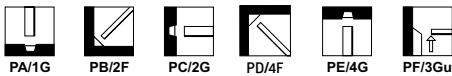
CLASSIFICATION

AWS A5.9 - ER310
ISO 14343-A - G 25 20

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)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	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	G-X25CrNiSi18-9	1.4762		
		G-X40CrNiSi22-9	1.4825		
	X15CrNiSi20-12		1.4826		
		G-X25CrNiSi20-14	1.4828		
	X15CrNiSi25-20		1.4832		
			1.4841	310S	S31008
	X12CrNi25-21			CK20	J94202
		G-X40CrNiSi 25-20	1.4845		
			1.4848	HK40	

PACKAGING AND AVAILABLE SIZES

Diameter [mm]	0.8	1.0	1.2
Unit :	15 kg spool BS300	X	X
Other sizes and packaging on request			

LNM 310: rev. EN 22

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

LNM 312

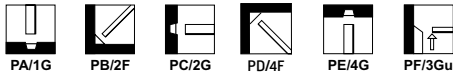
CLASSIFICATION

AWS A5.9 - ER312
ISO 14343-A - G 29 9

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)



SHIELDING GASES (ACC. ISO 14175)

M12 Mixed gas Ar+ 0.5-5% CO₂
M13 Mixed gas Ar+ 0.5-3% O₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(U) +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	G-X25CrNiSi18-9	1.4762		
		G-X40CrNiSi22-9	1.4825		
	X15CrNiSi20-12		1.4826		
		G-X25CrNiSi20-14	1.4828		
	X15CrNiSi25-20		1.4832		
			1.4841	310S	S31008
	X12CrNi25-21			CK20	J94202
		G-X40CrNiSi25-20	1.4845		
			1.4848	HK40	

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2
Unit : 15 kg spool BS300	X	X	X

Other sizes and packaging on request

LNM 312: rev. EN 02

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

LNM NiCro 31/27

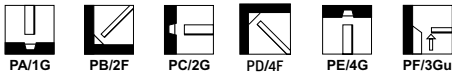
CLASSIFICATION

AWS A5.9 - ER383
ISO 14343-A - G 27 31 4 Cu L

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

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	-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 alloyed 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
Unit :	15 kg spool BS300 X

Other sizes and packaging on request

LNM NiCro 31/27; rev. EN 23

LNМ NiCrо 60/20

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCrMo-3
ISO 18274 - S Ni 6625 (NiCr22Mo9Nb)

GENERAL DESCRIPTION

Solid wire for welding of nickel alloys
Extreme resistance to various corrosion forms
High chromium and molybdenum content

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	Cr	Mo	Nb	Fe
0.02	0.06	0.07	64	21.9	9	3.5	0.4

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Typical values	Shielding gas	Condition	0.2% proof strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
	I1	AW	520	770	34	+20°C	-196°C

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	1.6
Unit :	15 kg spool BS300	X	X	X	X
Other sizes and packaging on request					

LNМ NiCrо 60/20: rev. EN 22

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

LNM NiCro 70/19

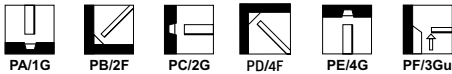
CLASSIFICATION

AWS A5.14/A5.14M - ERNiCr-3
ISO 18274 - S Ni 6082 (NiCr20Mn3Nb)

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
	I1	AW	390	640	35	+20°C	-196°C
Typical values						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	
		NiCr20TiAl	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)	0.8	1.0	1.2	1.6
Unit : 15 kg spool BS300	X	X	X	X
Other sizes and packaging on request				

LNM NiCro 70/19; rev. EN 22

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

LNM NiCroMo 60/16

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCrMo-4

ISO 18274 - S Ni 6276 [NiCr15Mo16Fe6W4]

GENERAL DESCRIPTION

Solid wire for welding CrMoW-alloyed nickel alloys (e.g. Alloy C276)

Depending on the corrosion requirements also applicable for welding C-22 and C-4

Extreme resistance to corrosion environments containing sulphuric acid and chlorides

Applicable for surfacing in high temperature applications (up to 1200°C)

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

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

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
Typical values	I1	AW	400	700	25	90

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	DIN/EN	Mat. Nr.	ASTM/ACI	UNS
Ni Base high CrMo steel for high corrosion environments				
	NiMo16Cr15W	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiMo16Cr16Ti	2.4610	C-4	N06455

- LNT/LNM NiCroMo 60/16 is developed for welding C-276 material

- Can also be applied for welding C-22 and C-4, depending on the corrosion requirements

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		0.9	1.0	1.2
Unit :	15 kg spool BS300	X	X	X

Other sizes and packaging on request

LNM NiCroMo 60/16; rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

LNM NiCu 70/30

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCu-7
ISO 18274 - S Ni 4060 [NiCu30MnTi]

GENERAL DESCRIPTION

Solid wire 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

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	Cu	Fe	Ti
0.1	3.3	0.6	64	29	1.5	2.4

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	-196°C
Typical values	I1	AW	300	500	35	150	60

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades		DIN 17743	Mat. Nr	ASTM/ACI	UNS
BS3076	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)		1.0	1.2
Unit :	15 kg spool BS300	X	X
Other sizes and packaging on request			

LNM NiCu 70/30: rev. EN 22

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

LNM NiTi

CLASSIFICATION

AWS A5.14/A5.14M - ERNi1
ISO 18274 - S Ni 2061 (NiTi3)

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/mm ²)	Tensile strength (N/mm ²)	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
Unit :	15 kg spool BS300 X
Other sizes and packaging on request	

LNM NiTi: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

LNM NiFe

CLASSIFICATION

AWS A5.15 - ENiFe-CI
ISO 1071 - S NiFe-CI

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)



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

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
Unit :	15 kg spool BS300 X
Other sizes and packaging on request	

LNM NiFe: rev. EN 22

LNM CuAl8

CLASSIFICATION

AWS A5.7 - ERCuAl-A1
EN 14640 - S Cu 6100 [CuAl8]

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

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/mm ²)	Tensile strength (N/mm ²)	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 CuAl8	2.0918 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
Unit : 12 kg spool B300	X	X	X	X
Other sizes and packaging on request				

LNM CuAl8: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

LNM CuAl8Ni2

CLASSIFICATION

EN ISO 24373 - S Cu 6327

GENERAL DESCRIPTION

Solid wire for welding copper-aluminium alloys

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

- I1Inert gas Ar (100%)
- I3Inert gas Ar+ 0.5-95% He

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	Al	Mn	Ni	Fe
bal.	8.7	1.5	2.1	2.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Hardness HB	Impact ISO-V(J) +20°C
Typical values	I1	AW	270	530	30	140	70

EXAMPLES OF MATERIALS TO BE WELDED

Cu-alloy grades

Copper-aluminium alloys with 7-9% Al

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.2	1.6
Unit :	12 kg spool B300	X	
	15 kg spool B300		X

Other sizes and packaging on request

LNM CuAl8Ni2: rev. EN 04

LNM CuAl8Ni6

CLASSIFICATION

AWS A5.7 - ERCuNiAl
EN ISO 24373 - S Cu 6328 [CuAl9Ni5]

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

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/mm ²)	Tensile strength (N/mm ²)	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)	1.0	1.6
Unit :	12 kg spool BS300	X
Other sizes and packaging on request		

LNM CuAl8Ni6: rev. EN 04

LNMCuNi30

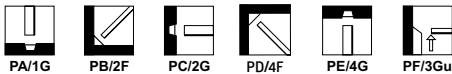
CLASSIFICATION

AWS A5.7 - ERCuNi
EN 14640 - S Cu 7158 [CuNi30]

GENERAL DESCRIPTION

Solid wire for welding copper-nickel alloys containing 10-30%Ni

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

Cu	Ni	Mn
bal.	31	0.8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength [N/mm²]	Tensile strength [N/mm²]	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]	1.0	1.2
Unit :	15 kg spool BS300 X	X
Other sizes and packaging on request		

LNMCuNi30: rev. EN 24

LNM CuSn

CLASSIFICATION

AWS A5.7 - ERCu
EN ISO 24373 - S Cu 1898 [CuSn]

GENERAL DESCRIPTION

Solid wire for GMA-welding of copper

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

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/mm ²]	Tensile strength [N/mm ²]	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
		Cu5P	2.1498
		CuTeP	2.1546

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	0.8	1.0	1.2	1.6
Unit :	12 kg spool B300	X	X	X	
	15 kg spool B300				X

LNM CuSn: rev. EN 24

Other sizes and packaging on request
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Fumes: Material Safety Data Sheets (MSDS) are available on our website.



LNM CuSn6

CLASSIFICATION

AWS A5.7 - ERcUSn-A
EN ISO 24373 - S Cu 5180 [CuSn6P]

GENERAL DESCRIPTION

Solid wire for welding of copper-tin alloys

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

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

Cu	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 (%)	Impact ISO-V(J) +20°C
Typical values	I1	AW	150	260	20	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)	1.0	1.2	1.6
Unit :	15 kg spool B300	X	X
Other sizes and packaging on request			

LNM CuSn6 rev. EN 03

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LNМ CuSn12

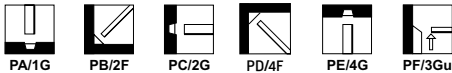
CLASSIFICATION

EN ISO 24373 - S Cu 5410 (CuSn12P)

GENERAL DESCRIPTION

Solid wire for GMA-welding of copper-tin and copper-zinc alloy

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

Cu	Sn	P
bal.	12	0.2

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2 proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	I1	AW	100	250	30

EXAMPLES OF MATERIALS TO BE WELDED

- Copper-tin alloys, e.g. bronze with 10-12% tin
- Copper-zinc alloys e.g. brass

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0
Unit :	12 kg spool B300	X X
Other sizes and packaging on request		

LNМ CuSn12 rev. EN 23

LNMCuSi3

CLASSIFICATION

AWS A5.7 - ERCuSi-A
EN ISO 24373 - S Cu 6560 [CuSi3Mn1]

GENERAL DESCRIPTION

Solid wire for GMA-welding of low alloy copper grades
High temperature and corrosion resistant

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

Cu	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)	0.8	1.0	1.2
Unit :	5 kg spool S200	X		
	12 kg spool BS300	X	X	X
Other sizes and packaging on request				

LNMCuSi3:rev. EN 03

SuperGlaze® MIG 1070

CLASSIFICATION

ISO 18273 - S Al 1070 (Al99.7)
W. 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

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	I1	AW	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range : 647 - 658°C
Density : approximately 2700 kg/m³

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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
Unit: 0.5 kg plastic spool S100	X	X	X	X	
7.26kg spool S300	X	X	X	X	X
7.0kg spool BS300	X	X	X		X
23-27kg wooden reel	X	X	X	X	X
125 kg Accupak			X	X	
159kg wooden reel	X	X	X	X	X
227kg wooden reel	X	X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 1070: rev. EN 02

SuperGlaze® MIG 1100

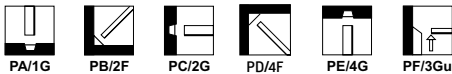
CLASSIFICATION

AWS 5.10/5.10M - ER1100
ISO 18273 - S Al 1100 (Al99.0Cu)
EN 573.3 - EN AW-Al99.0Cu
AA - 1100

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

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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
Unit:					
0.5 kg plastic spool S100	X	X	X	X	
7.26kg spool S300	X	X	X	X	X
70kg spool B5300	X	X	X	X	X
23-27kg wooden reel		X	X	X	X
125 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 1100: rev. EN 02

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

SuperGlaze[®] MIG 2319

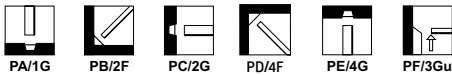
CLASSIFICATION

AWS 5.10/5.10M - ER2319
ISO 18273 - S Al 2319 [AlCu6MnZrTi]
EN 573.3 - EN AW-AlCu6Mn
AA - 2319

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 where 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

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	I1	AW	160-180	240-270	Approx. 3

PHYSICAL PROPERTIES

Melting range : 543 - 643°C
Density : approximately 2768 kg/m³

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

Aircraft applications
Spacecraft industry

PACKAGING AND AVAILABLE SIZES

	Diameter [mm]	0.8	1.0	1.2	1.6
Unit :	7.26kg spool S300	X	X	X	X
	7.0kg spool BS300	X	X	X	X
Other sizes and packaging on request					

Superglaze[®] MIG 2319 rev. EN 01

SuperGlaze® MIG 4043

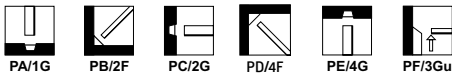
CLASSIFICATION

AWS 5.10/5.10M - ER4043
ISO 18273 - S Al 4043A (AlSi5)
EN 573.3 - EN AW-AlSi5
AA - 4043
Werkstoff Nr. - 3.2245

GENERAL DESCRIPTION

Designed for welding heat treatable base alloys and more specifically 6xxx Series Alloys
Lower melting point and fluidity than 5xxx series filler alloys
Low sensitivity to weld cracking with 6xxx base alloys
Suitable for sustained elevated temperature service. i.e. above 650C

WELDING POSITIONS (ISO/ASME)



SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)
Flow rate 14.2 - 23.6L/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	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/mm²]	Tensile strength [N/mm²]	Elongation [%]
Typical values	I1	AW	20-40	120-165	3-18

PHYSICAL PROPERTIES

Melting range : 573 - 625°C
Density : approximately 2680 kg/m3

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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
Unit :						
0.5 kg plastic spool S100	X		X	X	X	
7.26kg spool S300	X		X	X	X	X
70kg spool BS300	X		X	X	X	X
23-27kg wooden reel			X	X	X	X
125kg Gem-Pak		X		X	X	
159kg wooden reel			X	X	X	X
227kg wooden reel			X	X	X	X

Superglaze® MIG 4043: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

SuperGlaze® MIG 4047

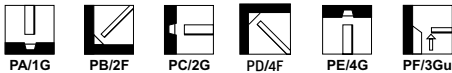
CLASSIFICATION

AWS A5.10/5.10M - ER4047
ISO 18273 - S Al 4047 [AlSi12]
EN 573.3 - EN AW-AlSi12
AA - 4047
Werkstoff 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)



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
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/mm²]	Tensile strength [N/mm²]	Elongation [%]
Typical values	I1	AW	60-80	130-190	5-20

PHYSICAL PROPERTIES

Melting range : 573 - 585°C
Density : approximately 2680 kg/m³

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

For welding 6XXX alloys. and most casting alloys
Automotive components , radiators and air conditioning

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	0.8	1.0	1.2	1.6	2.4
Unit :	0.5 kg plastic spool S100	X	X	X	X	
	7.26kg spool S300	X	X	X	X	X
	70kg spool BS300	X	X	X	X	X
	23-27kg wooden reel		X	X	X	X
	125 kg Accupak			X	X	
	159kg wooden reel		X	X	X	X
	227kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 4047: rev. EN 23

SuperGlaze® MIG 5087

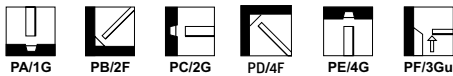
CLASSIFICATION

ISO 18273 - S Al 5087 (AlMg4,5MnZr)
EN 573.3 - EN AW-AlMg4,5MnZr
AA - 5087
Werkstoff 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)



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

GL	LR	DB	TÜV	Wiwib	
+	+	+	+	+	*(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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	
Unit :						Other sizes and packaging on request
0.5 kg plastic spool S100	X	X	X	X		
7.26kg spool S300	X	X	X	X	X	
7.0kg spool BS300	X	X	X	X	X	
23-27kg wooden reel		X	X	X	X	
136 kg Accupak			X	X		
159kg wooden reel		X	X	X	X	
227kg wooden reel		X	X	X	X	

Superglaze® MIG 5087: rev. EN 03

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

SuperGlaze® MIG 5183

CLASSIFICATION

AWS 5.10/5.10M - ER5183
ISO 18273 - S Al 5183 [AlMg4.5Mn0.7(Al)]
EN 573.3 - EN AW-AlMg4.5Mn
AA - 5183
Werkstoff 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	Wiwib
+	+	+	+	+	+	+	+

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	Other sizes and packaging on request
Unit: 0.5 kg plastic spool S100	X	X	X	X		
7.26kg spool S300	X	X	X	X	X	
7.0kg spool BS300	X	X	X	X	X	
23-27kg wooden reel		X	X	X	X	
136 kg Accupak				X		
159kg wooden reel		X	X	X	X	
227kg wooden reel		X	X	X	X	

Superglaze® MIG 5183; rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

SuperGlaze® MIG 5356

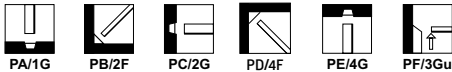
CLASSIFICATION

AWS 5.10/5.10M - ER5356
ISO 18273 - S Al 5356 [AlMg5Cr(A)]
EN 573.3 - EN AW-AlMg5
AA - 5356
Werkstoff 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)



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
+	+	+	+	+	+	+

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	
Unit:	0.5 kg plastic spool S100	X		X	X	X	Other sizes and packaging on request
	7.26kg spool S300	X		X	X	X	
	7.0kg spool BS300	X		X	X	X	
	23-27kg wooden reel			X	X	X	
	136kg Gem-Pak		X		X		
	159kg wooden reel			X	X	X	
	227kg wooden reel			X	X	X	

Superglaze® MIG 5356: rev. EN 24

SuperGlaze® MIG 5356 TM™

CLASSIFICATION

AWS 5.10/5.10M - ER5356
ISO 18273 - S Al 5356 [AlMg5Cr]

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	110-120	240-296	17-26

PHYSICAL PROPERTIES

Melting range : 562 - 633°C
Density : approximately 2640 kg/m³

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	Other sizes and packaging on request
Unit :	70kg spool BS300	X	X	X	
	136kg Gem-Pak	X	X	X	

Superglaze® MIG 5356 TM™ rev. EN 02

SuperGlaze® MIG 5556

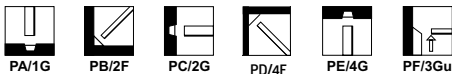
CLASSIFICATION

AWS A5.10/5.10M - ER5556
ISO 18273 - S Al 5556 (AlMg5Mn1Ti)
AA - 5556

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)



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
+

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	Other sizes and packaging on request
Unit :						
0.5 kg plastic spool S100	X	X	X	X		
7.26kg spool S300	X	X	X	X	X	
7.0kg spool BS300	X	X	X	X	X	
23-27kg wooden reel		X	X	X	X	
136 kg Accupak			X	X		
159kg wooden reel		X	X	X	X	
227kg wooden reel		X	X	X	X	

Superglaze® MIG 5556: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

SuperGlaze® MIG 5556A

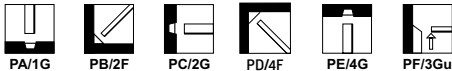
CLASSIFICATION

ISO 18273 - S Al 5556A (AlMg5Mn)
AA - 5556A
EN 573.3 - EN AW AlMg5Mn

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

Aircraft and Military Industry

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	0.8	1.0	1.2	1.6	2.4
Unit:	0.5 kg plastic spool S100	X	X	X	X	
	726kg spool S300	X	X	X	X	X
	70kg spool BS300	X	X	X	X	X
	23-27kg wooden reel		X	X	X	X
	136 kg Accupak			X	X	
	159kg wooden reel		X	X	X	X
	227kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5556A: rev. EN 02

SuperGlaze® MIG 5754

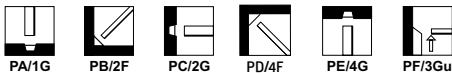
CLASSIFICATION

ISO 18273 - S Al 5754 [AlMg3]
EN 573.3 - EN AW AlMg3
Werkstoff 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)



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

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

General Construction Industry
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	0.8	1.0	1.2	1.6	2.4
Unit : 0.5 kg plastic spool S100	X	X	X	X	
7.26kg spool S300	X	X	X	X	X
70kg spool B5300	X	X	X	X	X
23-27kg wooden reel		X	X	X	X
136 kg Accupak			X	X	
159kg wooden reel		X	X	X	X
227kg wooden reel		X	X	X	X

Other sizes and packaging on request

Superglaze® MIG 5754: rev. EN 02

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

LNM 420FM

CLASSIFICATION

EN 14700 - S Fe8

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)



PA/1G



PB/2F



PC/2G



PD/4F



PE/4G



PF/3Gu

SHIELDING GASES (ACC. ISO 14175)

M21 : Mixed gas Ar+ >15-25% CO₂

CHEMICAL COMPOSITION (W%) TYPICAL WIRES

C	Mn	Cr	Si
0.5	0.4	9.0	3.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

2 Layers, AW

heat resistant to 450°C

Typical hardness values

: approx. 60 HRc

APPLICATION

Dies

Matrix

Parts for agricultural machinery

Transport rolls

Sand pumps

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		1.0	1.2	1.6
Unit :	15 kg spool B300	X	X	X
Other sizes and packaging on request				

LNM 420FM: rev. EN 23

LNM 4M

CLASSIFICATION

EN 14700 - S Fe2

GENERAL DESCRIPTION

Solid wire for hardfacing applications
Hardness approximately HB 325-375
Optimal welding characteristics
Martensitic structure

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% CO₂

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 (360 HB)

APPLICATION

Forming dies
Dies
Impact resistance tools

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit :	15 kg spool B300 X
Other sizes and packaging on request	

LNM 4M; rev. EN 23

TIG RODS

Mild Steel

LNT 25	398
LNT 26	399

Low Alloy Steel

LNT 28	400
LNT Ni1	401
LNT NiMo1	402
LNT Ni2.5	403
LNT 12	404
LNT 19	405
LNT 20	406
LNT 502	407
LNT 9Cr[Pg1]	408

Stainless Steel

LNT 304LSi	409
LNT 304L	410
LNT 347Si	411
LNT 316LSi	412
LNT 316L	413
LNT 318Si	414
LNT 4439Mn	415
LNT 4455	416
LNT 4465	417
LNT 4500	418
LNT 4462	419
LNT 2507	420
LNT Zeron 100X	421
LNT 309LSi	422
LNT 309LHF	423
LNT 307	424
LNT 304H	425
LNT 310	426
LNT 312	427

Nickel alloys

LNT NiCro 31/27	428
LNT NiCro 60/20	429
LNT NiCro 70/19	430
LNT NiCroMo 59/23	431
LNT NiCroMo 60/16	432
LNT NiCu 70/30	433
LNT NiTi	434

Copper alloys

LNT CuAl8	435
LNT CuNi30	436
LNT CuSn6	437
LNT CuSi3	438

Aluminium alloys

SuperGlaze® TIG 1070	439
SuperGlaze® TIG 1100	440
SuperGlaze® TIG 2319	441
SuperGlaze® TIG 4043	442
SuperGlaze® TIG 4047	443
SuperGlaze® TIG 5087	444
SuperGlaze® TIG 5183	445
SuperGlaze® TIG 5356	446
SuperGlaze® TIG 5556	447
SuperGlaze® TIG 5556A	448
SuperGlaze® TIG 5754	449

Autogenous Wires

LNG I	450
LNG II	451
LNG IV	452

TRAINING TIPS & TRICKS

TIG WELDING ALUMINIUM



LNT 25

CLASSIFICATION

AWS A5.18/A5.18M : ER70S-3
EN ISO 636-A : W 42 5 W2Si

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	-50°C
Typical values	I1	AW	450	560	26	170	100

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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	3.0	Note : Cut length = 1000 mm
Unit : 2 and 5 kg tube	X	X	X	X	
Other sizes and packaging on request					

LNT 25: rev. EN 24

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: Material Safety Data Sheets (MSDS) are available on our website.

LNT 26

CLASSIFICATION

AWS A5.18/A5.18M : ER70S-6
EN ISO 636-A : W 42 5 W3Si1

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/mm ²)	Tensile strength (N/mm ²)	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 steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH 36.
Cast steel	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 steel	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	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	3.0
Unit : 2 and 5 kg tube	X	X	X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT 26: rev. EN 24

LNT 28

CLASSIFICATION

AWS A5.28 : ER80S-G

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	3.0
Unit : 5 kg tube	X	X
Other sizes and packaging on request		

Note : Cut length = 1000 mm

LNT 28: rev. EN 22

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LNT Ni1

CLASSIFICATION

AWS A5.28 : ER80S-Ni1
EN ISO 636-A : W 42 6 W3Ni1

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 steel	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 steel	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
Unit : 2 & 5 kg tube	X	X	X
Other sizes and packaging on request			

Note : Cut length = 1000 mm

LNT Ni1: rev. EN 26

LNT NiMo1

CLASSIFICATION

AWS A5.28 - ER100S-G
ISO 16834-A - W Mn3Ni1Mo

GENERAL DESCRIPTION

Alloyed TIG rod suitable for welding high tensile strength steels
Excellent mechanical properties

SHIELDING GASES (ACC. ISO 14175)

It 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

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)
Typical values	It	AW	760	800	18

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
Pipe material	EN 10208-2 API 5LX	L480, L550 X65, X70, X80
Fine grained steel	EN 10025 part 6	S460, S500, S550, S620

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4
Unit: 5 kg tube	X	X

Other sizes and packaging on request

LNT NiMo1 rev. EN 02

GTAW

LNT Ni2.5

CLASSIFICATION

AWS A5.28 - ER80S-Ni2
EN ISO 636-A - W2 Ni2

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)

It 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	Tensile strength	Elongation	Impact ISO-V(J)	
			[N/mm ²]	[N/mm ²]	[%]	-62°C	-90°C
Typical values	It	AW	525	605	28	280	133

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type
General structural steel	EN 10025	S355
Pipe material	EN 10208-2	L360, L415, L445
	API 5 LX	X52, X56, X60, X65
Fine grained steel	EN 10025 part 3	S355, S420, S460
	EN 10025 part 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)	2.0	2.4
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Unit :	2 & 5 kg tube	X	X
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Other sizes and packaging on request

Note : Cut length = 1000 mm

LNT Ni2.5; rev. EN 24

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

LNT 12

CLASSIFICATION

AWS A5.28 - ER70S-A1
ISO 21952-A - W MoSi

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	-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 steel	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
Unit : 2 & 5 kg tube	X	X	X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT 12: rev. EN 24

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LNT 19

CLASSIFICATION

AWS A5.28 - ER80S-B2*
ISO 21952-A - W CrMo1Si

* Nearest classification

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) -10°C
Typical values	I1	AW	442	545	28	177

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)	1.6	2.0	2.4	3.0
Unit : 2 & 5 kg tube	X	X	X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT 19: rev. EN 23

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

LNT 20

CLASSIFICATION

AWS A5.28 - ER90S-B3*

ISO 21952-A - W CrMo2Si

* Nearest classification

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

		Yield strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)		
Shielding gas	Condition				-20°C	-10°C	
Typical values	It	AW	460	605	23	140	141

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	3.0
Unit : 2 & 5 kg tube	X	X	X
Other sizes and packaging on request			

Note : Cut length = 1000 mm

LNT 20: rev. EN 23

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

GTAW



LNT 502

CLASSIFICATION

AWS A5.28 - ER80S-B6
ISO 21952-A - W CrMo5Si

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	SR 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)		1.6	2.0	2.4
Unit :	2 kg tube	X	X	X
	5 kg tube	X		X

Note : Cut length = 1000 mm

LNT 502: rev. EN 24

Other sizes and packaging on request
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Fumes: Material Safety Data Sheets (MSDS) are available on our website.

LNT 9Cr(P91)

CLASSIFICATION

AWS A5.28 - ER90S-B9
ISO 21952-A - W CrMo91

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	500	700	18	70

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	Standard	Type	Standard	Type
Creep and hydrogen resistant steels	EN 10222-2 ASTM	X10CrMo V9-1 steels	ASME	
		A199 Grade T91		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
Unit : 2 & 5 kg tube	X	X
Other sizes and packaging on request		

LNT 9Cr(P91) rev. EN 23

LNT 304LSi

CLASSIFICATION

AWS A5.9 - ER308LSi
ISO 14343-A - W 19 9 L Si

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						+20°C	-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 302, 304	S30453 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 (TP)321H	S32100 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
Unit : 2 / 5 / 10 kg tube	X	X	X	X	X	X

Other sizes and packaging on request

Note : Cut length = 1000 mm

LNT 304LSi rev. EN 22

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

LNT 304L

CLASSIFICATION

AWS A5.9 - ER308L
ISO 14343-A - W 19 9 L

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)

l1 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	Tensile strength	Elongation	Impact ISO-V(J)	
			[N/mm ²]	[N/mm ²]	[%]	+20°C	-196°C
Typical values	l1	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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	[TP]304LN 302, 304	S30453 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 [TP]321H	S32100 S32109
	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
Unit : 2 / 10 kg tube	X	X	X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT 304L: rev. EN 23

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

LNT 347Si

CLASSIFICATION

AWS A5.9 - ER347Si
ISO 14343-A - W 19 9 NbSi

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	Tensile strength	Elongation	Impact ISO-V(J)	
			[N/mm ²]	[N/mm ²]	[%]	+20°C	-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	G-X5CrNiNb19-10	1.4541	[TP]321	S32100
				[TP]321H	S32109
	X6CrNiNb18-10		1.4550	[TP]347	S34700
				[TP]347h	S34709
				CF-8C	J92710
Non stabilized					
		G-X5CrNi19-10		302	
	X4CrNi18-10		1.4301	[TP]304	S30400
	X2CrNi19-11		1.4306	[TP]304L	S30403
			1.4308	CF-8	J92600
			1.4312		
				[TP]304H	S30409

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2
Unit: 2 & 10 kg tube	X	X	X	X

Other sizes and packaging on request

Note: Cut length = 1000 mm

LNT 347Si rev. EN 23

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

LNT 316LSi

CLASSIFICATION

AWS A5.9 - ER316LSi
ISO 14343-A - W 19 12 3 LSi

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	Tensile strength	Elongation	Impact ISO-V(J)	
			[N/mm ²]	[N/mm ²]	[%]	+20°C	-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 CF-3M	S31603 J92800
	X2CrNiMo18-14-3		1.4435	(TP)316L	S31603
	X2CrNiMoN17-12-2		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
Unit : 2 and 10 kg tube	X	X	X	X	X	X	

LNT 316LSi rev. EN 23

Other sizes and packaging on request

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: Material Safety Data Sheets (MSDS) are available on our website.

LNT 316L

CLASSIFICATION

AWS A5.9 - ER316L
ISO 14343-A - W 19 12 3 L

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	Tensile strength	Elongation	Impact ISO-V(J)		
			strength (N/mm ²)	(N/mm ²)	(%)	+20°C	-120°C	-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 CF-3M	S31603 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	316Cb	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
Unit: 10 kg tube	X	X	X	X	X	X
Other sizes and packaging on request						

LNT 316L: rev. EN 23

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



LNT 318Si

CLASSIFICATION

AWS A5.9 - ER318* * Nearest classification
ISO 14343-A - W 19 12 3 NbSi

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	-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 CF-3M	S31603 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)	1.2	1.6	2.0	2.4	3.2
Unit : 10 kg tube	X	X	X	X	X
Other sizes and packaging on request					

LNT 318Si: rev. EN 22

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

LNT 4439Mn

CLASSIFICATION

ISO 14343-A - W 18 16 5 N L* * Nearest classification

GENERAL DESCRIPTION

Solid rod 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

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/mm ²]	Tensile strength [N/mm ²]	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)	1.6	2.0	2.4	3.2
Unit: 2 & 5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 4439Mn: rev. EN 22

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

LNT 4455

CLASSIFICATION

AWS A5.9 - ER316Mn
ISO 14343-A - W 20 16 3 MnL

GENERAL DESCRIPTION

Solid rod for welding fully austenitic CrNiMnMo stainless steels and low temperature steels
Not susceptible for hot cracking

SHIELDING GASES [ACC. ISO 14175]

l1 Inert gas Ar (100%)

APPROVALS

TÜV
+

CHEMICAL COMPOSITION [W%] TYPICAL WIRE

C	Mn	Si	Cr	Ni	Mo	N
0.015	7.0	0.4	20	16	3.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

		0.2% proof strength [N/mm²]	Tensile strength [N/mm²]	Elongation [%]	Impact ISO-V[0] -196°C
Shielding gas	Condition				
Typical values	l1 AW	430	650	35	75

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	12Ni14	1.5637		
		X12Ni5	1.5680		

PACKAGING AND AVAILABLE SIZES

Diameter [mm]	2.0	2.4	Other sizes and packaging on request
Unit : 2 kg tube	X	X	
10 kg tube	X		

LNT 4455: rev. EN 23

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



LNT 4465

CLASSIFICATION

ISO 14343-A - W 25 22 2 N L

GENERAL DESCRIPTION

Solid rod for welding high CrNiMo-alloyed austenitic steels of type 25/22/2
Excellent resistance to strong oxidizing and moderate reducing conditions
Especially for urea applications

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	4.5	0.2	25	23	2.0	0.15

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -10°C
Typical values	I1	AW	360	620	30	80

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI	UNS
Fully austenitic corrosion resistant CrNiMo 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 layer -120 ...+350°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4
Unit : 2 & 5 kg tube	X
Other sizes and packaging on request	

LNT 4465: rev. EN 23

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

LNT 4500

CLASSIFICATION

AWS A5.9 - ER385
ISO 14343-A - W 20 25 5 Cu L

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)

l1 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	l1	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)	1.6	2.0	2.4
Unit : 2 & 10 kg tube	X	X	X
Other sizes and packaging on request			

LNT 4500: rev. EN 23

LNT 4462

CLASSIFICATION

AWS A5.9 - ER2209
ISO 14343-A - W 22 9 3 N L

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/mm ²)	Tensile strength (N/mm ²)	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
Unit : 2 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT 4462: rev. EN 23

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

LNT 2507

CLASSIFICATION

AWS A5.9/A5.9M - ER2594
EN ISO 14343-A - W 25 9 4 N L

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-ferritic stainless alloys of the 25%Cr 7%Ni 4%Mo low-C types.

SHIELDING GASES (ACC. ISO 14175)

It Inert gas Ar (100%)

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J) -40°C
Typical values	It	AW	650	850	23	55

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	ASTM	UNS
25%Cr Superduplex	A182 F53, F55 BS EN 10088-2 X2CrNiMoN25-7-4 [1.4410] SAF 2507[Sandvik/Avesta] Uranus 47N[CLl]	S32750, S32760
Casting	A890 Gr5A, 6A ACI CE3MN	J93404

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)	2.0	2.4	3.2
Unit : 2.5 kg tube	X	X	X

Note : Cut length = 1000 mm

Other sizes and packaging on request

LNT 2507: rev. EN 01

LNT Zeron 100X

CLASSIFICATION

AWS A5.9 - ER2594
ISO 14343-A - W 25 9 4 N L

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/mm ²]	Tensile strength [N/mm ²]	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
		GX6 CrNiMo 24-8-2	1.4463
			2205
			CD-4MCu
			Zeron 100
			S31803
			S32550
			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
Unit : 2 kg tube	X	X	X	X
5 kg tube			X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT Zeron100X: rev. EN 24

LNT 309LSi

CLASSIFICATION

AWS A5.9 - ER309LSi
ISO 14343-A - W 23 12 LSi

GENERAL DESCRIPTION

Solid rod for welding stainless steel to carbon steel
With high silicon for improved wettability

SHIELDING GASES (ACC. ISO 14175)

l1 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	l1	AW	400	600	35	65

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
Corrosion resistant cladsteels	X2CrNiN18-10	1.4311	(TP)304LN
	X2CrNi19-11	1.4306	(TP)304L
			CF-3
	X4CrNi18-10	1.4301	(TP)304

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)	1.0	1.2	1.6	2.0	2.4	3.2
Unit : 2.5 & 10 kg tube	X	X	X	X	X	X

Note : Cut length = 1000 mm

Other sizes and packaging on request

LNT 309LSi rev. EN 22

LNT 309LHF

CLASSIFICATION

AWS A5.9 - ER309L
ISO 14343-A - W 23 12 L

GENERAL DESCRIPTION

Solid rod for welding stainless steel to carbon steel
Low susceptibility 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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						+20°C	+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	2.4
Unit : 2 kg tube	X		
10 kg tube	X	X	X
Other sizes and packaging on request			

LNT 309LHF rev. EN 24

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

LNT 307

CLASSIFICATION

AWS A5.9 - ER307* * Nearest classification
ISO 14343-A - W 18 8 Mn

GENERAL DESCRIPTION

Solid rod for welding austenitic and ferritic stainless steels with difficult weldability
Often used as a buffer layer for hardfacing applications

SHIELDING GASES (ACC. ISO 14175)

I1 Inert gas Ar (100%)

APPROVALS

TÜV DB
+ +

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	Mn	Si	Cr	Ni
0.07	71	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	I1	AW	400	650	35	100

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)	1.6	2.0	2.4
Unit :	5 kg tube	X		X
	10 kg tube		X	X

Other sizes and packaging on request

LNT 307 rev. EN 22

LNT 304H

CLASSIFICATION

AWS A5.9 - ER308H
ISO 14343-A - W 19 9 H

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

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 (TP)304H	S30400 S30409
		G-X5CrNi19-10	1.4308 1.4948	CF 8	J92600

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	2.4	3.2
Unit : 2 & 10 kg tube	X	X	X
Other sizes and packaging on request			

LNT 304H rev. EN 21

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: Material Safety Data Sheets (MSDS) are available on our website.

LNT 310

CLASSIFICATION

AWS A5.9 - ER310
ISO 14343-A - W 25 20

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)

l1 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	l1	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	3.2
Unit : 2 & 10 kg tube	X	X	X	X

Other sizes and packaging on request

LNT 310 rev. EN 22

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: Material Safety Data Sheets (MSDS) are available on our website.

LNT 312

CLASSIFICATION

AWS A5.9 - ER312

ISO 14343-A - W 29 9

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
0.1	1.8	0.4	30.7	8.9

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength [N/mm ²]	Tensile strength [N/mm ²]	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) 2.4

Unit : 5 kg tube X

Other sizes and packaging on request

LNT 312 rev. EN 01

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

LNT NiCro 31/27

CLASSIFICATION

AWS A5.9 - ER383
ISO 14343-A - W 27 31 4 Cu L

GENERAL DESCRIPTION

Solid rod 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

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	Cu
0.01	1.5	0.2	31	27	3.5	1.0

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	0.2% proof strength N/mm ²	Tensile strength (N/mm ²)	Elongation [%]	Impact ISO-V(J)	
						+20°C	-196°C
Typical values	I1	AW	400	600	35	120	80

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			
	NiCr21Mo	2.4858	Alloy 825	N08825
	NiCr21Mo6Cu	2.6410	Alloy 825 h Mo	N08821
	X3NiCrCuMoTi 27-23	1.4503		

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	Note : Cut length = 1000 mm
Unit : 2 kg tube	X	
Other sizes and packaging on request		

LNT NiCro 31/27: rev. EN 23

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

LNT NiCr 60/20

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCrMo-3
ISO 18274 - S Ni 6625 (NiCr22Mo9Nb)

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

			0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)	
Shielding gas Condition						+20°C	-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
Unit : 2 610 kg tube	X	X	X	X
Other sizes and packaging on request				

Note : Cut length = 1000 mm

LNT NiCr 60/20: rev. EN 22

GTAW

LNT NiCro 70/19

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCr-3
ISO 18274 - S Ni 6082 (NiCr20Mn3Nb)

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

Typical values	Shielding gas	Condition	0.2% proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)	
			400	680	40	+20°C	-196°C
	I1	AW				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	
		NiCr20TiAl	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
Unit : 2 810 kg tube	X	X	X

Note : Cut length = 1000 mm

Other sizes and packaging on request

LNT NiCro 70/19; rev. EN 23



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

LNT NiCrMo 59/23

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCrMo-13

ISO 18274 - S Ni 6059 (NiCr23Mo16)

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/mm ²)	Tensile strength (N/mm ²)	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
Unit : 2 kg tube	X	X	X

Other sizes and packaging on request

Note : Cut length = 1000 mm

LNT NiCrMo 59/23: rev. EN 22

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

LNT NiCrMo 60/16

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCrMo-4
ISO 18274 - S Ni 6276 (NiCr15Mo16Fe6W4)

GENERAL DESCRIPTION

Solid rod for welding CrMoW-alloyed nickel alloys (e.g. Alloy C276)
Depending on the corrosion requirements also applicable for welding C-22 and C-4
Extreme resistance to corrosion environments containing sulphuric acid and chlorides
Applicable for surfacing in high temperature applications (up to 1200°C)

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	Cr	Mo	W	Fe
0.006	0.5	0.04	58	16	16	3.6	5.8

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Shielding gas	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	I1	AW	410	720	27	100

EXAMPLES OF MATERIALS TO BE WELDED

Ni-alloy grades	DIN/EN	Mat. Nr.	ASTM/ACI	UNS
Ni Base high CrMo steel for high corrosion environments	NiMo16Cr15W	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiMo16Cr16Ti	2.4610	C-4	N06455

- LNT/LNM NiCrMo 60/16 is developed for welding C-276 material
- Can also be applied for welding C-22 and C-4, depending on the corrosion requirements

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.4
Unit : 10 kg tube	X	X
Other sizes and packaging on request		

Note : Cut length = 1000 mm

LNT NiCrMo 60/16: rev. EN 23

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

LNT NiCu 70/30

CLASSIFICATION

AWS A5.14/A5.14M - ERNiCu-7
ISO 18274 - S Ni 4060 (NiCu30MnTi)

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						+20°C	-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
Unit :	2 kg tube	X	X	X	X
	10 kg tube	X		X	X

Note : Cut length = 1000 mm

Other sizes and packaging on request

LNT NiCu 70/30: rev. EN 24

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

LNT NiTi

CLASSIFICATION

AWS A5.14/A5.14M - ERNi1
ISO 18274 - S Ni 2061 [NiTi3]

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
Unit : 2 & 10 kg tube	X	X
Other sizes and packaging on request		

Note : Cut length = 1000 mm

LNT NiTi: rev. EN 22

LNT CuAl8

CLASSIFICATION

AWS A5.7 - ERCuAl-A1
EN ISO 24373 - S Cu 6100 [CuAl8]

GENERAL DESCRIPTION

Solid rod for welding copper-aluminium alloys, as aluminiumbronze
High resistance to corrosion and wear

SHIELDING GASES (ACC. ISO 14175)

- I1 Inert gas Ar (100%)
- I3 Inert gas Ar+ 0.5-95% He

CHEMICAL COMPOSITION (W%) TYPICAL WIRE

C	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)	2.0
Unit : 2 kg tube	X
Other sizes and packaging on request	

LNT CuAl8: rev. EN 22

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

LNT CuNi30

CLASSIFICATION

AWS A5.7 - ERCuNi
EN 14640 - S Cu 7158 [CuNi30]

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(I) +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	3.2
Unit : 2 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT CuNi30 rev. EN 22

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



LNT CuSn6

CLASSIFICATION

AWS A5.7 - ERCuSn-A
EN ISO 24373 - S Cu 5180 (CuSn6P)

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	4.0
Unit : 2 kg tube	X	X	X	X
10 kg tube	X	X	X	

Other sizes and packaging on request

LNT CuSn6: rev. EN 25

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

LNT CuSi3

CLASSIFICATION

AWS A5.7 - ERCuSi-A
EN ISO 24373 - S Cu 6560 [CuSi3Mn1]

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)	1.6	2.0	2.4
Unit : 2 kg tube	X	X	X
Other sizes and packaging on request			

Note : Cut length = 1000 mm

LNT CuSi3 rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

SuperGlaze® TIG 1070

CLASSIFICATION

ISO 18273 - S Al 1070 (Al99.7)
W. 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 rod and requires extra care to ensure good feeding

SHIELDING GASES (ACC. ISO 14175)

It Inert gas Ar (100%)
Flow Rate : 8 - 15 L/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%

MECHANICAL PROPERTIES. TYPICAL. ALL WELD METAL

	Shielding gas	Condition	Yield strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	It	AW	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range : 647 - 658°C
Density : approximately 2700 kg/m³

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X
Other sizes and packaging on request						

Note : Cut length = 1000 mm

Superglaze® TIG 1070: rev. EN 01

SuperGlaze® TIG 1100

CLASSIFICATION

AWS 5.10/5.10M - R1100
ISO 18273 - S Al 1100 (Al99.0Cu)
EN 573.3 - EN AW-Al99.0Cu
AA - 1100

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 rod wire and requires extra care to ensure good feeding

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
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
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	20-30	65-80	29-35

PHYSICAL PROPERTIES

Melting range : 647 - 658°C
Density : approximately 2700 kg/m³

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X

Note : Cut length = 1000 mm

Other sizes and packaging on request

Superglaze® TIG 1100: rev. EN 01

SuperGlaze® TIG 2319

CLASSIFICATION

AWS 5.10/5.10M - R2319
ISO 18273 - S Al 2319 (AlCu6MnZrTi)
EN 573.3 - EN AW-AlCu6Mn
AA - 2319

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 where high temperature properties are required

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.	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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

Aircraft applications
Spacecraft industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X
Other sizes and packaging on request						

Note : Cut length = 1000 mm

Superglaze® TIG 2319: rev. EN 01

SuperGlaze® TIG 4043

CLASSIFICATION

AWS 5.10/5.10M - R4043
ISO 18273 - S Al 4043A (AlSi5)
EN 573.3 - EN AW-AlSi5
AA - 4043
Werkstoff Nr. - 3.2245

GENERAL DESCRIPTION

Designed for welding heat treatable base alloys and more specifically 6xxx Series Alloys
Lower melting point and fluidity than 5xxx series filler alloys
Low sensitivity to weld cracking with 6xxx base alloys
Suitable for sustained elevated temperature service. i.e. above 659C

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/mm²)	Tensile strength (N/mm²)	Elongation [%]
Typical values	I1	AW	20-40	120-165	3-18

PHYSICAL PROPERTIES

Melting range : 573 - 625°C
Density : approximately 2680 kg/m3

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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
Unit : 5 kg cardboard box	X	X	X	X	X	X
Other sizes and packaging on request						

Note : Cut length = 1000 mm

Superglaze® TIG 4043: rev. EN 22

SuperGlaze® TIG 4047

CLASSIFICATION

AWS A5.10/5.10M - R4047
ISO 18273 - S Al 4047 [AlSi12]
EN 573.3 - EN AW-AlSi12
AA - 4047
Werkstoff 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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

For welding 6XXX alloys. and most casting alloys
Automotive components , radiators and air conditioning

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X
Other sizes and packaging on request						

Note : Cut length = 1000 mm

SuperGlaze® TIG 4047: rev. EN 22

SuperGlaze® TIG 5087

CLASSIFICATION

ISO 18273 - S Al 5087 (AlMg4,5MnZr)
EN 573.3 - EN AW-AlMg4,5MnZr
AA - 5087
Werkstoff 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	WlWeb	
+	+	+	+	+	<i>*(Valid for I1 and I3 gases)</i>

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	
Unit : 5 kg cardboard box	X	X	X	X	X	X	
Other sizes and packaging on request							

Note : Cut length = 1000 mm

Superglaze® TIG 5087: rev. EN 02

SuperGlaze® TIG 5183

CLASSIFICATION

AWS 5.10/5.10M - R5183
ISO 18273 - S Al 5183 [AlMg4.5Mn0.7(Al)]
EN 573.3 - EN AW-AlMg4.5Mn
AA - 5183
Werkstoff 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	Wiwib
+	+	+	+	+	+	+	+

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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X
Other sizes and packaging on request						

Note : Cut length = 1000 mm

Superglaze® TIG 5183: rev. EN 23

SuperGlaze® TIG 5356

CLASSIFICATION

AWS A5.10/5.10M - R5356
ISO 18273 - S Al 5356 [AlMg5Cr(A)]
EN 573.3 - EN AW-AlMg5
AA - 5356
Werkstoff 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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	4.8	
Unit : 5 kg cardboard box	X	X	X	X	X	X	
Other sizes and packaging on request							

Note : Cut length = 1000 mm

Superglaze® TIG 5356 rev. EN 22

SuperGlaze® TIG 5556

CLASSIFICATION

AWS 5.10/5.10M - R5556
ISO 18273 - S Al 5556 (AlMg5Mn1Ti)
AA - 5556

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

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/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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

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	3.2	4.0	4.8	
Unit : 5 kg cardboard box	X	X	X	X	X	X	
Other sizes and packaging on request							Note : Cut length = 1000 mm

Superglaze® TIG 5556 rev. EN 01

SuperGlaze® TIG 5556A

CLASSIFICATION

ISO 18273 - S Al 5556A (AlMg5Mn)
AA - 5556A
EN 573.3 - EN AW AlMg5Mn

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

SHIELDING GASES (ACC. ISO 14175)

I1 : Inert gas Ar (100%)
I3 : Inert gas Ar+ 0.5-95% He
Flow Rate : 8 - 15 L/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

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

Aircraft and Military Industry

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X

Note : Cut length = 1000 mm

Other sizes and packaging on request

Superglaze® TIG 5356A rev. EN 01

SuperGlaze® TIG 5754

CLASSIFICATION

ISO 18273 - S Al 5754 [AlMg3]
EN 573.3 - EN AW AlMg3
Werkstoff 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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]
Typical values	I1	AW	70-80	180-200	15-20

PHYSICAL PROPERTIES

Melting range : 580 - 642°C
Density : approximately 2660 kg/m3

EXAMPLES OF MATERIALS TO BE WELDED

Refer to "Selection table - Filler Metal Guide for Aluminium" p.48

APPLICATIONS

General Construction Industry
Automotive bumpers and supports

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6	2.0	2.4	3.2	4.0	4.8
Unit : 5 kg cardboard box	X	X	X	X	X	X
Other sizes and packaging on request						

Note : Cut length = 1000 mm

Superglaze® TIG 5754: rev. EN 01

LNG I

CLASSIFICATION

AWS A5.2 - R45* * Nearest classification
EN 12536 - O I

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	Tensile strength	Elongation	Impact ISO-V(J)
		(N/mm²)	(N/mm²)	(%)	+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 steel	S185 up to S275

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0	3.0
Unit : 5 kg carton box	X	X

Other sizes and packaging on request

LNG I: rev. EN 23

LNG II

CLASSIFICATION

AWS A5.2 - R60* * Nearest classification
EN 12536 - O II

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

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 steel	S185 up to S275

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.6	2.0	2.5	3.0	4.0
Unit:	5 kg carton box	X	X	X	X	X

Other sizes and packaging on request

LNG II: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

LNG IV

CLASSIFICATION

AWS A5.2 - R65* * Nearest classification
EN 12536 - O IV

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/mm ²)	Tensile strength (N/mm ²)	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 steel		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
Unit :	5 kg carton box	X	X	X	X

Other sizes and packaging on request

LNG IV: rev. EN 23

FLUX-CORED WIRES

Metal Cored, un and low alloyed

Outershield® MC700	454
Outershield® MC710-H	456
Outershield® MC710C-H	458
Outershield® MC715-H	460
Outershield® MC715-Ni1-H	462
Outershield® MC420N-H	464
Outershield® MC460VD-H	466

Rutile and Basic, Un-alloyed

Outershield® 70-H	468
Outershield® 70E-H	470
Outershield® 71C	472
Outershield® 71E	474
Outershield® 71E-H	476
Outershield® 71M-H	478
Outershield® T55-H	480

Rutile, Low alloyed

Outershield® 81Ni1-H	482
Outershield® 81Ni1-HSR	484
Outershield® 81NiC-H	486
Outershield® 81K2-H	488
Outershield® 81K2-HSR	490
Outershield® 91Ni1-HSR	492
Outershield® 91K2-HSR	494
Outershield® 101Ni1-HSR	496
Outershield® 690-H	498
Outershield® 690-HSR	500

Rutile and Metal Cored, weather resistant

Outershield® 500CT-H	502
Outershield® 555CT-H	504
Outershield® MC555CT-H	506

Rutile, Heat and Creep Resistant

Outershield® 12-H	508
Outershield® 19-H	510
Outershield® 20-H	512

Mild and low alloy steel, self shielded

Innershield® NR®-152	514
Innershield® NR®-203 NiC	516
Innershield® NR®-203Ni1	518
Innershield® NR®-211-MPE	520
Innershield® NR®-232	522
Innershield® NR®-233	524
Innershield® NR®-207	526
Innershield® NR®-207-H	528
Innershield® NR®-208-H	530
Innershield® NR®-305	532
Innershield® NR®-311	534
Innershield® NR®-400	536
Innershield® NR®-450-H	538
Innershield® NR®-3ME	540

Stainless steel, gas shielded

Cor-A-Rosta® 304L	542
Cor-A-Rosta® P304L	544
Cor-A-Rosta® 347	546
Cor-A-Rosta® 316L	548
Cor-A-Rosta® P316L	550
Cor-A-Rosta® 309L	552
Cor-A-Rosta® P309L	554
Cor-A-Rosta® 309MoL	556
Cor-A-Rosta® P309MoL	558
Cor-A-Rosta® 4462	560
Cor-A-Rosta® P4462	562

Nickel alloys

NiCro-Cor P60/20	564
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Hardfacing, self shielded

Lincore® 33	566
Lincore® 40-O	568
Lincore® 50	570
Lincore® 55	572
Lincore® 60-O	574
Lincore® T&D	576
Lincore® 15CrMn	578
Lincore® 420	580
Lincore® M	582

OUTERSHIELD 690-H

High Strength Flux Cored Wire

TAKEN TO THE NEXT LEVEL



Outershield® MC700

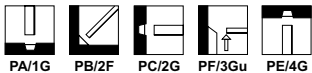
CLASSIFICATION

AWS A5.18/A5.18M : E70C-6M H8
EN ISO 17632-A : T 46 2 M M 2 H10

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						-20°C	-30°C
Required: AWS A5.18 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 47	min. 27
Typical values	M21	AW	475	560	24	75	45

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		1.2
Unit:	15 kg spool B300	X

Outershield® MC700: rev. EN 05

Outershield® MC700

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

FCAW

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

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/A5.18M : E70C-6M H4
EN ISO 17632-A : T 46 3 M M 2 H5 (ø1.2 and 1.6 mm) / T 46 2 M M 2 H5 (ø2.0 and 2.4 mm)

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%) CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DB	DNV	GL	LR	RINA	RMRS	TÜV
M21	3YSAH5	SA3YMH5	+	IIIYMS(H5)	3YH55	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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J]		
						-20°C	-29°C/-30°C	-40°C
Required: AWS A5.18 EN ISO 17632-A (1.2-1.6)			min. 400 min. 460	min. 480 530-680	min. 22 min. 20		min. 27 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)	1.2	1.4	1.6	2.4
Unit : 4.5 kg plastic spool S200	X			
15 kg spool B300		X	X	
25 kg wire reel B435		X	X	X
200 kg Accutrak® Drum	X	X	X	
270 kg metal coil			X	

Outershield® MC710-H: rev. EN 21

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: Material Safety Data Sheets (MSDS) are available on our website.

Outersheild® MC710-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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)% CO₂

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		
2.0	300-510A	300-510A			
	28-33V	28-33V			
2.4	400-550A	400-550A			
	32-36V	32-36V			

Outershield® MC710C-H

CLASSIFICATION

AWS A5.18/A5.18M : E70C-6C H4
EN ISO 17632-A : T 46 3 M C 2 H5

GENERAL DESCRIPTION

All position high efficiency CO₂ 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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-29°C/-30°C
Required: AWS A5.18 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20		min. 27 min. 47
Typical values	C1	AW	490	585	27	90	70

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool B300	X

Outershield® MC710C-H: rev. EN 25

Outershield® MC710C-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
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

FCAW

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

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

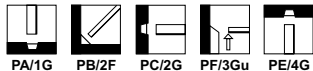
CLASSIFICATION

AWS A5.18/A5.18M : E70C-6M H4
EN ISO 17632-A : T 46 4 M M 2 H5

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 >47) at -40°C
Superior product consistency with optimal alloy control
Depending on application good alternative for basic flux cored wires

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	BV	DB	DNV	GL	RINA
M21	SA3,3YMH	+	IV Y40H5	4Y40H5S	4Y5H5

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 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20		min. 47	
Typical values	M21	AW	480	580	27	120	110	80
	M21	SR	430	485	30			

SR : 2h/640°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.4	1.6
Unit : 4.5 kg plastic spool S200	X		
15 kg spool B300	X		X
200 kg Accutrak® Drum	X	X	X

Outershield® MC715-H: rev. EN 26

Outershield® MC715-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

FCAW

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + [15-25]% CO₂

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

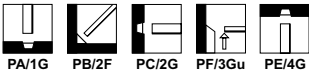
CLASSIFICATION

AWS A5.28 : E80C-Ni1M H4
EN ISO 17632-A : T 46 5 1Ni M M 2 H5

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 >47) 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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm²]	Tensile strength [N/mm²]	Elongation [%]	Impact ISO-V[J]		
						-40°C	-50°C	-60°C
Required: AWS A5.28 EN ISO 17632-A			min. 470 min. 460	min. 550 530-680	min. 24 min. 20	min. 27		
Typical values	M21	AW	530	600	25	100	80	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 15 kg spool B300	X	X

Outershield® MC715Ni1-H: rev. EN 04

Outershield® MC715Ni1-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355, S460
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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)% CO₂

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
1.6	280-460A		270-300A		
	28-36V		28-30V		

Outershield® MC420N-H

CLASSIFICATION

AWS A5.28/A5.28M : E70C-GM H4
EN ISO 17632-A : T 38 Z Z M M 2 H5

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%) CO₂
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)
Typical values	M21	N	353	493	32	-50°C 57

N = 900°C/4h

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 15 kg spool B300	X	X
200 kg Accutrak® Drum		X

Outershield® MC420N-H: rev. EN 26

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: Material Safety Data Sheets (MSDS) are available on our website.

Outershield® MC420N-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
EN 10028-3	P275N, P355N
Fine grained steel	
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	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]% CO₂

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

Outershield® MC460VD-H

CLASSIFICATION

AWS A5.18/A5.18M : E70C-6M H4
EN ISO 17632-A : T 46 2 M M 1 H5

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%) CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DNV	GL	LR
M21	3YSA,H5	SA3YMHHH	IIIIYMSH5	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-29°C
Required: AWS A5.18 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 47	min. 27
Typical values	M21	AW	510	600	25	90	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	
Unit : 4.5 kg plastic spool S200	X
15 kg spool B300	X

Outershield® MC460VD-H: rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

Outershield® MC460VD-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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)% CO₂

Diameter (mm)	Welding positions			
	PB/2F	PC/2G	PF/3Gup	PE/4G
1.2	250-300A	250-300A	200-220A	200-220A
	26-30V	26-30V	21-24V	23-25V

Outershield® 70-H

CLASSIFICATION

AWS A5.20/A5.20M : E70T-1C-H4 / E70T-1M-H4
EN ISO 17632-A : T 46 0 R C 3 H5 / T 46 0 R M 3 H5

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
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 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 47	min. 27	
Typical values	C1 M21	AW AW	480 530	560 610	26 27	80 70		50 40

PACKAGING AND AVAILABLE SIZES

Diameter [mm]	2.4
Unit : 25kg wire reel B435	X
270kg wooden reel	X

Outershield® 70-H: rev. EN 24

Outershield® 70-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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% CO₂

Diameter (mm)	Welding positions	
	PA/1G	PB/2F
2.4	410-560A	410-510A
	27-34V	28-32V

Outershield® 70E-H

CLASSIFICATION

AWS A5.20/A5.20M : E70T-1C-JH4 / E70T-1M-JH4
EN ISO 17632-A : T 46 3 R C 3 H5 / T 46 3 R M 3 H5

GENERAL DESCRIPTION

Gas shielded flux cored wire for high quality welding in downhand position
Excellent operator appeal due to superior welding characteristics
Capability with high deposition rate
Exceptional mechanical properties (CVN > 47J at -30°C)
Superior product consistency with optimal alloy control
Excellent wire feeding
Very suitable for welding of root runs on ceramic backing and welding on primed plate

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

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

Shielding gas	C	Mn	Si	P	S	HDM
M21/C1	0.04	1.45	0.60	0.015	0.010	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)	
						-30°C	-40°C
Required: AWS A5.20 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 47	min. 27
Typical values	M21/C1	AW	570	620	25	55	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6
Unit: 15 kg spool B300	X

Outershield® 70E-H: rev. EN 26

Outershield® 70E-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-25	3.1	1.20
		635	275	24-26	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.5	1.20
		1015	385	28-30	6.3	1.20
		1080	400	29-31	6.7	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

Diameter (mm)	Welding positions	
	PA/1G	PB/2F
1.6	250-350A	250-350A
	24-32V	24-32V

Outershield® 71C

CLASSIFICATION

AWS A5.20/A5.20M : E71T-1C-H8/E71T-9C-H8
EN ISO 17632-A : T 46 3 P C 1 H10

GENERAL DESCRIPTION

Rutile gas shielded flux cored wire developed for CO₂ shielding gas
Good mechanical properties (CVN > 47J at -30°C)
Smooth arc action and metal transfer; easy slag removal
Suitable for welding with ceramic backing
Applications include general fabrication, shipbuilding, building or bridge assembling

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC + : Active gas 100% CO₂
C1 Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	CRS	DNV	GL	LR	PRS	RINA	NKK	RMRS	CE
C1	3Y400SAH10	3YSH10	3YH10S	IIIV40MS[H10]	3YH10S	3YSH10	3YSH10	3YSH10	KSWS3G[C]H10	3YSH10	+

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

Shielding gas	C	Mn	Si	P	S	HDM
C1	0.05	1.4	0.4	0.015	0.010	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)		
						-18°C	-29°C	-30°C
Required: AWS A5.20 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 27 ⁽¹⁾	min. 27 ⁽²⁾	min. 47
Typical values	C1	AW	615	660	23	120		85

¹: E71T-1 requirement
²: E71T-9 requirement

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 5 kg plastic spool S200	X
15 kg spool S300	X

Outershield® 71C: rev. EN 08

Outershield® 71C

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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	125	21-23	1.5	1.21
		572	150	23-25	1.9	1.21
		699	170	24.26	2.4	1.21
		826	185	25-28	2.9	1.21
		953	210	26-28	3.3	1.21
		1080	230	27-29	3.7	1.21
		1207	245	28-30	4.2	1.21
		1524	285	30-32	5.3	1.21

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS 100% CO₂

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PH/5Gup	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	170-220A	160-220A
	26-32V	26-32V	25-30V	25-28V	26-28V	23-26V

Outershield® 71E

CLASSIFICATION

AWS A5.20/A5.20M : E71T-1M-JH8
EN ISO 17632-A : T 46 3 P M 1 H10

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)
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%) CO₂
Flow rate : 15-25 l/min

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

Shielding gas	C	Mn	Si	P	S	HDM
M21	0.05	1.25	0.7	0.015	0.015	<8 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)	
						-30°C	-40°C
Required: AWS A5.20 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 47	min. 27
Typical values	M21	AW	600	650	24	100	75

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.6
Unit : 15 kg spool B300	X

Outershield® 71E: rev. EN 24

Outershield® 71E

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-25	3.1	1.20
		635	275	24-26	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.5	1.20
		1015	385	28-30	6.3	1.20
		1080	400	29-31	6.7	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G
1.6	250-350A	250-350A	230-280A	220-260A	170-240A	170-240A
	24-32V	24-32V	24-30V	22-28V	22-28V	22-28V

Outershield® 71E-H

CLASSIFICATION

AWS A5.20/A5.20M : E71T-1M-JH4 / E71T-1C-H4
EN ISO 17632-A : T 46 3 P M 1 H5 / T 42 0 P C 1 H5

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%CO₂ shielding gas. Suitable for use with C1 100%CO₂

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%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	DB	DNV	GL	LR	RINA	RMRS	TÜV
M21	3YSAH5	SA3YMH5	+	IIYMS(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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)			
						0°C	-20°C	-30°C	-40°C
Required: AWS A5.20 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20			min. 47	min. 27
Typical values	M21 C1	AW AW	570 520	620 575	25 24	80	90	65	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 5kg plastic spool S200	X
15 kg spool B300	X
200kg Accutrak® Drum	X

Outershield® 71E-H; rev. EN 29

Outershield® 71E-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G
1.2	230-260A	230-260A	200-240A	200-240A	160-220A	160-220A
	26-32V	26-32V	25-30V	25-28V	23-26V	23-26V

Outershield® 71M-H

CLASSIFICATION

AWS A5.20/A5.20M : E71T-1C-JH4
EN ISO 17632-A : T 46 2 P C 1 H5

GENERAL DESCRIPTION

Rutile gas shielded flux cored wire for high quality welding
Excellent operator appeal due to superior welding characteristics
Specially developed for welding with 100% CO₂; smooth arc with low spatter
Suitable for welding coated plate with use of 100% CO₂
Also suitable for welding on ceramic backing
Good mechanical properties (CVN > 47J at -20°C)
By preference use OS 71 E-H for Ar/CO₂ shielding gas

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	ABS	BV	CRS	NKK	DB	DNV	GL	LR	RINA	RMRS
C1	3YSAH5	SA3YMH5	3YH5S	KSW53G(C)H5	+	III Y40(H5)	3Y46H5S	3YSH5	3YSH5	3MSH5,3Y40MSH5

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

Shielding gas	C	Mn	Si	P	S	HDM
C1	0.05	1.3	0.4	0.015	0.010	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)	
						-20°C	-40°C
Required: AWS A5.20 EN ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 47	min. 27
Typical values	C1	AW	580	620	24	80	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit: 15 kg spool B300	X	X

Outershield® 71M-H; rev. EN 27

Outershield® 71M-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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	21-23	1.7	1.20
		700	170	22-24	2.3	1.20
		955	220	25-27	3.3	1.20
		1270	260	27-29	4.5	1.20
		1590	290	30-32	5.6	1.20
1.6	20	320	180	21-23	2.2	1.20
		510	255	22-25	3.3	1.20
		635	300	24-26	4.2	1.20
		760	335	25-27	5.0	1.20
		890	370	27-29	5.8	1.20
		1015	395	28-30	6.5	1.20
		1080	415	29-31	7.0	1.20

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

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® T55-H

CLASSIFICATION

AWS 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

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC -
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
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	-40°C	-50°C
Required: AWS A5.20 EN ISO 17632-A			min. 400 min. 420	min. 480 500-640	min. 22 min. 20		min. 27 min. 47	
Typical values	M21	AW SR	480 425	570 550	27 27	130	85 80	60

SR : 15h/580°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 4.5 kg plastic spool S200	X	
15 kg spool B300	X	X
25kg wire reel B435		X

Outershield® T55-H : rev. EN 27

Outershield® T55-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

FCAW

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

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/A5.29M : E81T1-Ni1M-JH4 (all diameters)
EN ISO 17632-A : T 50 5 1Ni P M 2 H5 (only diameter 1.2 mm)

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
Meet NACE MR-0175 requirements
For PWHT, use Outershield 81Ni1-HSR

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ >15-25% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-40°C	-50°C
Required: AWS A5.29 EN ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18	min. 27	min. 47
Typical values	M21	AW	530	600	24	90	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.2	1.4	1.6	2.0
Unit :	4.5 kg plastic spool S200	X			
	14 kg S300 (alu bag)		X	X	X
	15 kg spool B300	X	X	X	
	15 kg spool BS300	X		X	X

Outershield® 81Ni1-H: rev. EN 28

Outershield® 81Ni1-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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 + [$\geq 15-25$] % CO₂

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

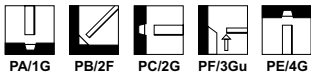
CLASSIFICATION

AWS A5.29/A5.29M : E81T1-Ni1M-JH4
EN ISO 17632-A : T 50 5 1Ni P M 2 H5 T

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
Meet NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS [ISO 14175]

DC +
M21 : Mixed gas Ar+ >15-25% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-40°C	-50°C
Required: AWS A5.29 EN ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18	min. 27	min. 47
Typical values	M21	AW SR	530 525	600 590	24 25	90	60 70

SR 1h/600°C, 3G up - V45°

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 4.5 kg plastic spool S200	X
14 kg S300 (alu bag)	X
15 kg spool B300	X

Outershield® 81Ni1-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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]% CO₂

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® 81Ni1C-H

CLASSIFICATION

AWS A5.29/A5.29M : E81T1-Ni1C-JH4
EN ISO 17632-A : T 50 4 1Ni P C 2 H5

GENERAL DESCRIPTION

All position 100% CO₂ 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 >47) at -40°C
Superior product consistency with optimal alloy control
Excellent wire feeding
Meet NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PF/3Gu



PG/3Gd



PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
C1 : Active gas 100% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)
						-40°C
Required: AWS A5.29 EN ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18	min. 27 min. 47
Typical values	C1	AW	530	600	24	80

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool B300	X

Outershield® 81Ni1C-H: rev. EN 03

Outershield® 81Ni1C-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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)% CO₂

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

Outershield® 81K2-H

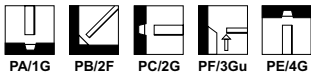
CLASSIFICATION

AWS A5.29/A5.29M : E81T1-K2M-JH4 (all diameters)
EN ISO 17632-A : T 50 6 1.5Ni P M 2 H5 (only diameter 1.2 mm)

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ >15-25% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
						-40°C	-50°C	-60°C
Required: AWS A5.29 EN ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18	min. 27		min. 47
Typical values	M21	AW	590	630	23	130	100	80

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 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. EN 27

Outershield® 81K2-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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)% CO₂

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

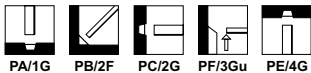
CLASSIFICATION

AWS A5.29/A5.29M : E81T1-K2M-JH4
EN ISO 17632-A : T 50 6 1.5Ni P M 2 H5 T

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% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
						-40°C	-50°C	-60°C
Required: AWS A5.29 EN ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18	min. 27		min. 47
Typical values	M21	AW SR	590 570	630 620	23 23	140	100	80 85

SR 1h/600°C, 3G up - V45°

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit: 15 kg spool B300	X

Outershield® 81K2-HSR: rev. EN 26

Outershield® 81K2-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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)% CO₂

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

Outershield® 91Ni1-HSR

CLASSIFICATION

AWS A5.29/A5.29M : E91T1-GM-H4
ISO 18276-A : T 55 4 1NiMo P M 2 H5

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
Meet NACE MR-0175 requirements

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PF/3Gu



PH/5Gu



PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ >15-25% CO₂
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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[J] -40°C
Required: AWS A5.29 ISO 18276-A			min. 540 min. 550	620-760 640-820	min. 17 min. 18	min. 47
Typical values	M21	AW	640	700	19	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	
Unit : 4.5 kg plastic spool S200	X
14 kg spool S300	X
15 kg spool B300	X

Outershield® 91Ni1-HSR; rev. EN 06

Outershield® 91Ni1-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH, P460GH
Fine grained steel	
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)% CO₂

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

Outershield® 91K2-HSR

CLASSIFICATION

AWS A5.29/A5.29M : E91T1-GM-H4
ISO 18276-A : T 55 4 1,5NiMo P M 2 H5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PH/5Gu



PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ >15-25% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)
						-40°C
Required: AWS A5.29 ISO 18276-A			min. 540 min. 550	620-760 640-820	min. 17 min. 18	min. 47
Typical values	M21	AW	640	700	19	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 4.5 kg plastic spool S200	X
14 kg spool S300	X
15 kg spool B300	X

Outershield® 91K2-HSR; rev. EN 06

Outershield® 91K2-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH, P460GH
Fine grained steel	
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)% CO₂

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

Outershield® 101Ni1-HSR

CLASSIFICATION

AWS A5.29/A5.29M : E101T1-G-H4

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
Meet NACE MR-0175 requirements

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% CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-40°C	-50°C
Required: AWS A5.29			min. 610	830	min. 16		min. 27
Typical values	M21	AW	750	810	17	60	40
		SR	690	7780	18		50

SR: 4h/645°C

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 14 kg spool S300	X
	X

Outershield® 101Ni1-HSR: rev. EN 05

Outershield® 101Ni1-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Fine grained steel	
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

FCAW

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + [>15-25]% CO₂

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

Outershield® 690-H

CLASSIFICATION

AWS A5.29/A5.29M : E111T1-K3M-JH4
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 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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
						-29°C	-40°C	-46°C
Required: AWS A5.29 ISO 18276-A			min. 680 min. 690	760-900 770-940	min. 15 min. 17	min. 27	min. 47	
Typical values	M21	AW	780	810	18	85	80	65

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 4.5 kg plastic spool S200	X	
14 kg S300 (alu bag)	X	
15 kg spool B300	X	X

Outershield® 690-H: rev. EN27

Outershield® 690-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Fine grained steel	
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)% CO₂

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/A5.29M : E111T1-K3M-JH4
ISO 18276-A : T 69 4 Z P M 2 H5 T

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

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-29°C/-30°C	-40°C
Required: AWS A5.29 ISO 18276-A			min. 680 min. 690	760-900 770-940	min. 15 min. 17	min. 27	min. 47
Typical values	M21	AW SR	740 720	790 770	19 20	75	70 60
SR: 1h/580°C, 3G up - V60°							

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		1.2	1.6
Unit :	4.5 kg plastic spool S200	X	
	15 kg spool B300	X	X

Outershield® 690-HSR: rev. EN 26

Outershield® 690-HSR

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Fine grained steel	
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)% CO₂

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/A5.29M : E81T1-GM-H4
EN ISO 17632-A : T 50 5 Z P M 2 H5

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% CO₂
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 EN ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18	not required min. 47
Typical values	M21	AW	580	610	23	80

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool B300	X
200 kg Accutrak drum	X

Outershield® 500CT-H: rev. EN26

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]% CO₂

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/A5.29M : E81T1-W2M-JH4
EN ISO 17632-B : T555T1-1MA-NCC1-UH5

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-40°C	-50°C
Required: AWS A5.29 EN ISO 17632-B			min. 470 min. 460	550-690 550-740	min. 19 min. 17	min. 27	min. 47
Typical values	M21	AW	600	660	20	140	100

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 4.5 kg plastic spool S200	X
15 kg spool B300	X

Outershield® 555CT-H: rev. EN03

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)% CO₂

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

Outershield® MC555CT-H

CLASSIFICATION

AWS A5.28/A5.28M	: E80C-W2 H4
EN ISO 17632-B	: T554T15-0MA-NCC1-UH5

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 >47) at -40°C
Superior product consistency with optimal alloy control

APPROVALS

Shielding gas	TUV
M21	+

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%) CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
						-30°C	-40°C	-50°C
Required: AWS A5.28 EN ISO 17632-B			min. 470 min. 460	min. 550 550-740	min. 19 min. 17	min. 27	min. 47	
Typical values	M21	AW	650	680	22	80	70	60

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool B300	X

Outershield® MC555CT-H: rev. EN 02

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

FCAW

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS Ar + (>15-25)% CO₂

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

Outershield® 12-H

CLASSIFICATION

AWS A5.29/A5.29M	: E81T1-A1M-H4
ISO 17634-A	: T MoL P M 2 H5

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	-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		
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
Unit: 15 kg spool B300	X

Outershield® 12-H: rev. EN 26

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 steel	
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}% CO₂

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

REMARKS/APPLICATION ADVICE

Recommended tempering heat treatment range: 570-630°C
Time depends on material thickness

Outershield® 19-H

CLASSIFICATION

AWS A5.29/A5.29M	: E 81T1-B2M-H4
ISO 17634-A	: T CrMo1 P M 2 H5

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%) CO₂
 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	-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		
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
Unit : 15 kg spool B300	X

Outershield® 19-H; rev. EN 25

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: Material Safety Data Sheets (MSDS) are available on our website.

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%) CO₂

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

FCAW

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/A5.29M	: E 91T1-B3M-H4
ISO 17634-A	: T CrMo2 P M 2 H5

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						+20°C	-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		
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
Unit : 15 kg spool B300	X

Outershield® 20-H: rev. EN 26

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

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)% CO₂

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

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

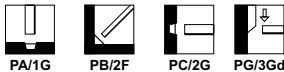
CLASSIFICATION

AWS A5.20/A5.20M : E71T-14
EN ISO 17632-A : T 42 Z Z N 5

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/mm ²)	Tensile strength (N/mm ²)	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
Unit: 22.68 kg coil 50C	X

Innershield® NR® 152: rev. EN 22

Innershield® NR® 152

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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/A5.29M : E61T8-K6

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PG/3Gd



PH/5Gu



PJ/5Gd

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

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength	Tensile strength	Elongation	Impact ISO-V(J)
		(N/mm ²)	(N/mm ²)	(%)	-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
Unit:	6.35 kg coil 14C	X
	22.68 kg coil 50C	X

Innershield® NR® 203 NiC: rev. EN 22

Innershield® NR® 203 NiC

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

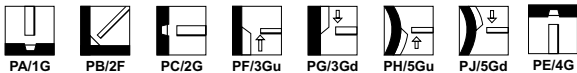
CLASSIFICATION

AWS A5.29/A5.29M : E71T8-Ni1
EN ISO 17632-A : T 42 4 1Ni Y N 1 H10

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)



CURRENT TYPE

DC -

APPROVALS

ABS	BV	DNV	GL	LR	RINA	TÜV
3SA,3YSA	SA3VMHH	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
Unit : 6.35 kg coil 14C	X	
22.68 kg coil 50C	X	X

Innershield® NR® 203 Ni1 rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

Innershield® NR® 203 Ni1

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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 MPE

CLASSIFICATION

AWS A5.20/A5.20M : E71T-11
EN ISO 17632-A : T 42 Z Z N 1 H10

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)



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

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
Unit :	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 MPE: rev. EN 02

Innershield® NR® 211 MPE

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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/A5.20M : E71T-8
EN ISO 17632-A : T 42 2 Y N 2 H10

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

CURRENT TYPE

DC -

APPROVALS

ABS	BV	DNV	LR	RINA	TÜV	NKK
3SA,3YSAH15	SA3YMH	IIIVMSH15	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-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
Unit : 6.12 kg coil 14C	X	X	X
22.68 kg coil 50C	X	X	X

Innershield® NR® 232: rev. EN 22

Innershield® NR® 232

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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/A5.20M : E71T-8
EN ISO 17632-A : T 42 3 Y N 2 H10

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)



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
Unit: 5.7 kg plastic spool	X	
11.3 kg plastic spool	X	X

Innershield® NR® 233: rev. EN 22

Innershield® NR® 233

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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 groove welds
Overhead fillet and groove welds
Seismic structural steel erection
General structural steel erection
Ship and barge fabrication

Innershield® NR® 207

CLASSIFICATION

AWS A5.29/A5.29M : E71T8-K6

GENERAL DESCRIPTION

Vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe
Recommended for API grades X42 up to undermatching X70
High deposition rates

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PG/3Gd



PE/4G



PJ/5Gd

CURRENT TYPE

DC -

APPROVALS

BV	DNV	GL	TÜV
SA3YMH	IIIYMSH15	3YH15S	+

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

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	2.0
Unit: 6.35 kg coil 14C	X	X
22.68 kg coil 50C		X

Innershield® NR® 207; rev. EN 22

Innershield® NR® 207

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
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, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Fine grained steel	
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	180	175	17.5	1.4	1.27
		230	220	18.5	1.7	1.27
		250	260	19.5	2.5	1.27

WELDING PARAMETERS, OPTIMUM FILL PASSES

Diameter (mm)		Welding positions			
		PA/1G PB/2F	PC/2G	PG/3Gdown PJ/5Gdown	PE/4G
2.0	Wire feed speed (cm/min)	280	230	230	190
	Current (A)	240	220	220	185
	Voltage (V)	21	19	19	19

FCAW

REMARKS/APPLICATION ADVICE

High productivity welding
Where arctic mechanical properties are required in general construction welding
Semi-automatic pipe welding

Innershield® NR® 207-H

CLASSIFICATION

AWS A5.29/A5.29M : E71T8-K6

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)



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	Al	Ni
0.07	0.9	0.2	0.005	0.003	1.0	0.85

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength	Tensile strength	Elongation	Impact ISO-V(J)
		(N/mm ²)	(N/mm ²)	(%)	-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
Unit: 6.35 kg coil 14C	X

Innershield® NR® 207-H: rev. EN 22

Innershield® NR® 207-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
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 steel	
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/A5.29M : E91T8-G

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)



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

		Yield strength [N/mm²]	Tensile strength [N/mm²]	Elongation [%]	Impact ISO-V[J] -30°C
Required: AWS A5.29	Condition	min. 540	620-760	17	
Typical values	AW (1G)	585	650	26	115

PACKAGING AND AVAILABLE SIZES

Diameter [mm]		1.7	2.0
Unit :	6.35 kg coil 14C	X	X

Innershield® NR® 208-H: rev. EN 22

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/A5.20M : E70T-6
 EN ISO 17632-A : T 42 0 W N 3 H15

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)



CURRENT TYPE

DC -

APPROVALS

ABS	BV	DNV
2SA,2YSA	SA2YMH	IYMS

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
Unit : 22.68 kg coil 50C	X	X	X

Innershield® NR® 305: rev. EN 22

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: Material Safety Data Sheets (MSDS) are available on our website.

Innershield® NR® 305

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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/A5.20M : E70T-7

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)



PA/1G



PB/2F



PC/2G



PG/3Gd

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
Unit: 6.35 kg coil 14C	X	
22.68 kg coil 50C		X

Innershield® NR® 311: rev. EN 22

Innershield® NR® 311

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

FCAW

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/A5.29M : E71T8-K6
EN ISO 17632-A : T 42 6 1Ni Y N 2 H10

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

CURRENT TYPE

DC -

APPROVALS

BV	LR	TÜV
SA3YMH	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

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	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
Unit: 6.35 kg coil 14C	X
22.68 kg coil 50C	X

Innershield® NR® 400: rev. EN 24

Innershield® NR® 400

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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

FCAW

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® NR® 450-H

CLASSIFICATION

AWS A5.29/A5.29M : E71T8-Ni2 ¹⁾
¹⁾ also meets: E81T8-Ni2

GENERAL DESCRIPTION

Self shielding: easiest equipment
Higher strength level, yield strength up to 450 N/mm²
Excellent impact toughness at -40°C
CTOD tested, offshore constructions

WELDING POSITIONS (ISO/ASME)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G



PH/5Gu

CURRENT TYPE

DC -

APPROVALS

ABS	GL	LR
3SA,3YSAH10	3YSH10	3S,3YSH10

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

C	Mn	Si	P	S	Al	Ni
0.07	0.26	0.6	0.004	0.002	0.88	2.44

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)	
					-29°C	-40°C
Required: AWS A5.29		min. 400	480-620	20	27	
Typical values	AW	500	570	28	88	84

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
Unit: 6.35 kg coil 14C	X

Innershield® NR® 450-H: rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

Innershield® NR® 450-H

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH36
Cast steel	
EN 10213-2	GP240R
Pipe material	
EN 10208-1	L210, L240, L290, L360, L415, L445
EN 10208-2	L240, L290, L360
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
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	19	150	140	16.5	1.18	1.44
		230	200	19.5	1.90	1.51
		280	225	20.5	2.35	1.33

FCAW

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® 3ME

CLASSIFICATION

AWS A5.20/A5.20M : E70T-4
EN ISO 17632-A : T 46 Z V N 3

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)



PA/1G



PB/2F

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/mm ²)	Tensile strength (N/mm ²)	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
Unit :	6.35 kg coil 14C	X		
	12.5 kg coil 25RR	X		
	22.68 kg coil 50C	X	X	X

Innershield® NS® 3ME: rev. EN 22

Innershield® NS® 3ME

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	
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 steel	
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
ISO 17633-A : T 19 9 L R C/M 3

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	LR	TÜV
M21	308LMS	4550S		+
C1	308LMS		304L	+

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	-110°C
Required: AWS A5.22 ISO 17633-A Typical values	M21/C1	AW	not required min. 320 400	min.520 min. 510 560	min. 35 min. 30 42	80	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 5 kg plastic spool S200	X	
15 kg spool S300	X	X

Cor-A-Rosta® 304L : rev. EN 25

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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	(TP)304LN 302,304	S30453 S30400
	X4CrNi18-10		1.4301	(TP)304	S30409
Medium carbon [C >0.03%]		G-X5CrNi19-10	1.4308	CF 8	J92600
	X6CrNiTi18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
Ti-, Nb stabilized	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 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
1.6	140-300A	140-300A	140-200A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P304L

FCAW

Cor-A-Rosta® P304L

CLASSIFICATION

AWS A5.22 : E308LT1-1/-4
ISO 17633-A : T 19 9 L P C/M 2

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%] CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+
C1			pending

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						+20°C	-110°C
Required: AWS A5.22 ISO 17633-A Typical values	M21/C1	AW	not required min. 320 400	min.520 min. 510 560	min. 35 min. 30 42	80	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool S300	X

Cor-A-Rosta® P304L::rev.EN 25

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 CF-3	S30403 J92500
	X2CrNi18-10		1.4311	(TP)304LN 302,304	S30453 S30400
	X4CrNi18-10		1.4301	(TP)304	S30409
Medium carbon [C >0.03%]		G-X5CrNi19-10	1.4308	CF 8	J92600
Ti-, Nb stabilized	X6CrNiTi18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6CrNiNb18-10		1.4550	(TP)347 (TP)347H	S34700 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
ISO 17633-A : T 19 9 Nb R C/M 3

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%) CO₂
C1 : Active gas 100% CO₂
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

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 ISO 17633-A Typical values	M21	AW	not required min. 350 435	min.520 min. 550 600	min. 30 min. 25 42	90

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool S300	X

Cor-A-Rosta® 347 : rev. EN 26

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 [TP]321H	S32100 S32109
	X6CrNiNb18-10		1.4550	[TP]347 [TP]347H	S34700 S34709
		G-X5CrNiNb19-10	1.4552	CF-8C	J92710
				302	
Non stabilized	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

FCAW

Cor-A-Rosta® 316L

CLASSIFICATION

AWS A5.22 : E316LT0-1/ -4
ISO 17633-A : T 19 12 3 L R C/M 3

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%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	BV	DNV	GL	LR	TÜV
M21		308LMS	4550S		+
C1	316L	316LMS		316L	+

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	-110°C
Required: AWS A5.22 ISO 17633-A Typical values	M21/C1	AW	not required min. 320 440	min. 485 min. 510 580	min. 30 min. 25 38	70	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 15 kg spool S300	X	X

Cor-A-Rosta® 316L : rev. EN 25

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 CF-3M	S31603 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
1.6	140-300A	140-300A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P316L

Cor-A-Rosta® P316L

CLASSIFICATION

AWS A5.22 : E316LT1-1/ -4
ISO 17633-A : T 19 12 3 L P C/M 2

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+
C1	316LMS		pending

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						+20°C	-110°C
Required: AWS A5.22 ISO 17633-A Typical values	M21/C1	AW	not required min. 320 440	min. 485 min. 510 580	min. 30 min. 25 38	70	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit: 5 kg plastic spool S200	X
15 kg spool S300	X

Cor-A-Rosta® P316L: rev. EN 25

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 CF-3M	S31603 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

FCAW

Cor-A-Rosta® 309L

CLASSIFICATION

AWS A5.22 : E309LT0-1/-4
ISO 17633-A : T 23 12 L R C/M 3

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%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	BV	DNV	GL	LR
M21		308LMS	4550S	
C1	309L	309LMS		SS/CMn

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	-20°C
Required: AWS A5.22 ISO 17633-A			not required	min. 520 min. 510	min. 30 min. 25		
Typical values	M21/C1	AW	445	560	36	45	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 5 kg plastic spool S200	X	X
15 kg spool S300	X	

Cor-A-Rosta® 309L : rev. EN 27

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
1.6	140-300A	140-300A	140-200A

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P309L

Cor-A-Rosta® P309L

CLASSIFICATION

AWS A5.22 : E309LT1-1/-4
ISO 17633-A : T 23 12 L P C/M 2

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+
C1	309LMS		pending

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						+20°C	-20°C
Required: AWS A5.22 ISO 17633-A			not required	min. 520	min. 30		
Typical values	M21/C1	AW	min. 320 445	min. 510 560	min. 25 36	45	40

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	
Unit:	5 kg plastic spool S200	X
	15 kg spool S300	X

Cor-A-Rosta® P309L: rev. EN 26

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

FCAW

Cor-A-Rosta® 309MoL

CLASSIFICATION

AWS A5.22 : E309LMoT0-1/-4
ISO 17633-A : T 23 12 2 L R C/M 3

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	BV	DNV	GL	LR	TÜV
M21		308LMS	4550S		+
C1	UP	309MoLMS		SS/CMn	+

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

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 ISO 17633-A Typical values	M21/C1	AW	not required min. 350 550	min. 520 min. 550 700	min. 25 min. 25 30	50

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 15 kg spool S300	X	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 CF-3M	S31603 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

FCAW

REMARKS/APPLICATION ADVICE

For positional welding, use Cor-A-Rosta P309MoL

Cor-A-Rosta® P309MoL

CLASSIFICATION

AWS A5.22 : E309LMoT1-1/-4
ISO 17633-A : T 23 12 2 L P C/M 2

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

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 ISO 17633-A Typical values	M21/C1	AW	not required min. 350 525	min. 520 min. 550 675	min. 25 min. 25 34	45

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 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 CF-3M	S31603 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

FCAW

REMARKS/APPLICATION ADVICE

For downhand welding, use Cor-A-Rosta 309MoL

Cor-A-Rosta® 4462

CLASSIFICATION

AWS A5.22 : E2209T0-1/-4
ISO 17633-A : T 22 9 3 N L R C/M 3

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active gas 100% CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

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	-50°C
Required: AWS A5.22 ISO 17633-A			not required	min. 520	min. 25		
Typical values	M21/C1	AW	min. 450 630	min. 550 800	min. 25 29	50	40

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 15 kg spool S300	X	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

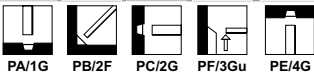
CLASSIFICATION

AWS A5.22 : E2209T1-1/-4
ISO 17633-A : T 22 9 3 N L P M 2

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)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Flow rate : 15-25 l/min

APPROVALS

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

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	-50°C
Required: AWS A5.22 ISO 17633-A			not required	min. 690	min. 25		
Typical values	M21	AW	min. 450 630	min. 550 800	min. 25 29	65	55

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2	1.6
Unit : 15 kg spool S300	X	X

Cor-A-Rosta® P4462 : rev. EN 26

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

NiCro-Cor P60/20

CLASSIFICATION

AWS A5.34 : ENiCrMo3T1-4
EN ISO 12153 : T Ni 6625 P M 2

GENERAL DESCRIPTION

Ni-base [CrMoNb alloyed] gas shielded rutile flux cored wire. Suitable for all position welding
Extremely high resistance to general - , intergranular- , pitting - and crevice corrosion as well as stress corrosion cracking
Suitable for welding dissimilar joints
High resistance to high temperature oxidation (max 1200°C) and carburization.
Good impact properties at low temperatures (down to -196°C), suitable for applications in 9%Ni-steel.
Good wire feedability characteristics and excellent slag release

WELDING POSITIONS (ISO/ASME)



CURRENT TYPE / SHIELDING GAS (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂

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

Shielding gas	C	Mn	Si	Cr	Ni	Mo	Nb	Fe
M21	0.02	0.3	0.2	21.0	66.0	8.5	3.4	1.0

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	-196°C
Required: AWS A5.34 EN ISO 12153			min. 420	min. 690 min. 690	min. 25 min. 27	min. 27	min. 47
Typical values	M21	AW	500	770	42	95	80

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 15 kg spool S300	X

NiCro-Cor P60/20 : rev. EN 02

NiCro-Cor P60/20

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades	DIN/EN	Mat. Nr	ASTM/ACI	UNS
NiCrMo-steel type alloy 625 & welding dissimilar high NiCrMo-steels for corrosion & 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 steel				
	10Ni14 [3.5% Ni]	1.5637	ASTM A333 Grade 3	
	12Ni19, X12Ni5	1.5680		K41583
9% Nickel steels 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

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	400	125	24-25	2.0	1.10
		600	145	25-26	2.3	1.10
		800	175	26-27	3.0	1.10
		1000	220	28-20	4.2	1.10

WELDING PARAMETERS, OPTIMUM FILL PASSES IN SHIELDING GAS 100% CO₂

Diameter (mm)	Welding positions			
	PA/1G	PB/2F	PC/2G	PF/3Gup
1.2	180-200A	180-200A	150-170A	150-170A
	28-30V	28-30V	25-26V	25-26V

REMARKS/APPLICATION ADVICE

Welding with max. 1,5kJ/mm heat-input is recommended for Ni-base materials
Limit the maximum interpass temperature to 150°C (depending on type base material)

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
Unit : 6.35 kg coil 14C			X	
11.34kg coil 22RR	X	X	X	
22.7 kg coil 50C			X	X

Lincore[®] 33: rev. EN 23

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.

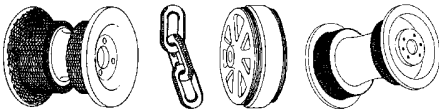
Typical applications include:

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 260°C 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® 40-0

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/TG

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]

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
Unit : 11.34 kg coil 22RR	X
22.7 kg coil 50C	X

Lincore® 40-0: rev. EN 23

Lincore[®] 40-0

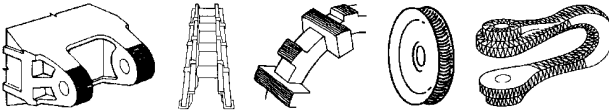
APPLICATION

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 bainite 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 overlaid.

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 40-0 deposits normally have good resistance to cross-checking. Special precautions, however, should be taken with any buildup or hardfacing product on applications that 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 40-0.

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
Unit : 11.34 kg coil 22RR	X		X	X	
22.7 kg coil 50C		X	X	X	X

Lincore[®] 50: rev. EN 23

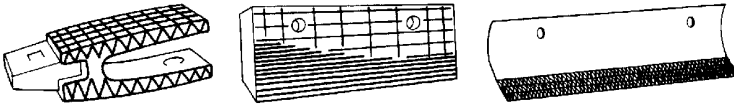
Lincore[®] 50

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 irregularities 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 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 and 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

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
Unit :	6.35 kg coil 14C			X	
	11.34 kg coil 22RR	X	X	X	
	22.7 kg coil 50C			X	X

Lincore[®] 55: rev. EN 22

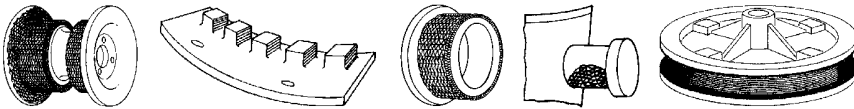
Lincore[®] 55

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	3.8-73	

COMPLEMENTARY PRODUCTS

Wearshield[®] MM and Wearshield[®] MI(e)

Lincore® 60-0

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
Unit :	11.34 kg coil 22RR	X	X	X

Lincore® 60-0: rev. EN 23

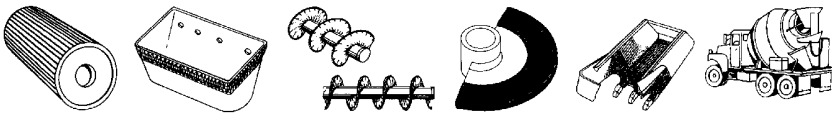
Lincore[®] 60-O

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
Unit : 11.34 kg coil 22RR	X

Lincore® T&D: rev. EN 24

Lincore® T&D

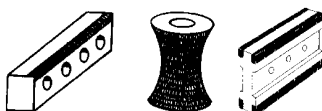
APPLICATION

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
Unit : 11.34 kg coil 22RR		X
22.7 kg coil 50C	X	

Lincore® 15CrMn rev. EN 23

Lincore[®] 15CrMn

APPLICATION

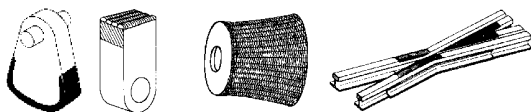
Lincore 15CrMn produces a premium austenitic chromium-manganese deposit. The term premium is used because the weld metal has sufficient alloy content to produce a single pass austenitic deposit on ordinary carbon steel. The deposit rapidly work hardens under impact making it particularly suitable for applications of high impact and gouging coupled with moderate abrasion. In addition to surfacing, the high crack resistance of this alloy design makes 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
Unit : 272.2 kg speed Feed Drum	X

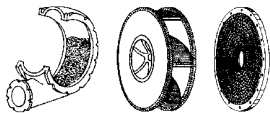
Lincore[®] 420 rev. EN 24

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 irregularities 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 its 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 + ferritic

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Typical hardness values
As deposited	18-28 Rc
Work Hardened	30-48 Rc

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.1	1.6	2.0	2.8
Unit :	11.34 kg coil 22RR	X	X	X	
	22.7 kg coil 50C			X	X
	272.2 kg speed Feed Drum				X

Lincore[®] M rev. EN24

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: Material Safety Data Sheets (MSDS) are available on our website.

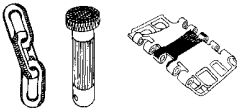
Lincore[®] M

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

Mild steel Solid Wires

L-60..... 585
L-61 586
LNS 135..... 587
L-50M..... 588

Low Alloy Solid Wires

L-70 589
LNS 140A..... 590
LNS 133TB 591
LNS 140TB 592
LNS 150 593
LNS 151 594
LNS 160 595
LNS 162 596
LNS 163 597
LNS 164 598
LNS 165 599
LNS 168 600
LA 100 601
LNS 175 602

Mild Steel Flux-Cored Wires

LNS T55 603

Stainless Steel Solid Wires

LNS 304L..... 604
LNS 304H..... 605
LNS 307 606
LNS 309L..... 607
LNS 316L 608
LNS 318 609
LNS 347 610
LNS 4455 611
LNS 4462 612
LNS 4500 613
LNS Zeron 100X 614

Nickel base Solid Wires

LNS NiCro 60/20 615
LNS NiCro 70/19 616
LNS NiCro Mo 60/16..... 617

Fluxes

761 / 761-CG 618
780 / 780-CG / 780-FG..... 620
781 622
782 / 782-FG 624
708GB 626
802 627
839 628
842-H 630
8500 632
860 634
888 636
960 638
980 640
995N 642
998N 644
P223 646
P230 648
P240 652
P2000 654
P2007..... 656
P2000S 658



Sahara ReadyBag™

**SOLUTION FOR ANY HAZARDOUS
FLUX STORAGE CONDITIONS**

**MOISTURE RESISTANT PACKAGING
FOR SUBMERGED ARC FLUXES**



L-60

CLASSIFICATION

AWS A5.17 : EL12
ISO 14171-A : S1

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
Unit :	15 kg stein basket B415	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. EN 03

L-61

CLASSIFICATION

AWS A5.17 : EM12K
ISO 14171-A : S2Si

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
Unit :	15 kg stein basket B415	X	X	X			
	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			X	
	250 kg Speed Feed® Drum				X	X	
	250 kg Accutrak® Drum	X					
	300 kg wooden reel	X	X	X	X	X	
	350 kg Speed Feed® Drum	X	X	X	X	X	X
	400 kg Speed Feed® Drum			X	X	X	
	500 kg Accutrak® Drum	X	X				
	600 kg Speed Feed® Drum			X	X	X	
	600 kg Accutrak® Drum	X	X	X			
	1000 kg Accutrak® Drum	X	X	X	X	X	
	1000 kg coil			X	X	X	
	1000 kg coil liftable					X	

L-61: rev. EN 03

LNS 135

CLASSIFICATION

AWS A5.17 : EM12
ISO 14171-A : S2

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)	2.0	2.4	3.2	4.0	4.8
Unit :	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			X	X	X

LNS 135 rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

L-50M (LNS 133-U)

CLASSIFICATION

AWS A5.17 : EH12K
ISO 14171-A : S3Si

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
Unit :	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			X		X

L-50M rev. EN 03

L-70

CLASSIFICATION

AWS A5.23/A5.23M : EA1
ISO 14171-A : S2 Mo

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
Unit :	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		

L-70 rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 133TB

CLASSIFICATION

AWS A5.23/A5.23M : EG
ISO 14171-A : SZ

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
Unit :	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	X	X

LNS 140A

CLASSIFICATION

AWS A5.23/A5.23M : EA2
 ISO 14171-A : S2 Mo
 ISO 24598-A : S Mo

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
Unit :	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	X		X	X	X	

LNS 140A rev. EN 04

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 140TB

CLASSIFICATION

AWS A5.23/A5.23M : EA2TiB
ISO 14171-A : S2MoTiB

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
Unit :	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			X	X	
	1000 kg coil liftable				X	

LNS 140TB rev. EN 04

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 150

CLASSIFICATION

AWS A5.23/A5.23M : EB2
ISO 21952-A : S Cr Mo1

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
Unit : 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 150 rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 151

CLASSIFICATION

AWS A5.23/A5.23M : EB3
ISO 21952-A : S Cr Mo2

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
Unit : 25 kg stein basket B415+VCI	X	X	X	X
400 kg Speed Feed® Drum				X
1000 kg Accutrak® Drum			X	

SAW

LNS 151 rev. EN 02

LNS 160

CLASSIFICATION

AWS A5.23/A5.23M : ENi1
ISO 14171-A : S2 Ni1

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
Unit : 25 kg stein basket B415+VCI	X	X	X
100 kg stein basket B785			X

LNS 160 rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 162

CLASSIFICATION

AWS A5.23/A5.23M : ENi2
ISO 14171-A : S2 Ni2*
* Nearest classification

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
Unit : 25 kg stein basket B415+VCI		X	X	X
300 kg wooden reel	X			

SAW

LNS 162 rev. EN 03

LNS 163

CLASSIFICATION

AWS A5.23/A5.23M : EG
ISO 14171-A : S2 Ni1Cu

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
Unit : 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. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 164

CLASSIFICATION

AWS A5.23/A5.23M : EF3
ISO 14171-A : S3 Ni1Mo

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
Meet 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
Unit :	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

SAW

LNS 164 rev. EN 03

LNS 165

CLASSIFICATION

AWS A5.23/A5.23M : ENi5
ISO 14171-A : SZ

GENERAL DESCRIPTION

Nickel and Molybdenum 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
Unit : 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 165 rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 168

CLASSIFICATION

ISO 26304-A : S 3Ni2.5CrMo

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
Unit : 25 kg stein basket B415+VCI	X	X	X	X
1000 kg coil		X	X	

LNS 168 rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LA 100

CLASSIFICATION

AWS A5.23/A5.23M : EM2
ISO 26304-A : SZ

GENERAL DESCRIPTION

A low carbon, high manganese wire with nickel and molybdenum designed to weld high strength steels such as HY-80 and HSLA-80

CHEMICAL COMPOSITION (W%), TYPICAL, WIRE

C	Mn	Si	Ni	Mo	P	S
0.05	1.7	0.45	1.9	0.45	<0.01	<0.01

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.4	3.2	4.0
Unit : 25 kg stein basket B415+VCI	X	X	X
100 kg stein basket B785		X	X
300 kg wooden reel			X

LA 100: rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 175

CLASSIFICATION

AWS A5.23/A5.23M : ENi3
ISO 14171-A : S2Ni3

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
Unit : 25 kg stein basket B415+VCI	X	X

SAW

LNS 175: rev. EN 02

LNS T55

CLASSIFICATION

AWS A5.17/A5.17M : EC1 H4

ISO 14171-A : TZ

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
Unit : 25 kg stein basket B415+VCI		X
250 kg metal coil		X

LNS T55: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 304L

CLASSIFICATION

AWS A5.9/A5.9M : ER308L
ISO 14343-A : S 19 9 L

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
Unit : 25 kg stein basket B415+VCI	X	X	X	X

LNS 304L: rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 304H

CLASSIFICATION

AWS A5.9/A5.9M : ER308H

ISO 14343-A : S 19 9 H

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
Unit : 25 kg stein basket B415+VCI	X	X

LNS 304H: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 307

CLASSIFICATION

AWS A5.9/A5.9M : ER307*
ISO 14343-A : S 18 8Mn
* Nearest classification

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
Unit : 25 kg stein basket B415+VCI	X	X	X

SAW

LNS 307: rev. EN 03

LNS 309L

CLASSIFICATION

AWS A5.9/A5.9M : ER309

ISO 14343-A : S 23 12 L

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
Unit : 25 kg stein basket B415+VCI	X	X	X	X

LNS 309L: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 316L

CLASSIFICATION

AWS A5.9/A5.9M : ER316L
ISO 14343-A : S 19 12 3 L

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
Unit : 25 kg stein basket B415+VCI	X	X	X	X

LNS 316L: rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 318

CLASSIFICATION

AWS A5.9/A5.9M : ER318
ISO 14343-A : S 19 12 3 Nb

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
Unit : 25 kg stein basket B415+VCI	X	X	X	X

LNS318: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 347

CLASSIFICATION

AWS A5.9/A5.9M : ER347
ISO 14343-A : S 19 9 Nb

GENERAL DESCRIPTION

Stabilized stainless steel wire suitable for 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
Unit : 25 kg stein basket B415+VCI	X	X	X
300 kg Speed Feed Drum	X		

LNS 347: rev. EN 03

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 4455

CLASSIFICATION

ISO 14343-A : S 20 16 3 Mn L

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
Unit : 25 kg stein basket B415+VCI	X	X

LNS 4455: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS 4462

CLASSIFICATION

AWS A5.9/A5.9M : ER 2209
ISO 14343-A : S 22 9 3 N L

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
Unit : 25 kg stein basket B450	X	X

SAW

LNS 4462: rev. EN 02

LNS 4500

CLASSIFICATION

AWS A5.9/A5.9M : ER385
ISO 14343-A : G 20 25 5 Cu L

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
Unit : 25 kg stein basket B450	X

LNS 4500: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

LNS Zeron 100X

CLASSIFICATION

AWS A5.9/A5.9M : ER 2594
ISO 14343-A : S 25 9 4 N L

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
Unit : 25 kg stein basket B415+VCI	X	X

LNS Zeron 100X: rev. EN 02

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

LNS NiCro 60/20

CLASSIFICATION

AWS A5.14/A5.14M : ERNiCrMo-3
ISO 18274 : S Ni 6625 (NiCr22Mo9Nb)

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
Unit : 25 kg stein basket B450	X	X	X

LNS NiCro 60/20: rev. EN 02

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

LNS NiCr 70/19

CLASSIFICATION

AWS A5.14/A5.14M : ERNiCr-3
ISO 18274 : S Ni 6082 (NiCr20Mn3Nb)

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
Unit : 25 kg stein basket B450	X

LNS NiCr 70/19: rev. EN 01

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

LNS NiCrMo 60/16

CLASSIFICATION

AWS A5.14/A5.14M : ERNiCrMo-4
ISO 18274 : S Ni 6276 (NiCr15Mo16Fe6W4)

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
Unit : 25 kg stein basket B415+VCI	X	X

LNS NiCrMo 60/16: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

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 188 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	-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 steel				
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 steel				
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
Steel 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 178 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	Tensile strength	Elongation	Impact ISO-V(J)	
		(N/mm²)	(N/mm²)	(%)	0°C	-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 steel				
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 steel				
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
Steel drum	250
Big Bag	500 / 1000

CLASSIFICATION			
Flux	Flux/wire		
ISO 14174	AWS A5.17 / A5.23		
S A ZS 1 87 AC H5	781 / L-60	F7A0-EL12	ISO 14171-A : TR
	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

EXAMPLES OF MATERIALS TO BE WELDED

Code	Type/ Steel grades	Limited runs		
		L-60	L-61	LNS 140A
Ship plates				
	A to D, AH32 to DH40	✓	✓	✓
	A to E, AH32 to EH40			✓
General structural steel				
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 steel				
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
Steel 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 176 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 4T 0 AR/AB S2Si	
	782 / L-50M (LNS133U)		S 46 0 AR/AB S3Si	
	761 / LNS 140A (L-70)		S 46 0 AR/AB S2Mo	
			S 5T 2 AR/AB S3Si	
			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/mm ²)	Tensile strength (N/mm ²)	Impact ISO-V(J)	
				0°C	-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: rev. EN 25

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 steel			
EN 10149	S315 to S460 MC	✓	✓
EN 10025 part 2	S185 to S355 quality, JR[G18G2	✓	✓
	S185 to S355 quality, JR[G18G2], J10		✓
	E2956 to E360	✓	✓
Boiler & pressure vessel steel			
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/mm²)	Tensile strength (N/mm²)	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.

PACKAGING AND AVAILABLE SIZES	
Unit	Net weight (kg)
Bag	25

802

CLASSIFICATION

Flux	Flux/wire	
ISO 14174		
S A CS 155 DC H5	Hardfacing flux cored wire	no AWS and EN classification
	Hardfacing solid wire	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 mentioned 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. EN 23

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 / F6A6-EM12K	
839/L-50M	F7A6-EH12K / F7A8-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

Wire grade	Condition*	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)			
					-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	
	AW	470	570	258		100		
L-50M	SR	415	520	29		140		110
	AW	460	560	26		80		
LNS 140A	AW	650	710	20	50			
LNS 164	AW	650	710	20	50			
	SR	590	670	24	100	65		

AW : As welded - SR : Stress relieved

839: rev. EN 02

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: Material Safety Data Sheets (MSDS) are available on our website.

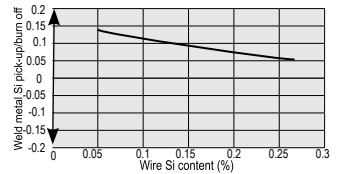
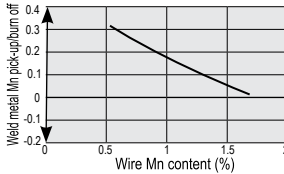
EXAMPLES OF MATERIALS TO BE WELDED

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 steel										
EN 10025 part 2	S185, S235, S275	✓	✓	✓	✓	✓				
	S355	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cast steel										
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 steel										
EN 10028-1	P235GH, P265GH, P295GH	✓	✓	✓	✓	✓	✓	✓		
	P355GH	✓	✓	✓	✓	✓	✓		✓	✓
Fine grained steels										
EN 10025 part 3/part 4	S275	✓	✓	✓	✓	✓				
	S355	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S420				✓		✓	✓	✓	✓
	S460						✓		✓	✓
High yield strenth steels										
EN 10025 part 6	S460, S500						✓		✓	

FLUX CHARACTERISTICS

Current type
Basicity (Boniszewski)
Solidification speed
Density (kg/dm³)
Grain size (ISO 14174)

DC/AC
2.4
Medium
1.2
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 155 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™; rev. EN 02

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 steel											
EN 10025 part 2	S185, S235, S275	✓	✓	✓							
	S355	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Cast steel											
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	Single and multi-wire systems
Low temperatures requirements	Off-shore and on-shore applications
Highly restrained constructions	Nuclear components

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Plastic pail	22.7

CLASSIFICATION

Flux	Flux/wire			
ISO 14174		AWS A5.17 / A5.23	ISO 14171-A : MR	ISO 14171-A : TR
S A FB 154 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/mm ²]	Tensile strength [N/mm ²]	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	
	MR	440	540	28		55	
LNS 140A (L-70)	MR	440	540	28		150	
	AW	430	510	30		150	50
LNS 160	SR	400	510	30		150	50
	AW	470	560			150	50
LNS 162	SR	450	530			150	50
	AW	530	600	25		120	50
LNS 165 (LA 85)	SR	480	580	30		120	50
	AW	530	620		120	80	
LNS T55	SR	500	570			70	

* MR: Multirun - TR: Two-run - AW: As welded - SR: Stress relieved

8500: rev. EN 24

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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 steel															
EN 10025 part 2	S185, S235, S275	✓	✓	✓										✓	✓
	S355	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cast steel															
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 steel															
EN 10028-1	P235GH, P265GH, P295GH	✓	✓	✓	✓	✓									
Fine grained steels															
EN 10025 part 3/part 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	Single and multi-wire systems
Low temperatures requirements	Off-shore and on-shore applications
Highly restrained constructions	Nuclear components

PACKAGING AND AVAILABLE SIZES

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Metal drum	250

CLASSIFICATION

Flux	Flux/wire			
ISO 14174 S A AB 156 AC H5		AWS A5.17 / A5.23	ISO 14171-A : MR	ISO 14171-A : TR
	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 S2	

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					0°C	-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. EN 24

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 steel											
EN 10025 part 2	S185, S235, S275	✓	✓	✓	✓	✓					
	S355	✓	✓	✓	✓	✓		✓		✓	✓
Cast steel											
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 steel											
EN 10028-1	P235GH, P265GH, P295GH	✓	✓	✓	✓	✓	✓	✓		✓	✓
	P355GH	✓	✓	✓	✓						
Fine grained steels											
EN 10025 part 3/part 4	S275	✓	✓	✓	✓	✓					
	S355	✓	✓	✓	✓	✓	✓	✓		✓	✓
	S420				✓		✓	✓		✓	✓
	S460						✓				
High yield stregh 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

CLASSIFICATION

Flux	Flux/wire		
ISO 14174	AWS A5.17 / A5.23		
S A FB 1 66 AC H5	888 / L-61	F7A6-EM12K	ISO 14171-A : MR
	888 / L-50M (LNS 133U)	F7A8/F6P8-EH12K	S 38 5 FB S2Si
	888 / LNS 140A	F8A4-EA2-A2	S 42 6 FB S3Si
	888 / L-70	F8A4-EA1-A2	S 46 4 FB S2Mo
	888 / LNS 160	F7A8/P8-ENi1-Ni1	S 46 4 FB S2Mo
	888 / LNS 162	F7A8/F7P8-ENi2-Ni2	S 42 5 FB S2Ni1*
	888 / LNS 164	F9A6/F9P4-EF3-F3	S 42 6 FB S2Ni2*
	888 / LNS 165	F8A6/F7P8-ENi5-Ni5	S 50 4 FB S3Ni1Mo
	888 / LNS 150	F7P6-EB2-B2	S 50 4 FB Sz
	888 / LNS 151	F8P6-EB3-B3	S 50 2 FB CrMo1
	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
Bruscatto 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	Bruscatto 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: Material Safety Data Sheets (MSDS) are available on our website.

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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
Ship plates														
	A to E	✓	✓	✓										
	AH[32],DH[36], EH[36]	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓
General structural steel														
EN 10025 part 2	S185, S235, S275	✓	✓	✓										
	S355	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓
Cast steel														
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 steel														
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/part 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

CLASSIFICATION

Flux	Flux/wire			
ISO 14174 S A AB 1 66 AC H5	960 / L-61 960 / L-50M (LNS133 U) 960 / LNS 163	AWS A5.17 / A5.23 F7A2-EM12K F7A2-EH12K F7A4-EG-G	ISO 14171-A : MR S 38 2 AB S2Si S 38 2 AB S3Si S 42 4 AB S2Ni1Cu	ISO 14171-A : TR S 3T 2 AB S2Si S 3T 2 AB S3Si

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-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

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 steel					
EN 10025 part 2	S185, S235, S275	✓	✓	✓	✓
	S355	✓	✓	✓	✓
Cast steel					
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 steel					
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)	1.0
Solidification speed	high
Density (kg/dm ³)	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

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	Tensile strength	Elongation	Impact ISO-V(J)
		(N/mm²)	(N/mm²)	(%)	-20°C
L-61	MR	420	520	29	50
L-50M(LNS 133U)	MR	460	550	29	60

* MR : Multirun

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 steel			
EN 10025 part 2	S185, S235, S275	✓	✓
	S355	✓	✓
Cast steel			
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 steel			
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/dm³)	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

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)				Hardness
					-20°C	-40°C	-50°C	-60°C	
Procedure 1									
LNS 140A (L-70)	TR	580	680	30					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: rev. EN 24

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 steel				
EN 10137	500 to 550 A & AL	✓	✓	✓
EN 10025 part 3/part 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 steel				
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)				Hardness
					-20°C	-40°C	-50°C	-60°C	
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. EN 24

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 steel				
EN 10137	500 to 550 A & AL	✓	✓	✓
EN 10025 part 3/part 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 steel				
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 thinnest 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	-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

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EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Two-run	
		LNS 140A [L-70]	LNS 133TB
General structural steel			
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 steel			
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

SAW

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. EN 24

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EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Two-run			
		LNS 135	L-61	L-50M (LNS 133U)	LNS 140A (L-70)
Ship plates					
	A to D	✓	✓	✓	✓
	AH[32],DH[40]	✓	✓	✓	✓
General structural steel					
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				✓

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

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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 steel					
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 strenght steels					
EN 10025 part 6	S460, S500				✓

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

SAW

P240

CLASSIFICATION

Flux	Flux/wire		
ISO 14174	AWS A5.17 / A5.23		
S A FB 1 55 AC H5	P240 / L-61 (LNS129)	F7A6-EM12K	ISO 14171-A : MR
	P240 / L-50M (LNS133U)	F7A8/P8-EH12K	S 42 4 FB S2Si
	P240 / LNS 160	F7A10/P10-ENi1-Ni1	S 42 6 FB S3Si
	P240 / LNS 162	F7A10/P10-ENi2-Ni2	S 46 6 FB S2Ni*
	P240 / LNS 165 (LA-85)	F8A8/P8-ENi5-Ni5	S 46 6 FB S2Ni2*
	P240 / LNS 150 (LA-92)	F8P2-EB2-B2R	S 50 6 FB Sz
	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	1.013	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				

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P240: rev. EN 26

AW : As welded - SR : Stress relieved

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

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EXAMPLES OF MATERIALS TO BE WELDED

Code	Type / Steel grades	Two-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 steel							
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 steel							
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

SAW

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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	-40°C	-196°C	-20°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		45		70
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. EN 24

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

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EXAMPLES OF MATERIALS TO BE WELDED

AI SI	Mat.nr.	EN 10088-1/2	ASTM/ACI	UNS	Wire
304L	1.4306	X2CrNi19-11	(TP) 304L	S30403	LNS 304L
304LN	1.4311	X2CrNi18-10	(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	X1NCrMoCu25-20-5			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/dm ³)	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

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. EN 04

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

Wire grade	Condition*	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	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	X1NCrMoCu25-20-5			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/dm ³)	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/mm ²)	Tensile strength (N/mm ²)	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. EN 23

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**Cellulosic Electrodes**

PIPELINER® 6P+.....	662
PIPELINER® 7P+.....	664
PIPELINER® 8P+.....	666

Basic Electrodes

PIPELINER® 16P	668
PIPELINER® 18P	670

High Strength, Basic Electrodes

PIPELINER® LH-D80	672
PIPELINER® LH-D90	674
PIPELINER® LH-D100.....	676

Solid Wires

PIPELINER® 70S-G	678
PIPELINER® 80S-G	679
PIPELINER® 80Ni1.....	680

Flux-cored Wires

PIPELINER® G60M-E	682
PIPELINER® G70M	684
PIPELINER® G70M-E.....	686
PIPELINER® G80M	688
PIPELINER® G80M-E	690
PIPELINER® G90M-E	692
PIPELINER® NR®-207+	694
PIPELINER® NR®-208XP	696

Pipeliner® 6P+

CLASSIFICATION

AWS A5.1 : E 6010
ISO 2560-A : E 42 3 C 25

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V[] -29°C/-30°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 331 min. 420 450	min. 430 500-640 570	min. 22 min. 20 27	min. 27 min. 47 70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	350
Unit: metal can	Net weight/unit (kg)	4.7	4.5	4.5

PIPELINER

Identification Imprint: 6010 Tip Color: none

Pipeliner®6P+ rev. EN 23

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: Material Safety Data Sheets (MSDS) are available on our website.

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
ISO 2560-A : E 42 3 Z C 25

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	-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
Unit: metal can	Net weight/unit (kg)		22.7	22.7	22.7

PIPELINER

Identification Imprint: 7010-P1

Tip Color:

Pipeliner® 7P+: rev. EN 02

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
ISO 2560-A : E 46 4 1Ni C 25

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/mm²]	Tensile strength [N/mm²]	Elongation [%]	Impact ISO-V(J)		
					-29°C	-40°C	-46°C
Required: AWS A5.5 ISO 2560-A Typical values	AW	min. 460 min. 460 495	min. 550 530-680 590	min. 19 min. 20 24	min. 27 80	min. 47 60	50

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
Unit: metal can	Net weight/unit (kg)	4.5	4.5	4.5

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
ISO 2560-A : E 42 3 B 12 H5

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	Tensile strength	Elongation	Impact ISO-V(J)	
		(N/mm²)	(N/mm²)	(%)	-29°C/ -30°C	-40°C
Required: AWS A5.1 ISO 2560-A Typical values	AW	min. 400 min. 420 470	min. 490 500-640 590	min. 22 min. 20 26	min. 27 min. 47 120	90

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: metal can	Net weight/unit (kg)	22.7	22.7	22.7

PIPELINER

Identification Imprint: 7016 H4 PIPELINER 16P Tip Color: none

Pipeliner®16P: rev. EN 23

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

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
ISO 2560-A : E 50 6 Mn1Ni B 32 H5

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)



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
0.05	1.5	0.5	0.010	0.009	0.95

MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

	Condition	Yield strength [N/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					-40°C	-60°C
Required: AWS A5.5 ISO 2560-A Typical values	AW	min. 460 min. 500 550	min. 550 560-720 640	min. 19 min. 18 24	140	min. 47 80

PACKAGING AND AVAILABLE SIZES

Unit: metal can	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
	Pieces / unit	139	75
	Net weight/unit (kg)	4.2	4.0

PIPELINER

Identification Imprint: 8018-G H4R PIPELINER 18P Tip Color: none

Pipeliner[®]18P: rev. EN 23

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

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
ISO 2560-A : E 46 4 Z B 45 H5

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)



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[I]	
				-30°C	-46°C
Required: AWS A5.5 ISO 2560-A Typical values	min. 460 min. 460 490	min. 550 530-680 580	min. 19 min. 20 27	min. 27 min. 47 80	50-95

PACKAGING AND AVAILABLE SIZES

Unit: metal can	Net weight/unit (kg)	Diameter (mm)		
		Length (mm)		
		3.2	4.0	4.5
		350	350	350

Identification Imprint: LH-D80 8018-G Tip Color: none

Pipeliner®LH-D80: rev. EN 23

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

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
EN 757 : E 55 4 ZB 45 H5

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 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	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 EN 757	min. 530	min. 620	min. 17	min. 27		
Typical values	min. 550 575	610-780 645	min. 18 27	95	min. 47	60

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: metal can	Net weight/unit (kg)	4.5	4.5

PIPELINER

Identification Imprint: LH-D90 Tip Color: none

Pipeliner® LH-D90: rev. EN 24

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

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

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 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	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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
					-29°C	-46°C
Required: AWS A5.5 Typical values	AW	min. 600 650	min. 690 730	min. 16 24	min. 27 100	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	Length (mm)
Unit: metal can	3.2	350
Net weight/unit (kg)	4.5	4.5

Identification Imprint: LH-D100 10018-G Tip Color: none

Pipeliner® LH-D100: rev. EN 24

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

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/A5.18M : ER70S-G
 EN ISO 14341-A : G 38 3 M G2Si / G 38 3 C G2Si

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)



PA/1G



PB/2F



PC/2G



PF/3Gu



PE/4G

SHIELDING GASES (ACC. ISO 14175)

M21 : Mixed gas Ar+ >15-25% CO₂
 C1 : Active gas 100% CO₂

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)
Typical values	C1	AW	425	525	25	-29°C 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
Unit : 4.5 Kg spool	X	X
11.3 Kg spool	X	X

Pipeliner® 80S-G

CLASSIFICATION

AWS A5.28 : ER80S-G
EN ISO 14341-A : G 50 3 M G4Si1

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



SHIELDING GASES (ACC. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂

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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)
Typical values	M21	AW	634	710	23	-29°C 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
Unit : 4.5 Kg spool	X	X
11.3 Kg spool	X	X

PIPELINER® 80S-G: rev. EN 24

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Pipeliner® 80Ni1

CLASSIFICATION

AWS A5.28 : ER80S-G
EN14341-A : G 3Ni1

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)



SHIELDING GASES (ACC. ISO 14175)

M20/M21 C1 75 - 95% Argon / Balance CO₂
100% CO₂

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	-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
Unit :	4.5 Kg spool	X	X
	11.3 Kg spool	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 : E71T-1MJ H4
 EN ISO : T 46 4 P M1 H5
 17632-A

GENERAL DESCRIPTION

All position gas shielded rutile flux cored wire
 Specifically designed for pipeline applications
 Superior weldability, low spatter, good bead appearance and outstanding operators appeal
 Exceptional mechanical properties (CVN>47J at -40°C)
 Very low hydrogen [HDM <5 ml/100g]
 Excellent wire feeding

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%) CO₂
 Amount : 15-25 l/min

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

Shielding gas	C	Mn	Si	P	S
M21	0.04	1.35	0.25	0.02	0.010

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 ISO 17632-A			min. 400 min. 460	490-670 530-680	min. 22 min. 20	27 47
Typical values	M21	AW	485	535	23	85

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	
Unit :	4.5 Kg spool S200	X
	15 Kg spool B300	X

Pipeliner® G60ME: rev. EN 01

Pipeliner® G60M-E

EXAMPLES OF MATERIALS TO BE WELDED

Steel grades/Standard	Type
Pipe material	
EN 10208-2	L290 to L450
API 5LX	X42, X46, X52, X56, X60, X65

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 + [$>15-25$] % CO₂

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® G70M

CLASSIFICATION

AWS A5.20 : E71T-1M-JH8 / E71T-9M-JH8
 EN ISO : T 46 4 P M 2 H10
 17632-A

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%) CO₂
 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 ISO 17632-A			min. 400 min. 460	min. 480 530-680	min. 22 min. 20	min. 27 min. 47
Typical values	M21	AW	560	645	26	125

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.1	1.3
Unit : 4.5 Kg spool	X	X
11.3 Kg spool	X	X

Pipeliner® G70M: rev. EN 23

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 : T 50 5 Z P M 2 H5
17632-A

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)



PA/1G



PB/2F



PC/2G



PG/3Gd



PE/4G



PJ/5Gd

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
						-20°C	-40°C	-50°C
Required: AWS A5.29 ISO 17632-A			min. 470 min. 500	550-690 560-720	min. 19 min. 18			min. 47
Typical values	M21	AW	580	630	23	100	90	70

PACKAGING AND AVAILABLE SIZES

	Diameter (mm)	1.2
Unit :	4.5 Kg 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 steel	
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)% CO₂

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3Gup	PJ/5Gdown	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	25-28V	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)



PA/1G



PB/2F



PC/2G



PG/3Gd



PE/4G



PJ/5Gd

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-29°C/-30°C	-40°C
Required: AWS A5.29 EN 12535			min. 605 620	690-825 700-890	min. 16 min. 18	min. 47	
Typical values	M21	AW	680	720	24	55	47

PACKAGING AND AVAILABLE SIZES

Diameter [mm]	1.1	1.3
Unit : 4.5 Kg spool	X	X
11.3 Kg spool	X	X

Pipeliner®G80M: rev. EN 24

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 : T 55 4 Z P M 2 H5
18276-A

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



PA/1G



PB/2F



PC/2G



PG/3Gd



PE/4G



PJ/5Gd

CURRENT TYPE

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
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/mm ²]	Tensile strength [N/mm ²]	Elongation [%]	Impact ISO-V(J)	
						-40°C	-40°C
Required: AWS A5.29 EN ISO 18276-A			min. 540 min. 550	620-760 640-820	min. 17 min. 18		
Typical values	M21	AW	695	740	21		65

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	1.2
Unit : 4.5 Kg spool S200	X
15 Kg spool B300	X

Pipeliner®G80ME: rev. EN 06

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)% CO₂

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 : T 69 4 Z P M 2 H5
 18276-A

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)



PA/1G



PB/2F



PC/2G



PG/3Gd



PE/4G



PJ/5Gd

CURRENT TYPE

DC +
 M21 : Mixed gas Ar+ (>15-25%) CO₂
 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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.29 EN ISO 18276-A			min. 680 min. 690	760-900 770-970	min. 15 min. 17	min. 47
Typical values	M21	AW	740	790	19	65

PACKAGING AND AVAILABLE SIZES

Diameter [mm]	1.2	1.6
Unit : 4.5 Kg spool S200	X	
15 Kg spool B300	X	X

Pipeliner®G90ME: rev. EN 06

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: Material Safety Data Sheets (MSDS) are available on our website.

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)% CO₂

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
	24-29V	24-29V	24-28V	24-26V	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 Typical values	AW	min. 400 435	485-620 545	min. 20 30	min. 27 160

PACKAGING AND AVAILABLE SIZES

Diameter (mm)		2.0
Unit:	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)



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	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 Typical values		AW	min. 470 495	500-690 570	min. 19 27	200

PACKAGING AND AVAILABLE SIZES

Diameter (mm)	2.0
Unit : 6.35 kg coil 14C	X

Pipeliner® NR®-208XP: rev. EN 01

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 therefore 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 CO₂ 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 disagreeable gases during welding.

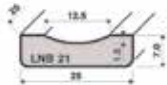
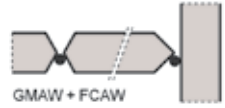
PRODUCT RANGE



Strip length 600 mm

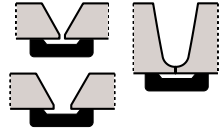
Products	Item	Pcs/box	mtr/box
LNB 6	tape	640007	100
LNB 9	tape	640014	72
LNB 12	tape	640021	60

Mainly for mild steel. For general steel structures

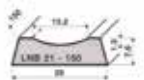


Strip length 600 mm

Products	Item	Pcs/box	mtr/box
LNB 21	tape	640083	56

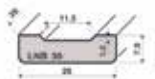


To be used with LNM solid wires and metal cored wires like Outersield MC 710-H and Outersield MC 715-H



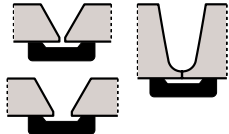
Strip length 600 mm

Products	Item	Pcs/box	mtr/box
LNB 21-150 tape	640090	56	33.6
LNB 21-150 rail	640021	63	378

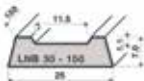


Strip length 600 mm

Products	Item	Pcs/box	mtr/box
LNB 30	tape	640151	56

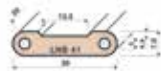


To be used with flux-cored wires like Outersield and Cor-A-Rosta



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
LNB 41	rail	640229	24

Elements are mounted on flexible wire
Suitable for pipe and cylindrical parts
Designed to bend easily



Magnetic clamp, item 640236

STRIP CLADDING



Belgium

Lincoln Smitweld Belgium
Tel: +32 54 33 42 12
Email: infobe@lincolnelectric.eu
www.lincolnelectric.nl

Denmark

Lincoln Electric Nordic
Tel.: +45 236 400 30
Email: upersson@lincolnelectric.eu
www.lincolnelectric.eu

Finland

Lincoln Electric Nordic Finland
Tel: +358 10 522 3500
Email: jpasanen@lincolnelectric.eu
www.lincolnelectric.eu

France

Lincoln Electric France S.A.S.
Tel: +33 2 32 11 40 40
Email: infofr@lincolnelectric.eu
www.lincolnelectric.fr

Germany

Lincoln Electric Deutschland
Tel: +49 2102/7 13 96-0
Email: infode@lincolnelectric.eu
www.lincolnelectric.de

Italy

Lincoln Electric Italia S.r.L.
Tel: +39 010 754 111
Email: infoit@lincolnelectric.eu
www.lincolnelectric.it

The Netherlands

Lincoln Smitweld bv
Tel: +31 24 3522 211
Email: jtimmer@lincolnelectric.eu
www.lincolnelectric.nl

Sweden/ Norway

Lincoln Electric Nordic
Tel.: +46 70 6061 769
Email: mabrahamsson@lincolnelectric.eu
www.lincolnelectric.eu

Poland

Lincoln Electric Bester sp. z o.o.
Tel: +48 74 64 61 100
Email: infopl@lincolnelectric.eu
www.lincolnelectric.pl

Portugal

Electro-Arco SA
Tel: +351 21 238 7300
www.lincolnelectric.es

Russia

Lincoln Electric Russia
Tel: +7 (495) 9660 94 04
Email: russia@lincolnelectric.eu
www.lincolnelectric.ru

Spain

Lincoln Electric Iberia S.L.
Tel: +34 (0) 93 685 9600
Email: infoes@lincolnelectric.eu
www.lincolnelectric.es

United Kingdom

Lincoln Electric UK Ltd
Tel: +44(0) 114 287 2401
Email: infouk@lincolnelectric.eu
www.lincolnelectric.co.uk

Middle East / Africa

Lincoln Electric
Tel: +971 4 88 333 17
www.lincolnelectric.com/en-za/

Baltics

Lincoln Electric Nordic
Tel: +37 069 813 591
Email: emikalauska@lincolnelectric.eu
www.lincolnelectric.eu

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