

Welding Consumables

Product Catalogue

General information &
Product Data Sheets for :

- Covered electrodes,
- TIG & MIG/MAG wires,
- Tubular cored wires,
- SAW consumables,
- PIPELINER® range for pipeline welding
- Ceramic backing products

LINCOLN®
ELECTRIC

NEW! PRODUCTS

COVERED ELECTRODES

Shield Arc® 6P+	138
Shield Arc® 7P+	140
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LNM NiMo1	344
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Outershield® 91K2-HSR	494
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Cor-A-Rosta™ 2509	566
Cor-A-Rosta™ P2509	568

SUBMERGED ARC WELDING

P2007	604
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and all SAW wires

NEW! RANGE



Cor-A-Rosta range

Best in class stainless steel flux-cored wired

NEW!

PACKAGING & CONDITIONING

Linc Can™

Hermetically sealed round can for stainless steel electrodes



Linc-Pack electrodes

a solution for every maintenance and repair applications

As many customers only need a limited number of repair electrodes, Lincoln Electric has developed handy sized transparent 1kg-Linc-Pack containers.

To help you boost your sales an attractive eye-catching counter top display has been created.



600 kg Accutrak drum

High capacity packaging for high deposition rate process

- Low change-over-time
- No turning table needed
- Trouble free operation by minimum wire distortion
- Wire protection in order to prevent dust/moisture contamination
- 2-level stackable(storage)
- Fully recyclable
- Typically designed for hard automation applications



We are a **global manufacturer** and the market leader of the **highest quality** welding, cutting and joining products. Our enduring passion for the development and application of our technologies allows us to create **complete solutions** that make our customers **more productive** and successful. We will distinguish ourselves through an unwearing **commitment** to our employees and customers.

A black and white photograph of a woman with long dark hair, wearing a Lincoln Electric baseball cap and a dark sweater. She is smiling and resting her chin on her hand. Behind her is a collection of Lincoln Electric products, including boxes of 'LNS WIRE', 'OUTERSHIELD', and 'CORED WIRE', as well as a large spool of wire. The background is filled with more product packaging, creating a sense of a well-stocked inventory.

I CHOOSE LINCOLN
for maximum **PRODUCTIVITY**

**LINCOLN®
ELECTRIC**

New Lincoln Electric Europe Consumables Catalogue contains a complete overview of the Lincoln Electric Europe consumables portfolio. It provides complete and up-to-date information that is essential for our Customers.

The catalogue has been subdivided into :

- A general information section
- Product Data Sheets for :
 - Covered electrodes,
 - GTA and GMA welding products,
 - Tubular cored wires,
 - Welding fluxes with the associated wires,
 - PIPELINER® range for pipeline welding
 - Ceramic backing products.

Tabs will help you find the various sections.

The section "General Information", contains all product listings, selection tables, information about packaging and a descriptive explanation about major European Standards.

Most European Standards for the classification of welding consumables have been published. We have provided, if available, the AWS and EN/ISO classification for each product. In cases where the EN/ISO standard is not yet officially published, the classification has been based upon most recent provisional standards.

As product properties may be upgraded in the future, the most actual MDS's are available and can be downloaded from www.lincolnelectric.eu.

The policy of The Lincoln Electric Company is to satisfy customer requirements, with products and services that comply with all relevant standards. The manufacturing and supply of our consumable products are in compliance with a Quality Programme which has been verified and approved by certifying authorities according ISO 9001:2000 and either VdTUV or ABS.

All the information in this catalogue is based on the best available knowledge at the time of printing and is subject to change without prior notice and can only be considered as suitable for general guidance. The listed typical mechanical properties are based on welding tests according to the European Standards, valid for the classification of products.

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CHEMICAL COMPOSITION AND CLASSIFICATION

(Covered electrodes for mild and fine grained steel)

COVERED ELECTRODES FOR MILD AND FINE GRAINED STEEL

Product name	Chemical composition (typical values) in %						AWS	EN/ISO
	C	Mn	Si	P	S			
Fleetweld® 5P+	0.15	0.50	0.25	-	-	A5.1	E6010	ISO 2560-A E 42 3 C 25
Supra®	0.12	0.5	0.6	-	-	A5.1	E6012	ISO 2560-A E 38 0 RC 11
Pantia®	0.07	0.5	0.5	-	-	A5.1	E6013	ISO 2560-A E 42 0 RC 11
Pantafix	0.09	0.5	0.4	-	-	A5.1	E6013	ISO 2560-A E 38 0 RC 11
Omnia®	0.07	0.5	0.5	-	-	A5.1	E6013	ISO 2560-A E 42 0 RC 11
Omnia® 46	0.06	0.5	0.45	-	-	A5.1	E6013	ISO 2560-A E 42 0 RC 11
Omnia® 46+	0.08	0.5	0.3	-	-	A5.1	E6013	ISO 2560-A E 42 0 RC 11
Cumulo®	0.1	0.5	0.4	-	-	A5.1	E6013	ISO 2560-A E 38 0 R 12
Universalis®	0.1	0.6	0.4	-	-	A5.1	E6013	ISO 2560-A E 42 0 RR 12
Ferrod 165A	0.07	0.95	0.3	-	-	A5.1	E7024-1	ISO 2560-A E 42 2 RA 73
Ferrod 135T	0.08	0.5	0.35	-	-	A5.1	E7024	ISO 2560-A E 38 0 RR 53
Ferrod 160T	0.07	0.9	0.6	-	-	A5.1	E7024	ISO 2560-A E 42 0 RR 73
Gonia 180	0.07	1.0	0.35	-	-	A5.1	E7024	ISO 2560-A E 42 0 RR 73
Baso® 48 SP	0.075	1.4	0.65	-	-	A5.1	E7018-1 H8	ISO 2560-A E 46 3 B 32 H10*
Baso® 49	0.09	1.1	0.6	-	-	A5.1	E7018 H4	ISO 2560-A E 46 3 B 32 H5
Baso® 51P	0.06	1.3	0.5	0.015	0.01	A5.1	E7018-1	ISO 2560-A E 46 3 B 32 H5
Baso® 100	0.08	1.0	0.5	-	-	A5.1	E7016 H4R	ISO 2560-A E 42 3 B 12 H5
Baso® 120	0.08	1.2	0.5	-	-	A5.1	E7018 H4R	ISO 2560-A E 42 3 B 32 H5
Basic® One	0.05	1.3	0.4	-	-	A5.1	E7018 H8	ISO 2560-A E 42 4 B 42 H5
Baso® G	0.05	1.3	0.4	-	-	A5.1	E7018-1 H4R	ISO 2560-A E 42 5 B 32 H5
Baso® 26V	0.09	1.1	0.7	-	-	A5.1	E 7048 H8	ISO 2560-A E 42 3 B 15 H10
Conarc® 48	0.05	1.3	0.3	-	-	A5.1	E7018-1 H4R	ISO 2560-A E 46 4 B 42 H5
Conarc® 49	0.09	1.1	0.6	0.015	0.010	A5.1	E7018 H4R	ISO 2560-A E 46 3 B 32 H5
Conarc® 49C	0.06	1.4	0.3	0.015	0.010	A5.1	E7018-1 H4R	ISO 2560-A E 46 4 B 32 H5
Conarc® One	0.05	1.3	0.4	-	-	A5.1	E7018-1 H4R	ISO 2560-A E 42 5 B 32 H5
Conarc® 51	0.06	1.4	0.5	0.015	0.010	A5.1	E7016-1 H4R	ISO 2560-A E 42 4 B 12 H5
Conarc® 52	0.06	1.2	0.4	0.010	0.020	A5.1	E7016 H4	ISO 2560-A E 42 3 B 12 H5
Conarc® 53	0.06	1.3	0.4	0.018	0.010	A5.1	E7016-1	ISO 2560-A E 42 5 B 12 H5
LINCOLN® 7018-1	0.05	1.0	0.3	-	-	A5.1	E7018-1	ISO 2560-A E 42 4 B 22 H5
Conarc® L150	0.07	0.95	0.4	-	-	A5.1	E7028 H4R	ISO 2560-A E 42 2 B 53 H5
Conarc® V180	0.08	1.2	0.3	-	-	A5.1	E7028 H4R	ISO 2560-A E 42 4 B 73 H5
Conarc® V250	0.08	1.3	0.45	-	-	A5.1	E7028 H4R	ISO 2560-A E 42 4 B 73 H5
Kardo®	0.03	0.4	0.25	-	-	A5.1	E6018 ¹⁾	ISO 2560-A E 35 2 B 32 H5

¹⁾ according classification 1966

* also complies to E 46 3 BR 32 H10

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

Product	Chemical composition (typical values) in %												AWS	ENISO		
	C	Mn	Si	Ni	Cr	Mo	Cu	V	Nb	N	P	S				
Shield Arc® 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*
	0.12	0.90	0.20	0.85	0.10	-	-	0.03	-	-	0.012	0.013	A5.5	E8010-G	ISO 2560-A	E 46 4 1Ni C 25
Shield Arc® 70+	0.13	0.60	0.15	0.7	-	0.6	-	-	-	-	-	-	A5.5	E 9010-G	ISO 2560-A	E 50 4 1NiMo C 25
Shield Arc® 6P+	0.11	0.55	0.18	-	-	-	-	-	-	-	0.009	0.009	A5.1	E6010	ISO 2560-A	E 42 3 C 25
Shield Arc® 7P+	0.12-0.23	0.5-0.9	0.14-0.32	0.62-0.95	-	0.12-0.3	-	-	-	-	0.015	0.015	A5.5	E7010-P1/E7010-G	ISO 2560-A	E 42 3 Z C 25
Shield Arc® 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® 55CT	0.05	1.5	0.4	0.9	-	-	0.4	-	-	-	0.010	0.015	A5.5	E8018-W2-H4R ¹⁾	ISO 2560-A	E 46 5 Mn1Ni B 32 H5
Conarc® 60G	0.06	1.0	0.4	1.6	-	0.3	-	-	-	-	0.015	0.010	A5.5	E9013M-H4	EN 757	E 55 4 Z B 32 H5
Conarc® 70G	0.06	1.2	0.4	1.0	-	0.4	-	-	-	-	0.014	0.009	A5.5	E9018-G-H4	EN 757	E 55 4 1NiMo B 32 H5
Conarc® 74	0.05	1.5	0.5	0.95	-	-	-	-	-	-	0.010	0.005	A5.5	E8018-G	ISO 2560-A	E 50 6 1Mn1Ni B 32 H5
Conarc® 80	0.06	1.5	0.4	2.2	-	0.4	-	-	-	-	0.015	0.01	A5.5	E11018M-H4	EN 757	E 69 5 Z B 32 H5
Conarc® 85	0.06	1.46	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	0.05	1.5	0.4	0.9	-	-	-	-	-	-	0.01	0.01	A5.5	E7018-G-H4R ²⁾	ISO 2560-A	E 50 6 Mn1Ni B 32 H5
Kryo® 1N	0.07	1.7	0.5	0.9	-	-	-	-	-	-	0.02	0.005	A5.5	E8016-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 12 H5
Kryo® 1P	0.05	1.5	0.5	0.95	-	-	-	-	-	-	0.010	0.005	A5.5	E 8018-G-H4R	ISO 2560-A	E 50 6 Mn1Ni B 32 H5
Kryo® 1-180	0.07	1.2	0.3	0.9	-	-	-	-	-	-	0.020	0.010	A5.5	E 8018-G-H4R	ISO 2560-A	E 50 5 1Ni B 73 H5
Kryo® 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® 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® 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	EN 1599	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	EN 1599	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	EN 1599	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	EN 1599	E CrMo2 B 32 H5
SL®20G(STC)	0.10	0.6	0.35	-	2.3	1.0	-	-	-	-	0.01	0.01	A5.5	E9018-B3-H4	EN 1599	E CrMo2 B 32 H 5
SL®22G	0.06	0.8	0.6	-	0.5	0.5	-	0.3	-	-	0.02	0.01	A5.5	E8018-B1-H4	EN 1599	E Z B 32 H5
SL®502	0.07	0.8	0.6	-	5.3	0.6	-	-	-	-	0.020	0.010	A5.5	E9018-B6-H4R	EN 1599	E CrMo5 B 32 H5
SL®9Cr(P91)	0.09	0.6	0.2	0.6	9.0	1.0	-	0.2	0.04	0.04	0.010	0.010	A5.5	E9016-B9-H4	EN 1599	E CrMo91 B 32 H5

¹⁾For deviations, consult datasheet²⁾ meet also AWS A5.5: E8018-G-H4R

COVERED ELECTRODES FOR STAINLESS AND HEAT RESISTANT STEEL

Product name	Chemical composition (typical values) in %											AWS	ENISO
	C	Mn	Si	Cr	Ni	Mo	Nb	Cu	N	W			
Arosta® 304L	0.02	0.80	0.80	19.5	9.7	-	-	-	-	-	A54 E308L-16	EN 1600	E 199 LR 12
	0.025	0.75	0.95	19.0	9.7	-	-	-	-	-	A54 E308L-17	EN 1600	E 199 LR 12
Limarosta® 304L	0.02	0.8	0.7	20.0	9.8	-	-	-	-	-	A54 E308L-15	EN 1600	E 199 LR 21
Vertarosta® 304L	0.025	1.8	0.4	19.0	10.0	-	-	-	-	-	A54 E308L-15	EN 1600	E 199 LB 22
Limarosta® 304L-130	0.02	0.6	0.9	19.0	10.0	-	-	-	-	-	A54 E308L-17	EN 1600	E 199 LR 53
Arosta® 347	0.03	0.8	0.8	19.5	9.8	-	0.35	-	-	-	A54 E347-16	EN 1600	E 199 NbR 12
Jungo® 347	0.02	1.6	0.5	20.0	10.0	-	0.40	-	-	-	A54 E347-15	EN 1600	E 199 NbB 22
Arosta® 316L	0.02	0.8	0.8	18.0	11.5	2.85	-	-	-	-	A54 E316L-16	EN 1600	E 19 123 LR 12
Arosta® 316L.P	0.02	0.7	0.85	18.1	11.5	2.85	-	-	-	-	A54 E316L-16	EN 1600	E 19 123 LR 12
Limarosta® 316L	0.02	0.8	1.0	18.0	11.5	2.8	-	-	-	-	A54 E316L-17	EN 1600	E 19 123 LR 12
Vertarosta® 316L	0.02	0.7	0.85	18.0	11.5	2.8	-	-	-	-	A54 E316L-15	EN 1600	E 19 123 LR 21
Jungo® 316L	0.025	1.6	0.4	18.5	11.0	2.7	-	-	-	-	A54 E316L-15	EN 1600	E 19 123 LB 22
Limarosta® 316L-130	0.02	0.65	1.0	18.0	11.5	2.8	-	-	-	-	A54 E316L-17	EN 1600	E 19 123 LR 53
Arosta® 318	0.03	0.8	0.85	18.0	11.5	2.7	0.35	-	-	-	A54 E318-16	EN 1600	E 19 123 NbR 12
Jungo® 318	0.025	1.5	0.4	18.0	11.0	2.7	0.5	-	-	-	A54 E318-15*	EN 1600	E 19 123 NbB 22
Arosta® 4439	0.02	1.3	0.8	18.0	17.0	4.6	-	0.18	-	-	A54 E316LMn-15	EN 1600	E 18 165 NLR 32
Jungo® 4455	0.03	7.3	0.4	20.0	16.0	3.0	-	-	0.16	-	A54 E310Mo-15*	EN 1600	E 20 163 Mn NLB 22
Jungo® 4465	0.03	4.5	0.4	25.0	22.0	2.2	-	-	0.13	-	A54 E385-16*	EN 1600	E 25 222 NLB 22*
Jungo® 4500	0.02	1.2	0.9	20.0	25.0	5.0	-	1.5	-	-	A54 E2209-16	EN 1600	E 20 255 Cu NLR 12
Arosta® 4462	0.02	0.8	1.0	22.5	9.5	3.2	-	-	0.16	-	A54 E2209-15	EN 1600	E 229 3 NLR 32
Jungo® 4462	0.025	1.6	0.5	23.5	9.0	3.0	-	-	0.15	-	A54 E2209-16	EN 1600	E 229 3 NLB 22
Jungo® Zenon 100X	0.03	0.8	0.3	25.0	9.5	3.6	-	0.8	0.2	0.7	A54 E2595-15	EN 1600	E 259 4 NLB 42
Jungo® 309L	0.025	1.5	0.4	23.0	13.0	-	-	-	-	-	A54 E309L-15	EN 1600	E 23 12 LB 22
Arosta® 309S	0.02	0.8	0.8	23.5	12.5	-	-	-	-	-	A54 E309L-16	EN 1600	E 23 12 LR 32
Limarosta® 309S	0.02	0.8	1.0	23.0	12.5	-	-	-	-	-	A54 E309L-17	EN 1600	E 23 12 LR 32
Arosta® 309Nb	0.02	0.8	0.8	23.0	12.0	-	0.5	-	-	-	A54 E309Cb-16*	EN 1600	E 23 12 Nb R 32
Arosta® 309Mo	0.02	0.8	0.8	23.0	12.5	2.7	-	-	-	-	A54 E309LMo-16	EN 1600	E 23 122 LR 32
Nichroma	0.025	0.8	1.0	20.0	9.5	2.3	-	-	-	-	A54 E308LMo-16	EN 1600	E 20 103 R 32
Nichroma 160	0.05	0.7	1.0	23.7	12.8	2.4	-	-	-	-	A54 E309Mo-26	EN 1600	E 23 122 LR 53*
Arosta® 329	0.08	0.7	1.2	25.0	4.5	-	-	-	-	-	A54 E312-17	EN 1600	E 25 4 R 12*
Limarosta® 312	0.11	0.9	1.0	29.0	9.0	-	-	-	-	-	A54 E307-16*	EN 1600	E 299 R 12
Arosta® 307	0.09	5.0	0.6	18.5	8.5	-	-	-	-	-	A54 E307-26*	EN 1600	E 18 Mn R 12
Limarosta® 307-160	0.06	5.0	1.0	18.0	8.0	-	-	-	-	-	A54 E307-15*	EN 1600	E 18 Mn R 53
Jungo® 307	0.08	5.5	0.3	19.0	8.5	-	-	-	-	-	A54 E308H-16	EN 1600	E 18 Mn B 22
Arosta® 304H	0.05	0.75	0.85	18.5	9.5	-	-	-	-	-	A54 E309H-16*	EN 1600	E 199 HR 12
Arosta® 309H	0.10	0.8	1.6	22.0	11.0	-	-	-	-	-	A54 E309H-16*	EN 1600	E 23 12 R 32*
Intherma® 310	0.12	2.5	0.5	26.0	20.5	-	-	-	-	-	A54 E310-16	EN 1600	E 25 20 R 12
Intherma® 310B	0.1	3.0	0.3	25.0	21.0	-	-	-	-	-	A54 E310-15*	EN 1600	E 25 20 B 12

For deviations, consult datasheet

COVERED ELECTRODES FOR NICKEL BASE ALLOYS

Product name	Chemical composition (typical values) in %												AWS	EN/ISO
	C	Mn	Si	Fe	Cr	Ni	Mo	Cu	Nb	W	Ti	S		
NiCr 31/27	0.02	0.8	0.9	35.8	27.1	31.0	3.5	0.9	-	-	-	-	A5.4	E 27 31 4 Cu L R 12
NiCr 60/20	0.03	0.5	0.35	2	22	62	9	-	3.4	-	-	-	A5.11/A5.11M	E Ni 6625 (NiCr22Mo9Nb)
NiCr 70/15	0.02	4.4	0.45	6	18	68.4	-	-	1.9	-	-	-	A5.11/A5.11M	E Ni 6182* (NiCr15Fe6Mn)*
NiCr 70/15Mn	0.025	5.5	0.4	-	16	76.1	-	-	2.0	-	-	0.010	A5.11/A5.11M	E Ni 6182 (NiCr15Fe6Mn)
NiCr 70/19	0.03	4.7	0.6	4.0	19.0	67.7	1.5	-	1.9	-	-	-	A5.11/A5.11M	E Ni 6082 (NiCr20Mn3Nb)
NiCrMo 60/16	0.015	0.5	0.05	6.5	15.5	57.9	16.0	-	-	3.5	-	-	A5.11/A5.11M	E Ni 6276 (NiCr15Mo15Fe6W4)
NiCrMo 59/23	0.015	0.4	0.15	-	22.5	59.0	15.5	-	-	-	-	-	A5.11/A5.11M	E Ni 6059 (NiCr23Mo16)
NiCu 70/30	0.03	3.0	0.4	1.75	-	64.5	-	30	-	-	0.35	-	A5.11/A5.11M	E Ni 4060 (NiCu30Mn3Ti)
NiJold 2	0.05	3.0	0.4	6	13	68	6	-	1.5	1.5	-	-	A5.11/A5.11M	E Ni 6620 (NiCr14Mo7Fe)

* For deviations, consult datasheet

COVERED ELECTRODES FOR ALUMINIUM ALLOYS

Product name	Chemical composition (typical values) in %									AWS	EN/ISO	
	Mn	Si	Fe	Cu	Al	Mg	Zn	Ti	Others			
A99.8	0.02 max.	0.085 max.	0.13 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 (AlMn1)
AlS5	-	5.0	-	-	Bal.	-	-	-	-	A5.3	E4043	ISO 18273 Al 4043A* (AlS5(Al))
AlSi12	-	-12.0	-	-	Bal.	-	-	-	-	-	-	ISO 18273 Al 4047A (AlSi12(Al))

* For deviations, consult datasheet

CHEMICAL COMPOSITION AND CLASSIFICATION

(Covered electrodes for hardfacing and repair applications)

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	E Fe1
Wearshield® Mangjet(e)	0.7	15	-	3.7	-	-	-	-	-	-	DIN 8555	E7-UM-200-KP	E Fe9
Wearshield® 15CrMn	0.35	14.0	0.6	15.0	-	-	-	-	-	-	DIN 8555	E7-UM-250-KP	E Fe9
Wearshield® MM 40	0.2	0.5	1.3	3.4	0.5	-	-	-	-	-	DIN 8555	E1-UM-400-G*	E Fe1
Wearshield® MM	0.55	0.5	1.5	4.5	0.5	0.5	-	-	-	-	DIN 8555	E2-UM-55-G*	E Fe2
Wearshield® T&D	0.65	0.4	0.7	4	6.0	1.8	1.1	-	-	-	A5.13 E Fe6*	E4-UM-60-SZ	E Fe4
Wearshield® MI (e)	0.5	0.4	1.8	9	-	-	-	-	-	-	A5.13 E Fe6	E6-UM-60-GPS	E Fe6
Wearshield® ABR	2.1	1.1	0.75	6.5	0.40	-	-	-	-	-	DIN 8555	E10-UM-50-GPZ	E Fe6
Wearshield® 44	2.0	0.16	0.9	24.2	2.5	-	-	-	-	-	DIN 8555	E10-UM-45-GPZ	E Fe14
Wearshield® ME (e)	3	-	1.0	33	-	-	-	-	-	-	DIN 8555	E10-UM-60-GRZ	E Fe14
Wearshield® 50MC	5	2	2.1	21	-	3.1	0.7	6.4	0.8	-	DIN 8555	E10-UM-65-GRZ	E Fe16
Wearshield® 60 (e)	5	-	4	35	-	-	-	-	-	-	DIN 8555	E10-UM-60-GR	E Fe15
Wearshield® 70	4.2	-	2.7	18	8.5	7	-	9	-	-	DIN 8555	E10-UM-65-GRZ	E Fe16
Wearshield® 420	0.5	0.3	0.4	12.4	0.4	-	-	-	-	1.3	DIN 8555	E6-UM-55-RZ	E Fe8

* Nearest classification

COVERED ELECTRODES FOR REPAIR WELDING

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

TIG AND MIG WIRES FOR MILD STEEL

Product name	Chemical composition (typical values) in %			AWS	EN/ISO		
	C	Mn	Si				
LNM 25	0.08	1.1	0.6	A5.18/A5.18M	ER70S-3	ISO 14341-A	G 42 2 M G2Si
LNT 25	0.08	1.1	0.6	A5.18/A5.18M	ER70S-3	EN/ISO 636-A	W 42 5 W2Si
LNM 26	0.08	1.4	0.8	A5.18/A5.18M	ER70S-6	ISO 14341-A	G 46 4 M G3Si1
LNT 26	0.10	1.5	0.9	A5.18/A5.18M	ER70S-6	EN/ISO 636-A	W 42 5 W3Si1
LNM 27	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	ISO 14341-A	G 42 3 M G4Si1
UltraMag™	0.07	1.45	0.85	A5.18/A5.18M	ER70S-6	ISO 14341-A	G 42 4 M G3Si1 / G 42 2 C G3Si1
UltraMag™ SG3	0.07	1.65	0.90	A5.18/A5.18M	ER70S-6	ISO 14341-A	G 46 5 M G4Si1/G 42 4 C G4Si1
SupraMIG®	0.08	1.55	0.85	A5.18/A5.18M	ER70S-6	ISO 14341-A	G 42 4 M G3Si1 / G 38 3 C G3Si1
SupraMIG Ultra®	0.08	1.70	0.85	A5.18/A5.18M	ER70S-6	ISO 14341-A	G 46 4 M G4Si1 / G 42 3 C G4Si1

TIG AND MIG WIRES FOR LOW ALLOY STEEL

Product name	Chemical composition (typical values) in %											AWS	EN/ISO	
	C	Mn	Si	Ni	Cu	Cr	Mo	V	Nb	N				
LNM 28	0.1	1.4	0.75	0.8	0.3	-	-	-	-	-	A5.28	ER80S-G	EN/ISO 16834	G 2 Mn3Ni1Cu*
LNT 28	0.1	1.4	0.75	0.8	0.3	-	-	-	-	-	A5.28	ER80S-G		
LNM MoNi	0.10	1.65	0.75	0.55	0.08	0.60	0.30	-	-	-	A5.28	ER100S-G	EN/ISO 16834	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	G 69 4 M Mn3Ni1CrMo
LNM MoNiCr	0.09	1.8	0.80	2.20	-	0.30	0.55	-	-	-	A5.28	ER120S-G	EN/ISO 16834	G 89 4 M Mn4Ni2CrMo
LNM N1	0.08	1.77	0.57	0.9	-	-	0.38	-	-	-	A5.28	ER80S-N1	ISO 14341-A	G 46 5 M G3Ni1
LNT N1	0.10	1.0	0.6	0.9	-	-	0.35	-	-	-	A5.28	ER80S-N1	EN/ISO 636-A	W 42 6 W3Ni1
LNT NiMo1	0.10	1.7	0.7	0.9	-	-	-	-	-	-	A5.28	ER100S-G	ISO 14341-A	G 69 4 M Mn3Ni1Mo
LNM Ni2.5	0.1	1.1	0.6	2.5	-	-	-	-	-	-	A5.28	ER80S-Ni2	ISO 14341-A	G 46 6 M G2Ni2
LNT Ni2.5	0.1	1.1	0.6	2.5	-	-	-	-	-	-	A5.28	ER80S-Ni2	EN/ISO 636-A	W 46 6 W2Ni2
LNM 12	0.12	1.2	0.6	-	-	-	0.5	-	-	-	A5.28	ER70S-A1	ISO 14341-A	G 46 3 M G2Mo
LNT 12	0.12	1.2	0.6	-	-	-	0.5	-	-	-	A5.28	ER70S-A1	ISO 21952-A	W MoSi
LNM 19	0.1	1.0	0.5	-	-	1.2	0.5	-	-	-	A5.28	ER80S-B2*	ISO 21952-A	G CrMo1Si
LNT 19	0.1	1.0	0.5	-	-	1.2	0.5	-	-	-	A5.28	ER80S-B2*	ISO 21952-A	W CrMo1Si
LNM 20	0.09	1.0	0.6	-	-	2.5	0.9	-	-	-	A5.28	ER90S-B3*	ISO 21952-A	G CrMo2Si
LNT 20	0.09	1.0	0.6	-	-	2.5	0.9	-	-	-	A5.28	ER90S-B3*	ISO 21952-A	W CrMo2Si
LNT 502	0.08	0.5	0.3	-	-	5.8	0.6	-	-	-	A5.28	ER80S-B6	ISO 21952-A	W CrMo6Si
LNT 3Cr(P91)	0.07	0.7	0.3	0.7	-	8.7	0.9	0.2	0.04	0.05	A5.28	ER90S-B9	ISO 21952-A	W CrMo91

* Nearest classification

Product name	Chemical composition (typical values) in %											AWS	EN/ISO
	C	Mn	Si	Cr	Ni	Mo	Nb	N	Cu	P	S		
LNW 304LSi	0.020	1.7	0.8	20.0	10.0	0.2	-	-	-	-	-	A5.9	ISO 14343-A
LNT 304LSi	0.010	1.6	0.8	20.0	10.0	0.2	-	-	-	-	-	ER308LSi	G 19.9 L Si
LNW 304L	0.010	1.6	0.5	20.0	10.0	0.2	-	-	-	-	-	ER308L	ISO 14343-A
LNT 304L	0.010	1.6	0.5	20.0	10.0	0.2	-	-	-	-	-	ER308L	G 19.9 L
LNW 347Si	0.04	1.3	0.9	19.2	9.9	0.30	0.6	-	-	-	-	A5.9	ISO 14343-A
LNT 347Si	0.04	1.5	0.8	19.5	9.5	0.30	0.6	-	-	-	-	ER347Si	G 19.9 NbSi
LNW 316L	0.010	1.5	0.5	18.5	12	2.7	-	-	-	-	-	A5.9	ISO 14343-A
LNT 316L	0.010	1.6	0.8	18.5	12.2	2.5	-	-	-	-	-	ER316L	G 19.12.3 L
LNW 316LSi	0.010	1.7	0.8	18.5	12.2	2.7	-	-	-	-	-	ER316LSi	ISO 14343-A
LNT 316LSi	0.010	1.7	0.8	18.5	12.2	2.7	-	-	-	-	-	ER316LSi	G 19.12.3 L Si
LNW 318Si	0.04	1.4	0.85	18.9	11.7	2.7	0.5	-	-	-	-	A5.9	ISO 14343-A
LNT 318Si	0.04	1.5	0.8	19.0	12.0	2.7	0.6	-	-	-	-	ER318*	G 19.12.3 NbSi
LNW 4439Mn	0.02	7.0	0.7	19.1	16.9	4.6	-	0.15	-	-	-	A5.9	ISO 14343-A
LNT 4439Mn	0.02	7.0	0.4	18.0	16.0	4.5	-	0.15	-	-	-	ER316L Mn	G 18.16.5 N L*
LNW 4455	0.015	7.0	0.35	20.0	16.0	2.8	-	0.15	-	-	-	A5.9	ISO 14343-A
LNT 4455	0.025	7.5	0.4	19.0	15.0	2.7	-	0.15	-	-	-	ER316L Mn	G 20.16.3 Mn L
LNW 4465	0.018	5.0	0.4	25.0	23.0	2.0	-	0.15	-	-	-	A5.9	ISO 14343-A
LNT 4465	0.018	5.0	0.4	25.0	23.0	2.0	-	0.15	-	-	-	ER316L Mn	G 25.22.2 N L
LNW 4500	0.009	1.7	0.3	20.0	25.0	4.4	-	1.5	-	-	-	A5.9	ISO 14343-A
LNT 4500	0.013	2.0	0.4	20.0	25.0	4.5	-	1.5	-	-	-	ER385	G 20.25.5 Cu L
LNW 4362	0.020	1.7	0.7	23.0	7.0	0.3	-	0.14	-	0.020	0.004	A5.9	ISO 14343-A
LNW 4462	0.018	1.5	0.5	22.7	8.5	3.0	-	0.15	-	-	-	ER2209	No EN or AWS standard
LNT 4462	0.015	1.6	0.5	22.5	8.5	3.0	-	0.15	-	-	-	ER2209	ISO 14343-A
LNW Zeron 100X	0.015	0.7	0.4	25.0	9.8	3.7	-	0.22	0.6	-	0.7	A5.9	G 25.9 4 N L
LNT Zeron 100X	0.020	0.6	0.4	25.0	9.3	3.6	-	0.22	0.65	-	0.7	ER2594	ISO 14343-A
LNW 309Si	0.010	1.8	0.8	23.3	13.8	0.14	-	-	-	-	-	A5.9	ISO 14343-A
LNT 309Si	0.010	1.6	0.8	23.5	13.0	0.2	-	-	-	-	-	ER309LSi	G 23.12 L Si
LNT 309LHF	0.010	1.65	0.35	24	13	0.05	-	-	-	-	-	A5.9	ISO 14343-A
LNW 307	0.08	7.1	0.8	19.2	9.0	-	-	-	-	-	-	ER307*	W 23.12 L
LNT 307	0.08	6.5	0.7	18.5	8.5	-	-	-	-	-	-	A5.9	ISO 14343-A
LNW 304H	0.05	1.8	0.5	20.0	10.0	0.2	-	-	-	-	-	ER307*	G 18.8 Mn
LNT 304H	0.05	1.6	0.5	20.0	10.0	0.2	-	-	-	-	-	ER308H	W 18.8 Mn
LNW 430LNb	0.01	0.7	0.4	18.0	-	-	0.3	-	-	-	-	A5.9	ISO 14343-A
LNW 309H	0.05	1.8	0.5	24.0	13.5	0.2	-	-	-	-	-	ER309	ISO 14343-A
LNW 310	0.1	1.8	0.45	26.0	21.0	0.2	-	-	-	-	-	ER310	G 23.12 L*
LNT 310	0.1	1.7	0.5	26.0	21	0.2	-	-	-	-	-	ER310	ISO 14343-A
Lincoln MIG 308LSi	0.020	1.7	0.8	20.0	10.0	0.2	-	-	-	-	-	ER308LSi	G 25.20
Lincoln TIG 308LSi	0.010	1.6	0.8	20.0	10.0	0.2	-	-	-	-	-	A5.9	ISO 14343-A
Lincoln TIG 308L	0.010	1.6	0.5	20.0	10.0	0.2	-	-	-	-	-	ER308LSi	W 19.9 L Si
Lincoln MIG 316LSi	0.010	1.6	0.8	18.5	12.2	2.5	-	-	-	-	-	A5.9	ISO 14343-A
Lincoln TIG 316LSi	0.010	1.7	0.8	18.5	12.2	2.7	-	-	-	-	-	ER316LSi	G 19.12.3 L Si
Lincoln TIG 316L	0.010	1.5	0.5	18.5	12	2.7	-	-	-	-	-	A5.9	ISO 14343-A
Lincoln MIG 308LSi	0.010	1.8	0.8	23.3	13.8	0.14	-	-	-	-	-	ER309LSi	W 19.12.3 L
Lincoln TIG 309LSi	0.010	1.6	0.8	23.5	13.0	0.20	-	-	-	-	-	A5.9	ISO 14343-A
Lincoln MIG 307	0.08	7.1	0.8	19.2	9.0	-	-	-	-	-	-	ER307*	G 23.12 L
Lincoln TIG 309L	0.010	1.65	0.35	24.0	13.0	0.05	-	-	-	-	-	A5.9	ISO 14343-A
Lincoln MIG 307	0.08	7.1	0.8	19.2	9.0	-	-	-	-	-	-	ER307*	W 18.8 Mn

* Nearest classification

WIRES FOR MIG/MAG & TIG WELDING (NI BASE ALLOYS)

Product name	Chemical composition (typical values) in %												AWS	ENISO	
	C	Mn	Si	Ni	Cr	Mo	Cu	Nb	Fe	Al	W	Ti			
LNM NiCr 31/27	0.01	1.5	0.2	31.0	27.0	3.5	1.0	-	-	-	-	-	A5.9	ER383	ISO 14343-A G 27 31 4 Cu L
LNT NiCr 31/27	0.01	1.5	0.2	31.0	27.0	3.5	1.0	-	-	-	-	-	A5.9	ER383	ISO 14343-A W 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	ERNiCrMo-3	ISO 18274 S N 6625 (NiCr22Mo9Nb)
LNT NiCr 60/20	0.03	0.1	0.1	bal.	22.0	9.0	-	3.5	0.4	-	-	-	A5.14/A5.14M	ERNiCrMo-3	ISO 18274 S N 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	ERNiCr-3	ISO 18274 S N 6082 (NiCr20Mn3Nb)
LNT NiCr 70/19	0.03	3.0	0.2	bal.	20.0	-	0.1	2.5	1.0	-	-	-	A5.14/A5.14M	ERNiCr-3	ISO 18274 S N 6082 (NiCr20Mn3Nb)
LNT NiCrMo 59/23	0.015	0.5	0.06	59	23	16	-	-	1.5	0.4	-	-	A5.14/A5.14M	ERNiCrMo-13	ISO 18274 S N 6059 (NiCr23Mo16)
LNM NiCrMo 60/16	0.006	0.5	0.04	57.8	16.0	16.0	-	-	5.8	-	3.6	-	A5.14/A5.14M	ERNiCrMo-4	ISO 18274 S N 6276 (NiCr15Mo16Fe6W4)
LNT NiCrMo 60/16	0.006	0.5	0.04	57.8	16.0	16.0	-	-	5.8	-	3.6	-	A5.14/A5.14M	ERNiCrMo-4	ISO 18274 S N 6276 (NiCr15Mo16Fe6W4)
LNM NiCu 70/30	0.10	3.3	0.6	64	-	-	29	-	1.5	-	-	2.4	A5.14/A5.14M	ERNiCu-7	ISO 18274 S N 4060 (NiCu30MnTi)
LNT NiCu 70/30	0.06	3.5	0.5	65	-	-	30	-	1.1	-	-	2.0	A5.14/A5.14M	ERNiCu-7	ISO 18274 S N 4060 (NiCu30MnTi)
LNM NITi	0.02	0.4	0.2	bal.	-	-	-	-	0.06	-	-	3.1	A5.14/A5.14M	ERNi1	ISO 18274 S N 2061 (NITi3)
LNT NITi	0.03	0.5	0.4	bal.	-	-	-	-	0.06	-	-	2.8	A5.14/A5.14M	ERNi1	ISO 18274 S N 2061 (NITi3)
LNM NiFe	0.05	0.83	0.14	bal.	-	-	0.4	-	43.8	-	-	-	A5.15	ENFe-CI	ISO 1071 S N Fe-CI

CHEMICAL COMPOSITION AND CLASSIFICATION
(TIG & MIG wires for Ni & Cu base alloys)

WIRES FOR MIG/MAG & TIG WELDING (CU BASE ALLOYS)

Product name	Chemical composition (typical values) in %											AWS	EN/ISO
	C	Al	Mn	Ni	Si	Ti	Fe	Sn	P	Zn			
LNM CuA8	bal.	8	0.3	-	-	-	-	-	-	-	-	ERCuA1	EN 14640 S Cu 6100 (CuA8)
LNT CuA8	bal.	8	0.3	-	-	-	-	-	-	-	-	ERCuA1	EN 14640 S Cu 6100 (CuA8)
LNM CuA8N2	bal.	8.7	1.5	2.1	-	-	2.0	-	-	-	-	EN 14640 S Cu 6327	EN 14640 S Cu 6327
LNM CuA8N6	bal.	9	2.5	5.0	-	-	4.0	-	-	-	-	ERCuA1	EN 14640 S Cu 6328 (CuA9N5)
LNM CuN30	bal.	-	0.8	31	-	-	-	-	-	-	-	ERCuNi	EN 14640 S Cu 7158 (CuN30)
LNT CuN30	bal.	-	0.75	30	0.05	0.35	0.5	-	-	-	-	ERCuNi	EN 14640 S Cu 7158 (CuN30)
LNM CuSn	bal.	-	0.2	0.1	0.3	-	-	0.8	-	-	-	ERCu	EN 14640 S Cu 1898 (CuSn1)
LNM CuSn6	bal.	-	-	-	-	-	-	6	0.2	-	-	ERCuSn-A	EN 14640 S Cu 5180 (CuSn6P)
LNT CuSn6	bal.	-	-	-	-	-	-	6	0.2	-	-	ERCuSn-A	EN 14640 S Cu 5180 (CuSn6P)
LNM CuSn12	bal.	-	-	-	-	-	-	12	0.2	-	-	ERCuSn-A	EN 14640 S Cu 5410 (CuSn12P)
LNM CuS3	bal.	-	1.0	-	3.0	-	-	0.1	-	0.1	-	ERCuS-A	EN 14640 S Cu 6560 (CuS3Mn1)
LNT CuS3	bal.	-	1.0	-	3.0	-	-	0.1	-	0.1	-	ERCuS-A	EN 14640 S Cu 6560 (CuS3Mn1)

WIRES FOR MIG/MAG & TIG WELDING (ALUMINIUM)

Product name	Chemical composition (typical values) in %											AWS	EN/ISO
	Al	Mn	Si	Ti	Fe	Zn	Mg	Cr	Cu	Si+Fe	Zr		
SuperGlaze® MIG 4043	bal.	0.01	4.7	0.001	0.3	0.002	0.004	-	0.01	-	-	A5-10 ER4043	ISO 18273 SAI 4043 A (A1S5)
SuperGlaze® TIG 4043	bal.	0.05	5.0	0.15	0.4	0.1	-	-	-	-	-	A5-10 R4043	ISO 18273 SAI 4043 A (A1S5)
SuperGlaze® MIG 5183	bal.	0.8	0.2	0.15	0.14	0.15	4.5	0.15	0.02	-	-	A5-10 ER5183	ISO 18273 SAI 5183 (AlMg4.5Mn0.7)
SuperGlaze® TIG 5183	bal.	0.8	0.1	0.02	0.2	0.15	4.5	0.15	-	-	-	A5-10 R5183	ISO 18273 SAI 5183 (AlMg4.5Mn0.7)
SuperGlaze® MIG 5356	bal.	0.11	0.08	0.06	0.2	0.03	4.9	0.07	0.01	-	-	A5-10 ER5356	ISO 18273 SAI 5356 (AlMg5Cr)
SuperGlaze® TIG 5356	bal.	0.10	0.1	0.10	-	-	5.0	0.15	-	-	-	A5-10 R5356	ISO 18273 SAI 5356 (AlMg5)
LNM A89.5	bal.	<0.01	0.05	0.04	0.12	0.02	-	-	0.04	0.2	-	A5-10 ER1100*	ISO 18273 SAI 5754 (AlMg3)
LNT A89.5	bal.	<0.01	0.05	0.04	-	0.02	-	-	0.04	-	-	A5-10 ER1100*	ISO 18273 SAI 5754 (AlMg3)
LNM AlMg3	bal.	0.01	0.06	0.09	0.13	0.1	3.4	0.19	0.01	-	-	ISO 18273	SAI 5356 (AlMg5)
LNT AlMg3	bal.	0.01	0.06	0.10	-	0.1	3.2	0.20	0.01	-	-	A5-10 ER5356	ISO 18273 SAI 5356 (AlMg5)
LNM AlMg5	bal.	0.11	0.08	0.06	0.2	0.03	4.9	0.07	0.01	-	-	A5-10 ER5356	ISO 18273 SAI 5356 (AlMg5)
LNT AlMg5	bal.	0.10	0.10	0.10	-	-	5.0	0.15	-	-	-	A5-10 ER5183	ISO 18273 SAI 5183 (AlMg4.5Mn0.7)
LNM AlMg4.5Mn	bal.	0.65	0.09	0.02	0.14	0.03	5	0.06	0.02	-	-	A5-10 ER5183	ISO 18273 SAI 5183 (AlMg4.5Mn0.7)
LNT AlMg4.5Mn	bal.	0.80	0.10	0.02	0.20	0.15	4.5	0.15	-	-	-	A5-10 ER5183	ISO 18273 SAI 5183 (AlMg4.5Mn0.7)
LNM AlMg4.5MnZr	bal.	0.8	0.2	0.15	-	0.15	4.5	0.15	-	-	0.1	ISO 18273	SAI 5087 (AlMg4.5MnZr)
LNT AlSi5	bal.	0.01	4.7	0.001	0.3	0.002	0.004	-	0.01	-	-	A5-10 ER4043	ISO 18273 SAI 4043 A (A1S5(A1))
LNT AlSi5	bal.	0.05	5.0	0.15	0.4	0.10	-	-	-	-	-	A5-10 ER4043	ISO 18273 SAI 4043 A (A1S5(A1))
LNM AlSi12	bal.	0.01	11.4	0.01	0.4	0.01	-	-	0.04	-	-	A5-10 ER4047	ISO 18273 SAI 4047 A (A1S12 (A1))
LNT AlSi12	bal.	-	12.0	-	0.5	0.10	0.10	-	-	-	-	A5-10 ER4047	ISO 18273 SAI 4047 A (A1S12 (A1))

* Nearest classification

OTHERS

Product name	Chemical composition (typical values) in %								AWS	DIN/ISO
	C	Mn	Si	Cr	P	S	Ni	Mo		
LNM 420FM	0.5	0.4	3	9	-	-	-	-		DIN 8555 MSG 6-GZ-60-PS
LNM 4M	0.7	1.9	0.45	1.0	-	-	-	-		DIN 8555 MSG 2-GZ-350
LNG I	0.07	0.4	0.07	-	0.01	0.01	-	-	A5.2 R45*	EN 12536 O I
LNG II	0.10	1.1	0.15	-	0.01	0.01	-	-	A5.2 R60*	EN 12536 O II
LNG III	0.06	1.1	0.15	-	0.01	0.01	0.40	-	A5.2 R60*	EN 12536 O III
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			
Outershield ¹ 70	C1	0.06	1.30	0.50	0.015	0.010	-	-	-	-	E70T-9C / E70T-9M	EN ISO 17632-A	T 46 0 R C 3 / T 46 0 R M 3
Outershield ¹ 70	M21	0.06	1.70	0.35	0.015	0.010	-	-	-	-	E70T-9C / E70T-9M	EN ISO 17632-A	T 46 0 R C 3 / T 46 0 R M 3
Outershield ¹ 70-H	C1	0.06	1.30	0.50	0.015	0.010	-	-	-	-	E70T1C-H4 / E70T1-MH-H4	EN ISO 17632-A	T 46 0 R C 3 H5 / T 46 0 R M 3 H5
Outershield ¹ 70-H	M21	0.06	1.70	0.35	0.015	0.010	-	-	-	-	E70T1C-H4 / E70T1-MH-H4	EN ISO 17632-A	T 46 0 R C 3 H5 / T 46 0 R M 3 H5
Outershield ¹ 70E-H	C1/M21	0.04	1.45	0.6	0.015	0.010	-	-	-	-	E70T1C-H4 / E70T1-M-H4	EN ISO 17632-A	T 46 3 R M 3 H5 / T 46 3 R M 3 H5
Outershield ¹ 71E	M21	0.05	1.25	0.7	0.015	0.015	-	-	-	-	E70T1M-H8	EN ISO 17632-A	T 46 3 P M 1 H10
Outershield ¹ 71E-H	M21	0.04	1.4	0.6	0.013	0.010	-	-	-	-	E71T1M-H5	EN ISO 17632-A	T 46 3 P M 1 H5
Outershield ¹ 71M-H	C1	0.05	1.3	0.4	0.015	0.010	-	-	-	-	E71T1C-H4	EN ISO 17632-A	T 46 2 P C 1 H5
Outershield ¹ 71C	C1	0.05	1.4	0.4	0.015	0.010	-	-	-	-	E71T1C-H8E/T-9C-H8	EN ISO 17632-A	T 46 3 P C 1 H10
Outershield ¹ T55-H	C1	0.05	1.5	0.55	0.012	0.010	-	-	-	-	E71T1C-H4 / E71T1-M-H4	EN ISO 17632-A	T 42 4 B C 2 H5 / T 42 4 B M 2 H5
Outershield ¹ T55-H	M21	0.06	1.5	0.6	0.012	0.010	-	-	-	-	E71T1C-H4 / E71T1-M-H4	EN ISO 17632-A	T 42 4 B C 2 H5 / T 42 4 B M 2 H5
Outershield ¹ MC700	M21	0.05	1.35	0.6	0.015	0.023	-	-	-	-	E70C-6M H8	EN ISO 17632-A	T 46 2 M M 2 H10
Outershield ¹ MC710-H	M21	0.05	1.35	0.6	0.015	0.023	-	-	-	-	E70C-6M H4	EN ISO 17632-A	T 46 3 M M 2 H5
Outershield ¹ MC710C-H	C1	0.05	1.35	0.6	0.015	0.023	-	-	-	-	E70C-6C H4	EN ISO 17632-A	T 46 3 M C 2 H5
Outershield ¹ MC715-H	M21	0.04	1.5	0.4	0.012	0.020	-	-	-	-	E70C-6M H4	EN ISO 17632-A	T 46 4 M M 2 H5
Outershield ¹ MC460VD-H	M21	0.05	1.25	0.6	0.015	0.015	-	-	-	-	E70C-6M H4	EN ISO 17632-A	T 46 2 M M 1 H5
Outershield ¹ MC420NH*	M21	0.03	0.6	0.45	0.017	0.023	2.9	-	-	0.03	E70C-GM H4	EN ISO 17632-A	T 38 Z Z M M 2 H5
Outershield ¹ 81N1C-H	C1	0.05	1.4	0.2	0.013	0.010	0.95	-	-	-	E81T1-N1C-H4 ³⁾	EN ISO 17632-A	T 50 4 1 N1 P C 2 H5 ⁴⁾
Outershield ¹ 81N1-H	M21	0.05	1.4	0.2	0.013	0.010	0.95	-	-	-	E81T1-N1M-H4 ³⁾	EN ISO 17632-A	T 50 5 1 N1 P M 2 H5 ⁴⁾
Outershield ¹ 81N1-HSR	M21	0.06	1.4	0.3	0.013	0.010	0.95	-	-	-	E81T1-N1M-H4	EN ISO 17632-A	T 50 5 1 N1 P M 2 H5 T
Outershield ¹ 81K2-H	M21	0.04	1.4	0.2	0.012	0.010	1.4	-	-	-	E81T1-H2M-H4 ³⁾	EN ISO 17632-A	T 50 6 1 5 N1 P M 2 H5 ⁴⁾
Outershield ¹ 81K2-HSR	M21	0.06	1.3	0.3	0.012	0.010	1.4	-	-	-	E81T1-H2M-H4	EN ISO 17632-A	T 50 6 1 5 N1 P M 2 H5 T
Outershield ¹ 500CT-H	M21	0.04	1.3	0.2	0.014	0.010	0.84	0.39	-	-	E81T1-GM-H4	EN ISO 17632-A	T 50 5 2 P M 2 H5
Outershield ¹ 555CT-H	M21	0.03	1.1	0.4	0.015	0.010	0.6	0.55	-	0.55	E81T1-V2M-H4	EN ISO 17632-B	T 555T1-1MAN-NCCT1-JH5
Outershield ¹ 91N1-HSR	M21	0.05	1.4	0.2	0.013	0.010	0.95	-	0.4	-	E91T1-GM-H4	ISO 18276-A	T 55 4 1 N1 M 2 P M 2 H5
Outershield ¹ 91K2-HSR	M21	0.05	1.4	0.2	0.013	0.010	1.4	-	0.4	-	E91T1-GM-H4	ISO 18276-A	T 55 4 1 5 N1 M 2 P M 2 H5
Outershield ¹ 550-H	M21	0.04	1.4	0.2	0.012	0.010	2.0	-	0.3	-	E10T11-H3M-H4	ISO 18276-A	T 55 4 2 P M 1 H5
Outershield ¹ 690-H	M21	0.06	1.5	0.2	0.015	0.010	2.0	-	0.5	-	E11T11-H3M-H4	ISO 18276-A	T 69 4 2 P M 2 H5
Outershield ¹ 690-HSR	M21	0.06	1.8	0.3	0.013	0.010	2.0	-	0.5	-	E11T11-H3M-H4	ISO 18276-A	T 69 4 2 P M 2 H5 T
Outershield ¹ 101N1-HSR	M21	0.06	1.5	0.2	0.015	0.010	0.95	-	0.4	-	E10T11-G	ISO 18276-A	T 69 4 2 P M 2 H5 T
Outershield ¹ 12-H	M21	0.065	0.8	0.2	0.014	0.010	-	-	0.46	-	E 81T1-A1M-H4	ISO 17634-A	T Mol P M 2 H5
Outershield ¹ 19-H	M21	0.06	0.74	0.24	0.013	0.010	-	-	0.52	1.24	E 81T1-B2M-H4	ISO 17634-A	T C1Mol P M 2 H5
Outershield ¹ 20-H	M21	0.06	0.75	0.21	0.013	0.008	-	-	1.09	2.23	E 91T1-B3M-H4	ISO 17634-A	T C1Mol P M 2 H5

* the mentioned classifications are an indication of the weld metal properties in the as welded condition. However, the Outershield MC420NH 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 ¹ -152	0.30	0.99	0.24	0.013	0.007	-	-	1.63	-	-	A5.20/A5.20M E7/T1-14	EN ISO 17632-A T 42 3 1N Y N 1
Innershield® NR ¹ -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 E6/T8-K6	
Innershield® NR ¹ -203M1	0.08	1.1	0.27	0.008	0.003	0.9	-	0.85	-	-	A5.29/A5.29M E7/T8-N1	
Innershield® NR ¹ -211-MPE	0.21	0.65	0.25	0.010	0.003	-	-	1.30	-	-	E7/T1-11	
Innershield® NR ¹ -232	0.18	0.65	0.27	0.006	0.004	-	-	0.55	-	-	A5.20/A5.20M E7/T1-8	
Innershield® NR ¹ -233	0.16	0.65	0.21	0.010	0.003	-	-	0.60	-	-	A5.20/A5.20M E7/T1-8	EN ISO 17632-A T 46 Z V N 3
Innershield® NR ¹ -207	0.07	0.9	0.20	0.005	0.003	0.85	-	1.0	-	-	A5.29/A5.29M E7/T8-K6	
Innershield® NR ¹ -207-H	0.07	0.9	0.20	0.005	0.003	0.85	-	1.0	-	-	A5.29/A5.29M E7/T8-K6	
Innershield® NR ¹ -208-H	0.05	1.65	0.25	0.007	<0.003	0.8	-	0.85	-	-	E9/T8-G	
Innershield® NR ¹ -305	0.09	0.9	0.20	0.007	0.008	-	-	0.80	-	-	E7/T1-6	
Innershield® NR ¹ -311	0.27	0.40	0.08	0.007	0.005	-	-	1.5	-	-	A5.20/A5.20M E7/T1-7	EN ISO 17632-A T 46 Z V N 3
Innershield® NR ¹ -400	0.06	0.74	0.17	0.004	0.002	0.75	0.13	0.74	-	-	A5.29/A5.29M E7/T8-K6	
Innershield® NR ¹ -450-H	0.07	0.26	0.06	0.004	0.002	2.44	-	0.88	-	-	A5.29/A5.29M E7/T8-N2 ¹⁾	
Innershield® NR ¹ -550-H	0.05	1.14	0.07	0.010	0.003	2.35	-	0.7	-	-	A5.29/A5.29M E8/T8-N2 H8	
Innershield® NS ¹ -3ME	0.23	0.45	0.25	0.006	0.006	-	-	1.40	-	-	A5.20/A5.20M E7/T1-4	

¹⁾ also meets: E81T8-N2

* 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 17663-A T 19 9 L R CM 3
Cor-A-Rosta™ P304L	M21/C1	0.03	1.3	0.7	19.5	10.0	-	-	-	A5.22	E308LT1-1/4	ISO 17663-A T 19 9 L P CM 2
Cor-A-Rosta™ 347	M21	0.05	1.4	0.6	19.5	10.0	-	-	-	A5.22	E347T0-4	ISO 17663-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 17663-A T 19 12 3 L R CM 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 17663-A T 19 12 3 L P CM 2
Cor-A-Rosta™ 309L	M21/C1	0.03	1.3	0.6	24.0	12.5	-	-	-	A5.22	E309LT0-1/4	ISO 17663-A T 23 12 L R CM 3
Cor-A-Rosta™ P309L	M21/C1	0.04	1.3	0.6	24.0	12.5	-	-	-	A5.22	E309LT1-1/4	ISO 17663-A T 23 12 L P CM 2
Cor-A-Rosta™ 309MoL	M21/C1	0.03	1.3	0.6	23.0	12.8	-	2.3	-	A5.22	E309LMoT0-1/4	ISO 17663-A T 23 12 2 L R CM 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 17663-A T 23 12 2 L P CM 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 17663-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 17663-A T 22 9 3 N L P CM 2
Cor-A-Rosta™ 2509	M21	0.03	1.2	0.6	23.0	9.3	-	3.1	0.13	A5.22	E2209T0-4	ISO 17663-A T 22 9 3 N L R M 3
Cor-A-Rosta™ P2509	M21	0.03	1.2	0.6	23.0	9.2	-	3.1	0.13	A5.22	E2209T1-4	ISO 17663-A T 22 9 3 N L P CM 2

CHEMICAL COMPOSITION AND CLASSIFICATION

(Stainless steel flux-cored wires)

SELF SHIELDING FLUX CORED WIRES FOR HARDFACING APPLICATIONS

Product name	Chemical composition (typical values) in %							AWS	EN/ISO
	C	Mn	Si	Cr	Mo	Al	W		
Lincore® 33	0.15	2.0	0.7	2.0	-	1.6	-	DIN 8555	EN 14700
Lincore® 40-O	0.2	1.5	0.7	3.5	0.4	1.8	-	DIN 8555	MF1-GF-350-GPS MF1-GF-400-GPS
Lincore® 50	2.2	1.2	1.0	11.0	0.5	0.6	-	DIN 8555	MF6-GF-50-GP
Lincore® 55	0.45	1.4	0.55	5.3	0.8	1.4	-	DIN 8555	MF2-GF-55-GP
Lincore® 60-O	4.2	1.6	1.3	25.4	-	0.6	-	DIN 8555	MF10-GF-60-CG
Lincore® T8D	0.65	1.5	0.8	7.0	1.4	1.8	1.6	DIN 8555	MF4-GF-60-S
Lincore® 15CrMn	0.4	15.0	0.25	16.0	-	-	-	DIN 8555	MF7-GF-250-KP
Lincore® 420 ø 1.6	0.5	1.7	1.7	11	-	-	-	DIN 8555	MF6-GF-55-CGR
Lincore® ø 2.0	0.5	1.4	0.7	11	-	-	-	DIN 8555	MF6-GF-35-CGR
Lincore® M	0.6	13.0	0.4	4.9	-	-	-	DIN 8555	MF6-GF-45-KP

SAW WIRES FOR MILD STEEL

Product name	Chemical composition (typical values) in %						AWS		EN/ISO	
	C	Mn	Si	P	S		A5.17	EL12	EN 756	S1
L-60	0.09	0.5	0.06	-	-		A5.17	EL12	EN 756	S1
LNS 135	0.1	1.0	0.10	0.015	0.015		A5.17	EM12	EN 756	S2
L-61	0.1	1.0	0.25	-	-		A5.17	EM12K	EN 756	S2Si
L-50M (LNS 133U)	0.1	1.6	0.25	-	-		A5.17	EH12K	EN 756	S3Si

SAW WIRES FOR LOW ALLOY STEEL

Product name	Chemical composition (typical values) in %											AWS	EN/ISO
	C	Mn	Si	P	S	Cr	Ni	Mo	Cu				
L-70	0.10	0.9	0.10	-	-	-	-	0.5	-	A5.23/A5.23M	EA1	EN 756	S2 Mo
LNS 140A	0.10	1.0	0.10	-	-	-	-	0.5	-	A5.23/A5.23M	EA2	EN 756	S2 Mo
LNS 140TB (LA 81)	0.06	1.1	0.20	-	-	-	-	0.5	-	A5.23/A5.23M	EG	EN 756	SZ
LNS 150 (LA 92)	0.13	0.8	0.15	<0.010	-	1.2	-	0.5	-	A5.23/A5.23M	EB2R	ISO 21952-A	Cr Mo1
LNS 151 (LA 93)	0.10	0.6	0.15	<0.010	-	2.6	-	1.0	-	A5.23/A5.23M	EB3R	ISO 21952-A	Cr Mo2
LNS 160	0.10	1.1	0.15	-	-	-	1.0	-	-	A5.23/A5.23M	EN1	EN 756	S2 Ni1*
LNS 162	0.10	1.1	0.15	-	-	-	2.2	-	-	A5.23/A5.23M	EN2	EN 756	S2 Ni2*
LNS 163	0.10	1.0	0.25	-	-	0.2	0.7	-	0.5	A5.23/A5.23M	EG	EN 756	S2 Ni7Cu
LNS 164 (LA 84)	0.10	1.6	0.10	-	-	-	0.9	0.5	-	A5.23/A5.23M	EF3	EN 756	S3 Ni1Mo
LNS 165 (LA 85)	0.10	1.4	0.20	-	-	-	1.0	0.2	-	A5.23/A5.23M	EN5	EN 756	SZ
LNS 167	0.13	1.0	0.20	-	-	-	0.9	0.6	-	A5.23/A5.23M	EF-1*	EN 756	S2 Ni1Mo
LNS 168	0.10	1.6	0.15	-	-	0.7	2.3	0.6	-	ISO 26304-A	-	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	EN 756	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	EN3	EN 756	S2Ni3
LNST55 **	0.06	1.5	0.60	<0.012	<0.010	-	-	-	-	A5.17/A5.17M	EC1 H4	EN 756	SZ H5
LNS T690**	0.08	1.7	0.60	<0.020	<0.015	-	1.8	0.5	-	A5.23/A5.23M	ECM3 H4	EN 756	SZ

* 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	1.8	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 329	0.09	1.8	1.2	25.5	5.6	-	-	-	-	-	-	S 25 4
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 NL
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 NL
									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 NiCr 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 NiCrMo 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	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® 8P+	0.17	0.7	0.25	0.8	0.2	0.01	0.01	-	-	A5.5	E8010-P1	ISO 2560-A E 46 4 1N1C 25
PIPELINER® 16P	0.06	1.3	0.5	-	-	0.013	0.009	-	-	A5.1	E7016 H4	E 42 3 B 12 H5
PIPELINER® 18P	0.05	1.5	0.5	0.95	-	0.010	0.005	-	-	A5.5	E8018-G-H4R	E 50 6 Mn1N1 B 32 H5
PIPELINER® LH-D80	0.05	1.15	0.45	-	-	0.010	0.010	-	-	A5.5	E8048-P2 H4R	E 46 4 Z 1N1B 45 H5
PIPELINER® LH-D90	0.05	1.30	0.50	0.90 (4.0 & 4.5mm) 0.25 (3.2mm)	0.2	0.010	0.010	-	-	A5.5	E8010-45-P2 H4R	ISO 18275 E 55 4 ZB 45 H5
PIPELINER® LH-D100	0.05	1.55	0.50	0.9	0.45	0.010	0.010	-	-	A5.5	E10045-P2 H4R	ISO 18275 E 69 15 GA H5
PIPELINER® 70S-G	0.07	1.25	0.55	-	-	0.010	0.020	-	-	A5.18	ER70S-G	ISO 14341 G 38 3 M G2Si / G 38 3 C G2Si
PIPELINER® 80S-G	0.09	1.72	0.61	-	0.45	0.012	0.007	-	-	A5.18	ER80S-G	ISO 14341 G 50 3 M G4S1
PIPELINER® G70M	0.05	1.60	0.45	0.36	-	0.013	0.011	-	-	A5.20/A5.20M	E71T-1M-JH8 / E71T-9M-JH8	EN 758 T 46 4 P M 2 H10
PIPELINER® G70M-E	0.05	1.45	0.20	0.95	0.15	0.013	0.010	-	-	A5.29/A5.29M	E81T1-GM-H4	EN 758 T 50 5 Z P M 2 H5
PIPELINER® G80M	0.04	1.75	0.40	1.0	0.25	0.020	0.010	0.11	-	A5.29/A5.29M	E101T1-G-H8	EN 12535 T 62 3 P M 2 H10
PIPELINER® G80M-E	0.06	1.40	0.30	0.95	0.40	0.013	0.010	-	-	A5.29/A5.29M	E91T1-GM-H4	ISO 18276-A T 55 4 Z P M 2 H5
PIPELINER® G90M-E	0.06	1.50	0.20	2.0	0.50	0.015	0.010	-	-	A5.29/A5.29M	E111T1-GM-H4	ISO 18276-A T 69 4 Z P M 2 H5
PIPELINER® NR@207+	0.04	1.22	0.25	0.82	-	0.010	0.010	-	1.1	A5.29/A5.29M	E71T8-K6	

Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux
1 Fleetweld 5P+				Innershield NR204-H, NR207-H	1
2 Supra				Innershield NR204-H, NR207-H	2
3 Panta					3
4 Pantafix					4
5 Omnia				Innershield NR-211-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 Gonia 180		LNM 25	Outershield MC700		13
14 Baso 48SP		LNM 26	Outershield MC710-H		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 L150					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 81Ni1-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 N11	LNM Ni1, LNM 28	Outershield 81K2-H/HSR		LNS 164 with flux P240, 8500, 888
8 Conarc 70G	LNT Ni2.5	LNM Ni2.5	Outershield 91K2-HSR	Innershield NR-450-H	
9 Conarc 74					
10 Conarc 80	-	-	Outershield 690-H/HSR		LNS 168, LNS T690 with flux P230, P240, 8500, 888
11 Conarc 85	-	LNM MoNiV/a			
12 Kryo 1				Innershield NR-203Ni1	
13 Kryo 1N	LNT Ni1	LNM Ni1	Outershield 81Ni1-H/HSR	Innershield NR-203Ni-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 20G(STC)	LNT 20	LNM 20	-	-	-
23 SL 22G	-	-	-	-	-
24 SL 502	LNT 502	-	-	-	LNS 502 with flux P230, P240, 8500
25 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			Cor-A-Rosta (P)304L	-	1
2 Linarosta 304L	LNT 304LSi, Lincoln TIG 308LSi	LNM 304LSi, Lincoln MIG 308LSi	Cor-A-Rosta 304L	-	2
3 Vertarosta 304L			Cor-A-Rosta P304L	-	3 LNS 304L with flux P2007
4 Jungo 304L	LNT 304L Lincoln TIG 308L	LNM 304L	Cor-A-Rosta (P)304L	-	4
5 Linarosta 304L-130	LNT 304LSi, Lincoln TIG 308LSi	LNM 304LSi, Lincoln MIG 308LSi	Cor-A-Rosta 304L	-	5
6 Arosta 347			Cor-A-Rosta 347	-	6 LNS 347 with flux P2007
7 Jungo 347	LNT 347	LNM 347	-	-	7
8 Arosta 316L / LP			Cor-A-Rosta (P)316L	-	8
9 Linarosta 316L	LNT 316LSi, Lincoln TIG 316LSi	LNM 316LSi, Lincoln MIG 316LSi	Cor-A-Rosta 316L	-	9
10 Vertarosta 316L			Cor-A-Rosta P316L	-	10 LNS 316L with flux P2007
11 Jungo 316L	LNT 316L, Lincoln TIG 316L	LNM 316L, Lincoln MIG 316L	Cor-A-Rosta (P)316L	-	11
12 Linarosta 316L-130	LNT 316LSi, Lincoln TIG 316LSi	LNM 316LSi, Lincoln MIG 316LSi	Cor-A-Rosta 316L	-	12
13 Arosta 318			-	-	13 LNS 318 with flux P2007
14 Jungo 318L	LNT 318Si	LNM 318Si	-	-	14
15 Jungo 4439	LNT 4439Mn	LNM 4439Mn	-	-	15 LNS 4439Mn with flux P2007
16 Jungo 4455	LNT 4455	LNM 4455	-	-	16 LNS 4455 with flux P2007
17 Jungo 4465	LNT 4465	LNM 4465	-	-	17 LNS 4465 with flux P2007
18 Jungo 4500	LNT 4500	LNM 4500	-	-	18 LNS 4500 with flux P2007
19 Arosta 4462			-	-	19
20 Jungo 4462	LNT 4462	LNM 4462	Cor-A-Rosta (P)4462	-	20 LNS 4462 with flux P2007, P2000S
21 Jungo Zeron 100X	LNT Zeron 100X	LNM Zeron 100X	-	-	21 LNS Zeron 100X with flux P2000S, P2007, P7000
22 Jungo 309L			-	-	22
23 Arosta 309S	LNT 309LSi, Lincoln TIG 309LSi	LNM 309LSi, Lincoln MIG 309LSi	Cor-A-Rosta (P)309L	-	23 LNS 309L with flux P2007, P2000S
24 Linarosta 309S			Cor-A-Rosta 309L	-	24
25 Arosta 309Nb	-	-	-	-	25
26 Arosta 309Mo	-	-	-	-	26
27 Nichroma			Cor-A-Rosta (P)309(Mo)L	-	27 LNS 309L with flux P2007, P2000S
28 Nichroma 160	LNT 309LSi, Lincoln TIG 309LSi	LNM 309LSi, Lincoln MIG 309LSi	-	-	28
29 Arosta 329	-	-	-	-	29 LNS 329 with flux P2007
30 Linarosta 312	-	-	-	-	30
31 Arosta 307			-	-	31
32 Arosta 307-160	LNT 307	LNM 307, Lincoln MIG 307	-	-	32 LNS 307 with flux P2007, P2000S
33 Jungo 307			-	-	33
34 Arosta 304-H	LNT 304-H	LNM 304-H, LNM 309-H	-	-	34 LNS 304H, LNS 309-H with flux P2007
35 Arosta 309-H	-	-	-	-	35
36 Intherma 310 / 310B	LNT 310	LNM 310	-	-	36 LNS NiCr60/20 with flux P2007, P2000, P7000

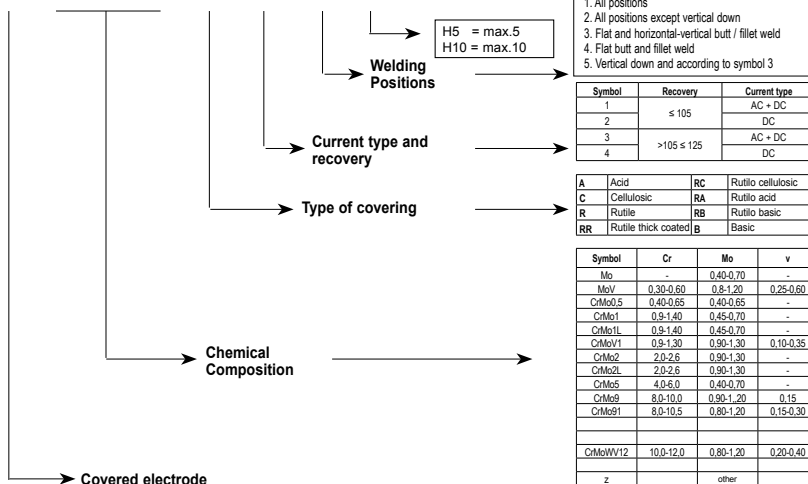
Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux
Copper & Nickel base alloys					
1 Nicro 31/27	-	-	-	-	1
2 Nicro 60/20	LNT Nicro 60/20	LNM Nicro 60/20	-	-	2 LNS NiCro 60/20 with flux P2007, P7000
3 Nicro 70/15	-	-	-	-	3
4 Nicro 70/15Mn	LNT Nicro 70/19	LNM Nicro 70/19	-	-	4
5 Nicro 70/19	-	-	-	-	5
6 NicroMo 59/23	LNT NicroMo 59/23	-	-	-	6
7 NicroMo 60/16	LNT NicroMo 60/16	-	-	-	7 LNS NiCroMo 60/16 with flux P2007
8 -	LNT NiTi	LNM NiTi	-	-	8
9 Nicro 70/30	LNT NiCu 70/30	LNM NiCu 70/30	-	-	9
10 Nyloid 2	LNT Nicro 60/20	LNM Nicro 60/20	-	-	10 LNS NiCro 60/20 with flux P2007
11 -	LNT CuNi 30	LNM CuNi 30	-	-	11
12 -	-	LNM CuSn	-	-	12
13 -	LNT CuSn6	LNM CuSn6	-	-	13
14 -	-	LNM CuSn12	-	-	14
15 -	LNT CuSi3	LNM CuSi3	-	-	15
16 -	LNT CuAl8	LNM CuAl8	-	-	16
17 -	-	LNM CuAl8Ni2	-	-	17
18 -	-	LNM CuAl8Ni6	-	-	18
Aluminium alloys					
1 Al99.8	LNT Al99.5	LNM Al99.5	-	-	1
2 AlMn	-	-	-	-	2
3 -	LNT Al99.5	LNM Al99.5	-	-	3
4 -	LNT AlMg3	LNM AlMg3	-	-	4
5 -	LNT AlMg5, Superglaze TIG 5356	LNM AlMg5, Superglaze MIG 5356	-	-	5
6 -	LNT AlMg4.5Mn, Superglaze TIG 5183	LNM AlMg4.5Mn, Superglaze MIG 5183	-	-	6
7 -	LNT AlMg4.5MnZr	LNM AlMg4.5MnZr	-	-	7
8 -	LNT AlSi5, Superglaze TIG 4043	LNT AlSi5, Superglaze MIG 4043	-	-	8
9 -	LNT AlSi12	LNM AlSi12	-	-	9

Covered electrodes	TIG rods	MIG/MAG wires	Gas shielded flux-cored wires	Self shielded flux-cored wires	SAW wires / flux
Cast iron					
1 Reptec Cast 1	LNT NiTi	LNM NiTi	-	-	1
2 Reptec Cast 3	-	LNM NiFe	-	-	2
3 Reptec Cast 31	-	LNM NiFe	-	-	3
Hardfacing applications					
1 Wearshield BU 30	-	-	-	Lincore 33	1 Lincore 30-S with flux 801
2 Wearshield Margjet (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)	-	-	-	Lincore 50, Lincore 55	7 Lincore 50 with flux 801
8 Wearshield ABR	-	-	-	-	8
9 Wearshield 44	-	-	-	-	9
10 Wearshield ME(e)	-	-	-	Lincore 60-0	10 L-60 with flux HS60
11 Wearshield 60 (e)	-	-	-	-	11
12 Wearshield 50M	-	-	-	-	12
13 Wearshield 70	-	-	-	Lincore 65-0	13
14 Wearshield 420	-	LNM 420FM	-	Lincore 420	14 L-60 with flux 802
15 Wearshield 34	-	-	-	-	15
Repair applications					
1 Reptec 126	-	LNM 307	-	-	1 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

EN 1599

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

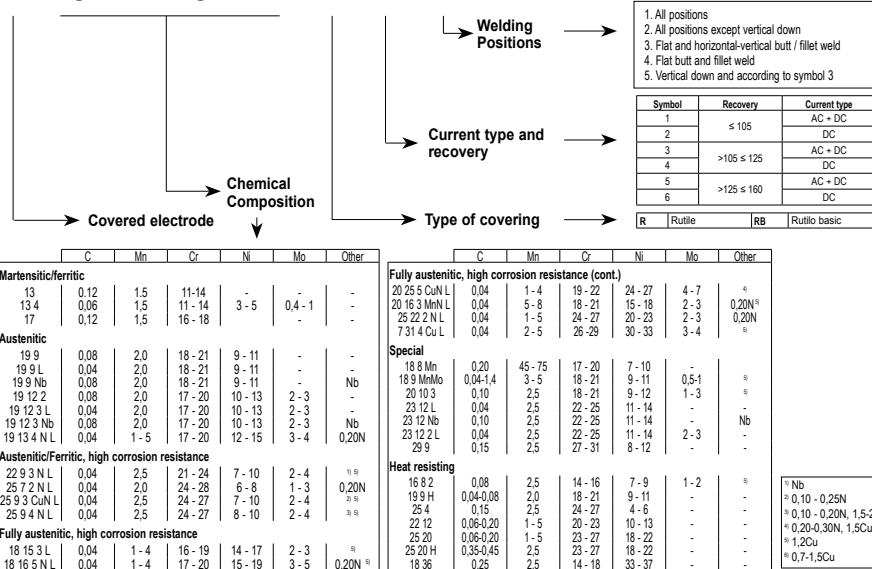
E CrMo2 B 3 2 H5 SL 20G



EN 1600

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

E 19 12 3 L R 1 2 *Limarosta 316L*



ISO 2560-A

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

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

Kryo 1

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

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

Welding
Positions

Current type and
recovery

Type of covering

Chemical
Composition

Minimum impact
of avg. 47 Joule at

Min. yield strength
(N/mm²)

Covered electrode

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

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

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

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	1,5-2,6	-
3Ni	1,4	>2,6-3,8	-
Mn1Ni	>1,4-2,0	0,6-0,12	-
1NiMo	1,4	0,6-0,12	0,3-0,6
Z		other	

Symbol	Yield	Tensile	A ₅
35	≥ 355	440-570	≥ 22%
38	≥ 380	470-600	≥ 20%
42	≥ 420	500-640	≥ 20%
46	≥ 460	530-680	≥ 20%
50	≥ 500	560-720	≥ 18%

EN 757

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

E 55 4 1NiMo B 3 2 H5 T

Stress relieved 1h / 560-600°C

Conarc 70G

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

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

Welding
Positions

Current type and
recovery

Type of covering

Chemical
Composition

Minimum impact of
avg. 47 Joule at

Min. yield strength
(N/mm²)

Covered electrode

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

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

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

Symbol	Mn	Ni	Cr	Mo
MnMo	1,4-2,0	0,6-1,2	-	0,3-0,6
Mn1Ni	1,4-2,0	0,6-1,2	-	-
1NiMo	<1,4	0,6-1,2	-	0,3-0,6
1,5NiMo	<1,4	1,2-1,8	-	0,3-0,6
2NiMo	<1,4	1,8-2,6	-	0,3-0,6
Mn1NiMo	1,4-2,0	0,6-1,2	-	0,3-0,6
Mn2NiMo	1,4-2,0	1,8-2,6	-	0,3-0,6
Mn2NiCrMo	1,4-2,0	1,8-2,6	-	0,3-0,6
Mn2NiCrMo	1,4-2,0	1,8-2,6	0,3-0,6	0,3-0,6
Z		other		

Symbol	Yield	Tensile	A ₅
55	≥ 550	610-780	≥ 18%
62	≥ 620	690-890	≥ 18%
69	≥ 690	760-960	≥ 17%
79	≥ 790	880-1080	≥ 16%
89	≥ 890	980-1180	≥ 15%

EN/ISO 14341-A (2008)

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
O = 0°C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C
7 = -70°C
8 = -80°C
9 = -90°C
10 = -100°C

Chemical composition

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

all grades: C 0.06-0.14 except G2Al: 0.08-0.14

all grades: S & P 0.025 / Cr 0.15 / V 0.03 / Cu total 0.35

single values are max.

Type of shielding gas

As described in EN-ISO 14175
M = M2 mixed shielding gas (without helium)
C = 100 CO₂
A = M13 mixed shielding gas (Ar + 0.5<O₂<3%)

Minimum impact of avg. 47 Joule at

Min. yield strength
(N/mm²)

Symbol	Yield	Tensile	A ₅
35	≥ 355	440-570	≥ 22%
38	≥ 380	470-600	≥ 20%
42	≥ 420	500-640	≥ 20%
46	≥ 460	530-680	≥ 20%
50	≥ 500	560-720	≥ 18%

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
O = 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 ₅
35	≥ 355	440-570	≥ 22%
38	≥ 380	470-600	≥ 20%
42	≥ 420	500-640	≥ 20%
46	≥ 460	530-680	≥ 20%
50	≥ 500	560-720	≥ 18%

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 = SAW

Chemical composition

Classification
Si = 0,65 - 1,2%

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

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

Outersheild 81Ni-H

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

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

Welding positions

Type of shielding gas

Type of electrode core

Chemical composition

Minimum impact of avg. 47 Joule at

Min. 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 ₅
35	≥ 355	440-570	≥ 22%
38	≥ 380	470-600	≥ 20%
42	≥ 420	500-640	≥ 20%
46	≥ 460	530-680	≥ 20%
50	≥ 500	560-720	≥ 18%

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

EN 760

Classification of flux for submerged arc welding

S A FB 1 54 AC H5 → H_{DM} (ml/100g) →

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

8500

Current type

AC = AC or DC
DC = DC only

Metallurgical behaviour

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

Applications

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

Type of flux

MS	manganese - silicate	MnO + SiO ₂	≥ 50
		CaO	≤ 15
CS	calcium - silicate	CaO + MgO + SiO ₂	≥ 55
		CaO + MgO	≤ 15
ZS	zirconium - silicate	ZrO ₂ + SiO ₂ + MnO	≥ 45
		ZrO ₂	≥ 15
RS	rutile - silicate	TiO ₂ + SiO ₂	≥ 50
		TiO ₂	≥ 20
AR	aluminate - rutile	Al ₂ O ₃ + TiO ₂	≥ 40
		Al ₂ O ₃ + SiO ₂ + MgO	≥ 40
		Al ₂ O ₃	≥ 20
AB	aluminate - Basic	CaF ₂	≥ 22
		Al ₂ O ₃ + SiO ₂ + ZrO ₂	≥ 40
AS	aluminate - silicate	CaF ₂ + MgO	≥ 30
		ZrO ₂	≥ 5
AF	aluminate - fluorure basic	Al ₂ O ₃ + CaF ₂	≥ 70
		CaO + MgO + CaF ₂ + MnO	≥ 50
FB	fluorure - basic	SiO ₂	≤ 20
		CaF ₂	≥ 15
Z	any other composition		

Manufacturing process

F = fused
A = agglomerated
M = mixed

Submerged arc welding

EN 756

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

S 42 5 AB S3Si *LNS133U/P230*

Chemical Composition

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

Type of flux

Symbol	Type of flux
MS	Manganese-silicate
CS	Calcium-silicate
ZS	Zirconium-silicate
RS	Rutile-silicate
AR	Aluminate-rutile
AB	Aluminate-Basic
AS	Aluminate-silicate
AF	Aluminate-fluorure basic
FB	Fluorure-basic
Z	any other type

Minimum impact of avg.
47 Joule at

Min. yield strength (N/mm²)

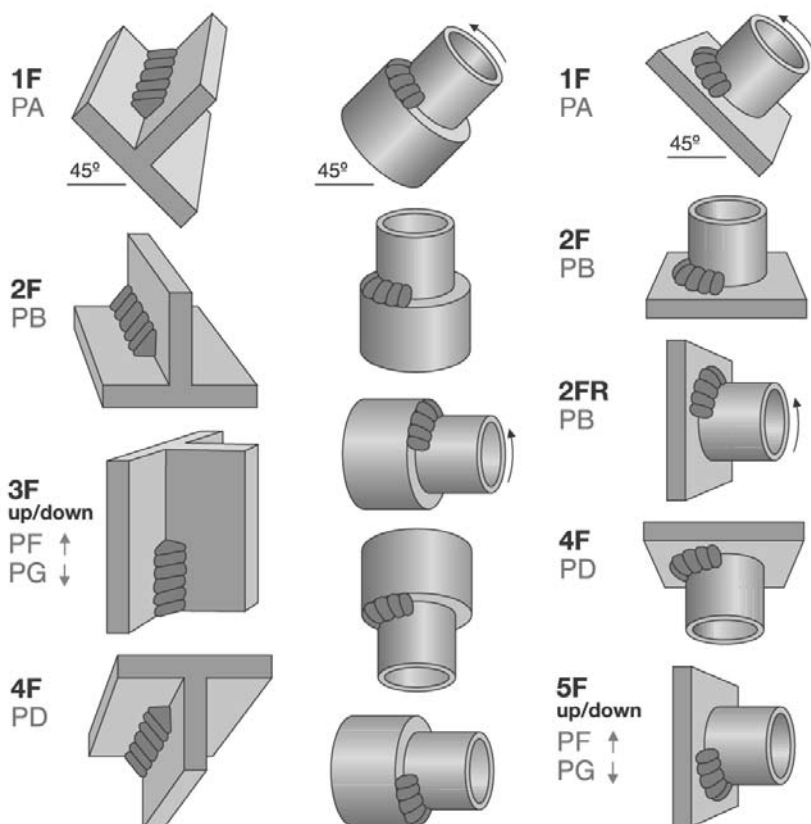
Symbol	Mn	Ni	Mo
SZ	any other agreed composition		0,3-0,6
S1	0,35-0,60		
S2	0,15		
S3	0,80-1,30		
S4	1,31-1,75		
S1Si	1,76-2,25		
S2Si	0,15-0,40		
S3Si2	0,15-0,40		
S3Si	0,40-0,60		
S4Si	0,15-0,40		
S1Mo	0,15-0,40	1,31-1,85	
S2Mo	0,05-0,25	0,35-0,60	0,45-0,65
S3Mo	0,15-0,40	0,80-1,30	0,45-0,65
S4Mo	0,15-0,40	1,31-1,75	0,45-0,65
S2Ni1	0,80-1,30	1,76-2,25	0,45-0,65
S2Ni1,5	0,80-1,30	0,80-1,20	
S2Ni2	0,80-1,30	1,21-1,80	
S2Ni3	0,80-1,30	1,81-2,40	
S2Ni1Mo	0,80-1,30	2,81-3,70	0,3-0,6
S3Ni1,5	0,80-1,30	0,80-1,20	0,45-0,65
S3Ni1Mo	1,31-1,70	1,21-1,80	
S3Ni1,5Mo	1,31-1,80	0,80-1,20	0,45-0,65
S3Ni1,5Mo	1,20-1,80	1,20-1,80	0,30-0,50

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

Multi-run			
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%

Submerged arc welding

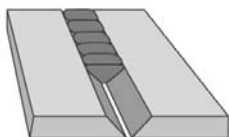
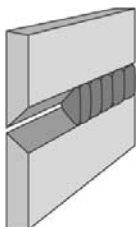
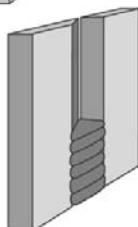
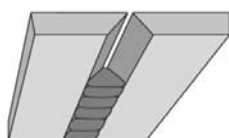
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Qualification test

Qualified for fillet welds

	Position	Plate	Pipe
Plate-fillet	1F	1F	1F
	2F	1F, 2F	1F, 2F, 2FR
	3F	1F, 2F, 3F	1F, 2F, 2FR
	4F	1F, 2F, 4F	1F, 2F, 2FR, 4F
	3F + 4F	All qualifications	All qualifications
Plate-fillet	1F	1F	1F
	2F	1F, 2F	1F, 2F, 2FR
	2FR		1F, 2FR
	4F	1F, 2F, 4F	1F, 2F, 2FR, 4F
	5F	All qualifications	All qualifications

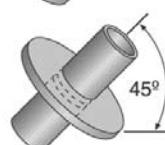
1G
PA

2G
PC

3G
up/down
PF ↑
PG ↓

4G
PE

1G
PA

2G
PC

5G
up/down
PF ↑
PG ↓

6G
H-L045


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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Application	Types of gas	Boiling Point		Applicable down to		Consumables				
		°C	K	°C	K	SMAW	MIG/MAG	TIG	FCAW	SAW
Fine grained steel with increasing strength	CO ₂ (to 1.5 ato)	-28	245			Baso G Conarc 49C/51N/180	LNM 26 Supra MIG	LNT 25 LNT 26	OS MC700 (-20°) OS MC710-H OS MC715-H OS T55-H OS 81Ni1-H / HSR	L61(LNS 129/860 (-20°C) LNS 135/860 (-20°C) L50M/LNS 133U/P230
	Propane	-42	231	-40	233	Conarc 60G/70G/80/85			OS 81K2-H / HSR OS 91K2-HSR OS 91Ni1-HSR	LNS 160 / P230/P240/888/8500
				-51	222	Kryo1 Kryo2	LNM Ni1	LNT Ni1		LNS 160 / P230/P240/888/8500 LNS 162 / P230/P240/888/8500
				-60	213	Kryo3		LNT Ni2.5		
12 Ni 14	CO ₂ (solid)	-78	195	-80	193					
	Acetylene	-84	189			Nyloid 2	LNM NiCro 70/19	LNT NiCro 70/19		LNS 4455 / P 2007
	Ethane	-88	185							
	Ethylene	-104	169	-105	168					
X12 Ni 5	Krypton	-153	120			Nyloid 2	LNM NiCro 70/19 LNM 4455	LNT NiCro 70/19 LNT 4455		LNS NiCro60/20 / P2007 LNS 4455 / P2007
	Methane	-161	112	-165	108					
						Nyloid 2	LNM NiCro 70/19	LNT NiCro 70/19		LNS NiCro 60/20 / P2007
						Jungo 304L NiCro 70/15 NiCro 70/19 NiCro 60/20	LNM 4455 LNM 304LSi LNM NiCro 70/19 LNM NiCro 60/20	LNT 4455 LNT 304L LNT NiCro 70/19 LNT NiCro 60/20	Cor-A-Rosta P304L	LNS 4455 / P2007 LNS 304L / P2007
X8 Ni 9 Austenitic CrNi steel AISI 304 AISI 316 LN AISI 317 LN	Oxygen	-183	90							
	Argon	-186	87							
	Nitrogen	-196	77	-196	77	Arostia 4439	LNM 4439Mn	LNT 4439Mn		LNM 4439Mn / P2007
X2 CrNi 19-11 X2 CrNiMo 17-12-2	Hydrogen	-253	-20							
	Helium	-269	4			Jungo 4455	LNM 4455	LNT 4455		LNS 4455 / P2007

SELECTION TABLE

(Applications in heat resistant steel)

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SELECTION TABLE

(Applications in heat resistant steel)

		Max. service temp. weld metal (°C)					
		1000	1050	1100	1100	1100	1200
Base materials		steel with approximately					
		22%Cr, 12%Ni		25%Cr, 4%Ni 0.4%C	25%Cr, 20%Ni	36%Ni, 18%Cr	36%Ni, 25%Cr
		EN	ENDIN	ENDIN	DIN	DIN	ENDIN
		NiCr22Mo9Nb 2.4586 ¹⁾ (Alloy 625)	X15 CrNiSi 20-12 1.4828 ¹⁾	X20 CrNiSi 25-4 1.4821	GX40 CrNiSi 25-20 1.4848	X12 NiCrSi 36-16 1.4864	GX40 NiCrSi35-25 1.4857
		X2 NiCrAlTi 32 20 1.4588 ²⁾ (Alloy 800L)	X12 CrAlTi 18-9 1.4878 ¹⁾	GX40 CrNi 24-5 1.4822	GX40 NiCrSi 25-12 1.4837	GX40 NiCrSi 36-18 1.4865	GX40 NiCrSiNb 38-25 1.4852
		X10 NiCrAlTi 32 20 1.4876 ²⁾ (Alloy 800H)	GX40 CrNiSi 22-9 1.4826 ¹⁾ GX25 CrNiSi 20-14 1.4832 ¹⁾ GX25 CrNiSi 18-9 1.4825 ¹⁾ GX30 CrSi 13 1.4710 ²⁾ GX40 CrSi 13 1.4729 ³⁾ GX40 CrSi 17 1.4740 ²⁾	GX40 CrNiSi 27.4 1.4823 X10 CrAl 7 1.4713 X10 CrAl 13 1.4724 X10 CrAl 18 1.4742 X10 CrAl 24 1.4762		GX40 NiCrSiNb 35-25 1.4852 X15 NiCrNb 32-21 1.4850	GX15 CrNi 25-20 1.4840
Products		ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
		B 163GN08 ²⁾ B407G610 ²⁾	A297GHC	A297GHK A297GHH	A297GHU A351GHT30	A351GCrK20	
SMAW	NCro 60/20 ¹⁾	Arosta 309H ^{1,2)} Arosta 329 ¹⁾	Arosta 329	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	LNr NCro 60/20	LNT NiCro 60/20					LNT310
MIG/ MAG	LNM NiCro 60/20	LNM NiCro 60/20					LNM 310
SAW	UNS NCro 60/20 P2007/P1000	LNS NiCro 60/20 P2007					LNS NCro 60/20 P2007/P1000

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

COVERED ELECTRODE SELECTION TABLE FOR STAINLESS STEEL

Material number	EN Code	Electrode type		Remarks
		First choice	Second choice	
Ferritic chromium steel				
1.4000 1.4001 1.4002 1.4006 1.4008 1.4016 1.4021 1.4024 1.4027	X6Cr13 *X7Cr14 X6CrAl13 X12Cr13 *GX8CrNi13 *X6Cr17 X20Cr13 *X15Cr13 *GX20Cr14	Arosta 309S Limarosta 309S	Arosta 329 Nichroma Arosta 309Mo	Arosta 329, when low Ni-content is required, for heavy material possibly only the capping layer
Martensitic chromium steel				
1.4113 1.4120	X6CrMo17 1 *X20CrMo13	Nichroma Arosta 309Mo	Arosta 329 Arosta 309S Limarosta 309S	Arosta 329, when low Ni-content is required, for heavy material possibly only the capping layer
Austenitic chromium-nickel steel				
1.4301 1.4303 1.4306 1.4308 1.4310 1.4311 1.4312 1.4318	X4CrNi18-10 X4CrNi18-12 X2CrNi19-11 GX5CrNi18-10 X10CrNi18-8 X2CrNiN18-10 *GX10CrNi18-8 X2CrNiN18-7	Arosta 304L Limarosta 304L-130 Limarosta 304L-130 Vertarosta 304L	Arosta 347	
1.4335	X1CrNi25-21	Jungo 4465		
1.4347	*GX8CrNi26-7	Jungo Zeron 100X	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 1.4460	X2CrNiMo 18-15-4 X2CrNiMoN 17-13-5 GX2CrNiMoN 17-13-4 GX6CrNiMo 17-13 X3CrNiMoN 27-5-2	Arosta 4439 Jungo Zeron 100X		
1.4462	X2CrNiMoN 22-5-3	Arosta 4462/ Jungo 4462	Jungo Zeron 100X	
1.4463 1.4464	*GX6CrNiMo 24-8-2 *GX40CrNiMo 27-5	Jungo Zeron 100X		
1.4465 1.4466	X1CrNiMoN 25-25-2 X1CrNiMoN 25-22-2	Jungo 4465		
1.4468 1.4469	*GX3CrNiMoN26-6-3 *GX2CrNiMoN26-7-4	Jungo Zeron 100X		

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	Jungo Zeron100X		
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		
1.4580	X6CrNiMoNb 17-12-2			
1.4581	*GX5CrNiMoNb 18-10	Arosta 318	Arosta 316L	Arosta 4439, when weld metal ferrite should not exceed <0,5%
1.4583	*X10CrNiMoNb 18-12	Vertarosta 316L	Limarosta 316L 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	GX8CrNi 18-10	NiCro 70/19	-	
1.6902	GX6CrNi 18-10			
1.6905	GX5CrNiNb 18-10			
1.6907	X3CrNiN 18-10			
Nickel-Copper-Iron-alloys				
2.4360	NiCu30Fe	NiCu 70/30	-	
2.4361	LC-NiCu30Fe			
2.4365	G-NiCu30Nb			
2.4375	NiCu30Al			
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	NiCr22Mo6Cu	NiCro 60/20		
2.4619	NiCr22Mo7Cu			
2.4641	NiCr21Mo6Cu			
2.4816	NiCr15Fe	NiCro 70/15 NiCro 70/15Mn	NiCro 60/20	
2.4817	LC-NiCr15Fe			
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	NiCr60 15	NiCro 70/15 NiCro 70/15Mn	-	
2.4869	NiCr80 20			
2.4951	NiCr20Ti			
2.4952	NiCr20TiAl			
2.4975	NiFeCr12Mo	NiCro 60/20	-	
2.4976	NiCr20Mo			

SELECTION TABLE

(Electrodes for dissimilar joints)

Type	EN code	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
		NiCr15Fe (Inconel 600) Wirt. (Incoloy 800)	X15CrNiSi 20 12 X15CrNiSi 25 20	X5CrNiMo 17-122 X2CrNiMo 18-143 X10CrNiMoNb 18-12	X8CrNi 18-10 X2CrNi 19-11 X8CrNiNb 18-10	X12Cr13 X6Cr17 X10CrAl24	X20CrMoV 12 1 X24CrMoV 12 1	10CrMo9-10 12CrMo19-5	13CrMo4-5 14MoV63	16Mo3	S420-500	S235-S355 P235-355
Un-alloyed steel Re<360N/mm ²	S235-S355 P235-P355	NiCr 70/15 NiCr 70/15Mn NiCr 70/19	Arosta 309S NiCr 70/15 NiCr 70/19	Nichroma Arosta 309S Arosta 309Mo NiCr 70/19	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Nichroma Arosta 309Mo Arosta 307	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Conarc 49C SL 12G SL 12G SL 19G SL 20G SL 502	SL 19G SL 20G SL 502	Conarc 49C Baso 100 Baso 120	Conarc 49C SL 12G Conarc 60G	Conarc 49C Baso 100 Baso 120
Un-alloyed fine grained steel Re<360-500N/mm ²	S420-S500	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 309S NiCr 70/15 NiCr 70/19 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo	Nichroma Arosta 309S Arosta 309Mo Arosta 307	Arosta 309S Arosta 309Mo Nichroma Arosta 307	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	SL 12G SL 19G SL 20G SL 502	SL 12G SL 19G	Conarc 49C SL 12G Conarc 60G Conarc 70G		
Mo-alloyed steel	16Mo3	1.5415	Arosta 309S NiCr 70/15 NiCr 70/19 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 70/19 NiCr 60/20	SL 12G SL 19G SL 20G SL 502	SL 12G SL 502			
CrMo MoV creep resistant steel	13CrMo4-5 14MoV63 (DIN)	1.7335 1.7715	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	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 19G SL 20G SL 22G				
CrMo creep resisting steel	10CrMo9-10 (DIN) 12CrMo19-5 (DIN)	1.7380 1.7362	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	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 20G SL 502				
Martensitic Cr-steel	X20CrMoV12-1 (DIN) X24CrMoV12-1 (DIN)	1.4922 1.4936	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	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	X12Cr13 X6Cr17 X10CrAl24 (DIN)	1.4006 1.4016 1.4762	Arosta 309S NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Nichroma Arosta 309S Arosta 309Mo	Nichroma Arosta 309S Arosta 309Mo	Arosta 329 Arosta 309S						
Stainless CrNi-steel	X5CrNi18-10 X2CrNi19-11 X6CrNiNb18-10	1.4301 1.4306 1.4550	NiCr 70/15 NiCr 70/15Mn NiCr 70/19 NiCr 60/20	Arosta 304L Arosta 316L	Arosta 304L Arosta 347							
Stainless CrNiMo-steel	X6CrNiMo17-122 X2CrNiMo18-143 X10CrNiMoNb18-12 (DIN)	1.4401 1.4435 1.4583	Arosta 309S NiCr 70/15Mn Arosta 309Mo	Arosta 316L Arosta 318								
High temperature CrNi-steel	X15CrNiSi20-12 (DIN) X15CrNiSi 25-20 (DIN)	1.4828 1.4841	Intherma 310 NiCr 70/19									
NiCr-Fe alloys	NiCr15Fe(DIN) (Alloy 600) NiCrAlTi (DIN) (Alloy 800)	2.4816 1.4876	NiCr 70/15 NiCr 70/15Mn NiCr 60/20									

Preheating and stress relieving

Preheating 150-250°C

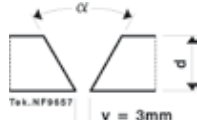
Type	Field of application	Deposit in cm ³ per electrode		
		Ø 3.2	Ø 4.0	Ø 5.0
Ferrod 135T Ferrod 160T	High recovery electrodes for fillet welds and horizontal V- and X-welds. Smooth weld appearance. High welding speed through high recovery of 135, 160 %	4.7	7.1 8.5	11.6 14.2
Ferrod 165A	As Ferrod 160T. 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
57 ¹ 69 ²	55 ¹ 69 ²	78
66	62	
66	72	
59/65	59/72	
64	66	77
84	79	
75	95	
62 ¹	64 ¹	91
62 ¹ 74 ²	63 ¹ 85 ²	99
70 ¹ 79 ²	75 ¹ 96 ²	114
67 ¹	83 ¹	95 ²
65	75 ¹ 100 ²	90
51	70	86
62	71	104
84	80	75
73	70	75
	70	75

Weld metal volume per meter

Fillet size "a" in mm	Theoretical content in 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	

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	

Thickness in mm	Theoretical content in cm ³	Formula : ((d-10) ² x 0,27 + 12d - 73)
20	194	
25	288	
30	395	
35	516	
40	650	

DETERMINATION OF WELDING COSTS

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

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

Ferrite Number

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

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

- fully austenitic weld metal:
- high corrosion resistance in severe oxidising and reducing acidic and chloride containing media: FN < 0.5
- fully austenitic CrNiMoN weld metal, non-magnetic: FN < 0.5
- low ferrite CrNiN and CrNiMoN weld metal, cryogenic applications: FN 3-6 or < 0.5
- general purpose stainless steel weld metal with corrosion resistance and high resistance to hot cracking and microfissures: FN 6-15
- buffer layer of austenitic/ferritic weld deposits for dissimilar joints and buffer layers in clad steel: FN 15-35
- austenitic/ferritic weld metal with high stress and pitting corrosion resistance as well as a balanced structure for toughness and corrosion: FN 30-70

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

Ferrite Measurement

An internationally accepted standardised method to determine the ferrite content is based upon an arbitrarily defined relationship between a magnetic force and weld ferrite content. This is necessary because an absolute and correct determination of the ferrite content is not available as a result of inherent inaccuracy of metallographic examination and the nonexistence of a calibration method for the absolute ferrite content in stainless steel. The attracting force between a defined permanent magnet and weld metal, containing delta-ferrite is measured by means of a torsion balance. The values are in fact compared with the values obtained in measurements using the same magnet, attracting a carbon steel base plate with a non magnetic copper coating of a specified thickness. A calibration method provides the necessary linear relation. The principles are accepted as the international standard ISO 8249 and AWS A4.2-91. The European Standardization will adopt the ISO standard.

The range in the revised standards has been extended to 100FN (originally 0-28FN).

Coated thickness standards are available from the "U.S. National Institute of Standards and Technology" (NIST). A precision torsion balance or the commercially available "Magne Gage" (fig.3) are suitable for the determination of the Ferrite Number under laboratory conditions (horizontal position). A permanent magnet of defined dimensions and magnetic strength, according ISO 8249, shall be used. Secondary standards for the checking and calibration of field equipment in the range 0-100FN are available from NIST.

Calculation of ferrite content

The ferrite content is estimated on the basis of calculation, using the as deposited weld metal chemical composition. The Cr- and Ni-equivalent is plotted in diagrams, based on the metallographic studies, such as:

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

Application of Ferrite Diagrams

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

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

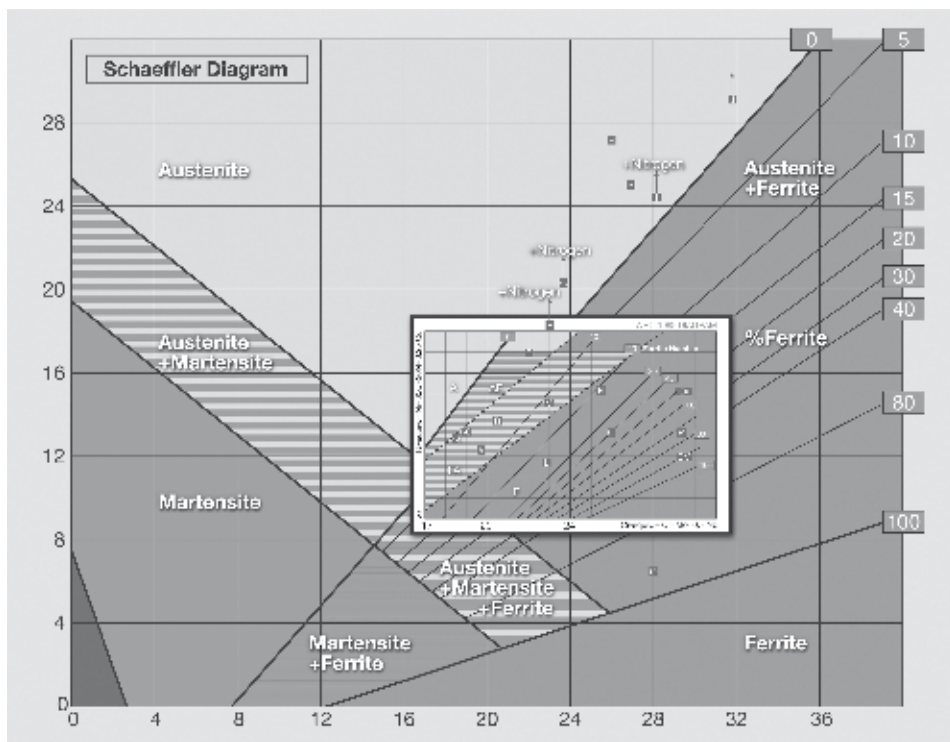


Fig. 1 Combined Schaeffler / WRC 1992 Constitution Diagram

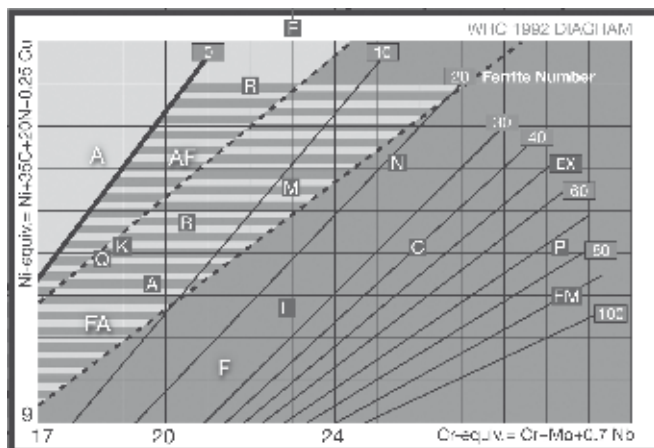


Fig. 2 WRC 1992 Constitution Diagram

Position of welding consumables

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

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

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

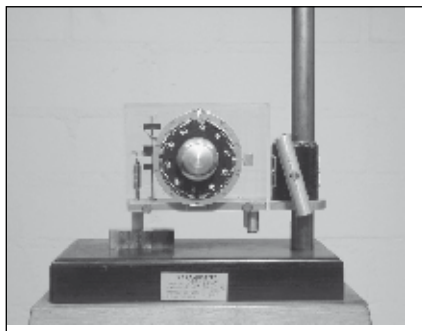


Fig. 3 Magne Gage

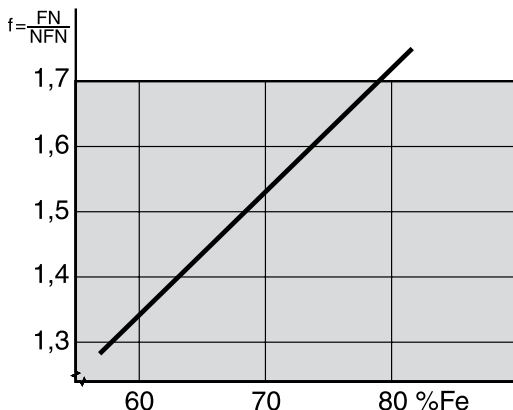


Fig. 4 Iron content versus factor f

Ferrite Number versus Ferrite Content

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

Limitations

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

Lincoln Electric laboratories

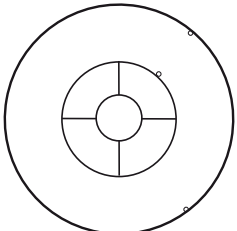
Since 1966 the Lincoln Electric and Lincoln Smitweld R&D departments have always been involved in the international development of ferrite determinations. The laboratories are equipped with calibrated Magne Gages and on site measurement equipment. Primary coating thickness standards and secondary standards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

References

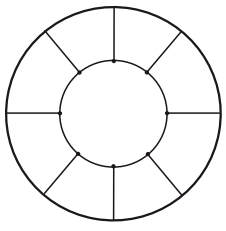
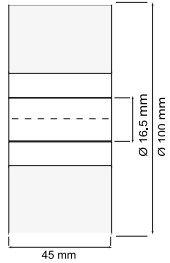
- 1) Schaeffler A.E., Metal Progress 56 (1949) p680-680s
- 2) DeLong W.T., Welding Journal 53 (1974) p273s-286s
- 3) Kotecki D.J., Siewert T.A., Welding Journal (1992) p171s-178s
- 4) Siewert T.A., McCowan C.N., Olson D.L., Welding Journal (1988) p289s-298s
- 5) Espy R.H., Welding Journal 61 (1982) p149s-156s

PACKAGING AND SIZES

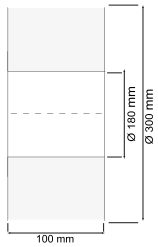
(Solid wires and flux-cored wires)



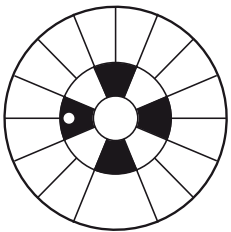
S100 (plastic)



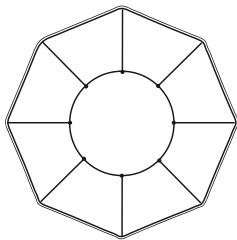
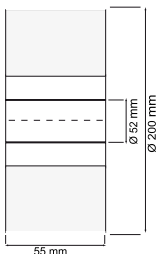
B300 (metal)



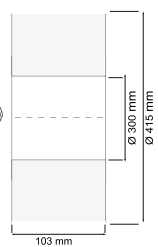
Adaptor : 2158341



S200 (plastic)

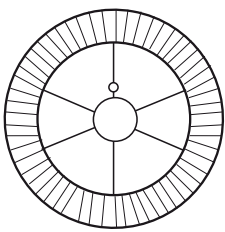


B415 (metal)

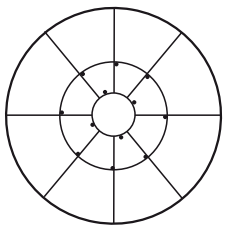
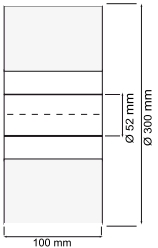


Adaptor : K299 (axis 25mm)

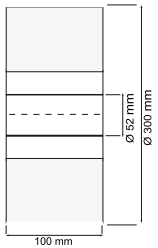
K1504-1 (axis 50mm)



S300 (plastic)

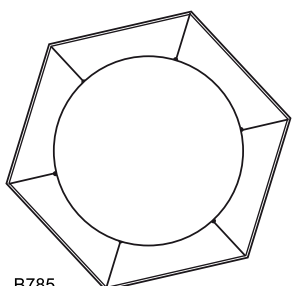


BS300 (metal)

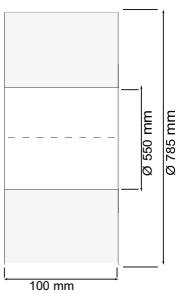


Adaptor : K10158

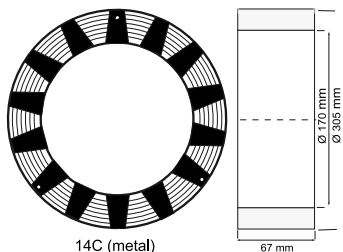
K10158-1 (plastic)



B785
(100 kg metal spool for SAW wire)



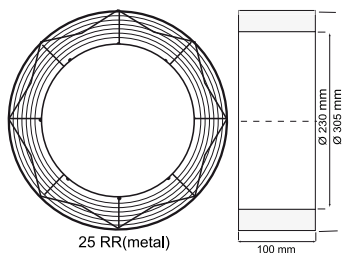
Adaptor : K10410



50C (metal)

Inner diameter : 300mm
outer diameter : 420mm
Outer width : 110mm

Adaptator: K10075 (axe 25 mm)
Adaptator: K435 (axe 50 mm)

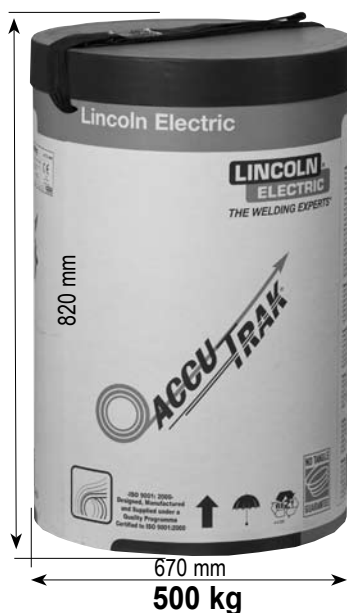


22RR (metal)

Inner diameter : 230mm
outer diameter : 305mm
Outer width : 96mm

Adaptator: K363P

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.

Accu-Pak®



Advantages

- High capacity packaging for high deposition rate process
- Low change-over-time
- Fully recyclable
- Trouble free operation by minimum wire distortion
- Excellent wire placement in the welding joint
- Premium SuperGlaze™ aluminium MIG wire
- Typically designed for robotics applications

Drum dimension $\phi \times H$ (mm) : 1020 x 1055

Wire Capacity (kg) : 146

Wire diameters (mm) : 1.2 - 1.6

Wire grade : 4043 (AlSi5), 5356 (AlMg5), 5183 (AlMg4.5Mn) and others

AccuTrak® drums



Advantages

- High capacity packaging for high deposition rate process
- Low change-over-time
- No turning table needed
- Trouble free operation by minimum wire distortion
- Wire protection in order to prevent dust/moisture contamination
- 2-level stackable(storage)
- Fully recyclable
- Typically designed for hard automation applications



Decagonal drum

Drum dimension $\phi \times H$ (mm) : 1060 x 1055

Wire Capacity (kg) : 1000

Wire diameters (mm) : 1,6 to 4,0

Wire grade : Mild and low alloy steels

SquarePack drum

Drum dimension HxWxL (mm) : 1051 x 720 x 720

Wire Capacity (kg) : 600

Wire diameters (mm) : 1,6 to 2,4

Wire grade : Mild and low alloy steels

Speed-Feed drums



Round drum

Drum dimension $\phi \times H$ (mm) : 560 x 904

Wire Capacity (kg) : 350/400

Wire diameters (mm) : 1,6 to 4,8

Wire grade : Mild and low alloy steels

SquarePack drum

Drum dimension HxWxL (mm) : 1051 x 720 x 720

Wire Capacity (kg) : 600

Wire diameters (mm) : 1,6 to 4,8

Wire grade : Mild and low alloy 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 (IIV) 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	Type	H _{DM} max. 5 ml/100 g	H _{DM} max. 3 ml/100 g
Baso G		*	Kryo 1		*
Conarc 49C		*	Kryo 1P		*
Conarc 51		*	Kryo 1-180		*
Conarc L150	*		Kryo 2		*
Conarc V180		*	Kryo 3		*
Kardo		*	Kryo 4		*
Conarc 55CT		*	Arosta 304L		
Conarc 60G		*	Arosta 316L		
Conarc 70G		*	Arosta 4462		
Conarc 80		*	Jungo 4462		
Conarc 85		*	Jungo Zeron 100X		
SL12G	*		Limarosta 304L		
SL19G	*		Limarosta 304L-130		
SL19G / SL19G(STC)	*		Limarosta 309S		
SL20G / SL20G(STC)	*		Limarosta 312		
SL22G	*		Limarosta 316L		
SL502	*		Limarosta 316L-130		
SL9r(P91)	*		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 alloyed high strength steel
 - low temperature fine grain steel
 - creep resistant steel
 - duplex- and superduplex stainless steel electrodes ¹⁾
 - Ni-base electrodes for 5-9% Ni-steel (Nylid 2)

¹⁾ some 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.

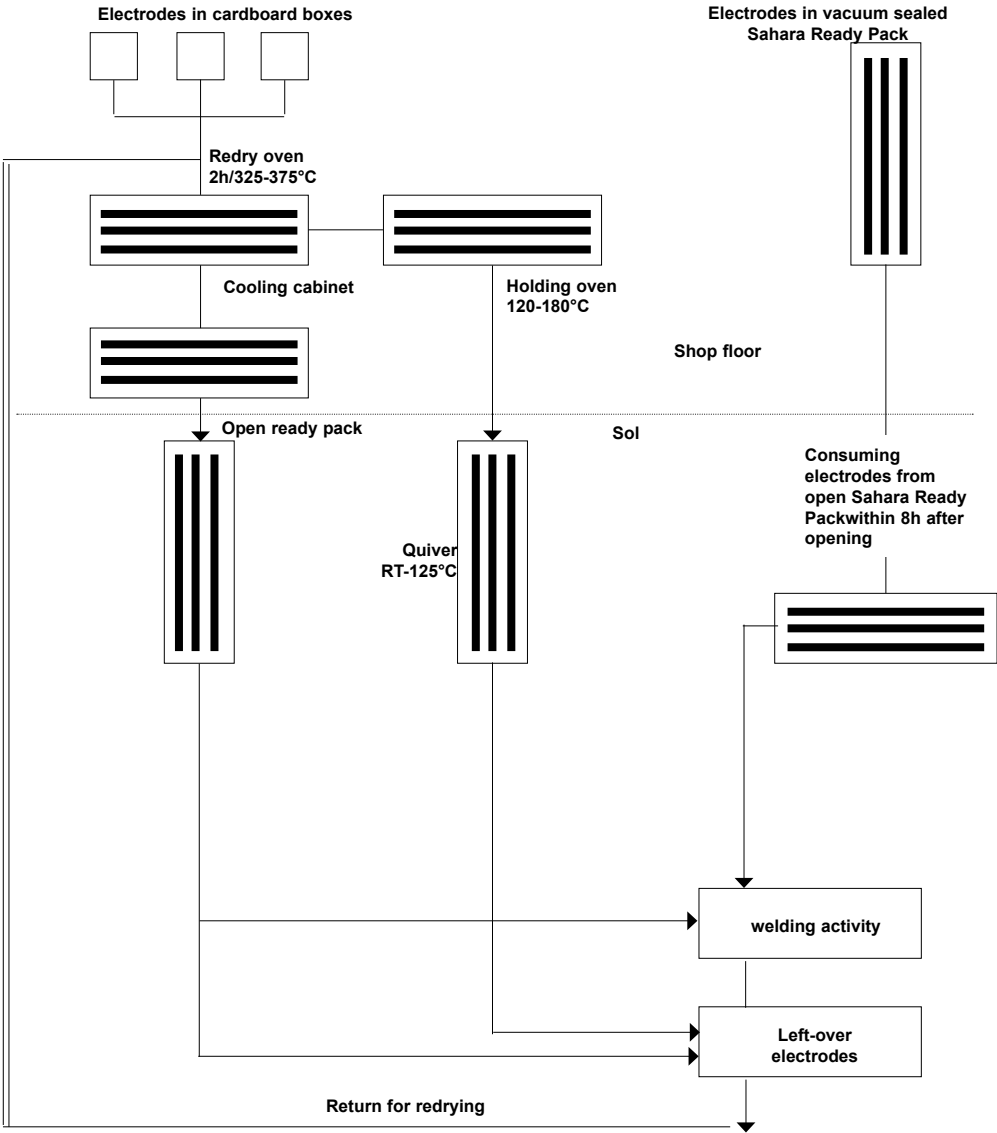
REDRYING AND HOLDING RECOMMENDATIONS

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
Outershield	spool in plastic bag in cardboard box
	spool in Al/PE vacuum packaging in cardboard outerbox or
	spool in plastic protection on pallet
Innershield 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%

Innershield wire in plastic buckets or in hermetically sealed cans and Outershield as well as Cor-A-Rosta in Al/PE bags under vacuum, if applicable, do not require measures against moisture pick-up. Damage of the packaging shall be prevented.

3. Handling

3a. Outershield, Innershield xxx-H types and Cor-A-Rosta

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

3b. Innershield, non xxx-H types:

Spools outside the protective packaging allow 2 weeks exposure to normal workshop conditions.

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

4. Deteriorated product

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

1. Scope

Trade name: 761, 780, 781, 782, 802, 860, 880, 882, 888, 960, 980, 995N, 998N, 8500, P223, P230, P240, P2000, P2007, P2000S, P7000.

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.

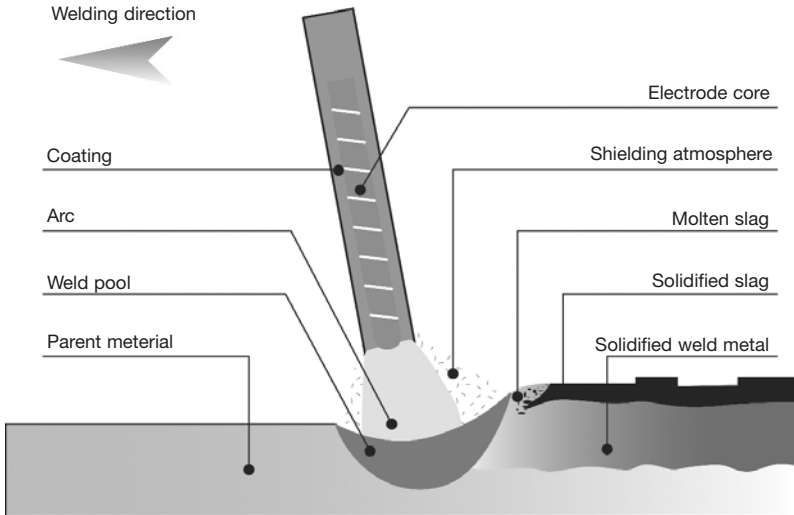
3. Recycling

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 impingments 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.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Shielded Metal Arc Welding / Stick (M.M.A.) Welding



In this welding process, an electric arc is created between a coated consumable electrode and the work piece to be welded, causing the parent material to be fused together and the electrode to melt. The electrode is of similar material as the parent material, and by melting provides the weld (or joint) with a reinforcing filler material. The electrode may be coated with basic, rutile or cellulose material, and as the coating burns it protects the arc and weld pool from the atmosphere with a gaseous shroud, the slag which solidifies over the newly deposited weld also protects it from the atmosphere.

Cellulosic electrode

Classification

AWS A5.1 : E6010
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 PF/5Gup PG/5Gdown

Current type

DC +

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		min. 331	min. 414	min. 22		27	
ISO 2560-A		min. 420	500-640	min. 20			47
Typical values	AW	440	520	26	70		65

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: metal can	Pieces / unit	325	205	130	83
	Net weight/unit (kg)	5.0	5.2	5.1	5.1

Identification Imprint: 6010-FW5P+

Tip Color: none

Fleetweld® 5P+: rev. EN 22

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	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	40-70	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 35 mm

Welding parameters, optimum fill passes

Welding positions	PF/5G up	PG/5G down
Diameter (mm)		
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

Rutile electrode

Classification

AWS A5.1 : E6012
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/3Gup PG/3Gdown 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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1	min. 331	min. 414	min. 17	not required
ISO 2560-A	min. 380	470-600	min. 20	min. 47
Typical values	AW 470	550	23	56

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: 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 22

Materials to be welded

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

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 350	70 - 90	AC	47	109	0.8	17.5	90	1.58
3.2 x 350	95 - 130	AC	64	175	1.1	27.6	53	1.45
4.0 x 350	130 - 170	AC	66	330	1.4	41.1	39	1.61
5.0 x 350	170 - 250	AC	77	534	1.8	63.6	26	1.63

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G
2.5	85A	80A	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

Rutile electrode

Classification

AWS A5.1 : E6013
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/3Gup PG/3Gdown PE/4G

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
0.07	0.5	0.5

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 331	min. 414	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	520	550	26	60

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steel	
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/	P235, P275
EN 10217-1	
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295
Fine grained steel	
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
2.5 x 350	70 - 90	AC	47	109	0.8	17.5	90	1.58
3.2 x 350	110 - 130	AC	59	198	1.1	29.5	54	1.58
4.0 x 350	130 - 160	AC	59	301	1.7	42.4	37	1.57

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G
Diameter (mm)						
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

Rutile electrode

Classification

AWS A5.1 : E6013
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/3Gup PG/3Gdown PE/4G PF/5Gup PG/5Gdown

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1 ISO 2560-A	min. 331 min. 380	min. 414 470-600	min. 17 min. 20	not required min. 47
Typical values AW	500	540	24	60

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	4.0
	Length (mm)	300	350	350	350
Unit: 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 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steel	
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/	P235, P275
EN 10217-1	
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295
Fine grained steel	
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
2.0 x 300	40 - 75	AC	41	58	0.5	10.4	178	1.98
2.5 x 350	50 - 90	AC	60	130	0.7	17.8	88	1.57
3.2 x 350	70 - 130	AC	66	206	1.0	29.5	53	1.58
4.0 x 350	130 - 175	AC	72	333	1.3	43.6	37	1.61
4.0 x 450	130 - 175							
5.0 x 450	185 - 230							

* stub end 35 mm

Welding parameters, optimum fill passes

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

Remarks/ Application advice

Vertical down only applicable for "clean" structural steel

Rutile electrode

Classification

AWS A5.1 : E6013
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 PA/1G PB/2F PC/2G PF/3Gup PG/3Gdown PE/4G

Current type

AC / DC -

Approvals

ABS	BV	DNV	GL	LR	RMRS
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 331	min. 414	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	520	550	26	60

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steel	
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/	P235, P275
EN 10217-1	
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295
Fine grained steel	
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
1.8 x 300	40 - 60	AC	40	38	0.4	8.4	210	1.75
2.5 x 350	65 - 90	AC	52	108	0.8	18.5	85	1.59
3.2 x 350	95 - 130	AC	65	229	1.0	31.1	53	1.67
4.0 x 350	130 - 160	AC	72	333	1.3	43.6	37	1.61
5.0 x 450	170 - 240	AC	106	740	2.1	92.2	16	1.47

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G
1.8					45A	
2.5	80A	75A	75A	75A	75A	75A
3.2	120A	115A	125A	115A	125A	115A
4.0	175A	165A	160A	160A	170A	160A
5.0	240A	240A			250A	

Remarks/ Application advice

Vertical down only applicable for "clean" structural steel

Rutile electrode

Classification

AWS A5.1 : E6013
ISO 2560-A : E 42 0 RC 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/3Gup



PG/3Gdown



PE/4G



PF/5Gup



PG/5Gdown

Current type

AC / DC -

Approvals

ABS	BV	DNV	GL	LR	TÜV
2	2	2	2	2	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si
0.06	0.5	0.45

Mechanical properties, typical, all weld metal

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

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	4.0
	Length (mm)	300	350	350	450	350	450
Unit: box	Pieces / unit	370	250	175	150	110	95
	Net weight/unit (kg)	4.2	4.8	5.3	6.2	5.0	5.9
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 23

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steel	
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/	P235, P275
EN 10217-1	
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295
Fine grained steel	
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G	PF/5G up	PG/5G down
2.0	55A	55A	55A	50A	55 A		50A	55 A
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		230 A				

Rutile electrode

Classification

AWS A5.1 : E6013
ISO 2560-A : E 42 0 RC 11

General description

Rutile general purpose electrode

Excellent for downhand and vertical up welding; not advised for vertical down welding

Very smooth arc, virtually no spatter

Excellent bead appearance, flat beads and self releasing slag

Very suitable for thin plates

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PG/3Gdown



PE/4G



PF/5Gup



PG/5Gdown

ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PG/3Gdown PE/4G PF/5Gup PG/5Gdown

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si
0.08	0.5	0.3

Mechanical properties, typical, all weld metal

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

Packaging and available sizes

	Diameter (mm)	2.5	3.2
	Length (mm)	350	350
Unit: box	Pieces / unit	250	190
	Net weight/unit (kg)	4.8	5.5

Identification

Imprint: 6013

Tip Color: none

Omnia® 46+: rev. EN 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steel	
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/	P235, P275
EN 10217-1	
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295
Fine grained steel	
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	60-95	AC	68	134	0.6	19.2	84	1.60
3.2x350	90-135	AC	80	220	0.9	28.9	50	1.51

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G	PF/5G up	PG/5G down
2,5	80A	85A	85A	80A	85A	85A	80A	85A
3,2	110A	115A	115A	110A	115A	110A	110A	115A

Rutile electrode

Classification

AWS A5.1 : E6013
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/3Gup PE/4G PF/5Gup

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 331	min. 414	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	min. 47
Typical values	AW	500	540	25	55

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275
Ship plates	
ASTM A 131	Grade A, B, D
Cast steel	
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/	P235, P275
EN 10217-1	
Boiler & pressure vessel steel	
EN 10028-2	P235, P295
Fine grained steel	
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
2.5 x 350	65 - 90	AC	52	120	0.8	18.7	86	1.61
3.2 x 350	85 - 130	AC	66	181	1.1	29.7	51	1.53
4.0 x 350	130 - 180	AC	62	345	1.6	46.5	36	1.69

* stub end 35 mm

Welding parameters, optimum fill passes

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

Rutile electrode

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 331	min. 414	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	480	560	26	50

Packaging and available sizes

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

Identification

Imprint: 6013 / UNIVERSALIS

Tip Color: none

Universalis®: rev. EN 23

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	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	L240, L290, L360.
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235, P275
EN 10217-1	P355
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295, P355
Fine grained steel	
EN 10025 part 3	S275, S355
EN 10025 part 4	S275, S355

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.0 x 300	40 - 65	AC	41	58	0.5	11.4	178	2.00
2.5 x 350	70 - 100	AC	51	134	0.8	21.1	93	1.96
3.2 x 350	100 - 140	AC	57	281	1.3	39.3	47	1.85
3.2 x 450	100 - 140	AC	69	341	1.5	49.6	36	1.79
4.0 x 450	150 - 200	AC	69	483	2.1	66.9	25	1.67

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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

High recovery rutile electrode

Classification

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

General description

Rutile 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



PA/1G



PB/2F



PC/2G

ISO/ASME

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					-10°C	-18°C	-20°C
Required: AWS A5.1		min. 400	min. 483	min. 22		min. 27	
ISO 2560-A		min. 420	500-640	min. 20			min. 47
Typical values	AW	475	520	26	70		67

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: 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 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A 131	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	L240, L290, L360.
API 5LX	X42, X46, X52
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295
Fine grained steel	
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
3.2 x 450	125 - 155	AC	75	326	1.9	62.9	25	1.39
4.0 x 450	140 - 235	AC	65	527	3.6	96.5	15	1.39
5.0 x 450	210 - 330	AC	68	853	5.3	144.9	10	1.39

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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, L360, P355 and DH36 preheat according EN 1011-1

High recovery rutile electrode

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		min. 400	min. 483	min. 17	not required
ISO 2560-A		min. 380	470-600	min. 20	47
Typical values	AW	460	530	25	54

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: 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 23

Materials to be welded

Steel grades/Code	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	G P 240R
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295, P355
Fine grained steel	
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
3.2 x 450	130 - 150	AC	85	344	1.6	61.3	27	1.67
4.0 x 450	180 - 200	AC	92	515	2.2	87.7	18	1.67
5.0 x 450	275 - 300	AC	86	735	3.7	129.9	11	1.43

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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, L360, P355 and DH36 preheat according EN 1011-1

High recovery rutile electrode

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



PA/1G



PB/2F



PC/2G

ISO/ASME

Current type

AC / DC -

Approvals

ABS	BV	DNV	GL	LR	TÜV
2Y	2Y	2Y	2Y	2Y	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si
0.07	0.9	0.6

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 400	min. 483	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	450	570	26	70

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0	6.0
Length (mm)		450	450	450	450
Unit: 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 23

Materials to be welded

Steel grades/Code	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	G P 240R
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295, P355
Fine grained steel	
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
3.2 x 450	130 - 160							
4.0 x 450	180 - 220	AC	90	554	2.6	92.7	15	1.43
5.0 x 450	280 - 300	AC	78	897	5.4	166.7	9	1.43

* stub end 35 mm

Welding parameters, optimum fill passes

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

Remarks/ Application advice

High yield strength steels such as S355, L360, P355 and DH36 preheat according EN 1011-1

High recovery rutile electrode

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

PA/1G

PB/2F

PC/2G

Current type

AC / DC -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si
0.07	1.0	0.35

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1		min. 399	min. 482	min. 17	not required
ISO 2560-A		min. 420	500-640	min. 20	min. 47
Typical values	AW	450	525	27	75

Packaging and available sizes

	Diameter (mm)	4.0	5.0	6.3
	Length (mm)	450	450	450
Unit: 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 22

Materials to be welded

Steel grades/Code	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to DH36
Boiler & pressure vessel steel	
EN 10028-2	P235, P265, P295, P355
Fine grained steel	
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
4.0 x 450	200 - 240	AC	78	515	3.4	100.0	14	1.35
5.0 x 450	280 - 300	AC	85	816	4.9	157.7	9	1.35
6.3 x 450	350 - 375	AC	102	1320	6.5	248.0	6	1.35

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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, L360, P355 and DH36 preheat according EN 1011-1

Basic electrode

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 ($H_{DM} < 8 \text{ ml/100g}$)

Welding positions



ISO/ASME

PA/1G

PB/2F

PC/2G

PF/3Gup

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	H _{DM}
0.075	1.4	0.65	7 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	-46°C
Required: AWS A5.1		min. 400	min. 483	min. 22			min. 27
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	590	640	25	90	60	

Packaging and available sizes

		Diameter (mm)					
		2.5	3.2	3.2	4.0	4.0	5.0
Unit: box	Length (mm)	350	350	450	350	450	450
	Pieces / unit	125	78	78	50	50	50
Unit: SRP	Net weight/unit (kg)	2.5	2.6	3.3	2.5	3.4	5.5
	Pieces / unit	44	51	-	27	-	-
Unit: SRP	Net weight/unit (kg)	0.9	1.8	-	1.4	-	-
	Pieces / unit	44	51	-	27	-	-

Identification	Imprint: 7018-1 / BASO 48SP	Tip Color: green	Baso® 48 SP: rev. EN 22
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Materials to be welded

Steel grades/Code	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	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, 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
2.5 x 350	50 - 85	AC	48	104	0.9	19.4	82	1.6
3.2 x 450	85 - 135	AC	75	273	1.1	41.0	42	1.72
4.0 x 450	135 - 190	AC	95	487	1.6	64.6	24	1.55

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
Diameter (mm)					
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

Basic electrode

Classification

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

General description

Basic very low hydrogen electrode ($H_{DM} < 5 \text{ ml/100g}$)
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/3Gup PE/4G

Current type

DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H_{DM}
0.09	1.1	0.6	5 ml/100

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		min. 400	min. 483	min. 22		min. 27		
ISO 2560-A		min. 460	530-680	min. 20			min. 47	
Typical values	AW	550	635	25	115		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: 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 22

Materials to be welded

Steel grades/Code	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	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

Sizes Diam. x length (mm)	Current range (A)	Current type (s)*	Arc time - per electrode at max. current - E(kJ)	Energy H(kg/h)	Dep.rate - (kg)	Weight/ 1000 pcs. B	Electrodes/ kg weldmetal 1/N	kg Electrodes/ kg weldmetal
2.5 x 350	70 - 80	DC+	58	120	0.85	23.1	73	1.7
3.2 x 350	110 - 130	DC+	68	194	1.3	36.8	41	1.5
4.0 x 450	140 - 180	DC+	98	429	1.8	69.5	20	1.4
5.0 x 450	160 - 240	DC+	117	619	2.3	107.3	13	1.4

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	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

Basic electrode

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/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	H _{DM}
0.06	1.3	0.5	0.015	0.01	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	-30 °C	-46 °C
Required: AWS A5.1		min. 400	min. 483	min. 22			min. 27
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	510	600	27	90	70	40

Packaging and available sizes

Unit: box	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
	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 22

Materials to be welded

Steel grades/Code	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	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, S460

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type (s)*	Arc time - per electrode at max. current - E(kJ)	Energy H(kg/h)	Dep.rate - (kg)	Weight/ 1000 pcs. B	Electrodes/ kg weldmetal 1/N	kg Electrodes/ kg weldmetal
2.5 x 350	50 - 100	DC+	48	104	0.9	19.4	82	1.6
3.2 x 450	75 - 140	DC+	75	273	1.1	41.0	42	1.72
4.0 x 450	140 - 190	DC+	95	487	1.6	64.6	24	1.55
5.0 x 450	180 - 280	DC+						

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	5G
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

Basic electrode

Classification

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

General description

Basic very low hydrogen electrode ($H_{DM} < 5 \text{ ml/100g}$)
Excellent for general purpose welding
Will run on low open circuit voltage (min. OCV 55 V)
Good side wall wetting
Impact toughness at -20°C
Popular at welding schools

Welding positions



ISO/ASME



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H_{DM}
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	-30°C
Required: AWS A5.1		min. 400	min. 483	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	555	600	26	120	80

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: box	Pieces / unit	135	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 23

Materials to be welded

Steel grades/Code	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	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, P274T1,
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, 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
2.5 x 350	55 - 80	AC	53	116	0.8	19.1	85	1.63
3.2 x 350	75 - 115	AC	62	229	1.2	36.1	50	1.81
4.0 x 350	120 - 160	AC	64	337	1.6	50.1	34	1.72
5.0 x 450	160 - 240	AC	91	578	2.4	96.7	16	1.58
5.0 x 450	160 - 240	DC+	93	591	2.6	96.7	15	1.44

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	5G
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

Basic electrode

Classification

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

General description

Basic very low hydrogen electrode ($H_{DM} < 4\text{ml}/100\text{g}$)
Recovery 120%
Excellent weldability even on AC in all positions
Good impact values at -30°C
Excellent X-ray soundness

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H_{DM}
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	-30°C
Required: AWS A5.1		min. 400	min. 483	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	540	600	26	150	80

Packaging and available sizes

Unit: box	Diameter (mm)	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
	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 23

Materials to be welded

Steel grades/Code	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	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 steel	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 350	60 - 80	AC	55	121	0.8	19.1	85	1.61
3.2 x 350	90 - 140	AC	62	229	1.3	37.1	44	1.64
3.2 x 450	90 - 140	AC	74	275	1.5	50.1	33	1.67
4.0 x 350	120 - 160	AC	63	338	1.8	54.4	32	1.72
4.0 x 450	120 - 160	DC+	85	391	1.9	69.5	22	1.52
5.0 x 450	160 - 240	AC	99	616	2.6	108.8	14	1.54
5.0 x 450	160 - 240	DC+	100	625	2.6	108.8	14	1.52

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	1 G	PB/2F	PC/2G	PF/3G up	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 electrode

Classification

AWS A5.1 : E7018 H8
ISO 2560-A : E 42 4 B 4 2 H5

General description

Electrode producing crack-free welded joints with good toughness properties even on steels with a carbon content up to 0,4 %.

Recovery 120%

Excellent weldability even in positional welding

Good impact values at -40°C

Suitable for depositing buffer layers on steels having a higher carbon content

Welding positions



ISO/ASME



PB/2F



PC/2G



PF/3Gup



PE/4G

Current type

DC +

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H _{DM}
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)	
					-46°C	-40°C
Required: AWS A5.1		min. 400	min. 483	min. 22	min. 27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	520	580	27	150	105

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
Length (mm)	350	450	450	450	
Unit: box	Pieces / unit	180	120	85	55
	Net weight/unit (kg)	4.4	5.9	6.0	5.9

Identification

Imprint: 7018 / BASIC ONE

Tip Color:

Basic ONE: rev. EN 01

Materials to be welded

Steel grades/Code	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	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 steel	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

Remarks/ Application advice

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

Basic electrode

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 at -50°C

Also available in vacuum sealed Sahara ReadyPack® (SRP)

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H ₀ M
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	-40°C	-46°C	-50°C
Required: AWS A5.1 ISO 2560-A		min. 400 min. 420	min. 483 500-640	min. 22 min. 20			min. 27	min. 47
Typical values	AW	490	575	28	200	130		100

Packaging and available sizes

		2.0	2.5	3.2	3.2	4.0	4.0	5.0
		300	350	350	450	350	450	450
Unit: box	Diameter (mm)							
	Length (mm)							
Unit: SRP	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 22

Materials to be welded

Steel grades/Code	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	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 steel	
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
2.0 x 300	35 - 55	DC+	50	61	0.5	11.7	149	1.75
2.5 x 350	55 - 90	DC+	59	107	0.8	20.3	78	1.59
3.2 x 350	75 - 120	DC+	70	234	1.2	36.5	42	1.54
3.2 x 450	75 - 120	DC+	79	265	1.4	45.4	33	1.47
4.0 x 350	120 - 180	DC+	75	358	1.7	50.9	28	1.45
4.0 x 450	120 - 180	DC+	96	473	1.7	69.3	22	1.52
5.0 x 450	160 - 240	DC+	114	671	2.2	106.2	14	1.54

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	5G
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

Basic electrode

Classification

AWS A5.1 : E 7048 H8
ISO 2560-A : E 42 3 B 15 H10

General description

Basic low hydrogen electrode
Specially developed for vertical down welding on shipyards
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/3Gup PG/3Gdown PE/4G

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H ₀₁
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. 483	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)	350	450	450
Unit: 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	2.5

Identification Imprint: 7048 / BASO 26V

Tip Color: dark green

Baso® 26V: rev. EN 23

Materials to be welded

Steel grades/Code	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	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 steel	
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
3.2 x 350	110 - 140	DC+	51	181	1.5	34.0	48	1.62
4.0 x 450	155 - 185	DC+	70	315	2.1	59.7	24	1.44
5.0 x 450	195 - 225	DC+	86	435	2.7	92.9	15	1.43

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PG/3G down
Diameter (mm)		
3.2	130A	130A
4.0	145A	175A
5.0	220A	220A

Remarks/ Application advice

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

Basic electrode

Classification

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

General description

Basic very low hydrogen electrode ($H_{DM} < 5 \text{ ml/100g}$)

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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

DC +

Approvals

DNV

4YH5

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H_{DM}
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		min. 400	min. 483	min. 22		min. 27
ISO 2560-A		min. 460	530-680	min. 20	min. 47	
Typical values	AW	470	570	27	103	80

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	300	350	350	450	350	450	450
Unit: 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 23

Materials to be welded

Steel grades/Code	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	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 steel	
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
2.0 x 300	50 - 80	DC+	53		0.6	14.3	123	1.76
2.5 x 350	80 - 110	DC+	64		0.8	23.1	67	1.55
3.2 x 350	95 - 150	DC+	67		1.3	40.0	40	1.60
3.2 x 450	95 - 150	DC+	-		-	-	-	-
4.0 x 350	125 - 210	DC+	83		1.7	57.6	26	1.50
4.0 x 450	125 - 210	DC+	95		1.8	73.4	21	1.54
5.0 x 450	190 - 270							

* stub end 35 mm

Remarks/ Application advice

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

Basic electrode

Classification

AWS A5.1 : E7018 H4R
ISO 2560-A : E 46 3 B 32 H5

General description

Basic very low hydrogen electrode ($H_{DM} < 5 \text{ ml/100g}$)

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

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	H_{DM}
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	-29°C	-30°C	-40°C
Required: AWS A5.1		min. 400	min. 483	min. 22		min. 27		
ISO 2560-A		min. 460	530-680	min. 20			min. 47	
Typical values	AW	480	560	28	140		120	80

Packaging and available sizes

		2.5	3.2	4.0	4.0	5.0	6.0
		350	350	350	450	450	450
Unit: box	Pieces / unit	118	120	85	85	55	46
	Net weight/unit (kg)	2.7	4.5	4.6	5.9	6.0	6.5
Unit: Linc Pack	Pieces / unit	44	27	18	-	-	-
	Net weight/unit (kg)	1.0	1.0	1.0	-	-	-

Identification

Imprint: 7018 / CONARC 49

Tip Color: green

Conarc® 49: rev. EN 22

Materials to be welded

Steel grades/Code	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	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 steel	
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
2.5 x 350	70 - 80	DC+	58	120	0.85	23.1	73	1.7
3.2 x 350	110 - 130	DC+	68	194	1.3	36.8	41	1.5
4.0 x 450	140 - 180	DC+	98	429	1.8	69.5	20	1.4
5.0 x 450	160 - 240	DC+	117	619	2.3	107.3	13	1.4
6.0 x 450	250 - 300	DC+	106	976	3.5	136.9	10	1.33

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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		
6.0	300A	290A				

Remarks/ Application advice

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

Basic electrode

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/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	H ₀₁₈
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	-50°C
Required: AWS A5.1 ISO 2560-A		min. 400 min. 460	min. 483 530-680	min. 22 min. 20		min. 47	min. 27
Typical values	AW	480	580	28	200	170	100
CTOD value at -10°C > 0.25 mm							

Packaging and available sizes

		Diameter (mm)							
		2.5	3.0	3.2	3.2	4.0	4.0	5.0	6.0
	Length (mm)	350	350	350	450	350	450	450	450
Unit: box	Pieces / unit	135	80	120	120	85	85	55	46
	Net weight/unit (kg)	2.7	2.4	4.2	5.8	4.5	5.7	6.0	6.5
Unit: SRP	Pieces / unit	70	54	50	50	28	28	23	21
	Net weight/unit (kg)	1.4	1.5	2.0	2.5	1.6	2.0	2.6	3.0

Identification

Imprint: 7018-1 / CONARC 49C

Tip Color: grey

Conarc® 49C: rev. EN 23

Materials to be welded

Steel grades/Code	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	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 steel	
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
2.5 x 350	55 - 80	DC+	55	99	0.78	19.6	84	1.65
3.0 x 350	70 - 110	DC+	53	193	1.2	30.4	58	1.77
3.2 x 350	80 - 130	DC+	65	217	1.2	37.9	45	1.69
4.0 x 350	120 - 160	DC+	75	348	1.6	54.2	30	1.61
4.0 x 450	120 - 160	DC+	100	444	1.7	70.4	21	1.47
5.0 x 450	180 - 240	DC+	90	632	2.6	105.6	15	1.60
6.0 x 450	250 - 330	DC+	106	976	3.5	136.9	10	1.33

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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		
6.0	300A	290A				

Remarks/ Application advice

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

Best choice: 3.0 x 350 mm for rootlayer welding in pipes

Basic electrode

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 soundness
Also available in vacuum sealed Sahara ReadyPack® (SRP)

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H ₀ M
0.05	1.3	0.4	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. 420	min. 483 500-640	min. 22 min. 20			min. 47	min. 27
Typical values	AW	490	575	28	200	130		100
CTOD value at -10°C > 0.25 mm								

Packaging and available sizes

		Diameter (mm)			
		2.5	3.2	4.0	5.0
		350	450	450	450
Unit: 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 01

Materials to be welded

Steel grades/Code	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	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 steel	
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
2.5 x 350	60 - 100	DC+	60	138	0.83	23.1	72	1.67
3.2 x 350	90 - 145	DC+	93	337	1.27	50.8	30	1.54
4.0 x 450	110 - 160	DC+	103	464	1.65	71.2	21	1.52
5.0 x 450	160 - 250	DC+	177	717	2.24	108.8	14	1.49

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Basic electrode

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 at -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): H_{DM} < 3 ml/100g

Welding positions



ISO/ASME

PA/1G



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	H _{DM}
0.06	1.4	0.5	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°C
Required: AWS A5.1		min. 400	min. 483	min. 22			min. 27
ISO 2560-A		min. 420	500-640	min. 20		min. 47	
Typical values	AW	520	575	28	115	80	60
CTOD value at -10°C > 0.25 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: box	Pieces / unit	135	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 23

Materials to be welded

Steel grades/Code	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	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 steel	
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
2.5 x 350	40 - 80	DC+	53	123	0.8	19.6	86	1.68
3.2 x 350	70 - 120	DC+	62	178	1.0	30.8	57	1.74
3.2 x 450	70 - 120							
4.0 x 350	100 - 160	DC+	71	306	1.4	48.0	37	1.78
4.0 x 450	100 - 160							
5.0 x 450	180 - 240	DC+	104	702	2.6	103.0	13	1.36

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Basic electrode

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 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/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	H ₂ O
0.06	1.2	0.4	0.010	0.02	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	-30°C
Required: AWS A5.1		min. 400	min. 480	min. 22	27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	480	590	28	140	125
CTOD value at -10°C > 0.25 mm						

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	4.0
	Length (mm)	350	350	350	450
Unit: 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 02

Materials to be welded

Steel grades/Code	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	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, P420N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH
Fine grained steel	
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
2.5 x 350	50 - 80	DC+	59	100,6	0.71	18.5	86	1.59
3.2 x 350	60 - 120	DC+	68	179,9	1.02	30.3	52	1.57
4.0 x 350	120 - 170	DC+	77	258,7	1.50	48.7	31	1.51

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Basic electrode

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 at -50°C

Excellent root pass electrode (diameters 2,5 & 3,2 mm) on pipe

Welding positions



ISO/ASME PA/1G



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

NAKS

Pending

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	H _{DM}
0.06	1.3	0.4	0.010	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		min. 400	min. 490	min. 22		min. 27	
ISO 2560-A		min. 420	500-640	min. 20			min. 47
Typical values	AW	520	575	28	120	70	60

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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 01

Materials to be welded

Steel grades/Code	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	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, P420N
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

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. (s)*	Energy E(kJ)	Dep.rate - current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 350	40 - 80	DC+	53	123	0.8	19.6	86	1.68
3.2 x 350	70 - 120	DC+	62	178	1.0	30.8	57	1.74
4.0 x 350	100 - 160							

* stub end 35 mm

Welding parameters, optimum fill passes

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

Remarks/ Application advice

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

Basic electrode

Classification

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

General description

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

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type

DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si
0.05	1.0	0.3

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		min. 400	min. 483	min. 22		min. 27
ISO 2560-A		min. 420	500-640	min. 20	min. 47	
Typical values	AW	436	533	29	100	90

Packaging and available sizes

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

Identification

Imprint: LINCOLN 7018-1

Tip Color: none

LINCOLN® 7018-1: rev. EN 22

Materials to be welded

Steel grades/Code	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	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

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

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	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

High recovery basic electrode

Classification

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

General description

Basic low hydrogen electrode ($H_{DM} < 5 \text{ ml/100g}$)

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H _{DM}
0.07	0.95	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)	
					-18°C	-20°C
Required: AWS A5.1		min. 400	min. 483	min. 22	min. 27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	540	580	27		75

Packaging and available sizes

		Diameter (mm)			
		3.2	4.0	5.0	6.0
	Length (mm)	450	450	450	450
Unit: box	Pieces / unit		55	35	
	Net weight/unit (kg)		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 23

Materials to be welded

Steel grades/Code	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	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 steel	
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
3.2 x 450	140 - 160	AC/DC+	84	375	1.7	64.8	26	1.67
4.0 x 450	175 - 220	AC/DC+	80	555	2.6	97.8	17	1.69
5.0 x 450	275 - 325	AC/DC+	75	838	4.4	155.7	11	1.72
6.0 x 450	325 - 350	AC/DC+	85	1260	5.4	209.4	8	1.64

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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

High recovery basic electrode

Classification

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

General description

Basic extremely low hydrogen electrode

175% recovery and easy slag release

Fillet welds and horizontal V- and X-welds

Reliable impact toughness -40°C, good CTOD at -10°C

Excellent X-ray quality

Also available in vacuum sealed Sahara ReadyPack® (SRP): $H_{DM} < 3 \text{ ml/100g}$

Welding positions



PA/1G



PB/2F



PC/2G

ISO/ASME

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H_{DM}
0.08	1.2	0.3	2 ml/100g

Mechanical properties, typical, all weld metal

Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
				-18°C	-20°C	-40°C
Required: AWS A5.1	min. 400	min. 483	min. 22	min. 27		
ISO 2560-A	min. 420	500-640	min. 20			min. 47
Typical values AW	440	510	30		130	80
CTOD value at -10°C > 0.25 mm						

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0	6.3
Length (mm)	450	450	450	450	450
Unit: 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 22

Materials to be welded

Steel grades/Code	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	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 steel	
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. (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	130 - 160	AC	73	337	2.3	68.9	21	1.47
4.0 x 450	170 - 240	AC	70	538	3.6	101.0	14	1.45
5.0 x 450	275 - 330	AC	75	780	4.9	149.7	10	1.45
6.3 x 450	280 - 425	AC	83	1171	7.0	230.4	6	1.43

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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

High recovery basic electrode

Classification

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

General description

Basic low hydrogen electrode ($H_{DM} < 5 \text{ ml/100g}$)
245% recovery and easy slag release
Fillet welds and horizontal V- and X-welds
Good impact values at -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	GL	LR	RINA	RMRS	TÜV
4Y400H5	3,3YHH	4Y40H5	4Y40H5	4Y40H5	4YH5	3-3YH5	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H _{DM}
0.08	1.3	0.45	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)	
					-18°C	-40°C
Required: AWS A5.1		min. 400	min. 483	min. 22	min. 27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	460	550	29		80

Packaging and available sizes

	Diameter (mm)	4.0	5.0	6.0
	Length (mm)	450	450	450
Unit: 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 22

Materials to be welded

Steel grades/Code	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	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 steel	
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
4.0 x 450	190 - 240	AC	70	621	4.8	141	10	1.40
5.0 x 450	260 - 360	AC	73	1017	7.1	217	7	1.39
6.0 x 450	300 - 470	AC	72	1324	10.1	300	4	1.37

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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

Low strength basic electrode

Classification

AWS A5.1 : E6018 ¹⁾
ISO 2560-A : E 35 2 B 32 H5

¹⁾ according to classification 1966

General description

Basic extremely low hydrogen electrode

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): H_{DM} < 3 ml/100g

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	H _{DM}
0.03	0.4	0.25	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)	
					-18°C	-20°C
Required: AWS A5.1		min. 331	min. 414	min. 22	min. 27	
ISO 2560-A		min. 355	440-570	min. 22		
Typical values	AW	390	450	28	>200	

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
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 22

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 NederlandseGasunie)

API 5L: X52 - X65 (EN 10208: L360 to L460).

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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	60 - 80	DC+	81	173	0.5	19.7	81	1.60
3.2 x 350	90 - 120	DC+	84	252	1.0	36.5	43	1.58
4.0 x 350	120 - 160	DC+	79	448	1.6	53.0	29	1.56

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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.

High strength cellulosic electrode

Classification

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

General description

Cellulosic electrode for vertical do wn 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 PG/5Gdown

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Mo	V
0.12	0.40	0.15	0.50	0.01

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	-29°C
Required: AWS A5.5		min. 415	min. 480	min. 22		27
ISO 2560-A		min. 420	500-640	min. 20	min. 47	
Typical values	AW	450	540	24	65	45

Packaging and available sizes

Unit: Metal can	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	350	350	350
	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 02

Materials to be welded

Steel grades/Code	Type
Pipe material	
EN 10208-2	L360, L415, L445
EN 10216-1 / 10217-1	P 355
API 5LX	X52, X56, X60, X65
Gaz de France	X52, X63

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

Welding parameters, optimum fill passes

Welding positions	PG/5G down
Diameter (mm)	
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

High strength cellulosic electrode

Classification

AWS A5.5 : E8010-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 PG/5Gdown

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		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 460	530-680	min. 20	min. 47	
Typical values	AW	510	570	24	75	

Packaging and available sizes

Unit: Metal can	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
	Pieces / unit	320	195	125
	Net weight/unit (kg)	8.3	7.7	7.8

Identification

Imprint: 8010-G SA70+

Tip Color: none

Shield Arc® 70+: rev. EN 21

Materials to be welded

Steel grades/Code	Type
Pipe material	
EN 10208-2	L 360, L 415, L 445, L 480
EN 10216-1 / 10217-1	P 355
API 5LX	X 56, X60, X65, X70
Gaz de France	X52, X63

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	75 - 130	DC+				25.8		
4.0 x 350	90 - 185	DC+				39.5		
5.0 x 350	140 - 225	DC+				62.3		

Welding parameters, optimum fill passes

Welding positions	PG/5G down
Diameter (mm)	
3.2	110A
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
 Use Fleetweld 5P+ for lower hardness in the root pass

High strength cellulosic electrode

Classification

AWS A5.5 : E 9010-G
ISO 2560-A : E 50 4 1NiMo C 25

General description

Cellulosic electrode, 0.5% Mo and Ni-alloyed, for vertical down welding in pipes

Suitable for pipe material API 5LX-70 and X-80, EN 10208-2, or L480 and L550

Applicable for root, filling- and capping pass

Not sensitive for wagon tracks, windows and pinholes

Welding positions



ISO/ASME PG/5Gdown

Current type

DC +
DC- (root)

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Mo
0.13	0.60	0.15	0.7	0.6

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	-46°C
Required: AWS A5.5		min. 530	min. 620	min. 17	not required	
ISO 2560-A		min. 500	560-720	min. 18	min. 47	
Typical values	AW	550	640	22	50	45

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
Unit: Metal can	Pieces / unit	300	185	125
	Net weight/unit (kg)	7.7	7.3	7.9

Identification Imprint: 9010-G

Tip Color: none

Shield Arc® 90: rev. EN 21

Materials to be welded

Steel grades/Standard	Type
Pipe material	
EN 10208-2	L 480 , L 550
API 5LX	X70, X80

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	75-130	DC+				26.3		
4.0 x 350	80-185	DC+				40.8		
5.0 x 350	140-225	DC+				63.6		

Welding parameters, optimum fill passes

Welding positions	PG/5G down
Diameter (mm)	
3.2	120A
4.0	170A
5.0	180A

Remarks/ Application advice

Preheating pipe material required (acc. EN 1011-1)

Rootlayer preferable to weld with lower yield electrodes (Fleetweld 5P+ or Shield Arc 70+.)

Pipeclamps to be removed after finishing root pass, start welding hot pass (within 5 min) after root pass

Use electrodes directly from metal cans

Cellulosic electrode

Classification

AWS A5.1 : E6010
ISO 2560-A : E 42 3 C 25

General description

Cellulosic electrode for pipe welding

Smooth arc

Soft and ductile root welds

Suitable for root, fill and cap passes up to X52 grades

Welding positions



ISO/ASME PF/5Gup PG/5Gdown

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(J)	
					-29°C	-30°C
Required: AWS A5.1		min. 331	min. 414	min. 22	27	
ISO 2560-A		min. 420	500-640	min. 20		47
Typical values	AW	420-524	503-594	24-33	51-85	

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: metal can	Pieces / unit	205	130
	Net weight/unit (kg)	5.2	5.1

Identification

Imprint: 6010 Shield Arc 6P+

Tip Color: none

Shield Arc® 6P+: rev. EN 02

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X42, X46, X52

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 - current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2x350	65-130	DC+/-	46			25.3		
4.0x350	90-175	DC+/-	52			39.2		

Welding parameters, optimum fill passes

Welding positions	5G up	5G down
Diameter (mm)		
3.2	90A	110A
4.0	130A	150A

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

High strength Cellulosic electrode

Classification

AWS A5.5 E7010-P1/E7010-G
ISO 2560-A : E 42 3 Z C 25

General description

Cellulosic electrode for pipe welding
Suitable for root, fill and cap passes up to X65 grades
High resistance to porosity
Easy welding puddle control
High stacking efficiency: fill joints in fewer passes
Micro-alloyed to ensure consistent mechanical properties

Welding positions



ISO/ASME PG/5Gdown

Current type

DC + (Also DC- for dia.4mm)

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Mo	P	S
0.12-0.23	0.5-0.9	0.14-0.32	0.62-0.95	0.12-0.3	0.015	0.015

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	-40°C
Required: AWS A5.1		min.414	min480	min. 22		min.27	
ISO 2560-A		min. 420	500-640	min. 20	47		
Typical values	AW	427-520	496-635	23-30	34-102		27-85

Packaging and available sizes

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

Identification

Imprint: 7010-P1 Shield Arc 7P+

Tip Color: none

Shield Arc® 7P+: rev. EN 02

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X42, X46, X52, X56, X60, X65

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
4.0x350	90-175	DC+/-				39.1		
5.0x350	130-210	DC+				62.5		

Welding parameters, optimum fill passes

Welding positions 5G down

Diameter (mm)

4.0	150A
5.0	165A

Remarks/ Application advice

Preheating pipe material from L360 to L450 (X52 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

High strength cellulosic electrode

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
Micro-alloyed to ensure consistent mechanical properties

Welding positions



ISO/ASME PG/5Gdown

Current type

DC + (Also DC- for dia.4mm)

Approvals

DNV	TÜV
+	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					-29°C	-40°C	-46°C
Required: AWS A5.5		min. 460	min. 550	min. 19	27		
ISO 2560-A		min. 460	530-680	min. 20		min. 40	
Typical values	AW	460-559	550-676	20-27	62-99		46-84

Packaging and available sizes

Unit: metal can	Diameter (mm)	4.0	5.0
	Length (mm)	350	350
	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 02

Materials to be welded

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

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 - current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
4.0 x 350	90 - 185	DC+/-				39.1		
5.0 x 350	140 - 225	DC+				62.5		

Welding parameters, optimum fill passes

Welding positions	5G down
Diameter (mm)	
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
 Use PIPELINER 6P+ for lower hardness in the root pass when required

Basic electrode for weathering resistant steel

Classification

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

¹⁾ Deviation, see remarks

General description

Basic extremely low hydrogen electrode

All position electrode for welding weather resistant steel

Very suitable for off- and on-shore constructions, high resistance to corrosion caused by seawater or combinations of oil, gas and seawater

Excellent mechanical properties (impact at -50°C)

Also available in vacuum sealed Sahara ReadyPack® (SRP): H_{DM} < 3 ml/100g

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC + / -

Approvals

LR
 4Y42H5

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Cu	H _{DM}
0.05	1.5	0.4	0.010	0.015	0.9	0.4	3ml/100g

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)			
					-18°C	-20°C	-40°C	-50°C
Required: AWS A5.5		min. 460	min. 550	min. 19	min. 27			
ISO 2560-A		min. 460	530-680	min. 20				min. 47
Typical values	AW	540	610	25		115	100	60

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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 22

Materials to be welded

Steel grades/Standard Type

Weather resisting steels

EN 10155

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
2.5 x 350	55 - 85	DC+	53	81	0.77	19.7	88	1.74
3.2 x 350	80 - 145	DC+	70	223	1.2	36.9	43	1.60
4.0 x 350	120 - 185	DC+	77	355	1.6	54.1	29	1.59
5.0 x 450	180 - 270	DC+	104	784	2.4	105.2	15	1.53

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

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%

High strength basic electrode

Classification

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

General description

Basic all position extremely low hydrogen electrode

For welding high strength steel grades (UTS 540-640 N/mm²)

Good impact values at -51°C

DC welding preferred

115 - 120% recovery

Also available in vacuum sealed Sahara ReadyPack® (SRP): H_{DM} < 3 ml/100g

Welding positions



ISO/ASME PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

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	H _{DM}
0.06	1.0	0.4	0.015	0.010	1.6	0.3	2 ml/100g

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	-51°C
Required: AWSA5.5		540-620*	min. 620	min. 24			min. 27
EN 757		min. 550	610-780	min. 18		min. 47	
Typical values	AW	600	670	25		98	
	SR: 1h/620°C	550	640	24	90		40

* Dia. 2.5 mm max 655 N/mm²

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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 22

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S355
Pipe material	
EN 10208-2	L360, L415, L445, L480
API 5 LX	X52, X56, X60, X65, X70
Fine grained steel	
EN 10025 part 4	S420 M (L), S460 M (L), S420 N (L), S460 N (L)
EN 10025 part 6	S460, S500
Weather resisting steels	
EN 10155	S235 J0W S235 J2W S355 J0W S355 J2W S 355 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
2.5 x 350	60 - 100	DC+	63	114	0.7	23.5	77	1.80
3.2 x 350	80 - 130	DC+	69	231	1.3	38.3	40	1.52
4.0 x 350	120 - 180	DC+	72	324	1.7	55.8	30	1.66
5.0 x 450	160 - 240	DC+	119	760	2.2	105.2	14	1.43

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

High strength basic electrode

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

For high strength steel grades (UTS 640-735 N/mm²), root passes in HY 100 steel

Good impact values at -40°C

DC welding preferred

115 - 120% recovery

Also available in vacuum sealed Sahara ReadyPack® (SRP): H_{DM} < 3 ml/100g

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC + / -

Approvals

DNV TÜV
4Y50H5 +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Mo	H _{DM}
0.06	1.2	0.4	0.014	0.009	1.0	0.4	2 ml/100g

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		min. 530	min. 620	min. 17	not required		
EN 757		min. 550	610-780	min. 18		min. 47	
Typical values	AW	600	655	24		90	60
	SR: 15h/580°C	550	640	24	90		50

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
Unit: 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 22

Materials to be welded

Steel grades/Standard	Type
Boiler & pressure vessel steel (Reactor steels incl. Q & T steels)	
DIN	20MnMoNi5-5, 22NiMoCr3-7, 15NiCuMoNb5-6-4 GS-18NiMoCr3-7
ASTM	A508CL2, A508CL3, A533CL1Gr.B / C, A533CL2Gr.B / C
Creep resistant steels	
	15NiCuMoN6-5 (WB36), 17MnMoVL6-4(WB35)
Pipe material	
API 5LX	X65, X70 (X80 root run)
EN 10208-2	L480, L550
Fine grained steel	
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
2.5 x 350	60 - 100	DC+	67	121	0.7	19.5	75	1.47
3.2 x 350	80 - 130	DC+	70	234	1.3	37.5	41	1.56
4.0 x 350	120 - 180	DC+	74	343	1.7	55.4	29	1.59
5.0 x 450	160 - 240	DC+	106	573	2.5	106.4	14	1.43

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Low temperature basic electrode

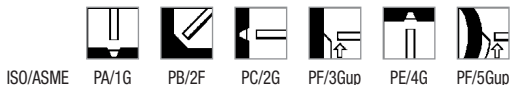
Classification

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 at -60°C)
Extremely low hydrogen content
110 - 120% recovery
Weldable on AC and DC

Welding positions



Current type

AC / DC + / -

Approvals

NAKS

Pending

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H _{tot}
0.05	1.5	0.5	0.01	0.005	0.95	2 ml/100g

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: AWS5.5		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	550	640	24	140	80
CTOD value at -10°C > 0.25 mm						

Packaging and available sizes

Unit: Box	Diameter (mm)	2.5	3.2	4.0	4.0	5.0
	Length (mm)	350	350	350	450	450
	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 01

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	GP 240R
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	P275 T1
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 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
2.5 x 350	55 - 80	DC+	59	85	0.72	19.3	86	1.65
3.2 x 350	80 - 145	DC+	66	220	1.2	37.7	48	1.79
4.0 x 350	120 - 185	DC+	77	355	1.6	54.1	29	1.59
4.0 x 450	120 - 185	DC+	90	450	1.8	68.4	23	1.56
5.0 x 450	180 - 240	DC+	104	784	2.4	105.2	15	1.53

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

High strength basic electrode

Classification

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

General description

Basic all position extremely low hydrogen electrode

Weldable on AC and DC

110 - 115% recovery

Good impact values at -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): H_{DM} < 3 ml/100g

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

ABS LR
+ 4Y69H5

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Mo	H _{DM}
0.06	1.5	0.4	0.015	0.01	2.2	0.4	2 ml/100g

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	-51°C
Required: AWSA5.5		680-760*	min. 760	min. 20			min. 27
EN 757		min. 690	760-960	min. 17		min. 47	
Typical values	AW	750	785	22	100	80	80

* Diam. 2.5 max. 795 N/mm²

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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 22

Materials to be welded

Steel grades/Standard	Type
Pipe material	
API-5LX	X70, X75
Fine grained steel	
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
2.5 x 350	60 - 80	DC+	55	99	0.8	19.5	82	1.61
3.2 x 350	80 - 130	DC+	78	261	1.1	36.5	43	1.55
4.0 x 350	120 - 180	DC+	75	356	1.6	53.2	30	1.59
5.0 x 450	160 - 240	DC+	116	627	2.3	105.1	14	1.45

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

High strength basic electrode

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

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): H_{DM} < 3 ml/100g

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

ABS	DNV
+	4Y69H5

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Ni	Mo	H _{DM}
0.06	1.4	0.3	0.01	0.01	0.4	2.0	0.4	2 ml/100g

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	3.2	4.0	4.0	5.0
	Length (mm)	350	350	450	350	450	450
Unit: SRP	Pieces / unit	68	50	50	28	28	23
	Net weight/unit (kg)	1.4	1.9	2.4	1.5	1.9	2.5

Identification

Imprint: 12018-G / CONARC 85

Tip Color: light blue

Conarc® 85: rev. EN 22

Materials to be welded

Steel grades/Standard	Type
Pipe material	
API-5LX	X70, X75, X80
Fine grained steel	
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
3.2 x 350	80 - 130	DC+	69	219	1.0	37.5	50	1.89
4.0 x 350	120 - 180	DC+	68	321	1.5	53.2	35	1.87
5.0 x 450	160 - 240	DC+	106	632	2.0	106.7	17	1.81

* stub end 35 mm

Welding parameters, optimum fill passes

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

Low temperature basic electrode

Classification

AWS A5.5 : E7018-G-H4R ¹⁾
 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 at -60°C)

Good CTOD at -10°C

Extremely low hydrogen content

110 - 120% recovery

Weldable on AC and DC

Vacuum sealed Sahara ReadyPack®: H_{DM} < 3 ml/100g

Also available in carton boxes

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H _{DM}
0.05	1.5	0.4	0.01	0.01	0.9	2 ml/100g

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: AWS5.5		min. 390	min. 480	min. 25	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values		550	640	24	150	90
CTOD value at -10°C > 0.25 mm						

Packaging and available sizes

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

Identification

Imprint: 7018-G / KRYO 1

Tip Color: purple

Kryo® 1: rev. EN 22

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	GP 240R
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	P275 T1
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 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
2.5 x 350	55 - 80	DC+	59	85	0.72	19.3	86	1.65
3.0 x 350	70 - 110	DC+	74	256	0.93	30.2	52	1.58
3.2 x 350	80 - 140	DC+	66	220	1.2	37.7	48	1.79
3.2 x 450	80 - 140	DC+	78	259	1.3	48.7	35	1.72
4.0 x 350	120 - 170	DC+	77	355	1.6	54.1	29	1.59
4.0 x 450	120 - 170	DC+	90	450	1.8	68.4	23	1.56
5.0 x 450	180 - 240	DC+	104	784	2.4	105.2	15	1.53

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Low temperature basic electrode

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 at -60°C)
Good CTOD at -10°C
Extremely low hydrogen content
Weldable on AC and DC
Only available in vacuum sealed Sahara ReadyPack® (SRP): $H_{DM} < 3 \text{ ml/100g}$

Welding positions



ISO/ASME



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H_{DM}
0.07	1.7	0.5	0.02	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		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18		min. 47
Typical values	AW	570	650	24	95	60
CTOD value at -10°C > 0.25 mm						

Packaging and available sizes

Unit: SRP	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	450	450	450
	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 22

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	GP 240R
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	P275 T1
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 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
2.5 x 350	60 - 95	DC+	50	106	0.82	19.2	90	1.71
3.2 x 450	80 - 145	DC+	68	256	1.2	40.1	43	1.73
4.0 x 450	120 - 190	DC+	82	436	1.7	63.6	26	1.65
5.0 x 450	175 - 230							

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	75A	70A	75A	70A	75A	80A
3.0	100A	110A	100A	100A	100A	110A
4.0	150A	140A	130A	125A	125A	120A

Remarks/ Application advice

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

Low temperature basic electrode

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 at -60°C)
Good CTOD at -10°C
Extremely low hydrogen content
110 - 120% recovery
Weldable on AC and DC
Vacuum sealed Sahara ReadyPack®: H_{DM} < 3 ml/100g
Also available in carton boxes

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H _{DM}
0.05	1.5	0.5	0.010	0.005	0.95	2 ml/100g

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: AWSA5.5		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: 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 22

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S275, S355
Ship plates	
ASTM A131	Grade A, B, D, E, AH 32 to EH 40
Cast steel	
EN 10213-2	GP 240R
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	P275 T1
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 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
2.5 x 350	55 - 85	DC+	59	85	0.72	19.3	86	1.65
3.2 x 350	80 - 145	DC+	66	220	1.2	37.7	48	1.79
3.2 x 450	80 - 145	DC+	78	259	1.3	48.7	35	1.72
4.0 x 350	120 - 185	DC+	77	355	1.6	54.1	29	1.59
4.0 x 450	120 - 185	DC+	90	450	1.8	68.4	23	1.56
5.0 x 450	180 - 270	DC+	104	784	2.4	105.2	15	1.53

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Low temperature basic electrode

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): $H_{DM} < 3 \text{ ml/100g}$

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	H_{DM}
0.07	1.2	0.3	0.020	0.010	0.9	2 ml/100g

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: AWSA5.5		min. 460	min. 550	min. 19	not required	
ISO 2560-A		min. 500	560-720	min. 18	min. 47	
Typical values	AW	550	640	26	90	60
	SR: 600°C/4h	540	620	24	100	85

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 23

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	GP 240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445
API 5 LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275 T1
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 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 at max. current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 450	130 - 160							
4.0 x 450	170 - 240	AC	73	537	3.5	102.0	14	1.43
5.0 x 450	250 - 300	AC	78	772	5.0	156.7	9	1.45
6.3 x 450	280 - 390	AC	84	1171	6.9	234.6	6	1.45

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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

Low temperature basic electrode

Classification

AWS A5.5 : E9018-G-H4R
EN 757 : 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 at -60°C

Good CTOD at -15°C

Vacuum sealed Sahara ReadyPack®: $H_{DM} < 3 \text{ ml/100g}$

Also available in carton boxes

Welding positions



ISO/ASME



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H_{DM}
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		min. 530	min. 620	min. 17	not required		
EN 757		min. 550	610-780	min. 18			min. 47
Typical values	AW	570	650	22	140	110	60
CTOD-value at -15°C > 0.30mm							

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	450	450	450
Unit: 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 22

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S355
Cast steel	
EN 10213-2	GP 240R
Pipe material	
EN 10208-1	L290 GA, L360 GA
EN 10208-2	L290, L360, L415, L445, L480
API 5 LX	X42, X46, X52, X60, X65, X70
EN 10216-1	P275 T1
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 10025 part 6	S460, S500
Low temperature steels	
EN 10028-4	11 MnNi 5-3, 13 MnNi 6-3, 15 NiMn 6
EN 10222-3	13 MnNi 6-3, 15 NiMn 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
2.5 x 350	55 - 85	DC+	59	85	0.72	19.4	86	1.65
3.2 x 450	80 - 140	DC+	80	268	1.2	46.8	36	1.70
4.0 x 450	120 - 170	DC+	89	445	1.8	70.0	22	1.52
5.0 x 450	180 - 240	DC+	96	598	2.6	103.8	14	1.51

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Low temperature basic electrode

Classification

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

General description

The basic all position offshore electrode with approx. 2.5% Ni

115 - 120% recovery

Excellent impact toughness at -80°C

Good CTOD at -10°C

Extremely low hydrogen content

Also available in vacuum sealed Sahara ReadyPack® (SRP): $H_{DM} < 3 \text{ ml/100g}$

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

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

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H_{DM}
0.05	0.7	0.3	0.015	0.010	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: AWSA5.5	SR ¹⁾	min. 460	min. 550	min. 19	min. 47	
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: 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 22

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

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 - 80	DC+	57	103	0.72	19.5	88	1.71
3.2 x 350	80 - 140	DC+	65	218	1.3	37.4	44	1.64
3.2 x 450	80 - 140	DC+	79	263	1.4	48.5	33	1.59
4.0 x 350	120 - 170	DC+	74	344	1.6	52.7	30	1.57
4.0 x 450	120 - 170	DC+	100	463	1.7	69.8	21	1.45
5.0 x 450	180 - 240	DC+	103	723	2.5	104.8	14	1.48

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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%

EN: Ni = 2.6 - 3.8%

Low temperature basic electrode

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 at -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



Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	H _{01m}
0.03	0.6	0.4	0.010	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: AWSA5.5	SR ¹⁾	min. 390	min. 480	min. 25		min. 27
Typical values	AW	450	520	26	80	
Typical values	SR ²⁾	430	510	26	120	80
Stress relieved: SR ¹⁾ = 605±14°C/1h						
Stress relieved: SR ²⁾ = 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
	Consult Lincoln for availability		

Identification

Imprint: 7016-C2 / KRYO 4

Tip Color: silver

Kryo® 4: rev. EN 22

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
EN 10025 part 4	S355, S420
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
ASTM A203	Grade A, B
ASTM A333	Grade 3
ASTM A334	Grade 3
ASTM A350	Grade LF3, CL1 & 2
ASTM A480	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
3.2 x 350	80 - 140	DC+	72	207	1.1	30.8	48	1.45
4.0 x 350	120 - 165	DC+	72	309	1.6	46.1	32	1.48

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
3.2	110A	120A	110A	100A	100A	100A
4.0	150A	140A	150A	140A	135A	140A

Creep resistant basic electrode

Classification

AWS A5.5 : E7018-A1-H4R
EN 1599 : E Mo B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)

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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC + / -

Approvals

DB	DNV	TÜV
x	0,3 Mo PT.2	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Mo	H_{DM}
0.05	0.8	0.6	0.02	0.01	0.55	2 ml/100g

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	SR ¹⁾	min. 390	min. 480	min. 25	not required	
EN 1599	SR ²⁾	min. 355	min. 510	min. 22	min. 47	
Typical values	SR ³⁾	560	620	25	140	50
	AW	550	610	25	160	70

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

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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 22

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	P295 G H, P355 G H, 16 Mo 3
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

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
2.5 x 350	60 - 90	DC+	65	118	0.7	22.8	84	1.92
3.2 x 350	80 - 130	DC+	69	230	1.3	37.9	42	1.59
4.0 x 350	120 - 180	DC+	81	373	1.6	54.8	28	1.56
5.0 x 450	160 - 240	DC+	106	799	2.4	107.4	14	1.52

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Creep resistant basic electrode

Classification

AWS A5.5 : E8018-B2-H4
EN 1599 : E CrMo1 B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)

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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

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	H_{DM}
0.06	0.75	0.6	0.015	0.01	1.1	0.5	3 ml/100g

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	SR ¹⁾	min. 460	min. 550	min. 19	not required	
EN 1599	SR ²⁾	min. 355	min. 510	min. 20	min. 47	
Typical values	SR ³⁾	570	640	24	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	350	450
Unit: 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 21

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	13 CrMo 4-5
EN 10083-1	25 CrMo 4
EN 10222-2	14 CrMo 4-5
Tool steel	
DIN 17210	16 MnCr 5

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
2.5 x 350	60 - 90	DC+	63	114	0.71	21.0	80	1.67
3.2 x 350	80 - 130	DC+	68	227	1.3	37.9	41	1.56
4.0 x 350	120 - 180	DC+	79	367	1.6	54.9	29	1.59
5.0 x 450	160 - 240	DC+	103	777	2.5	106.9	14	1.52

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Creep resistant basic electrode

Classification

AWS A5.5 : E8018-B2-H4
EN 1599 : E CrMo1 B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)
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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Mo	Bruscato	H_{DM}
0.06	0.7	0.35	0.010	0.010	1.2	0.55	max. 15 ppm	3 ml/100g

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	SR ¹⁾	min. 460	min. 550	min. 19	not required	
EN 1599	SR ²⁾	min. 355	min. 510	min. 20	min. 47	
Typical values	SR ³⁾	570	640	24	180	100

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

Shifting CVN at 55 J(DeltaT55): +10°C after "STC" (step cool treatment)

Packaging and available sizes

Unit: SRP	Length (mm)	350	350	350
	Diameter (mm)	2.5	3.2	4.0
	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 22

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	13 CrMo 4-5
EN 10083-1	25 CrMo 4
EN 10222-2	14 CrMo 4-5
Tool steel	
DIN 17210	16 MnCr 5

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
2.5 x 350	60 - 90							
3.2 x 350	80 - 145	DC+	68	227	1.3	37.9	41	1.56
4.0 x 350	120 - 185	DC+	79	367	1.6	54.9	29	1.59

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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: Bruscato factor $X = (10 P + 5 Sb + 4 Sn + As)/100 \leq 15$ ppm and Mn + Si < 1.1

Creep resistant basic electrode

Classification

AWS A5.5 : E9018-B3-H4
EN 1599 : E CrMo2 B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)

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/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

RINA TÜV
C2M1 +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Mo	H_{DM}
0.06	0.8	0.6	0.015	0.01	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
EN 1599	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: 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 22

Materials to be welded

Steel grades/Standard Type

Creep and hydrogen resistant steels

EN 10028-2 10 CrMo 9-10

EN 10222-2 12 CrMo 9-10

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
2.5 x 350	60 - 90	DC+	63	114	0.72	21.0	79	1.67
3.2 x 350	80 - 130	DC+	70	233	1.3	37.6	40	1.49
4.0 x 350	120 - 180	DC+	75	348	1.7	56.7	28	1.56
5.0 x 450	160 - 240	DC+	100	754	2.6	107.6	14	1.47

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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/interpass 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

Creep resistant basic electrode

Classification

AWS A5.5 : E9018-B3-H4
EN 1599 : E CrMo2 B 32 H 5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)
For welding 2.25% Cr 1% Mo-creep and hydrogen resistant steels
Excellent weldability for pipe and site welding
Reliable X-ray properties
Good mechanical properties in the as welded and stress relieved condition
Applicable for service temperature from -20 to 600°C
SL 20G (STC) meets the actual "step cool" requirements including the Bruscato factor $X < 15$
Only available in vacuum sealed Sahara ReadyPack® (SRP)

Welding positions



ISO/ASME



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Mo	Bruscato	H_{DM}
0.10	0.6	0.35	0.01	0.01	2.3	1.0	max. 15 ppm	3 ml/100g

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	SR ¹⁾	min. 530	min. 620	min. 17	not required	
EN 1599	SR ²⁾	min. 400	min. 500	min. 18	min. 47	
Typical values	SR ³⁾	540	640	20	160	80

Stress relieved: SR¹⁾ = 690±14°C/1h, SR²⁾ = 690-750°C/1h, SR³⁾ = 695°C/1h

Shifting CVN at 55 J(DeltaT55): +10°C after "STC" (step cool treatment)

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	51	28	23
	Net weight/unit (kg)	1.4	2.0	1.5	1.6

Identification

Imprint: 9018-B3 / SL 20 G (STC)

Tip Color: White

SL®20G(STC): rev. EN 22

Materials to be welded

Steel grades/Standard Type

Creep and hydrogen resistant steels

EN 10028-2 10 CrMo 9-10

EN 10222-2 12 CrMo 9-10

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
2.5 x 350	60 - 95	DC+	63	114	0.72	21.0	79	1.67
3.2 x 350	80 - 145	DC+	70	233	1.3	37.6	40	1.49
4.0 x 350	120 - 185	DC+	75	348	1.7	56.7	28	1.56
5.0 x 450	160 - 260	DC+	100	754	2.6	107.6	14	1.47

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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/interpass temperature: 200 - 300°C

Recommended tempering heat treatment range: 680 - 750°C (time depends on material thickness)

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

Creep resistant basic electrode

Classification

AWS A5.5 : E8018-B1-H4
EN 1599 : E Z B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)

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/3Gup

PE/4G

PF/5Gup

Current type

AC / DC + / -

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Mo	V	H _{DM}
0.06	0.8	0.6	0.02	0.01	0.5	0.5	0.3	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⁾ = 730°C/1h

Packaging and available sizes

Unit: SRP	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
	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 22

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
DIN	14MoV63
	17MnMoV64
	10CrSiMoV7
	24CrMoV5-5

Creep data

Test temperature	(°C)	400	450	500	550	575
Yield strength Rp-0,2%	(N/mm²)	480	470	450		
Creep strength Rm/1000	(N/mm²)			270	170	150
Creep strength Rm/10.000	(N/mm²)			250	150	130
Creep resistance Rp1%/10.000	(N/mm²)			210	130	110

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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	60 - 90	DC+	64	115	0.70	21.0	82	1.69
3.2 x 350	80 - 130	DC+	71	238	1.2	37.5	41	1.54
4.0 x 350	120 - 180	DC+	76	353	1.6	55.8	30	1.64
5.0 x 450	160 - 220	DC+	101	762	2.6	106.6	14	1.49

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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/interpass temperature: 200 - 300°C

Recommended tempering heat treatment range: 700 - 720°C (time depends on material thickness)

Creep resistant basic electrode

Classification

AWS A5.5 : E8018-B6-H4R
EN 1599 : E CrMo5 B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)
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/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Mo	H_{DM}
0.07	0.8	0.6	0.020	0.010	5.3	0.6	3 ml/100g

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	SR ¹⁾	min. 460	min. 550	min. 19	not required
EN 1599	SR ²⁾	min. 400	min. 590	min. 17	min. 47
Typical values	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 22

Materials to be welded

Steel grades/Standard Type

Creep and hydrogen resistant steels

DIN	12CrMo19.5 and equivalent grades
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	140	(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
2.5 x 350	60 - 90	DC+	55	95	0.82	20.8	80	1.67
3.2 x 350	85 - 130	DC+	66	237	1.1	35.4	50	1.79
4.0 x 350	130 - 180	DC+	76	331	1.5	51.8	32	1.64

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
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 and interpass temperature 200 - 300°C

Postweld heat treatment 730 - 760°C (time depends on material thickness)

Creep resistant basic electrode

Classification

AWS A5.5 : E9016-B9-H4
EN 1599 : E CrMo91 B 32 H5

General description

Basic very low hydrogen all position electrode ($H_{DM} < 5 \text{ ml/100g}$)
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/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Cr	Ni	Mo	Nb	V	N	H_{DM}
0.09	0.6	0.2	0.010	0.010	9.0	0.6	1.0	0.04	0.2	0.04	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	SR ¹⁾	min. 530	min. 620	min. 17	not required
EN 1599	SR ²⁾	min. 415	min. 585	min. 17	min. 47
Typical values	SR ³⁾	650	800	20	50

Stress relieved: SR¹⁾ = 740±14°C/1h, SR²⁾ = 750-770°C/2h, SR³⁾ = 750-754°C/2h

Packaging and available sizes

	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 22

Materials to be welded

Steel grades/Standard	Type	Code	Type
Creep and hydrogen resistant steels			
EN 10222-2	X10CrMoV 9-1	ASME	SA 182-F91
ASTM	A199 Grade T91		
	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

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	60 - 90	DC+	57	88	0.7	19.3	92	1.78
3.2 x 350	85 - 140	DC+	65	172	1.0	34.8	59	2.04
4.0 x 350	130 - 175	DC+	66	263	1.5	50.8	36	1.81

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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 and interpass temperature: 250 - 300°C

Recommended tempering heat treatment range: 740 - 780°C (time depends on material thickness)

Stainless steel electrode

Classification

AWS A5.4 : E308L-16
EN 1600 : 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/3Gup PE/4G PF/5Gup

Current type

AC / DC + / -

Approvals

BV TÜV
304L +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.02	0.80	0.80	19.5	9.7	04-10

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		not required	min. 520	min. 35	not required		
EN 1600		min. 320	min. 510	min. 30	not required		
Typical values	AW	440	580	43	70	60	24

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: Box	Pieces / unit	125	225	135	150	85	65
	Net weight/unit (kg)	0.7	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 21

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%)					
	X2 CrNi 19 11		1.4306	(TP)304L CF-3	S30403 J92500
	X2 CrNiN 18 10		1.4311	(TP)304LN 302,304	S30453 S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18 10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5 CrNiNb 19 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	5.5	330	1.82
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
1.5		35A	35A			
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 passes DC- is recommended.

Stainless steel electrode

Classification

AWS A5.4 : E308L-17
EN 1600 : 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 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)

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

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 192)
0.025	0.75	0.95	19.0	9.7	04-10

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	-20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
EN 1600		min. 320	min. 510	min. 30	not required	
Typical values	AW	440	600	45	75	60

Packaging and available sizes

		Diameter (mm)				
		2.0	2.5	3.2	4.0	5.0
Unit: Box	Length (mm)	300	350	350	450	450
	Pieces / unit	125	125	135	85	55
Unit: SRP	Net weight/unit (kg)	2.3	2.7	4.7	5.8	5.8
	Pieces / unit	60	65	52	28	22
Unit: Linc Can™	Net weight/unit (kg)	0.6	1.4	1.8	2.0	2.4
	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 21

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%)					
	X2 CrNi 19 11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2 CrNiN 18 10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5 CrNiNb 19 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
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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				

Stainless steel electrode

Classification

AWS A5.4 : E308L-15
EN 1600 : 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 passes in grooves with root opening
High corrosion resistance in oxidizing environments

Welding positions



ISO/ASME PG/3Gdown

Current type

DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.02	0.8	0.7	20.0	9.8	04-10

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	-20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
EN 1600		min. 320	min. 510	min. 30	not required	
Typical values	AW	440	600	40	70	50

Packaging and available sizes

	Diameter (mm)	2.5	3.2
	Length (mm)	300	300
Unit: 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 21

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%)					
	X2 CrNi 19 11		1.4306	(TP)304L CF-3	S30403 J92500
	X2 CrNiN 18 10		1.4311	(TP)304LN 302,304	S30453 S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18 10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5 CrNiNb 19 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
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 35 mm

Welding parameters, optimum fill passes

Welding positions	3G down
Diameter (mm)	
2.5	70A
3.2	100A

Stainless steel electrode

Classification

AWS A5.4 : E308L-15
EN 1600 : 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/3Gup PE/4G PF/5Gup

Current type

DC +

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.025	1.8	0.4	19.0	10.0	04-10

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	-196°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
EN 1600		min. 320	min. 510	min. 30	not required	
Typical values	AW	450	600	40	80	40

Packaging and available sizes

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

Identification Imprint: 308L-15 / JUNGO 304 L

Tip Color: dark blue

Jungo® 304L: rev. EN 21

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%)					
	X2 CrNi 19 11		1.4306	(TP)304L CF-3	S30403 J92500
	X6 CrNiNb 18 10		1.4311	(TP)304LN 302,304	S30453 S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18 10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5 CrNiNb 19 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
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 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
2.5	60A	60A	60A	60A	60A	60A
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A

Stainless steel electrode

Classification

AWS A5.4 : E308L-17
EN 1600 : E 19 9 L R 53

Temperature range

pressurized parts : -120...+350°C
oxidation resistance : to 800°C

General description

A rutile-basic all position stainless steel electrode for 304L or equivalent steels

High recovery (130%) providing high welding speed

Good side wall wetting, no undercut, self releasing slag

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	FN (acc. WRC 192)
0.02	0.6	0.9	19.0	10.0	04-10

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	-20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
EN 1600		min. 320	min. 510	min. 30	not required	
Typical values	AW	440	600	40	70	50

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: SRP	Pieces / unit	31	23	19
	Net weight/unit (kg)	1.6	2.0	2.3

Identification Imprint: 308L-17 / LIMAROSTA 304 L-130 Tip Color: light blue

Limarosta® 304L-130: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240A312/A351	UNS
Extra low carbon (C <0.03%)					
	X2 CrNi 19 11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2 CrNiN 18 10		1.4311	(TP)304LN	S30453
				302,304	S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5 CrNiNb 19 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+	69	241	1.8	59.0	28	1.67
4.0 x 450	120 - 160	DC+	76	378	2.5	87.4	19	1.64
5.0 x 450	160 - 230	DC+	84	616	3.6	135.0	12	1.64

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F
Diameter (mm)		
3.2	110A	105A
4.0	155A	150A
5.0	175A	175A

Stainless steel electrode

Classification

AWS A5.4 : E347-16
EN 1600 : 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
Excellent resistance in oxidizing environments such as nitric acid
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/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Nb	FN (acc. WRC 192)
0.03	0.8	0.8	19.5	9.8	0.35	06-12

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	-60°C
Required: AWS A5.4		not required	min. 550	min. 25	not required		
EN 1600		min. 350	min. 550	min. 25	not required		
Typical values	AW	500	630	35	70	50	35

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-, Nb stabilized					
	X6CrNiTi 18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6CrNiNb 18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb 19-10	1.4552	CF-8C 302	J92710
Non stabilized					
	X4CrNi 18-10		1.4301	(TP)304	S30400
	X2CrNi 19-11		1.4306	(TP)304L	S30403
		GX5CrNi 19-10	1.4308	CF-8	J92600
			1.4312	(TP)304H	S30409

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

For root passes DC- is recommended.

Stainless steel electrode

Classification

AWS A5.4 : E347-15
EN 1600 : 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
Excellent resistance in oxidizing environments such as nitric acid
High resistance to intergranular corrosion
Easy slag release and smooth bead appearance
Strong electrode coating

Welding positions



Current type

DC +

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Nb	FN (acc. WRC 192)
0.02	1.6	0.5	20.0	10.0	0.40	06-12

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	-120°C
Required: AWS A5.4		not required	min. 520	min. 30	not required		
EN 1600		min. 350	min. 550	min. 25	not required		
Typical values	AW	500	630	35	80	50	40

Packaging and available sizes

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

Identification

Imprint: 347-15 / JUNGO 347

Tip Color: brown

Jungo® 347: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-, Nb stabilized					
	X6 CrNiTi 18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18-10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5CrNiNb19-10	1.4552	CF-8C 302	J92710
Non stabilized					
	X4 CrNi 18-10		1.4301	(TP)304	S30400
	X2 CrNi 19-11		1.4306	(TP)304L	S30403
		GX5 CrNi 19-10	1.4308	CF-8	J92600
			1.4312	(TP)304H	S30409

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A
5.0	150A	150A				

Stainless steel electrode

Classification

AWS A5.4 : E316L-16
EN 1600 : 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/3Gup PE/4G PF/5Gup

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 192)
0.02	0.8	0.8	18.0	11.5	2.85	04-10

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Impact ISO-V(J)	
					-20°C	-120°C
Required: AWS A5.4 EN 1600		not required min. 320	min. 490 min. 510	min. 30 min. 25	not required not required	
Typical values	AW	450	580	39	60	40

Packaging and available sizes

	Diameter (mm)	1.5	2.0	2.5	3.2	4.0	5.0
	Length (mm)	250	300	350	350	350	350
Unit: Box	Pieces / unit	160	225	135	150	90	65
	Net weight/unit (kg)	0.8	2.4	2.7	4.9	4.8	5.0
Unit: SRP	Pieces / unit		84	69	56	29	-
	Net weight/unit (kg)		0.9	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 22

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
1.5		35A	35A			
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 passes DC- is recommended.

Stainless steel electrode

Classification

AWS A5.4 : E316L-16
EN 1600 : 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/3Gup



PE/4G



PG/3Gdown



PG/5Gdown

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
0.02	0.7	0.85	18.1	11.5	2.85	04-10

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
Required: AWS A5.4		not required	min. 490	min. 30	not required
EN 1600		min. 320	min. 510	min. 25	not required
Typical values	AW	450	580	39	60

Packaging and available sizes

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

Identification

Imprint: 316L-16

Tip Color: pink

Arosta® 316LP: rev. EN 22

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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
2.0 x 250	30 - 60	DC+						
2.5 x 250	30 - 70	DC+						

* stub end 35 mm

Stainless steel electrode

Classification

AWS A5.4 : E316L-17
EN 1600 : 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)

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G PF/5Gup

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 192)
0.02	0.8	1.0	18.0	11.5	2.8	04-10

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		not required	min. 490	min. 30	not required		
EN 1600		min. 320	min. 510	min. 25	not required		
Typical values	AW	450	580	40	70	60	40

Packaging and available sizes

		1.5	2.0	2.5	3.2	4.0	5.0
	Diameter (mm)						
	Length (mm)	250	300	350	350	450	450
Unit: 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 Pack	Pieces / unit		-	47	28	-	-
	Net weight/unit (kg)		-	1.0	1.0	-	-
Unit: Linc Can™	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 21

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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				

Stainless steel electrode

Classification

AWS A5.4 : E316L-15
EN 1600 : E 19 12 3 L R 21

Temperature range

pressurized parts : -60...+400°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/3Gdown

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 192)
0.02	0.7	0.85	18.0	11.5	2.8	04-10

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	-20°C	-60°C
Required: AWS A5.4		not required	min. 490	min. 30	not required		
EN 1600		min. 320	min. 510	min. 25	not required		
Typical values	AW	500	620	35	50	45	35

Packaging and available sizes

	Diameter (mm)	2.5	3.2
	Length (mm)	300	300
Unit: 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 21

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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
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 35 mm

Welding parameters, optimum fill passes

Welding positions	3G (down)
Diameter (mm)	
2.5	70A
3.2	100A

Stainless steel electrode

Classification

AWS A5.4 : E316L-15
EN 1600 : 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
Service temperature up to 400°C
High resistance against general and intercrystalline corrosion

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G PF/5Gup

Current type

DC +

Approvals

BV
316LBT

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
0.025	1.6	0.4	18.5	11.0	2.7	04-10

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	-196°C
Required: AWS A5.4		not required	min. 490	min. 30	not required	
EN 1600		min. 320	min. 510	min. 25	not required	
Typical values	AW	450	650	35	100	35

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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 22

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	60A	60A	60A	60A	60A	60A
3.2	95A	90A	90A	75A	75A	75A
4.0	125A	110A	125A	100A	100A	100A

Stainless steel electrode

Classification

AWS A5.4 : E316L-17
EN 1600 : 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 192)
0.02	0.65	1.0	18.0	11.5	2.8	04-10

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	-20°C	-105°C
Required: AWS A5.4		not required	min. 490	min. 30	not required		
EN 1600		min. 320	min. 510	min. 25	not required		
Typical values	AW	450	580	40	70	60	40

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
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 21

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F
3.2	110A	105A
4.0	155A	150A
5.0	175A	175A

Stainless steel electrode

Classification

AWS A5.4 : E318-16
EN 1600 : 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



Current type

AC / DC + / -

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	Nb	FN (acc. WRC 192)
0.03	0.8	0.85	18.0	11.5	2.7	0.35	06-12

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	-60°C
Required: AWS A5.4 EN 1600		not required min. 350	min. 550 min. 550	min. 25 min. 25	not required not required		
Typical values	AW	500	630	38	60	50	35

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	450
Unit: 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 21

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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		

For root passes DC- is recommended.

Stainless steel electrode

Classification

AWS A5.4 : E318-15*
EN 1600 : E 19 12 3 Nb B 22

*: Deviation, see remarks

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/3Gup



PE/4G



PF/5Gup

Current type

DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	Nb	FN (acc. WRC 192)
0.025	1.5	0.4	18.0	11.0	2.7	0.5	06-12

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	not required	min. 550	min. 25	not required
EN 1600	min. 350	min. 550	min. 25	not required
Typical values	AW 430	650	30	90

Packaging and available sizes

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

Identification

Imprint: JUNGO 318

Tip Color: red

Jungo® 318: rev. EN 21

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	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
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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%

Stainless steel electrode

Classification

EN 1600 : 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

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

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 192)
0.02	1.3	0.8	18.0	17.0	4.6	0.18	<0.3

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	-196°C
Required: EN 1600		min. 300	min. 480	min. 25	not required		
Typical values	AW	460	650	40	70	70	50

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Box	Pieces / unit	140	140	100
	Net weight/unit (kg)	2.8	4.7	5.1

Identification

Imprint: AROSTA 4439

Tip Color: red

Arosta® 4439: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Fully austenitic CrNiMo corrosion resistant steels					
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429	(TP)316LN	S31653
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMo 18-15-4		1.4438	317L	S31725
	X2 CrNiMoN 17-13-5		1.4439	317LN	S31726
	G-X2 CrNiMoN 17-13-4	GX2 CrNiMo 17-13-4	1.4446		
	G-X6 CrNiMo 17-13	GX6 CrNiMo 17-13	1.4448		

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+	78	153	0.58	19.8	79	1.56
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	90A	100A	65A	65A	65A
4.0	130A	125A	130A	80A		

For root passes DC- is recommended.

Remarks/ Application advice

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

Stainless steel electrode

Classification

AWS A5.4 : E316LMn-15
EN 1600 : 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/3Gup



PE/4G



PF/5Gup

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	N	FN (acc. WRC 192)
0.03	7.3	0.4	20.0	16.0	3.0	0.16	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 -196°C
Required: AWS A5.4 EN 1600		not required min. 320	min. 550 min. 510	min. 20 min. 25	not required not required
Typical values	AW	460	650	35	80 50

Packaging and available sizes

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

Identification

Imprint: 316LMn-15 / JUNGO 4455

Tip Color: purple

Jungo® 4455: rev. EN 21

Materials to be welded

Steel grades	Standard	Type	Mat. Nr	ASTM/ACI	UNS
Austenitic nitrogen alloyed CrNi and CrNiMo steels					
	EN 10088-1/-2	X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
		X2 CrNiMoN 17-11-2	1.4406	(TP)316LN	S31653
		X2 CrNiMoN 17-13-3	1.4429		
		X2 CrNiMoN 17-13-5	1.4439	317LN	S31726
Austenitic anti-magnetic steels					
	SEW 390	X2 CrNiMoN 22-15	1.3951		
		X2 CrNiMoN 18-14-3	1.3952		
		X2 CrNiMo 18-15	1.3953		
		X8 CrMnNi 18-8	1.3965		
Low temperature steels					
	SEW 685	GX6 CrNi 18-10	1.6902		
		GX5 CrNiNb 18-10	1.6905		
	EN 10028-4	12 Ni 14	1.5637		
		X12 Ni 5	1.5680		

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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Stainless steel electrode

Classification

AWS A5.4 : E310Mo-15*
EN 1600 : E 25 22 2 N L B 22*

*: Deviation, see remarks

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 oxidizing 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



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	N	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					+20°C	-196°C
Required: AWS A5.4		not required	min. 550	min. 30	not required	
EN 1600		min. 320	min. 510	min. 25	not required	
Typical values	AW	400	620	35	90	50

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Box	Pieces / unit	135	150	100
	Net weight/unit (kg)	2.8	4.8	4.9

Identification

Imprint: JUNGO 4465

Tip Color: yellow

Jungo® 4465: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM / ACI A240/A312/A351	UNS
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Fully austenitic CrNiMo corrosion resistant steels

X1 CrNiMoN 25-25-2	1.4465			
X3 CrNiMoTi 25-25	1.4577			
X2 CrNi 19-11	1.4306	(TP)304L		S30403
		CF-3		J92500
X2 CrNiN 18-10	1.4311	(TP)304LN		S30453
		310S		S31008

Also very well applicable for build-up welding on low alloyed steel, such as pipe plates

Bufferlayers 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Stainless steel electrode

Classification

AWS A5.4 : E385-16*
EN 1600 : E 20 25 5 Cu N L R 12

*: Deviation, see remarks

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/3Gup



PE/4G



PF/5Gup

Current type

DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	Cu	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					+20°C	-10°C	-60°C
Required: AWS A5.4 EN 1600		not required min. 320	min. 520 min. 510	min. 30 min. 25	not required not required		
Typical values	AW	410	620	40	80	100	50

Packaging and available sizes

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

Identification

Imprint: JUNGO 4500

Tip Color: black

Jungo® 4500: rev. EN 22

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr
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Fully austenitic NiCrMoCu and CrNiMoCu steels

		GX7 NiCrMoCuNb 25-20	1.4500
	X5 NiCrMoCuTi 20-18		1.4506
		GX2 NiCrMoCuN 20-18	1.4531
		GX2 NiCrMoCuN 25-20	1.4536
	X1 NiCrMoCu 25-20-5	(Alloy 904L)	1.4539
		GX7 CrNiMoCuNb 18-18	1.4585
	X5 NiCrMoCuNb 22-18		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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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. 1.0%

AWS: Si = max. 0.9%

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

Stainless steel electrode

Classification

AWS A5.4 : E2209-16
EN 1600 : 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
EMR-Sahara product
Also available in vacuum sealed Sahara ReadyPack® (SRP)

Welding positions



ISO/ASME



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

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 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					+20°C	-30°C	-40°C
Required: AWS A5.4 EN 1600		not required min. 450	min. 690 min. 550	min. 20 min. 20	not required not required		
Typical values	AW	650	800	27	60	50	40

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: 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 22

Materials to be welded

Steel grades	EN 10088-1/-2/-4	Mat. Nr	ASTM / ACI A240	UNS
Duplex stainless steels				
	X2 CrNiMoN 22 -5-3	1.4462		S31803
		1.4417		S31500
	X3 CrNiMoN 27-5-2	1.4460		S31200
	X2 CrNiN 23-4	1.4362		S32304
	X2 CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloyed 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	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	DC+	65	357	2.8	77.4	20	1.61

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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 passes DC- is recommended.

Remarks/ Application advice

Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Stainless steel electrode

Classification

AWS A5.4 : E2209-15
EN 1600 : E 22 9 3 N L B 22

Temperature range

pressurized parts : -40 ... +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/3Gup PE/4G PF/5Gup

Current type

DC +

Approvals

DNV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	N	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)			
					+20°C	-20°C	-40°C	-50°C
Required: AWS A5.4 EN 1600		not required min. 450	min. 690 min. 550	min. 20 min. 20	not required not required			
Typical values	AW	650	800	28	80	75	70	45

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	250	350	350
Unit: SRP	Pieces / unit	69	55	30
	Net weight/unit (kg)	1.4	1.8	1.5
Unit: Box	Pieces / unit	112	152	103
	Net weight/unit (kg)	2.3	5.0	5.0

Identification

Imprint: 2209-15 / JUNGO 4462

Tip Color: red

Jungo® 4462: rev. EN 22

Materials to be welded

Steel grades	EN 10088-1/-2/-4	Mat. Nr	ASTM / ACI A240	UNS
Duplex stainless steels				
	X2 CrNiMoN 22 -5-3	1.4462		S31803
		1.4417		S31500
	X3 CrNiMoN 27-5-2	1.4460		S31200
	X2 CrNiN 23-4	1.4362		S32304
	X2 CrMnNiN21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloyed steel to duplex stainless steel

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate 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	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 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
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)

Stainless steel electrode

Classification

AWS A5.4 : E2595-15
EN 1600 : E 25 9 4 N L B 42

Temperature range

pressurized parts : -50 ... +250°C
oxidation resistance : n.a.

General description

A fully basic all position "super duplex" electrode
For welding Zeron 100 and other "super duplex" stainless steel grades
Fully cored wire alloyed electrode (including W+Cu)
High resistance to pitting and crevice corrosion, e.g. in seawater; PREN > 40
High strength and reliable impact toughness
Good weldability on DC+ polarity
Only available in vacuum sealed Sahara ReadyPack® (SRP)

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Mo	Cu	W	N	FN (acc. WRC 192)
0.03	0.8	0.3	25.0	9.5	3.6	0.8	0.7	0.2	30-60

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	-46°C
Required: AWS A5.4		not required	min. 760	min. 15	not required	
EN 1600		min. 550	min. 620	min. 18	not required	
Typical values	AW	740	920	24	50	45

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: SRP	Pieces / unit	69	52	15
	Net weight/unit (kg)	1.4	1.8	0.8

Identification

Imprint: 2595-15 / JUNG0 ZERON 100 X Tip Color: purple

Jungo® Zeron 100X: rev. EN 23

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM / ACI A276/A351/A473	UNS
Regular and super duplex stainless steels					
	X2CrNiMoN 25-7-4		1.4410		
	X4 CrNiMoN 27-5-2		1.4460		
	X2 CrNiMoN 22-5-3		1.4462	2205	S31803
		GX6 CrNiMo 24-8-2	1.4463		
				CD-4MCu	S32550
				Zeron 100	S32760

Super duplex stainless steel grades: chemical composition approximately:
24-27% Cr, 6-9% Ni, 3-4% Mo, 0.10-0.25% N alloyed also with Cu and/or W

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+	74	101	0.62	21.0	78	1.64
3.2 x 350	70 - 100	DC+	84	219	0.88	33.8	49	1.64
4.0 x 350	100 - 130	DC+	80	304	1.4	50.8	32	1.61

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	60A	60A	60A	60A	60A	60A
3.2	85A	80A	90A	80A	80A	80A
4.0	120A	120A	120A	100A	100A	100A

Remarks/ Application advice

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

Stainless steel electrode

Classification

AWS A5.4 : E309L-15
EN 1600 : E 23 12 L B 22

Temperature range

pressurized parts : -196...+350°C
scaling 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/3Gup



PE/4G



PF/5Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.025	1.5	0.4	23.0	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) -196°C
Required: AWS A5.4		not required	min. 520	min. 30	
EN 1600		min. 320	min. 510	min. 25	
Typical values	AW	470	570	40	40

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
Unit: Box	Pieces / unit	142	60	
	Net weight/unit (kg)	4.7	4.8	4.8

Identification

Imprint: 309L-15 / JUNGO 309 L

Tip Color:

Jungo® 309L: rev. EN 02

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to CrNi or CrNiMo stainless steel)

Build-up welding on mild and low alloyed steel

Bufferlayer CrNi-cladsteel

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

Stainless steel electrode

Classification

AWS A5.4 : E309L-16
EN 1600 : E 23 12 L R 32

Temperature range

pressurized parts : -120...+350°C
scaling resistance : n.a.

General description

A rutile-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
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/3Gup PE/4G PF/5Gup

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 192)
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 EN 1600		not required min. 320	min. 520 min. 510	min. 30 min. 25	not required not required		
Typical values	AW	480	560	40	60	50	40

Packaging and available sizes

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

Identification

Imprint: 309L-16 / AROSTA 309 S

Tip Color: sea green

Arosta® 309S: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to CrNi or CrNiMo stainless steel)

Build-up welding on mild and low alloyed steel

Bufferlayer CrNi-cladsteel

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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			

Stainless steel electrode

Classification

AWS A5.4 : E309L-17
EN 1600 : E 23 12 L R 32

Temperature range

pressurized parts : -120 ... +350°C
scaling 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/3Gup



PE/4G



PF/5Gup

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 192)
0.02	0.8	1.0	23.0	12.5	10-20

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		not required	min. 520	min. 30	not required	
EN 1600		min. 320	min. 510	min. 25	not required	
Typical values	AW	480	560	40	55	50

Packaging and available sizes

		Diameter (mm)				
		2.0	2.5	3.2	4.0	5.0
Unit: Box	Length (mm)	300	350	350	450	450
	Pieces / unit	200	125	135	85	55
Unit: SRP	Net weight/unit (kg)	2.3	2.8	4.9	5.9	6.0
	Pieces / unit	60	65	50	28	-
Unit: Linc Can™	Net weight/unit (kg)	0.6	1.5	1.8	2.0	-
	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 21

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L CF-3	S30403 J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to CrNi or CrNiMo stainless steel)

Build-up welding on mild and low alloyed steel

Bufferlayer CrNi-cladsteel

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 450	100 - 155	DC+	76	317	2.0	69.9	23	1.64
5.0 x 450	150 - 220	DC+	84	575	2.9	108.0	15	1.59

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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				

Stainless steel electrode

Classification

AWS A5.4 : E309Cb-16*
EN 1600 : E 23 12 Nb R 32

*: Deviation, see remarks

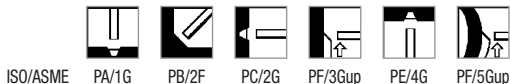
Temperature range

pressurized parts : -10 ... +460°C
scaling resistance : n.a.

General description

A high CrNiNb-alloyed rutile-basic all position buffer electrode
Specially developed for buffering mild and low alloyed steels for nuclear applications
Also to be used as buffer electrode in AISI 321 and AISI 347 claddings
Weldable on AC and DC+ polarity

Welding positions



Current type

AC / DC +

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	Nb	FN (acc. WRC 192)
0.02	0.8	0.8	23.0	12.0	0.5	15-25

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 EN 1600		not required min. 350	min. 550 min. 550	min. 30 min. 25	not required not required	
Typical values	AW	490	660	35	60	50

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: Box	Pieces / unit	150	100
	Net weight/unit (kg)	5.2	5.0

Identification

Imprint: AROSTA 309 Nb

Tip Color: gold

Arosta® 309Nb: rev. EN 22

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%)					
	X2 CrNi 19-11		1.4306	(TP)304L	S30403
				CF-3	J92500
	X2 CrNiN 18-10		1.4311	(TP)304LN	S30453
				302	
Medium carbon (C >0.03%)					
	X4 CrNi 18-10		1.4301	(TP)304	S30400
		GX5 CrNi 19-10	1.4308	CF-8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18-10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5 CrNiNb 19-10	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 350	60 - 130	DC+	62	171	1.3	34.5	45	1.54
4.0 x 350	80 - 150	DC+	67	273	1.9	49.7	30	1.47

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

Remarks/ Application advice

Deviations: chemical composition

Nb + Ta = min. 0.40%, max. 1.00%

AWS: Nb + Ta = min. 0.70%, max. 1.00%

Stainless steel electrode

Classification

AWS A5.4 : E309LMo-16
EN 1600 : E 23 12 2 L R 32

Temperature range

pressurized parts : -60 ... +400°C
scaling 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/3Gup



PE/4G



PF/5Gup

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 192)	
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					+20°C	-20°C	-60°C
Required: AWS A5.4		not required	min. 520	min. 30	not required		
EN 1600		min. 350	min. 550	min. 25	not required		
Typical values	AW	580	700	30	57	50	45

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	450
Unit: 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 21

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					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X10 CrNiMoTi 17-3		1.4573	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	GX5 CrNiMo 19-11		1.4408		

Welding dissimilar metals: mild steel or low alloyed steel to stainless CrNiMo-steel up to max. thickness of 12 mm.

Build-up welding on mild and low alloyed 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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			

Stainless steel electrode

Classification

ASW A5.4 : E308LMo-16
EN 1600 : E 20 10 3 R 32

Temperature range

pressurized parts : -20 ... +350°C
scaling 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



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

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 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					+20°C	-20°C
Required: AWS A5.4		not required	min. 520	min. 35	not required	
EN 1600		min. 400	min. 620	min. 20	not required	
Typical values	AW	500	720	30	70	60

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	350
Unit: Box	Pieces / unit	225	135	150	100	65
	Net weight/unit (kg)	2.5	2.7	4.9	5.0	5.0
Unit: Linc Pack	Pieces / unit		50	31		
	Net weight/unit (kg)		1.0	1.0		

Identification

Imprint: 308LMo-16 / NICHROMA

Tip Color: Mauve

Nichroma: rev. EN 21

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					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L	S31603
				CF-3M	J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X10 CrNiMoTi 17-3		1.4573	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
		GX5 CrNiMo 19-11	1.4408		

Welding dissimilar metals: mild steel and low alloyed steel to stainless CrNi and CrNiMo-steel

Build-up welding on mild and low alloyed 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 - 50	DC+	44	46	0.57	11.0	144	1.59
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 350	140 - 220	DC+	66	365	2.8	78.4	19	1.52

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
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			

Stainless steel electrode

Classification

AWS A5.4 : E309Mo-26
EN 1600 : E 23 12 2 LR 53*

*: Deviation, see remarks

Temperature range

pressurized parts : -20 ... +350°C
scaling 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 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					+20°C	-20°C
Required: AWS A5.4 EN 1600		not required min. 350	min. 550 min. 550	min. 30 min. 25	not required not required	
Typical values	AW	550	740	28	50	45

Packaging and available sizes

	Diameter (mm)	3.2	4.0	4.5	5.0
	Length (mm)	450	450	600	450
Unit: Box	Pieces / unit	90	55	40	35
	Net weight/unit (kg)	6.1	5.9	7.3	5.8

Identification

Imprint: 309Mo-26 / NICHROMA 160

Tip Color: sea green

Nichroma 160: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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First layer in CrNiMo claddings

X2 CrNiMo 17-12-2			1.4404	(TP)316L	S31603
CF-3M	J92800				
X2 CrNiMo 18-14-3			1.4435	(TP)316L	S31603
X4 CrNiMo 17-12-2			1.4401	(TP)316	S31600
X4 CrNiMo 17-13-3			1.4436		
X6 CrNiMoTi 17-12-2			1.4571	316Ti	S31635
X10 CrNiMoTi 17-3			1.4573	316Ti	S31635
X6 CrNiMoNb 17-12-2			1.4580	316Cb	S31640
	GX5 CrNiMo 19-11		1.4408		

Welding dissimilar metals: mild steel or low alloyed steel to stainless CrNiMo-steel up to max. thickness of 12 mm.

Build-up welding on mild and low alloyed 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
4.5 x 600	200 - 250	DC+						
5.0 x 450	230 - 300	DC+	90	1084	4.1	162.0	10	1.59

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	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%

Stainless steel electrode

Classification

EN 1600 : E 25 4 R 12*

*: Deviation, see remarks

Temperature range

pressurized parts : -10 ... +350°C
scaling 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 resistance
- 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/3Gup



PE/4G



PF/5Gup

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

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: EN 1600		min. 400	min. 600	min. 15	not required
Typical values	AW	500	700	15	30

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: 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 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI
Base metals for high temperature applications				
		GX30 CrSi 6	1.4710	
X10 CrSi 6			1.4712	502
X10 CrAl 7			1.4713	502
				403/405-TP405-CA15
X10 CrAl 13			1.4724	410/414-TP405-CA15
		GX40 CrSi 17	1.4740	
X10 CrAl 18			1.4742	430B-TP430-CB30
		GX40 CrSi 23	1.4745	TP433
X10 CrAl 24			1.4762	TP443
X20 CrNiSi 25-4			1.4821	TP329
		GX40 CrNi 24-5	1.4822	TP329
		GX40 CrNiSi 27-4	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 Application

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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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%

Stainless steel electrode

Classification

AWS A5.4 : E312-17
EN 1600 : E 29 9 R 12

Temperature range

pressurized parts : -10 ... +350°C
scaling 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/3Gup



PE/4G



PF/5Gup

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.4		not required	min. 660	min. 22	not required
EN 1600		min. 450	min. 650	min. 15	not required
Typical values	AW	700	800	20	50

Packaging and available sizes

	Diameter (mm)	2.0	2.5	3.2	4.0	5.0
	Length (mm)	300	350	350	350	350
Unit: 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	53	69	52	31	24
	Net weight/unit (kg)	0.6	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 21

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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	90A	100A	65A	65A	65A
4.0	130A	125A	130A	80A		
5.0						

Stainless steel electrode

Classification

AWS A5.4 : E307-16*
EN 1600 : E 18 8 Mn R 12

*: Deviation, see remarks

Temperature range

pressurized parts : -60 ... +350°C
scaling 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 plates 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/3Gup PE/4G PF/5Gup

Current type

AC / DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.09	5.0	0.6	18.5	8.5	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	-60°C
Required: AWS A5.4		not required	min. 590	min. 30	not required	
EN 1600		min. 350	min. 500	min. 25	not required	
Typical values	AW	450	650	35	110	75

Packaging and available sizes

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

Identification

Imprint: AROSTA 307

Tip Color: dark blue

Arosta® 307: rev. EN 21

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
- 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	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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%

Stainless steel electrode

Classification

ASW A5.4 : E307-26*
EN 1600 : 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 PA/1G PB/2F

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni
0.06	5.0	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		not required	min. 590	min. 30	not required	
EN 1600		min. 350	min. 500	min. 25	not required	
Typical values	AW	425	650	35	85	60

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	450	450
Unit: PE tube	Pieces / unit	116	94	62	49
	Net weight/unit (kg)	2.5	4.7	6.0	6.0

Identification Imprint: AROSTA 307-160

Tip Color: red

Arosta® 307-160: rev. EN 01

Materials to be welded

Various steel grades, such as:

- Armour plate
- Hardenable steels including steels difficult to weld
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Dissimilar steel grades (CMn-steels to stainless steel)

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - 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 - 100	DC+	44	71	0.96	17.8	85	1.52
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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G
2.5	90A	90A	90A
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%

Stainless steel electrode

Classification

AWS A5.4 : E307-15*
EN 1600 : E 18 8 Mn B 22

*: Deviation, see remarks

Temperature range

pressurized parts : -120 ... +400°C
scaling 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 plates and austenitic high Mn-steels

Often used as a buffer layer in hardfacing applications

Weldable on DC+ polarity

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					+20°C	-120°C
Required: AWS A5.4		not required	min. 590	min. 30	not required	
EN 1600		min. 350	min. 500	min. 25	not required	
Typical values	AW	500	650	35	100	35

Packaging and available sizes

Unit: Box	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	450	450
Unit: Box	Pieces / unit	160	170	110	70
	Net weight/unit (kg)	2.8	5.0	6.5	6.5

Identification

Imprint: JUNGO 307

Tip Color: silver

Jungo® 307: rev. EN 21

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
- 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
5.0 x 450	160 - 170	DC+	82	388	2.7	85.3	16	1.39

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Deviations: chemical composition

Mn = 4.5 - 6.5%

Ni = 5.7 - 9.5%

AWS: Mn = 3.30 - 4.75%

AWS: Ni = 9.0 - 10.7%

Stainless steel electrode

Classification

AWS A5.4 : E308H-16
EN 1600 : E 19 9 H R 12

Temperature range

pressurized parts : -20 ... +730°C
scaling 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

Popular in petrochemical and nuclear industry

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.05	0.75	0.85	18.5	9.5	03-7

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 EN 1600		not required min. 350	min. 550 min. 550	min. 35 min. 30	not required not required
Typical values	AW	450	600	44	70 50

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: 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 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Medium carbon (C >0.03%)	X4 CrNi 18-10	GX5 CrNi 19-10	1.4301	(TP)304	302
				(TP)304H	S30400
	1.4308		CF8	S30409	
	1.4948			J92600	

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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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 passes DC- is recommended.

Stainless steel electrode

Classification

AWS A5.4 : E309H-16*
EN 1600 : E 23 12 R 32*

*: Deviation, see remarks

Temperature range

pressurized parts : -10 ... +400°C
scaling 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/3Gup



PE/4G



PF/5Gup

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.10	0.8	1.6	22.0	11.0	03-8

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	not required	min. 550	min. 30	not required
EN 1600	min. 350	min. 550	min. 25	not required
Typical values	AW 500	700	30	50

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: 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 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
		GX30 CrSi 6	1.4710		
	X10 CrAl 7		1.4713	502	
	X10 CrAl 13		1.4724	410/414-TP405-CA15	
		GX40 CrSi 13	1.4729		
		GX40 CrSi 17	1.4740		
	X10 CrAl 18		1.4742	430-TP430-CB30	
	X10 CrAl 24		1.4762	TP443	
		GX25 CrNiSi 18-9	1.4825		J92502
		GX40 CrNiSi 22-9	1.4826		
	X15 CrNiSi 20-12		1.4828	TP309	S30900
		GX25 CrNiSi 20-14	1.4832		
	X12 CrNiTi 18-9				

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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	70A	70A	70A	60A	60A	60A
3.2	100A	100A	100A	70A	70A	70A
4.0	140A	140A	140A	80A		

For root passes DC- is recommended.

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%

Stainless steel electrode

Classification

AWS A5.4 : E310-16
EN 1600 : E 25 20 R 12

Temperature range

pressurized parts : -20 ... +400°C
scaling resistance : 1100°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 1100°C
Avoid service temperatures between 650 - 850°C
Weldable on AC and DC

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.12	2.5	0.5	26.0	20.5	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 EN 1600		not required min. 350	min. 550 min. 550	min. 30 min. 20	not required not required
Typical values	AW	440	600	30	80

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	350
Unit: 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 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A351	UNS
Heat resisting steels					
X10 CrAl 24			1.4762	310S CK20	S31008 J94202
		GX25 CrNiSi 18-9	1.4825		
		GX40 CrNiSi 22-9	1.4826		
X15 CrNiSi 20-12	GX25 CrNiSi 20-14		1.4828		
			1.4832		
X15 CrNiSi 25-20			1.4841		
X12 CrNi 25-21			1.4845		
		GX40 CrNiSi 25-20	1.4848	HK40	

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 - 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							

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
3.2	130A	120A	130A	110A	110A	110A
4.0	160A	160A	160A	140A		

Remarks/ Application advice

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 100°C

Stainless steel electrode

Classification

AWS A5.4 : E310-15*
EN 1600 : E 25 20 B 12

*: Deviation, see remarks

Temperature range

pressurized parts : -20 ... +400°C
scaling resistance : 1100°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 1100°C
Avoid service temperatures between 650 - 850°C
Weldable on DC only

Welding positions



ISO/ASME



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
0.1	3.0	0.3	25.0	21.0	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		not required	min. 550	min. 30	not required
EN 1600		min. 350	min. 550	min. 20	not required
Typical values	AW	440	600	30	100

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Box	Pieces / unit	135	150	100
	Net weight/unit (kg)	2.4	4.3	4.3

Identification

Imprint: INTHERMA 310 B

Tip Color: light green

Intherma® 310B: rev. EN 21

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Heat resisting steels					
	X10 CrAl 24		1.4762		
		GX25 CrNiSi 18-9	1.4825		
		GX40 CrNiSi 22-9	1.4826		
	X15 CrNiSi 20-12		1.4828		
		GX25 CrNiSi 20-14	1.4832		
	X15 CrNiSi 25-20		1.4841	310S CK20	S31008 J94202
	X12 CrNi 25-21		1.4845		
		GX40 CrNiSi 25-20	1.4848	HK40	

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 350	60 - 70							
3.2 x 350	80 - 90							
4.0 x 350	110 - 130							

* stub end 35 mm

Remarks/ Application advice

Deviations: chemical composition

Mn = max. 5.0%

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 100°C

AWS: Mn = 1.0 - 2.5%

Ni-base electrode

Classification

AWS A5.4 : E383-16
EN 1600 : E 27 31 4 Cu L R 12

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



Current type

AC / DC +

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo	Cu	Fe	FN (acc. WRC 192)
0.02	0.8	0.9	31.0	27.1	3.5	0.9	35.8	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
Required: AWS A5.4 EN 1600	not required min. 240	min. 520 min. 500	min. 30 min. 25	not required not required
Typical values	AW 440	640	38	70

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: PE tube	Pieces / unit	91	66	45
	Net weight/unit (kg)	1.8	2.0	2.0

Identification

Imprint: Nicro 31/27

Tip Color: orange

NiCro 31/27: rev. EN 22

Materials to be welded

Steel grades	Standard	Type	Mat. Nr	ASTM/ACI	UNS
Copper alloyed CrNiMo and NiCrMo steels					
	EN 10088-1/-2	X1NiCrMoCu 31 27 4	1.4563	Alloy 28	N08028
		X1NiCrMoCu 25-20-5	1.4539	Alloy 904L	N08904
	DIN 17744	NiCr 21 Mo	2.4858	Alloy 825	N08825
		NiCr 21 Mo 6Cu	2.4641	Alloy 825 h Mo	N08821
		X3NiCrMoTi 27 23	1.4503		

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	45-70	DC+	52	95	0.84	21.3	83	1.75
3.2x350	70-95	DC+	56	132	1.3	31.2	48	1.49
4.0x350	110-150	DC+	53	198	2.0	46.0	34	1.56

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
2.5	65A	70A	70A	60A	60A	60A
3.2	95A	95A	95A	80A	80A	80A
4.0	120A	120A				

Remarks/ Application advice

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

Ni-base electrode

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/3Gup PE/4G PF/5Gup

Current type

DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo	Nb	Fe
0.03	0.5	0.35	62	22	9	3.4	2

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		not required	min. 760	min. 30	not required
ISO 14172		min. 420	760	min. 27	not required
Typical values	AW	510	770	44	92

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
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 21

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 Alloyed steels				
	10Ni14 (3.5% Ni)	1,5637	ASTM A333 Grade 3	-
	12Ni19, X12Ni5	1,5680	-	K41583
9% Ni steel for LNG storage tanks				
	X8Ni9 (9% Ni)	1,5662	A353/A353M	-
	X8Ni9 (9% Ni)	1,5662	A553/A553M Type I	-
	(8% Ni)		A553/A553M Type II	K71340

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Ni-base electrode

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



Current type

DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Nb	Fe
0.02	4.4	0.45	68.4	18	1.9	6

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. 550	min. 30	not required	
ISO 14172		min. 360	min. 550	min. 27	not required	
Typical values	AW	430	680	40	145	130

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
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 21

Materials to be welded

Steel grades	BS 3076	DIN 17742 SEW 470/595	Mat. Nr	ASTM / ACI B366	UNS
Ni base on Cr alloyed steels for high and low temperature service					
		LC-NiCr15Fe	2.4817		N06600
	NA14	NiCr15Fe	2.4816	Alloy600/B168	N06600
		NiCr23Fe	2.4851	Alloy601(H)	N06601
		NiCr60 15	2.4867		
		NiCr80 20	2.4869		
		NiCr20Ti	2.4951	Alloy75	N06075
		NiCr20TiAl	2.4952	Alloy80A	N07080
	NA17	X12NiCrSi36 16	1.4864	330	N08330
		G-X10NiCrNb32 20	1.4859		
	NA15	X10NiCrAlTi32 20	1.4876	Alloy800/800H	N08800/ N08810

Suitable for welding dissimilar metals:

- Mild- and low-alloyed steel to stainless steel
- Mild- and low-alloyed steel to Ni base alloys
- Stainless steel to low-alloyed 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 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
Diameter (mm)						
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 = 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%

Ni-base electrode

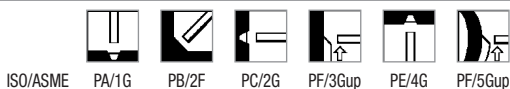
Classification

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



Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	S	Ni	Cr	Nb
0.025	5.5	0.4	0.010	76.1	16	2.0

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -196°C
Required: AWS A5.11		not required	min. 550	min. 30	not required
ISO 14172		min. 360	min. 550	min. 27	not required
Typical values	AW	400	630	40	125

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	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 21

NiCro 70/15Mn

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	Alloy75 Alloy80A	N06075 N07080 N08330
		NiCr80 20	2.4869		
		NiCr20Ti	2.4951		
NA17		NiCr20TiAl	2.4952		
		X12NiCrSi36 16	1.4864	330	N08330
		G-X10NiCrNb32 20	1.4859		
NA15		X10NiCrAlTi32 20	1.4876	Alloy800/800H	N08800/N08810

Suitable for welding dissimilar metals:

- Mild- and low-alloyed steel to stainless steel
- Mild- and low-alloyed steel to Ni base alloys
- Stainless steel to low-alloyed 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. (s)*	Energy - at max. current - 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+	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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. 150°C

Ni-base electrode

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 alloyed 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/3Gup PE/4G PF/5Gup

Current type

DC +

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo	Nb	Fe
0.03	4.7	0.6	67.7	19.0	1.5	1.9	4.0

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

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	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 21

Materials to be welded

Steel grades	BS3076	DIN 17744/17465 SEW 595	Mat. Nr	ASTM/ACI B366	UNS
Ni base to CrNi alloyed steel for composition in highly corrosive environments					
NA 14		NiCr15Fe	2.4816	B168-Alloy 600	N06600
		LC-NiCr15Fe	2.4817	Alloy 600L	N06600
		NiCr20Ti	2.4951	Alloy 75	
		NiCr20TiA1	2.4952	Alloy 80A	N07080
NA 15		X10NiCrAlTi32 20	1.4876	Alloy 800/800H	N08800/10
		NiCr23Fe	2.4851	Alloy 601(H)	N06601
NA 17		X12NiCrSi36 16	1.4864	330	N08330
		G-X40NiCrNb35 25	1.4852		
		G-X40NiCrSi35 25	1.4857	HP	

Suitable for welding dissimilar metals:

- Mild- and low-alloyed steel to stainless steel
- Mild- and low-alloyed steel to Ni base alloys
- Stainless steel to low-alloyed 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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	60A	55A	60A	60A	55A	60A
3.2	90A	80A	90A	80A	80A	80A
4.0	120A	120A				

Remarks/ Application advice

Deviations: chemical composition

Mn = 2.0 - 6.0%

AWS: Mn = 1.0 - 3.5%

Cr = 18.0 - 22.0%

AWS: Mn = 13.0 - 17%

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

Ni-base electrode

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/3Gup PE/4G PF/5Gup

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo	W	Fe
0.015	0.5	0.05	57.9	15.5	16.0	3.5	6.5

Mechanical properties, typical, all weld metal

	Condition	Yield Strength (N/mm ²)	Tensile Strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					20 °C	-196 °C
Required: AWS A5.11M		not required	min. 690	min. 25	not required	
ISO 14172		min. 400	min. 690	min. 22	not required	
Typical values	AW	550	800	40	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 22

NiCroMo 60/16

SMW

Materials to be welded

Steel grades	DIN/EN	Mat. Nr.	ASTM/ACI	UNS
Ni Base high CrMo steel for high corrosion environments				
	NiMo 16Cr15W	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiMo 16Cr16Ti	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	60A	55A	60A	60A	60A	60A
3.2	90A	80A	85A	80A	80A	80A
4.0	130A	130A	120A	120A	120A	120A

Remarks/ Application advice

Welding with Heat-Input max. 1.5 kJ/mm

Interpass temperature max. 150°C

Ni-base electrode

Classification

AWS A5.11/A5.11M : ENiCrMo-13
ISO 14172 : E Ni 6059 (NiCr23Mo16)

General description

Basic coated 22%Cr and 16% Mo alloyed Ni-base electrode for all positions without vertical down
Excellent resistance against pitting-, crevice and stress corrosion in sulphur and phosphorus environments also at higher temperature
Suitable for welding Alloy 59 (UNS N06059), Alloy C 276 (UNS N10276), C4 (UNS N06455) and C 22 (UNS N06022) in the chemical industry
Suitable for dissimilar joints such as mentioned above to low alloyed steel grades
Wear resistant overlays for high temperature applications
Also for superaustenitic steel alloyed with 6% Mo (UNS S 31254)

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G PF/5Gup

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo
0.015	0.4	0.15	59.0	22.5	15.5

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
Required: AWS A5.11 ISO 14172		not required min. 350	min. 690 min. 690	min. 25 min. 22	not required not required
Typical values	AW	450	720	30	75

Packaging and available sizes

	Diameter (mm)	2.5	3.2
	Length (mm)	300	350
Unit: PE tube	Pieces / unit	85	52
	Net weight/unit (kg)	1.7	1.8

Identification

Imprint: NiCrMo-13 / NICROMO 59/23 Tip Color: light green

NiCroMo 59/23: rev. EN 22

NiCroMo 59/23

Materials to be welded

Steel grades	Standard	Type	Mat. Nr	ASTM/ACI	UNS
Ni base alloys with high CrMo content					
	DIN 17744	NiCr23Mo16	2.4605		N06059
		NiMo16Cr16Ti	2.4610	C-4	N06455
		NiMo16Cr15Ti	2.4819	C-276	N10276
		NiCr21Mo14W	2.4602	C-22	N06022
		NiCr22 Mo 9Nb	2.4856	625	N06625
High Mo stainless steel for high corrosion environments					
	EN 10088-1/-2	X1 NiCrMoCuN25-20-7	1.4529	904hMo	N08925
		X1 CrNiMoCuN20-18-7	1.4547		S31254

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	DC+	48	56	0.8	21.7	94	1.61
3.2 x 350	70 - 100	DC+	60	149	1.3	36.8	46	

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions	PA/1G	PB/2F	PC/2G
Diameter (mm)			
2.5	65A	65A	60A
3.2	90A	90A	80A

Remarks/ Application advice

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

Ni-base electrode

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 alloyed steel
Very suitable for welding salt fabrication components
Excellent weldability and self releasing slag

Welding positions



ISO/ASME



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

DC +

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cu	Fe	Ti
0.03	3.0	0.4	64.5	30	1.75	0.35

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 A5.11M		not required	min. 480	min. 30	not required
ISO 14172		min. 200	min. 480	min. 27	not required
Typical values	AW	300	485	40	110

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 22

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

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	0.80	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	47.17	31	1.51

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
2.5	65A	60A	65A	55A	55A	55A
3.2	90A	85A	90A	75A	75A	75A
4.0						

Remarks/ Application advice

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

Ni-base electrode

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 Sahara ReadyPack (vacuum sealed)

Welding positions



Current type

AC / DC +

Approvals

GL TÜV
5680 +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Ni	Cr	Mo	Nb	W	Fe
0.05	3.0	0.4	68	13	6	1.5	1.5	6

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 A5.11M		not required	min. 620	min. 35	not required	
ISO 14172		min. 350	min. 620	min.32	not required	
Typical values	AW	475	725	40	100	90

Packaging and available sizes

Unit: SRP	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
	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 22

Materials to be welded

Steel grades	EN 10028-4	Mat. Nr	ASTM	UNS
9% Ni steel for LNG storage tanks				
	X8Ni9	1.5662	A353/A353M	
	X8Ni9 (9% Ni)	1.5662	A553/A553M Type I	
	(8% Ni)		A 553/A553M Type II	K71340
Low alloyed steel for cryogenic applications				
	X12Ni5 (12Ni19)	1.5680		K41583
	10Ni14 (3.5% Ni)	1.5637	A333 Grade 3	
	12Ni14 (3.5% Ni)	1.5637	A202 Grade E	

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	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G	PF/5G up
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

Aluminium electrode

Classification

AWS A5.3 : E1100*
ISO 18273 : Al 1080A (Al 99.8(A))

*: Deviation, see remarks

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	Si	Fe	Cu	Mn	Zn	Others
99.8 min.	0.085 max.	0.13 max.	0.02 max.	0.02 max.	0.03 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	3.2	4.0
	Length (mm)	350	350	350
Unit: Can	Pieces / unit	217	143	98
	Net weight/unit (Kg)	2.0	2.0	2.0

Al99.8: rev. EN 21

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	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+				9.2		
3.2x350	80-110	DC+				14.0		
4.0x350	100-140	DC+				20.4		

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F
2.5	80A	80A
3.2	100A	100A
4.0	130A	130A

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

Aluminium electrode

Classification

AWS A5.3 : E3003*
ISO 18273 : Al 3103 (AlMn1)

*: Deviation, see remarks

General description

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

Welding positions



PA/1G



PB/2F



PF/3Gup

ISO/ASME

Current type

DC +

Chemical composition (w%), typical, all weld metal

Si	Mg	Fe	Cu	Mn	Zn	Others	Al
0.3 max.	0.15 max.	0.6 max.	0.02 max.	0.9-1.2	0.09 max.	0.15 max.	Bal.

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	222	146	98
	Net weight/unit (Kg)	2.0	2.0	2.0

AIMn: rev. EN 21

Materials to be welded

Aluminium manganese alloys and Aluminium magnesium alloys like:

AlMn1 (Werkstoff-Nr. 3.0515)

AlMn1Mg1 (Werkstoff-Nr. 3.0526)

AlMg1 (Werkstoff-Nr. 3.3315)

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5x350	60-90	DC+				9.2		
3.2x350	80-110	DC+				14.0		
4.0x350	100-140	DC+				20.4		

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PF/3G up
2.5	80A	80A	75A
3.2	100A	100A	95A
4.0	130A	130A	125A

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

Aluminium electrode

Classification

AWS A5.3 : E4043
ISO 18273 : Al 4043A* (AISI5(A))

* Nearest classification

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/3Gup

Current type

DC +

Chemical composition (w%), typical, all weld metal

Si	Al
5	Bal.

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile Strength (N/mm ²)	Elongation (%)
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	222	152	98
	Net weight/unit (Kg)	2.0	2.0	2.0

AISI5: rev. EN 21

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	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	40-70	DC+				9.2		
3.2x350	60-90	DC+				14.0		
4.0x350	80-120	DC+				20.4		

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PF/3G up
2.5	80A	80A	75A
3.2	100A	100A	95A
4.0	130A	130A	125A

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

Aluminium electrode

Classification

ISO 18273

: Al 4047A (AlSi12(A))

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/3Gup

Current type

DC +

Chemical composition (w%), typical, all weld metal

Si	Al
12	Bal.

Mechanical properties, typical, all weld metal

	Condition	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	227	152	102
	Net weight/unit (Kg)	2.0	2.0	2.0

AlSi12: rev. EN 21

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	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	40-70	DC+				8.8		
3.2x350	60-90	DC+				13.2	164	2.16
4.0x350	80-120	DC+				19.6		

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PF/3G up
2.5	80A	80A	75A
3.2	100A	100A	95A
4.0	130A	130A	125A

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

Wearshield® BU-30

Hardfacing electrode

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

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 APLs 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

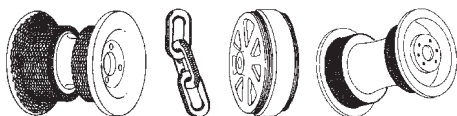
Hardfacing:

Crane and mine car wheels

Tractor rolls, idlers, links and sprockets

Cable drums

Roller guides



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	6.0
	Length (mm)	350	350	450	450
Unit: Box	Pieces / unit	65	44	23	-
	Net weight/unit (kg)	2.5	2.5	2.5	2.5

Identification Imprint: WEARSHIELD BU-30

Tip Color: black

Wearshield® BU-30: rev. EN 22

Additional information

When welding with Wearshield BU30, DC+ is preferred for most applications, although AC also provides satisfactory results. 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 BU30 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 BU30 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 MM40 would be preferred.

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
0.2	0.8	1.0	1.5	0.5

Structure

In the as welded condition the microstructure consists mainly of martensite with some bainite

Calculation data

Sizes Diam. x length (mm)	Current range
3.2 x 350	90 - 130A
4.0 x 350	140 - 180A
5.0 x 450	180 - 220A
6.0 x 450	220 - 260A

Complementary products

Complementary products include Lincore® 33

Wearshield® Mangjet (e)

Hardfacing electrode

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 operator appeal

Exhibits excellent arc striking characteristics, clean slag detachability and low spatter

The electrode coating permits out of position welding

140% recovery

Application

Wearshield Mangjet produces a 14% Mn deposit that rapidly work hardens under heavy impact and battering. Ideally suited to APLs to high impact and gouging coupled with moderate abrasion.

Typical applications include:

Jaw and cone crushers

Heavy rock moving plant

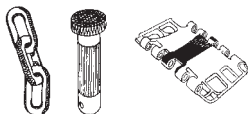
Hammer drills

Crusher screens

Dredge parts

Shovel tracks

Rail crossovers, frogs and switches



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(e)

Tip Color: Violet

Wearshield® Mangjet (e): rev. EN 22

Wearshield® Mangjet (e)

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 maybe 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 Arosta 307 are preferred.

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.

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Cr
0.7	15	3.7

Structure

In the as deposited condition, the microstructure consists of a soft manganese alloy austenite which rapidly work hardens under impact loading.

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)
3.2 x 350	95 - 105	DC+	-	-	1.1
4.0 x 350	130 - 140	DC+	-	-	1.6

Complementary products

Complementary products include Lincore® M

Wire/flux combination : Lincore M / 801 or 802

Wearshield® 15CrMn

Hardfacing electrode

Classification

DIN 8555 : E7-UM-250-KP
EN 14700 : E Fe9

General description

A rutile hardfacing electrode that exhibits excellent arc characteristics
Easy slag detachability, good arc restriking and low spatter
The electrode coating permits out of position welding

Application

APL 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 APLs 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



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 22

Wearshield® 15CrMn

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.

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr
0.35	14.0	0.6	15.0

Structure

In the as deposited condition, the microstructure consists of a soft manganese alloy austenite which rapidly work hardens under impact loading.

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	140 - 160
4.0 x 355	190 - 210
4.8 x 355	220 - 250

Complementary products

Complementary products include Lincore® 15CrMn

Hardfacing electrode

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

Designed for operator appeal and weld quality having excellent arc characteristics

Good restriking and low spatter

The electrode can be used with the drag or contact welding technique as well as out of position

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 APLs involving sliding, rolling and metal to metal wear, combined with resistance to mild abrasion.

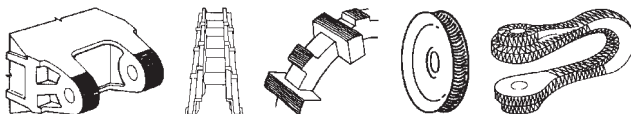
Typical applications include:

Buckets links, bucket bases

Guide rolls

Tractor rolls

Crane wheels



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® MM 40: rev. EN 22

Wearshield® MM 40

Additional information

When welding with Wearshield MM40 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.

Welding positions



PA/1G



PC/2G



PF/5Gup

ISO/ASME

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
0.2	0.5	1.3	3.4	0.5

Structure

In the as welded condition the microstructure consists mainly of martensite

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	38.6	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

Complementary products include Lincore® 40-0

Hardfacing electrode

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 high carbon heat treatable martensitic deposit

Designed for operator appeal and weld quality

Excellent arc characteristics, good restriking and low spatter

The electrode can be used with the drag or contact welding technique as well as out of position

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 APLs 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

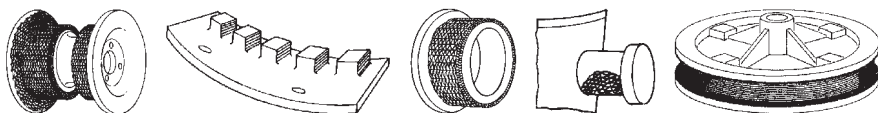
Skip guides

Dredger buckets

Scraper blades

Transfer tables

Cable sheaves



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	6.0
	Length (mm)	350	350	450	450
Unit: Box	Pieces / unit	66	45	22	-
	Net weight/unit (kg)	2.5	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 22

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.

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	W
0.55	0.5	1.5	4.5	0.5	0.5

Structure

In the as welded condition the microstructure consists mainly of martensite with carbides.

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
6.0 x 450	230 - 270	DC+						

Complementary products

Complementary products include Lincore® 55

Hardfacing electrode

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

Designed for operator appeal and weld quality

Excellent arc characteristics, good restriking and low spatter

The electrode coating permits the use of the drag or contact welding technique

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 APLs 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 APL of wear resistant surfaces to carbon and low alloy steels.

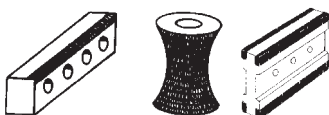
Typical applications include:

Punch and forging dies

Shear blades

Trimmers

Cutting tools



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 22

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 an gouge the weld deposit. Preheat temperature similar to those for welding may be necessary to prevent cracking along the cut edge.

Welding positions



ISO/ASME PA/1G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	W	V
0.65	0.4	0.7	4	6.0	1.8	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

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 350	80 - 100
4.0 x 350	110 - 130
5.0 x 350	130 - 160

Complementary products

Complementary products include Lincore® T&D

Hardfacing electrode

Classification

AWS A5.13	: E Fe6
DIN 8555	: E6-UM-60-GPS
EN 14700	: E Fe6

General description

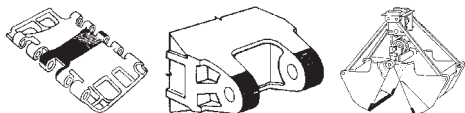
A basic coated electrode that produces a martensitic deposit with a considerable amount of retained austenite
Designed for operator appeal and weld quality
Excellent arc characteristics, good restriking and low spatter

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 APLs 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



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	45-55 HRC
2 Layers	50-58 HRC
Welded on Mild Steel Plate	

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 22

Wearshield® MI (e)

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.

Welding positions



ISO/ASME

PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

Current type

AC / DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr
0.5	0.4	1.8	9

Structure

In the as welded condition the microstructure consists of a mixed structure of martensite and austenite.

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)
2.5 x 350	60 _ 70	AC/DC E-	-	-	7.6
3.2 x 350	70 _ 120	AC/DC E-	-	-	1.10
4.0 x 450	110 _ 150	AC/DC E-	-	-	1.45
5.0 x 450	150 - 200	AC/DC E-	-	-	2.00

Complementary products

Solid wire LNM 420 FM.

Hardfacing electrode

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

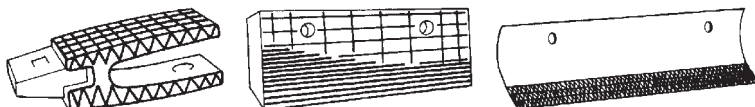
Good resistance to both abrasion and impact, as well as hot-forging properties

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 APLs involving transportation of abrasive media under heavy variable loading. Wearshield ABR is also suitable for metal to metal wear APLs.

Typical applications include:

- Dipper and dredge cutter teeth
- Rock crusher hammers and mill hammers
- Rock crushers and crusher mantles
- Screw flights
- Coal mining cutters
- Conveyor buckets and rolls
- Plough shares, scraper blades and cultivator sweeps
- Truck chain and gears



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)	54	4.0	4.8
	Length (mm)	355	355	355
Unit: 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 22

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.

Welding positions



PA/1G



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
2.1	1.1	0.75	6.5	0.40

Structure

In the as welded condition the microstructure consists of primary austenite and a eutectic of austenite plus carbides.

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	40 - 150
4.0 x 355	75 - 200
5.0 x 355	110 - 250

Complementary products

The closest product is Lincore® 50, however, the deposit varies significantly to Wearshield ABR.

Hardfacing electrode

Classification

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

General description

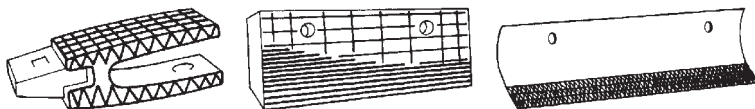
A heavy coated rutile electrode that produces a primary austenite-chrome carbide eutectic weld deposit
Designed for operator appeal and weld quality
Excellent arc characteristics, good restriking, complete slag coverage and low spatter
The electrode coating permits the use of the drag or contact welding technique

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



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)	3.2	4.0	4.8
	Length (mm)	355	355	355
Unit: Box	Pieces / unit	59	-	2.7
	Net weight/unit (kg)	2.5	2.5	2.5

Identification

Imprint: WEARSHIELD 44

Tip Color: none

Wearshield® 44: rev. EN 22

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.

Welding positions



ISO/ASME

PA/1G

PC/2G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
2.0	0.16	0.9	24.2	2.5

Structure

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

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	120-160
4.0 x 355	150 - 220
4.8 x 355	190 - 270

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)

Hardfacing electrode

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 operator appeal and weld quality having excellent arc characteristics, good restriking, complete slag coverage and low spatter levels. The electrode coating permits the use of a light drag or contact welding technique

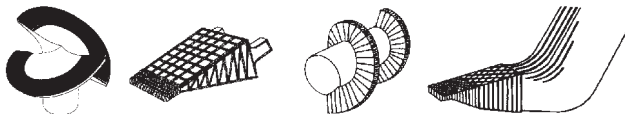
Application

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



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 22

Wearshield® ME (e)

SMAW

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.

Welding positions



ISO/ASME PA/1G PB/2F

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Cr	Si
3	33	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

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)
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.

Hardfacing electrode

Classification

DIN 8555 : E10-UM-65-GRZ
EN 14700 : E Fe16

General description

Basic coated electrode for hardfacing with an efficiency of about 200%
Extreme resistance against abrasion up to temperatures of 700°C

Application

Typical APLs include:
Ore-crushers, ore chutes, hot slag crushers, dragline teeth, diggers, etc.



Mechanical properties, typical, all weld metal

Typical hardness values

1 Layer 62-67 HRC
Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: Box	Pieces / unit	41	27
	Net weight/unit (kg)	2.5	2.5

Identification Imprint: WEARSHIELD 50 MC

Tip Color: white

Wearshield® 50MC: rev. EN 22

Wearshield® 50MC

Additional information

By preference, weld under inclined angle of 20 degrees.

Weave during welding in a width of approx. 50 mm.

During solidification small cracks will occur.

These cracks, however, will have no detrimental effect on the weld metal properties regarding its abrasive wear resistance.

A maximum of two layers should be applied to prevent the weld from braking out.

Welding positions



ISO/ASME PA/1G PF/3Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Cr	Nb	W	V	Si	B
5	2	21	6.4	3.1	0.7	2.1	0.8

Structure

Supereutectic + primary carbides.

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	DC+	156	699	1.28	67	18	1.21
4.0 x 350	160 - 200	DC+	172	1011	1.50	100	14	1.40

Complementary products

Complementary products include Lincore® 65-O.

There is no flux cored equivalent to Wearshield 50MC. The closest product is Lincore® 65-O, however, the deposit varies significantly to Wearshield 50MC.

Wearshield® 60 (e)

Hardfacing electrode

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

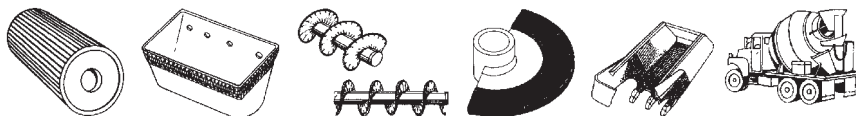
Application

Wearshield 60 produces an primary carbide deposit with a hardness range of 60-62 HRC.

The primary carbide microstructure makes Wearshield 60 ideally suitable for APLs of severe abrasion

Typical applications include:

Crusher rolls, plates and jaws
Conveyor screws and sleeves
Shovel lips
Brick & coke machinery
Cement mill parts



Mechanical properties, typical, all weld metal

Typical hardness values

1 Layer 57-60 HRC
2 Layers 60-62 HRC

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	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 22

Wearshield® 60 (e)

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 BU30 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.

Alternatively, a preheat of 650°C can be used to eliminate the formation of check cracks.

Welding positions



ISO/ASME

PA/1G

PB/2F

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Cr	Si
5	35	4

Structure

In the as welded condition the microstructure consists of primary chromium carbides in an austenite - carbide eutectic matrix

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)
3.2 x 450	110 - 150	DC+	-	-	1.75
4.0 x 450	140 - 180	DC+	-	-	2.20

Complementary products

Complementary products include Lincore® 60-O and Lincore® 60-S with flux 801 or 802

Hardfacing electrode

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. The electrode facilitates easy arc control whilst maintaining a long arc. Recovery 240%.

Application

Wearshield 70 produces a "premium" carbide weld deposit with a hardness range of 68-70HRC.

The premium carbide microstructure makes Wearshield 70 ideally suitable for APLs of high stress abrasion (crushing of abrasive particles), severe abrasion and abrasion at elevated temperatures (>760°C)

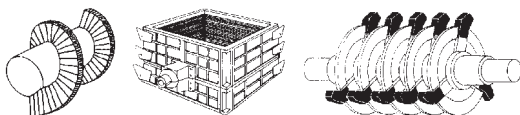
Typical applications include:

Blast furnace bells (burden area)

Hoppers and screens

Sinter plants

Cement mill parts



Mechanical properties, typical, all weld metal

Typical hardness values

1 Layer 68-70 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 22

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.

Welding positions



ISO/ASME

PA/1G

PB/2F

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Cr	Nb	Mo	W	Si
4.2	18	9	8.5	7	2.7

Structure

The microstructure consists mainly of primary chromium carbides with premium carbides of molybdenum, niobium, tungsten and vanadium in an austenite - carbide eutectic matrix

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

Complementary products include Lincore® 65-O.

There is no flux cored equivalent to Wearshield 70. The closest product is Lincore® 65-O, however, the deposit varies significantly to Wearshield 70.

Hardfacing electrode

Classification

DIN 8555 : E6-UM-55-RZ
EN 14700 : E Fe8

General description

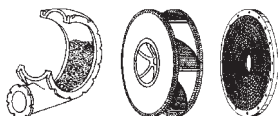
Heavily coated electrode that produces a martensitic deposit similar to AISI 420 stainless steel. Designed for operator appeal and weld quality having excellent arc characteristics, good restriking and low spatter levels. The electrode coating permits the use of the drag or contact welding technique as well as positional welding if required.

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



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 22

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 Wearshield 420.

Preheat would be needed if the welding is done over either highly restrained material or martensitic stainless base metal.

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 positions



ISO/ASME

PA/1G

PC/2G

PF/3Gup

PE/4G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	Ti
0.5	0.3	0.4	12.4	0.4	1.3

Structure

Ferrite and martensite

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	AC	83	324	1.08	45	40	1.80
4.0 x 350	120 - 170	AC	102	522	1.36	67	26	1.74
5.0 x 450	170 - 220	AC						

Complementary products

Complementary products include Lincore® 420

Repair electrode

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.

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	balance

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 01

Materials to be welded

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

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	110-140 * stub end 35mm	-	-	-	-	59	-	-

Welding parameters, optimum fill passes

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

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

Repair electrode

Classification

AWS A5.15 : ENi-CI
ISO 1071 : E C Ni-CI 1

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/3Gup



PG/3Gdown



PE/4G



PF/5Gup



PG/5Gdown

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Hardness HB10
Required: AWS A5.15		262-414	276-448	03-6	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 21

Materials to be welded

Steel grades	DIN1691	DIN 1692	DIN 1693
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For welding and repair

GG 10	GTS-35-10	G GG-40
GG 15	GTS-45-06	G GG-50
GG 20	GTS-55-4	G GG-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	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
2.5	70A	70A	70A	70A	70A
3.2	100A	100A	100A	80A	80A
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)

Repair electrode

Classification

AWS A5.5 : 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/3Gup PG/3Gdown PE/4G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Fe	Ni
0.6	40	balance

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Hardness HB10
Required: AWS A5.15		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 21

Materials to be welded

Steel grades	DIN 1691	DIN 1692	DIN 1693
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For welding and repair

GG-10	GTS-35	G GG-40
GG-15	GTS-45	G GG-50
GG-20	GTS-55	G GG-60
GG-25	GTW-35	G GG-70
GG-30	GTW-40	G GG-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
3.2 x 350	70 - 90							
4.0 x 350	100 - 120	AC	75	234	1.78	46.2	27	1.2
4.0 x 400	100 - 120							

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	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.

Repair electrode

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



PG/3Gup



PG/3Gdown



PE/4G



PF/5Gup



PG/5Gdown

Current type

AC / DC -

Chemical composition (w%), typical, all weld metal

C	Fe	Ni
0.7	45	balance

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Hardness HB10
Required: AWS A5.15		296-434	400-579	6-18	165-218
ISO 1071		250	350	6	
Typical values	AW	300	460	12	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

RepTec Cast 31: rev. EN 21

Materials to be welded

Steel grades	DIN 1691	DIN 1692	DIN 1693
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For welding and repair

GG10	GTS-35-10	G GG-40
GG15	GTS-45-06	G GG-50
GG20	GTS-55-4	G GG-60
GG25	GTW-35-04	
GG30	GTW-40-05	
GG35	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 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	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

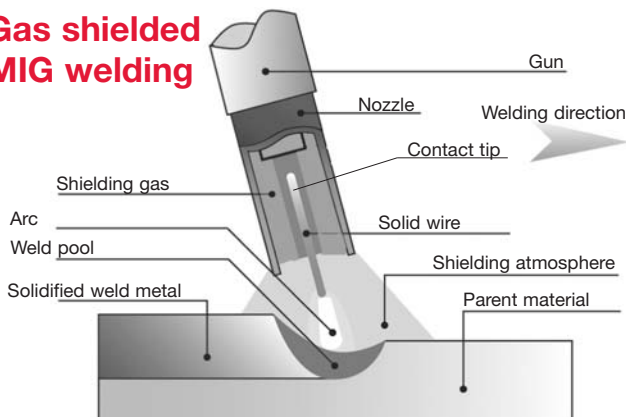
Cold welding, interpass temperature (Ti<100°C)

Heavy parts preheat (to max. 300°C)

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MIG and TIG Process

Gas shielded MIG welding



The MIG/MAG welding process (or GMAW - Gas Metal Arc Welding) is when an electric arc is created between a continuous consumable wire and the work piece to be welded, protected within a gas atmosphere. This atmosphere can be either inert (Argon) or active (CO_2 or mixture of Argon and CO_2). The wire is continuously fed through a gun to the weld pool by a wire feeder.

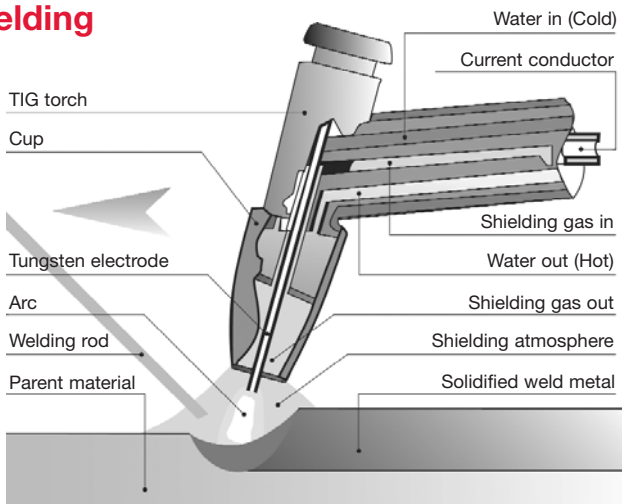
Gas Tungsten Arc Welding

In this welding process, the electric arc is generated between a non-consumable tungsten electrode and the work piece to be welded. An inert gas atmosphere, usually argon, protects the weld pool. Welding can be done by simply fusing of the parent material together, or with the addition of welding rod similar to the parent material. The rod is allowed to melt in the electric arc and will fill and reinforce the weld joint.

Arc ignition is achieved by touching the work piece with the electrode and lifting it by a few millimetres (contact ignition and lift ignition) or by using a high frequency voltage discharge, a gap of about 4 millimetres is maintained from the tungsten electrode and the work piece, high frequency spark is generated, this makes the air gap conductive, and allows the arc to be established without touching of the work piece with the tungsten electrode, no tungsten contamination can occur (High Frequency ignition).

The following can be used:

- DC (continuous) current is used with most metals (steel / stainless steel).
- AC (alternative) current is ideal for welding aluminium and other materials containing surface refractory oxide.



Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-3
ISO 14341-A : G 42 2 M G2Si

General description

Solid wire for welding general construction in mild steel

High impact values

Stable arc and excellent feedability

Shielding gases (acc. ISO 14175)

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

Approvals

ABS	BV	DNV	GL	LR
3YSA	SA3,3YM	IIIYMS	3YS	3S,3YS

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) -20°C
Typical values	M21	AW	500	575	25	95

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	EN10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L451MB, 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

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM 25: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid rod

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

+

Chemical composition (w%), Typical, rod

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)	
						-20°C	-50°C
Typical values	I1	AW	450	560	26	170	100
		SR 15h/620°C	410	525	26		80

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	EN10213-2	GP240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L451MB, 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

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.0
2 and 5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 25: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-6
ISO 14341-A : G 46 4 M G3Si1

General description

Solid wire for welding general construction in mild steel

Smooth bead appearance

Stable arc and excellent feedability

Shielding gases (acc. ISO 14175)

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

Approvals

ABS	BV	DNV	GL	LR	RIINA	TÜV	RMRS
3SA,3YSA	SA3YM	IIIYMS	3YS	3S,3YS	3YS	+	3S,3YS

Chemical composition (w%) typical wire

C	Mn	Si
0.08	1.4	0.8

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	-40°C
Typical values	M21	AW	520	600	25	110	70

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/ EN 10217-1	P235T1, P235T2, P275T1 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

Unit type	Diameter (mm)				
	0.6	0.8	1.0	1.2	1.6
5 kg plastic spool S200	X	X	X	X	
15 kg spool B300		X	X	X	X
15 kg spool S300	X				
250 kg Accutrak® Drum		X	X	X	
300 kg metal coil				X	
Other sizes and packaging on request					

LNM 26: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid rod

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

+

Chemical composition (w%), Typical, rod

C	Mn	Si
0.10	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

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

Unit type	Diameter (mm)
	2.0 2.4
2 and 5 kg tube	X X
Other sizes and packaging on request	

LNT 26: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-6
ISO 14341-A : G 42 3 M G4Si1

General description

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

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
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	-20°C	-50°C
Typical values	M21	AW	500	650	26	150	80	50

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

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool B300	X	X	X	X
Other sizes and packaging on request				

LNМ 27: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-6
ISO 14341-A : G 42 4 M G3Si1 / G 42 2 C G3Si1

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

Shielding gases (acc. ISO 14175)

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

Approvals

ABS	BV	DB	DNV	GL	LR	RINA	TÜV	RS
+	+	+	+	+	+	+	+	+

Chemical composition (w%) typical wire

C	Mn	Si
0.07	1.45	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	-30°C	-40°C
Typical values	Required		min. 420	500-640	min. 20		min. 47	
	M21	AW	470	580	28		100	75
	C1		440	550	26	100		

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

Unit type	Diameter (mm)				
	0.8	1.0	1.2	1.4	1.6
15 kg metal basket - K300	X	X	X	X	X
15 kg spool B300 - D300	X	X	X	X	X
250 kg Accutrak® Drum	X	X	X		
380 kg Accutrak® Drum	X	X	X	X	X
500 kg Accutrak® Drum	X	X	X	X	X

Other sizes and packaging on request

UltraMag™: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-6
ISO 14341-A : G 46 5 M G4Si1/G 42 4 C G4Si1

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

Shielding gases (acc. ISO 14175)

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

Approvals

DB	TÜV	RS
+	+	+

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) -40°C -50°C	
Typical values	Required		min. 460	530-680	min. 20	min. 47	
	M21	AW	490	590	27		90
	C1		460	560	25	70	

Materials to be welded

Steel grades	Standard	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates		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
Boiler & pressure vessel steel	EN 10216-1/	P235T1, P235T2, P275T1
	EN 10217-1	P275T2, P355N
	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

Packaging and available sizes

Unit type	Diameter (mm)				
	0.8	1.0	1.2	1.4	1.6
15 kg metal basket - K300	X	X	X	X	X
15 kg spool B300 - D300	X	X	X	X	X
250 kg Accutrak® Drum	X	X	X		
380 kg Accutrak® Drum	X	X	X	X	X
500 kg Accutrak® Drum	X	X	X	X	X

Other sizes and packaging on request

UltraMag™ SG3: rev. EN 05

Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-6
ISO 14341-A : G 42 4 M G3Si1 / G 38 3 C G3Si1

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®

Shielding gases (acc. ISO 14175)

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

Approvals

BV	DNV	GL	LR	TÜV
S3YM	IVY40	4Y40S	3S,3Y40S	+

Chemical composition (w%) typical wire

C	Mn	Si
0.08	1.55	0.85

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	-30°C	Impact ISO-V(J) -40°C	-50°C
Typical values	M21	AW	490	590	27	100	60	40
	C1	AW	460	550	29	80	40	

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 t/m 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
	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Boiler & pressure vessel steel	EN 10025 part 3	S275, S355, S420
Fine grained steel	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool B300	X	X	X	
15 kg spool S300	X	X	X	X
250 kg Accutrak® Drum	X	X	X	
Other sizes and packaging on request				

SupraMIG®: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.18/A5.18M : ER70S-6
ISO 14341-A : G 46 4 M G4Si1 / G 42 3 C G4Si1

General description

Solid wire with increased manganese for semi-automatic welding and robotic applications
Excellent feedability and very consistent welding performance
Very good weldability, tight and stable arc with extremely low spatter, low fume productions
Better bead profile and appearance
Highest productivity
Also available in AccuTrak®

Shielding gases (acc. ISO 14175)

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

Approvals

BV	DNV	GL	TÜV
S3Y40M	IVY40MS	4Y42S	+

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	AW	490	620	30	60	50

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 t/m 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
	EN 10028-2	P235GH, P265GH, P295GH, P355GH
Boiler & pressure vessel steel	EN 10025 part 3	S275, S355, S420
Fine grained steel	EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460

Packaging and available sizes

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

SupraMIG Ultra®: rev. EN 23

Low alloy solid wire

Classification

AWS A5.28 : ER80S-G
EN ISO 16834 : G 42 Mn3 Ni1 Cu*

* Nearest classification

General description

Solid wire for welding of weather resisting steels

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

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

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

LNM 28: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

Classification

AWS A5.28 : ER80S-G

General description

Solid rod for welding of weather resisting steels

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

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
Typical values	I1	AW	570	620	26	80

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

Unit type	Diameter (mm)
	2.4
5 kg tube	X
Other sizes and packaging on request	

LNT 28: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Low alloy solid wire

Classification

AWS A5.28	: ER100S-G
EN ISO 16834	: 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

Shielding gases (acc. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO ₂
C1	Active gas 100% CO ₂

Chemical composition (w%) typical wire

C	Mn	Si	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 (MPa)	Tensile strength (MPa)	Elongation (%)	-20 °C	Impact ISO-V(J) -40 °C	-60 °C
Typical values	M21	AW	635	770	19	100	90	70

Materials to be welded

Steel grades	Standard	Type
Pipe material	API-5LX EN 10208-2	X60, X65, X70, X80 L480, L550
Fine grained steel	EN 10025 part 6	S460, S500, S550, S620

Packaging and available sizes

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM MoNi: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.28	: ER100S-G
EN ISO 16834	: G 69 4 M Mn3Ni1CrMo

General description

Solid wire for welding high strength steels with yield strength up to 690 N/mm²
Good impact values at -40°C

Shielding gases (acc. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO ₂
C1	Active gas 100% CO ₂

Approvals

ABS	DB	TÜV
+	+	+

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

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

Packaging and available sizes

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

LNМ MoNiVa: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.28	: ER120S-G
EN ISO 16834	: 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

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	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

Materials to be welded

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

Packaging and available sizes

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

LNM MoNiCr: rev. EN 04

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.28 : ER80S-Ni1
ISO 14341-A : G 46 5 M G3Ni1

General description

Solid wire for welding fine grained and low alloyed nickel steels
High impact value at low temperature (-60°C)
Typical offshore applications
Stable arc and excellent feedability

Shielding gases (acc. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂

Chemical composition (w%) typical wire

C	Mn	Si	Ni	Mo	Ti
0.08	1.77	0.57	0.9	0.38	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) -60°C
Typical values	M21	AW	480	580	30	60

Materials to be welded

Steel grades	Standard	Type
	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

Packaging and available sizes

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

LNM Ni1: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

Classification

AWS A5.28 : ER80S-Ni1
EN ISO 636-A : W 42 6 W3Ni1

General description

Solid rod for welding fine grained and low alloyed nickel steels
High impact value at low temperature (-60°C)
Typical offshore applications
Stable arc and excellent feedability

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Approvals

GL TÜV
4Y42 +

Chemical composition (w%), Typical, rod

C	Mn	Si	Ni
0.1	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	I1	AW	480	560	30	80

Materials to be welded

Steel grades	Standard	Type
	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
	EN 10216-1	P275T1
	EN 10217-1	P275 T2, P355 N
Fine grained steel	EN 10025 part 3	S275, S355, S420
	EN 10025 part 4	S274, S355, S420

Packaging and available sizes

Unit type	Diameter (mm)		
	1.6	2.0	2.4
2 and 5 kg tube	X	X	X
Other sizes and packaging on request			

LNT Ni1: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.28 : ER100S-G
ISO 14341-A : G 69 4 M Mn3Ni1Mo*

* Nearest classification

General description

Solid wire for GMA welding of high strength steel with yield up to 620 N/mm²
Nickel content < 1% to meet NACE specifications

Shielding gases (acc. ISO 14175)

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

Approvals

TÜV

+

Chemical composition (w%) typical wire

C	Mn	Si	Ni	Mo	Ti
0.10	1.7	0.7	0.9	0.35	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
Typical values	M21	AW	690	790	16	100	50

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

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

LNМ NiMo1: rev. EN 03

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Low alloy solid wire

Classification

AWS A5.28 : ER80S-Ni2
ISO 14341-A : G 46 6 M G2Ni2

General description

Solid wire for welding fine grained and low alloyed 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)

M21 Mixed gas Ar+ >15-25% CO₂

Approvals

TÜV

+

Chemical composition (w%) typical wire

C	Mn	Si	Ni
0.1	1.1	0.6	2.5

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
						-62°C	-70°C	-90°C
Typical values	M21	AW	490	580	24	105	50	
	M21	SR 580°C/15 h	420	535	29	150		140

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

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

LNM Ni2.5: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

Classification

AWS A5.28 : ER80S-Ni2
EN ISO 636-A : W 46 6 W2Ni2

General description

Solid rod for welding fine grained and low alloyed nickel steels

High impact value at low temperature (-60°C as welded and -90°C after stress relieving 15h/580°C).

Typical offshore applications

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Approvals

TÜV

+

Chemical composition (w%), Typical, rod

C	Mn	Si	Ni
0.1	1.1	0.6	2.5

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -62°C	-90°C
Typical values	I1	AW	525	610	28	280	170
	I1	SR 580°C/15 h	500	570	30	230	160

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

Unit type	Diameter (mm)	
	2.0	2.4
2 and 5 kg tube	X	X
Other sizes and packaging on request		

LNT Ni2.5: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.28	: ER70S-A1
ISO 14341-A	: G 46 3 M G2Mo

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

Shielding gases (acc. ISO 14175)

M21	Mixed gas Ar+ >15-25% CO ₂
C1	Active gas 100% CO ₂

Approvals

TÜV

+

Chemical composition (w%) typical wire

C	Mn	Si	Mo
0.12	1.2	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	-30°C
Typical values	M21	AW	540	640	22	130	90	70
		SR 620°C/1h	500	600	25	120		

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

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

LNLM 12: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

Classification

AWS A5.28	: ER70S-A1
ISO 21952-A	: W MoSi
EN ISO 636-A	: W 46 3 W2Mo

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 -30°C to +500°C

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
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Approvals

DNV	TÜV
For NV 0,3 Mo	+

Chemical composition (w%), Typical, rod

C	Mn	Si	Mo
0.12	1.2	0.6	0.5

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%) ¹	Impact ISO-V(J)	
						+20°C	-30°C
Typical values	I1	AW	550	650	24	170	90
		SR 620°C/1h	520	610	23	190	120

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

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.0
2 and 5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 12: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.28 : ER80S-B2*
ISO 21952-A G CrMo1Si

* Nearest classification

General description

Solid wire for welding creep and hydrogen resistant Cr-Mo steels (1,25Cr - 0,5Mo)
Service temperature up to 550°C

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) +20°C
Typical values	M21	SR 700°C/1h	530	635	23	160

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

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool B300	X	X	X	X

Other sizes and packaging on request

LNM 19: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

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, rod

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) +20°C
Typical values	I1	SR 700°C/1h	540	640	22	250

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

Unit type	Diameter (mm)		
	1.6	2.0	2.4
2 and 5 kg tube	X	X	X
Other sizes and packaging on request			

LNT 19: rev. EN 22

Low alloy solid wire

Classification

AWS A5.28 : ER90S-B3*
ISO 21952-A : G CrMo2Si

* Nearest classification

General description

Solid wire for welding creep and hydrogen resistant Cr-Mo steels (2,25Cr - 1Mo)
Service temperature up to 600°C

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
0.09	1.0	0.6	2.5	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
Typical values	M21	SR 700°C/1h	560	680	20	100

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

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool B300	X	X	X
Other sizes and packaging on request			

LNМ 20: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

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, rod

C	Mn	Si	Cr	Mo
0.09	1.0	0.6	2.5	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
Typical values	I1	SR 700°C/1h	560	640	22	140

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

Unit type	Diameter (mm)		
	2.0	2.4	3.0
2 and 5 kg tube	X	X	X
Other sizes and packaging on request			

LNT 20: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

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%)
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Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Mo
0.08	0.5	0.3	5.8	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) +20°C
Typical values	I1	SR 750°C/1h	560	650	20	80

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

Unit type	Diameter (mm)		
	1.6	2.0	2.4
2 and 5 kg tube	X	X	X
Other sizes and packaging on request			

LNT 502: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid rod

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, rod

C	Mn	Si	Cr	Mo	Ni	Nb	V	N
0.07	0.7	0.3	8.7	0.9	0.7	0.04	0.2	0.05

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	SR 750°C/3h	500	700	18	70

Materials to be welded

Steel grades	Standard	Type	Code	Type
Creep and hydrogen resistant steels	EN 10222-2 ASTM	X10CrMo V9-1	ASME	SA 182-F91
		A199 Grade T91		
		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

Unit type	Diameter (mm)	
	2.0	2.4
2 and 5 kg tube	X	X
Other sizes and packaging on request		

LNT 9Cr(P91): rev. EN 22

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Approvals

ABS	BV	DNV	GL	LR	TÜV
ER308LSi	308L	308L	4306S	304L S	+

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.020	1.7	0.8	20	10	0.2

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	420	570	35	85	55

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	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18 10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18 10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
5 kg plastic spool S200	X			
15 kg spool BS300	X	X	X	X
Other sizes and packaging on request				

LNМ 304LSi: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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%)
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Approvals

ABS	DNV	LR	TÜV
ER 308LSi	308L	+	+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.8	20	10	0.2

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	390	590	36	120	50

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19 11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18 10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18 10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18 10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)					
	1.0	1.2	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X	X	X
Other sizes and packaging on request						

LNT 304LSi: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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
0.010	1.6	0.5	20	10	0.2

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	390	590	35	95	60

Materials to be welded

Steel grades	EN 10088-11-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19 11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18 10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18 10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18 10		1.4541	(TP)321	S32100/
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)
	1.0
15 kg spool BS300	X
Other sizes and packaging on request	

LNM 304L: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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)

I1 Inert gas Ar (100%)

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.5	20	10	0.2

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	390	590	35	120	50

Materials to be welded

Steel grades	EN 10088-11-2	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
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
5 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 304L: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Approvals

LR	TÜV
+	+

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo	Nb
0.04	1.3	0.9	19.2	9.9	0.30	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

Materials to be welded

Steel grades	EN 10088-11-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-Nb stabilized					
	X6CrNiTi 18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18-10		1.4550	(TP)347 (TP)347h	S34700 S34709
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710
Non stabilized					
	X4 CrNi 18-10		1.4301	302 (TP)304	S30400
	X2 CrNi 19-11		1.4306	(TP)304L	S30403
		GX5 CrNi 19-10	1.4308 1.4312	CF-8 (TP)304H	J92600 S30409

Packaging and available sizes

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool BS300	X	X	X
Other sizes and packaging on request			

LNM 347Si: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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
+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo	Nb
0.04	1.5	0.8	19.5	9.5	0.30	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	I1	AW	400	650	35	80 45

Materials to be welded

Steel grades	EN 10088-11-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti, Nb stabilized					
	X6CrNiTi 18-10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18-10		1.4550	(TP)347 (TP)347h	S34700 S34709
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710
Non stabilized					
	X4 CrNi 18-10		1.4301	302 (TP)304	S30400
	X2 CrNi 19-11		1.4306	(TP)304L	S30403
		GX5 CrNi 19-10	1.4308 1.4312	CF-8 (TP)304H	J92600 S30409

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 347Si: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.5	0.5	18.5	12	2.7

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(J)		
						+20°C	-120°C	-196°C
Typical values	I1	AW	400	620	35	100	80	40

Materials to be welded

Steel grades	EN 10088-11-2	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
	X2CrNiMoN 17 11 2		1.4406	(TP)316LN	S31653
	X2CrNiMoN 17 13 3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17 12 2		1.4401	(TP)316	S31600
	X4 CrNiMo 17 13 3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6 CrNiMoTi 17 12 2		1.4571	316 Ti	S31635
	X6 CrNiMoNb 17 12 2		1.4580	316 Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
10 kg tube	X	X	X	X

Other sizes and packaging on request

LNT 316L: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Approvals

ABS	BV	DNV	GL	LR	TÜV
ER316LSi	316L	316L	4571S	316L S	+

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.8	18.5	12.2	2.5

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	-120°C	-196°C
Typical values	M12	AW	420	620	39	150	70	45

Materials to be welded

Steel grades	EN 10088-11-2	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
	X2CrNiMoN 17 11 2		1.4406	(TP)316LN	S31653
	X2CrNiMoN 17 13 3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17 12 2		1.4401	(TP)316	S31600
	X4 CrNiMo 17 13 3		1.4436		
	GX5 CrNiMo 19-11		1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6 CrNiMoTi 17 12 2		1.4571	316 Ti	S31635
	X6 CrNiMoNb 17 12 2		1.4580	316 Nb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
5 kg plastic spool S200	X	X		
15 kg spool BS300	X	X	X	X
Other sizes and packaging on request				

LNLM 316LSi: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Stainless steel solid rod

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)

It	Inert gas Ar (100%)
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Approvals

ABS	DNV	LR	TÜV
ER 316LSi	316L MS	+	+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.7	0.8	18.5	12.2	2.7

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(J)	
						+20°C	-196°C
Typical values	It	AW	400	620	35	100	40

Materials to be welded

Steel grades	EN 10088-11-2	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
	X2CrNiMoN 17 11 2		1.4406	(TP)316LN	S31653
	X2CrNiMoN 17 13 3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17 12 2		1.4401	(TP)316	S31600
	X4 CrNiMo 17 13 3		1.4436		
	GX5 CrNiMo 19-11		1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6 CrNiMoTi 17 12 2		1.4571	316 Ti	S31635
	X6 CrNiMoNb 17 12 2		1.4580	316 Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)					
	1.0	1.2	1.6	2.0	2.4	3.2
2,5 and 10 kg tube	X	X	X	X	X	X
Other sizes and packaging on request						

LNT 316LSi: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9 : ER318*
ISO 14343-A : G 19 12 3 NbSi

* Nearest classification

General description

Solid wire for welding Ti or Nb stabilized stainless CrNiMo-steels
High resistance to intergranular corrosion and general corrosion conditions

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
0.04	1.4	0.85	18.9	11.7	2.7	0.5

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	410	630	35	100

Materials to be welded

Steel grades	EN 10088-11-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A35	UNS
Extra low carbon (C < 0.03%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo19-11	1.4408	CF 8M	J92900
Ti-Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316 Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

LNM 318Si: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

Classification

AWS A5.9 : ER318*
ISO 14343-A : W 19 12 3 NbSi

* Nearest classification

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%)

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo	Nb
0.04	1.5	0.8	19.0	12.0	2.7	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	I1	AW	420	680	35	70	45

Materials to be welded

Steel grades	EN 10088-11-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A35	UNS
Extra low carbon (C < 0.03%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo19-11	1.4408	CF 8M	J92900
Ti, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X	X
Other sizes and packaging on request					

LNT 318Si: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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
0.02	7	0.7	19.1	16.9	4.6	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	-120°C	-196°C
Typical values	M12	AW	410	620	30	120	80	50

Materials to be welded

Steel grades	EN10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Fully austenitic CrNiMo corrosion resistant steels					
X2 CrNiMoN 17-11-2			1.4406	(TP)316LN	S31653
X2 CrNiMoN 17-13-3			1.4429	(TP)316LN	S31653
X2 CrNiMo 18-14-3			1.4435	(TP)316L	S31603
X2 CrNiMo 18-15-4			1.4438	317L	S31725
X2 CrNiMoN 17-13-5			1.4439	317LN	S31726
G-X2 CrNiMoN 17-13-4		GX2 CrNiMo 17-13-4	1.4446		
G-X6 CrNiMo 17-13		GX6 CrNiMo 17-13	1.4448		

Packaging and available sizes

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool BS300	X	X	X
Other sizes and packaging on request			

LNM 4439Mn: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo	N
0.02	7	0.4	18.0	16.0	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

Materials to be welded

Steel grades	EN10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Fully austenitic CrNiMo corrosion resistant steels					
X2 CrNiMoN 17-11-2			1.4406	(TP)316LN	S31653
X2 CrNiMoN 17-13-3			1.4429	(TP)316LN	S31653
X2 CrNiMo 18-14-3			1.4435	(TP)316L	S31603
X2 CrNiMo 18-15-4			1.4438	317L	S31725
X2 CrNiMoN 17-13-5			1.4439	317LN	S31726
G-X2 CrNiMoN 17-13-4		GX2 CrNiMo 17-13-4	1.4446		
G-X6 CrNiMo 17-13		GX6 CrNiMo 17-13	1.4448		

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 and 5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 4439Mn: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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	0.35	20	16	2.8	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

Materials to be welded

Steel grades	Standard		Mat. Nr	ASTM/ACI	UNS
N-alloyed stainless CrNi-and CrNiMo steels					
	EN 10088-1/-2	X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
		X2 CrNiMoN 17-11-2	1.4406	(TP)316LN	S31653
		X2 CrNiMoN 17-13-3	1.4429		
		X2 CrNiMoN 17-13-5	1.4439	317LN	S31726
Austenitic anti-magnetic steels					
	SEW 390	X2 CrNiMoN 22-15	1.3951		
		X2 CrNiMoN18-14-3	1.3952		
		X2 CrNiMo 18-15	1.3953		
		X8 CrMnNi 18-8	1.3965		
Low temperature steels					
	SEW 685	GX6 CrNi 18-10	1.6902		
		GX5 CrNiNb 18-10	1.6905		
	EN 10028-4	12 Ni 14	1.5637		
		X12 Ni 5	1.5680		

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 4455: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

Classification

AWS A5.9 : ER316LMn
ISO 14343-A : W 20 16 3 Mn L

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)

I1 Inert gas Ar (100%)

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo	N
0.025	7.5	0.4	19	15	2.7	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	430	650	35	75

Materials to be welded

Steel grades	Standard		Mat. Nr	ASTM/ACI	UNS
N-alloyed stainless CrNi-and CrNiMo steels					
	EN 10088-1/-2	X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
		X2 CrNiMoN 17-11-2	1.4406	(TP)316LN	S31653
		X2 CrNiMoN 17-13-3	1.4429		
		X2 CrNiMoN 17-13-5	1.4439	317LN	S31726
Austenitic anti-magnetic steels					
	SEW 390	X2 CrNiMoN 22-15	1.3951		
		X2 CrNiMoN18-14-3	1.3952		
		X2 CrNiMo 18-15	1.3953		
		X8 CrMnNi 18-8	1.3965		
Low temperature steels					
	SEW 685	GX6 CrNi 18-10	1.6902		
		GX5 CrNiNb 18-10	1.6905		
	EN 10028-4	12 Ni 14	1.5637		
		X12 Ni 5	1.5680		

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.4
2 and 10 kg tube	X	X
Other sizes and packaging on request		

LNT 4455: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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
0.018	5.0	0.4	25.0	23.0	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

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM / ACI	UNS
Fully austenitic corrosion resistant CrNiMo steels				
	X1 CrNiMoN 25-25-2	1.4465		
	X3 CrNiMoTi 25-25	1.4577		
	X2 CrNi 19-11	1.4306	(TP)304L CF-3	S30403 J92500
	X2 CrNiN 18-10	1.4311	(TP)304LN 310S	S30453 S31008

Also very well applicable for build-up welding on low alloyed steel, such as pipe plates

Buffer layer -120 ...+350°C

Packaging and available sizes

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool BS300	X	X	X
Other sizes and packaging on request			

LNM 4465: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo	N
0.018	5.0	0.4	25.0	23.0	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

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM / ACI	UNS
Fully austenitic corrosion resistant CrNiMo steels				
X1 CrNiMoN 25-25-2		1.4465		
X3 CrNiMoTi 25-25		1.4577		
X2 CrNi 19-11		1.4306	(TP)304L	S30403
			CF-3	J92500
X2 CrNiN 18-10		1.4311	(TP)304LN	S30453
			310S	S31008

Also very well applicable for build-up welding on low alloyed steel, such as pipe plates

Buffer layer -120 ...+350°C

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.4
2 and 5 kg tube	X	X
Other sizes and packaging on request		

LNT 4465: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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
0.009	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

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr
Fully austenitic NiCrMoCu and CrNiMoCu steels			
		GX7 NiCrMoCuNb 25-20	1.4500
	X5 NiCrMoCuTi 20 18		1.4506
		G-X2 NiCrMoCuN 20 18	1.4531
		G-X2 NiCrMoCuN 25 20	1.4536
	X1 NiCrMoCuN 25 20 5		1.4539
		G-X7 CrNiMoCuNb 18 18	1.4585
	X5 NiCrMoCuNb 22 18		1.4586

Packaging and available sizes

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool BS300	X	X	X
Other sizes and packaging on request			

LNM 4500: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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)

I1 Inert gas Ar (100%)

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo	Cu
0.013	2.0	0.4	20	25	4.5	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) -196°C
Typical values	I1	AW	380	560	35	80

Materials to be welded

Steel grades EN 10088-1/-2 EN 10213-4 Mat. Nr

Fully austenitic NiCrMoCu and CrNiMoCu steels

	GX7 NiCrMoCuNb 25-20	1.4500
X5 NiCrMoCuTi 20 18		1.4506
	G-X2 NiCrMoCuN 20 18	1.4531
	G-X2 NiCrMoCuN 25 20	1.4536
X1 NiCrMoCuN 25 20 5		1.4539
	G-X7 CrNiMoCuNb 18 18	1.4585
X5 NiCrMoCuNb 22 18		1.4586

Packaging and available sizes

Unit type	Diameter (mm)		
	1.6	2.0	2.4
2 and 5 kg tube	X	X	X
Other sizes and packaging on request			

LNT 4500: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo	N	P	S
0.020	1.7	0.7	23.0	7.0	0.3	0.14	0.020	0.004

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	-20°C
Typical values	M12	AW	525	710	25	170	150

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
Duplex stainless steels	X2 CrNiMoN 21 5	1.4162	S32101
	X2 CrNiN 23-4	1.4362	S32304

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 4362: rev. EN 03

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Approvals

BV	GL	TÜV
2209	4462S	+

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo	N
0.018	1.5	0.5	22.7	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 -46°C
Typical values	M12	AW	625	810	28	110 40

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
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Duplex stainless steels

X2 CrNiMoN 22 5 3	1.4462	S31803
	1.4417	S31500
X2 CrNiN 23-4	1.4362	S32304
X3 CrNiMoN 27-5-2	1.4460	S31200
X2 CrNiMoN 21 5 1	1.4162	S32101

Dissimilar joints such as un- and low alloyed steel to duplex stainless steel

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo	N
0.015	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)		
						+20°C	-20°C	-60°C
Typical values	I1	AW	600	800	28	85	60	45

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	UNS
Duplex stainless steels	X2 CrNiMoN 22 5 3	1.4462	S31803
		1.4417	S31500
	X2 CrNiN 23-4	1.4362	S32304
	X3 CrNiMoN 27-5-2	1.4460	S31200
	X2 CrNiMoN 21 5 1	1.4162	S32101

Dissimilar joints such as un- and low alloyed steel to duplex stainless steel

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 4462: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo	Cu	W	N
0.015	0.7	0.4	25.0	9.8	3.7	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) -20°C	-46°C
Typical values	M12	AW	655	845	23	75	55

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A276/A351/A473	UNS
Regular and super duplex stainless steels					
	X2 CrNiMoN 25-7-4		1.4410		
	X4 CrNiMoN 27-5-2		1.4460		
	X2 CrNiMoN 22-5-3		1.4462	2205	S31803
		GX6 CrNiMo 24-8-2	1.4463		
				CD-4MCu	S32550
				Zeron 100	S32760

Super duplex stainless steel grades: chemical composition approximately:
24-27% Cr, 6-9% Ni, 3-4% Mo, 0.10-0.25% N alloyed also with Cu and/or W

Packaging and available sizes

Unit type	Diameter (mm)		
	1.0	1.2	1.6
12.5 kg spool S300	X	X	X
Other sizes and packaging on request			

LNМ Zeron 100X: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo	Cu	W	N
0.020	0.6	0.4	25.0	9.3	3.6	0.65	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) -20°C -46°C
Typical values	I1	AW	680	885	26	80 60

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A276/A351/A473	UNS
Regular and super duplex stainless steels					
	X2 CrNiMoN 25-7-4		1.4410		
	X4 CrNiMoN 27-5-2		1.4460		
	X2 CrNiMoN 22-5-3		1.4462	2205	S31803
		GX6 CrNiMo 24-8-2	1.4463		
				CD-4MCu	S32550
				Zeron 100	S32760

Super duplex stainless steel grades: chemical composition approximately:
24-27% Cr, 6-9% Ni, 3-4% Mo, 0.10-0.25% N alloyed also with Cu and/or W

Packaging and available sizes

Unit type	Diameter (mm)		
	1.6	2.4	3.2
2 kg tube	X	X	X
Other sizes and packaging on request			

LNT Zeron 100X: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Stainless steel solid wire

Classification

AWS A5.9	: ER309LSi
ISO 14343-A	: G 23 12 L Si

General description

Solid wire for welding stainless steel to carbon steel
With high silicon for improved wettability

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Approvals

ABS	BV	DB	DNV	GL	LR	TÜV
ER309LSi	309L	+	309	4332S	SS/CMn S	+

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.010	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	-120°C
Typical values	M12	AW	430	565	35	96	65

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to stainless steel)

Build-up welding on mild and low alloyed steel

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X
Other sizes and packaging on request				

LNLM 309LSi: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

Classification

AWS A5.9	: ER309LSi
ISO 14343-A	: W 23 12 L Si

General description

Solid rod for welding stainless steel to carbon steel
With high silicon for improved wettability

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
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Approvals

ABS	LR	TÜV
ER 309LSi	+	+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.8	23.5	13.0	0.2

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) -120°C
Typical values	I1	AW	400	600	35	65

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
	X2 CrNi 19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to stainless steel)

Build-up welding on mild and low alloyed steel

Packaging and available sizes

Unit type	Diameter (mm)					
	1.0	1.2	1.6	2.0	2.4	3.2
2,5 and 10 kg tube	X	X	X	X	X	X
Other sizes and packaging on request						

LNT 309LSi: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.65	0.35	24	13	0.05

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	390	600	35	150

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
	X2 CrNi 19-11	1.4306	(TP)304L CF-3	S30403 J92500
	X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to stainless steel)

Build-up welding on mild and low alloyed steel

Packaging and available sizes

Unit type	Diameter (mm)		
	1.6	2.0	2.4
2 and 10 kg tube	X	X	X
Other sizes and packaging on request			

LNT 309LHF: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9 : ER307*
ISO 14343-A : G 18 8 Mn

* Nearest classification

General description

Solid wire for welding Steel with difficult weldability
Often used as a buffer layer in hardfacing applications

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
0.08	7.1	0.8	19.2	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 -120°C
Typical values	M12	AW	400	630	40	80 50

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)

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 307: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

Classification

AWS A5.9 : ER307*
ISO 14343-A : W 18 8 Mn

* Nearest classification

General description

Solid rod for welding Steel with difficult weldability
Often used as a buffer layer in hardfacing applications

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni
0.08	6.5	0.7	18.5	8.5

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 -120°C
Typical values	I1	AW	400	650	35	100 50

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)

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
2 kg tube	X
Other sizes and packaging on request	

LNT 307: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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
0.05	1.8	0.5	20	10	0.2

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

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Medium carbon (C > 0.03%)				302	
	X4 CrNi 18-10		1.4301	(TP)304	S30400
		GX5 CrNi 19-10	1.4308	(TP)304H	S30409
			1.4948	CF 8	J92600

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 304H: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo
0.05	1.6	0.5	20	10	0.2

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	370	600	35	80

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
Medium carbon (C > 0.03%)				302	
	X4 CrNi 18-10		1.4301	(TP)304	S30400
		GX5 CrNi 19-10	1.4308	(TP)304H	S30409
	X6 CrNi 18-10		1.4948	CF 8	J92600

Packaging and available sizes

Unit type	Diameter (mm)		
	2.0	2.4	3.2
2 and 10 kg tube	X	X	X
Other sizes and packaging on request			

LNT 304H: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Chemical composition (w%) typical wire

C	Mn	Si	Cr	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

Materials to be welded

Steel grades	EN 10088-1	Mat. Nr
EN 10088-1	Mat. Nr	ASTM/A420
X3CrNb17	1.4511	AlSi430
X6CrNb17	1.4511	
X6Cr17	1.4016	
X8Cr17	1.4016	

Packaging and available sizes

Unit type	Diameter (mm)
	1.0
250 kg Accutrak® Drum	X
Other sizes and packaging on request	

LNM 430LNb: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9 : ER309

General description

Solid wire for high temperature applications like industrial furnaces
High resistance to oxidation up to 1050°C

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
0.05	1.8	0.5	24.0	13.5	0.2

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

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
		GX30 CrSi6	1.4710		
	X10 CrAl7		1.4713	502	
	X10 CrAl13		1.4724	410/414-TP405-CA15	
		GX40 CrSi13	1.4729		
		GX40 CrSi17	1.4740		
	X10 CrAl18		1.4742	430-TP430-CB30	
	X10 CrAl24		1.4762	TP443	
		GX25 CrNiSi18-9	1.4825		J92502
		GX40 CrNiSi22-9			
	X15 CrNiSi20-12		1.4828	TP309	S30900
		GX25 CrNiSi20-14	1.4832		
	X12 CrNiTi18-9		1.4878		

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM 309H: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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

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	1.8	0.45	26	21	0.2

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

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
	X10 CrAl24		1.4762		
		GX25 CrNiSi18-9	1.4825		
		GX40 CrNiSi22-9	1.4826		
	X15 CrNiSi20-12		1.4828		
		GX25 CrNiSi20-14	1.4832		
	X15 CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12 CrNi25-21		1.4845		
		GX40 CrNiSi 25-20	1.4848	HK40	

Packaging and available sizes

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool BS300	X	X	X
Other sizes and packaging on request			

LNM 310: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid rod

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)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.1	1.7	0.5	26	21	0.2

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

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI	UNS
	X10 CrAl24		1.4762		
		GX25 CrNiSi18-9	1.4825		
		GX40 CrNiSi22-9	1.4826		
	X15 CrNiSi20-12		1.4828		
		GX25 CrNiSi20-14	1.4832		
	X15 CrNiSi25-20		1.4841	310S	S31008
				CK20	J94202
	X12 CrNi25-21		1.4845		
		GX40 CrNiSi 25-20	1.4848	HK40	

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT 310: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln MIG 308LSi

Stainless steel solid wire

Classification

AWS A5.9	: ER308LSi
ISO 14343-A	: G 19 9 LSi

General description

Solid wire with extra low carbon for welding austenitic CrNi-steels
With increased silicon for improved wettability

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.02	1.7	0.8	20	10	0.2

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	420	570	45	85	55

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
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

Lincoln MIG 308LSi: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln TIG 308LSi

Stainless steel solid rod

Classification

AWS A5.9	: ER308LSi
ISO 14343-A	: W 19 9 LSi

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%)
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Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.8	20	10	0.2

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	390	590	36	120	50

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19 11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18 10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18 10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18 10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.6	2.0	2.4	3.2
5 kg tube	X	X	X	X	X
Other sizes and packaging on request					

Lincoln TIG 308LSi: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln TIG 308L

Stainless steel solid rod

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)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.5	20	10	0.2

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	390	590	35	120 50

Materials to be welded

Steel grades	EN 10088-11-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Extra low carbon (C < 0.03%)					
	X2CrNi19 11		1.4306	(TP)304 L	S30403
				CF-3	J92500
	X2CrNiN18 10		1.4311	(TP)304LN	S30453
				302, 304	S30400
Medium carbon (C > 0.03%)					
	X4CrNi18 10		1.4301	(TP)304	S30409
		GX5CrNi19 10	1.4308	CF-8	J92600
Ti-,Nb stabilized					
	X6CrNiTi18 10		1.4541	(TP)321	S32100/
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.6	2.0	2.4	3.2
5 kg tube	X	X	X	X	X
Other sizes and packaging on request					

Lincoln TIG 308L: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln MIG 316LSi

Stainless steel solid wire

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
With increased silicon for improved wettability

Shielding gases (acc. ISO 14175)

M12	Mixed gas Ar+ 0.5-5% CO ₂
M13	Mixed gas Ar+ 0.5-3% O ₂

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.8	18.5	12.2	2.5

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	-120°C	-196°C
Typical values	M12	AW	420	620	35	150	70	40

Materials to be welded

Steel grades	EN 10088-11-2	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
	X2CrNiMoN 17 11 2		1.4406	(TP)316LN	S31653
	X2CrNiMoN 17 13 3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17 12 2		1.4401	(TP)316	S31600
	X4 CrNiMo 17 13 3		1.4436		
	GX5 CrNiMo 19-11		1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6 CrNiMoTi 17 12 2		1.4571	316 Ti	S31635
	X6 CrNiMoNb 17 12 2		1.4580	316 Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

Lincoln MIG 316LSi: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln TIG 316LSi

Stainless steel solid rod

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
With increased silicon for improved wettability

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.7	0.8	18.5	12.2	2.7

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(J) +20°C -196°C
Typical values	I1	AW	400	620	35	100 45

Materials to be welded

Steel grades	EN 10088-11-2	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
	X2CrNiMoN 17 11 2		1.4406	(TP)316LN	S31653
	X2CrNiMoN 17 13 3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17 12 2		1.4401	(TP)316	S31600
	X4 CrNiMo 17 13 3		1.4436		
	GX5 CrNiMo 19-11		1.4408	CF 8M	J92900
Ti-,Nb stabilized					
	X6 CrNiMoTi 17 12 2		1.4571	316 Ti	S31635
	X6 CrNiMoNb 17 12 2		1.4580	316 Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.6	2.0	2.4	3.2
5 kg tube	X	X	X	X	X

Other sizes and packaging on request

Lincoln TIG 316LSi: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln TIG 316L

Stainless steel solid rod

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, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.5	0.5	18.5	12	2.7

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(J)		
						+20°C	-120°C	-196°C
Typical values	I1	AW	400	620	35	100	80	40

Materials to be welded

Steel grades	EN 10088-11-2	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
	X2CrNiMoN 17 11 2		1.4406	(TP)316LN	S31653
	X2CrNiMoN 17 13 3		1.4429		
Medium carbon (C > 0.03%)					
	X4 CrNiMo 17 12 2		1.4401	(TP)316	S31600
	X4 CrNiMo 17 13 3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti, Nb stabilized					
	X6 CrNiMoTi 17 12 2		1.4571	316 Ti	S31635
	X6 CrNiMoNb 17 12 2		1.4580	316 Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.6	2.0	2.4	3.2
5 kg tube	X	X	X	X	X
Other sizes and packaging on request					

Lincoln TIG 316L: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln MIG 309LSi

Stainless steel solid wire

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

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
0.010	1.8	0.8	23.3	13.8	0.14

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
Typical values	M12	AW	430	565	35	96	65

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to stainless steel)
Build-up welding on mild and low alloyed steel

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
15 kg spool BS300	X	X	X	X

Other sizes and packaging on request

Lincoln MIG 309LSi: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln TIG 309LSi

Stainless steel solid rod

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)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.6	0.8	23.5	13.0	0.20

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) -46°C
Typical values	I1	AW	400	600	35	65

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to stainless steel)

Build-up welding on mild and low alloyed steel

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.6	2.0	2.4	3.2
5 kg tube	X	X	X	X	X

Other sizes and packaging on request

Lincoln TIG 309LSi: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincoln TIG 309L

Stainless steel solid rod

Classification

AWS A5.9 : ER309L
ISO 14343-A : W 23 12 L

General description

Solid rod for welding stainless steel to carbon steel

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

C	Mn	Si	Cr	Ni	Mo
0.010	1.65	0.35	24	13	0.05

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	390	600	35

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to stainless steel)

Build-up welding on mild and low alloyed steel

Packaging and available sizes

Unit type	Diameter (mm)		
	1.6	2.0	2.4
5 kg tube	X	X	X
Other sizes and packaging on request			

Lincoln TIG 309L: rev. EN 02

Stainless steel solid wire

Classification

AWS A5.9 : ER307*
ISO 14343-A : G 18 8 Mn

* Nearest classification

General description

Solid wire for welding steel with difficult weldability
Often used as a buffer layer in hardfacing applications

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
0.08	7.1	0.8	19.2	9

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
Typical values	M12	AW	400	630	40	80	50

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)

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
200kg Accutrak® Drum	X	X
Other sizes and packaging on request		

Lincoln MIG 307: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid wire

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

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	1.5	0.2	31.0	27.0	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	610	35	100	50

Materials to be welded

Steel grades	EN 10088-1/2	Mat. Nr	ASTM/ACI	UNS
Copper alloyed CrNiMo and NiCrMo-steels				
	X1NiCrMoCu 31-27-4	1.4563		N08028
	X1NiCrMoCu 25-20-5	1.4539	Alloy 904L	N08904
	DIN 17744			
	NiCr 21 Mo	2.4858	Alloy 825	N08825
	NiCr 21 Mo 6Cu	2.6410	Alloy 825 h	MoN08821
	X3NiCrCuMoTi 27-23	1.4503		

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X
Other sizes and packaging on request	

LNM NiCro 31/27: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid rod

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

Chemical composition (w%), Typical, rod

C	Mn	Si	Ni	Cr	Mo	Cu
0.01	1.5	0.2	31.0	27.0	3.5	1.0

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	600	35	120	80

Materials to be welded

Steel grades	EN 10088-1/2	Mat. Nr	ASTM/ACI	UNS
Copper alloyed CrNiMo and NiCrMo-steels				
	X1NiCrMoCu 31-27-4	1.4563		N08028
	X1NiCrMoCu 25-20-5	1.4539	Alloy 904L	N08904
	DIN 17744			
	NiCr 21 Mo	2.4858	Alloy 825	N08825
	NiCr 21 Mo 6Cu	2.6410	Alloy 825 h	MoN08821
	X3NiCrCuMoTi 27-23	1.4503		

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.4
2 kg tube	X	X
Other sizes and packaging on request		

LNT NiCro 31/27: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid wire

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

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

	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	520	770	34	80	60

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 alloyed 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

Unit type	Diameter (mm)		
	0.8	1.0	1.2
5 kg plastic spool S200		X	
15 kg spool BS300	X	X	X
Other sizes and packaging on request			

LNM NiCro 60/20: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid rod

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, rod

C	Mn	Si	Ni	Cr	Mo	Nb	Fe
0.03	0.1	0.1	bal.	22	9	3.5	0.4

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength	Tensile strength	Elongation	Impact ISO-V(J)	
			(N/mm ²)	(N/mm ²)	(%)	+20°C	-196°C
Typical values	I1	AW	520	800	35	130	100

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 alloyed 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

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X

Other sizes and packaging on request

LNT NiCro 60/20: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid wire

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

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	Fe	Cu
0.03	3.1	0.08	72.5	20.5	2.6	0.8	0.01

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	390	640	35	150 50

Materials to be welded

Ni-alloy grades	BS3076	DIN 17744/17465 SEW 595	Mat. Nr	ASTM/ACI B366	UNS
Ni-base high Cr alloyed steel for low and high corrosion searching application					
Na 14		NiCr15Fe	2.4816	B168-Alloy 600	N06600
		LC-NiCr15Fe	2.4817	Alloy 600L	N06600
		NiCr20Ti	2.4951	Alloy 75	
		NiCr20TiA1	2.4952	Alloy 80A	N07080
		X10NiCrAlTi32 20	1.4876	Alloy 800/800H	N0800/10
Na 15		NiCr23Fe	2.4851	Alloy 601(H)	N06601
		X12NiCrSi36 16	1.4864	330	N08330
Na 17		G-X40NiCrNb35 25	1.4852		
		G-X40NiCrSi35 25	1.4857	HP	

Un- and low alloyed 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

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM NiCro 70/19: rev. EN 21

Ni-base solid rod

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, rod

C	Mn	Si	Ni	Cr	Nb	Fe	Cu
0.03	3.0	0.2	bal.	20	2.5	1.0	0.1

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	400	680	40	150 120

Materials to be welded

Ni-alloy grades	BS3076	DIN 17744/17465 SEW 595	Mat. Nr	ASTM/ACI B366	UNS
Ni-base high Cr alloyed steel for low and high corrosion searching application					
Na 14		NiCr15Fe	2.4816	B168-Alloy 600	N06600
		LC-NiCr15Fe	2.4817	Alloy 600L	N06600
		NiCr20Ti	2.4951	Alloy 75	
		NiCr20TiA1	2.4952	Alloy 80A	N07080
Na 15		X10NiCrAlTi32 20	1.4876	Alloy 800/800H	N0800/10
		NiCr23Fe	2.4851	Alloy 601(H)	N06601
Na 17		X12NiCrSi36 16	1.4864	330	N08330
		G-X40NiCrNb35 25	1.4852		
		G-X40NiCrSi35 25	1.4857	HP	

Un- and low alloyed 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

Unit type	Diameter (mm)		
	2.0	2.4	3.2
2 and 10 kg tube	X	X	X
Other sizes and packaging on request			

LNT NiCro 70/19: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

LNT NiCrMo 59/23

Ni-base solid rod

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%)
I3 Inert gas Ar+ 0.5-95% He

Approvals

TÜV

+

Chemical composition (w%), Typical, rod

C	Mn	Si	Ni	Cr	Mo	Fe	Al
0.015	0.5	0.06	59	23	16	1.5	0.4

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	400	720	30

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
	NiCr21Mo 14W	2.4602	C-22	N06022
	NiCr22Mo 9Nb	2.4856	625	N06625
High Mo stainless steel for high corrosion environments				
	EN 10088-1/-2			
	X1 NiCrMoCuN25-20-7	1.4529	904hMo	N08925
	X1 CrNiMoCuN20-18-7	1.4547		S31254

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
2 kg tube	X
Other sizes and packaging on request	

LNT NiCrMo 59/23: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

LNM NiCrMo 60/16

Ni-base solid wire

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)

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	57.8	16	16.0	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

Materials to be welded

Ni-alloy grades	DIN/EN	Mat. Nr.	ASTM/ACI	UNS
Ni Base high CrMo steel for high corrosion environments				
	NiMo 16Cr15W	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiMo 16Cr16Ti	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

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool B300	X	X

LNM NiCrMo 60/16: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

LNT NiCrMo 60/16

Ni-base solid rod

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, rod

C	Mn	Si	Ni	Cr	Mo	W	Fe
0.006	0.5	0.04	57.8	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	410	720	27	100

Materials to be welded

Ni-alloy grades	DIN/EN	Mat. Nr.	ASTM/ACI	UNS
Ni Base high CrMo steel for high corrosion environments				
	NiMo 16Cr15W	2.4819	C-276	N10276
	NiCr21Mo14W	2.4602	C-22	N06022
	NiMo 16Cr16Ti	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

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 kg tube	X	X	X	X

LNT NiCrMo 60/16: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Ni-base solid wire

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-alloyed steels
Can be used as well for welding mild and low alloyed 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
0.10	3.3	0.6	64	29	1.5	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)	(%)	+20°C	-196°C
Typical values	I1	AW	300	500	35	150	60

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

Unit type	Diameter (mm)	
	1.0	1.2
15 kg spool BS300	X	X
Other sizes and packaging on request		

LNM NiCu 70/30: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid rod

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-alloyed steels
Can be used as well for welding mild and low alloyed 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, rod

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	550	40	160	140

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

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 and 10 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT NiCu 70/30: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Ni-base solid wire

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 unalloyed/low-alloyed steel
Suitable for surfacing carbon steels

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	30	120

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

Unit type	Diameter (mm)
	1.2
15 kg spool BS300	X
Other sizes and packaging on request	

LNM NiTi: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-base solid rod

Classification

AWS A5.14/A5.14M : ERNi1
ISO 18274 : S Ni 2061 (NiTi3)

General description

Solid rod for welding pure nickel and nickel alloys and joining these materials with unalloyed/low-alloyed 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, rod

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	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	30	120

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

Unit type	Diameter (mm)	
	2.0	2.4
2 and 10 kg tube	X	X
Other sizes and packaging on request		

LNT NiTi: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Ni-base solid wire

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

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	Fe	Cu
0.05	0.83	0.14	54.8	bal.	0.4

Mechanical properties, typical, all weld metal

	Typical hardness values
2 Layers, AW	approx. 200 HB

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool BS300	X
Other sizes and packaging on request	

LNM NiFe: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

AWS A5.7	: ERCuAl-A1
EN 14640	: S Cu 6100 (CuAl8)

General description

Solid wire 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

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

Materials to be welded

Cu-alloy grades	Standard	Type	Mat. Nr
Copper-aluminium wrought alloys		DIN 17665 CuAl8	CuAl5As 2.0918 2.0920
Copper-aluminium cast alloys		DIN 1714	G-CuAl8Mn 2.0962

Packaging and available sizes

Unit type	Diameter (mm)				
	0.8	1.0	1.2	1.6	2.0
12 kg spool B300	X	X	X	X	X
Other sizes and packaging on request					

LNМ CuAl8: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Cu-base solid rod

Classification

AWS A5.7	: ERCuAl-A1
EN 14640	: 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, rod

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

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

Unit type	Diameter (mm)
	2.0
2 kg tube	X
Other sizes and packaging on request	

LNT CuAl8: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

EN 14640 : S Cu 6327

General description

Solid wire for welding copper-aluminium alloys

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.	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 (%)	Impact ISO-V(J) +20°C	Hardness HB
Typical values	I1	AW	270	530	30	70	140

Materials to be welded

Cu-alloy grades

Copper-aluminium alloys with 7-9% Al

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
12 kg spool B300	X	X
Other sizes and packaging on request		

LNM CuAl8Ni2: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Cu-base solid wire

Classification

AWS A5.7 : ERCuNiAl
EN 14640 : S Cu 6328 (CuAl9Ni5)

General description

Solid wire for welding copper-aluminium alloys, as aluminiumbronzes
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

Cu	Al	Mn	Ni	Fe
bal.	9	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

Materials to be welded

Cu-alloy grades

Copper-aluminium alloys with 7-9% Al

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
12 kg spool B300	X	X
Other sizes and packaging on request		

LNM CuAl8Ni6: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

AWS A5.7	: ERCuNi
EN 14640	: S Cu 7158 (CuNi30)

General description

Solid wire 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

Chemical composition (w%) typical wire

Cu	Mn	Ni
bal.	0.8	31

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Hardness HB
Typical values	I1	AW	220	380	30	70

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

Unit type	Diameter (mm)		
	0.8	1.0	1.2
15 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM CuNi30: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid rod

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, rod

Cu	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C	Hardness HB
Typical values	I1	AW	250	400	30	100	70

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

Unit type	Diameter (mm)			
	1.6	2.0	2.4	3.2
2 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT CuNi30: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

AWS A5.7 : ERCu
EN 14640 : S Cu 1898 (CuSn1)

General description

Solid wire for GMA-welding of copper

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

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 alloyed copper alloys	DIN 17666	CuFe2P	2.1310
		CuSP	2.1498
		CuTeP	2.1546

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
12 kg spool B300	X	X
Other sizes and packaging on request		

LNМ CuSn: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

AWS A5.7	: ERCuSn-A
EN 14640	: S Cu 5180 (CuSn6P)

General description

Solid wire 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

Cu	Sn	P
bal.	6	0.2

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	150	260	20	80

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

Unit type	Diameter (mm)		
	1.0	1.2	1.6
15 kg spool B300	X	X	X
Other sizes and packaging on request			

LNМ CuSn6: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid rod

Classification

AWS A5.7	: ERCuSn-A
EN 14640	: 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, rod

Cu	Sn	P
bal.	6	0.2

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	Hardness HB
Typical values	I3	AW	150	260	20	80	75

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

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
2 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT CuSn6: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

EN 14640 : S Cu 5410 (CuSn12P)

General description

Solid wire for GMA-welding of copper-tin and copper-zinc alloy

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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	100	250	30

Materials to be welded

Copper-tin alloys, e.g. bronze with 10-12% tin
Copper-zinc alloys e.g. brass

Packaging and available sizes

Unit type	Diameter (mm)
	0.8
12 kg spool B300	X
Other sizes and packaging on request	

LNM CuSn12: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid wire

Classification

AWS A5.7	: ERCuSi-A
EN 14640	: S Cu 6560 (CuSi3Mn1)

General description

Solid wire for GMA-welding of low-alloyed 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

Cu	Mn	Si	Sn	Zn
bal.	1.0	3.0	0.1	0.1

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	Hardness HB
Typical values	I1	AW	120	350	40	60	95

Materials to be welded

Copper, low alloyed copper and copper-zinc alloys

Packaging and available sizes

Unit type	Diameter (mm)	
	0.8	1.0
5 kg spool BS300	X	X
12 kg spool B300		X
Other sizes and packaging on request		

LNМ CuSi3: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cu-base solid rod

Classification

AWS A5.7	: ERCuSi-A
EN 14640	: S Cu 6560 (CuSi3Mn1)

General description

Solid rod for GTA-welding of low-alloyed 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, rod

Cu	Mn	Si	Sn	Zn
bal.	1.0	3.0	0.1	0.1

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	Hardness HB
Typical values	I1	AW	120	350	40	60	95

Materials to be welded

Copper, low alloyed copper and copper-zinc alloys

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.4
2 kg tube	X	X
Other sizes and packaging on request		

LNT CuSi3: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

AWS A5.10	: ER4043
ISO 18273	: S Al 4043 A (AlSi5)

General description

Solid wire for welding of aluminium-silicium alloys

Excellent feedability and very consistent welding performance

Tight and stable arc

Also available in 120 kg AccuPak®, that increases productivity by reducing time to change spools

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

Al	Mn	Si	Ti	Fe	Zn	Cu	Mg
bal.	0.01	4.7	0.001	0.3	0.002	0.01	0.004

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	-60°C
Typical values	I1	AW	100	160	15	20	20

Physical properties

Melting range 573 - 625°C

Density approximately 2680 kg/m³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium cast alloys	DIN 1725-1	Al Mg Si 0.5	3.3206	6060	
		Al Mg Si 0.7	3.3210	6005A	
		Al Mg Si 0.8	3.2316	6181	
Aluminium cast alloys	DIN 1725-2	G-Al Si 5			443.0

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
0.5 kg plastic spool S100	X	X	X	X
7.26 kg spool S300	X	X	X	X
7.0 kg spool BS300	X	X	X	X
125 kg AccuPak			X	

Other sizes and packaging on request

SuperGlaze® MIG 4043: rev. EN 21

Aluminium rod

Classification

AWS A5.10	: R4043
ISO 18273	: S Al 4043 A (AlSi5)

General description

Solid rod for welding of aluminium-silicium alloys
Excellent feedability and very consistent welding performance
Tight and stable arc

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

TÜV

+

Chemical composition (w%), Typical, rod

Al	Mn	Si	Ti	Fe	Zn
bal.	0.05	5.0	0.15	0.4	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	-60°C
Typical values	I1	AW	100	160	15	20	20

Physical properties

Melting range	573 - 625°C
Density	approximately 2680 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium cast alloys	DIN 1725-1	Al Mg Si 0.5	3.3206	6060	
		Al Mg Si 0.7	3.3210	6005A	
		Al Mg Si 0.8	3.2316	6181	
Aluminium cast alloys	DIN 1725-2	G-Al Si 5			443.0

Packaging and available sizes

Unit type	Diameter (mm)				
	1.6	2.0	2.4	3.2	4.0
2 and 5 kg tube	X	X	X	X	X
Other sizes and packaging on request					

SuperGlaze® TIG 4043: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

AWS A5.10	: ER5183
ISO 18273	: S Al 5183 (AlMg4.5Mn0,7)

General description

Solid wire for welding of high strength aluminium alloys and low temperature applications (-196°C)

Excellent feedability and very consistent welding performance

Tight and stable arc

Also available in 90 kg AccuPak®, that increases productivity by reducing time to change spools

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

ABS	BV	DNV	GL	LR	TÜV
WC	WC	5183	S AlMg4.5Mn	+	+

Chemical composition (w%) typical wire

Al	Mn	Si	Ti	Mg	Zn	Cr	Fe	Cu
bal.	0.8	0.02	0.15	4.5	0.15	0.15	0.14	0.02

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	140	300	30

Physical properties

Melting range	568 - 638°C
Density	approximately 2400 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4.5 Mn	3.3547	5083	
		Al Mg 5	3.3555	6082	
		Al Mg Si 1			
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3	3.3541		
		G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
7.26 kg spool S300	X	X	X	X
7.0 kg spool BS300	X	X	X	X
136 kg AccuPak			X	
Other sizes and packaging on request				

SuperGlaze® MIG 5183: rev. EN 21

Aluminium rod

Classification

AWS A5.10	: R5183
ISO 18273	: S Al 5183 (AlMg4.5Mn0,7)

General description

Solid rod for welding of high strength aluminium alloys and low temperature applications (-196°C)
 Excellent feedability and very consistent welding performance
 Tight and stable arc

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

TÜV

+

Chemical composition (w%), Typical, rod

Al	Mn	Si	Ti	Mg	Zn	Cr	Fe
bal.	0.8	0.1	0.02	4.5	0.15	0.15	0.2

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	150	290	25

Physical properties

Melting range	568 - 638°C
Density	approximately 2400 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4.5 Mn	3.3547	5083	
		Al Mg 5	3.3555	6082	
		Al Mg Si 1			
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3	3.3541		
		G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)				
	1.6	2.0	2.4	3.2	4.0
5 kg tube	X	X	X	X	X

Other sizes and packaging on request

SuperGlaze® TIG 5183: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

AWS A5.10	: ER5356
ISO 18273	: S Al 5356 (AlMg5Cr)

General description

Solid wire for welding aluminium alloys containing more than 3% Mg

Excellent feedability and very consistent welding performance

Tight and stable arc

Also available in 90 kg AccuPak®, that increases productivity by reducing time to change spools

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

ABS	BV	DNV	GL	LR	TÜV
WB	WB	5356	S ALMg5	+	+

Chemical composition (w%) typical wire

Al	Mn	Si	Ti	Mg	Cr	Cu	Fe	Zn
bal.	0.11	0.08	0.06	4.9	0.07	0.01	0.2	0.03

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	110	250	25

Physical properties

Melting range	562 - 633°C
Density	approximately 2640 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4,5	3.3345	5082	
		Al Mg 5	3.3555	5056A	
		Al Mg 2 Mn 0,8	3.3527	5049	
		Al Mg 2,7 Mn	3.3537	5454	
		Al Mg 4 Mn	3.3545	5086	
		Al Zn 4,5 Mg 1	3.4335	7020	
		G-Al Mg 3	3.3541		
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
0.5 kg plastic spool S100	X	X	X	X
2.0 kg plastic spool S200			X	
7.26 kg spool S300	X	X	X	X
7.0 kg spool BS300	X	X	X	X
136 kg AccuPak			X	
Other sizes and packaging on request				

SuperGlaze® MIG 5356: rev. EN 22

Aluminium rod

Classification

AWS A5.10	: R5356
ISO 18273	: S Al 5356 (AlMg5)

General description

Solid rod for welding aluminium alloys containing more than 3% Mg
Excellent feedability and very consistent welding performance
Tight and stable arc

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

Al	Mn	Si	Ti	Mg	Cr
bal.	0.10	0.1	0.10	5.0	0.15

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	130	285	25

Physical properties

Melting range	562 - 633°C
Density	approximately 2640 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4,5	3.3345	5082	
		Al Mg 5	3.3555	5056A	
		Al Mg 2 Mn 0,8	3.3527	5049	
		Al Mg 2,7 Mn	3.3537	5454	
		Al Mg 4 Mn	3.3545	5086	
		Al Zn 4,5 Mg 1	3.4335	7020	
		G-Al Mg 3	3.3541		
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)					
	1.6	2.0	2.4	3.2	4.0	5.0
5 kg tube	X	X	X	X	X	X
Other sizes and packaging on request						

SuperGlaze® TIG 5356: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

AWS A5.10 : ER1100*

* Nearest classification

General description

Solid wire for welding pure aluminium with maximum of 0.5% alloying elements

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)
I3 Inert gas Ar+ 0.5-95% He

Chemical composition (w%) typical wire

Al	Zn	Ti	Cu	Mn	Si	Si+Fe	Fe
bal.	0.02	0.04	0.04	<0.01	0.05	0.2	0.12

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	30	80	40

Physical properties

Melting range 647 - 658°C
Density approximately 2700 kg/m³

Materials to be welded

Standard	Type	W. Nr	Int.Reg.Nr.
DIN 1712-3	Al 99.8	3.0285	1080 A
	Al 99.7	3.0275	1070 A
	Al 99.5	3.0255	1050 A
	E-Al	3.0257	1350 A
	Al 99	3.0205	1200

Packaging and available sizes

Unit type	Diameter (mm)		
	1.0	1.2	1.6
7 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM A199.5: rev. EN 21

Aluminium rod

Classification

AWS A5.10 : ER1100*

* Nearest classification

General description

Solid rod for welding pure aluminium with maximum of 0.5% alloying elements

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Chemical composition (w%), Typical, rod

Al	Zn	Ti	Cu	Mn	Si
bal.	0.02	0.04	0.04	<0.01	0.05

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	30	80	40

Physical properties

Melting range 647 - 658°C
Density approximately 2700 kg/m³

Materials to be welded

Standard	Type	W. Nr	Int.Reg.Nr.
DIN 1712-3	Al 99.8	3.0285	1080 A
	Al 99.7	3.0275	1070 A
	Al 99.5	3.0255	1050 A
	E-Al	3.0257	1350 A
	Al 99	3.0205	1200

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT Al99.5: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

ISO 18273 : S Al 5754 (AlMg3)

General description

Solid wire for welding of aluminium alloys up to 3%Mg

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

Al	Mg	Zn	Cr	Ti	Mn	Si	Cu	Fe
bal.	3.4	0.1	0.19	0.09	0.01	0.06	0.01	0.13

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	100	210	30

Physical properties

Melting range 580 - 642°C
Density approximately 2660 kg/m³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 1	3.3315	5005 A	
		Al Mg 1.5	3.3316	5050 B	
		Al Mg 1.8	3.3326	5051 A	
		Al Mg 2.5	3.3523	5052	
		Al Mg 3	3.3535	5754	
		Al Mg 1	3.0515	3103	
		Al Mg Si 0.5	3.3206	6060	
		Al Mg Si 0.7	3.3210	6005 A	
		Al Mg Si 0.8	3.2316	6181	
		G-AlMg 3	3.3541		
Aluminium cast alloys	DIN 1725-2	G-AlMg 3 Si	3.3241		512.0

Packaging and available sizes

Unit type	Diameter (mm)		
	1.0	1.2	1.6
7 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM AIMg3: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium rod

Classification

ISO 18273 : S Al 5754 (AlMg3)

General description

Solid rod for welding of aluminium alloys up to 3%Mg

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)
I3 Inert gas Ar+ 0.5-95% He

Approvals

TÜV

+

Chemical composition (w%), Typical, rod

Al	Mg	Zn	Cr	Ti	Mn	Si	Cu
bal.	3.2	0.1	0.20	0.10	0.01	0.06	0.01

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	100	220	33

Physical properties

Melting range 580 - 642°C
Density approximately 2660 kg/m³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 1	3.3315	5005 A	
		Al Mg 1.5	3.3316	5050 B	
		Al Mg 1.8	3.3326	5051 A	
		Al Mg 2.5	3.3523	5052	
		Al Mg 3	3.3535	5754	
		Al Mg 1	3.0515	3103	
		Al Mg Si 0.5	3.3206	6060	
		Al Mg Si 0.7	3.3210	6005 A	
		Al Mg Si 0.8	3.2316	6181	
		G-AlMg 3	3.3541		
Aluminium cast alloys	DIN 1725-2	G-AlMg 3 Si	3.3241		512.0

Packaging and available sizes

Unit type	Diameter (mm)				
	1.6	2.0	2.4	3.2	4.0
5 kg tube	X	X	X	X	X
Other sizes and packaging on request					

LNT AIMg3: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

AWS A5.10	: ER5356
ISO 18273	: S Al 5356 (AlMg5)

General description

Solid wire for welding aluminium alloys containing more than 3% Mg

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

ABS	BV	DNV	GL	LR	TÜV
WB	WB	5356	S ALMg5	+	+

Chemical composition (w%) typical wire

Al	Mn	Si	Ti	Mg	Cr	Cu	Fe	Zn
bal.	0.11	0.08	0.06	4.9	0.07	0.01	0.2	0.03

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	110	250	25

Physical properties

Melting range	562 - 633°C
Density	approximately 2640 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4,5	3.3345	5082	
		Al Mg 5	3.3555	5056A	
		Al Mg 2 Mn 0,8	3.3527	5049	
		Al Mg 2,7 Mn	3.3537	5454	
		Al Mg 4 Mn	3.3545	5086	
		Al Zn 4,5 Mg 1	3.4335	7020	
		G-Al Mg 3	3.3541		
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)			
	0.8	1.0	1.2	1.6
7 kg spool B300	X	X	X	X
Other sizes and packaging on request				

LNM AIMg5: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium rod

Classification

AWS A5.10	: ER5356
ISO 18273	: S Al 5356 (AlMg5)

General description

Solid rod for welding aluminium alloys containing more than 3% Mg

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

RINA	TÜV
RC	+

Chemical composition (w%), Typical, rod

Al	Mn	Si	Ti	Mg	Cr
bal.	0.10	0.10	0.10	5.0	0.15

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	130	285	25

Physical properties

Melting range	562 - 633°C
Density	approximately 2640 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4,5	3.3345	5082	
		Al Mg 5	3.3555	5056A	
		Al Mg 2 Mn 0,8	3.3527	5049	
		Al Mg 2,7 Mn	3.3537	5454	
		Al Mg 4 Mn	3.3545	5086	
		Al Zn 4,5 Mg 1	3.4335	7020	
		G-Al Mg 3	3.3541		
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)					
	1.6	2.0	2.4	3.2	4.0	5.0
5 kg tube	X	X	X	X	X	X
Other sizes and packaging on request						

LNT AIMg5: rev. EN 22

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Aluminium wire

Classification

AWS A5.10	: ER5183
ISO 18273	: S Al 5183 (AlMg4.5Mn0,7)

General description

Solid wire for welding of high strength aluminium alloys and low temperature applications (-196°C)

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

ABS	BV	DNV	GL	LR	TÜV
WC	WC	5183	S AlMg4.5Mn	+	+

Chemical composition (w%) typical wire

Al	Mn	Si	Ti	Mg	Zn	Cr	Fe	Cu
bal.	0.65	0.09	0.02	5	0.03	0.06	0.14	0.02

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	150	290	25

Physical properties

Melting range	568 - 638°C
Density	approximately 2400 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4.5 Mn	3.3547	5083	
		Al Mg 5	3.3555	6082	
		Al Mg Si 1			
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3	3.3541		
		G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)		
	1.0	1.2	1.6
7 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM AIMg4.5Mn: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Aluminium rod

Classification

AWS A5.10	: ER5183
ISO 18273	: S Al 5183 (AlMg4.5Mn0,7)

General description

Solid rod for welding of high strength aluminium alloys and low temperature applications (-196°C)

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Approvals

TÜV

+

Chemical composition (w%), Typical, rod

Al	Mn	Si	Ti	Mg	Zn	Cr	Fe
bal.	0.80	0.10	0.02	4.5	0.15	0.15	0.20

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	150	290	25	40

Physical properties

Melting range	568 - 638°C
Density	approximately 2400 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4.5 Mn	3.3547	5083	
		Al Mg 5	3.3555	6082	
		Al Mg Si 1			
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3	3.3541		
		G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT AlMg4.5Mn: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium wire

Classification

ISO 18273 : S Al 5087 (AlMg4.5MnZr)

General description

Solid wire for welding of high strength aluminium alloys and low temperature applications (-196°C)
Zr added to increase hot cracking resistance and improve structure

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

Al	Mn	Si	Ti	Mg	Zn	Cr	Zr
bal.	0.8	0.2	0.15	4.5	0.15	0.15	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	140	300	30	25 15

Physical properties

Melting range 568 - 638°C
Density approximately 2400 kg/m³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium wrought alloys	DIN 1725-1	Al Mg 3	3.3535	5754	
		Al Mg 4,5 Mn	3.3547	5083	
		Al Mg 5	3.3555	6082	
		Al Mg Si 1			
Aluminium cast alloys	DIN 1725-2	G-Al Mg 3	3.3541		
		G-Al Mg 3 Si	3.3241		512.0
		G-Al Mg 5	3.3561		B 535.0
		G-Al Mg 5 Si	3.3261		

Packaging and available sizes

Unit type	Diameter (mm)		
	1.0	1.2	1.6
7 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM AlMg4.5MnZr: rev. EN 21

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Aluminium wire

Classification

AWS A5.10	: ER4043
ISO 18273	: S Al 4043A (AlSi5(Al))

General description

Solid wire for welding of aluminium-silicium alloys

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

Al	Mn	Si	Ti	Fe	Zn	Cu	Mg
bal.	0.01	4.7	0.001	0.3	0.002	0.01	0.004

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 -60°C	
Typical values	I1	AW	100	160	15	20	20

Physical properties

Melting range	573 - 625°C
Density	approximately 2680 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium cast alloys	DIN 1725-1	Al Mg Si 0.5	3.3206	6060	443.0
		Al Mg Si 0.7	3.3210	6005A	
		Al Mg Si 0.8	3.2316	6181	
Aluminium cast alloys	DIN 1725-2	G-Al Si 5			

Packaging and available sizes

Unit type	Diameter (mm)				
	0.8	1.0	1.2	1.6	2.4
7 kg spool B300	X	X	X	X	X
Other sizes and packaging on request					

LNM AISi5: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium rod

Classification

AWS A5.10 : ER4043
ISO 18273 : S Al 4043A (AlSi5(Al))

General description

Solid rod for welding of aluminium-silicium alloys

Shielding gases (acc. ISO 14175)

I1 Inert gas Ar (100%)

Approvals

TÜV
+

Chemical composition (w%), Typical, rod

Al	Mn	Si	Ti	Fe	Zn
bal.	0.05	5.0	0.15	0.4	0.10

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 -60°C	
Typical values	I1	AW	100	160	15	20	20

Physical properties

Melting range 573 - 625°C
Density approximately 2680 kg/m³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Reg.Nr.	Int.Cast.Nr.
Aluminium cast alloys	DIN 1725-1	Al Mg Si 0.5	3.3206	6060	
		Al Mg Si 0.7	3.3210	6005A	
		Al Mg Si 0.8	3.2316	6181	
Aluminium cast alloys	DIN 1725-2	G-Al Si 5			443.0

Packaging and available sizes

Unit type	Diameter (mm)				
	1.6	2.0	2.4	3.2	4.0
5 kg tube	X	X	X	X	X
Other sizes and packaging on request					

LNT AISi5: rev. EN 21

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Aluminium wire

Classification

AWS A5.10	: ER4047
ISO 18273	: S Al 4047A (AlSi12 (A))

General description

Solid wire for welding of cast aluminium alloys containing up to 12% Si

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Chemical composition (w%) typical wire

Al	Mn	Si	Ti	Fe	Zn	Cu
bal.	0.01	11.4	0.01	0.4	0.01	0.04

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	80	180	6

Physical properties

Melting range	573 - 585°C
Density	approximately 2650 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Cast.Nr.
Aluminium cast alloys	DIN 1725-2	G-Al Si 12	3.3581	A 413.0
		G-Al Si 12 (Cu)	3.3583	
		G-Al Si 11		
		G-Al Si 10 Mg	3.2381	361.0
		G-Al Si 10 Mg (Cu)	3.2383	
		G-Al Si 9 Mg	3.2373	359.0
		G-Al Si 9 Cu 3	3.2161	
		G-Al Si 7 Mg	3.2371	356.0
		G-Al Si 6 Cu 4	3.2151	319.0

Packaging and available sizes

Unit type	Diameter (mm)		
	1.0	1.2	1.6
7 kg spool B300	X	X	X
Other sizes and packaging on request			

LNM AISi12: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Aluminium rod

Classification

AWS A5.10	: ER4047
ISO 18273	: S Al 4047A (AlSi12 (A))

General description

Solid rod for welding of cast aluminium alloys containing up to 12% Si

Shielding gases (acc. ISO 14175)

I1	Inert gas Ar (100%)
I3	Inert gas Ar+ 0.5-95% He

Chemical composition (w%), Typical, rod

Al	Si	Fe	Zn	Mg
bal.	12.0	0.5	0.10	0.10

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)
Typical values	I1	AW	80	180	5

Physical properties

Melting range	573 - 585°C
Density	approximately 2650 kg/m ³

Materials to be welded

Aluminium grades	Standard	Type	W. Nr	Int.Cast.Nr.
Aluminium cast alloys	DIN 1725-2	G-Al Si 12	3.3581	A 413.0
		G-Al Si 12 (Cu)	3.3583	
		G-Al Si 11		
		G-Al Si 10 Mg	3.2381	361.0
		G-Al Si 10 Mg (Cu)	3.2383	
		G-Al Si 9 Mg	3.2373	359.0
		G-Al Si 9 Cu 3	3.2161	
		G-Al Si 7 Mg	3.2371	356.0
		G-Al Si 6 Cu 4	3.2151	319.0

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
5 kg tube	X	X	X	X
Other sizes and packaging on request				

LNT AlSi12: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Hardfacing solid wire

Classification

DIN 8555 : MSG 6-GZ-60-PS

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

Shielding gases (acc. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂

Application

Dies
Matrix

Parts for agricultural machinery

Transport rolls
Sand pumps

Chemical composition (w%) typical wire

C	Mn	Si	Cr
0.5	0.4	3	9

Mechanical properties, typical, all weld metal

Typical hardness values
2 Layers, AW approx. 60 HRc
Heat resistant to 450°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

LNM 420FM: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Hardfacing solid wire

Classification

DIN 8555 : MSG 2-GZ-350

General description

Solid wire for hardfacing applications
Hardness approximately HB 325-375
Optimal welding characteristics
Martensitic structure

Shielding gases (acc. ISO 14175)

M21 Mixed gas Ar+ >15-25% CO₂

Application

Forming dies
Dies

Impact resistance tools

Chemical composition (w%) typical wire

C	Mn	Si	Cr
0.7	1.9	0.45	1.0

Mechanical properties, typical, all weld metal

	Typical hardness values
2 Layers, AW	approx. 38 HRc (360 HB)

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

LNM 4M: rev. EN 22

Autogenous wire

Classification

AWS A5.2 : R45*
EN 12536 : O I

* Nearest classification

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, rod

C	Mn	Si	P	S
0.07	0.4	0.07	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	280	390	16	50

Packaging and available sizes

Unit type	Diameter (mm)			
5 kg / 25 kg box	2.0	3.0	4.0	5.0
	X	X	X	X

LNG I: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Autogenous wire

Classification

AWS A5.2 : R60*
 EN 12536 : O II

* Nearest classification

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, rod

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

Packaging and available sizes

Unit type	Diameter (mm)					
	1.6	2.0	2.5	3.0	4.0	5.0
5 kg / 25 kg box	X	X	X	X	X	X

LNG II: rev. EN 21

Autogenous wire

Classification

AWS A5.2 : R60*
 EN 12536 : O III

* Nearest classification

General description

Rods with 0.4% Ni for oxy-acetylene gas welding of joints in pipes

Excellent rootwelding

Applicable for design temperatures from -20°C to +350°C

Chemical composition (w%), Typical, rod

C	Mn	Si	P	S	Ni
0.06	1.1	0.15	0.01	0.01	0.40

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	340	470	26	65

Packaging and available sizes

Unit type	Diameter (mm)				
	2.0	2.5	3.0	4.0	5.0
5 kg / 25 kg box	X	X	X	X	X

LNG III: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Autogenous wire

Classification

AWS A5.2 : R65*
 EN 12536 : O IV

* Nearest classification

General description

Rods with 0.5% Mo for oxy-acetylene gas welding of fine grained and creep resisting steel
 Design temperature max. 500°C

Chemical composition (w%), Typical, rod

C	Mn	Si	P	S	Mo
0.09	1.0	0.19	0.010	0.010	0.5

Mechanical properties, typical, all weld metal

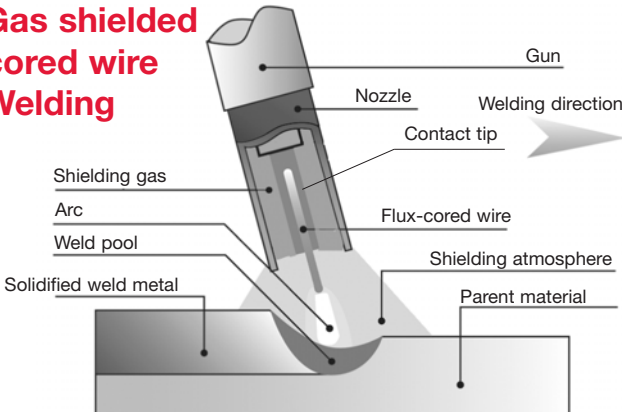
	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Typical values	AW	380	500	22	60

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.5	3.0	4.0
5 kg / 25 kg box	X	X	X	X

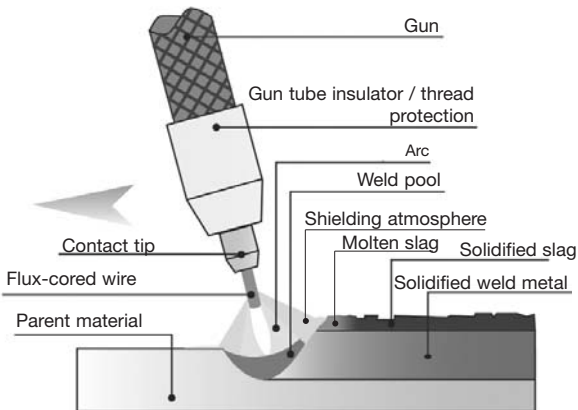
LNG IV: rev. EN 21

Gas shielded cored wire Welding



The Flux Cored Arc Welding process is when an electric arc is created between a continuous (flux or metal) cored wire and the work piece to be welded, protected within a gas atmosphere. This atmosphere can be either inert (Argon) or active (CO_2 or a mixture of Argon and CO_2). The wire is continuously fed through a gun to the weld pool by a wire feeder. For metal cored wires, both the dragging and the pushing weld technique can be used, for flux cored wires the dragging technique is recommended.

Self shielded Flux-Cored welding



Innershield welding is an Arc welding process in which welding heat is created from an arc between a continuous flux cored wire and the work piece. The flux provides gas shielding for the arc and a slag covering of the weld deposit.

Mild steel rutile cored wire

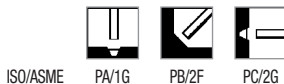
Classification

AWS A5.20/A5.20M : E70T-9C / E70T-9M
EN ISO 17632-A : T 46 0 R C 3 / T 46 0 R M 3

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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	How ml/100g
C1	0.06	1.30	0.50	0.015	0.010	< 8
M21	0.06	1.70	0.35	0.015	0.010	< 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)		
						0°C	-29°C	-30°C
Required: AWS A5.20			min. 400	min. 480	min. 22	min. 27		
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47		
Typical values	C1	AW	480	560	26	80		40
	M21	AW	530	610	27	70		40

Packaging and available sizes

Unit type	Diameter (mm)	
	1.6	2.4
15 kg spool B300	X	
25kg wire reel B435	X	

Outershield® 70: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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	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 weld metal
1.6	20	320	170	23-25	2.1	1.15
		510	235	25-27	3.4	1.15
		635	275	25-28	4.2	1.15
		760	310	27-29	5.0	1.15
		955	365	29-31	6.4	1.15
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 Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions		
	PA/1G	PB/2F	PC/2G
1.6	290-380A	210-375A	290-340A
	25-34V	25-32V	25-32V
2.4	410-560A	410-510A	
	27-34V	28-32V	

Mild steel rutile cored wire

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
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Excellent wire feeding
Superior product consistency with optimal alloy control

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DB
M21	+
C1	+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
C1	0.06	1.30	0.50	0.015	0.010	< 5
M21	0.06	1.70	0.35	0.015	0.010	< 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)		
						0°C	-18°C	-30°C
Required: AWS A5.20			min. 400	min. 480	min. 22			min. 27
EN ISO 17632-A			min. 460	530-680	min. 20		min. 47	
Typical values	C1	AW	480	560	26	80		50
	M21	AW	530	610	27	70		40

Packaging and available sizes

Unit type	Diameter (mm)
	2.4
25kg wire reel B435	X
270kg wooden reel	X

Outershield® 70-H: rev. EN 23

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	S185, S235, S275, S355
Ship plates	
ASTM 131	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 weld metal
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

Mild steel rutile cored wire

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)
Very low hydrogen ($H_{DM} < 5$ ml/100g)
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
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
C1/M21	0.04	1.45	0.6	0.015	0.010	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)	
						-30°C	-40°C
Required: AWS A5.20			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	
Typical values	C1/M21	AW	570	620	25	55	40

Packaging and available sizes

Unit type	Diameter (mm)
	1.6
15 kg spool B300	X
200kg Accutrak® Drum	X

Outershield® 70E-H: rev. EN 23

Outershield® 70E-H

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)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg weld metal
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/3G up	PG/3G down	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

Mild steel rutile cored wire

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



Current type/Shielding gas (ISO 14175)

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	H _{tot} ml/100g
M21	0.05	1.25	0.7	0.015	0.015	< 8

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength	Tensile strength	Elongation	Impact ISO-V (J)	
			(N/mm ²)	(N/mm ²)	(%)	-30°C	-40°C
Required: AWS A5.20			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	
Typical values	M21	AW	600	650	24	100	75

Packaging and available sizes

Unit type	Diameter (mm)
	1.6
15 kg spool B300	X

Outershield® 71E: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg weld metal
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/3G up	PG/3G down	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

Mild steel rutile cored wire

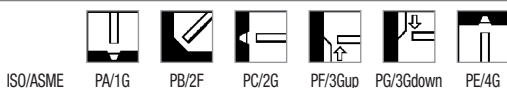
Classification

AWS A5.20 : E71T-1M-JH5
EN ISO 17632-A : T 46 3 P M 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)
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Very suitable for welding of root runs on ceramic backing
By preference use OS 71 M-H for 100 % CO₂ shielding gas

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 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	+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
M21	0.04	1.4	0.6	0.013	0.010	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	-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. 27 min. 47
Typical values	M21	AW	570	620	25	90	65	40

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
5 kg plastic spool S200	X
15 kg spool B300	X
200kg Accutrak® Drum	X

Outershield® 71E-H: rev. EN 25

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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, 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 weld metal
1.2	20	445	130	21-23	1.5	1.20
		700	180	22-24	2.3	1.20
		955	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/3G up	PG/3G down	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

Mild steel rutile cored wire

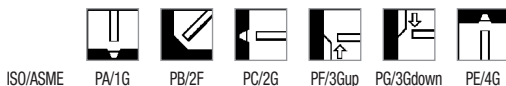
Classification

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)
Very low hydrogen (H_{DM} < 5 ml/100g)
By preference use OS 71 E-H for Ar/CO₂ shielding gas

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
C1 : Active Gas 100% CO₂
Amount : 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	3YSH53MSH5,3Y40MSH5	

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
C1	0.05	1.3	0.4	0.015	0.010	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 -40°C
Required: AWS A5.20			min. 400	min. 480	min. 22	min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47
Typical values	C1	AW	580	620	24	80 40

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
5 kg plastic spool S200	X	
15 kg spool B300	X	X
15 kg spool S300		X
25kg wire reel B435		X
200kg Accutrak® Drum	X	

Outershield® 71M-H: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 71M-H

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	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 weld metal
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 100% CO₂

Diameter (mm)	Welding positions							
	PA/1G	PB/2F	PC/2G	PF/3G up	PG/3G down	PE/4G	PF/3F up	PG/3Fdown
1.2	230-280A	230-280A	200-240A	200-240A	160-220A	160-220A	170-220A	170-220A
	26-32V	26-32V	25-30V	25-28V	23-26V	23-26V	26-28V	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		

Mild steel rutile cored wire

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

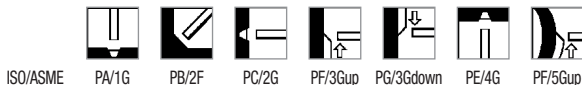
Good mechanical properties (CVN > 47J at -30°C)

Smooth arc action and metal transfer; easy slag removal

Suitable for welding with ceramic backing

Applications include general fabrication, shipbuilding, building or bridge erection

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	ABS	BV	CRS	DNV	GL	LR	PRS	RINA	NKK	RMRS	CE
C1	3Y400SAH10	3YSH10	3YH10S	IIY40MS(H10)	3YH10S	3YSH10	3YSH10	3YSH10	KSW53G(C)H10	3YSH10	+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Hom ml/100g
C1	0.05	1.4	0.4	0.015	0.010	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)		
						-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

Unit type	Diameter (mm)		
	1.2	1.4	1.6
5 kg plastic spool S200	X		
15 kg spool S300		X	X
15 kg spool B300	X	X	X
15 kg spool BS300	X		

Outershield® 71C: rev. EN 06

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025	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
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/3G up	PF/3F up	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® T55-H

Mild steel basic cored wire

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)
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC -
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	ABS	BV	DB	DNV	GL	LR	RINA
M21	3SA,3YSA	SA3,3YMH	+	IVYMSH5	4YH10S	4Y40SH15	
C1	3SA,3YSA	SA3,3YMH	+	IVYMSH5	4YH10S	4Y40SH15	3YS

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
C1	0.05	1.5	0.55	0.012	0.010	3
M21	0.06	1.5	0.6	0.012	0.010	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	-50°C
Required: AWS A5.20			min. 400	min. 480	min. 22			min. 27
EN ISO 17632-A			min. 420	500-640	min. 20			min. 47
Typical values	M21/C1	AW	480	570	27	130	85	60
		SR	425	550	27		80	

SR : 15h/580°C

Packaging and available sizes

Unit type	Diameter (mm)		
	1.2	1.6	2.4
4.5kg plastic spool S200	X		
15 kg spool B300	X	X	
25kg wire reel B435		X	X

Outershield® T55-H: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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 weld metal
1.2	20	510	130	25-27	1.6	1.20
		760	185	26-28	2.5	1.20
		1015	225	27-29	3.3	1.20
		1270	260	28-30	4.1	1.20
		1525	290	29-31	5.0	1.20
		1780	310	30-32	5.8	1.20
1.6	20	380	170	24-26	2.5	1.15
		510	225	25-27	3.1	1.15
		760	310	27-29	4.7	1.15
		1015	380	29-31	6.3	1.15
		1270	430	31-33	7.9	1.15

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions			
	PA/1G	PB/2F	PC/2G	PF/3G up
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® MC700

Mild steel metal cored wire

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

PA/1G

PB/2F

PC/2G

PF/3Gup

PE/4G

Current type/Shielding gas (ISO 14175)

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	Hom ml/100g
M21	0.05	1.35	0.6	0.015	0.023	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	-30°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	
Typical values	M21	AW	475	560	24	75	45

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® MC700: rev. EN 04

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® MC700

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 weld metal
1.2	short-arc	15	230	100	15	1.1	1.10
			320	120	16	1.4	1.10
			400	150	17	1.9	1.10
1.2	spray-arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	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® MC710-H

Mild steel metal cored wire

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 scaly plate, good resistance to porosity
Very good mechanical properties (CVN >47J at -30°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	ABS	BV	DB	DNV	TUV	GL	LR	RINA	RMRS
M21	3YSAH5	SA3YMH5	+	IIYMS(H5)	+	3YH5S	3YSH5	3YS	3YSH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
M21	0.05	1.35	0.6	0.015	0.023	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 -29°C -30°C -40°C
Required:						
AWS A5.18			min. 400	min. 480	min. 22	min. 27
EN ISO 17632-A (1.2/1.6)			min. 460	530-680	min. 20	min. 47
Typical values	M21	AW	495	570	26	90 60
	M21	SR	430	530	28	105 75
SR : 1h/580°C						

Packaging and available sizes

Unit type	Diameter (mm)				
	1.2	1.4	1.6	2.0	2.4
4.5kg plastic spool S200	X				
15 kg spool B300	X	X	X		
25kg wire reel B435		X	X	X	X
200kg Accutrak® Drum	X	X	X		
270kg metal coil	X		X	X	X

Outershield® MC710-H: rev. EN 25

Outershield® MC710-H

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 weld metal
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	spray-arc	25	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	spray-arc	25	635	325	29-32	5.0	1.10
			890	400	34-37	7.0	1.10
			1145	460	36-38	9.1	1.10
2.0	spray-arc	28	320	290	25-27	3.7	1.05
			510	385	28-31	6.1	1.05
			760	510	32-35	9.3	1.05
2.4	spray-arc	30		400	28-32		
				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/3G up	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			

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® MC710C-H

Mild steel metal cored wire

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 scaly plate, high resistance to porosity on primed plate
Very good mechanical properties (CVN >47J at -30°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	ABS	BV	DNV	GL	LRS	RINA	TÜV
C1	3YSA-H5	3YH5	III YMS	3YH5	3YH5	3YSH5	+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
C1	0.05	1.35	0.6	0.015	0.023	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	-29°C	-30°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27	
EN ISO 17632-A			min. 460	530-680	min. 20			min. 47
Typical values	C1	AW	490	585	27	90		70

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® MC710C-H: rev. EN 22

Outershield® MC710C-H

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 weld metal
1.2	short-arc	15	230	100	16	1.1	1.10
			320	120	16.5	1.4	1.10
			400	150	17	1.9	1.10
1.2	spray-arc	20	635	180	28-30	2.7	1.10
			940	275	31-34	4.8	1.10
			1420	340	35-38	6.8	1.10

Welding parameters, optimum fill passes in shielding gas 100% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-380A	230-380A	230-300A	100-170A	140-175A
	26-36V	26-36V	26-30V	16-17V	16-17V

Outershield® MC715-H

Mild steel metal cored wire

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 >47J at -40°C)
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Depending on application good alternative for basic flux cored wires

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	BV	DB	DNV	TUV	GL	RINA
M21	SA3,3YMHH	+	IV Y40H5	+	4Y40H5S	4YSH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	H _{DM} ml/100g
M21	0.04	1.5	0.4	0.012	0.020	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)			
						-29°C	-30°C	-40°C	-50°C
Required: AWS A5.18			min. 400	min. 480	min. 22	min. 27			
EN ISO 17632-A			min. 460	530-680	min. 20			min. 47	
Typical values	M21	AW	480	580	27		120	110	80
	M21	SR	430	485	30				100

SR : 2h/640°C

Packaging and available sizes

Unit type	Diameter (mm)		
	1.2	1.4	1.6
4.5kg plastic spool S200	X		
14 kg spool S300 (alu. Bag)	X		
15 kg spool B300	X	X	X
25kg wire reel B435			X
200kg Accutrak® Drum	X	X	X

Outershield® MC715-H: rev. EN 23

Outershield® MC715-H

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, 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 weld metal
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	25	445	170	27-29	2.5	1.10
			890	270	29-32	5.0	1.10
			1400	355	32-34	8.1	1.10
1.6	short-arc	18	180	145	15	1.5	1.10
			205	160	16	1.7	1.10
			230	170	18	1.9	1.10
1.6	spray-arc	25	380	235	25-26	2.9	1.10
			635	325	29-32	5.0	1.10
			890	400	34-37	7.0	1.10
			1145	460	36-38	9.1	1.10

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	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		

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® MC460VD-H

Mild steel metal cored wire

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
Very low hydrogen ($H_{DM} < 5 \text{ ml/100g}$)

Welding positions



Current type/Shielding gas (ISO 14175)

DC - for all welding positions
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	ABS	BV	DNV	GL	LR
M21	3YSA,H5	SA3YMH5H	IIIYMSH5	3YH5S	3S,3YSH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	$H_{DM} \text{ ml/100g}$
M21	0.05	1.25	0.6	0.015	0.015	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength	Tensile strength	Elongation	Impact ISO-V (J)	
			(N/mm ²)	(N/mm ²)	(%)	-20°C	-29°C
Required: AWS A5.18			min. 400	min. 480	min. 22		min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47	
Typical values	M21	AW	510	600	25	90	60

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® MC460VD-H: rev. EN 23

Outershield® MC460VD-H

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	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 weld metal
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	PG/3F down	PG/3G down	PE/4F
1.2	250 - 300A	250 - 300A	200-220A	200-220A
	26-30V	26-30V	21-24V	23-25V

Outershield® MC420N-H

Metal cored wire for applications that need to be normalized

Classification

A5.28/A5.28M : E70C-GM H4
EN ISO 17632-A : T 38 Z Z 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

Very low hydrogen ($H_{DM} < 5 \text{ ml/100g}$)

Only to be used in normalized condition!

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type/Shielding gas (ISO 14175)

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	Cr	Ni	$H_{DM} \text{ ml/100g}$
M21	0.03	0.6	0.45	0.017	0.023	0.03	2.9	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) -50°C
Typical values N = 900°C/4h	M21	N	353	493	32	57

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
15 kg spool B300	X	X
200kg Accutrak® Drum		X

Outershield® MC420N-H: rev. EN 24

Outershield® MC420N-H

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 weld metal
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/3G up	PE/4G
1.2	230-380A	230-380A	230-300A	130-170A	140-175A
	26-36V	26-36V	26-30V	15-17V	16-17V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 81Ni1C-H

Low temperature rutile cored wire

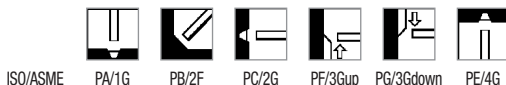
Classification

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 >47J at -40°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meet NACE MR-0175 requirements

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
C1	0.05	1.4	0.2	0.013	0.010	0.95	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
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47
Typical values	C1	AW	530	600	24	80

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 81Ni1C-H: rev. EN 01

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 weld metal
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/3G up	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® 81Ni1-H

Low temperature rutile cored wire

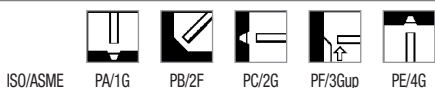
Classification

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)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meet NACE MR-0175 requirements
For PWHT, use Outershield 81Ni1-HSR

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	BV	DNV	GL	LR	RINA
M21	SA3,3YMH	IVYMSH5	4YH10S	4Y40SH5	4YSH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H_{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	0.95	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)	
						-40°C	-50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-A			min. 500	560-720	min. 18		min. 47
Typical values	M21	AW	530	600	24	90	60

Packaging and available sizes

Unit type	Diameter (mm)			
	1.2	1.4	1.6	2.0
4.5kg plastic spool S200	X			
14 kg spool S300 (alu. Bag)	X			
15 kg spool B300	X	X	X	
15 kg spool BS300			X	X
25kg wire reel B435			X	

Outershield® 81Ni1-H: rev. EN 25

Outershield® 81Ni1-H

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 weld metal
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/3G up	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

Low temperature rutile cored wire

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)
Very low hydrogen ($H_{DM} < 5$ ml/100g)
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/3Gup



PE/4G

Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 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	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	0.95	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength	Tensile strength	Elongation	Impact ISO-V (J)	
			(N/mm ²)	(N/mm ²)	(%)	-40°C	-50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-A			min. 500	560-720	min. 18		min. 47
Typical values	M21	SR	525	590	25		70
		AW	530	600	24	20	60
SR 1h/600°C, 3G up - V45°							

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5kg plastic spool S200	X	
14 kg spool S300 (alu. Bag)	X	X
15 kg spool S300	X	
15 kg spool B300	X	

Outershield® 81Ni1-HSR: rev. EN 24

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

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 weld metal
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/3G up	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-H

Low temperature rutile cored wire

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)
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
For PWHT, use Outershield 81K2-HSR

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	LR	RINA	RMRS
M21	IVY46MSH5	4Y40SH5	4YS	4Y50SH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
M21	0.04	1.4	0.2	0.012	0.010	1.4	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)		
						-40°C	-50°C	-60°C
Required: A5.29			min. 470	550-690	min.19	min. 27		
EN ISO 17632-A			min. 500	560-720	min.18			min. 47
Typical values	M21	AW	590	630	23	130	100	80

Packaging and available sizes

Unit type	Diameter (mm)		
	1.2	1.6	2.0
4.5kg plastic spool S200	X		
14 kg spool S300	X		
15 kg spool B300	X		
25kg wire reel B435		X	X
200kg Accutrak® Drum	X		

Outershield® 81K2-H: rev. EN 24

Outershield® 81K2-H

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 weld metal
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/3G up	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
	24-32V	24-32V	24-32V	24-28V	22-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 81K2-HSR

Low temperature rutile cored wire

Classification

AWS A5.29 : 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)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type/Shielding gas (ISO 14175)

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	H _{DM} ml/100g
M21	0.06	1.3	0.3	0.012	0.010	1.4	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)		
						-40°C	-50°C	-60°C
Required: A5.29			min. 470	550-690	min.19	min. 27		
EN ISO 17632-A			min. 500	560-720	min.18			min. 47
Typical values	M21	SR	570	620	24			85
		AW	590	630	23	140	100	80

SR 1h/600°C, 3G up - V45°

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 81K2-HSR: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 81K2-HSR

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, S500Q, 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 weld metal
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/3G up	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® 500CT-H

Weather resistant rutile cored wire

Classification

AWS A5.29/A5.29M : E81T1-9G-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)

Very low hydrogen (H_{DM} <5 ml/100g)

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



Current type/Shielding gas (ISO 14175)

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	Cu	H _{DM} ml/100g
M21	0.04	1.3	0.2	0.014	0.010	0.84	0.39	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) -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	not required
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47
Typical values	M21	AW	580	610	23	80

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 500CT-H: rev. EN 24

Outershield® 500CT-H

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 42W
ASTM A242	Type 1
ASTM A580	Grade A
ASTM A595	Grade C
ASTM A709	Grade HPS 50W & HPS 70W
ISO 5952	HSA 355W1 & W2

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 weld metal
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/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 555CT-H

Weather resistant rutile cored wire

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)

Very low hydrogen ($H_{DM} < 5$ ml/100g)

Superior product consistency with optimal alloy control

Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

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	Cr	Ni	Cu	H _{DM} ml/100g
M21	0.03	1.1	0.4	0.015	0.010	0.55	0.60	0.55	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) -30°C -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 47
EN ISO 17632-B			min. 460	550-740	min. 17	min. 47
Typical values	M21	AW	600	660	20	140 100

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 555CT-H: rev. EN 01

Outershield® 555CT-H

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 42W
ASTM A242	Type 1
ASTM A580	Grade A
ASTM A595	Grade C
ASTM A709	Grade HPS 50W & HPS 70W
ISO 5952	HSA 355W1 & W2
ISO 5952	HSA 355W1 & W2

Weather resistant steels like Cor-Ten®, Patinax®-F, Patinax®-37 and similar Ni, Cr 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 weld metal
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/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 91Ni1-HSR

Low temperature rutile cored wire

Classification

AWS A5.29 : 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
Very low hydrogen ($H_{DM} < 5$ ml/100g)
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



Current type/Shielding gas (ISO 14175)

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	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	0.95	0.4	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
Required: AWS A5.29			min. 540	620-760	min. 17	min. 27
ISO 18276-A			min. 550	640-820	min. 18	min. 47
Typical values	M21	AW	640	700	19	60

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 91Ni1-HSR: rev. EN 04

Outershield® 91Ni1-HSR

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 weld metal
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/3G up	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

Low temperature rutile cored wire

Classification

AWS A5.29 : 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
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures

Welding positions



Current type/Shielding gas (ISO 14175)

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	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	1.4	0.4	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
Required: AWS A5.29			min. 540	620-760	min. 17	min. 27	
ISO 18276-A			min. 550	640-820	min. 18		min. 47
Typical values	M21	AW	640	700	19		60

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 91K2-HSR: rev. EN 04

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 91K2-HSR

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, 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 weld metal
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/3G up	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® 550-H

High strength rutile cored wire

Classification

AWS A5.29/A5.29M : E101T1-K3M-JH4
ISO 18276-A : T 55 4 Z P M 1 H5

General description

All position gas shielded rutile flux cored wire, for high strength steel grades for welding pipes and plates

Outstanding operator appeal

Excellent mechanical properties (CVN >50J at -40°C)

Very low hydrogen (H_{DM} <5 ml/100g)

Superior product consistency with optimal alloy control

Good wire feeding

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PG/3Gdown



PE/4G



PF/5Gup



PG/5Gdown

ISO/ASME

Current type/Shielding gas (ISO 14175)

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	H _{DM} ml/100g
M21	0.04	1.4	0.2	0.012	0.010	2.0	0.3	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) -40°C
Required: AWS A5.29			min. 610	690-800	min.16	min. 27
ISO 18276-A			min. 550	640-820	min.18	min. 47
Typical values	M21	AW	700	730	19	60

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 550-H: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 550-H

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API 5LX	X52, X60, X60, X65, X70, X80
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Fine grained steel

EN 10025 part 6	S460Q, S460QL1, S500Q, S500QL1, S550Q, S550QL1
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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 weld metal
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/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V

High strength rutile cored wire

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
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Outstanding operator appeal
Excellent mechanical properties (CVN >50J at -40°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Good wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas ABS
M21 AWS

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.5	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)		
						-29°C	-40°C	-46°C
Required: A5.29			min. 680	760-900	min.15	min. 27		
ISO 18276-A			min. 690	770-940	min.17		min. 47	
Typical values	M21	AW	800	830	17	75	60	50

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5kg plastic spool S200	X	
14 kg spool S300	X	
15 kg spool B300	X	X
15 kg spool BS300	X	X

Outershield® 690-H: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 690-H

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 weld metal
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/3G up	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

High strength rutile cored wire

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

Outstanding operator appeal

Excellent mechanical properties (CVN >50J at -40°C)

Very low hydrogen ($H_{DM} < 5$ ml/100g)

Superior product consistency with optimal alloy control

Good wire feeding

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type/Shielding gas (ISO 14175)

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	H _{DM} ml/100g
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.5	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)		
						-29°C	-30°C	-40°C
Required: AWS A5.29			min. 680	760-900	min.15	min.27		
ISO 18276-A			min. 690	770-970	min.17			min.47
Typical values	M21	SR	720	770	20			60
		AW	740	790	19	75	70	

SR: 1h/580°C, 3G up - V60°

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5kg plastic spool S200	X	
15 kg spool B300	X	X

Outershield® 690-HSR: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 690-HSR

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 weld metal
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/3G up	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® 101Ni1-HSR

High strength rutile cored wire

Classification

AWS A5.29/A5.29M : E101T1-G

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)

Very low hydrogen ($H_{DM} < 5$ ml/100g)

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/3Gup



PE/4G

Current type/Shielding gas (ISO 14175)

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	H _{DM} ml/100g
M21	0.06	1.8	0.3	0.013	0.010	0.95	0.4	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) -50°C
Required: AWS A5.29	M21	AW	610	690-830	16	27
Typical values	M21	AW	730	810	17	43
		SR	660	760	18	46

SR: 4h/645°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 101Ni1-HSR: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 101Ni1-HSR

Materials to be welded

Steel grades/Standard	Type
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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 weld metal
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/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Creep resistant rutile cored wire

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
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Mo	H _{DM} ml/100g
M21	0.065	0.8	0.2	0.014	0.010	0.46	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	-20°C
Required: AWS A5.29		SR ¹⁾	min. 470	550-690	min. 19	not required	
EN 17634-A		SR ²⁾	min. 355	min. 510	min. 22	47	
Typical values	M21	SR ³⁾	540	600	27	160	79

Stress relieving: SR¹⁾ = 620 ± 15°C/1h, SR²⁾ = 570-620°C/1h, SR³⁾ = 1h/620°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 12-H: rev. EN 24

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	P295 G H, P355 G H, 16 Mo 3 & similar alloys
EN 10222-2	17 Mo 3, 14 Mo 6 & 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 weld metal
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/3G up	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

Creep resistant rutile cored wire

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
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Cr	Mo	H _{DM} ml/100g
M21	0.06	0.74	0.24	0.013	0.010	1.24	0.52	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	-20°C
Required: AWS A5.29		SR ¹⁾	min. 470	550-690	min. 19	not required	
EN 17634-A		SR ²⁾	min. 355	min. 510	min. 20	47	
Typical values	M21	SR ³⁾	545	635	21	160	75

Stress relieving: SR¹⁾ = 690 ± 15°C/1h, SR²⁾ = 660-700°C/1h, SR³⁾ = 1h/690°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 19-H: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	13 CrMo 4-5 & similar alloys
EN 10083-1	25 CrMo 4 & similar alloys
EN 10222-2	14 CrMo 4-5 & 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	16 MnCr 5 & 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 weld metal
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/3G up	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: 660-700°C
 Time depends on material thickness

Outershield® 20-H

Creep resistant rutile cored wire

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
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Cr	Mo	H _{DM} ml/100g
M21	0.06	0.75	0.21	0.013	0.008	2.23	1.09	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	-20°C
Required: AWS A5.29		SR ¹⁾	min. 540	620-760	min. 17	not required	
EN 17634-A		SR ²⁾	min. 400	min. 500	min. 18	47	
Typical values	M21	SR ³⁾	570	680	19	160	60

Stress relieving: SR¹⁾ = 690 ± 15°C/1h, SR²⁾ = 690-750°C/1h, SR³⁾ = 1h/690°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 20-H: rev. EN 23

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Outershield® 20-H

Materials to be welded

Steel grades/Standard	Type
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Creep and hydrogen resistant steels

EN 10028-2	10 CrMo 9-10 & similar alloys
EN 10222-2	12 CrMo 9-10 & 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 weld metal
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/3G up	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

Self-shielded cored wire

Classification

AWS A5.20/A5.20M : E71T-14

General description

Self shielded: easiest equipment arrangement

Welding galvanized steel

Single pass automatic and semi-automatic

Recommended for sheets from 1.2 to 5.0mm

Welding positions



ISO/ASME



PA/1G



PC/2G



PG/3Gdown



PG/5Gdown

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

Unit type	Diameter (mm)
	1.6
22.68 kg coil 50C	X

Innershield® NR®-152: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Innershield® NR®-152

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 t/m 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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position		
		PA/1G	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

Innershield® NR®-203 NiC

Self-shielded cored wire

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/3Gup



PG/3Gdown



PF/5Gup



PG/5Gdown

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 (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J) -29°C
Required:	AWS A5.29	min. 340	410-550	22	27
Typical values	AW	400	490	29	95

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
6.35 kg coil 14C	X
22.68 kg coil 50C	X

Innershield® NR®-203 NiC: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Innershield® NR®-203 NiC

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position				
		PA/1G PB/2F	PC/2G	PF/3G up PF/5G up	PG/5G down PG/5G down	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, offshore

Innershield® NR®-203Ni1

Self-shielded cored wire

Classification

AWS A5.29/A5.29M : E71T8-Ni1
EN ISO 17632-A : T 42 3 1Ni Y N 1

General description

Self shielded: easiest equipment arrangement
All position welding
Easy to weld in vertical up position
All passes
Good impact and CTOD toughness

Welding positions



Current type

DC -

Approvals

ABS	BV	DNV	GL	LR	RINA	TÜV
3SA,3YSA	SA3YMMH	IIYMSH10	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/mm ²)	Tensile strength (N/mm ²)	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

Unit type	Diameter (mm)	
	2.0	2.4
6.35 kg coil 14C	X	
22.68 kg coil 50C	X	X

Innershield® NR®-203Ni1: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Innershield® NR®-203Ni1

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position					
		PA/1G	PB/2F	PC/2G	PF/3G up	PF/5G up	PG/3G down PG/5G down
2.0	Wire feed speed (cm/min.)	280	330	230	200	200	200
	Current (A)	255	300	235	215	215	215
	Voltage (V)	21	22	20	19	19	18
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, offshore
 For semi- and full automatic welding

Innershield® NR®-211-MPE

Self-shielded cored wire

Classification

AWS A5.20/A5.20M : E71T-11

General description

Self shielding: easiest equipment arrangement

General purpose welding

Easy handling and welding versatility

Recommended for sheets from 2.5 to 12mm

With electrode diameter 0.9mm: excellent for sheets from 1.2mm

Welding positions



ISO/ASME



PA/1G



PB/2F



PC/2G



PF/3Gup



PG/3Gdown



PE/4G



PG/5Gdown

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/mm ²)	Tensile strength (N/mm ²)	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

Unit type	Diameter (mm)			
	0.9	1.2	1.7	2.0
6.35 kg coil 14C	X	X		
6.35 kg coil 14C			X	X
11.34 kg coil 22RR	X	X		
22.68 kg coil 50C			X	X

Remarks/ Application advice

Fabricating and repair of machinery parts, truck bodies, saddles, tanks, hoppers, etc.

Racks, scaffolding, light angle structurals, joints, small roundabouts, etc.

Short assembly welds on brackets, dips, etc.

Galvanized steel

Innershield® NR®-211-MPE: rev. EN

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Innershield® NR®-211-MPE

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position				
		PA/1G PB/2F	PC/2G	PF/3G up	PG/3G down PG/5G down	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

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Innershield® NR®-232

Self-shielded cored wire

Classification

AWS A5.20/A5.20M : E71T-8

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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type

DC -

Approvals

ABS	BV	DNV	LR	RINA	TÜV	NKK
3SA,3YSAH15	SA3YMH	IIYMSH15	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

Unit type	Diameter (mm)		
	1.7	1.8	2.0
6.12 kg coil 14C	X	X	X
22.68 kg coil 50C	X	X	X

Innershield® NR®-232: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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
1.8	12-25	200	130	17	1.5	1.22
		430	250	21	2.9	1.22
		730	350	24	5.0	1.22
2.0	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 position				
		PA/1G	PB/2F	PC/2G	PF/3G up	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-pass 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

Self-shielded cored wire

Classification

AWS A5.20/A5.20M E71T-8

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



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

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/mm ²)	Tensile strength (N/mm ²)	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

Unit type	Diameter (mm)	
	1.6	1.8
5,7kg plastic spool	X	
11,3 kg plastic spool Foil Bag	X	X

Innershield® NR®-233: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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

Self-shielded cored wire

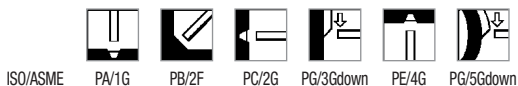
Classification

AWS A5.29/A5.29M : E71T8-K6

General description

Self shielded: easiest equipment arrangement
Vertical down filling semi-automatic pipe welding
High quality construction welding in all positions
Good impact and CTOD toughness

Welding positions



Current type

DC -

Approvals

BV	DNV	GL	TÜV
SA3YMH	IIYMSH15	3YH15S	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al
0.07	0.9	0.20	0.005	0.003	0.85	1.0

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	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

Unit type	Diameter (mm)	
	1.7	2.0
6.35 kg coil 14C	X	X
22.68 kg coil 50C		X

Innershield® NR®-207: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Innershield® NR®-207

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position			
		PA/1G PB/2F	PC/2G	PG/3G down PG/5G down	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

Remarks/ Application advice

High productivity welding
Where arctic mechanical properties are required in general construction welding
Semi-automatic pipe welding

Innershield® NR®-207-H

Self-shielded cored wire

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



PA/1G



PB/2F



PC/2G



PG/3Gdown



PE/4G



PG/5Gdown

ISO/ASME

Current type

DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al
0.07	0.9	0.20	0.005	0.003	0.85	1.0

Mechanical properties, typical, all weld metal

		Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	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

Unit type	Diameter (mm)
	1.7
6.35 kg coil 14C	X

Innershield® NR®-207-H: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Innershield® NR®-207-H

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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

Self-shielded cored wire

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 ($H_{DM} < 8 \text{ ml/100g}$)

Welding positions



ISO/ASME PG/5Gdown

Current type

DC -

Approvals

TÜV

+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Al	Ni
0.05	1.65	0.25	0.007	<0.003	0.85	0.8

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J) -30°C
Required:	AWS A5.29	min. 540	620-760	17	
Typical values	AW (1G)	585	650	26	115

Packaging and available sizes

Unit type	Diameter (mm)	
	1.7	2.0
6.35 kg coil 14C	X	X

Innershield® NR®-208-H: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

Innershield® NR®-208-H

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API5LX	X60, X70
EN 10208-2	L 415, L445, L480, L550

Calculation data at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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

Self-shielded cored wire

Classification

AWS A5.20/A5.20M : E70T-6

General description

NR-305 is a self-shielded flux cored wire

Not intended for out-of-position welding, but can be used on 15° max. downhill and 5° max. uphill applications

High deposit rates and fast travel speed

Easy handling

Recommended for maximum productivity, downhand welding

Welding positions



ISO/ASME



PA/1G

PB/2F

Current type

DC +

Approvals

ABS	BV	DNV
2SA,2YSA	SA2YMH	IYMS

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Al
0.09	0.9	0.20	0.007	0.008	0.80

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	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

Unit type	Diameter (mm)		
	1.7	2.0	2.4
22.68 kg coil 50C	X	X	X

Innershield® NR®-305: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Innershield® NR®-305

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position	
		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

Self-shielded cored wire

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/3Gdown

Current type

DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Al
0.27	0.40	0.08	0.007	0.005	1.5

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	min. 400	480	22	not required
Typical values	AW	430	590	24	

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.4
6.35 kg coil 14C	X	
22.68 kg coil 50C		X

Innershield® NR®-311: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Innershield® NR®-311

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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	4100	28	7.1	1.28

Welding parameters, optimum fill passes

Diameter (mm)		Welding position			
		PA/1G	PB/2F	PC/2G	PG/3G down
2.0	Wire feed speed (cm/min.)	610	510	410	380
	Current (A)	355	320	280	260
	Voltage (V)	26	26	25	25

Remarks/ Application advice

Horizontal butt welds such as column structural connections

Fillet and lap welds in the flat horizontal and downhill positions

Deep groove welds. The penetration and extremely easy slag removal permit using a narrow gap and small bevel angle to minimize the total amount of

Innershield® NR®-400

Self-shielded cored wire

Classification

AWS A5.29/A5.29M : E71T8-K6

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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type

DC -

Approvals

BV	LR	TÜV
SA3YMH	3S,3YSH15	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Cr	Al
0.06	0.74	0.17	0.004	0.002	0.75	0.13	0.74

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

Unit type	Diameter (mm)
	2.0
6.35 kg coil 14C	X
22.68 kg coil 50C	X

Innershield® NR®-400: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Innershield® NR®-400

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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 position			
		PA/1G	PC/2G	PF/3G(up) PF/5G(up)	PE/4G
2.0	Wire feed speed (cm/min.)	280	230	200	200
	Current (A)	265	225	190	190
	Voltage (V)	20	19	18	18

Remarks/ Application advice

Off-shore oil equipment, piping, storage tanks
General plate fabrication including bridge construction on ships and barges
Circumferential groove welds for heavy wall, large diameter tubular construction

Innershield® NR®-450-H

Self-shielded cored wire

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/3Gup



PE/4G



PF/5Gup

Current type

DC -

Approvals

ABS	GL	LR
3SA,3YSAH10	3YSH10	3S,3YSH10

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al
0.07	0.26	0.06	0.004	0.002	2.44	0.88

Mechanical properties, typical, all weld metal

		Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J)	
						-29°C	-40°C
Required:	AWS A5.29		min. 400	480-620	20	27	
Typical values		AW	500	570	28	88	84

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
6.35 kg coil 14C	X

Innershield® NR®-450-H: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Innershield® NR®-450-H

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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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

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®-550-H

Self-shielded cored wire

Classification

AWS A5.29/A5.29M : E81T8-Ni2 H8

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/3Gup



PE/4G



PF/5Gup

Current type

DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al
0.05	1.14	0.07	0.010	0.003	2.35	0.7

Mechanical properties, typical, all weld metal

		Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J)	
						-18°C	-29°C
Required:	AWS A5.29		min. 400	480-620	20		27
Typical values		AW	490	585	25	113	100

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
6.35 kg coil 14C	X

Innershield® NR®-550-H: rev. EN 22

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Innershield® NR®-550-H

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 t/m 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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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

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

Self-shielded cored wire

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 %	Impact ISO-V(J)
Required:	AWS A5.20	460	530-670	22	not required
Typical values	AW	470	640	27	

Packaging and available sizes

Unit type	Diameter (mm)		
	2.0	2.4	3.0
6.35 kg coil 14C	X		
12.5 kg coil 25RR	X		
22.68 kg coil 50C	X	X	X

Innershield® NS®-3ME: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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	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 at normal setting

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. 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
2.0	95	530	450	35	11.3	1.23
		900	600	38	17.9	1.23

Welding parameters, optimum fill passes

Diameter (mm)		Welding position	
		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

Stainless steel rutile cored wire

Classification

AWS A5.22 : E308LT0-1/-4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	LR	TÜV
M21	308LMS	4550S		+
C1	308LMS		304L	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
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 17663-A			not required min. 320	min. 520 min. 510	min. 35 min. 30	
Typical values	M21/C1	AW	400	560	42	80 40

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
5 kg plastic spool S200	X	
15 kg spool S300	X	X

Cor-A-Rosta 304L: rev. EN 23

Cor-A-Rosta 304L

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%)					
	X2 CrNi 19 11		1.4306	(TP)304L CF-3	S30403 J92500
	X2 CrNiN 18 10		1.4311	(TP)304LN 302,304	S30453 S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18 10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Welding parameters, optimum fill passes in shielding gas M21/C1

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

Use for positional welding: Cor-A-Rosta P304L

Stainless steel rutile cored wire

Classification

AWS A5.22 : E308LT1-1/-4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+
C1			pending

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
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			not required	min. 520	min. 35		
ISO 17663-A			min. 320	min. 510	min. 30		
Typical values	M21/C1	AW	400	560	42	80	40

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta P304L: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta P304L

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%)					
	X2 CrNi 19 11		1.4306	(TP)304L CF-3	S30403 J92500
	X2 CrNiN 18 10		1.4311	(TP)304LN 302,304	S30453 S30400
Medium carbon (C >0.03%)					
	X4 CrNi 18 10		1.4301	(TP)304	S30409
		GX5 CrNi 19 10	1.4308	CF 8	J92600
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321 (TP)321H	S32100 S32109
	X6 CrNiNb 18 10		1.4550	(TP)347 (TP)347H	S34700 S34709
		GX5 CrNiNb 19 10	1.4552	CF-8C	J92710

Welding parameters, optimum fill passes in shielding gas M21/C1

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

Use for downhand welding: Cor-A-Rosta 304L

Stainless steel rutile cored wire

Classification

AWS A5.22 : E347T1-1
ISO 17663-A : T 19 9 Nb R 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
Amount : 15-25 l/min

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
M21/C1	0.05	1.4	0.6	19.5	10	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			not required	min. 520	min. 30	
ISO 17663-A			min. 350	min. 550	min. 25	
Typical values	M21	AW	435	600	42	90

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta 347: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta 347

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Ti-, Nb stabilized					
	X6 CrNiTi 18 10		1.4541	(TP)321	S32100
				(TP)321H	S32109
	X6 CrNiNb 18 10		1.4550	(TP)347	S34700
				(TP)347H	S34709
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710
Non stabilized					
	X4CrNi 18-10		1.4301	302	
				(TP)304	S30400
	X2CrNi 19-11		1.4306	(TP)304L	S30403
		GX5 CrNi 19-10	1.4308	CF-8	J92600
			1.4312		
				(TP)304H	S30409

Welding parameters, optimum fill passes in shielding gas M21

Diameter (mm)	Welding positions		
	PA/1G	PB/2F	PC/2G
1.2	100-250A	100-250A	100-200A

Stainless steel rutile cored wire

Classification

AWS A5.22 : E316LT0-1/ -4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	BV	DNV	GL	LR	TÜV
M21		308LMS	4550S		+
C1	316L	316LMS		316L	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C -110°C
Required: AWS A5.22 ISO 17663-A			not required min. 320	min. 485 min. 510	min. 30 min. 25	
Typical values	M21/C1	AW	440	580	38	70 40

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
15 kg spool S300	X	X

Cor-A-Rosta 316L: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta 316L

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
		GX5 CrNiMo 19-11	1.4408	CF 8M	J92900
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
		GX5 CrNiNb 19-10	1.4552	CF-8C	J92710

Welding parameters, optimum fill passes in shielding gas M21/C1

Diameter (mm)	Welding positions	
	PA/1G	PB/2F
1.2	100-250A	100-250A
1.6	140-300A	140-300A

Remarks/ Application advice

Use for positional welding: Cor-A-Rosta P316L

Stainless steel rutile cored wire

Classification

AWS A5.22 : E316LT1-1/-4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+
C1	316LMS		pending

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
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 17663-A			not required min. 320	min. 485 min. 510	min. 30 min. 25		
Typical values	M21/C1	AW	440	580	38	70	40

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
5 kg plastic spool S200	X
15 kg spool S300	X

Cor-A-Rosta P316L: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta P316L

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%)					
	X2 CrNiMo 17-12-2		1.4404	(TP)316L CF-3M	S31603 J92800
	X2 CrNiMo 18-14-3		1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2		1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3		1.4429		
Medium carbon (C >0.03%)					
	X4 CrNiMo 17-12-2		1.4401	(TP)316	S31600
	X4 CrNiMo 17-13-3		1.4436		
Ti-, Nb stabilized					
	X6 CrNiMoTi 17-12-2		1.4571	316Ti	S31635
	X6 CrNiMoNb 17-12-2		1.4580	316Cb	S31640
	X6 CrNiNb 18-10		1.4550	(TP)347	S34700
	GX5 CrNiNb 19-10		1.4552	CF-8C	J92710

Welding parameters, optimum fill passes in shielding gas M21/C1

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

Use for downhand welding: Cor-A-Rosta 316L

Stainless steel rutile cored wire

Classification

AWS A5.22 : E309LT0-1/-4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	BV	DNV	GL	LR	TÜV
M21		308LMS	4550S		+
C1	309L	309LMS		SS/CMn	pending

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
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 17663-A			not required min. 320	min. 520 min. 510	min. 30 min. 25	
Typical values	M21/C1	AW	445	560	36	45 40

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
5 kg plastic spool S200	X	
15 kg spool S300	X	X

Cor-A-Rosta 309L: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta 309L

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
	X2 CrNi 19-11	1.4306	(TP)304L	S30403
			CF-3	J92500
	X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to CrNi or CrNiMo stainless steel)

Build-up welding on mild and low alloyed steel

Welding parameters, optimum fill passes in shielding gas M21/C1

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

Use for positional welding: Cor-A-Rosta P309L

Stainless steel rutile cored wire

Classification

AWS A5.22 : E309LT1-1/-4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+
C1	309LMS		pending

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	FN (acc. WRC 192)
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 17663-A			not required min. 320	min. 520 min. 510	min. 30 min. 25	
Typical values	M21/C1	AW	445	560	36	65 55

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
5 kg plastic spool S200	X
15 kg spool S300	X

Cor-A-Rosta P309L: rev. EN 24

Cor-A-Rosta P309L

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiN 18-10	1.4311	(TP)304LN	S30453
X2 CrNi 19-11	1.4306	(TP)304L	S30403
		CF-3	J92500
X4 CrNi 18-10	1.4301	(TP)304	S30400

Dissimilar metals (mild and low alloyed steel to CrNi or CrNiMo stainless steel)

Build-up welding on mild and low alloyed steel

Welding parameters, optimum fill passes in shielding gas M21/C1

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

Use for downhand welding: Cor-A-Rosta 309L

Cor-A-Rosta 309MoL

Stainless steel rutile cored wire

Classification

AWS A5.22 : E309LMoT0-1/-4
ISO 17663-A : T 23 12 2 L R C/M 3

General description

Gas shielded flux cored high CrNiMo alloyed wire electrode for downhand welding

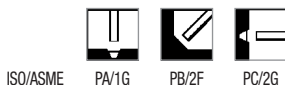
High Corrosion resistant deposit

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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	BV	DNV	GL	LR	TÜV
M21		308LMS	4550S		+
C1	UP	309MoLMS		SS/CMn	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.22			not required	min. 520	min. 25	
ISO 17663-A			min. 350	min. 550	min. 25	
Typical values	M21/C1	AW	550	700	30	50

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
15 kg spool S300	X	X

Cor-A-Rosta 309MoL: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta 309MoL

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
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Corrosion resistant cladsteels

X2 CrNiMo 17-12-2	1.4404	(TP)316L CF-3M	S31603 J92800
X2 CrNiMo 18-14-3	1.4435	(TP)316L	S31603
X2 CrNiMoN 17-11-2	1.4406	(TP)316LN	S31653
X2 CrNiMoN 17-13-3	1.4429		
X4 CrNiMo 17-13-3	1.4436		
X6 CrNiMoTi 17-12-2	1.4571	316Ti	S31635
X10 CrNiMoTi 17-3	1.4573	316Ti	S31635
X6 CrNiMoNb 17-12-2	1.4580	316Cb	S31640

Welding dissimilar metals: mild steel or low alloyed steel to stainless CrNi or CrNiMo-steel up to max. thickness of 12 mm.

Build-up welding on mild and low alloyed steel

Welding parameters, optimum fill passes in shielding gas M21/C1

Diameter (mm)	Welding positions		
	PA/1G	PB/2F	PC/2G
1.2	100-250A	100-250A	100-200A

Remarks/ Application advice

Use for positional welding Cor-A-Rosta P309MoL

Cor-A-Rosta P309MoL

Stainless steel rutile cored wire

Classification

AWS A5.22 : E309LMoT1-1/-4
ISO 17663-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



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) +20°C
Required: AWS A5.22			not required	min. 520	min. 25	
ISO 17663-A			min. 350	min. 550	min. 25	
Typical values	M21/C1	AW	525	675	34	45

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta P309MoL: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta P309MoL

Materials to be welded

Steel grades	EN 10088-1/-2	Mat. Nr	ASTM/ACI A240/A312/A351	UNS
Corrosion resistant cladsteels				
	X2 CrNiMo 17-12-2	1.4404	(TP)316L	S31603
			CF-3M	J92800
	X2 CrNiMo 18-14-3	1.4435	(TP)316L	S31603
	X2 CrNiMoN 17-11-2	1.4406	(TP)316LN	S31653
	X2 CrNiMoN 17-13-3	1.4429		
	X4 CrNiMo 17-13-3	1.4436		
	X6 CrNiMoTi 17-12-2	1.4571	316Ti	S31635
	X10 CrNiMoTi 17-3	1.4573	316Ti	S31635
	X6 CrNiMoNb 17-12-2	1.4580	316Cb	S31640

Welding dissimilar metals: mild steel or low alloyed steel to stainless CrNi or CrNiMo-steel up to max. thickness of 12 mm.

Build-up welding on mild and low alloyed steel

Welding parameters, optimum fill passes in shielding gas M21/C1

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

Use for downhand welding Cor-A-Rosta 309MoL

Stainless steel rutile cored wire

Classification

AWS A5.22 : E2209T0-1/-4
ISO 17663-A : T 22 9 3 N L R 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



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

Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	N	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
						-20°C	-50°C
Required: AWS A5.22			not required	min. 520	min. 25		
ISO 17663-A			min. 350	min. 550	min. 25		
Typical values	M21	AW	630	800	29	40	30

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta 4462: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta 4462

Materials to be welded

Steel grades	EN 10088-1/-2/-4	Mat. Nr	ASTM / ACI A240	UNS
Duplex stainless steels				
	X2 CrNiMoN 22 -5-3	1.4462		S31803
		1.4417		S31500
	X3 CrNiMoN 27-5-2	1.4460		S31200
	X2 CrNiN 23-4	1.4362		S32304
	X2 CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloyed steel to duplex stainless steel

Welding parameters, optimum fill passes in shielding gas M21

Diameter (mm)	Welding positions		
	PA/1G	PB/2F	PC/2G
1.2	100-250A	100-250A	100-200A

Remarks/ Application advice

Use for positional welding Cor-A-Rosta P4462
Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Stainless steel rutile cored wire

Classification

AWS A5.22 : E2209T1-1/-4
ISO 17663-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

M21 shielding gas is recommended

Welding positions



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

ISO/ASME

Current type/Shielding gas (ISO 14175)

DC +

M21 : Mixed gas Ar+ (>15-25%) CO₂

Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	N	FN (acc. WRC 192)
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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -20°C -50°C
Required: AWS A5.22			not required	min. 690	min. 20	
ISO 17663-A			min. 450	min. 550	min. 20	
Typical values	M21	AW	630	800	29	65 55

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta P4462: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta P4462

Materials to be welded

Steel grades	EN 10088-1/-2/-4	Mat. Nr	ASTM / ACI A240	UNS
Duplex stainless steels				
	X2 CrNiMoN 22 -5-3	1.4462		S31803
		1.4417		S31500
	X3 CrNiMoN 27-5-2	1.4460		S31200
	X2 CrNiN 23-4	1.4362		S32304
	X2 CrMnNi21-5-1	1.4162		S32101

Dissimilar joints such as un- and low alloyed steel to duplex stainless steel

Welding parameters, optimum fill passes in shielding gas M21/C1

Diameter (mm)	Welding positions			
	PA/1G	PB/2F	PC/2G	PF/3G up
1.2	100-250A	100-250A	100-200A	130-180A

Remarks/ Application advice

Use for downhand welding Cor-A-Rosta 4462
Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Stainless steel rutile cored wire

Classification

AWS A5.22 : E2209T0-4
ISO 17663-A : T 22 9 3 N L R M 3

General description

Gas shielded flux cored wire electrode for duplex stainless steel welding in downhand position

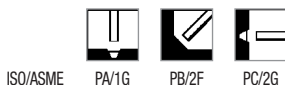
Excellent weldability

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

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
M21/C1	0.03	1.3	0.6	20	10	3.1	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
Required: AWS A5.22		not required	min. 520	min. 25	
ISO 17663-A		min. 350	min. 550	min. 25	
Typical		630	800	29	40

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta 2509: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta 2509

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM / ACI A276/A351/A473	UNS
Regular and super duplex stainless steels					
	X2CrNiMoN 25-7-4		1.4410		
	X4 CrNiMoN 27-5-2		1.4460		
	X2 CrNiMoN 22-5-3		1.4462	2205	S31803
		GX6 CrNiMo 24-8-2	1.4463		
				CD-4MCu	S32550
				Zeron 100	S32760

Super duplex stainless steel grades: chemical composition approximately:
24-27% Cr, 6-9% Ni, 3-4% Mo, 0.10-0.25% N alloyed also with Cu and/or W

Welding parameters, optimum fill passes in shielding gas M21

Diameter (mm)	Welding positions		
	PA/1G	PB/2F	PC/2G
1.2	100-250A	100-250A	100-200A

Remarks/ Application advice

Use for positional welding Cor-A-Rosta P2509
Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Stainless steel rutile cored wire

Classification

AWS A5.22 : E2209T1-4
ISO 17663-A : T 22 9 3 N L P C/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

M21 shielding gas is recommended

Welding positions



ISO/ASME



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G

Current type/Shielding gas (ISO 14175)

DC +

M21 : Mixed gas Ar+ (>15-25%) CO₂

Amount : 15-25 l/min

Approvals

Shielding gas	DNV	GL	TÜV
M21	308LMS	4550S	+

Chemical composition (w%) and Ferrite Number (FN), Typical, all weld metal

Shielding gas	C	Mn	Si	Cr	Ni	Mo	FN (acc. WRC 192)
M21/C1	0.03	1.3	0.6	20	10	3.1	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 -50°C
Required: AWS A5.22			not required	min. 690	min. 20	
ISO 17663-A			min. 450	min. 550	min. 20	
Typical values	M21	AW	640	790	29	65 55

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool S300	X

Cor-A-Rosta P2509: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Cor-A-Rosta P2509

Materials to be welded

Steel grades	EN 10088-1/-2	EN 10213-4	Mat. Nr	ASTM / ACI A276/A351/A473	UNS
Regular and super duplex stainless steels					
	X2CrNiMoN 25-7-4		1.4410		
	X4 CrNiMoN 27-5-2		1.4460		
	X2 CrNiMoN 22-5-3		1.4462	2205	S31803
		GX6 CrNiMo 24-8-2	1.4463		
				CD-4MCu	S32550
				Zeron 100	S32760

Super duplex stainless steel grades: chemical composition approximately:
24-27% Cr, 6-9% Ni, 3-4% Mo, 0.10-0.25% N alloyed also with Cu and/or W

Welding parameters, optimum fill passes in shielding gas M21/C1

Diameter (mm)	Welding positions			
	PA/1G	PB/2F	PC/2G	PF/3G up
1.2	100-250A	100-250A	100-200A	130-180A

Remarks/ Application advice

Use for downhand welding Cor-A-Rosta 2509
Welding with Heat-Input max. 2.5 kJ/mm
Interpass temperature max. 150°C

Hardfacing cored wire

Classification

DIN 8555 : MF1-GF-350-GPS
EN 14700 : T Fe 1

General description

Lincore 33 is a self shielded, open arc, flux cored tubular electrode designed primarily for the build-up of steel parts or as a buttering layer prior to hardfacing. Arc characteristics are excellent producing a soft low penetration arc (ideal for build-up) that exhibits low spatter levels and excellent slag removal. Although, Lincore 33 is primarily designed for the open arc operation, it may be used under a neutral flux for conditions requiring spatter elimination and removal of arc glare

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 APLs involving rolling, sliding and metal to metal wear.

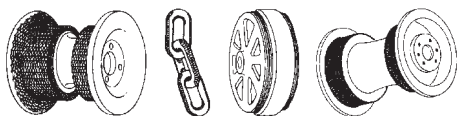
Typical applications include:

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
Shafts
Roller guides



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

Unit type	Diameter (mm)			
	1.1	1.6	2.0	2.8
6.35 kg coil 14C			X	
10 kg coil 22RR	X	X	X	
22.68 kg coil 50C			X	X

Lincore® 33: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

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.

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)	Efficiency (%)
1.1	5.1 to 12.7	80-150	25-31	1.5-3.9	80-85
1.6	3.8 to 8.9	125-225	26-32	2.1-5.0	79-84
2.0	3.2 to 6.4	200-325	23-29	3.1-6.1	87-86

Complementary products

Complementary products include Wearshield® BU30

Hardfacing cored wire

Classification

DIN 8555 : MF1-GF-400-GPS

General description

Lincore 40-O is a self shielded, open arc, flux cored tubular electrode that produces a martensitic deposit. The arc characteristics are excellent producing minimal spatter and good slag removal. Although, Lincore 40-O is primarily designed for the open arc operation, it may be used with a neutral flux for conditions requiring spatter elimination and removal of arc glare.

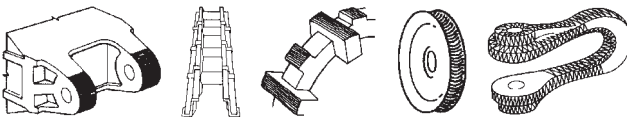
Application

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:

Bucket links
Bucket bases
Guide rolls
Tractor rollers

Actuating cams
Steel shafts
Crane wheels
Mine car wheels



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

Unit type	Diameter (mm)	
	2.0	2.8
10 kg coil 22RR	X	
22.68 kg coil 50C		X

Lincore® 40-O: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

Additional information

The area to be hardfaced should be clean and free of rust, scale, oil, grease or dirt of any kind. Any previous hardfacing deposit that has been embrittled by severe work hardening should also be removed. Irregularities such as cracks, low spots etc. should be properly repaired before hardfacing. Cold parts should be preheated to at least 40°C. Larger parts, and those made of higher alloy or higher carbon steel, should be preheated to the 100-150°C range.

Lincore 40-O deposits normally have good resistance to cross-checking. Special precautions, however, should be taken with any buildup or hardfacing product on applications 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-O.

The weld deposited, can be machined with carbide tools or can be finished by grinding.

Welding positions



ISO/ASME

PA/PG

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	Al
0.2	1.5	0.7	3.5	0.4	1.8

Structure

Martensitic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)	Efficiency (%)
2.0	3.2 to 6.4	200-325	23-29	3.1-6.1	87-86

Complementary products

Complementary products include Wearshield[®] MM40

Hardfacing cored wire

Classification

DIN 8555 : MF6-GF-50-GP

General description

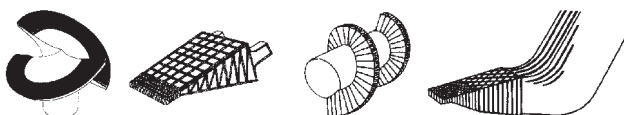
Lincore 50-O is a self shielded, open arc, flux cored tubular electrode that produces a primary austenite and austenite-carbide eutectic weld deposit. The arc characteristics are excellent producing minimal spatter and good slag removal. Although, Lincore 50 is primarily designed for the open arc operation, it may be used with a neutral flux for conditions requiring spatter elimination and removal of arc glare. The as welded deposit usually check cracks.

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 APLs involving transportation of abrasive media under heavy variable loading.

Typical applications include:

- Dipper and dredge cutter teeth
- Rock crusher hammers and mill hammers
- Rock crushers and crusher mantles
- Screw flights
- Coal mining cutters
- Conveyor buckets and rolls
- Plough shares, scraper blades and cultivator sweeps
- Truck chain and gears
- Dragline buckets, links and chains



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

Unit type	Diameter (mm)			
	1.1	1.6	2.0	2.8
10 kg coil 22RR			X	
11,34 kg coil 22RR	X	X		
22.68 kg coil 50C	X	X	X	X

Lincore® 50: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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 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.

Welding positions



ISO/ASME PA/1G

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	Al
2.2	1.2	1.0	11.0	0.5	0.6

Structure

In the as welded condition the microstructure consists mainly of primary austenite with an austenite-carbide eutectic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.1	5.1 to 15.2	120 - 250	20 - 28	1.9 - 5.8
1.6	3.8 to 8.9	175 - 365	23 - 33	2.7 - 7.9
2.0	3.2 to 6.4	210 - 380	27 - 23	3.4 - 6.8
2.8	2.0 to 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.

Hardfacing cored wire

Classification

DIN 8555 : MF2-GF-55-GP

General description

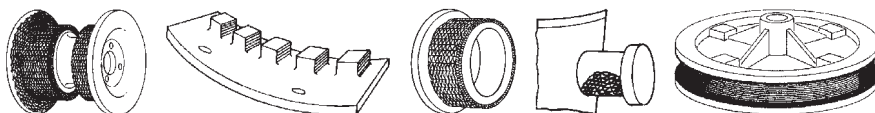
Lincore 55 is a self shielded, open arc, flux cored tubular electrode designed to provide a hardfacing overlay on new or old steel components. Although, Lincore 55 is primarily designed for the open arc operation, it may be used under a neutral flux for conditions requiring spatter elimination and removal of arc glare. A long stickout for maximum efficiency and minimum penetration.

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 APLs involving sliding, rolling and metal to metal wear, coupled with resistance to mild abrasion. Typical APLs include:

Typical applications include:

- Crane and mine car wheels
- Sprockets and gear teeth
- Skip guides
- Dredger buckets
- Scraper blades
- Transfer tables
- Cable sheaves



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

Unit type	Diameter (mm)		
	1.1	1.6	2.0
6.35 kg coil 14C			X
10 kg coil 22RR			X
11,34 kg coil 22RR	X		
22.68 kg coil 50C			X

Lincore® 55: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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.

Welding positions



ISO/ASME PA/1G

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	Al
0.45	1.4	0.55	5.3	0.8	1.4

Structure

In the as welded condition the microstructure consists mainly of martensite with some retained austenite

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)	Efficiency (%)
1.1	5.1 to 12.7	85 - 165	25 - 31	1.6 - 4.3	80 - 85
1.6	3.8 to 8.9	125 - 245	26 - 32	2.2 - 5.5	79 - 84
2.0	3.2 to 6.4	190 - 330	24 - 30	3.2 - 6.2	87 - 86

Complementary products

Complementary products include Wearshield® MM and Wearshield® MI(e).

Hardfacing cored wire

Classification

DIN 8555 : MF10-GF-60-CG

General description

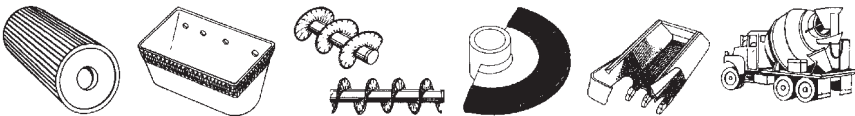
Lincore 60-O is a self shielded, open arc, flux cored tubular electrode that produces a primary carbide weld deposit. Although , designed primarily for the open arc process it can be used with a neutral flux to improve the weld shape, minimise fume and remove arc glare.

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 APLs of severe abrasion. Typical APLs include:

Typical applications include:

Crusher rolls, plates and jaws
Conveyor screws and sleeves
Bucket and shovel lips
Brick & coke machinery
Cement mill parts



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

Unit type	Diameter (mm)		
	1.1	1.6	2.0
10 kg coil 22RR			X
11.34 kg coil 22RR	X	X	
22.68 kg coil 50C			X

Lincore® 60-O: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

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.

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.1	5.1 to 12.7	125 - 210	21 - 27	1.9 - 4.7
1.6	5.1 to 11.4	240 - 350	28 - 33	3.4 - 7.5
2.0	6.4 to 3.2	250 - 400	25 - 32	3.4 - 6.9

Complementary products

Complementary products include Wearshield® 60

Hardfacing cored wire

Classification

DIN 8555 : MF4-GF-60-S

General description

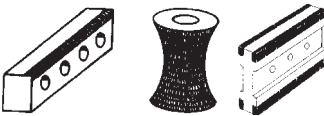
Lincore T&D is a self shielded, open arc, flux cored tubular electrode that produces a H12 type airhardening tool steel deposit. The arc characteristics are excellent producing minimal spatter and good slag removal. Although, Lincore T&D is primarily designed for the open arc operation, it may be used with a neutral flux for conditions requiring spatter elimination and removal of arc glare.

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 APLs 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 and forging dies
- Shear blades
- Trimmers
- Cutting tools



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

Unit type	Diameter (mm)	
	1.6	2.8
10 kg coil 22RR	X	
22.68 kg coil 50C		X

Lincore® T&D: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

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.

Welding positions



ISO/ASME PA/1G

Current type

DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	W	Al
0.65	1.5	0.8	7.0	1.4	1.6	1.8

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.6	3.8 to 8.9	170 - 300	22 - 26	2.4 - 5.4
2.8	2.5 to 5.1	340 - 500	26 - 30	4.7 - 9.1

Complementary products

Complementary products include Wearshield® T&D

Hardfacing cored wire

Classification

DIN 8555 : MF7-GF-250-KP

General description

Lincore 15CrMn is a self shielded, open arc, flux cored tubular electrode that exhibits excellent arc characteristics, clean slag detachability, and low spatter levels. Although, Lincore 15CrMn is primarily designed for the open arc operation, it may be used under neutral flux for conditions requiring spatter elimination and removal of arc glare.

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 APLs 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:

Railroad frogs
Track ends
Crusher hammers and screens
Earth moving equipment
Rebuilding of austenitic manganese plates and components
Construction equipment



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

Unit type	Diameter (mm)	
	2.0	2.8
6.35 kg coil 14C	X	
10 kg coil 22RR	X	
22.68 kg coil 50C	X	X

Lincore® 15CrMn: rev. EN 21

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.

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
2.0	3.2 to 8.9	210 - 380	26 - 32	3.3 - 9.7
2.8	1.9 to 4.4	250 - 380	26 - 30	2.5 - 7.5

Complementary products

Complementary products include Wearshield® 15CrMn

Hardfacing cored wire

Classification

DIN 8555 : MF6-GF-55-CGR

General description

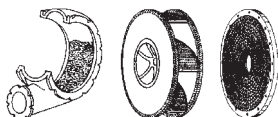
Lincore 420 is a self shielded, open arc, flux cored tubular electrode that produces a martensitic deposit similar to AISI 420 stainless steel. The arc characteristics are excellent producing minimal spatter and good slag removal.

Application

Lincore 420 is martensitic stainless hardfacing electrode designed to provide overlay deposits that resists metal wear under corrosion.

Typical applications include:

Sand pumps
Dredging equipment
Fans
Valve seats in steam and liquid pipes



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

Unit type	Diameter (mm)			
	1.6	2.4	3.2	4.0
14 kg spool S300	X			
22.68 kg coil 50C		X	X	
272.2 kg speed-feed® drum			X	X

Lincore® 420: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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.

Welding positions



ISO/ASME PA/1G

Current type

DC +

Chemical composition (w%), typical, all weld metal

ø1.6 mm	C	Mn	Si	Cr	ø2.0 mm	C	Mn	Si	Cr
	0.5	1.7	0.9	11		0.5	1.4	0.7	11

Structure

Martensitic + ferritic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.1	5.1 to 15.2	120 - 250	20 - 28	1.9 - 5.8
1.6	3.8 to 8.9	175 - 365	23 - 33	2.7 - 7.9
2.0	3.2 to 6.4	210 - 380	27 - 23	3.4 - 6.8

Complementary products

Complementary products include Wearshield® 420

Hardfacing cored wire

Classification

DIN 8555 : MF6-GF-45-KP

General description

Lincore M is a selfshielded, open arc, flux cored tubular electrode
Deposition of austenitic manganese steel with 14% manganese

Application

Lincore M is designed for rebuilding and hardfacing of manganese steel, carbon steel and low alloy steel parts Typical APLs include: Rail crossovers, frogs and switchpoints

Typical applications include:

- Rail crossovers, frogs and switches

Dipper teeth and lips

Crusher hammers

Crushers screens and grizzlies

Chain hooks

Dredge parts, pump shells

Parts for safes and vaults
- Manganese bucket fronts

Crusher rolls

Dragline pins and links

Rolling mill parts

Drive sprockets

Shovel tracks

Mechanical properties, typical, all weld metal

	Typical hardness values
As deposited	18-28 Rc
Work Hardened	30-48 Rc

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
10 kg coil 22RR	X

Lincore® M: rev. EN 21

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.

First layers on mild and low alloy steel can be welded with RepTec 126, Lincore M can be used to complete the build up.

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
2.0	3.2 to 6.4	240 - 360	24 - 29	2.9 - 6.2

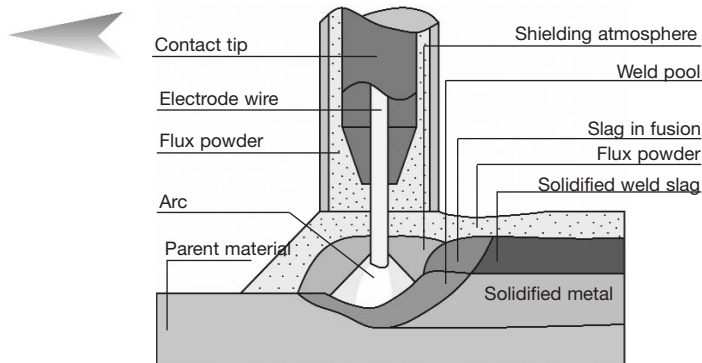
Complementary products

Complementary products include Wearshield® Mangjet (e)

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Subarc Process

Welding direction



The mechanics of the Submerged Arc Welding process (SAW): Both the electrode and the base metal are melted beneath a layer of flux. This layer protects the weld metal from contamination and concentrates the heat into the joint. The molten flux rises through the pool, deoxidising and cleaning the molten metal. It then forms a protective slag covering and maintaining the newly deposited weld.

The range of applications can be anything from 2 mm increasing with no upper limit. Subarc is one of the most versatile of welding processes. All steel grades, from non to high alloyed, including Ni-based, can be welded with a combination of various application techniques.

Ranging from a single electrode-single power source to a combination of four power sources feeding two wires each, Lincoln is proud to offer an extensive range of application solutions to the market.

As a global supplier, including equipment and consumables, Lincoln's knowledge in the SAW process will support you in reaching the toughest productivity and quality targets.

Mild steel solid wire

Classification

AWS A5.17 : EL12
EN 756 : S1

General description

A low carbon, low manganese, low silicon general purpose wire

Provides low hardness and is best suited for use with the Lincolnweld® 700 series of active fluxes

Approvals

	GL	TÜV
782		X
860	X	X
780		X
781		X
761		X

Chemical composition (w%) typical wire

C	Mn	Si
0.09	0.5	0.06

Packaging and available sizes

Unit type	Diameter (mm)					
	1.6	2.0	2.4	3.2	4.0	4.8
15KG stein basket	X					
25 kg Stein basket	X	X	X	X	X	X
100 kg Stein basket	X			X	X	
300 kg wooden reel		X	X		X	
350 kg Speed Feed drum		X	X	X	X	X
400 kg Speed Feed drum			X	X	X	
600 kg Speed Feed drum				X	X	
600 Accutrak drum	X	X	X			
1000 kg Accutrak drum		X	X	X	X	

L-60: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.17 : EM12
EN 756 : S2

General description

A low carbon, medium manganese, low silicon general purpose wire

Provides low hardness and is best suited for use with the Lincolnweld® 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	P	S
0.1	1.0	0.10	0.015	0.015

Packaging and available sizes

Unit type	Diameter (mm)				
	2.0	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X	
25 kg Stein basket+VCI bag			X	X	
100 kg Stein basket		X	X	X	
300 kg wooden reel		X	X		
400 kg Speed Feed drum				X	
1000 kg Accutrak® Drum	X		X	X	
1000kg coil				X	X

LNS 135: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Mild steel solid wire

Classification

AWS A5.17 : EM12K
EN 756 : 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	BV	DNV	GL	LRS	RINA	TÜV	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			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

Unit type	Diameter (mm)						
	1.2	1.6	2.0	2.4	3.2	4.0	4.8
15kg Stein basket		X	X	X	X		
25 kg Stein basket	X	X	X	X	X	X	X
25 kg Stein basket+VCI bag		X	X	X	X	X	X
100 kg Stein basket		X	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
400 kg Speed Feed drum		X		X	X	X	
500 kg Accutrak® Drum		X	X				
600 kg Speed Feed drum					X	X	
600 kg Accutrak® Drum		X	X	X			
1000 kg Accutrak® Drum			X	X	X	X	
1000kg coil				X	X	X	

L-61: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

L-50M (LNS 133-U)

Mild steel solid wire

Classification

AWS A5.17 : EH12K
EN 756 : 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	BV	DNV	LRS	RINA	TÜV	CRS
781	X	X	X	X	X		
782	X	X	X		X		
8500	X	X	X	X			
P230		X	X	X		X	
P240	X	X	X	X		X	X
780						X	

Chemical composition (w%) typical wire

C	Mn	Si
0.1	1.6	0.25

Packaging and available sizes

Unit type	Diameter (mm)		2.4	3.2	4.0
	1.6	2.0			
15kg Stein basket	X	X			
25 kg Stein basket	X	X	X	X	X
25 kg Stein basket+VCI bag				X	X
100 kg Stein basket			X	X	X
300 kg wooden reel	X		X		X
350 kg Speed Feed drum		X			X
400 kg Speed Feed drum			X	X	X
600 kg Speed Feed drum				X	X
600 kg Accutrak® Drum	X	X	X		
1000 kg Accutrak® Drum	X	X	X	X	X
1000kg coil			X		X

L-50M (LNS 133-U): rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EA1
EN 756 : 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	BV	DNV	GL	LRS	RINA	TÜV	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	
P223							X		

Chemical composition (w%) typical wire

C	Mn	Si	Mo
0.1	0.9	0.10	0.5

Packaging and available sizes

Unit type	Diameter (mm)				
	2.0	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X	X
25 kg Stein basket+VCI bag	X		X	X	
100 kg Stein basket			X	X	X
350 kg Speed Feed drum	X		X	X	
400 kg Speed Feed drum			X	X	
1000 kg Accutrak® Drum	X	X	X	X	X

L-70: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EA2
EN 756 : S2 Mo

General description

A 0,5%Mo wire to be used on steel grades such as 16Mo3 or on mon alloy steels to improve impact properties when welding in 2-run technique

Approvals

	ABS	BV	DNV	GL	LRS	RINA	TÜV	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	1.0	0.10	0.5

Packaging and available sizes

Unit type	Diameter (mm)				
	2.0	2.4	3.2	4.0	4.8
15kg Stein basket	X	X			
25 kg Stein basket	X	X	X	X	X
25 kg Stein basket+VCI bag	X	X	X	X	X
100 kg Stein basket			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	X	
600 kg Speed Feed drum			X	X	
600 kg Accutrak® Drum	X	X			
1000 kg Accutrak® Drum	X	X	X	X	
1000kg coil			X	X	

LNS 140A: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EG
EN 756 : SZ

General description

Titanium and boron micro alloy wire to achieve optimum impact properties with the 2-run technique, especially with pipemill 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

Unit type	Diameter (mm)					
	2.0	2.4	3.2	3.5	4.0	4.8
25 kg Stein basket		X	X		X	X
25 kg Stein basket+VCI bag			X		X	X
300 kg wooden reel		X	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		X	
1000 kg Accutrak® Drum	X	X	X	X	X	
1000kg coil				X	X	

LNS 140TB: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EB2
EN 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	P	Cr	Mo
0.13	0.8	0.15	<0.010	1.2	0.5

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X
25 kg Stein basket+VCI bag				X
100 kg Stein basket	X		X	X
300 kg wooden reel	X	X		
350 kg Speed Feed drum	X	X		
1000 kg Accutrak® Drum			X	

LNS 150: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EB3
EN 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

Approvals

	TÜV
780	X

Chemical composition (w%) typical wire

C	Mn	Si	P	Cr	Mo
0.10	0.6	0.15	<0.010	2.6	1.0

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X
100 kg Stein basket	X		X	X
350 kg Speed Feed drum	X			
400 kg Speed Feed drum				X
1000 kg Accutrak® Drum	X			

LNS 151: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : ENi1
EN 756 : 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

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket		X	X	X
100 kg Stein basket			X	X
1000 kg Accutrak® Drum	X	X	X	X

LNS 160: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : ENi2
EN 756 : S2 Ni2

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

Unit type	Diameter (mm)				
	2.0	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X	X
100 kg Stein basket			X	X	
400 kg Speed Feed drum			X		
1000 kg Accutrak® Drum	X	X	X	X	

LNS 162: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M	EG
EN 756	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 color

To be used with 960 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	Cu	Ni	Cr	S & P
0.1	1	0.25	0.5	0.7	0,2max	0,02max

Packaging and available sizes

Unit type	Diameter (mm)				
	2.0	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X	X
100 kg Stein basket	X	X	X	X	
350 kg Speed Feed drum		X			
400 kg Speed Feed drum	X	X	X	X	
1000 kg Accutrak® Drum	X	X	X	X	

LNS 163: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EF3
EN 756 : S3 Ni1Mo

General description

Nickel and Molybdenum alloy wire to reach both high yield/ tensile properties and good impact toughness at low temperatures

Optimum results obtained with the multipass technique

Approvals

	TÜV
P230	X
P240	X

Chemical composition (w%) typical wire

C	Mn	Si	Ni	Mo
0.10	1.6	0.10	0.9	0.5

Packaging and available sizes

Unit type	Diameter (mm)			
	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X
25 kg Stein basket+VCI bag	X	X	X	
100 kg Stein basket		X	X	
300 kg wooden reel		X	X	X
350 kg Speed Feed drum			X	
400 kg Speed Feed drum			X	

LNS 164: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : ENi5
EN 756 : 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

	ABS	DNV	TÜV
P240	X	X	X

Chemical composition (w%) typical wire

C	Mn	Si	Ni	Mo
0.10	1.4	0.20	1.0	0.2

Packaging and available sizes

Unit type	Diameter (mm)				
	2.0	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X	X
25 kg Stein basket+VCI bag		X	X	X	
100 kg Stein basket			X	X	
350 kg Speed Feed drum				X	
400 kg Speed Feed drum			X		
1000 kg Accutrak® Drum		X	X	X	

LNS 165: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EF1*
EN 756 : S2 Ni1Mo

* Nearest classification

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
P230	X

Chemical composition (w%) typical wire

C	Mn	Si	Ni	Mo
0.13	1.0	0.20	0.9	0.5

Packaging and available sizes

Unit type	Diameter (mm)
	4.0
25 kg Stein basket	X

LNS 167: rev. EN 01

Low alloy solid wire

Classification

ISO 26304-A

S 3Ni2.5CrMo

General description

Low alloy solid wire dedicated to high strength steel grades ($R_e > 690 \text{ MPa}$)

Good impact properties guaranteed down to -40°C when combined with a basic flux

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.1	1.6	0.15	0.7	2.3	0.6

Packaging and available sizes

Unit type	Diameter (mm)			
	2.5	3.2	4.0	5
20 kg Stein basket		X		X
25 kg Stein basket	X		X	
380 kg Accutrak® Drum		X		

LNS 168: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M : EM2
EN 756 : 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	P	S	Ni	Mo
0.05	1.7	0.45	<0.010	<0.010	1.9	0.45

Packaging and available sizes

Unit type	Diameter (mm)			
	2.4	3.2	4.0	4.8
25 kg Stein basket	X	X	X	X
100 kg Stein basket		X	X	
300 kg wooden reel			X	X
1000 kg Accutrak® Drum		X		

LA 100: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M EB9
ISO 21952-A S CrMo91

General description

A 9%Cr wire for creep resistant application on steel grades such as P91
To be used with basic fluxes such as 802, 8500, P240, 888 or MIL800-H

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo	V	Nb	Cu	N
0.12	0.6	0.3	8.8	0.7	1	0.2	0.06	0,07	0,04

Packaging and available sizes

Unit type	Diameter (mm)
	3.2
25 kg Stein basket	X

LNS 9Cr: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy solid wire

Classification

AWS A5.23/A5.23M	ENi3
EN 756	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	0.1	3.5

Packaging and available sizes

Unit type	Diameter (mm)	
	2.4	3.2
25 kg Stein basket	X	X

LNS 175: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Low alloy Flux cored wire

Classification

AWS A5.17/A5.17M : EC1 H4
EN 756 : Sz

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	<0.012	0.010

Packaging and available sizes

Unit type	Diameter (mm)
	2.8
25 kg Stein basket	X
250kg metal coil	X

LNS T55: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Low alloy Flux cored wire

Classification

AWS A5.23/A5.23M : ECM3 H4
EN 756 : SZ

General description

Flux cored SAW wire designed to weld high strength steel grades

Delivers yield strength greater than 690 MPa (100 ksi)

Extremely low H₂ hydrogen levels and impact at -40°C can be achieved when combined with MIL800-H flux

Chemical composition (w%) typical wire

C	Mn	Si	P	S	Ni	Mo
0.08	1.7	0.6	0,018	0,011	1.8	0.5

Packaging and available sizes

Unit type	Diameter (mm)
	2.8
25 kg Stein basket	X

LNS T690: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9/A5.9M : ER308L
EN 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
P2000	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

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 304L: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9/A5.9M : ER308H
EN 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	Cr	Ni
0.05	1.2	0.6	20.1	10.5

Packaging and available sizes

Unit type	Diameter (mm)	
	2.4	3.2
25 kg Stein basket	X	X

LNS 304H: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9/A5.9M : ER307
 EN 14343-A : S 18 8 Mn

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	0.6	19	8.9

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 307: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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
P2000S	X

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo
0.01	1.8	0.4	23.4	13.8	0.07

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 309L: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Stainless steel solid wire

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
P2000	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

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 316L: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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	Cr	Ni	Mo	Nb
0.04	1.8	0.4	19.5	11.3	2.6	0.5

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 318: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Stainless steel solid wire

Classification

ISO 14343-A : S 25 4

General description

Stainless steel wire with limited Ni content for high temperature application (up to 1100°C)

Recommended with P2007 and P2000 fluxes

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni
0.09	1.8	1.2	25.5	5.6

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 329: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

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	Cr	Ni	Mo	Nb
0.03	1.6	0.4	19.5	9.7	0.1	0.6

Packaging and available sizes

Unit type	Diameter (mm)			
	2.0	2.4	3.2	4.0
25 kg Stein basket	X	X	X	X

LNS 347: rev. EN 01

Stainless steel solid wire

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

Unit type	Diameter (mm)	
	2.4	3.2
25 kg Stein basket	X	X

LNS 4455: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9/A5.9M : ER2209
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
P2000S	X
P2007	X

Chemical composition (w%) typical wire

C	Mn	Si	Cr	Ni	Mo	N
0.015	1.6	0.5	23	8.6	3.1	0.16

Packaging and available sizes

Unit type	Diameter (mm)	
	2.4	3.2
25 kg Stein basket	X	X

LNS 4462: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Stainless steel solid wire

Classification

AWS A5.9/A5.9M : ER385
ISO 14343-A : G 20 25 5 Cu L

General description

Fully austenitic stainless steel wire

Used for sulphuric and phosphoric acid environment and in the paper mill industry

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

Unit type	Diameter (mm)
	3.2
25 kg Stein basket	X

LNS 4500: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Stainless steel solid wire

Classification

AWS A5.9/A5.9M : ER2594
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	Cr	Ni	Mo	N	Cu
0.02	0.7	0.3	25	9.3	3.7	0.23	0.6

Packaging and available sizes

Unit type	Diameter (mm)		
	1.6	2.4	3.2
25 kg Stein basket	X	X	X

LNS Zeron 100X: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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Ni-Base solid wire

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

Unit type	Diameter (mm)		
	1.6	2.0	2.4
25 kg Stein basket	X	X	X

LNS NiCro 60/20: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Ni-Base solid wire

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	Cr	Ni	Mo	W	Fe
0.006	0.5	0.04	16	58	16	3.6	5.8

Packaging and available sizes

Unit type	Diameter (mm)	
	1.6	2.4
25 kg Stein basket	X	X

LNS NiCrMo 60/16: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Flux

Classification

Flux 761	EN 760 :	S A CS/MS 1 88 AC H5	
Flux/wire	AWS A5.17 / A5.23	EN 756 : MR	EN 756 : TR
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-61	3YM/2YT	A3YM/A2YT	3YM/2YT	2YT	3YM/2YT	3YM/2YT	3YM/3YT	3YM/2YT	2YT	X
LNS 140A	2YTM	A3YM/A3YT		2Y40M/3Y40T	3YM/2YT	3YTM	2YM/2YT	3YM/3YT	2YM/3YT	X
L-60										X
LNS 135										X
L-70										X

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	0.06	1.7	0.8	<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)	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	MR	480	600		80	40
	TR	>440	>540		100	55

MR: multi run

TR: two-run

761 / 761-CG: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Wire	Characteristics	Applications
L-60	To prevent defects from organic components	Flat fillet, large throat
L-61	Reliable properties	Butt joints in two passes, in medium and thick plates
LNS 140A	For good impact toughness in two-run as welded	Flux backing, modified series arc-welding
		Low quality steels

Materials to be welded

STEEL / STANDARD	TYPE	Limited runs		
		L60	L61	LNS140A
Ship plates				
	A to D, A (H) 32 to D(H) 36	x	x	x
General Structural steel				
EN 10025 part 6	500 A			x
EN 10025 part 3/part 4	S275 to S420, N,M	x	x	x
EN 10149	S315 to S420, MC	x	x	x
	S315 to S420, NC	x	x	x
	S460, MC & NC			x
EN 10025 part 2	S185 to S355, E295 to E360, JR(G1 & G2), J0, J2 (G3&G4)	x	x	x
Boiler & pressure vessel steel				
EN 10028	P235 to P420, GH N, NH, M, Q & QH	x	x	x
	P235 to P460, GH, N, NH, M, Q & QH	x	x	x
	P500, GH, N, NH, M, Q & QH			x
	P235 S, P265 S	x	x	x
	A37 to A52, CP, AP	x	x	x

Flux characteristics

Current type	DC / AC
Basicity (Boniszewski)	0,8
Solidification speed	Low, slag viscous
Density (kg/dm ³)	1,2
Grain size	761 : 1-16
	761-CG : 1-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Steel drum	250
Big Bag	1000

Flux

Classification

Flux 780	EN 760 :	S A AR/AB 1 78 AC H5	
Flux/Wire	AWS A5.17 / A5.23	EN 756 : MR	EN 756 : TR
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 grains and coarse formula

Fine grain formula preferably used on high speed fillet welds applications

Approvals

Wire grade	BV	ABS	LRS	DNV	GL	RINA	PRS	RMRS	CRS	TÜV
L-60	A3YT	2YT	2T/2YT	3YT	3YT	2YT				X
L-61	A3YT		3YM/3YT	3YTM	3YT	3YT	3YM/3YT	3YT	3YT	X
LNS 140A			3YT				3YT			X
LNS 150										X
L-70										X
LNS 135										X
LNS 151										X
LNS 133U										X

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	P	S	Mo
L-60	0.07	1.4	0.6	<0.030	<0.025	
L-61	0.07	1.6	0.7	<0.030	<0.025	
LNS 140A	0.07	1.6	0.6	<0.030	<0.025	0.4

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	MR	> 420	510	28	50
L-61	TR	> 420	> 540	28	50
LNS 140A	TR	> 420	> 550	25	60

MR: multi run

TR: two-run

780 / 780-CG / 780-FG: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Wire	Characteristics	Applications
L-60	To prevent defects from organic components	Horizontal fillet
L-61	Reliable properties	High speed on dirty plates
LNS 140A	For good impact toughness in two-run as welded	Good on circumferential welds on small diameters with low voltage

Materials to be welded

STEEL / STANDARD	TYPE	Limited passes		
		L60	L61	LNS140A
Ship plates				
	A to D, A (H) 32 to D(H) 36	x	x	x
General Structural steel				
EN 10025 part 6	500 A			x
EN 10025 part 3/part 4	S275 to S420, N,M	x	x	x
EN 10149	S315 to S420, MC	x	x	x
	S315 to S420, NC	x	x	x
	S460, MC & NC			x
EN 10025 part 2	S185 to S355, E295 to E360,			
	JR(G1 & G2), JO, , J2 (G3&G4)	x	x	x
Boiler & pressure vessel steel				
EN 10028	P235 to P420, GH N, NH, M, Q & QH	x	x	x
	P235 to P460, GH, N, NH, M, Q & QH	x	x	x
	P500, GH, N, NH, M, Q & QH, P235 S, P265 S	x	x	x
	A37 to A52, CP, AP	x	x	x

Flux characteristics

Current type	DC / AC
Basicity (Boniszewski)	0,7
Solidification speed	high
Density (kg/dm ³)	1,4
Grain size	780-FG : 1-16
	780 : 1-20
	780-CG : 2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Steel drum	250
Big Bag	1000

Flux

Classification

Flux 781	EN 760 :	S A ZS 1 87 AC H5	EN 756 : TR
Flux/Wire	AWS A5.17 / A5.23		S 4T 2 ZS S2Si
781 / L-61	F7A0-EM12K		S 4T 2 ZS S3Si
781 / L50M (LNS 133U)			S 4T 2 ZS S2Mo
781 / LNS 140A			

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
L50M (LNS 133U)	A4YT	4Y400T	3YT	3YT	3YT	
L-60						X
L-61						X

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	
L50M (LNS 133U)	0.06	1.6	1	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/mm ²)	Tensile strength (N/mm ²)	Impact ISO-V(J) -20°C
L-61	TR	> 420	> 540	50
L50M (LNS 133U)	TR	> 450	> 560	60
LNS 140A (L-70)	TR	> 490	> 580	65

TR: two-run

781: rev. EN 23

Suggestions for use

Wire	Characteristics	Applications
L-61	High speeds on clean plate	Single pass or limited passes
L50M (LNS 133U)	Very high speeds	Best results with clean plates and high Si/Mn wires
LNS 140A	Good impact toughness	

Materials to be welded

STEEL / STANDARD	TYPE	Limited passes		
		L61	L50M (LNS133U)	LNS140A (L-70)
Ship plates				
	A to D, AH32 to DH40	x	x	x
	A to E, AH32 to EH40			x
General Structural steel				
EN 10025 part 6	500 & 550 A	x	x	x
	500 & 550 A & AL			x
EN 10025 part 3/part 4	S275 to S460 N/M	x	x	x
	S275 to S460 all qualities			x
EN 10149	S315 to S600 MC & NC	x	x	x
EN 10025 part 2	S185 to S360 all qualities	x	x	x
Boiler & pressure vessel steel				
EN 10028	P235 to P460, (GH, N NH, M, ML1)	x	x	x
	P235 to P460 all qualities			x
EN 10207	P235 to P275 S	x	x	x
A36-601 & NF A36-605	A37 to A52 (CP, AP)	x	x	x
	A37 to A52 (CP, AP, FP)			x

Flux characteristics

Current type	DC / AC
Basicity (Boniszewski)	0,7
Solidification speed	fast, fluid slag
Density (kg/dm ³)	1,5
Grain size	1-16

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Steel drum	250

Flux

Classification

Flux 782	EN 760 :	S A AR/AB 1 76 AC H5	
Flux/wire	AWS A5.17 / A5.23	EN 756 : MR	EN 756 : TR
782 / L-60		S 42 A AR/AB S1	S 4T A AR/AB S1
782 / LNS 135	F7AZ-EM12		S 4T 0 AR/AB S2
782 / L-61	F7AZ-EM12K	S 46 0 AR/AB S2Si	S 4T 0 AR/AB S2Si
782 / L50M (LNS 133U)		S 45 0 AR/AB S3Si	S 5T 2 AR/AB S3Si
782/ LNS 140A (L-70)		S 46 0 AR/AB S2Mo	S 5T 2 AR/AB S2Mo

General description

Active flux for limited pass welding

Good bead shape with optimum wetting

High speed on thin plates

Single & multi-electrode 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
L50M (LNS 133U) 4YT		4Y400T	4YT	3YT	
LNS 135					X

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	P	S	Mo
L-60	0.07	1	0.6	<0.030	<0.025	-
LNS 135	0.07	1.15	0.7	<0.030	<0.025	-
L-61	0.07	1.15	0.8	<0.030	<0.025	-
L50M (LNS 133U)	0.06	1.7	1	<0.030	<0.025	-
LNS 140A (L-70)	0.07	1.2	0.7	<0.030	<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	
L50M (LNS 133U)	TR	>460	> 550	65	50
LNS 140A (L-70)	TR		>600	70	50

TR: two-run

782 / 782-FG: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Wire	Characteristics	Applications
LNS 135	Limited hardness	Fillet weld, lap joint
L-61	Good properties	• truck wheels
L50M (LNS 133U)	Very high speeds	• gas bottles • Tube to fin fillet weld • Boiler tubes

Materials to be welded

STEEL / STANDARD	TYPE	Limited passes	
		LNS135	L61
Ship plates			
	A, AH32 to AH40		x
General Structural steel			
EN 10149	S315 to S460 MC	x	x
EN 10025 part 2	S185 to S355 quality, JR(G1&G2)	x	x
	S185 to S355 quality, JR(G1&G2), J10		x
	E2956 to E360	x	x
Boiler & pressure vessel steel			
EN 10028	P235 to 275 GH		x
	P355 to P460M		x
A36-601 & NF A36-605	A37 to A52 (CP)		x

Flux characteristics

Current type	DC / AC
Basicity (Boniszewski)	0,4
Solidification speed	High
Density (kg/dm ³)	1,4
Grain size	782-FG : 1-16 782 : 1-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	500

Flux

Classification

Flux 802	EN 760 :	S A CS 1 55 DC H5	
Flux/wire	Hardfacing flux cored wire		no AWS and EN classification
	Hardfacing solid wire		

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	20	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

Wire grade	AW	2 hours postweld tempering at				
	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	AW	46	45	46	38	32

Hardness: HRc in 6 layers hardfacing application

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

802: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

www.lincolnelectric.eu

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Flux

Classification

Flux 8500	EN 760 :	S A FB 1 54 AC H5	
Flux/wire	AWS A5.17 / A5.23	EN 756 : MR	EN 756 : TR
8500 / L-61	F7A6/F6P8-EM12K	S 38 4 FB S2Si	S 4T 0 FB S2Si
8500 / L50M (LNS133U)	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		
8500/ LNS 165 (LA 85)	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/3YT	
L50M (LNS 133U)	A4YTM	3YTM	3YM/3YT	4Y40M/13Y40T		
LNS 140A (L-70)		3YM			3Y40TM	3YM/3YT

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		
L50M (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
LNS 162	0.08	1.0	0.1	0.02	0.015		2
LNS 165 (LA85)	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
L50M (LNS 133U)	MR	440	540	28		110	
	SR	> 420	> 500	30		150	
LNS 140A (L-70)	MR	440	540	28		55	
LNS 160	AW	430	510	30		150	50
	SR	400	510	30		150	50
LNS 162	AW	470	560			150	50
	SR	450	530			150	50
LNS 165 (LA85)	AW	530	600	25		120	50
	SR	480	580	30		120	50
LNS T55	AW	530	620		120	80	
	SR	500	570			70	

MR: multi run / TR: two-run / AW : As welded / SR: Stress relieved

8500: rev. EN 23

Suggestions for use

Applications

Suitable for deep groove
Low temperatures requirements
Highly restrained constructions
Single and multi-wire systems
Off-shore and on-shore applications
Nuclear components

Materials to be welded

STEEL / STANDARD	TYPE	Multirun													
		L61	L50M (LNS133U)		LNS140A (L-70)		LNS160		LNS 162		LNS165		LNST55		
		AW	AW	SR	AW	SR	AW	SR	AW	SR	AW	SR	AW	SR	
Ship plates															
	A to E	x	x	x										x	x
	AH(32),DH(36), EH(36)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
General Structural steel															
EN 10025 part 2	S185, S235, S275	x	x	x										x	x
	S355	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cast steel															
EN 10213-2	GP240R	x	x	x										x	x
Pipe material															
EN 10208-1	L210, L240, L290	x	x	x										x	x
	L360	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	L415		x		x	x					x	x	x	x	x
	L445, L480											x	x		
API 5LX	X42, X46	x	x	x											
	X52	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	X56, X60		x		x	x					x	x	x	x	x
	X65, X70											x	x		
EN 10216-1/10217-1	P235, P275	x	x	x										x	x
	P355	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boiler & pressure vessel steel															
EN 10028-1	P235GH, P265GH, P295GH	x	x	x	x	x								x	x
Fine grained steel															
EN 10025 part 3/part 4	S275	x	x	x										x	x
	S355	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	S420		x		x	x			x	x	x	x	x	x	x
	S460											x	x		

Flux characteristics

Current type	DC / AC
Basicity (Boniszewski)	2,8
Solidification speed	Medium
Density (kg/dm ³)	1,3
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux 860	EN 760 :	S A AB 1 56 AC H5	
Flux/wire	AWS A5.17 / A5.23	EN 756 : MR	EN 756 : 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 / L50M (LNS133U)	F7A2/F7P2-EH12K	S 42 2 AB S3Si	
860 / L-61	F7A2-EM12K	S 38 2 AB S2Si	S 3T 0 AB S2Si
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 T55	F7A2/F7P4-EC1	S 50 3 AB Sz	
860 / LNS 163	F7A4-EG	S 42 4 AB S2Ni1Cu	

General description

Multi purpose neutral agglomerated flux

Good impact values in both multi-run (with L60/L61/L50M) and two-run (with LNS 140A) techniques

High restraint cracking resistant

Approvals

Wire grade	BV	ABS	LRS	DNV	GL	RMRS	RINA	CRS	TÜV
L-61	A3YTM/A3TM	3YM/2YT	3YM/3T/3YT	3M/2T	3YM/2YT	3YM/2YT	3M3YM/3T3YT	3YM/2YT	x
LNS 135					3YTM				x
LNS 140A	A3YTM		3M/3YM/3YT	3Y40TM	3YM/2YT				x
L-70	A3YTM		3M/3YM/3YT	3Y40TM	3YM/2YT				x
L-60									x
LNS 150									x
LNS 163									x

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	0.1	1.2	0.3	<0.025	<0.020	
L50M (LNS 133U)	0.07	1.7	0.5	<0.025	<0.020	
LNS 140A	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
L50M (LNS 133U)	AW	460	530	28	120	80
	SR	420	520			115
LNS 140A	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 23

Suggestions for use

Wire	Characteristics
L-60 & LNS 135	Low yield stress steels
L-61	Yield stress < 430MPa
L50M (LNS 133U)	Yield stress steels < 460MPa and good impact toughness at -20°C
L-70	Good impact toughness in two-run applications

Materials to be welded

STEEL / STANDARD	TYPE	Multirun								
		L61	L60	LNS135	L50M (LNS133U)		LNS 140A		LNS T55	
		AW	AW	AW	AW	SR	AW	SR	AW	SR
Ship plates										
	A to D	x	x	x	x		x			
	AH(32),DH(36), DH(40)	x			x	x	x	x	x	x
General Structural steel										
EN 10025 part 2	S185, S235, S275	x	x	x	x	x				
	S355	x	x	x	x	x	x	x	x	x
Cast steel										
EN 10213-2	GP240R	x	x	x	x	x				
Pipe material										
EN 10208-2	L210, L240, L290	x	x	x	x	x				
	L360	x	x	x	x	x	x	x	x	x
	L415				x		x	x	x	x
	L445, L480						x	x		
API 5LX	X42, X46	x	x	x	x	x				
	X52	x	x	x	x	x	x	x	x	x
	X56, X60				x		x	x	x	x
	X65, X70						x	x		
EN 10216-1/10217-1	P235, P275	x	x	x	x	x				
	P355	x	x	x	x	x	x	x	x	x
Boiler & pressure vessel steel										
EN 10028-1	P235GH, P265GH, P295GH	x	x	x	x	x	x	x	x	x
	P355GH	x	x	x						
Fine grained steel										
EN 10025 part 3/part 4	S275	x	x	x	x	x				
	S355	x	x	x	x	x	x	x	x	x
	S420				x		x	x	x	x
	S460						x			
High yield strength steel										
EN 10025 part 6	S460, S500						x			

Flux characteristics

Current type	DC / AC
Basicity (Boniszewski)	1,1
Solidification speed	High
Density (kg/dm ³)	1,4
Grain size	1-16

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	1000

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Flux

Classification

Flux 888	EN 760 :	S A FB 1 66 AC H5
Flux/Wire	AWS A5.17 / A5.23	EN 756 : MR
888/L-61 (LNS 129)	F7A8-EM12K	S 38 6 FB S2Si
888/L50M (LNS 133U)	F7A6/F7P8-EH12K	S 42 6 FB S3Si
888/ LNS 140A	F8A4-EA2-A2	S 46 4 FB S2Mo
888/ L-70	F8A4-EA1-A2	S 46 4 FB S2Mo
888/LNS 160	F7A8/P8-ENi1-Ni1	
888/LNS 162	F8A8/F7P8-ENi2-Ni2	
888/LNS 164 (LA84)	F10A4/F9P6-EF3-F3	S 50 4 FB S3Ni1Mo
888/LNS 165 (LA85)	F8A6/F7P8-ENi5-Ni5	S 50 4 FB Sz
888/LNS 150 (LA92)	F7P6-EB2-B2	S 50 2 FB CrMo1
888/LNS 151 (LA93)	F8P6-EBR3-B3R H4	
888/LA100	F10A4-EM2-M2	S 50 4 FB S3Ni1,5Mo

General description

Basic flux designed for carbon and low alloy steels

Easy slag removal in deep groove

Robust mechanical properties including CTOD values

Bruscati factor typically below 10 ppm with LNS150 & LNS151 wires

Excellent in multi arc configurations

Only available in Sahara ReadyBag™

Approvals

Wire grade	TUV
L-61	x

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	P	S	Ni	Mo	Cr	Bruscati factor
L-61	0.08	1.05	0.37	<0.02	<0.015				
L50M (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
LA100	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/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	-30°C	Impact ISO-V(J) -40°C	-50°C	-60°C
L-61	AW	415	515	31		135		125
L50M (LNS 133U)	AW	480	580	29				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 (LA84)	AW	650	750	21		65		30
	SR	610	700	23		65		30
LNS 165 (LA85)	AW	530	620	26		70		40
	SR	495	595	27				70
LNS 150 (LA92)	SR	420	580	26		150	115	110
LNS 151 (LA93)	SR	530	645	23		125	70	50
LA100	AW	680	760	25		50		

AW : As welded - SR: Stress relieved

888: rev. EN 23

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Suggestions for use

Boiler and pressure vessels
Off-shore applications
Wind towers
Structural fabrications

Materials to be welded

STEEL / STANDARD	TYPE	Multirun												
		L61	L50M (LNS133U)		LNS164	LNS165		LNS150	LNS151	LNS160		LNS 162		LA100
		AW-60°	AW-60°	SR-60°	AW-40°	AW-40°	SR-60°	SR-50°	SR-50°	AW	SR	AW	SR	AW-40°
Ship plates														
	A to E	x	x	x										
	AH(32),DH(36), EH(36)	x	x	x	x	x	x			x	x	x	x	
General Structural steel														
EN 10025 part 2	S185, S235, S275	x	x	x										
	S355	x	x	x	x	x	x			x	x	x	x	
Cast steel														
EN 10213-2	GP240R	x	x	x										
Pipe material														
EN 10208-2	L210, L240, L290	x	x	x										
	L360	x	x	x	x	x	x			x	x	x	x	
	L415		x		x	x	x							
	L445, L480				x	x	x							
EN 10216-1/10217-1	P235, P275	x	x	x										
	P355	x	x	x	x	x	x			x	x	x	x	
Boiler & pressure vessel steel														
EN 10028-1	P235GH, P265GH, P295GH	x	x	x										
EN 10028-2	16 Mo 3					x	x							x
(Elevated temperature steel)	13CrMo 4-5							x	x					
	10CrMo 9-10							x	x					
EN 10028-4/10222-3 (Low temperature steel)	11MnNi5-3, 13MnNi6-3					x	x			x	x	x	x	x
Fine grained steel														
EN 10025 part 3/part 4	S275	x	x	x										
	S355	x	x	x	x	x	x			x	x	x	x	
	S420		x		x	x	x					x	x	
	S460				x	x	x							
High yield strength steel														
EN 10025 part 6	S460, S500				x	x	x			x	x	x	x	

Flux characteristics

Current type	AC/DC (+/-)
Basicity (Boniszewski)	2,6
Density (kg/dm ³)	1,2
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux 960	EN 760 :	S A AB 1 66 AC H5	
Flux/Wire	AWS A5.17	EN 756 : MR	EN 756 : TR
960 / L-61	F7A2-EM12K	S 38 2 AB S2Si	S 3T 2 AB S2Si
960 / L50M (LNS 133U)	F7A2-EH12K	S 38 2 AB S3Si	S 3T 2 AB S3Si
960 / LNS 163	F7A4-EG	S 42 4 AB S2Ni1Cu	

General description

General purpose neutral flux

Attractive as the "one-flux" in the shop

Very good results in semi-automatic submerged arc welding

Very good operating characteristics (deslagging - wash in - aspect)

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	P	S
L-61	0.07	1.3	0.4	<0.030	<0.025
L50M (LNS 133U)	0.07	1.6	0.6	<0.030	<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	
L50M (LNS 133U)	AW	430	530	28	70	
LNS 163	AW	460	540	27		55
AW : As welded						

960: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Wire	Characteristics	Applications
L50M (LNS133U)	For dirty plates	Fillet welds
L-61	General purpose	Butt welds (single pass and multi-run)

Materials to be welded

STEEL / STANDARD	TYPE	Multirun		Two-run	
		L61	L50M (LNS133U)	L61	L50M (LNS133U)
Ship plates					
	A to E	x	x	x	x
	AH(32),DH(36), EH(36)	x	x	x	x
General Structural steel					
EN 10025 part 2	S185, S235, S275	x	x	x	x
	S355	x	x	x	x
Cast steel					
EN 10213-2	GP240R	x	x	x	x
Pipe material					
EN 10208-2	L210, L240, L290	x	x	x	x
	L360	x	x	x	x
	L415		x		
API 5LX	X42, X46	x	x	x	x
	X52	x	x	x	x
	X56, X60		x		
EN 10216-1/10217-1	P235, P275	x	x	x	x
	P355	x	x	x	x
Boiler & pressure vessel steel					
EN 10028-1	P235GH, P265GH, P295GH	x	x	x	x
	P355GH	x	x	x	x
Fine grained steel					
EN 10025 part 3/part 4	S275	x	x	x	x
	S355	x	x	x	x
	S420		x		

Flux characteristics

Current type	DC (+/-); AC
Basicity (Boniszewski)	1
Solidification speed	high
Density (kg/dm ³)	1,4
Grain size	1-16

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux 980	EN 760 :	S A AR/AB 1 57 AC H5	
Flux/Wire	AWS A5.17	EN 756 : MR	EN 756 : TR
980/L-61	F7A2-EM12K	S 38 2 AR / AB S2Si	S 3T 2 AR/AB S2Si
980/L50M (LNS133U)	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	<0.020	<0.020
L50M (LNS 133U)	0.06	1.9	0.4	<0.020	<0.020

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
L-61	AW	420	520	29	50
L50M (LNS 133U)	AW	460	550	29	60

AW : As welded

980: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Wire	Applications
L-61	Lower cost combination
L50M (LNS133U)	For the best operating characteristics
	For the best impact values in multi-pass (AW or SR)

Materials to be welded

STEEL / STANDARD	TYPE	Multirun	
		L61	L50M (LNS133U)
Ship plates			
	A to E	x	x
	AH(32),DH(36), EH(36)	x	x
General Structural steel			
EN 10025 part 2	S185, S235, S275	x	x
	S355	x	x
Cast steel			
EN 10213-2	GP240R	x	x
Pipe material			
EN 10208-2	L210, L240, L290	x	x
	L360	x	x
	L415		x
API 5LX	X42, X46	x	x
	X52	x	x
	X56, X60		x
EN 10216-1/10217-1	P235, P275	x	x
	P355	x	x
Boiler & pressure vessel steel			
EN 10028-1	P235GH, P265GH, P295GH	x	x
	P355GH	x	x
Fine grained steel			
EN 10025 part 3/part 4	S275	x	x
	S355	x	x
	S420		x

Flux characteristics

Current type	DC (+/-) ; AC
Basicity (Boniszewski)	0,6
Solidification speed	High
Density (kg/dm ³)	1,4
Grain size	1-16

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

Flux (Pipemill)

Classification

Flux 995N	EN 760 :	S A AB 1 67 AC H5
Flux/Wire	AWS A5.23	EN 756 : TR
995N / LNS 140A		S 4T 2 AB S2Mo
995N / LNS140 TB (LA 81)	F9A2-EG-G	S 5T 5 AB Sz

General description

Flux designed for longitudinal multi-arc welding pipemill station

High end pipemill 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%)

Base material	Wire grade	C	Mn	Si	P	S	Mo	Ti	B	N
X65	LNS 140A	0.07	1.45	0.3	<0.025	<0.025	0.2	-	-	0.005
X80	LNS 140TB (LA81)	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 (%)	-20°C	Impact ISO-V(J) -40°C -50°C	-60°C	Hardness HV30
Proced. 1								
LNS 140A (L-70)	AW	580	680	30				230
LNS 140TB (LA81)	AW	630	700	27	115	75	50	235
Proced. 2								
LNS 140TB(LA81)	AW	600	720	25	100	65	45	220-235
AW : As welded								

Remark: the mechanical properties from butt welds in pipe depends on the chemical composition of base material.

Proced1: tandem in 12,5mm X65; Proced2: multiwire weld (4/5 wires) in 19-25mm X65

995N: rev. EN 22

Suggestions for use

One run on each side in one or multi wire systems for high welding speed and excellent mechanical properties.

Materials to be welded

STEEL / STANDARD	TYPE	Two-run	
		LNS 140TB	LNS140A (L-70)
Ship plates			
A, B, D, E	A to E	x	x
	A 32 to FH40	x	x
General Structural steel			
EN 10137	500 to 550 A & AL	x	x
EN 10025 part 3/part 4	S275 to S460 all qualities	x	x
EN 10149	S315 to S650 all qualities	x	x
EN 10025 part 2	S185 to S355 all qualities	x	x
	E295 to E360	x	x
Boiler & pressure vessel steel			
EN 10028	P235 to P460G all qualities	x	x
	P235 to P275		x
	A37 to A52 all qualities	x	x
	PF24 to PF36 all qualities	x	x
	P265 to P460 all qualities	x	x
	A37 to A52, CP	x	x
	X42 to X70	x	x
	X42 to X80	x	

Flux characteristics

Current type	DC(+/-), AC
Basicity (Boniszewski)	1,3
Solidification speed	medium
Density (kg/dm ³)	1
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	500
Big Bag	600

Flux (Pipemill)

Classification

Flux 998N	EN 760 :	S A AB 1 67 AC H5
Flux/Wire	AWS A5.23	EN 756 : TR
998N / LNS 140A		S 4T 2 AB S2Mo
998N / LNS 140TB (LA 81)	F9A2-EG-G	S 5T 5 AB Sz

General description

Flux designed for longitudinal multi-arc welding pipemill station

High end pipemill 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

Chemical composition (w%)

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

AW : As welded

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 (%)	-20°C	Impact ISO-V(J) -40°C	-50°C	-60°C	Hardness HV30
Proced. 1									
LNS 140A (L-70)	AW	570	680	27					230
LNS 140TB (LA81)	AW	610	700	27	115	75	50		235
Proced. 2									
LNS 140TB (LA81)	AW	640	730	24	160	120	90	70	220-235

AW : As welded

Remark: the mechanical properties from butt welds in pipe depends on the chemical composition of base material.

Proced1: tandem in 12,5mm X65; Proced2: multiwire weld (4/5 wires) in 19-25mm X65

998N: rev. EN 22

Materials to be welded

STEEL / STANDARD	TYPE	Two-run	
		LNS 140TB	LNS140A (L-70)
Ship plates			
A, B, D, E	A to E	x	x
	A 32 to FH40	x	x
General Structural steel			
EN 10025 part 6	500 to 550 A & AL	x	x
EN 10025 part 3/part 4	S275 to S460 all qualities	x	x
EN 10149	S315 to S650 all qualities	x	x
EN 10025 part 2	S185 to S355 all qualities	x	x
	E295 to E360	x	x
Boiler & pressure vessel steel			
EN 10028	P235 to P460G all qualities	x	x
	P235 to P275		x
	A37 to A52 all qualities	x	x
	PF24 to PF36 all qualities	x	x
	P265 to P460 all qualities	x	x
	A37 to A52, CP	x	x
	X42 to X70	x	x
	X42 to X80	x	

Flux characteristics

Current type	DC (+,-) / AC
Basicity (Boniszewski)	1,3
Solidification speed	fast
Density (kg/dm ³)	1,3
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	500
Big Bag	600

Flux (Pipemill)

Classification

Flux P223	EN 760 :	S A AB 1 67 AC H5
Flux/Wire	AWS A5.17 / A5.23	EN 756 : TR
P223 / L-61	F7A4-EM12K	S 4T 2 AB S2Si
P223 / L50M (LNS133U)	F7A5-EH12K	S 4T 2 AB S3Si
P223 / LNS 140A	F8A4-EA2-A2	S 4T 4 AB S2Mo

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

Chemical composition (w%)

Wire grade	C	Mn	Si	P	S	Mo	Ni
L-61	0.08	1.0	0.2	<0.02	<0.015		
L50M (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
LNS 162	0.08	1.0	0.1	0.02	0.015		2
LNS 165 (LA85)	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		

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/mm ²)	Tensile strength (N/mm ²)	Impact ISO-V(J)	
				-20°C	-40°C
L-61	TR	450	550	60	
L50M (LNS 133U)	TR	470	570	80	
LNS 140A (L-70)	TR	500	600		60

TR: two-run

P223: rev. EN 21

Suggestions for use

Single/ multi wire welding
Longitudinal and spiral pipe welding

Materials to be welded

STEEL / STANDARD	TYPE	Two-run
		LNS140A (L-70)
		AW
General Structural steel		
EN 10025 part 6	500A	x
EN 10025 part 3/part 4	S275 to 460 N, NL, M & ML	x
EN10149	S315 to S500MC & NC	x
EN 10025 part 2	S185, S235, S275, S355	x
Pipe material		
API 5LX	X 42 to X70	x
Boiler & pressure vessel steel		
EN 10028-1	P235 to P460 all qualities	x
EN 10207	P235 to P275 S & SL	x
A36-601 & NF A36-605	A37 to A52 CP, AP & FP	x
EN 10222	P285 & P420 all qualities	x
Offshore plates		
A36-212	PF 24 to PF 36 all qualities	x

Flux characteristics

Current type	DC (+, -) / AC
Basicity (Boniszewski)	1,6
Solidification speed	High
Density (kg/dm3)	1,2
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25
Big Bag	500
Big Bag	600
Big Bag	1000

Flux

Classification

Flux P230	EN 760 :	S A AB 1 67 AC H5	
Flux/Wire	AWS A5.17 / A5.23	EN 756 : MR	EN 756 : TR
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 / L50M (LNS133U)	F7A5/F7P5-EH12K	S 42 5 AB S3Si	
P230 / LNS 140A	F8A4-EA2-A2	S 46 4 AB S2Mo	S 4T 4 AB S2Mo
P230 / L-70	F8A4-EA1-A2	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	

* Nearest classification

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		3M3YM	3YM/3YT				3YM/3YT	X
L50M (LNS 133U)	A3M,A3YM		4Y40M/4Y40T	4YM				X
LNS 140A	A4YTM	3YM/2YT			3Y40TM	3YM/2YT	4YM/3YT	X
L-70	A4YTM	3YM/2YT			3Y40TM	3YM/2YT	4YM/3YT	X
LNS 135								X
LNS 162								X
LNS 160								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	<0.030	<0.020		
LNS 135	0.07	1.4	0.25	<0.030	<0.020		
L50M (LNS 133U)	0.08	1.8	0.5	<0.030	<0.020		
LNS 140A (L-70)	0.07	1.4	0.4	<0.030	<0.020	0.5	
LNS 160	0.07	1.4	0.25	<0.030	<0.020		1.1
LNS 162	0.08	1.2	0.3	<0.030	<0.020		2.1
LNS T55	0.07	1.8	0.8	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)		
					-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	
L50M (LNS 133U)	AW	480	580	30		80	
	SR	460	540	28		70	
LNS 140A (L-70)	MR	540	620	28	70		
LNS 140A (L-70)	TR		620			60	
	AW	490	570	28		120	45
LNS 160	SR	430	550	28		140	75
	AW	500	590	28		120	50
LNS 162	SR	460	570	28		150	80
	AW	540	630	28	90	60	
LNS T55	SR	520	610	28	80	50	

MR: multi run - TR: two-run

P230-1: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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

Materials to be welded

STEEL / STANDARD	TYPE	Multirun			
		LNS135	L61	L50M/ LNS133U	LNS140A /L-70
Ship plates					
	A to D	x	x	x	x
	AH(32),DH(40)	x	x	x	x
General Structural steel					
EN 10025 part 6	500A				x
EN 10025 part 3/part 4	S275 to 355 N & M	x	x	x	x
	S275 to 420 N, NL, M & ML		x	x	x
	S275 to 460 N, NL, M & ML			x	x
EN 10149	S315 & S355 MC & NC	x	x	x	x
	S315 to S420MC & NC		x	x	x
	S315 to S460MC & NC			x	x
	S315 to S500MC & NC				x

Flux characteristics

Current type	DC (+, -) / AC
Basicity (Boniszewski)	1,6
Solidification speed	High
Density (kg/dm ³)	1,2
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux P230	EN 760 :	S A AB 1 67 AC H5	
Flux/Wire	AWS A5.17 / A5.23	EN756/EN14295: MR	EN 12070
P230 / LNS 150 (LA92)	F8P2-EB2-B2R		S CrMo1
P230 / LNS 151 (LA93)	F9PZ-EB3-B3R		S CrMo2
P230 / LNS 163		S 38 0 AB SZ	
P230 / LNS 164	F9A6-EF1*-F3	S 50 4 AB S3NiMo1	
P230 / LNS 167	F8A6/F7P6-EF1*-F1	S 50 4 AB S2NiMo1	
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	X
LNS 167	X

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	P	S	Mo	Ni	Cr	Cu
LNS 150 (LA92)	0.08	1.1	0.3	<0.020	<0.010	0.5		0.9	
LNS 151 (LA93)	0.12	0.8	0.3	<0.020	<0.010	1.0		2.6	
LNS 163	0.07	1.1	0.6	0.020	0.020		0.7		0.7
LNS 164	0.07	1.5	0.3	<0.020	<0.010	0.5	1.0		
LNS 167	0.09	1.1	0.3	<0.020	<0.015	0.5	1.0		
LNS 168	0.08	1.7	0.4	<0.020	<0.020	0.4	2.4	0.25	

Mechanical properties, typical, all weld metal

Wire grade	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	0°C	Impact ISO-V(J) -20°C	-40°C
LNS 150 (LA92)	SR	535	620	25	70	90**	60**
LNS 151 (LA93)	SR	560	640	24		30	
LNS 163	AW	450	600	20	60	50	
LNS 164	AW	630	710	22	90	80	50
	SR	630	710	24	70	60	35
LNS 167	AW	550	635	22		100	70
	SR	565	650	22		80	65
LNS 168	AW	710	840	20		65	min. 47

MR: multi run

TR: two-run

**SR=2h/720°C

P230-2: rev. EN 23

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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

Materials to be welded

STEEL / STANDARD	TYPE	Multirun				
		LNS150 (LA92)	LNS151 (LA93)	LNS164	LNS167	LNS168
Pipe material						
EN 10208-2	L415			x	x	
	L445, L480			x	x	
API 5LX	X56, X60			x	x	
	X65, X70			x	x	
Gaz de France	X63			x	x	
Fine grained steel						
EN 10025 part 3/part 4	S420			x	x	
EN 10025 part 6	S460			x	x	
Boiler & pressure vessel steel						
EN 10028-2	13CrMo 4-5	x	x			
Elevated temperature steel	10CrMo 9-10	x	x			
Low temperature steels	11MnNi5-3					x
EN 10028-4/10222-3	13MnNi6-3					x
High strength steel						
EN 10025 part 6	S460, S500				x	x

Flux characteristics

Current type	DC (+,-) / AC
Basicity (Boniszewski)	1,6
Solidification speed	High
Density (kg/dm ³)	1,2
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux P240	EN 760 :	S A FB 1 55 AC H5
Flux/Wire	AWS A5.17 / A5.23	EN 756 : MR
P240 / L61 (LNS129)	F7A4-EM12K	S 42 4 FB S2Si
P240 / L50M (LNS133U)	F7A/P8-EH12K	S 42 6 FB S3Si
P240 / LNS 160	F7A/P10-ENi1-Ni1	S 46 6 FB S2Ni1*
P240 / LNS 162	F7A/P10-ENi2-Ni2	S 46 6 FB S2Ni2*
P240 / LNS 165 (LA85)	F8A/P8-ENi5-Ni5	S 50 6 FB Sz
P240 / LNS 150 (LA92)	F8P2-EB2-B2R	
P240 / LNS 151 (LA93)	F9P0-EB3-B3R	
P240 / LNS 168	F6A5-EM2-M2	S 69 4 FB S0

* Nearest classification

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	LRS	BV	ABS	DNV	GL	Controlas	CRS	TÜV
L50M (LNS 133U)	3YM	A3M,A3YM	YM>47J<	4Y40M	6YM	x	3YM	X
LNS 162								X
LNS 160								X
LNS 164								X

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	S	P	Ni	Mo	Cr
L61 (LNS129)	0.08	1.0	0.35	< 0.010	< 0.010			
L50M (LNS 133U)	0.08	1.6	0.35	< 0.015	< 0.020			
LNS 160	0.08	1	0.25	< 0.015	< 0.020	1		
LNS 162	0.08	1	0.25	< 0.015	< 0.020	2.2		
LNS 165	0.08	1.3	0.35	< 0.015	< 0.020	0.9	0.15	
LNS 150 (LA92)	0.08	1.2	0.3	< 0.010	< 0.015		0.15	1.1
LNS 151 (LA93)	0.10	0.7	0.3	< 0.010	< 0.015		1.0	2.5
LNS 168	0.08	1.5	0.4	< 0.015	< 0.015	2.4	0.4	0.3

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
L61 (LNS129)	AW	440	530	30	115	75		
L50M (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 (LA92)	SR	520	610	24				100
LNS 151 (LA93)	SR	550	640	24				50
LNS 168	AW	790	840	20			55	

AW : As welded

SR: Stress relieved

P240: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Characteristics :	Applications
Boiler and pressure vessels	Low temperature applications
Off-shore applications	Highly restraint constructions
Nuclear components	Single and multi-wire systems

Materials to be welded

STEEL / STANDARD	TYPE	Multirun					
		L50M (LNS133U)	LNS160	LNS162	LNS165	LNS150 (LA92)	LNS151 (LA93)
Ship plates							
	A to E,	x	x	x	x		
	AH32 to EH40	x	x	x	x		
General structural steel							
EN 10025 part 6 (A 36-204)	500 A & AL				x		
EN 10025 part 3/part 4	S275 to S460 all qualities	x	x	x	x		
EN 10149 (A36-231)	S315 to S460 MC & NC	x	x	x	x		
	S315 to S500 MC & NC				x		
EN 10025 part 2	S185 to E360 all qualities	x	x	x	x		
Boiler & pressure vessel steel							
EN 10028 (A 36-205)	P235 to P460 all qualities	x	x	x	x		
EN 10207 (A36-220)	P235 to P275 all qualities	x	x	x	x		
A36-601 & NF A36-605	A37 to A52 all qualities	x	x	x	x		
EN 10028-2	13CrMo 4-5					x	x
(Elevated temperature steel)	10CrMo 9-10					x	x
Steel for dangerous material transportation							
A 36-215	P265 to P460 all qualities	x	x	x	x		
Low temperature steels							
	P285 to P420 all qualities	x	x	x	x		

Flux characteristics

Current type	DC (+,-) / AC
Basicity (Boniszewski)	3
Density (kg/dm3)	1,1
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux P2000	EN 760 :	S A AF 2 64 DC H5
Wire	ISO 14343-A	
LNS 304L	S 19 9 L	
LNS 309L	S 24 12 L	
LNS 316L	S 19 12 3 L	
LNS 4462	S 22 9 3 N L	
LNS 318	S 19 12 3 Nb	
LNS 347	S 19 9 Nb	
LNS Zeron 100X	S 25 9 4 N L	
LNS NiCro 60/20	ISO 18274 : S Ni 6625	R-NiCr 21 Mo 9Nb
LNS 4439Mn	S 18 16 5 N L	
LNS 4455	S 20 16 3 Mn L	
LNS 4500	S 20 25 5 Cu L	
LNS 310	S 25 20	

General description

Stainless steel welding flux
Excellent slag release
Low flux consumption

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	0.1				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 4439Mn	0.025	3.6	0.5	18	17	3.6	0.15				
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		
LNS 310	0.5	1.7	0.5	25	21						

Mechanical properties, typical, all weld metal

Wire grade	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	-20°C	Impact ISO-V(J) -40°C -196 °C
LNS 304L	AW	380	550	35	80	
LNS 309L	AW	425	580	33		80
LNS 316L	AW	425	560	33		50
LNS 4462	AW	550	800	27		50
LNS Zeron 100X	AW	670	880	21	70	45
LNS NiCro 60/20	AW	520	780	40		100
LNS 4439Mn	AW	375	630	33		
LNS 4455	AW	360	640	30		
LNS 310	AW	440	600	28		

P2000: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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

Materials to be welded

AISI	Mat.nr.	EN 10088-1/2	ASTM/ACI	UNS	Wire
304L	1.4306	X2 CrNi 19-11	(TP) 304L	S30403	LNS 304L
304LN	1.4311	X2 CrNiN 18-10	(TP) 304LN	S30453	LNS 304L
316LN	1.4406	X2 CrNiMoN 17-11-2	(TP) 316LN	S31653	LNS 316L
316L	1.4404	X2 CrNiMo 17-12-2	(TP) 316L	S31603	LNS 316L
316L	1.4435	X2 CrNiMo 18-14-3	(TP) 316L	S31603	LNS 316L
316LN	1.4429	X2 CrNiMoN 17-13-3			LNS 316L
304	1.4301	X4 CrNi 18-10	(TP) 304	S30409	LNS 304L
321	1.4541	X6 CrNiTi 18-10	(TP) 321	S32100	LNS 304L/347
316	1.4401	X4 CrNiMo 17-12-2	(TP) 316	S31600	LNS 316L
316	1.4436	X4 CrNiMo 17-13-3			LNS 316L
347	1.4550	X6 CrNiNb 18-10	(TP) 347	S34700	LNS 304L/347
318	1.4580	X6 CrNiMoNb 17-12-2	316Cb	S31640	LNS 316L/318
318	1.4583	X10 CrNiMoNb 18-12(DIN)			LNS 316L/318
317LN	1.4439	X2 CrNiMoN 17-13-5	316LN	S31726	4439Mn
	1.4539	X1 NCrMoCu 25-20-5			4500
	1.3952	X2 CrNiMoN 18-14-3(DIN)			4455
	1.4462	X2 CrNiMoN 22-5-3			4462
			Zeron 100	S32760	LNS Zeron 100 X
	2.4856	NiCr22Mo9Nb(DIN)		N06625	LNS NiCro 60/20
	1.5637	12Ni14 (DIN)			LNS NiCro 60/20
	1.5680	12Ni19 (DIN)			LNS NiCro 60/20
	1.5662	X8Ni9 (DIN)			LNS NiCro 60/20

Flux characteristics

Current type	DC (+,-)
Basicity (Boniszewski)	1,6
Solidification speed	High
Density (kg/dm3)	1,2
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux P2007	EN 760 :	S A AF 2 64 AC H5			
Wire	ISO 14343-A	AWS A5.9/A5.9M	Wire	ISO 18274	AWS A5.14/A5.14M
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 NiCroMo 59/23	S Ni 6059	ERNiCrMo-13
LNS 4462	S 22 9 3 N L	ER2209	LNS NiCro 70/19	S Ni 6082	ERNiCr-3
LNS 318	S 19 12 3 Nb	ER318			
LNS 347	S 19 9 Nb	ER347			
LNS Zeron 100X	S 25 9 4 N L	ER2553*			
LNS 4439Mn	S 18 16 5 N L	-			
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 310	S 25 20	ER310			
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	DNV	TUV
LNS 304L	x	x	x	
LNS 309L	x	x	x	
LNS 316L	x	x	x	
LNS 4462				x

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	0.1				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 4439Mn	0.025	3.6	0.5	18	17	3.6	0.15				
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		

P2007: rev. EN 03

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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 NiCro 60/20	AW	520	780	40				100
LNS Zeron 100X	AW	670	880	21	70	45		
LNS 4439Mn	AW	375	630	33				

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

Materials to be welded

AlSi	Mat.nr.	EN 10088-1/2	ASTM/ACI	UNS	Wire
304L	1.4306	X2 CrNi 19-11	(TP) 304L	S30403	LNS 304L
304LN	1.4311	X2 CrNiN 18-10	(TP) 304LN	S30453	LNS 304L
316LN	1.4406	X2 CrNiMoN 17-11-2	(TP) 316LN	S31653	LNS 316L
316L	1.4404	X2 CrNiMo 17-12-2	(TP) 316L	S31603	LNS 316L
316L	1.4435	X2 CrNiMo 18-14-3	(TP) 316L	S31603	LNS 316L
316LN	1.4429	X2 CrNiMoN 17-13-3			LNS 316L
304	1.4301	X4 CrNi 18-10	(TP) 304	S30409	LNS 304L
321	1.4541	X6 CrNiTi 18-10	(TP) 321	S32100	LNS 304L/347
316	1.4401	X4 CrNiMo 17-12-2	(TP) 316	S31600	LNS 316L
316	1.4436	X4 CrNiMo 17-13-3			LNS 316L
347	1.4550	X6 CrNiNb 18-10	(TP) 347	S34700	LNS 304L/347
318	1.4580	X6 CrNiMoNb 17-12-2	316Cb	S31640	LNS 316L/318
318	1.4583	X10 CrNiMoNb 18-12(DIN)			LNS 316L/318
317LN	1.4439	X2 CrNiMoN 17-13-5	316LN	S31726	4439Mn
	1.4539	X1 NCrNiMoCu 25-20-5			4500
	1.3952	X2 CrNiMoN 18-14-3(DIN)			4455
	1.4462	X2 CrNiMoN 22-5-3			4462
	2.4856	NiCr22Mo9Nb(DIN)	Zeron 100	S32760	LNS Zeron 100 X
	1.5637	12Ni14 (DIN)		N06625	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 (+,-) / AC
Basicity (Boniszewski)	1,6
Solidification speed	High
Density (kg/dm ³)	1,2
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Sahara ReadyBag™ (SRB)	25
Drum	40

Flux

Classification

Flux P2000S :	EN 760 :	S A AF 2 64Cr DC H5
Wire	ISO 14343-A	
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

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	Cr	Ni	Mo	N	other	FN
LNS 309L	0.015	1.5	0.5	25	13				15-20
LNS 4462	0.015	1.5	0.5	24	8	3	0.1		40-60
LNS Zeron 100X	0.02	0.5	0.4	26	9	3.7	0.2	W=0.6 Cu = 0.7	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 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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

Materials to be welded

Dissimilar
Duplex

Flux characteristics

Current type	DC (+,-)
Basicity (Boniszewski)	1,6
Solidification speed	high
Density (kg/dm ³)	1,2
Grain size	1-16

Packaging and available sizes

Unit	Net weight (kg)
Bag	25
Sahara ReadyBag™ (SRB)	25

Flux

Classification

Flux P7000	EN 760 :	S A AB/AR 2 69 AC H5
Wire	AWS 5.9 / 5.14	ISO 14343-A / ISO 18974
P7000 / LNS 4439 Mn		S-18 16 5 L
P7000 / LNS 4455		S-20 16 3 Mn L
P7000 / LNS 4465		S-25 22 2 L
P7000 / LNS 4500	ER 385 L	S-20 25 5 Cu L
P7000 / LNS NiCr 31/27		
P7000 / LNS NiCr 70/19	NiCr-3	R-NiCr 20 Nb
P7000 / LNS NiCr 60/20	NiCrMo-3	R-NiCr 21 Mo 9 Nb

General description

Agglomerated aluminate basic welding flux which increases the Mn content of the weld metal
For full austenitic stainless steel grades,
Suitable for Ni-based alloys in multi run butt welding (Alloy 625)
For welding low Ni-alloyed structural steels (12Ni14, 12Ni19, X8Ni9)
Good resistance to hot cracking

Chemical composition (w%), typical, all weld metal

Wire grade	C	Mn	Si	Cr	Ni	Mo	N	Nb	Fe
LNS 4455	0.02	7.5	0.6	19	16	2.7	0.13		bal.
LNS 4465	0.02	6	0.6	25	23	2	0.12		bal.
LNS 4500	0.02	3	0.6	20	25	4.5			bal.
LNS NiCr 31/27	0.02	2.7	0.4	27	31	3.5			bal.
LNS NiCr 70/19	0.025	4.8	0.45	19	bal.			2.5	1.2
LNS NiCr 60/20	0.01	2	0.3	21	bal.	8.5		4	6

Mechanical properties, typical, all weld metal

Wire grade	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -100 °C	-196 °C
LNS 4455	AW	420	620	30		40
	SR	420	610	30		40
LNS NiCr 60/20	AW	450	740	40	90	90

AW : As welded
SR: Stress relieved

P7000: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Suggestions for use

Good slag release

AC/DC welding and for multi wire systems

Materials to be welded

AISI	Mat.nr.	EN	UNS
317L	1.4438	X2 CrNiMo 18-15-4	
317LN	1.4439	X2 CrNiMoN 17 13 5	
	1.4455		
	1.4465		
904L	1.4539	X1 NiCrMoCu 25-20-5	N08904
	1.4563	X1 NiCrMoCu 31-27-4	N08028
Alloy 254		X4 CrNi 18-10	S31254
Alloy 625	2.4856	NiCr 22 Mo 9 Nb	N06625
Special	1.5637	12 Ni 14	
	1.5680	12 Ni 19	
	1.5662	X8 Ni 9	

Flux characteristics

Current type	AC, DC(+/-)
Basicity (Boniszewski)	1,5
Solidification speed	High
Density (kg/dm ³)	1,1
Grain size	2-20

Packaging and available sizes

Unit	Net weight (kg)
Drum	40
Sahara ReadyBag™ (SRB)	25

Cellulosic electrode

Classification

AWS A5.1 : E6010
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



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(J)	
					-29°C	-30°C
Required: AWS A5.1		min. 331	min. 414	min. 22	27	
ISO 2560-A		min. 420	500-640	min. 20		47
Typical values	AW	420-524	503-594	24-33	51-85	

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Metal can	Net weight/unit (kg)	4.5	4.5	4.5

Identification

Imprint: 6010 PIPELINER 6P+

Tip Color: none

PIPELINER® 6P+: rev. EN 21

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X42, X46, X52, X56, X60

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	40-70	DC+/-						
3.2x350	65-130	DC+/-						
4.0x350	90-175	DC+/-						
5.0x350	140-225	DC+/-						

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions	
	5G up	5G down
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

High strength cellulosic electrode

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

Welding positions



ISO/ASME



PA/1G



PB/2F



PC/2G



PF/3Gup



PG/3Gdown



PE/4G



PF/5Gup



PG/5Gdown

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	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)		
					-29°C	-40°C	-46°C
Required: AWS A5.5		min. 460	min. 550	min. 19	27		
ISO 2560-A		min. 460	530-680	min. 20		min. 47	
Typical values	AW	460-559	550-676	20-27	62-99		46-84

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

Identification

Imprint: 8010-P1 PIPELINER 8P+

Tip Color: none

PIPELINER® 8P+: rev. EN 21

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X56, X60, X65, X70

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	75 - 130	DC+						
4.0 x 350	90 - 185	DC+						
5.0 x 350	140 - 225	DC+						

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions	
	5G up	5G down
3.2	90A	110A
4.0	130A	150A
5.0	150A	165A

Remarks/ Application advice

Preheating pipe material L360 - L480 (X56 - 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

Use PIPELINER 6P+ for lower hardness in the root pass when required

Basic electrode

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 X80
Suitable for hot, fill, and cap pass welding for up to and including X65
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



Current type

DC - / +, AC

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	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-29°C	-30°C
Required: AWS A5.1		min. 400	min. 480	min. 22	27	
ISO 2560-A		min. 420	500-640	min. 20		min. 47
Typical values	AW	448-566	550-640	25-32	54-122	

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	450
Unit: Metal can	Net weight/unit (kg)	22.7	22.7	22.7

Identification

Imprint: 7016 H4 PIPELINER 16P

Tip Color: none

PIPELINER® 16P: rev. EN 21

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X42, X46, X52, X56, X60, X65

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - at max. current - 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 - 80	DC+						
3.2 x 350	75 - 120	DC+						
4.0 x 350	120 - 160	DC+						

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions				
	1G	2F	2G	3Gup	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 - L445 (X56 - X65) required (acc. EN 1011-1).

Basic electrode

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



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	0.005	0.95

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-46°C	-60°C
Required: AWS A5.1		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		80

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: Metal can	Pieces / unit	123	75
	Net weight/unit (kg)	4.2	4.0

Identification Imprint: 8018-G H4R PIPELINER 18P Tip Color: none

PIPELINER® 18P: rev. EN 21

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X 56, X60, X65, X70, X80

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 - 145	DC+	66	220	1.2	37.7	48	1.79
4.0 x 350	120 - 185	DC+	77	355	1.6	54.1	29	1.59

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions					
	1G	2F	2G	3Gup	4G	5G up
3.2	140A	120A	145A	120A	120A	120A
4.0	150A	140A	150A	140A	135A	140A

Remarks/ Application advice

Preheating pipe material L360 - L480 (X56 - X70) required (acc. EN 1011-1).

High strength basic electrode

Classification

AWS A5.5 : E8048-P2 H4R
ISO 2560-A : E 46 4 Z 1Ni 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



PB/2F



PC/2G



Pg/3Gdown



PE/4G



PG/5Gdown

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S
0.05	1.15	0.45	0.010	0.010

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-30°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	523-543	599-618	25-30	80	50-95

Packaging and available sizes

	Diameter (mm)	3.2	4.0	4.5
	Length (mm)	350	350	350
Unit: Metal can	Net weight/unit (kg)	4.5	4.5	4.5

Identification Imprint: LH-D80 8018-G

Tip Color: none

PIPELINER® LH-D80: rev. EN 21

PIPELINER® LH-D80

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5 L X60, X65, X70

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	140 - 170	DC+						
4.0 x 350	180 - 240	DC+						
4.5 x 350	200 - 260	DC+						

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions PG/5G down
3.2	140-170A
4.0	180-240A
4.5	200-260A

High strength basic electrode

Classification

AWS A5.5 : E8010-45-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

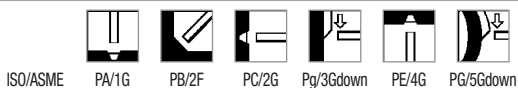
Recommended for pipe grades up to and including API 5L Grade X80

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



Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Mo
0.05	1.30	0.50	0.010	0.0100.80 / 0.25(3.2mm)0.2		

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-29°C	-50°C
Required: AWS A5.5		min. 530	min. 620	min. 17	27	
EN 757		min. 550	610-780	min. 18		min. 47
Typical values	AW	550-600	630-670	24-28	90-120	65-95

Packaging and available sizes

	Diameter (mm)	3.2	4.0	4.5
	Length (mm)	350	350	350
Unit: Metal can	Net weight/unit (kg)	4.5	4.5	4.5

Identification Imprint: LH-D90 9018-G

Tip Color: None

PIPELINER® LH-D90: rev. EN 21

PIPELINER® LH-D90

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5 L X65, X70, X80

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	140 - 170	DC+						
4.0 x 350	180 - 240	DC+						
4.5 x 350	200 - 260	DC+						

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions PG/5G down
3.2	140-170A
4.0	180-240A
4.5	200-260A

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

High strength basic electrode

Classification

AWS A5.5 : E10045-P2 H4R
ISO 18275 : E 69 15 GA 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 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



PA/1G



PB/2F



PC/2G



Pg/3Gdown



PE/4G



PG/5Gdown

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Mo
0.05	1.55	0.50	0.010	0.010	0.9	0.45

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J)	
					-29°C	-46°C
Required: AWS A5.5		min. 600	min. 690	min. 16	27	
Typical values	AW	620-690	700-750	21-28	75-110	55-85

Packaging and available sizes

	Diameter (mm)	3.2	4.0	4.5
	Length (mm)	350	350	350
Unit: Metal can	Net weight/unit (kg)	4.5	4.5	4.5

Identification Imprint: LH-D100 10018-G

Tip Color: None

PIPELINER® LH-D100: rev. EN 21

PIPELINER® LH-D100

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API 5 L	X70, X80, X90
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Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	20 - 170	DC+						
4.0 x 350	170 - 250	DC+						
4.5 x 350	200 - 300	DC+						

Welding parameters, optimum fill passes

Diameter (mm)	Welding positions PG/5G down
3.2	20-170A
4.0	170-250A
4.5	200-300A

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Solid wire

Classification

AWS A5.18	: ER70S-G
ISO 14341	: 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 X65
 Suitable for welding root passes for up to and including API 5L X80

Shielding gases (acc. ISO 14175)

GMAW	M21	Mixed gas Ar+ >15-25% CO ₂
	C1	Active gas 100% CO ₂

Chemical composition (w%) typical wire

C	Mn	Si	P	S
0.07	1.25	0.55	0.010	0.020

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -18°C
Typical values	C1	AW	439	525	30	95

Materials to be welded

Steel grades/Standard	Type
Pipe material	
API 5LX	X42, X46, X52, X56, X60, X65

Packaging and available sizes

Unit	Diameter (mm)	
	1.1	1.3
4.5 kg Plastic spool SFB	X	X
11.3 kg Plastic spool SFB	X	X
SFB = Sealed Foil Bag		

PIPELINER® 70S-G: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Solid wire

Classification

AWS A5.18 : ER80S-G
ISO 14341 : 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

Shielding gases (acc. ISO 14175)

GMAW M21 Mixed gas Ar+ >15-25% CO₂

Chemical composition (w%) typical wire

C	Mn	Si	P	S	Mo
0.09	1.72	0.61	0.012	0.007	0.45

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
Typical values	M21	AW	634	710	23	147

Materials to be welded

Steel grades/Standard Type

Pipe material

API 5LX X65, X70, X80

Packaging and available sizes

Unit	Diameter (mm)	
	1.1	1.3
4.5 kg Plastic spool SFB	X	X
11.3 kg Plastic spool SFB	X	X

SFB = Sealed Foil Bag

PIPELINER® 80S-G: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

PIPELINER® 80Ni1

Low alloy solid wire

Classification

AWS A5.28/A5.28M : ER80S-G
EN14341-A : G 3Ni1

General description

Pipelinertm 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 69 - 95 J @ -50°C, Pipelinertm 80Ni1 is designed for tough pipeline jobs. For an electrode that meets the expanding demands of higher strength pipe and severe conditions - choose Pipelinertm 80Ni1.

Shielding gases (acc. ISO 14175)

75 - 95% Argon / Balance CO₂
100% CO₂

Welding positions



Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al	Ti	Cu	Mo	Cr	V
0.07	1.50	0.65	<0.15	<0.15	0.85	<0.01	<0.10	<0.20	<0.01	<0.05	<0.01

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J)	
					-29°C	-50°C
Required: AWS A5.28			550			
Typical values	AW	575-615	655-685	27-28	99-119	69-95

Packaging and available sizes

Unit type	Diameter (mm)	
	1.0	1.2
4.5 kg Plastic spool SFB	X	X
15 kg plastic spool SFB	X	X
SFB = Sealed Foil Bag		

PIPELINER® 80Ni1: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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PIPELINER® 80Ni1

Suggestions for use

Optimum performance on vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe
For consistently high Charpy-V impact values

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API 5LX	X42, X46, X52, X56, X60, X65, X70
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Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg Weldmetal
2.0	19	170-330	210-305	18-21		

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Rutile cored wire

Classification

AWS A5.20/A5.20M : E71T-1M-JH8 / E71T-9M-JH8
EN ISO 17632-A : T 46 4 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 for 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



PA/1G



PB/2F



PC/2G



PF/3Gup



PE/4G



PF/5Gup

ISO/ASME

Current type/Shielding gas (ISO 14175)

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	1.60	0.45	0.013	0.011	0.36

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) -40°C
Required: AWS A5.20			min. 400	min. 480	min. 22	min. 27
EN ISO 17632-A			min. 460	530-680	min. 20	min. 47
Typical values	M21	AW	550	612	26	106

Packaging and available sizes

Unit type	Diameter (mm)	
	1.1	1.3
4.5 kg Plastic spool SFB	X	X
11.3 kg Plastic spool SFB	X	X
SFB = Sealed Foil Bag		

PIPELINER® G70M: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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PIPELINER® G70M

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API 5LX	X42, X46, X52, X56, X60, X65, X70
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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	440-1330	130-275	23-30	1.4-4.4	1.21
1.3	19	380-1140	155-315	22-31	1.6-4.9	1.22

PIPELINER® G70M-E

Low temperature rutile cored wire

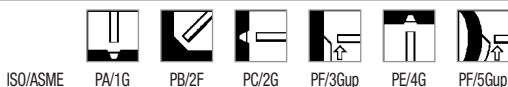
Classification

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 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 ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

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	0.05	1.45	0.2	0.013	0.01	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			min. 468	550-689	min. 19			
EN ISO 17632-A			min. 500	560-720	min. 18			min. 47
Typical values	M21	AW	580	630	23	100	60	min. 47

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5 kg Plastic spool S200	X
15 kg Plastic spool B300	X

PIPELINER® G70M-E: rev. EN 04

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

PIPELINER® G70M-E

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 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

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3G up	PF/5G up	PE/4G
1.2	230-280A	230-280A	200-240	200-240	200-240	160-220
	26-32V	26-32V	25-32V	25-28V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Rutile cored wire

Classification

AWS A5.29/A5.29M : E101T1-G-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 to 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



Current type/Shielding gas (ISO 14175)

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	0.40	0.020	0.010	1.0	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			min. 605	690-825	min. 16	not required		
EN ISO 17632-A			620	700-890	min. 18	min. 47		
Typical values	M21	AW	724	765	21	46		39

Packaging and available sizes

Unit type	Diameter (mm)		
	1.1	1.3	1.3
4.5 kg Plastic spool SFB	X	X	X
11.3 kg Plastic spool SFB	X	X	X

SFB = Sealed Foil Bag

PIPELINER® G80M: rev. EN 22

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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PIPELINER® G80M

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API 5LX	X70, X80
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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	440-1330	130-275	23-30	1.4-4.4	1.21
1.3	19	380-1140	155-315	22-31	1.6-4.9	1.22

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PIPELINER® G80M-E

Low temperature rutile cored wire

Classification

AWS A5.29/A5.29M : E91T1-GM-H4
EN ISO 18276-A : T 55 4 Z P M 2 H5

General description

All position gas shielded 1% Ni and 0.4%Mo alloyed flux cored wire for offshore and pipeline applications
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures

Welding positions



Current type/Shielding gas (ISO 14175)

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	Tensile strength	Elongation	Impact ISO-V(J)	
			(N/mm ²)	(N/mm ²)	(%)	-40°C	-50°C
Required: AWS A5.29			min. 540	620-760	min. 17		
EN ISO 18276-A			min. 550	640-820	min. 18	min. 47	
Typical values	M21	AW	695	740	21		65

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5 kg Plastic spool S200	X
15 kg Plastic spool B300	X

PIPELINER® G80M-E: rev. EN 04

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PIPELINER® G80M-E

Materials to be welded

Steel grades/Standard Type

Pipe material

EN 10208 L360, L360NB, L360QB, L360MB, L415MB, L415NB, L485MB, L555MB
API 5LX X60, X65, X70, X80

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

Diameter (mm)	Welding positions					
	PA/1G	PB/2F	PC/2G	PF/3G up	PF/5G up	PE/4G
1.2	230-280A	230-280A	200-240	200-240	200-240	160-220
	26-32V	26-32V	25-32V	25-28V	25-28V	23-28V

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PIPELINER® G90M-E

High strength rutile cored wire

Classification

AWS A5.29/A5.29M : E111T1-GM-H4
EN ISO 18276-A : T 69 4 Z P M 2 H5

General description

All position gas shielded 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 (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

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.	0.2	0.015	0.01	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)	
						-30°C	-40°C
Required: AWS A5.29			min. 680	760-900		min. 27	
EN ISO 18276-A			min. 690	770-970	min. 17		min. 47
Typical values	M21	AW	740	790	19	75	70

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5 kg Plastic spool S200	X	
15 kg Plastic spool B300	X	X

PIPELINER® G90M-E: rev. EN 04

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PIPELINER® G90M-E

Materials to be welded

Steel grades/Standard Type

Pipe material

EN 10208-2 L485MB, L555MB
API 5LX X70, X80

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

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240	200-240	160-220
	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

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PIPELINER® NR®-207+

Self-shielded cored wire

Classification

AWS A5.29/A5.29M : 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



PA/1G



PB/2F



PC/2G



PG/3Gdown



PE/4G



PG/5Gdown

ISO/ASME

Current type

DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al
0.04	1.22	0.25	0.010	0.010	0.82	1.1

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J)	
					-29°C	-40°C
Required:	AWS A5.29	min. 400	483-620	20	27	not required
Typical values	AW	400-441	517-551	20-33	176-230	147

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
6,35 kg Coils 14C	X

PIPELINER® NR®-207+: rev. EN 22

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PIPELINER® NR®-207+

Suggestions for use

Optimum performance on vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe

Materials to be welded

Steel grades/Standard	Type
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Pipe material

API 5LX	X42, X46, X52, X56, X60, X65, X70
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Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg Weldmetal
2.0	19	170-330	210-305	18-21	1.6-3.0	1.21

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PIPELINER® NR®-207XP

Self-shielded cored wire

Classification

AWS A5.29/A5.29M : 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

Great arc characteristics and superior feedability

Superior Charpy-V impact properties, consistent down to -40°C. Virtually eliminates Charpy-V impact values below 56J

Welding positions



PA/1G



PB/2F



PC/2G



PG/3Gdown



PE/4G



PG/5Gdown

ISO/ASME

Current type

DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	P	S	Ni	Al
0.04	1.15	0.07	0.010	0.010	0.68	1.0

Mechanical properties, typical, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation %	Impact ISO-V(J)	
					-29°C	-40°C
Required: AWS A5.29		min. 400	483-620	20	27	not required
Typical values	AW	434	545	30	234-340	199

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
6,35 kg Coils 14C	X

PIPELINER® NR®-207XP: rev. EN 21

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PIPELINER® NR®-207XP

Suggestions for use

Optimum performance on vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe
For consistently high Charpy-V impact values

Materials to be welded

Steel grades/Standard	Type
-----------------------	------

Pipe material

API 5LX	X42, X46, X52, X56, X60, X65, X70
---------	-----------------------------------

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed cm/min	Current (approx. A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg Weldmetal
2.0	19	170-330	210-305	18-21		

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Ceramic backing material

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.

Ceramic backing material

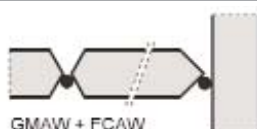
Product range



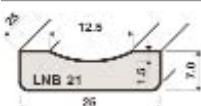
Strip length: 600 mm

Product	item	pcs/bx	mtr/bx
LNB 6	tape 640007	100	60
LNB 9	tape 640014	72	43.2
LNB 12	tape 640021	60	36

Mainly for mild steel. For general steel structures

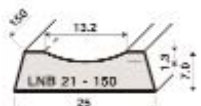
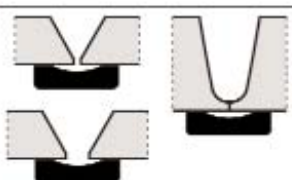


GMAW + FCAW



Strip length: 600 mm

Product	item	pcs/bx	mtr/bx
LNB 21	tape 640083	56	33.6

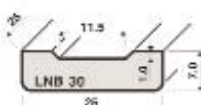


Strip length: 600 mm

Product	item	pcs/bx	mtr/bx
LNB 21 - 150	tape 640090	56	33.6
LNB 21 - 150	rail 640106	63	37.8

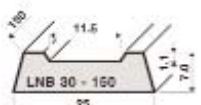
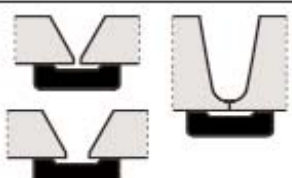
Strips can be used in metal rail.
For fastening use magnetic clamps.

To be used with LNM solid wires
and metal cored wires like
Outershield MC 710-H and MC 715-H



Strip length: 600 mm

Product	item	pcs/bx	mtr/bx
LNB 30	tape 640151	56	33.6

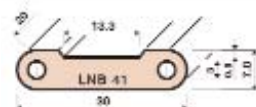


Strip length: 600 mm

Product	item	pcs/bx	mtr/bx
LNB 30 - 150	tape 640168	56	33.6
LNB 30 - 150	rail 640175	63	37.8

Strips can be used in metal rail.
For fastening use magnetic clamps.

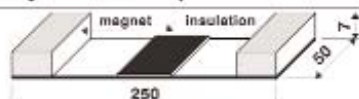
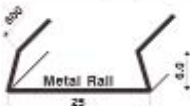
To be used with flux cored wires like
Outershield and Cor-A-Rosta



LNB 40 - strip length: 600 mm
LNB 41 - strip length: 1000 mm

Product	item	pcs/bx	mtr/bx
LNB 40	tape 640243	48	28.8
LNB 41	wire 640229	24	24

Elements are mounted on flexible wire.
Suitable for pipe and cylindrical parts.
Designed to bend easily.



Magnetic Clamp, Item 640236



PACKAGING OPTIONS MEETING DIFFERENT CUSTOMER NEEDS

Packaging plays a very important role during the transfer of the stick electrodes from the manufacturing place to the application location. Its role is multiple as it has to :

1. Protect stick electrodes against potential **damage** occurring during transportation and storage.
2. Prevent interactions between **moisture** from the coating and moisture from the atmosphere.
3. **Identify** the electrodes.

Because the stainless steel stick electrode application range is broad and because each application requires its own degree of weld quality and quality assurance, Lincoln extends its stainless steel stick electrodes packaging offer to better **respond to different customer needs**.

The Linc Can™ provides an optimum compromise between the cost effective cardboard and premium Sahara ReadyPack® packaging options.



Cardboard :
the cost effective solution



Linc Can™ :
New high quality packaging



Sahara ReadyPack® :
The best vacuum pack available in the market

LINC CAN™

- ✓ Hermetically sealed round can : Linc Can™
- ✓ For customers looking for perfect protection of the coating hence moisture absorption resistance : Sahara ReadyPack®

PRODUCT FEATURES

- ✓ **Withstands severe** transportation and handling conditions
- ✓ **The Shock absorber** inside the Linc Can™ protects the coating, ensuring reliable arc striking
- ✓ **Hermetically sealed** before first opening. Acts as a moisture barrier
- ✓ **Easy to close using the plastic cap** after first opening
- ✓ **Highly visible red color** for an easier product identification in the warehouse, the workshop or on site

CUSTOMER ASSISTANCE POLICY

The business of Lincoln Electric Europe is manufacturing and selling high quality welding equipment, consumables and cutting equipment. Our challenge is to meet the needs of the customer and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice and assumes no responsibility, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

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