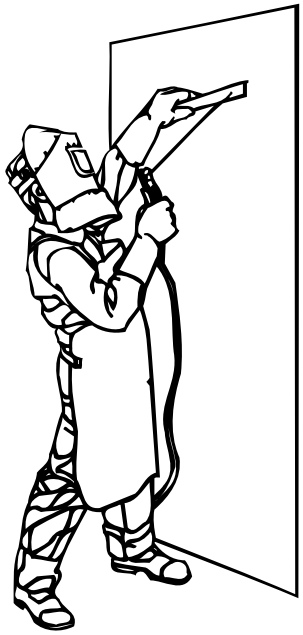

ELEKTRODE JESENICE

WELDING CONSUMABLES

BUREAU VERITAS
Certification

Certification

Awarded to

ELEKTRODE JESENICE, d.o.o.

JESENICE, SLOVENIJA

Bureau Veritas Certification certify that the Management System of the above organization has been audited and found to be in accordance with the requirements of the management system standards detailed below

Standards

ISO 9001:2008

Permitted Exclusion(s)

7.5.2 Validation of processes for production and service provision

Scope of supply

DEVELOPMENT, PRODUCTION AND SALES OF WELDING CONSUMABLES

Original Approval Date: 22/05/1997

Subject to the continued satisfactory operation of the organization's management System, this certificate is valid until: 30/07/2012

To check this certificate validity please call +386 1 47 57 670.
Further clarifications regarding the scope oh this certificate and the applicability of the management system requirements may be obtained consulting the organization.

Certificate number: SL13468Q *Date:* 30/07/2009

Bureau Veritas Certification acting the accreditation certificate number 008

UKAS QUALITY MANAGEMENT

CERTIFICATION AUTHORITY: Bureau Veritas Certification, s.r.o., Olbrachtova 1, 14002 Praha 4, Czech Republic
MANAGING OFFICE: Bureau Veritas Certification, Linhartova cesta 49a, 1000 Ljubljana, Slovenija

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Industrie Service

CERTIFICATE

The company

Elektrode Jesenice d.o.o.

Cesta Zelezarjev 8
SI-4270 Jesenice

has been audited and approved as manufacturer of filler metals according to

VdTÜV-Merkblatt 1153
in connection with AD 2000-Merkblatt W 0

The company

- has facilities permitting manufacturing and inspection in compliance with the current technical standards,
- operates a quality system which guarantees that manufacturing and inspection of the filler metals stated in our report are in conformity with the technical rules and standards,
- employs qualified supervisory and inspection personnel.

The certificate expires in October 2011.

München, 10.12.2008

TÜV SÜD Industrie Service GmbH
TÜV-CERT-Zertifizierungsstelle für Druckgeräte

(J. Meyer)
Notified Body, Ident No. 0036

TÜV SÜD Industrie Service GmbH, Department Materials and Welding Technology
Westendstraße 199, D-80686 München

TÜV®

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service GmbH

Industrie Service

CERTIFICATE

0036 - CPD - S 012

In compliance with the Directive 89/106/EEC of the Council of European Communities of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to the construction products (Construction Products Directive – CPD) amended by the Directive 93/68/EEC of the Council od European Communities of 22 July 1993, it has been stated that the construction product **welding consumables**

Stick electrodes acc. to EN ISO 2560, EN ISO 3580, EN 1600
Welding wires acc. to EN ISO 14341, EN ISO 14343, EN ISO 16834
Welding wires and rods acc. to EN 21952
Welding rods acc. to EN ISO 636, EN 12536
Flux cored wires acc. to EN ISO 17632, EN ISO 17633
SAW wire/flux combinations acc. to EN 756
SAW fluxes acc. to EN 760

of the company **Elektrode Jesenice d.o.o.**

Cesta Zelezarjev 8
SI-4270 Jesenice

is submitted to a factory production control.

The Notified Body TÜV SÜD Industrie Service GmbH has performed the initial inspection of the factory and of the factory production control (FPC) and performs the continous surveillance, assessment and approval of the FPC.

This certificate attests that all provisions concerning the attestation of conformity and the properties of the product described in Annex ZA of the standard

DIN EN 13479: 03.2005

were applied.

This certificate was first issued on 03.08.2006 and renewed on 10.12.2008 and remains valid as long as the conditions laid down in the harmonized technical specification in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly, and latest on 09.12.2011.

Munich, December 10th, 2008

Certification Body for Welding Consumables

(J. Meyer)

Notified Body, Identification No. 0036

TÜV SÜD Industrie Service GmbH 00 36 Benannte Stelle

elektrode jesenice d.o.o.

TRADITION

Our history and tradition goes back to the year 1939, since that time at Jesenice location welding material is developed and produced. Now about 200 experienced employees care for

QUALITY

Our philosophy is the customer satisfaction and production of high quality products, so we in 1997 got quality management system approval **ISO 9001.**

Our production facilities are continuously checked and approved by Internacional Supervisory Institutions **TÜV, DB** and many Classification societies: **GL, BV, ABS, LR, RS, DNV, RINA, PRS, SZU, CR** and **SŽ.**

All metallic and mineral materials for the production of Elektrode Jesenice products are under strict control and all welding materials produced in our company are tested. Manufacturing certificates are available on request.

SERVICE

Today we supply to more than 200 constant **customers** from 10 countries.

Long experiences enables Electrode to offer you a comprehensive **know-how about of welding.**

elektrode jesenice d.o.o.

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CLASSIFICATION BY NORMS

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elektrode jesenice d.o.o.

PRODUCT PROGRAMME

PRODUCT	EN ISO		AWS	Page
	2560-A	2560-B	A-5.1 / A-5.5*	
Low alloyed cellulosic, rutile and acid electrodes				
NEUTRAL	E 35 AA 13	E 43 40 A	/	A1
RAPID	E 38 2 R A 13	E 43 20 A	E 6020	A2
CELEX	E 35 2 C 21	~E 43 10 A	E 6010	A3
CELEX Mn	E 42 3 C 21	~E 49 10 A	E 7010-G	A4
CELEX Mo	E 42 3 Mo C 21	~E 49 10 A	E 7010-A1*	A5
CELEX Ni	E 46 3 1NiC 21	~E 55 10-N1 A	E 8010-G *	A6
CELEX NiMo	E 50 3 1NiMo C 21	~E 57 10-N2M3 A	E 9010-G*	A7
JADRAN S	E 35 0 RC 11	E 43 13 A	E 6013	A8
RUTILEN 12	E 35 0 RC 11	E 43 12 A	E 6012	A9
RUTILEN Z	E 42 0 RC 11	E 49 13 A	E 6013	A10
RUTILEN 1000 S	E 42 0 RC 11	E 49 13 A	E 6013	A11
EMONA	E 35 2 RB 12	E 43 03 A	E 6013	A12
RUTILEN 13	E 42 0 RR 12	E 49 12 A	E 6013	A13
RUTILEN X	E 42 0 RR 12	E 49 13 A	E 6013	A14
RUTILEN 2000 S	E 42 0 RR 12	E 49 13 A	E 6013	A15
RUTILEN K	E 38 2 R 12	E 43 13 A	E 6013	A16
RUTILEN 13 M	E 35 A R 12	E 43 12 A	E 6013	A17
RUTILEN S	E 38 0 RC 11	E 43 13 A	E 6013	A18
RUTILEN E	E 42 0 RC 11	~E 49 13 A	E 6013	A19
High efficiency electrodes				
SAVA 130	E 38 0 RR 33	E 43 24 A	E 7024	B1
SAVA 150	E 38 0 RR 53	E 43 24 A	E 7024	B2
SAVA 180	E 42 0 RR 74	E 49 24 A	E 7024	B3
SAVA 200	E 42 0 RR 74	E 49 24 A	E 7024	B4
SAVA GV 130	E 38 0 RR 34	E 43 24 A	E 7024	B5
SAVA GV 160	E 38 0 RR 54	E 43 24 A	E 7024	B6
SAVA 150 B	E 42 2 B 53	E 49 28 A	E 7028	B7
SAVA 150 AR	E 42 4 RA 53	E 49 27 A	E 7027	B8
Basic, low hydrogen electrodes				
EVB 50	E 42 4 B 32 H 5	E 49 18 A	E 7018	C1
EVB 55	E 42 6 B 32 H5	E 49 18-P1 A	E 7018-1	C2
EVB EXTRA	E 42 2 B 12 H10	E 49 A6-P1 A	E 7016	C3
EVB 45	E 42 2 B 32 H5	E 49 18-P1 A	E 7016	C4
EVB 47	E 38 2 B 32 H5	E 43 18 A	E 6018	C5
EVB S	E 42 4 B 12 H10	E 49 16 A	E 7016	C6
GALEB 50	E 42 2 B 32 H5	E 49 16 A	E 7016	C7
EVB K	E 42 2 B 12 H5	~E 49 16-P1 H5	E 7016	C8
	2560-A / 18275-A*	**2560-B / 18275-B***	**A-5.5**	
Medium alloyed basic electrodes for welding finegrained steels				
EVB 60	E 50 2 Mo B 42 H5	~E 57 18-3M2 A	E 8018-G	D1
EVB 65	E 55 6Mn1NiMo B42H5*	/	E 9018-G	D2
EVB Ni	E 50 41 Ni B 42 H5	~E 55 16-3N3 A	E 8018-C3	D3
EVB CuNi	E 46 4 ZB 42 H5	E 49 16-NC A	E 7018-G	D4
EVB CuNiCr	E 46 4 Z B 42 H5	E 49 16-NCC1 A	E 7018-G	D5
EVB NiMo	E 50 41 NiMo B 42 H5	~E 57 18-N2M3 A	E 8018-G	D6
GALEB 70	E 50 2Mn 1Ni B 42 H5	~E 57 16-N2M3 A	E 9016-G	D7
EVB 2.5 Ni	E 50 8 2Ni B 42 H5	~E 57 18-3N3 A	E 8018-C1	D8
EVB 2.5 NiMo	E 55 6 2NiMo B 42 H5 *	~E 62 18 N4M2A H5 *	E 9018-G	D9
EVB 75	E696Mn2NiCrMoB42H*	~E 78 16-N5CM3AH5*	E 10018-G	D10
EVB CrNiMo	E 62 2Z-B 42 H5 *	/	~E 11018 G	D11
EVB 80	~E 696Mn2NiCrMoB42H5*	~E 78 16 N5CM3 A H5*	E 11018-G	D12
EVB 100	E 794Mn2Ni1CrMoB42H5*	~E 83 16 –N5CM3 H5*	E 12018-G	D13
EVB 100 EKSTRA	E 89 6 ZB62 H5	~E 83 16 –N5CM3 H5*	E 12018-G	D14
EVB SP2	~ E 62 4 Z B 34	~E 69 18 GA	/	D15

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PRODUCT PROGRAMME

PRODUCT	EN ISO		AWS	Page
	2560-A / 3580-A *	**2560-B / 3580-B ***	**A-5.5 / A-5.4 ***	
Medium and high alloyed basic electrodes for welding creep resistant steels				
EVB Mo	E464MoB42H5 EMoB42H5 *	~E4918-3M3A ~E4918-1M3 *	E 7018-A1	E1
EVB MoV	E MoV B 42 H5 *	~E 62 18-G H5 *	E 8018-G	E2
EVB CrMo	E CrMo1 B 42 H5 *	~E 55 18-1CM H5 *	E 8018-B2	E3
EVB 2 CrMo	E CrMo2 B 42 H5 *	~E 62 18-2C1MH5 *	E 9018-B3	E4
EVB P24	E Z B42 H5 *	~E 55 18-3C1MV *	/	E5
EVB 5 CrMo	E CrMo5 B 42 H5 *	E 55 15 5CM-H5 *	E 502-15 *	E6
EVB 9 CrMo	E CrMo9 B 42 H5 *	E 62 15-9C1M H5 *	E 505-15 *	E7
EVB CrMoV	~ E CrMoV1 B32 H5*	~E 55 16-GH5 *	/	E8
EVB 3 CrMoV	E Z B 42 H5 *	~E 62 16-3C1 MV H5*	/	E9
EVB 9 CrMoV	~ E CrMo91 B 42 H5*	~E 62 15-9C1MV1 H5*	~ E 9016-B9	E10
EVB 91 CrMoV	E CrMo91 B 42 H5 *	~E 62 15-9C1MV H5 *	~ E 9018	E11
EVB Mo1Cr	E Z B42 H5 *	~E 55 18-1M3 H5 *	E 8016-B5	E12
Medium alloyed rutile electrodes for welding creep resistant steels				
E Ti Mo	E46AMoR12/EAMoR12*	~E 55 13-1M3 A (*)	E 8013-G	F1
E Ti MoV	E MoV R 12 *	E 55 13 G *	E 8013-G	F2
E Ti CrMo	E CrMo1 R 12 *	E 55 13 1CM *	E 8013-G	F3
E Ti 2 CrMo	E CrMo2 R 12 *	E 62 13 2C1M *	E 9013-G	F4
E Ti 5 CrMo	E CrMo5 R 12 *	E 62 13 5CM *	E 8016-B6	F5
	EN 1600 / ISO 3581 *	**DIN 8556/ DIN 1736 ***	**A-5.4 / A-5.11***	
High alloyed ferritic stainless steel electrodes				
INOX B 13 Fe	E 13 B 43	E 13 MPB 30+ 130	E 410-15	G1
INOX B 13/1 Fe	E 13 1 B 43	E 13 1 MPB 30+ 130	/	G2
INOX B 13/4 Fe	E 13 4 B 43	E 13 4 MPB 30+ 130	E 410 NiMo-15	G3
INOX B 13/6 Fe	/	/	/	G4
INOX B 17 Fe	E 17 B 43	E 17 MPB 30+ 130	E 430-15	G5
INOX B 17 MoFe	/	/	~ E 430Mo-15	G6
High alloyed austenitic and austenitic-ferritic stainless steel electrodes				
INOX R 19/9 Nb	E 19 9 Nb R 12	E 19 9 Nb R 26	E 347-17	H1
INOX B 19/9 Nb	E 19 9 Nb B 22	E 19 9 Nb B 20+	E 347-15	H2
INOX R 19/9 NC	E 19 9 LR 12	E 19 9 LR 26	E 308 L-17	H3
INOX R 19/12/3 Nb	E 19 12 3 Nb R 12	E 19 12 3 Nb R 26	E 318-17	H4
INOX B 19/12/3 Nb	E 19 12 3 Nb B 22	E 19 12 3 Nb B 20+	E 318-15	H5
INOX R 19/12/3 NC	E 19 12 3 LR 12	E 19 12 3 LR 26	E 316 L-17	H6
INOX R 19/13/4 L	~ E 19 13 4 LR 12	~ E 19 13 4 LR 23	E 317 L-17	H7
INOX R 22/9/3 LN	E 22 9 3 N L	/	E 2209 L-17	H8
INOX R 20/10/3 L	~ E 20 10 3 R 12	~ E 20 10 3 R 23	E 308 MoL-17	H9
INOX R 20/25 L	E 20 25 5 Cu NL R 23	E 20 25 5 L Cu R	E 385-17	H10
High alloyed heat resistant stainless steel electrodes				
INOX R 25/4 Fe	E 25 4 R 43	E 25 4 MPR 33 160	AISI: 446	I1
INOX R 25/14 NC	E 23 12 LR 12	E 23 12 LR 26	E 309 L-17	I2
INOX R 25/14/3 NC	E 23 12 2 LR 12	E 23 13 2 LR 26	E 309Mo L-17	I3
INOX R 25/20	E 25 20 R 12	E 25 20 R 26	E 310-16	I4
INOX B 25/20	E 25 20 B 42	E 25 20 B 20+	E 310-15	I5
High alloyed, special purpose electrodes				
INOX R 22/12/3 Fe	E 23.12.2R 160 33X*	/	E 309Mo-16	J1
INOX B 18/8/6	E 18 8 Mn B 22	E 18 8 Mn B 20+	~ E 307-15	J2
INOX R 18/8/6 Fe	E 18 8 Mn R 53	E 18 8 Mn MPR33 160	~ E 307-16	J3
INOX R 18/8/6	E 18 8 Mn R 12	E 18 8 Mn R 26	E 307-17	J4
INOX R 29/9	E 29 9 R 12	E 29 9 R 26	E 312-17	J5
INOX R 29/9 Fe	E 29 9 R 53	E 29 9 R 26	E 312-26	J6
INOX B 70/15	/	EL NiCr 15 Fe Mn *	E NiCrFe-3 *	J7

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PRODUCT PROGRAMME

PRODUCT	EN	DIN	AWS	Page
	EN 14700	**DIN 8555**	**A-5.13**	
Hardfacing electrodes				
UTOP 38	E Fe 3	E 3-UM-40-T	/	K1
UTOP 55	E Fe 4	E 6-UM-60-T	/	K2
TOOLDUR	E Fe 4	E 4-UM-60-65 S	E Fe 5-B	K3
E DUR 250	E Fe 3	E 1-UM-250	/	K4
E DUR 300	E Fe 1	E 1-UM-300	/	K5
E DUR 400	E Fe 3	E 1-UM-400	/	K6
E DUR 500	E Fe 3	E 1-UM-50	/	K7
E DUR 600	E Fe 8	E 6-UM-60	/	K8
E DUR 60 R	E Fe 8	E 6-UM-55	/	K9
E DUR 600 Si	E Fe 8	E 6-UM-55	/	K10
TOOLDUR Co	E Fe 3	~ E3-UM-50-CTZ		K11
E DUR Cr 13	E Fe 8	E 5-UM-CGP	/	K12
Electrodes, producing abrasion resistant deposit				
ABRADUR 54	E Fe 8	E 6-UM-55-G	/	L1
ABRADUR 58	E Fe 14	~ E 10-UM-60-G2	/	L2
ABRADUR 60	E Fe 14	E 10-UM-60-GR	/	L3
ABRADUR 64	E Fe 15	~ E 10-UM-65-GR	/	L4
ABRADUR 65	E Fe 16	~ E 10-UM-65-G	/	L5
ABRADUR 66	E Fe 16	E 10-UM-65-GR	/	L6
CrWC 600	E Fe 16	E 10-UM-60-C	/	L7
Manganese alloyed hardfacing electrodes				
E Mn 14	E Fe 9	E 7-UM-200-KP	/	M1
E Mn 14 Cr 4	E Fe 9	~ E 7-UM-200-KP	/	M2
E Mn 17 Cr 13	E Fe 9	/	/	M3
E Mn 17 Cr 10 Nb 3	E Fe 9	/	/	M4
High cobalt alloyed electrodes and rods – Durostels				
DUROSTEL 1 E		E 20-UM-55-ZCT	R Co Cr-C	N1
DUROSTEL 1 P		G/WSG-20-GO-55-ZCT	E Co Cr-C	N2
DUROSTEL 6 E		E 20-UM-40-ZCT	R Co Cr-A	N3
DUROSTEL 6 P		G/WSG-20-GO-45-ZCT	E Co Cr-A	N4
DUROSTEL 12 E		E 20-UM-50-ZCT	R Co Cr-B	N5
DUROSTEL 12 P		G/WSG-20-GO-50-ZCT	E Co Cr-B	N6
DUROSTEL 21 E		E 20-UM-300-CKZT	/	N7
DUROSTEL 21 P		G/WSG-20-GO-300-CKZT	/	N8
DUROSTEL F P		G/WSG-20-GO-40-ZCT	/	N9
	EN ISO 1071	**DIN 8573**	**A-5.15**	
Cast Iron electrodes				
MONEL	EC NiCu-1	E NiCu BG1	E NiCu-B	O1
MONEL C	EC NiCu-1	E NiCu G3	E NiCu-B	O2
SUPER Ni	EC NiCu-1	E Ni BG1	E Ni-Cl	O3
CAST Ni	EC NiCu-1	E Ni BG1	E Ni-Cl	O4
CAST Ni C	EC NiCu-1	E Ni BG1	E Ni-Cl	O5
CAST NiFe	EC NiCu-1	E NiFe BG1	E NiFe-Cl	O6
CAST NiFe C	EC NiCu-1	E NiFe BG13	E NiFe-Cl	O7
CAST NiFe B	EC NiCu-1	E NiFe BG1	E NiFe-Cl	O8
CAST NiFe 10	EC NiCu-1	~E Ni BG22	~E Ni-Cl	O9
CAST Fe	EC St 1	~E NiFe BG1	~E St	O10
SL 250	EC FeC-2-7	E (FeC-2) BG 49	/	O11

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PRODUCT PROGRAMME

PRODUCT	EN	DIN	AWS	Page
	EN ISO 1071	**DIN 1733 / DIN 8555***	**A-5.6**	
Electrodes for welding copper and aluminium alloys				
BRON CuSn	E CuSn 2 B2	E CuSn-7	E CuSn-A	P1
BRON CuAl	E CuAl 2 B2	E CuAl-8	E CuAl-A2	P2
BRON CuMn	E CuAlMn 2 B2	E 31-200cn *	~ E CuMnNiAl	P3
EL Cu		~ E CuMn2	~ ECu	P4
		DIN 1732	**A-5.3**	
ALU 99.5		EL-Al 99.5	E-1100	P5
ALU Mn		EL-Al Mn	E-3003	P6
ALU 5 Si		EL-Al Si5	E-4043	P7
ALU 12 Si		EL-AlSi 12	/	P8
Electrodes for cutting, gouging and preheating				
SEKATOR 1	/	/	/	Q1
SEKATOR 2 A	/	/	/	Q2
SEKATOR 2 B	/	/	/	Q3
TERMO		/	/	Q4
	EN 760	**DIN 32 522**	**A-5.17**	
Agglomerated welding fluxes and wires for S.A. – welding				
AR 18.5	SAAR 188 AC	BAR 1 88 AC 10 SKM	F7 A0–EM 12K	R1
AR D1	SAAR 197 AC	BAR 1 97 AC 10 SKM	F7 A0–EM 12K	R2
AR 18.1	SAAR 188 AC	BAR 1 88 AC 10 SKM	F7 A2–EM 12K	R3
AB 100	SAAB 176 AC	BAB 1 76 AC 10	F6 A2–EM 12K	R4
FB TT	SAFB 155 AC H5	BFB 1 55 AC10MHP5	F6 A4–EM 12K	R5
FB 12.2	SAFB 165 AC H5	BFB 1 65 AC12MHP5	F6 A4–EM 12K	R6
FB CrNi	SAFB 263 DC	BFB 5 63 745 DC 8 K	/	R7
CS Cr 6	SACS 196 AC	BCS 1 96 AC 12 B	/	R8
CS CrNi	SACS 299 AC	BCS 5 99 545 AC10KMB	/	R9
AB Cr	SAAB 265 AC	BAB 5 65 545 AC 10B	/	R10
CS 350	SACS 397 AC	BCS 3 97C CrMo AC8	/	R11
FB 33	SAAF 254 DC	BFB 6 54255 DC 8K		R12
FB 578	SAFB 175 AC	BFB 1 75 AC	F6 A4-EM12K	R13
	EN ISO			
	**636-A / 21952-A * 14343-A ** **	**636-B / 21952-B * 14343-B *** **	**A-5.9 / A-5.28***	
Welding rods for TIG – welding				
TIG Mo	W 46 2 W2Mo W MoSi *	W 55 2 W2M3 W 1M3 *	ER 80 S-G *	S1
TIG CrMo	W CrMo1Si *	W 1CM3 *	ER 80 S-G *	S2
TIG 2 CrMo	W CrMo2Si *	W 2C1M3 *	ER 90S-G	S3
TIG VAC 60	W 42 4 W3Si1	W 49 4 W6	A-5.18: ER70 S-6	S4
TIG VAC 65	W 46 4 W4Si1	W 55A 4 W6	A-5.18: ER70 S-6	S5
TIG 19/9 NbSi	W 19 9 Nb Si **	SS 347 Si **	ER 347	S13
TIG 19/9 NC Si	W 19 9 L Si **	SS 308 LSi **	ER 308 L Si	S14
TIG 19/12/3 NbSi	W 19 12 3 Nb Si **	~SS 318 **	ER 318 Si	S15
TIG 19/12/3 NC Si	W 19 12 3 L Si **	SS 316 LSi **	ER 316 L Si	S16
TIG 25/14 NC Si	W 23 12 L Si **	SS 309 LSi **	ER 309 L Si	S17
TIG 18/8/6 Si	W 18 8 Mn **	~SS 307 **	~ ER 307	S18
TIG 25/20	W 25 20 **	SS 310 **	ER 310	S19
TIG 29/9	W 29 9 **	SS 312 **	ER 312	S20
TIG 70/15	/	/	A-5.14:ER NiCr-3	S21
TIG 22/9/3 LN	W 22 9 3 NL **	SS 2209 **	ER 2209	S22
		DIN 1733	**A-5.7**	
TIG Cu	/	SG-CuSn	ER CuSn	S23
TIG CuAl8	/	SG-CuAl8	ER CuAl-A1	S24
TIG CuSn6	/	SG-CuSn6	ER CuSn-A	S25
TIG CuAg	/	SG-CuAg	/	S26
TIG CuMn		SG-CuMn13Al7	/	S27
TIG CuSi3		SG-CuSi3	ER CuSi-A	S28

PRODUCT	EN ISO		AWS	Page
	14341-A	**14341-B**	**A-5.18/A-5.28***	
Welding wires for MAG (CO_2) – welding				
VAC 60	G 42 4 M/C G 3 Si1	G 49A 4 M/C G6	ER 70 S-6	S4
VAC 65	G 46 4 M/C G 4 Si1	G 55A 4 M/C G6	ER 70 S-6	S5
VAC 60 Ni	G 42 4 M/C G 3 Ni1	G 49A 4 M/C GN2	~ ER 80 S-Ni1*	S6
VAC 60 Ti	~G 42 2 M/A/C G3Si1	~G 49A 2 M/A/C G11	ER 70 S-2	S7
VAC 60 CuNi	G 42 2 M/C G 0	G 49A 2 M/C G0	ER 80 S-G*	S8
	EN ISO			
	**16834-A / 14343-A * 21952-A ** **	**16834-B / 14343-B * 21952-B ** **	**A-5.9 / A-5.28 ***	
Welding wires for GMA – welding				
MIG Mo	G MoSi **	G 1M3 **	ER 80 S-G *	S1
MIG CrMo	/	/	ER 80 S-G *	S2
MIG 2 CrMo	/	/	ER 90S-G *	S3
MIG 65	G 55 2 A Mn3Ni1Mo	G 62A 2 N2M2T	ER 80 S-Ni 1 *	S9
MIG 75	G 69 4 Mn3Ni1CrMo	G 69A 2 N2M2T	ER 100 S-1 *	S10
MIG 90	G 89 6 M Mn4Ni2CrMo	G 83A 6 M N4M4T	ER 120 S-1 *	S11
MIG 17	G 17*	SS 430 *	ER 430	S12
MIG 19/9 Nb Si	G 19 9 Nb Si *	SS 347 Si *	ER 347	S13
MIG 19/9 NC Si	G 19 9 L Si *	SS 308 LSi *	ER 308 L Si	S14
MIG 19/12/3 Nb Si	G 19 12 3 Nb Si *	~SS 318 *	ER 318 Si	S15
MIG 19/12/3 NC Si	G 19 12 3 L Si *	SS 316 LSi *	ER 316 L Si	S16
MIG 25/14 NC Si	G 23 12 L Si *	SS 309 LSi *	ER 309 L Si	S17
MIG 18/8/6 Si	G 18 8 Mn *	~SS 307	ER 307	S18
MIG 25/20	G 25 20 *	SS 310	ER 310	S19
MIG 29/9	G 29 9 *	SS 312	ER 312	S20
		DIN 1733	**A-5.7**	
MIG Cu		SG-CuSn	ER CuSn	S23
MIG CuAl8		SG-CuAl8	ER CuAl-A1	S24
MIG CuSn6		SG-CuSn6	ER CuSn-A	S25
MIG CuAg		SG-CuAg	/	S26
MIG CuMn		SG-CuMn13Al7	/	S27
MIG CuSi3		SG-CuSi3	ER CuSi-A	S28
	EN 12 536	**DIN 8554**	**A-5.2**	
Welding rods for oxyacetilene- welding				
VP 37	O I	G I	R 45	T1
VP 40	O II	G II	R 60	T2
VP 42	O III	G III	R 60	T3
VP Mo	O IV	G IV	R 65	T4
VP CrMo	O V	G V	R 65	T5
	EN 756* / EN 12072 EN 10 088**	**DIN 8557* / DIN 8556**	**A-5.17 /A-5.23* /A-5.9****	
Wires and strips for submerged arc welding				
EPP 2	S 2 *	S 2 *	EM 12 K	U1
EPP 2 Mo	S 2 Mo *	S 2 Mo *	EA 2 *	
EPP 3	S 3 *	S 3 *	EM 13 K	
EPP 17 Cr	X 6 Cr 17**		ER 430 **	
EPP 19/9 NC	S 19 9 L	UP X2 CrNi 19 9	ER 308 L **	
EPP 19/12/3 NC	S 19 12 3 L	UP X2 CrNiMo 19 12	ER 316 L **	
EPP 18/8/6	S 18 8 Mn	UP X 15 CrNiMn 18 8	ER 307 **	
INOX TR Cr 17	/	UP X8 Cr 18	/	
INOX TR 19/9	/	UP X2 CrNi 19 9	/	

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PRODUCT PROGRAMME

PRODUCT	EN ISO		AWS	Page
Flux – cored wires for MIG – MAG welding				
Metalic type	**17632-A / 18276-A ***	**17632-B / 18276-B ***	**A-5.20/A-5.29 ***	
FILTUB 12 M	T 46 4 MM1 H5	T554T151MA H5	E 71 T-1 M	V1
FILTUB 32 M	T 694Mn2NiCrMoMM1H5*	T764T5-1MA-N4C1M2H5 *	E 111 T1 K4 *	V2
Rutile type	**17632-A / 17634-A ***	**17632-B / 17634-B ***	**A-5.29/A-5.20 ***	
FILTUB 4 R	T 46 4 C/M1 H5	T 554T1-C/M/A H10	E 71 T-1 *	V3
FILCORD 4 R	T 46 4 C/M1 H10	T 5541-T1-C/M/A H10	E 71 T-1 *	V4
FILTUB 5 R	T 504ZP C/M1 H5	T554T1-1C/M/A-NCC1 H5	E 71 T1-G	V5
FILTUB 6 R	T 42 AZ PC/M 1 H5	T 49YT1-1C/M/A-G H5	E 71 T1-G	V6
FILTUB 7 R	T 46 6 1Ni PM1 H5	T556T1-1MA-N1 H5	E 81 T1-Ni 1	V7
FILTUB 8 R	T 46AMoPM1 H5 T MoP C/M1 H5 *	T55YT1-1MA-2M3 H5 T49T1-1C/M-2M3 H5*	E 81 T1-A1	V8
Basic type	**17632-A / 17634-A * 18276-A ****	**17632-B / 17634-B * 18276-B ****	**A-5.29/A-5.20 ***	
FILTUB 12 B	T 42 4B M/C3 H5	T494T5.3M/C/A-2M3H5	E 70 T-5 M4 *	V9
FILTUB 14 B	T 464MoBC/M3 H5 T MoBC/M1 H5 *	T554T53M/CA-2M3H5 T49T5-0M/C-2M3 H5*	E 80 T5-G	10
FILTUB 16 B	T CrMo1 BM/C3 H5 *	T55T5-0M/C-1CM-H5*	E 80 T5-B2	V11
FILTUB 18 B	T CrMo2 BM/C3 H5 *	T62T5-0M/C-2C1M-H5*	E 80 T5-G	V12
FILTUB 19 B	/	/	E 90 T5-G	V13
FILTUB 25 B	/	/	E 90 T5-G	V14
FILTUB 28 B	T5561NiMoBC/M3 H5**	T626T4-3C/M-N2M2H5**	E 90 T5-G	V15
FILTUB 32 B	T696Mn2NiCrMoBM/C3H5**	T766T5-3M/C/A-N4C1M2H5**	E 110 T5-K4	V16
FILTUB 36 B	T 42 8 2Ni B M3 H5	T498T5-3MA-N5H5	E 90 T5-G	V17
FILTUB 38 B	T894Mn2Ni1CrMoBM3H5**	T834T5-3MA-N4C2M2H5**	E 120 T5-G	V18
FILTUB 40 B	~T466ZBM/C3 H5	~T556T5-3M/C/A-G H5	E 80 T5-G	V19
FILTUB 42 B	/	/	E 110 T5-G	V20
		DIN 8555		
For hardfacing				
FILTUB DUR 3		MSG1-GF-M21-250/MSG1-GF-C1-250		V21
FILTUB DUR 4		MSG1-GF-M21-300/MSG1-GF-C1-300		V22
FILTUB DUR 5		MSG1-GF-M21-350/MSG1-GF-C1-350-P		V23
FILTUB DUR 12		MSG5-GF-M21-40-P/MSG5-GF-C1-40-P		V24
FILTUB DUR 14		MSG6-GF-M21-55-GP/MSG6-GF-L1-55-GP		V25
FILTUB DUR 15.1		MSG5 -GF-M21-50-P/MSG5-GF-C1-50-P		V26
FILTUB DUR 16		MSG6-GF-M21-60-GP/MSG6-GF-C1-60-GP		V27
FILTUB UTOP 38		MSG5-GF-M21-40-P/MSG5-GF-C1-40-P		V28
FILTUB UTOP 55		MSG6-GF-M21-55-GP/MSG6-GF-C1-55-GP		V29
FILTUB UTOP Co		MSG 6-GF-M21-55-GP/MSG6-GF-C1-55-GP		V30
FILTUB UTOP Mo1		MSG 5-GF-M21-50-GP/MSG5-GF-C1-50-GP		V31
Flux – cored wires for S.A.-welding			**A – 5.23**	
FILTUB 112			F7 A4-EC-G	V32
FILTUB 114			F7 A4-EC-A4	V33
FILTUB 116			F8 P0-EC-B2	V34
FILTUB 118			F8 PO-EC-B3	V35
FILTUB 128			F9 A8-EC-G	V36
FILTUB 132			F11 A8-EC-F5	V37
FILTUB 136			F7 A15-EC-Ni2	V38
FILTUB 138			F12 A4-EC-G	V39
FILTUB 140			F7 A4-EC-G	V40
		DIN 8555		
For hardfacing				
FILTUB DUR 205		UP1-GF-BFB-165-350		V41
FILTUB DUR 212		UP5-GF-BFB4 652-40		V42
FILTUB DUR 214		UP6-BFB4 652 - 50		V43
FILTUB DUR 215		UP5-GF-BFB4 652-55		V44
FILTUB DUR 12Cr2NiMo		UP5-GF-BFB 165-400		V45
FILTUB DUR 13Cr3NiMoV		UP5-GF-BFB 165-40		V46
FILTUB DUR 17 Cr		UP5-GF-BCS 256-40		V47

For welding stainless steel	EN ISO 17633-A	EN ISO 17633-B	
FILCORD 308 L	T19 9 LR M/C 5	TS 308L-F M/C0	V48
FILCORD 316 L	T 19 12 3LR M/C 5	TS 316L-F M/C0	V49
FILCORD 309 L	T23 12 LR M/C 5	TS 309L-F M/C0	V50

PRODUCT	EN	DIN	AWS	Page
	EN 499	**DIN 1913 / 8529 ***	**A-5.1 / A-5.5***	
Low alloyed cellulosic, rutile and acid electrodes				
NEUTRAL	E 35 A A 13	E 43 10 A 2	/	A1
RAPID	E 38 2 R A 13	E 43 33 AR 7	E 6020	A2
CELEX	E 35 2 C 21	E 43 53 C 4	E 6010	A3
CELEX Mn	E 42 3 C 21	E 51 53 C 4	E 7010-G	A4
CELEX Mo	E 42 3 Mo C 21	/	E 7010-A1*	A5
CELEX Ni	E 46 3 1Ni C 21	/	E 8010-G *	A6
CELEX NiMo	E 50 3 1NiMo C 21	/	E 9010-G*	A7
JADRAN S	E 35 0 RC 11	E 43 11 R(C) 3	E 6013	A8
RUTILEN 12	E 38 0 RC 11	E 43 22 R(C) 3	E 6012	A9
RUTILEN Z	E 42 0 RC 11	E 51 22 RR(C) 6	E 6013	A10
RUTILEN 1000 S	E 42 0 RC 11	E 51 32 RR(C) 5	E 6013	A11
EMONA	E 35 2 RB 12	E 43 43 RR(B) 7	E 6013	A12
RUTILEN 13	E 42 0 RR 12	E 51 22 RR 6	E 6013	A13
RUTILEN X	E 42 0 RR 12	E 51 22 RR 6	E 6013	A14
RUTILEN 2000 S	E 42 0 RR 12	E 51 22 RR 6	E 6013	A15
RUTILEN K	E 38 2 R 12	E 43 33 R 3	E 6013	A16
RUTILEN 13 M	E 35 A R 12	E 43 21 R 3	E 6013	A17
RUTILEN S	E 38 0 RC 11	E 43 22 R(C)3	E 6013	A18
RUTILEN E	E 42 0 RC 11	E 51 32 R(C)3	E 6013	A19
High efficiency electrodes				
SAVA 130	E 38 0 RR 33	E 43 32 RR 11 130	E 7024	B1
SAVA 150	E 38 0 RR 53	E 43 32 RR 11 150	E 7024	B2
SAVA 180	E 42 0 RR 74	E 43 32 RR 11 180	E 7024	B3
SAVA 200	E 42 0 RR 74	E 43 32 RR 11 200	E 7024	B4
SAVA GV 130	E 38 0 RR 34	E 43 32 RR 11 130	E 7024	B5
SAVA GV 160	E 38 0 RR 54	E 43 32 RR 11 160	E 7024	B6
SAVA 150 B	E 42 2 B 53	E 51 43 B 12 150	E 7028	B7
SAVA 150 AR	E 42 4 RA 53	E 51 53 AR 11 160	E 7027	B8
Basic, low hydrogen electrodes				
EVB 50	E 42 4 B 32 H 5	E 51 55 B 10	E 7018	C1
EVB 55	E 42 6 B 42 H5	EY 42 76 Mn B *	E 7018-1	C2
EVB EXTRA	E 42 2 B 32 H10	EY 42 53 Mn B *	E 7016	C3
EVB 45	E 42 2 B 32	E 51 43 B(R) 9	E 7016	C4
EVB 47	E 38 2 B 32	E 43 55 B 10	E 6018	C5
EVB S	E 42 4 B 12 H10	E 51 43 B(R) 10	E 7016	C6
GALEB 50	E 42 2 B 42	E 51 54 B(R) 10	E 7016	C7
EVB K	E 42 2 B 12	E 51 43 B(R) 10	E 7016	C8
	EN 499 / EN 757 *	**DIN 8529**	**A-5.5**	
Medium alloyed basic electrodes for welding finegrained steels				
EVB 60	E 50 2 Mo B 42	EY 5075 Mn1Mo B	E 8018-G	D1
EVB 65	/	EY5576Mn1NiMoBH5	E 9018-G	D2
EVB Ni	E 50 41 Ni B 42	EY 50 75 Mn1Ni B	E 8018-C3	D3
EVB CuNi	/	EY 50 75 CuNi B	E 7018-G	D4
EVB CuNiCr	E 46 4 Z B 42	/	E 7018-G	D5
EVB NiMo	E 50 21 NiMo B 42	EY 50 76 1 NiMo B	E 8018-G	D6
GALEB 70	E 50 A1 NiMo B 42	EY 50 75 1 NiMo B	E 9016-G	D7
EVB 2.5 Ni	E 50 2 2Ni B 32 H10	EY 50 76 2Ni B	E 8018-C1	D8
EVB 2.5 NiMo	E 55 2 2NiMo B 42 *	EY 50 75 2 NiMo B	E 9018-G	D9
EVB 75	E 692Mn2NiCrMoB42*	EY 6975Mn2NiCrMoB	E 10018-G	D10
EVB CrNiMo		≈EY 62 52 1NiCrMo B	≈E 11018 G	D11
EVB 80	E 692Mn2NiCrMoB42*	EY 6975Mn2NiCrMoB	E 11018-G	D12
EVB 100	E 89AMn2Ni1CrMoB42*	EY7964Mn2Ni1CrMoB	E 12018-G	D13
EVB 100 EKSTRA	/	EY8975Mn2Ni1MoBH5	E 12018-G	D14
EVB SP2	≈ E 62 4 Z B 34	/	/	D15

PRODUCT	EN	DIN	AWS	Page
	EN 1599 / EN 499 *	**DIN 8575**	**A-5.5**	
Medium and high alloyed basic electrodes for welding creep resistant steels				
EVB Mo	≈E Mo B42 / E 46 2MoB42*	E Mo B 26	E 7018-A1	E1
EVB MoV	E MoV B 42	E MoV B 20+	E 8018-G	E2
EVB CrMo	E CrMo1 B 42	E CrMo1 B 26	E 8018-B2	E3
EVB 2 CrMo	E CrMo2 B 42	E CrMo2 B 20+	E 9018-B3	E4
EVB P24	/	/	/	E5
EVB 5 CrMo	E CrMo5 B 42	E CrMo5 B 20+	E 502-15 *	E6
EVB 9 CrMo	E CrMo9 B 42	E CrMo9 B 20+	E 505-15 *	E7
EVB CrMoV	≈ E CrMoV1 B	E CrMoV1 B 20+	/	E8
EVB 3 CrMoV	E Z CrMo 3V B42 H5	/	/	E9
EVB 9 CrMoV	≈ E CrMo91 B 42	/	≈ E 9016-B9	E10
EVB 91 CrMoV	E CrMo91 B 42	/	≈ E 9018	E11
EVB Mo1Cr	/	/	E 8016-B5	E12
Medium alloyed rutile electrodes for welding creep resistant steels				
E Ti Mo	E 46 A Mo R 12 *	E Mo R 22	E 8013-G	F1
E Ti MoV	E MoV R 12	E MoV R 22	E 8013-G	F2
E Ti CrMo	E CrMo1 R 12	E CrMo1 R 22	E 8013-G	F3
E Ti 2 CrMo	E CrMo2 R 12	E CrMo2 R 22	E 9013-G	F4
E Ti 5 CrMo	E CrMo5 R 12	E CrMo5 R 22	E 8016-B6	F5
	EN 1600	**DIN 8556/ DIN 1736 ***	**A-5.4 / A-5.11***	
High alloyed ferritic stainless steel electrodes				
INOX B 13 Fe	E 13 B 43	E 13 MPB 30+ 130	E 410-15	G1
INOX B 13/1 Fe	E 13 1 B 43	E 13 1 MPB 30+ 130	/	G2
INOX B 13/4 Fe	E 13 4 B 43	E 13 4 MPB 30+ 130	E 410 NiMo-15	G3
INOX B 13/6 Fe	/	/	/	G4
INOX B 17 Fe	E 17 B 43	E 17 MPB 30+ 130	E 430-15	G5
INOX B 17 MoFe	/	/	≈ E 430Mo-15	G6
High alloyed austenitic and austenitic-ferritic stainless steel electrodes				
INOX R 19/9 Nb	E 19 9 Nb R 12	E 19 9 Nb R 26	E 347-17	H1
INOX B 19/9 Nb	E 19 9 Nb B 22	E 19 9 Nb B 20+	E 347-15	H2
INOX R 19/9 NC	E 19 9 LR 12	E 19 9 LR 26	E 308 L-17	H3
INOX R 19/12/3 Nb	E 19 12 3 Nb R 12	E 19 12 3 Nb R 26	E 318-17	H4
INOX R 19/12/3 NC	E 19 12 3 LR 12	E 19 12 3 LR 26	E 316 L-17	H5
INOX B 19/12/3 Nb	E 19 12 3 Nb B 22	E 19.12.3 Nb B 20+	E 318-15	H6
INOX R 19/13/4 L	≈ E 19 13 4 LR 12	≈ E 19 13 4 LR 23	E 317 L-17	H7
INOX R 22/9/3 LN	E 22 9 3 N L	/	E 2209 L-17	H8
INOX R 20/10/3 L	≈ E 20 10 3 R 12	≈ E 20 10 3 R 23	E 308 MoL-17	H9
INOX R 20/25 L	E 20 25 5 Cu NL 23	E 20 25 5 L Cu R	E 385-17	H10
High alloyed heat resistant stainless steel electrodes				
INOX R 25/4 Fe	E 25 4 R 43	E 25 4 MPR 33 160	AISI: 446	I1
INOX R 25/14 NC	E 23 12 LR 12	E 23 12 LR 26	E 309 L-17	I2
INOX R 25/14/3 NC	E 23 12 2 LR 12	E 23 13 2 LR 26	E 309Mo L-17	I3
INOX R 25/20	E 25 20 R 12	E 25 20 R 26	E 310-16	I4
INOX B 25/20	E 25 20 B 42	E 25 20 B 20+	E 310-15	I5
High alloyed, special purpose electrodes				
INOX R 22/12/3 Fe	/	/	E 309Mo-16	J1
INOX B 18/8/6	E 18 8 Mn B 22	E 18 8 Mn B 20+	≈ E 307-15	J2
INOX R 18/8/6 Fe	E 18 8 Mn R 53	E 18 8 Mn MPR33 160	≈ E 307-16	J3
INOX R 18/8/6	E 18 8 Mn R 53	E 18 8 Mn R 26	E 307-17	J4
INOX R 29/9	E 29 9 R 12	E 29 9 R 26	E 312-17	J5
INOX R 29/9 Fe	E 29 9 R 53	E 29 9 R 26	E 312-26	J6
INOX B 70/15	/	EL NiCr 15 Fe Mn *	E NiCrFe-3 *	J7

PRODUCT	EN	DIN	AWS	Page
	/	**DIN 8555**	**A-5.13**	
Hardfacing electrodes				
UTOP 38		E 3-UM-40-T	/	K1
UTOP 55		E 6-UM-60-T	/	K2
TOOLDUR		E 4-UM-60-65 S	E Fe 5-B	K3
E DUR 250		E 1-UM-250	/	K4
E DUR 300		E 1-UM-300	/	K5
E DUR 400		E 1-UM-400	/	K6
E DUR 500		E 1-UM-50	/	K7
E DUR 600		E 6-UM-60	/	K8
E DUR 60 R		E 6-UM-55	/	K9
E DUR 600 Si		E 6-UM-55	/	K10
TOOLDUR Co		≈ E3-UM-50-CTZ		K11
E DUR Cr 13		E 5-UM-CGP	/	K12
Electrodes, producing abrasion resistant deposit				
ABRADUR 54		E 6-UM-55-G	/	L1
ABRADUR 58		≈ E 10-UM-60-G2	/	L2
ABRADUR 60		E 10-UM-60-GR	/	L3
ABRADUR 64		≈ E 10-UM-65-GR	/	L4
ABRADUR 65		≈ E 10-UM-65-G	/	L5
ABRADUR 66		E 10-UM-65-GR	/	L6
CrWC 600		E 10-UM-60-C	/	L7
Manganese alloyed hardfacing electrodes				
E Mn 14		E 7-UM-200-KP	/	M1
E Mn 14 CR 4		≈ E 7-UM-200-KP	/	M2
E Mn 17 Cr 13		/	/	M3
E Mn 17 Cr 10 Nb 3		/	/	M4
High cobalt alloyed electrodes and rods – Durostels				
DUROSTEL 1 E		E 20-UM-55-ZCT	R Co Cr-C	N1
DUROSTEL 1 P		G/WSG-20-GO-55-ZCT	E Co Cr-C	N2
DUROSTEL 6 E		E 20-UM-40-ZCT	R Co Cr-A	N3
DUROSTEL 6 P		G/WSG-20-GO-45-ZCT	E Co Cr-A	N4
DUROSTEL 12 E		E 20-UM-50-ZCT	R Co Cr-B	N5
DUROSTEL 12 P		G/WSG-20-GO-50-ZCT	E Co Cr-B	N6
DUROSTEL 21 E		E 20-UM-300-CKZT	/	N7
DUROSTEL 21 P		G/WSG-20-GO-300-CKZT	/	N8
DUROSTEL F P		G/WSG-20-GO-40-ZCT	/	N9
	/	**DIN 8573**	**A-5.15**	
Cast Iron electrodes				
MONEL		E NiCu G3	E NiCu-B	O1
MONEL C		E NiCu BG13	E NiCu-B	O2
SUPER Ni		E Ni BG1	E Ni-Cl	O3
CAST Ni		E Ni BG1	E Ni-Cl	O4
CAST Ni C		E Ni BG13	E Ni-Cl	O5
CAST NiFe		E NiFe BG1	E NiFe-Cl	O6
CAST NiFe C		E NiFe BG13	E NiFe-Cl	O7
CAST NiFe B		E NiFe BG1	E NiFe-Cl	O8
CAST NiFe 10		≈E Ni BG22	≈E Ni-Cl	O9
CAST Fe		≈E NiFe BG1	≈E St	O10
SL 250		E (FeC-2) BG 49	/	O11

PRODUCT	EN	DIN	AWS	Page
	/	**DIN 1733 / DIN 8555***	**A-5.6**	
Electrodes for welding copper and aluminium alloys				
BRON CuSn		E CuSn-7	E CuSn-A	P1
BRON CuAl		E CuAl-8	E CuAl-A2	P2
BRON CuMn		E 31-200cn *	≈ E CuMnNiAl	P3
EL Cu		≈ E CuMn2	≈ ECu	P4
		DIN 1732	**A-5.3**	
ALU 99.5		EL-Al 99.5	E-1100	P5
ALU Mn		EL-Al Mn	E-3003	P6
ALU 5 Si		EL-Al Si5	E-4043	P7
ALU 12 Si		EL-AlSi 12	/	P8
Electrodes for cutting, gouging and preheating				
SEKATOR 1	/	/	/	Q1
SEKATOR 2 A	/	/	/	Q2
SEKATOR 2 B	/	/	/	Q3
TERMO		/	/	Q4
	EN 760	**DIN 32 522**	**A-5.17**	
Agglomerated welding fluxes and wires for S.A. – welding				
AR 18.5	SA AR 1 88 AC	BAR 1 88 AC 10 SKM	F7 A0–EM 12K	R1
AR D1	SA AR 1 97 AC	BAR 1 97 AC 10 SKM	F7 A0–EM 12K	R2
AR 18.1	SA AR 1 88 AC	BAR 1 88 AC 10 SKM	F7 A2–EM 12K	R3
AB 100	SA AB 1 76 AC	BAB 1 76 AC 10	F6 A2–EM 12K	R4
FB TT	SA FB 1 55 AC H5	BFB 1 55 AC10MHP5	F6 A4–EM 12K	R5
FB 12.2	SA FB 1 65 AC H5	BFB 1 65 AC12MHP5	F6 A4–EM 12K	R6
FB CrNi	SA FB 2 63 DC	BFB 5 63 745 DC 8 K	/	R7
CS Cr 6	SA CS 1 96 AC	BCS 1 96 AC 12 B	/	R8
CS CrNi	SA CS 2 99 AC	BCS 5 99 545 AC10KMB	/	R9
AB Cr	SA AB 2 65 AC	BAB 5 65 545 AC 10B	/	R10
CS 350	SA CS 3 97 AC	BCS 3 97C CrMo AC8	/	R11
FB 33	SA AF 2 54 DC	BFB 6 54255 DC 8K		R12
FB 578	SA FB 1 75 AC	BFB 1 75 AC	F6 A4-EM12K	R13
	EN12072 / EN 1668*	**DIN 8556 / DIN 8575***	**A-5.9 / A-5.28***	
Welding rods for TIG – welding				
TIG Mo	EN12070:WMoSi/W2Mo*	SG Mo *	ER 80 S-G *	S1
TIG CrMo	EN12070: W CrMo1 Si	SG CrMo 1 *	ER 80 S-G *	S2
TIG 2 CrMo	EN12070: W CrMo2 Si	SG CrMo 2 *	ER 90S-G	S3
TIG VAC 60	W 42 4 W 3 Si 1 *	DIN 8559: SG-2	A-5.18: ER70 S-6	S4
TIG VAC 65	W 46 4 W 4 Si 1 *	DIN 8559: SG-3	A-5.18: ER70 S-6	S5
TIG 19/9 NbSi	W 19 9 Nb Si	SG X5 CrNiNb 19 9	ER 347	S13
TIG 19/9 NC Si	W 19 9 L Si	SG X2 CrNi 19 9	ER 308 L Si	S14
TIG 19/12/3 NbSi	W 19 12 3 Nb Si	SG X5 CrNiMoNb 19 12	ER 318 Si	S15
TIG 19/12/3 NC Si	W 19 12 3 L Si	SG X2 CrNiMo 19 12	ER 316 L Si	S16
TIG 25/14 NC Si	W 23 12 L Si	SG X2 CrNi 24 12	ER 309 L Si	S17
TIG 18/8/6 Si	W 18 8 Mn	SG X15 CrNiMn 18 8	≈ ER 307	S18
TIG 25/20	W 25 20	SG X 12 CrNi 25 20	ER 310	S19
TIG 29/9	W 29 9	SG X10 CrNi 30 9	ER 312	S20
TIG 70/15	/	SG NiCr20Nb (DIN1736)	A-5.14:ER NiCr-3	S21
TIG 22/9/3 LN	W 22 9 3 LN	/	ER 2209	S22
		DIN 1733	**A-5.7**	
TIG Cu		SG-CuSn	ER CuSn	S23
TIG CuAl8		SG-CuAl8	ER CuAl-A1	S24
TIG CuSn6		SG-CuSn6	ER CuSn-A	S25
TIG CuAg		SG-CuAg	/	S26

TIG CuMn		SG-CuMn13Al7	/	S27
TIG CuSi3		SG-CuSi3	ER CuSi-A	S28
PRODUCT	**EN**	**DIN**	**AWS**	**Page**
	EN 440	**DIN 8559**	**A-5.18/A-5.28***	
Welding wires for MAG (CO_2) – welding				
VAC 60	G 42 4 C/M G 3 Si1	SG-2	ER 70 S-6	S4
VAC 65	G 46 4 C/M G 4 Si1	SG-3	ER 70 S-6	S5
VAC 60 Ni	G 42 4 C/M G 3 Ni1	/	≈ ER 80 S-Ni1*	S6
VAC 60 Ti	G 42 2 C/M G 2 Ti	/	ER 70 S-2	S7
VAC 60 CuNi	G 42 2 C/M G 0	/	ER 80 S-G*	S8
	EN 12 072/EN 12534* EN 10 0088-3 97**	**DIN 8556 / DIN 8575***	**A-5.9 / A-5.28 ***	
Welding wires for GMA – welding				
MIG Mo	/	SG Mo *	ER 80 S-G *	S1
MIG CrMo	EN12070: G CrMo1 Si	SG CrMo 1 *	ER 80 S-G *	S2
MIG 2 CrMo	EN12070: G CrMo2 Si	SG CrMo 2 *	ER 90S-G *	S3
MIG 65	/	/	ER 80 S-Ni 1 *	S9
MIG 75	Mn3Ni1CrMo*	/	ER 100 S-1 *	S10
MIG 90	89 6 M GMn4Ni2CrMo	/	ER 120 S-1 *	S11
MIG 17	G17 , X6 Cr17**	/	ER 430	S12
MIG 19/9 Nb Si	G 19 9 Nb	SG X5 CrNiNb 19 9	ER 347	S13
MIG 19/9 NC Si	G 19 9 L Si	SG X5 CrNi 19 9	ER 308 L Si	S14
MIG 19/12/3 Nb Si	G 19 12 3 Nb Si	SG X5 CrNiMoNb 19 12	ER 318 Si	S15
MIG 19/12/3 NC Si	G 19 12 3 L Si	SG X2 CrNiMo 19 12	ER 316 L Si	S16
MIG 25/14 NC Si	G 23 12 L Si	SG X2 CrNi 24 12	ER 309 L Si	S17
MIG 18/8/6 Si	G 18 8 Mn	SG X 15 CrNiMn 18 8	ER 307	S18
MIG 25/20	G 25 20	SG X 12 CrNi 25 20	ER 310	S19
MIG 29/9	G 29 9	SG X10 CrNi 30 9	ER 312	S20
		DIN 1733	**A-5.7**	
MIG Cu		SG-CuSn	ER CuSn	S23
MIG CuAl8		SG-CuAl8	ER CuAl-A1	S24
MIG CuSn6		SG-CuSn6	ER CuSn-A	S25
MIG CuAg		SG-CuAg	/	S26
MIG CuMn		SG-CuMn13Al7	/	S27
MIG CuSi3		SG-CuSi3	ER CuSi-A	S28
	EN 12 536	**DIN 8554**	**A-5.2**	
Welding rods for oxyacetilene- welding				
VP 37	O I	G I	R 45	T1
VP 40	O II	G II	R 60	T2
VP 42	O III	G III	R 60	T3
VP Mo	O IV	G IV	R 65	T4
VP CrMo	O V	G V	R 65	T5
	EN 756* / EN 12072 EN 10 088**	**DIN 8557* / DIN 8556**	**A-5.17 /A-5.23* /A-5.9****	
Wires and strips for submerged arc welding				
EPP 2	S 2 *	S 2 *	EM 12 K	U1
EPP 2 Mo	S 2 Mo *	S 2 Mo *	EA 2 *	
EPP 3	S 3 *	S 3 *	EM 13 K	
EPP 17 Cr	X 6 Cr 17**		ER 430 **	
EPP 19/9 NC	S 19 9 L	UP X2 CrNi 19 9	ER 308 L **	
EPP 19/12/3 NC	S 19 12 3 L	UP X2 CrNiMo 19 12	ER 316 L **	
EPP 18/8/6	S 18 8 Mn	UP X 15 CrNiMn 18 8	ER 307 **	
INOX TR Cr 17	/	UP X8 Cr 18	/	
INOX TR 19/9	/	UP X2 CrNi 19 9	/	

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PRODUCT PROGRAMME

PRODUCT	EN	DIN	AWS	Page
Flux – cored wires for MIG – MAG welding				
Metalic type	**EN 758 / EN 12535 ***		**A-5.20/A-5.29***	
FILTUB 12 M	T 46 4 M M 1 H5		E 71 T-1 M	V1
FILTUB 32 M	T 69 4 Mn 2Ni Cr Mo M M 1 H5 *		E111T1-K4H4*	V2
Rutile typ	**EN 758/EN12071***		**A-5.29/A-5.20 ***	
FILTUB 4 R	T 46 4 PM1 H5/ T 46 4 PC1 HST		E 71 T-1 *	V3
FILCORD 4 R	T 46 4 PM1 / T 46 4 PC1		E 71 T-1 *	V4
FILTUB 5 R	T 46 A 1 NiCrCuP M1		E 71 T1-G	V5
FILTUB 6 R	T 42 AZ PC1 H5 / T AZ PM1 HST		E 71 T1-G	V6
FILTUB 7 R	T 46 4 1Ni PM1		E 81 T1-Ni 1	V7
FILTUB 8 R	T Mo LPM1 H5 *		E 81 T1-A1	V8
Basic typ	**EN 758/EN12071***	**• EN 12535**	**A-5.29/A-5.20 ***	
FILTUB 12 B	T 42 4B C3 H5 / T 42 4B M3 H5		E 70 T-5 M4 *	V9
FILTUB 14 B	T Mo LBC3 H5 / T Mo LBM3 H5 *		E 80 T5-G	V10
FILTUB 16 B	T CrMo1 BC3 H5 / T CrMo1 M3 H5 *		E 80 T5-B2	V11
FILTUB 18 B	T CrMo2 BC3 H5 / T CrMo2 M3 H5 *		E 80 T5-G	V12
FILTUB 19 B	T CrMo2 BC3 H5 / T CrMo2 M3 H5 *		E 90 T5-G	V13
FILTUB 25 B	/		E 90 T5-G	V14
FILTUB 28 B	• T 50 61NiMoBC3 H5 / T 50 61NiMoBM3 H5		E 90 T5-G	V15
FILTUB 32 B	• T 69 6 Mn2NiCrMo B M (C)3 H5		E 110 T5-K4	V16
FILTUB 36 B	T 42 6 2Ni B M3 H5		E 90 T5-G	V17
FILTUB 38 B	• T 89 4 Mn2Ni1CrMo BM3 H5		E 120 T5-G	V18
FILTUB 40 B	T 46 6 ZB C3 H5/ T 46 6 ZB M3 H5		E 80 T5-G	V19
FILTUB 42 B	/		E 110 T5-G	V20
		DIN 8555		
For hardfacing				
FILTUB DUR 3		MSG1-GF-M21-250/MSG1-GF-C1-250		V21
FILTUB DUR 4		MSG1-GF-M21-300/MSG1-GF-C1-300		V22
FILTUB DUR 5		MSG1-GF-M21-350/MSG1-GF-C1-350-P		V23
FILTUB DUR 12		MSG5-GF-M21-40-P/MSG5-GF-C1-40-P		V24
FILTUB DUR 14		MSG6-GF-M21-55-GP/MSG6-GF-L1-55-GP		V25
FILTUB DUR 15.1		MSG5 -GF-M21-50-P/MSG5-GF-C1-50-P		V26
FILTUB DUR 16		MSG6-GF-M21-60-GP/MSG6-GF-C1-60-GP		V27
FILTUB UTOP 38		MSG5-GF-M21-40-P/MSG5-GF-C1-40-P		V28
FILTUB UTOP 55		MSG6-GF-M21-55-GP/MSG6-GF-C1-55-GP		V29
FILTUB UTOP Co		MSG 6-GF-M21-55-GP/MSG6-GF-C1-55-GP		V30
FILTUB UTOP Mo1		MSG 5-GF-M21-50-GP/MSG5-GF-C1-50-GP		V31
Flux – cored wires for S.A.-welding			**A – 5.23**	
FILTUB 112			F7 A4-EC-G	V32
FILTUB 114			F7 A4-EC-A4	V33
FILTUB 116			F8 P0-EC-B2	V34
FILTUB 118			F8 PO-EC-B3	V35
FILTUB 128			F9 A8-EC-G	V36
FILTUB 132			F11 A8-EC-F5	V37
FILTUB 136			F7 A15-EC-Ni2	V38
FILTUB 138			F12 A4-EC-G	V39
FILTUB 140			F7 A4-EC-G	V40
		DIN 8555		
For hardfacing				
FILTUB DUR 205		UP1-GF-BFB-165-350		V41
FILTUB DUR 212		UP5-GF-BFB4 652-40		V42
FILTUB DUR 214		UP6-BFB4 652 - 50		V43
FILTUB DUR 215		UP5-GF-BFB4 652-55		V44
FILTUB DUR 12Cr2NiMo		UP5-GF-BFB 165-400		V45
FILTUB DUR 13Cr3NiMoV		UP5-GF-BFB 165-40		V46
FILTUB DUR 17 Cr		UP5-GF-BCS 256-40		V47

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PRODUCT PROGRAMME

For welding stainless steel	EN 12073	A-5.22	
FILCORD 308 L		E 308L T0-1 / E 308L T0-4	V48
FILCORD 316 L		E 316L T0-1 / E 316L T0-4	V49
FILCORD 309 L		E 309L T0-1 / E 309L T0-4	V50

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PRODUCTION PROGRAM

PRODUCT	W. Nr.	Page	PRODUCT	W. Nr.	Page
Electrodes			**Rods and wires**		
INOX B 13 Fe	~1.4009	G1	TIG / MIG Mo	1.5424	S1
INOX B 13/1 Fe	~1.4018	G2	TIG / MIG CrMo	1.7339	S2
INOX B 13/4 Fe	~1.4351	G3	TIG CrMo / MIG 2 CrMo	1.7384	S3
INOX B 17 Fe	~1.4015	G5	TIG VAC 60 / VAC 60	1.5125	S4
INOX B 17MoFe	1.4115	G6	TIG VAC 65 / VAC 65	1.5130	S5
INOX R 19/9 Nb	1.4551	H1	VAC 60 Ti	1.5125	S7
INOX B 19/9 Nb	1.4551	H2	MIG 17	1.4016	S12
INOX R 19/9 NC	1.4316	H3	TIG / MIG 19/9 NbSi	1.4551	S13
INOX R 19/12/3 Nb	1.4576	H4	TIG / MIG 19/9 NC Si	1.4316	S14
INOX B 19/12/3 Nb	1.4576	H5	TIG / MIG 19/12/3 NbSi	1.4576	S15
INOX R 19/12/3 NC	1.4430	H6	TIG / MIG 19/12/3 NC Si	1.4430	S16
INOX R 19/13/4 L	1.4453	H7	TIG / MIG 25/14 NC Si	1.4332	S17
INOX R 22/9/3 LN	1.4462	H8	TIG / MIG 18/8/6 Si	1.4370	S18
INOX R 20/25 L	~1.4539	H10	TIG / MIG 25/20	1.4842	S19
INOX R 25/4 Fe	~1.4820	I1	TIG / MIG 29/9	1.4337	S20
INOX R 25/14 NC	1.4332	I2	TIG 70/15	2.4806	S21
INOX R 25/14/3 NC	1.4459	I3	TIG 22/9/3 LN	1.4462	S22
INOX R 25/20	1.4842	I4	TIG / MIG Cu	2.1006	S23
INOX B 25/20	1.4842	I5	TIG / MIG CuAl 8	2.0921	S24
INOX B 18/8/6	1.4370	J2	TIG / MIG CuSn 6	2.1022	S25
INOX R 18/8/6	1.4370	J4	TIG / MIG CuAg	2.1211	S26
INOX R 29/9	1.4337	J5	TIG / MIG CuMn	2.1367	S27
INOX B 70/15	~2.4620	J7	TIG / MIG CuSi 3	2.1461	S28
BRON CuSn	2.1025	P1	VP 37	~1.1116	T1
BRON CuAl	~2.0926	P2	VP 40	1.0495	T2
BRON CuMn	~2.1368	P3	VP 42	~1.6215	T3
EL Cu	~2.1363	P4	VP Mo	1.5425	T4
ALU 99.5	3.0259	P5	VP CrMo	~1.7346	T5
ALU Mn	3.0516	P6			
ALU 5 Si	~3.2245	P7			
ALU 12 Si	~3.2585	P8			

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ALPHABETICAL LIST
OF WELDING CONSUMABLES

Welding electrodes	Page	Welding electrodes	Page
ABRADUR 54	L1	EVB 2 CrMo	E4
ABRADUR 58	L2	EVB 2.5 Ni	D8
ABRADUR 60	L3	EVB 2.5 NiMo	D9
ABRADUR 64	L4	EVB 3 CrMoV	E9
ABRADUR 65	L5	EVB 45	C4
ABRADUR 66	L6	EVB 47	C5
ALU 12Si	P8	EVB 5 CrMo	E6
ALU 5 Si	P7	EVB 50	C1
ALU 99.5	P5	EVB 55	C2
ALU Mn	P6	EVB 60	D1
BRON CuAl	P2	EVB 65	D2
BRON CuMn	P3	EVB 75	D10
BRON CuSn	P1	EVB 80	D12
CAST Fe	O10	EVB 9 CrMo	E7
CAST Ni	O4	EVB 9 CrMoV	E10
CAST Ni C	O5	EVB 91 CrMoV	E11
CAST NiFe	O6	EVB CrMo	E3
CAST NiFe C	O7	EVB CrMoV	E8
CAST NiFe 10	O9	EVB CrNiMo	D11
CAST NiFe B	O8	EVB CuNi	D4
CELEX	A3	EVB CuNiCr	D5
CELEX Mn	A4	EVB EXTRA	C3
CELEX Mo	A5	EVB K	C8
CELEX Ni	A6	EVB Mo	E1
CELEX NiMo	A7	EVB Mo1Cr	E12
CrWC 600	L7	EVB MoV	E2
DUROSTEL 1 E	N1	EVB Ni	D3
DUROSTEL 1 P	N2	EVB NiMo	D6
DUROSTEL 12 E	N5	EVB P24	E5
DUROSTEL 12 P	N6	EVB S	C6
DUROSTEL 21 E	N7	EVB SP2	D15
DUROSTEL 21 P	N8	GALEB 50	C7
DUROSTEL 6 E	N3	GALEB 70	D7
DUROSTEL 6 P	N4	INOX B 13 Fe	G1
DUROSTEL F P	N9	INOX B 13/1 Fe	G2
E DUR 250	K4	INOX B 13/4 Fe	G3
E DUR 300	K5	INOX B 13/6 Fe	G4
E DUR 400	K6	INOX B 17 Fe	G5
E DUR 500	K7	INOX B 17 MoFe	G6
E DUR 600	K8	INOX B 18/8/6	J2
E DUR 600 Si	K10	INOX B 19/9 Nb	H2
E DUR Cr13	K12	INOX B 25/20	I5
E DUR 60 R	K9	INOX B 70/15	J7
E Mn 14	M1	INOX R 18/8/6	J4
E Mn 14 CR 4	M2	INOX R 18/8/6 Fe	J3
E Mn 17 Cr 10 Nb 3	M4	INOX R 19/12/3 Nb	H4
E Mn 17 Cr 13	M3	INOX B 19/12/3 Nb	H6
EL Cu	P4	INOX R 19/12/3 NC	H5
E Ti 2 CrMo	F4	INOX R 19/13/4 L	H7
E Ti 5 CrMo	F5	INOX R 19/9 Nb	H1
E Ti CrMo	F3	INOX R 19/9 NC	H3
E Ti Mo	F1	INOX R 20/10/3 L	H9
E Ti MoV	F2	INOX R 20/25 L	H10
EMONA	A12	INOX R 22/12/3 Fe	J1
EVB 100	D13	INOX R 22/9/3 LN	H8
EVB 100 EKSTRA	D14	INOX R 25/14 NC	I2

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ALPHABETICAL LIST OF WELDING CONSUMABLES

Welding electrodes	Page	Welding electrodes	Page
INOX R 25/14/3 NC	I3	RUTILEN Z	A10
INOX R 25/4 Fe	I1	SAVA 130	B1
INOX R 25/20	I4	SAVA 150	B2
INOX R 29/9	J5	SAVA 150 AR	B8
INOX R 29/9 Fe	J6	SAVA 150 B	B7
JADRAN S	A8	SAVA 180	B3
MONEL	O1	SAVA 200	B4
MONEL C	O2	SAVA GV 130	B5
NEUTRAL	A1	SAVA GV 160	B6
RAPID	A2	SEKATOR 1	Q1
RUTILEN 1000 S	A11	SEKATOR 2 A	Q2
RUTILEN 12	A9	SEKATOR 2 B	Q3
RUTILEN 13	A13	SL 250	O11
RUTILEN 13 M	A17	SUPER Ni	O3
RUTILEN 2000 S	A15	TOOLDUR	K3
RUTILEN E	A19	TOOLDUR Co	K11
RUTILEN K	A16	TERMO	Q4
RUTILEN S	A18	UTOP 38	K1
RUTILEN X	A14	UTOP 55	K2

Welding fluxes	Page	Welding fluxes	Page
AB 100	R4	CS CrNi	R9
AB Cr	R10	FB 12.2	R6
AR 18.1	R3	FB CrNi	R7
AR 18.5	R1	FB TT	R5
AR D1	R2	FB 33	R12
CS 350	R11	FB 578	R13
CS Cr 6	R8		

Welding rods, wires and strips	Page	Welding rods, wires and strips	Page
EPP 17 Cr	U1	MIG CuAg	S26
EPP 18/8/6	U1	MIG CuSi3	S28
EPP 19/12/3 NC	U1	MIG CuSn6	S25
EPP 19/9 NC	U1	MIG CuAl8	S24
EPP 2	U1	MIG CuMn	S27
EPP 2 Mo	U1	TIG 18/8/6 Si	S18
EPP 3	U1	TIG 19/12/3 Nb Si	S14
INOX TR 19/9	U1	TIG 19/12/3 NC Si	S15
INOX TR Cr 17	U1	TIG 19/9 NbSi	S12
MIG 17	S12	TIG 19/9 NC Si	S13
MIG 18/8/6 Si	S18	TIG 2 CrMo	S3
MIG 19/12/3 Nb Si	S15	TIG 22/9/3 LN	S22
MIG 19/12/3 NC Si	S16	TIG 25/14 NC Si	S16
MIG 19/9 Nb Si	S13	TIG 25/20	S19
MIG 19/9 NC Si	S14	TIG 29/9	S20
MIG 2 CrMo	S3	TIG 70/15	S21
MIG 25/14 NC Si	S17	TIG CrMo	S2
MIG 25/20	S19	TIG Mo	S1
MIG 29/9	S20	TIG Cu	S23
MIG 65	S9	TIG CuAg	S26
MIG 75	S10	TIG CuSi3	S28
MIG CrMo	S2	TIG CuSn6	S25
MIG Mo	S1	TIG CuAl8	S24
MIG Cu	S23	TIG CuMn	S27

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ALPHABETICAL LIST
OF WELDING CONSUMABLES

Welding rods, wires and strips	Page	Welding rods, wires and strips	Page
TIG VAC 60	S4	VAC 65	S5
TIG VAC 65	S5	VP 37	T1
VAC 60	S4	VP 40	T2
VAC 60 CuNi	S8	VP 42	T3
VAC 60 Ni	S6	VP CrMo	T5
VAC 60 Ti	S7	VP Mo	T4

Flux – cored wires	Page	Flux – cored wires	Page
FILCORD 308 L	V48	FILTUB 4 R	V3
FILCORD 309 L	V50	FILTUB 40 B	V19
FILCORD 316 L	V49	FILTUB 42 B	V20
FILCORD 4R	V4	FILTUB 5 R	V5
FILTUB 112	V32	FILTUB 6 R	V6
FILTUB 114	V33	FILTUB 7 R	V7
FILTUB 116	V34	FILTUB 8 R	V8
FILTUB 118	V35	FILTUB DUR 12	V24
FILTUB 12 B	V9	FILTUB DUR 12Cr2NiMo	V45
FILTUB 12 M	V1	FILTUB DUR 13Cr3NiMoV	V46
FILTUB 128	V36	FILTUB DUR 14	V25
FILTUB 132	V37	FILTUB DUR 15.1	V26
FILTUB 136	V38	FILTUB DUR 16	V27
FILTUB 138	V39	FILTUB DUR 17 Cr	V47
FILTUB 14 B	V10	FILTUB DUR 205	V41
FILTUB 140	V40	FILTUB DUR 212	V42
FILTUB 16 B	V11	FILTUB DUR 214	V43
FILTUB 18 B	V12	FILTUB DUR 215	V44
FILTUB 19 B	V13	FILTUB DUR 3	V21
FILTUB 25 B	V14	FILTUB DUR 4	V22
FILTUB 28 B	V15	FILTUB DUR 5	V23
FILTUB 32 B	V16	FILTUB UTOP 38	V28
FILTUB 32 M	V2	FILTUB UTOP 55	V29
FILTUB 36 B	V17	FILTUB UTOP Co	V30
FILTUB 38 B	V18	FILTUB UTOP Mo1	V31

LOW ALLOYED CELLULOSIC, RUTILE AND ACID ELECTRODES ..... A

HIGH EFFICIENCY ELECTRODES ..... B

BASIC, LOW HYDROGEN ELECTRODES C

MEDIUM ALLOYED BASIC ELECTRODES FOR WELDING
FINEGRAINED STEELS ..... D

MEDIUM AND HIGH ALLOYED BASIC ELECTRODES FOR WELDING
CREEP RESISTANT STEELS ..... E

MEDIUM ALLOYED RUTILE ELECTRODES FOR WELDING
CREEP RESISTANT STEELS ..... F

HIGH ALLOYED FERRITIC STAINLESS STEEL ELECTRODES ..... G

HIGH ALLOYED AUSTENITIC AND AUSTENITIC-FERRITIC
STAINLESS STEEL ELECTRODES ..... H

HIGH ALLOYED HEAT RESISTANT STAINLESS STEEL ELECTRODES I

HIGH ALLOYED SPECIAL PURPOSE ELECTRODES ..... J

HARDFACING ELECTRODES ..... K

ELECTRODES, PRODUCING ABRASION RESISTANT DEPOSIT L

MANGANESE ALLOYED HARDFACING ELECTRODES ..... M

HIGH COBALT ALLOYED ELECTRODES AND RODS – DUROSTELS ..... N

CAST IRON ELECTRODES ..... O

ELECTRODES FOR WELDING COPPER AND ALUMINIUM ALLOYS ..... P

ELECTRODES FOR CUTTING, GOUGING AND PREHEATING ..... Q

AGGLOMERATED WELDING FLUXES AND WIRES FOR S.A.-WELDING ..... R

WELDING RODS FOR TIG-WELDING ..... S
WELDING WIRES FOR MAG(CO_2)-WELDING
WELDING WIRES FOR GMA-WELDING

WELDING RODS FOR OXYACETILENE-WELDING ..... T

WIRES AND STRIPS FOR SUBMERGED ARC WELDING ..... U

FLUX-CORED WIRES V

NEUTRAL A1

RAPID..... A2

CELEX A3

CELEX Mn A4

CELEX Mo A5

CELEX Ni A6

CELEX NiMo A7

JADRAN S A8

RUTILEN 12 ..... A9

RUTILEN Z A10

RUTILEN 1000 S A11

EMONA A12

RUTILEN 13 ..... A13

RUTILEN X A14

RUTILEN 2000 S A15

RUTILEN K A16

RUTILEN 13 M A17

RUTILEN S A18

RUTILEN E A19

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NEUTRAL

Classification:

EN 499:	E 35 A A 13
DIN 1913:	E 43 10 A 2
AWS A-5.1:	-
EN ISO 2560-A:	E 35 AA 13
EN ISO 2560-B:	E 43 40 A

Description and application:

Extra low alloyed electrode for welding armco steel as for steels with extremely low carbon, silicon and manganese content. Also suitable for light gauge sheet-metal work and for welding zinc coating kettle.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 42.3	1.0035 to 1.0136, 1.1013
Thin sheets:	1623/1	

Coating type:
Acid (oxydising)

Welding current:
AC
DC -/+

Welding positions:

Redrying temperature:
140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.06	0.08	0.40

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 330	MPa (N/mm2)
Tensile strength	Rm:	420 – 470	MPa (N/mm2)
Elongation	A_5:	> 20	%
Impact energy	KV:	> 55	J (+20°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	120 – 140	4.4	22	
4	450	150 – 180	5.4	27	
5	450	200 – 240	5.4	27	
6	450	240 – 280	5.4	27	

* approximate data

Classification:

EN 499:	E 38 2 RA 13
DIN 1913:	E 43 33 AR 7
AWS A-5.1:	E 6020
EN ISO 2560-A:	E 38 2 RA 13
EN ISO 2560-B:	E 43 20 A

RAPID

Description and application:

Thick coated rutile-acid type electrode for welding with increased efficiency of steels with tensile strength up to 510 N/mm2. High current-carrying capability and good slag detachability even in fillets and narrow angles.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn 4	1.0345, 1.0425
Pipe steels:	St 35 to St 45.8	1.0308 to 1.0405
Shipbilding plates:	A, B, D, E	1.0440, 1.0472, 1.0475, 1.0476
Steel castings:	GS-38, GS-45	1.0416, 1.0443

Coating type:

Acid-rutile

Welding current:

AC
DC -

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.06	0.20	0.60

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	450 - 550	MPa (N/mm2)
Elongation	A_5:	> 24	%
Impact energy	KV:	> 47	J (- 20°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 90	4	20	17.4
3.25	350	90 – 160	4.4	22	34.4
4	450	130 – 220	5.4	27	66.7
5	450	180 – 300	5.4	27	103.8
6	450	250 - 340	5.4	27	150

* approximate data

elektrode jesenice d.o.o.

CELEX

Classification:

EN 499:	E 38 2 C 21
DIN 1913:	E 43 53 C 4
AWS A-5.1:	E 6010
EN ISO 2560-A:	E 38 2 C 21
EN ISO 2560-B:	≈ E 43 10 A

Description and application:

Cellulose coated all positional welding electrode for welding pipelines, cisterns and different containers.
It is suitable for vertical down root pass welding on DC negative polarity and for subsequent passes on DC positive polarity.

Base materials:

API Spec. 5L:	Grade A, B, X42, X46, X52, X56, as the root pass up to API grade X 80
DIN 17172:	Grade StE 210.7, StE 240.7.StE 290.7 (TM), StE 320.7 (TM), StE 360.7 (TM), as well as the root pass up to StE 550.7 (TM)
DIN 17100:	St 37-3, St 52-3
DIN 17155:	St 35.8, St 45.8 H I, H II

Coating type:

Cellulosic

Welding current:

DC +
DC – (for root beads)

Welding positions:

Redrying temperature:

Not permitted

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.14	0.2	0.8

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390 MPa (N/mm2)
Tensile strength	Rm:	450 - 550 MPa (N/mm2)
Elongation	A5:	> 22 %
Impact energy	KV:	> 70 J (+20°C) > 47 J (-20°C)

Approvals:

TÜV

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50 – 65	4	16	13.4
3.25	350	90 – 120	5	20	26.5
4	350	110 – 140	5	20	40.0
5	350	140 – 200	6.6	26,4	80.5

* approximate data

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CELEX Mn

Classification:

EN 499:	E 42 2 C 21
DIN 1913:	E 51 53 C 4
AWS A-5.5:	E 7010-G
EN ISO 2560-A:	E 42 2 C 21
EN ISO 2560-B:	≈E 49 10 A

Description and application:

Cellulose coated all positional welding electrode for vertical down pipe welding. Especially recommended for hot passes, filler and cover layers.

Base materials:

API Spec. 5L:	Grade X42, X46, X52, X56, X60 and the root pass up to API grade X 70
DIN 17172:	Grade StE 290.7 (TM), StE 320.7 (TM), StE 360.7 (TM), StE 385.7 (TM), StE 415.7 (TM) as well as the root pass up to StE 480.7 (TM)
DIN 17100:	St 37-3, St 52-3
DIN 17155:	St 35.8, St 45.8

Coating type:

Cellulosic

Welding current:

DC +

DC – (for root beads)

Welding positions:

Redrying temperature:

Not permitted

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.15	0.2	1.3

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420 MPa (N/mm2)
Tensile strength	Rm:	510 – 610 MPa (N/mm2)
Elongation	A5:	> 20 %
Impact energy	KV:	> 70 J (+20°C) > 47 J (-20 °C)

Approvals:

TÜV

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50 – 65	4	16	13.4
3.25	350	90 – 120	5	20	26.5
4	350	110 – 140	5	20	40.0
5	350	140 – 200	6.6	26,4	80.5

* approximate data

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Classification:
EN 499: E 42 3MoC 21
AWS A-5.5: E 7010-A1
EN ISO 2560-A: E 42 3 MoC 21
EN ISO 2560-B: ≈E 49 10 A

CELEX Mo

Description and application:
Cellulose coated electrode for vertical down welding hot and filler passes and for caping of higher strength pipe steels.

Base materials:

API Spec. 5L: Grade X42, X46, X52, X56, X60 and the root pass up to API grade X 80
DIN 17172: Grade StE 290.7 (TM), StE 320.7 (TM), StE 360.7 (TM), StE 385.7 (TM), StE 415.7 (TM) as well as the root pass up to StE 550.7 (TM)
DIN 17100: St 37-3, St 52-3
DIN 17155: St 35.8, St 45.8
St-WstE 255-355

Coating type:
Cellulosic

Welding current:
DC +
DC – (for root beads)

Welding positions:


Redrying temperature:
Not permitted

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo
0.12	0.2	0.9	0.5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420 MPa (N/mm2)
Tensile strength	Rm:	510 - 610 MPa (N/mm2)
Elongation	A5:	> 20 %
Impact energy	KV:	> 70 J (+20°C)
		> 47 J (-30°C)

Approvals:
/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50 – 65	4	16	13.4
3.25	350	90 – 120	5	20	26.5
4	350	110 – 140	5	20	40.0
5	350	140 – 200	6.6	26,4	80.5

* approximate data

Classification:

EN 499:	E 46 3 1 NiC 21
AWS A-5.5:	E 8010-G
EN ISO 2560-A:	E 46 3 1 NiC 21
EN ISO 2560-B:	≈ E 55 10-N1 A

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CELEX Ni

Description and application:

Cellulose coated electrode for vertical down pipe welding higher strength pipe steels. Especially recommended for hot passes, filler and cover layers.

Base materials:

API Spec. 5L: Grade X56, X60, X65, X70.
DIN 17172: Grade StE 385.7 (TM), StE 415.7 (TM), StE 455.7 (TM) as well as the root pass up to StE 550.7 (TM)

Coating type:

Cellulosic

Welding current:

DC +
DC – (for root beads)

Welding positions:

Redrying temperature:

Not permitted

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni
0.14	0.2	0.7	0.6

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460 MPa (N/mm2)
Tensile strength	Rm:	550 - 650 MPa (N/mm2)
Elongation	A_5:	> 20 %
Impact energy	KV:	> 70 J (+20°C) > 47 J (-30°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50 – 65	4	16	13.4
3.25	350	90 – 120	5	20	26.5
4	350	110 – 140	5	20	40.0
5	350	140 – 200	6.6	26,4	80.5

* approximate data

Classification:
EN 499: E 50 3 1NiMo C 21
AWS A-5.5: E 9010-G
EN ISO 2560-A: E 50 3 1NiMo C 21
EN ISO 2560-B: ≈ E 49 10 A

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CELEX Ni Mo

Description and application:
Cellulose coated electrode for vertical down pipe welding high yield and tensile strength pipe steels.
Especially recommended for hot passes, filler and cover layers.

Base materials:

API Spec. 5L: Grade X65, X70, X80.
DIN 17172: Grade StE 455.7 (TM), StE 480.7 (TM)

Coating type:
Cellulosic

Welding current:
DC +
DC – (for root beads)

Welding positions:

Redrying temperature:
Not permitted

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Mo
0.12	0.2	0.8	0.7	0.4

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490 MPa (N/mm2)
Tensile strength	Rm:	620 -720 MPa (N/mm2)
Elongation	A5:	> 20 %
Impact energy	KV:	> 70 J (+20°C) > 47 J (-30°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50 – 65	4	16	13.4
3.25	350	90 – 120	5	20	26.5
4	350	110 – 140	5	20	40.0
5	350	140 – 200	6.6	26,4	80.5

* approximate data

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Classification:

EN 499:	E 35 0 RC 11
DIN 1913:	E 43 11 R(C) 3
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 35 0 RC 11
EN ISO 2560-B:	E 43 13 A

JADRAN S

Description and application:

Multi-purpose electrode, easy to use, for welding light and medium fabrications of steels with tensile strength up to 510 N/mm2. Suitable also for vertical-down welding.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII	1.0345, 1.0425
Pipe steels:	St 35 to St 35.8	1.0308 to 1.0305
	St 45 to St 45.8	1.0408 to 1.0405
	St.E 210.7 to St.E 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38, GS-45	1.0416, 1.0443
Thin sheets:	1623/1	

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
140ºC / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.06	0.20	0.35

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	470 - 550	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV:	> 47	J (0°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 60	4	20	10.5
2.5	300	65 – 80	4	20	14.7
3.25	350	110 – 135	5	25	29.1
4	350	140 – 170	5	25	40.3
5	450	180 – 210	6.6	33	86.8
6	450	250 - 300	6.6	33	124.5

* approximate data

Classification:

EN 499:	E 38 0 RC 11
DIN 1913:	E 43 22 R(C) 3
AWS A-5.1:	E 6012
EN ISO 2560-A:	E 38 0 RC 11
EN ISO 2560-B:	E 43 12 A

RUTILEN 12

Description and application:

Celulosic-rutile type electrode used in maintenance and for repairing purposes of mild steel. In smaller dimensions can be used also for vertical-down welding.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:
Cellulosic-rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.06	0.30	0.40

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	450 - 550	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV:	> 47	J (0°C)

Approvals:

CR: 1
BV: 1
LR: 1
DNV 2
SŽ
TÜV
DB
SZU

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
1.6	250	30 – 50	3.6	18	
2	300	50 – 60	4	20	9.5
2.5	300	55 – 85	4	20	14.9
3.25	350	90 – 140	5	22	34.4
4	350	130 – 180	4.4	30	44.9
5	450	180 – 230	6	30	89.6
6	450	250 - 320	6	30	127.7

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 499:	E 42 0 RC11
DIN 1913:	E 51 22 RR(C) 6
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 42 0 RC 11
EN ISO 2560-B:	E 49 13 A

RUTILEN Z

Description and application:

Thick coated rutile-cellulose type electrode for welding low alloyed steels. Suitable for welding constructions, in maintenance and for repairing purposes.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Cellulosic-rutile

Welding current:

AC
DC - / +

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.40	0.60

Mechanical properties:

Yield strength	Rp 0.2 %:	> 420	MPa (N/mm2)
Tensile strength	Rm:	500– 640	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

TÜV
DB

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	30 – 50	4	20	
2.5	350	55 – 85	4.4	22	19.8
3.25	350	90 – 135	4	20	33.9
4	350	130 – 170	4	20	51.9
5	450	175 – 220	5.4	27	

* approximate data

Classification:

EN 499:	E 42 0 RC11
DIN 1913:	E 51 32 RR(C) 5
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 42 0 RC 11
EN ISO 2560-B:	E 49 13 A

elektrode jesenice d.o.o.

RUTILEN 1000 S

Description and application:

Thick coated rutile-cellulose type electrode for welding low alloyed steels. Suitable for welding constructions, in maintenance and for repairing purposes.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Cellulosic-rutile

Welding current:

AC
DC - / +

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.45	0.65

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm2)
Tensile strength	Rm:	510 – 610	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV:	> 47	J (0°C)

Approvals:

TÜV
DB
GL 1Y

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
1.6	250	40 – 55	3.6	18	
2	300	55 – 65	4	20	
2.5	350	60 – 85	4.4	22	
3.25	350	90 – 135	4	20	
4	350	130 – 170	4	20	
5	450	175 – 220	5.4	27	

* approximate data

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EMONA

Classification:

GOST 9467-60:	E 46-T
EN 499:	E 35 2 RB 12
DIN 1913:	E 43 43 RR(B)7
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 35 2 RB 12
EN ISO 2560-B:	E 43 03 A

Description and application:

Thick basic-rutile coated electrode for welding low alloyed steels with tensile strength up to 510 N/mm2. The weld metal deposit has high mechanical properties and can be used for a wide range of materials.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HIII, 17Mn4	1.0345, 1.0435, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E	1.0440 to 1.0476
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Finegrained steels	StE 255 to StE 355	1.0461 to 1.0562

Coating type:

Basic-rutile

Welding current:

AC
DC -

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.10	0.20	0.55

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	450 - 540	MPa (N/mm2)
Elongation	A_5:	> 24	%
Impact energy	KV:	> 47	J (-20°C)

Approvals:

CR: 3
ABS: 3
BV: 3
GL: 3
LR: 3
DNV: 3
RS: 3
TÜV
SŽ
PRS: 3
SZU

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	55 – 70	4	20	11
2.5	300	70 – 90	4	20	17.1
3.25	350	115 – 145	4.4	22	32.8
4	450	145 – 190	6	30	62.5
5	450	200 – 250	6	30	98.4
6	450	250 - 290	6	30	142.9

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 499:	E 42 0 RR 12
DIN 1913:	E 51 22 RR 6
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 42 0 RR 12
EN ISO 2560-B:	E 49 12 A

RUTILEN 13

Description and application:

Thick rutile coated electrode for welding low alloyed steels. It has excellent welding characteristic, easy to use.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Rutile

Welding current:

AC
DC-

Welding positions:

Redrying temperature:

140ºC / 2 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.35	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm2)
Tensile strength	Rm:	500 – 640	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV:	> 47	J (0ºC)

Approvals:

CR: 2
ABS: 2
BV: 2
GL: 2
LR: 2
DNV: 2
SŽ
TÜV
DB
SZU

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
1.6	250	30 – 50	3.6	18	6.1
2	300	50 – 70	4	20	11.1
2.5	300	65 – 90	3.8	19	17.6
3.25	350	100 – 140	4	20	34.5
4	450	140 – 180	5.4	27	67.5
5	450	190 – 240	5.4	27	105.9
6	450	240 - 290	5.4	27	150

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 499:	E 42 0 RR 12
DIN 1913:	E 51 22 RR 6
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 42 0 RR 12
EN ISO 2560-B:	E 49 13 A

RUTILEN X

Description and application:

Thick rutile coated electrode for welding low alloyed steels up to 510 N/mm2. It has excellent welding characteristic.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Rutile

Welding current:

AC
DC - / +

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.09	0.50	0.70

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm2)
Tensile strength	Rm:	510 – 610	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

TÜV
DB

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 70	4	20	
2.5	350	55 – 85	4	20	
3.25	350	90 – 135	4	20	
4	450	130 – 170	5.4	27	
5	450	175 – 220	5.4	27	

* approximate data

Classification:

EN 499:	E 42 0 RR 12
DIN 1913:	E 51 22 RR 6
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 42 0 RR 12
EN ISO 2560-B:	E 49 13 A

elektrode jesenice d.o.o.

RUTILEN 2000 S

Description and application:

Thick rutile coated electrode for welding low alloyed steels up to 510 N/mm2. It has excellent welding characteristic.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Rutile

Welding current:

AC
DC - / +

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.50	0.70

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm2)
Tensile strength	Rm:	510 – 610	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV:	> 47	J (0°C)

Approvals:

TÜV
DB

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 70	4	20	
2.5	350	55 – 85	4	20	
3.25	350	90 – 135	4	20	
4	450	130 – 170	5.4	27	
5	450	175 – 220	5.4	27	

* approximate data

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Classification:

EN 499:	E 38 2 R 12
DIN 1913:	E 43 33 R 3
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 38 2 R 12
EN ISO 2560-B:	E 43 13 A

RUTILEN K

Description and application:

Medium coated rutile electrode suitable for shipbuilding and structural steels as well as general purpose fabrications in mild and medium carbon steels. It is specially designed for horizontal, vertical and overhead welding. The coating of electrode is of higher basicity than most other rutile types and provides weld deposits of high metallurgical quality. Used for steels with higher carbon equivalent than normally considered suitable for E 6013 type electrodes.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E	1.0440, 1.0472, 1.0475, 1.0476
Fine-grain structural steels:	StE 255 – StE 355	1.0461 to 1.0562

Coating type:
Rutile

Welding current:
AC
DC+/-
DC – for root passes

Welding positions:

Redrying temperature:
150°C / 2 h

Metal recovery:
cca. 95 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.20	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	470 – 550	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (-20°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 100	3.8	19	
3.25	350	90 – 120	4	20	
4	450	130 – 180	5.4	27	
5	450	160 – 240	5.4	27	
6	450	240 - 290	5.4	27	

* approximate data

Classification:

EN 499:	E 35 A R 12
DIN 1913:	E 43 21 R 3
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 35 A R 12
EN ISO 2560-B:	E 43 12 A

RUTILEN 13 M

Description and application:

Rutile type, medium coated electrode, specially suitable for thin sheet welding. It has good striking and restriking, little spatter loss, smooth bead appearance.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII	1.0345, 1.0425
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
Shipbilding plates:	A, B	1.0440, 1.0472
Steel castings:	GS-38, GS-45	1.0416 to 1.0443
Thin sheets:	1623/1	

Coating type:

Rutile

Welding current:

AC
DC-

Welding positions:

Redrying temperature:

140ºC / 2 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.07	0.40	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	450 - 550	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV:	> 60	J (+20°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 70	4	20	10.5
2.5	300 / 350	60 – 90	4 / 5	20 / 25	16.7/19.2
3.25	350	90 – 140	5	25	32.2
4	350	120 – 180	5	25	50
5	450	160 – 230	6	30	92.3

* approximate data

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Classification:

EN 499:	E 38 0 RC 11
DIN 1913:	E 43 22 R(C) 3
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 38 0 RC 11
EN ISO 2560-B:	E 43 13 A

RUTILEN S

Description and application:

Rutile cellulosic universal electrode used in maintenance and for repairing purposes in shipbuilding and repair.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbuilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Cellulosic-rutile

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.40	0.60

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa (N/mm2)
Tensile strength	Rm:	470 - 600	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV:	> 47	J (0°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
1.6	250	30 – 50	3.6	18	
2	300	50 – 60	4	20	9.5
2.5	300	55 – 85	4	20	14.9
3.25	350	90 – 140	4.4	22	34.4
4	350	130 – 180	6	30	44.9
5	450	180 – 230	6	30	89.6
6	450	250 - 320	6	30	127.7

- approximate data

Classification:

EN 499:	E 42 0 RC11
DIN 1913:	E 51 32 R(C) 3
AWS A-5.1:	E 6013
EN ISO 2560-A:	E 42 0 RC 11
EN ISO 2560-B:	E 49 13 A

elektrode jesenice d.o.o.

RUTILEN E

Description and application:

Thin coated rutile- cellulosic electrode for welding low alloyed steels. Rutilen E is easy operating all position electrode including vertical down. Suitable for welding constructions, in maintenance and repair purposes.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551
Thin sheets:	1623/1	

Coating type:

Cellulosic-rutile

Welding current:

AC
DC - / +

Welding positions:

Redrying temperature:

140°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.07	0.40	0.6

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm2)
Tensile strength	Rm:	510 – 610	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV:	> 47	J (0°C)

Welding and packing data:

Approvals:

BV 2Y

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	55 – 85	4	20	14.9
3.25	350	90 – 140	5	22	34.4
4	350	130 – 180	4.4	30	44.9

* approximate data

SAVA 130 ..... B1

SAVA 150 ..... B2

SAVA 180 ..... B3

SAVA 200 ..... B4

SAVA GV 130 ..... B5

SAVA GV 160 ..... B6

SAVA 150 B B7

SAVA 150 AR B8

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SAVA 130

Classification:

EN 499:	E 38 0 RR 33
DIN 1913:	E 43 32 RR 11 130
AWS A-5.1:	E 7024
EN ISO 2560-A:	E 38 0 RR 33
EN ISO 2560-B:	E 43 24 A

Description and application:

High efficiency, rutile electrode with approximately 130 % metal recovery. Suitable for welding low alloyed steels with tensile strength up to 510 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425, 1.0481
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
250ºC / 1 h

Metal recovery:
cca.130 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.30	0.55

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	470 - 540	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 65			
2.5	300	70 – 100	4	20	45.5
3.25	350	120 – 160			
4	450	160 – 200			
5	450	220 – 260			

* approximate data

elektrode jesenice d.o.o.

SAVA 150

Classification:

EN 499:	E 38 0 RR 53
DIN 1913:	E 43 32 RR 11 150
AWS A-5.1:	E 7024
EN ISO 2560-A:	E 38 0 RR 53
EN ISO 2560-B:	E 43 24 A

Description and application:

High efficiency, rutile electrode with approximately 150 % metal recovery. Suitable for welding low alloyed steels with tensile strength up to 510 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425, 1.0481
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
250ºC / 1 h

Metal recovery:
cca.150 %

Approvals:

TÜV

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.20	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	470 - 540	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 65	3,8	19	15
2.5	300	70 – 100	3,8	19	22,5
3.25	350	120 – 160	4	20	49,4
4	450	160 – 200	5,2	26	94,5
5	450	220 – 260	5,2	26	157,6

* approximate data

elektrode jesenice d.o.o.

SAVA 180

Classification:

EN 499:	E 42 0 RR 74
DIN 1913:	E 43 32 RR 11 180
AWS A-5.1:	E 7024
EN ISO 2560-A:	E 42 0 RR 74
EN ISO 2560-B:	E 49 24 A

Description and application:

High efficiency, rutile electrode with approximately 180 % metal recovery for high productivity welding heavy fabrications in ordinary structural steels with tensile strength up to 510 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425, 1.0481
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
250ºC / 1 h

Metal recovery:
cca. 180 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.40	0.80

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 430	MPa(N/mm^2)
Tensile strength	Rm:	490 - 550	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 65			
2.5	300	70 – 100			
3.25	350	120 – 160	5	25	
4	450	160 – 200	5	25	110.2
5	450	220 – 260	5	25	

* approximate data

elektrode jesenice d.o.o.

SAVA 200

Classification:

EN 499:	E 42 0 RR 74
DIN 1913:	E 43 32 RR 11 200
AWS A-5.1:	E 7024
EN ISO 2560-A:	E 42 0 RR 74
EN ISO 2560-B:	E 49 24 A

Description and application:

High efficiency, rutile electrode with approximately 200 % metal recovery for high productivity welding heavy fabrications in ordinary structural steels, with tensile strength up to 510N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425, 1.0481
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
250°C / 1 h

Metal recovery:
cca. 200 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.30	0.75

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 430	MPa(N/mm^2)
Tensile strength	Rm:	490 - 550	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

CR: 2Y
ABS: 2Y
BV: 2Y
LR: 2Y
DNV: 2Y
RS: 2Y
SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	450	130 – 180	5	25	72.5
4	450	180 – 220	5.2	26	113
5	450	240 – 290	5.2	26	157.6
6	450	300 – 370	5.2	26	260

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 499:	E 38 0 RR 34
DIN 1913:	E 43 32 RR 11 130
AWS A-5.1:	E 7024
EN ISO 2560-A:	E 38 0 RR 34
EN ISO 2560-B:	E 43 24 A

SAVA GV 130

Description and application:

High efficiency, rutile electrode with approximately 125 % metal recovery, designed for gravity welding but and fillet welds. Suitable for welding steels with tensile strength up to 510 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425, 1.0481
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:

Rutile

Welding current:

AC
DC -

Welding positions:

Redrying temperature:

250ºC / 1 h

Metal recovery:

cca.130 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.30	0.55

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	470 - 540	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

CR: 2Y
ABS: 2Y
BV: 2Y
GL: 2Y
LR: 2Y
DNV: 2Y
RS: 2Y
SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
5	700	210 – 250	10	20	200
6	700	250 – 300	10	20	285.7

* approximate data

Classification:

EN 499:	E 38 0 RR 54
DIN 1913:	E 43 32 RR 11 160
AWS A-5.1:	E 7024
EN ISO 2560-A:	E 38 0 RR 54
EN ISO 2560-B:	E 43 24 A

SAVA GV 160

Description and application:

High efficiency, rutile electrode with approximately 160 % metal recovery, designed for gravity welding long but and fillet welds. Suitable for welding steels with tensile strength up to 510 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425, 1.0481
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D	1.0440, 1.0472, 1.0475
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:

Rutile

Welding current:

AC
DC -

Welding positions:

Redrying temperature:

250°C / 1 h

Metal recovery:

cca.160 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.25	0.55

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	470 - 540	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (0°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
5	700	260 – 320	10	20	238.1
6	700	300 – 360	10	20	357.1

* approximate data

elektrode jesenice d.o.o.

SAVA 150 B

Classification:

EN 499:	E 42 2 B 53
DIN 1913:	E 51 43 B 12 150
AWS A-5.1:	E 7028
EN ISO 2560-A:	E 42 2 B 53
EN ISO 2560-B:	E 49 28 A

Description and application:

High efficiency, basic electrode with approximately 155 % metal recovery. It is suitable for high productivity welding steels with tensile strength up to 610 N/mm2 and finegrained steels with yield strength up to 380 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 70.2	1.0035 to 1.0070
Boiler plates:	HI, HII,17Mn4, 19Mn5	1.0345, 1.0425, 1.0481, 1.0482
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Shipbilding plates:	A, B, D, E	1.0440, 1.0472, 1.0475, 1.0476
Steel castings:	GS-38, GS-45, GS-52	1.0416, 1.0443, 1.0551

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Metal recovery:
cca. 150 %

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.50	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa(N/mm^2)
Tensile strength	Rm:	510 – 610	MPa(N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 47	J (-20°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50 – 100			
3.25	350	110 – 160			
4	450	160 – 210	5.4	27	
5	450	200 – 280	5.4	27	
6	450	260 - 350	5.4	27	

* approximate data

Classification:
EN 499: E42 4 RA 53
DIN 1913: E 51 53 AR 11 160
AWS A-5.1: E 7027
EN ISO 2560-A: E 42 4 RA 53
EN ISO 2560-B: E 49 27 A

elektrode jesenice d.o.o.

SAVA 150 AR

Description and application:

High-recovery rutile-acid electrode for horizontal and horizontal-vertical fillets, lap and butt joins in mild steels. Electrode runs with a very fast smooth stable arc, leaving a finely rippled bead surface with self- detaching porous slag and minimum spatter. Electrode is also suitable for primer-treated materials.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 do St 52.3	1.0035 to 1.0561
Boiler plates:	HI, HII,17Mn4	1.0345, 1.0425
High tensile steels:	StE255 –StE355 WStE 255 – WStE 355	
Shipbuilding plates:	A, B, D, E, AH 32 –EH36	1.0440, 1.0472, 1.0475
Steel castings:	GS-38, GS-52	1.0416

Coating type:
Rutile-acid

Welding current:
AC
DC - / +

Welding positions:

Redrying temperature:
100-110°C / 1 h

Metal recovery:
cca. 150 %

Approvals:

ABS:	**3Y**
BV:	**3Y**
GL:	**3Y**
LR:	**3Y**
DNV:	**3Y**
RINA:	**3Y**
TÜV	

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.30	1,0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa(N/mm^2)
Tensile strength	Rm:	500 - 650	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 85	J (+20°C)
		> 75	J (-20° C)
		> 47	J (-40° C)

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 65	3.8	19	
2.5	350	70 – 100	3.8	19	
3.25	450	120 – 160	5.2	26	65
4	450	160 – 220	5.0	25	94
5	450	220 – 320	5.0	25	147
6	450	300 - 400	5.1	25.7	205

* approximate data

Notes:

EVB 50 ..... **C1**

EVB 55 ..... **C2**

EVB EXTRA **C3**

EVB 45 ..... **C4**

EVB 47 ..... **C5**

EVB S **C6**

GALEB 50 ..... **C7**

EVB K **C8**

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EVB 50

Classification:

EN 499:	E 42 4 B 32 H 5
DIN 1913:	E 51 55 B 10
AWS A-5.1:	E 7018
EN ISO 2560-A:	E 42 4 B 32 H5
EN ISO 2560-B:	E 49 18 A

Description and application:

Basic, CTOD tested electrode with excellent welding characteristics, recommended for welding structural steels and steel castings with tensile strength up to 610 N/mm2 and finegrained steels with increased yield strength.
Metal recovery about 118 %. Deposits have very low hydrogen contents (HD < 5 ml/100 g).

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 60.2	1.0035 to 1.0060
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
	WStE 255 to WstE 355	1.0462 to 1.0565
Boiler plates:	HI, HII, 17 Mn4, 19 Mn 5	1.0345, 1.0425, 1.0481, 1.0482
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E,	1.0440, 1.0472, 1.0475, 1.0476
	AH to EH	up to 1.1830
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:
Basic

Welding current:
DC +
AC (OCV>70 V)

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.07	0.60	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 440	MPa (N/mm^2)
Tensile strength	Rm:	510 – 610	MPa (N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

CR: 3YHH
ABS: 4YHH
BV: 4YHH
GL: 4YH10
LR: 3/3YH
DNV: 4YH10
RS: 3YHH
SŽ
TÜV
DB
RINA: 4YHH
SZU
PRS: 3H10,3YH10

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 70	3.4	17	
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150
8	450	350 – 450	5.4	27	275

* approximate data

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EVB 55

Classification:

EN 499 :	E 42 6B 42 H5
DIN 8529 :	EY 42 76 MnB
AWS/ASME –5.1:	E 7018-1EN
EN ISO 2560-A:	E 42 6B 42 H5
EN ISO 2560-B:	E 49 18-P1 A

Description and application:

Basic , CTOD-tested electrode, particularly suitable for welding high strength low-alloy steels. Electrode has excellent welding properties, it has good slag removal and minimum spatter. The weld metal is very resistant to hot cracking, has good low temperature impact strength and low hydrogen content.

Base materials:

Unalloyed steels:	St 33 – St 52-3, St 50-2, St 60-2, St 70-2
Boiler plates:	H I , H II, 17 Mn 4, 19Mn5
Pipe steels:	St 52.4, St 35.8 – 17Mn4, StE 210.7 – StE 415.7, TM quality steels
High tensile steels:	StE255 – StE420, WStE 255 – WStE 420, EStE 255 – EStE 420
Cold drawing steels:	TT St 35 N – V
Shipbuilding plates:	A, B, D, E
Steel castings:	GS – 38 - GS-52

Coating type:

Basic

Welding current:

DC +
AC (OCV > 70V)

Welding positions:

Redrying temperature:

300 - 350ºC/ 2 h
or
400ºC/1h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.06	0.40	1.60

Mechanical properties:		stress relieved 580ºC/15h
Yield strength	R_{eL} / $Rp_{0.2}$:	> 420 MPa (N/mm^2) > 420 MPa (N/mm^2)
Tensile strength	Rm:	500 – 610 MPa (N/mm^2) > 500 MPa (N/mm^2)
Elongation	A5:	> 25 % > 25 %
Impact energy	KV :	> 47 J(-60°C) typ. 100 J typ. 100 J (-60°C)

Hydrogen content: < 5 ml / 100 g weld metal

Welding and packing data:

Approvals:	**Welding parameters**			**Packing**		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
DB	2.0	300	50 – 70			
	2.5	300	65 – 95	4.7	23.5	19
	3.25	350	90 – 140	4.4	22.0	35
	4.0	450	140 – 185	5.4	27.0	68
	5.0	450	180 – 240	5.4	27.2	109
	6.0	450	250 – 330	5.6	28.3	161

* approximate data

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EVB EXTRA

Classification:

EN 499:	E 42 2 B 32 H10
DIN 8529:	EY 42 53 MnB
AWS A-5.1:	E 7016
EN ISO 2560-A:	E 42 2 B 32 H10
EN ISO 2560-B:	E 4916-P1 A

Description and application:

Double- coated basic electrode with excellent welding properties in difficult positions and in welding root-runs.
It has stable welding arc at DC+ and AC current.

Base materials:

	DIN:
Unalloyed steels:	St 33 to St 52,3 , St 50-2, St 60-2 St 70-2
Finegrained steels:	StE 255 to StE 355
	WStE 255 to WStE 355
Boiler plates:	HI, HII, 17 Mn4,
Pipe steels:	St 35 to St 52.4
Shipbilding plates:	A ,B,D, E,
Steel castings:	GS-38 to GS-52
Rail steel:	till 685 N/mm^2

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.08	0.5	1.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm^2)
Tensile strength	Rm:	500-640	MPa (N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (-20°C)

Hydrogen content: < 10 ml / 100 g weld metal

Approvals:

TÜV
DB

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet Kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

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EVB 45

Classification:

EN 499:	E 42 2 B 32 H5
DIN 1913:	E 51 43 B(R)9
AWS A-5.1:	E 7016
EN ISO 2560-A:	E 42 2 B 32 H5
EN ISO 2560-B:	E 49 18-P1 A

Description and application:

Basic electrode for welding particularly in vertical down positions of root runs with or without backing plates.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 60.2	1.0035 to 1.0060
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
	WstE 255 to WstE 355	1.0462 to 1.0565
Boiler plates:	HI, HII, 17 Mn4, 19Mn5	1.0345, 1.0425, 1.0481, 1.0482
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E,	1.0440, 1.0472, 1.0475, 1.0476
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:
Basic

Welding current:
DC +
AC (OCV>70V)

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.07	0.60	0.90

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 410	MPa (N/mm^2)
Tensile strength	Rm:	510 – 610	MPa (N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 47	J (-20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 70	3.4	17	
2.5	300	65 – 90	4	20	
3.25	350	110 – 140	4.4	22	
4	450	140 – 170	5.8	29	
5	450	180 – 220	5.8	29	
6	450	230 – 280	6	30	

* approximate data

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EVB 47

Classification:

EN 499:	E 38 2 B 32 H5
DIN 1913:	E 43 55 B 10
AWS A-5.1:	E 6018
EN ISO 2560-A:	E 38 2 B 32 H5
EN ISO 2560-B:	E 43 18 A

Description and application:

Basic electrode with lower tensile strength and increased yield strength, therefore suitable for welding rigid constructions.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 60.2	1.0035 to 1.0060
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
Boiler plates:	HI, HII, 17 Mn4,	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E,	1.0440, 1.0472, 1.0475, 1.0476
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:

Basic

Welding current:

DC +
AC (OCV>70 V)

Welding positions:

Redrying temperature:

400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.04	0.30	0.85

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm^2)
Tensile strength	Rm:	470 – 530	MPa (N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 47	J (-20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 70	3.4	17	
2.5	300	65 – 90	3.4	17	
3.25	350	110 – 140	4	20	
4	450	140 – 180	5.4	27	
5	450	180 – 230	5.4	27	
6	450	240 – 290	5.4	27	
8	450	350 – 450	5.4	27	

* approximate data

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EVB S

Classification:

EN 499:	E 42 4 B 12 H10
DIN 1913:	E 51 43 B(R)10
AWS A-5.1	E 7016
EN ISO 2560-A:	E 42 4 B 12 H10
EN ISO 2560-B:	E 49 16 A

Description and application:

Doublecoated, basic CTOD-tested electrode with excellent welding properties in difficult positions. It has stable welding arc. Very suitable for welding root-runs with DC and AC current.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 52.3	1.0035 to 1.0570
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
	WstE 255 to WstE 355	1.0462 to 1.0565
Boiler plates:	HI, HII, 17 Mn4	1.0345, 1.0425, 1.0481
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E,	1.0440, 1.0472, 1.0475, 1.0476
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:

Rutile-basic

Welding current:

DC +
AC

Welding positions:

Redrying temperature:

380°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.05	0.65	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm^2)
Tensile strength	Rm:	500 – 640	MPa (N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (-20°C)

Hydrogen content: < 10 ml / 100 g weld metal

Approvals:

TÜV
DB
SŽ
DNV 3YH10

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	55 – 65	3.4	17	
2.5	350	60 – 90	4.4	22	19.6
3.25	350/450	90 – 140	4.4/5	22/25	32.8/41.7
4	450	140 – 190	5	25	66.7
5	450	190 – 250	5	25	100
6	450	250 – 320	5	25	

* approximate data

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GALEB 50

Classification:

EN 499:	E 42 2 B 42
DIN 1913:	E 51 54 B(R)10
AWS A-5.1	E 7016
EN ISO 2560-A:	E 42 2 B 42 H5
EN ISO 2560-B:	E 49 16 A

Description and application:

Basic electrode for welding structural steels also in thin plates; insensitive to impurities in base material.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 33 to St 60.2	1.0035 to 1.0060
Finegrained steels:	StE 255 to StE 355	1.0461 to 1.0562
	WstE 255 to WstE 355	1.0462 to 1.0565
Boiler plates:	HI, HII, 17 Mn4, 19Mn5	1.0345, 1.0425, 1.0481, 1.0482
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Shipbilding plates:	A, B, D, E,	1.0440, 1.0472, 1.0475, 1.0476
Steel castings:	GS-38 to GS-52	1.0416 to 1.0551

Coating type:

Basic

Welding current:

DC +
AC (OCV>70 V)

Welding positions:

Redrying temperature:

400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.10	0.50	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 410	MPa (N/mm^2)
Tensile strength	Rm:	510 – 570	MPa (N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 60	3.4	17	
2.5	300	60 – 80	4	20	
3.25	350	110 – 130	4.4	22	
4	450	130 – 160	5.8	29	
5	450	170 – 200	5.8	29	
6	450	200 – 230	6	30	

* approximate data

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EVB K

Classification:

EN 499:	E 42 2 B 12 H5
DIN 1913:	E 51 43 B(R) 10
AWS A-5.1:	E 7016
EN ISO 2560-A:	E 42 2 B 12 H5
EN ISO 2560-B:	≈ E 49 16-P1 A

Description and application:

Basic electrode for exclusive use for one side welding of pipes and general structure. Low hydrogen type electrode, good arc stability. Performed one side welding with relatively low currents, good slag detachability and smooth weld beads.

Base materials:

DIN 17100:	St 33- to St 52-3
DIN 17155:	H I, H II
DIN 17172:	St E 210.7 to St E 415.7
DIN 17175:	St E 35.8 to St E 45.8
DIN 17102:	St E 255 to St E 355
	W St E 255 to W St E 355
DIN 1629	to St 52.4
	St 38.8 to 17 Mn 4
API 5 LX	X 42 to X 60

Coating type:
basic

Welding current:
DC +
DC – (for only root pass)
AC (OCV > 70V)

Welding positions:

Redrying temperature:
400 °C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn
0.06	0.60	1.3

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa (N/mm^2)
Tensile strength	Rm:	510 – 610	MPa (N/mm^2)
Elongation	A5:	> 24 %	
Impact energy	KV :	> 47 J	(-20°C)
		> 47 J	(-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	60 – 90	4.4	22	22
3.25	350	95 – 150	4.4	22	32.5
4	450	125 – 190	5.4	29	65.0
5	450	190 – 250	5.4	29	96.5
6	450	240 – 350	6	30	167

* approximate data

Notes:

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MEDIUM ALLOYED BASIC ELECTRODES FOR WELDING FINEGRAINED STEELS

EVB 60 ..... **D1**

EVB 65 ..... **D2**

EVB Ni **D3**

EVB CuNi **D4**

EVB CuNiCr **D5**

EVB NiMo **D6**

GALEB 70 ..... **D7**

EVB 2.5 Ni **D8**

EVB 2.5 NiMo **D9**

EVB 75 ..... **D10**

EVB CrNiMo **D11**

EVB 80 ..... **D12**

EVB 100 ..... **D13**

EVB 100 EKSTRA **D14**

EVB SP2 ..... **D15**

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EVB 60

Classification:

EN 499:	E 50 4 Mo B 42
DIN 8529:	EY 50 75 Mn1 MoB
AWS A-5.5:	E 8018-G
EN ISO 2560-A:	E 50 4 MoB 42 H5
EN ISO 2560-B:	≈ E 57 18-3M2A

Description and application:

Mn and Mo alloyed basic electrode for welding steels and steel castings with tensile strength up to 735 N/mm2 and finegrained steels with yield strength up to 550 N/mm2.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 44.2 to St 70.2	1.0035 to 1.0070
Finegrained steels:	StE 255 to StE 500	1.0461 to 1.8907
	WStE 255 to WStE 500	1.0462 to 1.8937
Boiler plates:	HI, HII, 17 Mn4, 19Mn5	1.0345, 1.0425, 1.0481, 1.0482
Ageing resistant steels:	ASt 41, ASt 45, ASt 52	1.0426, 1.0436, 1.0577
Pipe steels:	St 35 to St 52.4	1.0308 to 1.0581
Shipbilding plates:	A to E, AH 32 to EH 36	1.0440 to 1.0476
Steel castings:	GS-38 to GS-60	1.0416 to 1.0553

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo
0.07	0.45	1.30	0.35

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 520 MPa (N/mm2)
Tensile strength	Rm:	620 – 720 MPa (N/mm2)
Elongation	A5:	> 22 %
Impact energy	KV :	> 47 J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

CR: 3Y40
ABS 3Y40
BV: 3Y40HH
GL: 3Y40H15
LR: 3/3YH
DNV: 3Y40H15
RS: 3Y46
SŽ
SZU
PRS: 3H10,3Y40H10
TÜV

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

EVB 65

Classification:

EN	
DIN 8529:	EY 55 76 Mn 1 NiMo B H5
AWS A-5.5:	E 9018-G
EN ISO 18275-A:	E 55 6 Mn 1 NiMo B42H5

Description and application:

Mn, Ni and Mo alloyed basic electrode with excellent welding characteristics. Electrode runs with a smooth stable arc. It has very good slag removal and minimum spatter. Weld metal has low hydrogen content.

Base materials:

Unalloyed steels: StE355 – StE500, WStE 355 – WStE500, EStE 355 – EStE 500
High tensile steels: TStE 500
Creep resistant steels: 17 MnMoV64 , 15NiCuMoNb5, 11NiMoV 53, 20 MnMoNi 45

Coating type:
basic

Welding current:
DC +
AC (OCV > 70V)

Welding positions:

Redrying temperature:
300-350ºC / 2 h
or
400ºC / 2 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo	Ni
0.06	0.40	1.60	0.30	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 560	MPa (N/mm2)
Tensile strength	Rm:	630 - 780	MPa (N/mm2)
Elongation	A5:	>20 %	
Impact energy	KV :	150 J (+20 °C) 55J (- 60 ° C)	

Hydrogen content: < 5 ml / 100 g weld metal

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	65-95	5.0	25.0	22
3.2	350	90-140	4.6	23.0	37
4.0	450	140-185	5.5	27.5	69
5.0	450	180-240	5.2	26.0	104
6.0	450	210-310	5.7	28.5	164

* approximate data

Classification:

EN 499:	E 50 4 1 Ni B 42 H5
DIN 8529:	EY 50 75 Mn1 NiB
AWS A-5.5:	E 8018-G
AWS A-5.5:	≈ E 8018-C3
EN ISO 2560-A:	E 50 4 1Ni B 42 H5
EN ISO 2560-B:	≈E 55 16-3N3 A

EVB Ni

Description and application:

Ni alloyed basic, CTOD-tested electrode for welding steels and steel castings with tensile strength up to 685 N/mm2 and finegrained steels with yield strength up to 460 N/mm2. Guaranteed mechanical properties at law temperatures.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 52.3 to St 70.2	1.0570 to 1.0070
Finegrained steels:	StE 380 to StE 460	1.8900 to 1.8905
	WStE 380 to WStE 460	1.8930 to 1.8935
Finegr.microalloy.steels	TStE 380 to TStE 460	1.8910 to 1.8915
Ni alloyed steels	13MnNi63, 15MnNi63	1.6217, 1.6210
Boiler plates:	17Mn4, 19Mn5	1.0481 1.0482
Steel castings:	GS-52, GS-60	1.0551, 1.0553
Weather corr.resist.steel:	CORTEN, Patinax	

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni
0.07	0.55	1,3	1.1

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$::	> 500	MPa (N/mm2)
Tensile strength	Rm:	560 – 720	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:
CR: 3YH
LR: 3/4Y
TÜV
SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB CuNi

Classification:

EN 499	E 46 4 ZB 42 H5
DIN 8529:	EY 50 75 CuNi B
AWS A-5.5:	E 7018-G
EN ISO 2560-A:	E 46 4 ZB 42 H5
EN ISO 2560-B:	E 49 16-NC A

Description and application:

Cu and Ni alloyed basic electrode for welding weather-resistant steels with yield strength of about 460 N/mm2.

Base materials:

	DIN:	W.Nr.:
Weather corr.resist.steel:	WTSt 37, WTSt 52	
	CORTEN A, B, C,	1.8962, 1.8963, 1.8965
	Patinax 37	1.8960
	RBH 35	
	Acor 37, Acor 50	
	HSB 51, HSB 55 C	

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cu	Ni
0.06	0.50	1.0	0.40	0.70

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa (N/mm2)
Tensile strength	Rm:	540 – 620	MPa (N/mm2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB CuNiCr

Classification:

EN 499:	≈ E 46 4 Z B 42 H5
AWS A-5.5:	E 8018-W2
AWS A-5.5:	≈ E 7018-G
ČSN 05 5010:	E NiCrCu-14B
EN ISO 2560-A:	E 46 4 Z B 42 H5
EN ISO 2560-B:	E 49 16-NCC1A

Description and application:

Cu, Ni and Cr alloyed, low hydrogen basic electrode for welding weather-resistant steels (resistant to atmospheric corrosion) with yield strength of about 460 N/mm2. Principal applications: public buildings, department of civil engineering, navy, tanks, water tower, bridges, crash barrier, electrical pylons.

Base materials:

	ČSN	W.Nr.:
Weather corr.resist.steel	15 217 S355J2G1W	1.8963
Corten steel: Atmofix steel	CORTEN A, B, C	

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cu	Ni	Cr
0.07	0.50	1.0	0.40	0.70	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa (N/mm2)
Tensile strength	Rm:	530 – 700	MPa (N/mm2)
Elongation	A_5:	> 22	%
Impact energy	KV :	> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB NiMo

Classification:

EN 499:	E 50 21 NiMo B 42 H5
DIN 8529:	EY 50 76 1 NiMo B
AWS A-5.5:	E 8018-G
EN ISO 2560-A:	E 50 21 NiMo B 42H5
EN ISO 2560-B:	≈E 57 18-N2M3 A

Description and application:

Ni and Mo alloyed basic, CTOD-tested electrode for welding low alloyed steels with tensile strength up to 735 N/mm2 and finegrained steels with yield strength up to 500 N/mm2. Guaranteed mechanical properties at law temperatures.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 52.3 to St 70.2	1.0570 to 1.0070
Finegrained steels:	StE 460, StE 460	1.8905, 1.8907
	WStE 460, WStE 500	1.8935, 1.8937
	TStE 460, TStE 500	1.8915, 1.8917
	NAXTRA 56, NAXTRA 63	1.7279

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Mo
0.06	0.50	1.0	1.10	0.30

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$::	> 510	MPa (N/mm2)
Tensile strength	Rm:	580 – 710	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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GALEB 70

Classification:

EN 499:	E 50 2 Mn1Ni B 42 H5
DIN 8529:	EY 50 75 1 NiMo B
AWS A-5.5:	E 9016-G
EN ISO 2560-A:	E 50 2 Mn1Ni B 42 H5
EN ISO 2560-B:	≈ E 57 16-N2M3 A

Description and application:

Mn, Ni and Mo alloyed basic electrode for welding low alloyed steels with tensile strength up to 735 N/mm2 and finegrained steels with yield strength up to 500 N/mm2. Preheating and interpass temperature, as well as postweld heat treatment as required by the base metal.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 50.2, St 60.2, St 70.2	1.0050, 1.0060, 1.0070
Finegrained steels:	StE 380, StE 500	1.8900, 1.8907
	WStE 380, WStE 500	1.8930, 1.8937
Heat resistant steels:	WB 35, WB 36, BHW 35, BHW 38	1.8817, 1.6368
Steel castings:	GS-60, GS-70	1.0553, 1.0554
Rail steels:	Rm to 880 N/mm2	
Medium alloyed steels:	Ni-Cr-Mo- base	

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Mo
0.08	0.70	1.50	0.70	0.20

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 520	MPa (N/mm2)
Tensile strength	Rm:	640 – 710	MPa (N/mm2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 125	J (+20°C)
		> 47	J (-20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	50 – 60	3.4	17	12
2.5	300	60 – 90	4	20	18.8
3.25	350	110 – 130	4.4	22	32.1
4	450	130 – 160	5.4	27	61.4
5	450	170 – 200	5.4	27	96.4

* approximate data

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EVB 2.5 Ni

Classification:

EN 499:	E 50 6 2Ni B 42 H 10
DIN 8529:	EY 50 76 2 Ni B
AWS A-5.5:	E 8018-C1
EN ISO 2560-A:	E 50 8 2 Ni B 42 H5
EN ISO 2560-B:	≈E 57 18-3N3 A

Description and application:

Ni alloyed basic electrode for welding low alloyed steels with tensile strength up to 735 N/mm2 and finegrained steels with yield strength up to 550 N/mm2. Guaranteed mechanical properties at law temperatures.

Base materials:

	DIN:	W.Nr.:
Finegrained steels:	EStE 380 to EStE 500	1.8911 to 1.8919
Finegr.microalloy steels		
Quenched and tempered steels:	NAXTRA 56	1.7279
Low temperature steels:	TTSt35N to TTSt45V	
	14Ni6 to 16Ni14	1.5622 to 1.5639

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni
0.05	0.50	1.0	2.3

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 510 MPa (N/mm2)
Tensile strength	Rm:	590 – 670 Mpa (N/mm2)
Elongation	A5:	> 22 %
Impact energy	KV :	> 47 J (-20°C)
		> 47 J (-80°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 90	3.4	17	19.8
3.25	350	100 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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Classification:

EN 757:	E 55 6 2NiMo B 42 H5
DIN 8529:	EY 50 75 2 Ni Mo B
AWS A-5.5:	E 9018-G
ISO 18275-A:	E 55 6 2 Ni Mo B 42 H5
EN ISO 2560-B:	≈E 62 18 N4M2A H5

EVB 2.5 NiMo

Description and application:

Ni and Mo alloyed basic electrode for welding Ni-Mo alloyed steels with tensile strength up to 785 N/mm2, finegrained steels with guaranteed mechanical properties at law temperatures and Q&T finegrained steels with yield strength up to 590 N/mm2

Base materials:

	DIN:	W.Nr.:
Quenched and tempered	NAXTRA 56	1.7279
finegrained steels:	NAXTRA 63	1.7279
	HY 80	1.6780
Boiler plates:	17MnMoV64	1.5403, 1.8817
	22NiMoCr37	1.6751
Steel castings:	GS-60, GS-70	1.0553, 1.0554
Rail steels (Rm to 880 N/mm2)		

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400ºC / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Mo
0.06	0.45	1.3	2.3	0.40

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 590	MPa (N/mm2)
Tensile strength	Rm:	650 – 780	MPa (N/mm2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-60°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 90	3.4	17	19.8
3.25	350	100 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB 75

Classification:

EN 757:	E 69 6 Mn2NiCrMo B 42 H5
DIN 8529:	EY 69 75 Mn2NiCrMo
AWS A-5.5:	E 10018-G
ISO 18275-A:	E 69 6 Mn2NiCrMo B 42 H5
ISO 18275-B:	E 78 16-N5CM3 A H5

Description and application:

Mn, Ni, Cr and Mo alloyed basic, CTOD-tested electrode for welding similarly alloyed steels with yield strength up to 685 N/mm2.Cracking resistance and low-temperature, ductility down to -60°C.
Preheating, interpass temperature and postweld treatment as required by the base metal.

Base materials:

	DIN:	W.Nr.:
Quenched and tempered finegrained steels:	NAXTRA 65	
	NAXTRA 70	1.7279
	HSB 77Y	
	T 1A	1.8851, 1.8921
	T 1B	1.8852, 1.8922

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0.06	0.45	1.5	0.45	2.2	0.45

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 700	MPa (N/mm2)
Tensile strength	Rm:	780 – 940	MPa (N/mm2)
Elongation	A_5:	> 17	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-60°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

CR
SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.8	19	16.7
3.25	350	90 – 140	4	20	34.2
4	450	140 – 195	5.4	27	65.1
5	450	180 – 240	5.4	27	105.9
6	450	210 – 320	5.4	27	150

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 757:
DIN 8529: ≈EY 62 52 1NiCrMo B
AWS A-5.5: ≈E 11018-G
ISO 18275-A: E 62 2Z-B 42 H5

EVB CrNiMo

Description and application:
Mn, Ni, Cr and Mo alloyed basic electrode for welding similarly alloyed steels and for special purposes.
Preheating, interpass temperature and postweld treatment as required by the base metal.

Base materials:

	DIN:	W.Nr.:
Finegrained steels:	≈ WSt 52.3 ČSN: ≈ 15222	1.8963

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400ºC / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0.06	0.50	1.0	0.40	1.2	0.35

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 620	MPa (N/mm2)
Tensile strength	Rm:	700 – 800	MPa (N/mm2)
Elongation	A5:	> 18	%
Impact energy	KV :	> 150	J (+20°C)
		> 47	J (-20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.8	19	16.7
3.25	350	90 – 140	4	20	34.2
4	450	140 – 195	5.4	27	65.1
5	450	180 – 240	5.4	27	105.9
6	450	210 – 320	5.4	27	150

* approximate data

elektrode jesenice d.o.o.

EVB 80

Classification:

EN 757:	E 69 6 Mn2NiCrMo B 42 H5
DIN 8529:	EY 69 75 Mn2NiCrMo B
AWS A-5.5:	E 10018-G
ISO 18275-A:	≈E 69 6Mn2NiCrMo B 42 H5
ISO 18275-B:	≈E 78 16 N5CM3 A H5

Description and application:

Mn, Ni, Cr and Mo alloyed basic electrode for welding similarly alloyed high tensile steels with yield strength up to 785 N/mm2. Cracking resistance and low-temperature, ductility down to -60°C.
Preheating, interpass temperature and postweld treatment as required by the base metal.

Base materials:

	DIN:	W.Nr.:
Quenched and tempered finegrained steels:	NAXTRA 70	1.7279
	NAXTRA 75	
	HSB 77Y, HSY 100	
	T 1A	1.8851, 1.8921
	T 1B	1.8852, 1.8922
Wear resistant steels		

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0.05	0.40	1.80	0.40	2.2	0.45

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 700	MPa (N/mm2)
Tensile strength	Rm:	810 – 960	MPa (N/mm2)
Elongation	A5:	> 16	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-60°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.8	19	16.7
3.25	350	90 – 140	4	20	34.2
4	450	140 – 195	5.4	27	65.1
5	450	180 – 240	5.4	27	105.9
6	450	210 – 320	5.4	27	150

* approximate data

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EVB 100

Classification:

EN 757:	E 79 4 Mn2Ni1CrMo B 42
DIN 8529:	EY 79 64 Mn2Ni1CrMoB
AWS A-5.5:	E 12018-G
ISO 18275-A:	E 78 4 Mn2Ni1CrMo B42 H5
ISO 18275-B:	≈E 8316 – N5CM3 H5

Description and application:

Mn, Ni, Cr and Mo alloyed basic electrode for welding similarly alloyed high tensile steels with yield strength up to 900 N/mm2. Cracking resistance and low-temperature, ductility down to -40°C.
Preheating, interpass temperature and postweld treatment as required by the base metal.

Base materials:

	DIN:	W.Nr.:
Quenched and tempered Wear resistant steels: Wear resistant steels	XABO 90	1.8925

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0.06	0.40	1.6	0.75	2.4	0.60

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 790	MPa (N/mm2)
Tensile strength	Rm:	980 – 1080	MPa (N/mm2)
Elongation	A5:	> 14	%
Impact energy	KV :	> 60	J (+20°C)
		> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

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Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 90	3.8	19	16.7
3.25	350	90 – 140	4	20	34.2
4	450	140 – 195	5.4	27	65.1
5	450	180 – 240	5.4	27	105.9
6	450	210 – 320	5.4	27	150

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 8529: ≈Y8975 Mn2Ni1CrMo B H5
AWS A-5.5: E 12018 - G
ISO 18275-A: E 89 4 ZB62 H5
ISO 18275-B: ≈E 8316 – N5CM3 H5

EVB 100 Extra

Description and application:

Basic electrode alloyed with Mn, Cr, Ni and Mo, particularly suitable for welding fine grained similar alloyed structural steels. Electrode runs with a stable arc, low spatter and easy removal slag.

Base materials:

Heat-treated fine grained structural steels up to a yield strength of 960N/mm2
S 960 QL / TStE 960V

Coating type:
basic

Welding current:
AC(OCV>70V)
DC +

Welding positions:

Redrying temperature:
300-350°C/ 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	Ni
0.07	0.50	1.6	0.90	0.8	2.5

Hydrogen content / 100 g weld metal: < 5ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 960	MPa (N/mm2)
Tensile strength	Rm:	> 1050	MPA (N/mm2)
Elongation	A5:	> 15	%
Impact energy	KV :	> 60	J (+20 ° C)
		> 40	J (- 40 ° C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65-95	3.8	19.0	17.7
3.2	350	90-140	4.0	20.0	34.7
4.0	450	140-185	5.4	27.0	67.6
5.0	450	180-240	5.4	27.0	107.5

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 757:	≈ E 62 4 ZB 34
ISO 18275-A:	E 62 4 Z B34
ISO 18275-B:	≈E 69 18 GA

EVB SP2

Description and application:

Basic electrode for rapid joining of large cross section profiles. Profiles can be cut off straight . Applications rails, thick and concrete bars.
Drying of electrodes before use is recommended.

Base materials:

Coating type:

Basic

Welding current:

DC +
AC (OCV>70 V)

Welding positions:

Redrying temperature:

400ºC / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr
0.08	0.40	1.0	2,3

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 620	MPa (N/mm2)
Tensile strength	Rm:	690-890	MPa (N/mm2)
Elongation	A5:	> 18	%
Impact energy	KV :	> 47	J (-40°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3,25	350				
4	450	140 – 180	5.4	27	
5	450	180 – 230	5.4	27	
6	450	240 – 290	5.4	27	

* approximate data

EVB Mo E1

EVB MoV E2

EVB CrMo E3

EVB 2 CrMo E4

EVB P 24 ..... E5

EVB 5 CrMo E6

EVB 9 CrMo E7

EVB CrMoV E8

EVB 3 CrMoV E9

EVB 9 CrMoV E10

EVB 91 CrMoV E11

EVB Mo1Cr E12

Classification:

EN 1599:	≈E Mo B 42
EN 499:	E 46 4 MoB 42 H5
DIN 8575:	E Mo B 26
AWS A-5.5:	E 7018-A1
EN ISO 3560-A:	E 46 4Mo B 42 H5
EN ISO 2560-B:	≈E 49 18-3M3 A
EN ISO 3580-A:	E Mo B42 H5
EN ISO 3580-B:	≈E 49 18-1M3

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EVB Mo

Description and application:

Mo alloyed basic electrode for welding creep resistant steels with yield strength up to 460°C. Suited for working temperatures for –40°C to 525°C.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 37.2 to St 52.3	1.0037 to 1.0570
Finegrained steels:	WStE 380 to WStE 460	1.8930 to 1.8935
Boiler plates:	H I, H II, H III	1.0345, 1.0425, 1.0435
	17 Mn4, 19 Mn5, 15 Mo3	1.0481, 1.0482, 1.5415
Pipe steels:	St 35.8, St 45.8	1.0305, 1.0405
	15 Mo3	1.5415
Steel castings:	GS-22 Mo4	1.5419

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo
0.05	0.60	0.95	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm2)
Tensile strength	Rm:	530 – 680	MPa(N/mm2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 47	J (-20°C)
		> 47	J (-40°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

CR 3YH
TÜV
SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 95	3.4	17	19.8
3.25	350	110 – 140	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

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EVB MoV

Classification:

EN 1599:	E MoV B 42
DIN 8575:	E MoV B 20+
AWS A-5.5:	E 8018-G
EN ISO 3580-A:	E MoV B 42 H5
EN ISO 3580-B:	≈E 62 18-G H5

Description and application:

Cr, Mo and V-alloyed basic electrode for welding similarly alloyed steels and steel castings for working temperatures up to 500°C. Suitable for reparatur-welding CrMoV and CrMnV steels.

Base materials:

	DIN:	W.Nr.:
Boiler plates:	14 MoV63, 21 MoV53, 17 MoV84, 24 CrMoV 55 10CrSiMoV7	1.7715, 1.5404, 1.5406, 1.7733 1.8075
Steel castings:	GS-17 CrMoV 5.11	1.7706

Heat treatment:

Stress relieved: 700 °C / 1 h and then cooled on the air.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V
0.05	0.70	1.0	0.50	1.0	0.35

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 500	MPa(N/mm2)
Tensile strength	Rm:	650 – 750	MPa(N/mm2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 95	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 95	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB CrMo

Classification:

EN 1599:	E CrMo1 B 42
DIN 8575:	E CrMo1 B 20+
AWS A-5.5:	E 8018-B2
EN ISO 3580-A:	E CrMo1 B 42 H5
EN ISO 3580-B:	≈E 55 18-1CM H5

Description and application:

Cr and Mo-alloyed basic electrode for welding creep resistant steels and steel castings for working temperatures up to 550°C, as for similarly alloyed steels, quenched and tempered for cementation and nitriding.

Base materials:

	DIN:	W.Nr.:
Boiler plates and tubes:	13CrMo44, 15CrMo3 13CrMoV42 (HIV)	1.7335, -
Steel for the cementation:	15Cr3, 16MnCr5 20MnCr5, 15CrMo5	1.7015, 1.7131 1.7147, 1.7262
Quenched and tempered steel:	25CrMo4	1.7218
Steel castings:	GS-22CrMo5, GS-22CrMo54	- , 1.7354

Heat treatment:

Stress relieved: 680 °C / 2 h, oven-cooling down to 300 °C and then cooled on the air.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.06	0.60	0.95	1.10	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 470	MPa(N/mm2)
Tensile strength	Rm:	570 – 670	MPa(N/mm2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 95	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

TÜV
DB

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 95	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

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Classification:

EN 1599:	E CrMo2 B 42
DIN 8575:	E CrMo2 B 20+
AWS A-5.5:	E 9018-B3
EN ISO 3580-A:	E CrMo2 B42 H5
EN ISO 3580-B:	≈E 62 18-2C1M H5

EVB 2 CrMo

Description and application:

Cr and Mo-alloyed basic electrode for welding creep resistant steels and steel castings for working temperatures up to 600°C, as for similarly alloyed steels, quenched and tempered for cementation and nitriding.

Base materials:

	DIN:	W.Nr.:
Heat resistant steel:	10CrMo9.10	1.7380
	10CrSiMoV7	1.8075
	12CrSiMo8	
Quenched and tempered steel:	30CrMoV9	1.7707
Steel castings:	GS-18CrMo9.10	1.7379

Heat treatment:

Stress relieved: 690 °C / 2 h, oven-cooling down to 400 °C and then cooled on the air.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.06	0.60	0.90	2.4	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 520	MPa(N/mm2)
Tensile strength	Rm:	620 – 720	MPa(N/mm2)
Elongation	A5:	> 18	%
Impact energy	KV :	> 95	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

CR
SŽ
TÜV
DB

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 95	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	150 – 180	5.4	27	66.7
5	450	180 – 220	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

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EVB P24

Classification:
EN 1599:
DIN 8575:
AWS A-5.5:
EN ISO 3580-A: E Z B42 H5
EN ISO 3580-B: ≈E 55 18-3C1MV

Description and application:

Cr , Mo, V and B alloyed basic electrode for welding creep resistant Cr-Mo,Cr-Mo-V in T/P 24 boyler, pipe and tube steels stable till 600° C.

Base materials

Creep resistant steels P24 Cr Mo and Cr Mo V steels	

Heat treatment:

Stress relieved: 2h / 690° C oven-cooling down to 400° C and then cooled on the air. Where necessary PWHT can be omitted.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400ºC / 1 h

Approvals:

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V	B
0,04	0,33	0,6	2,6	0,9	0,2	0,0025

Mechanical properties:	**as welded**	**PWHT**
Yield strength R_{eL} / $Rp_{0.2}$:	typ. 720 MPa(N/mm2)	> 450 MPa(N/mm2)
Tensile strength Rm:	typ. 840 MPa(N/mm2)	585-840 MPa(N/mm2)
Elongation A_5:	> 15 %	> 15 %
Impact energy Av (+20°C) :	> 40 J	> 40 J (tip. 150J)
Hydrogen content:	< 5 ml / 100 g weld metal	

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 95	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	150 – 180	5.4	27	66.7
5	450	180 – 220	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

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Classification:

EN 1599:	E CrMo5 B 42
DIN 8575:	E CrMo5 B 20+
AWS A-5.4:	E 502-15
EN ISO 3580-A:	E CrMo5 B42 H5
EN ISO 3580-B:	E 55 15 5CM-H5

EVB 5 CrMo

Description and application:

Cr and Mo-alloyed basic electrode for welding creep resistant steels and steel castings for working temperatures up to 600°C. The weld metal is resistant to high hydrogen pressure. The electrode is recommended for applications in the construction and maintenance of modern power station, oil (cracking plant) and chemical plants.

Base materials:

	DIN:	W.Nr.:
Heat and H2 resistant steel:	12CrMo19.5	1.7362
Steel castings:	GS-12CrMo19.5	1.7363

Heat treatment:

Stress relieved: 730 °C / 2 h and then cooled on the air.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.06	0.60	0.90	5.2	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490	MPa(N/mm2)
Tensile strength	Rm:	580 – 740	MPa(N/mm2)
Elongation	A5:	> 18	%
Impact energy	KV :	> 70	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 85	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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Classification:

EN 1599:	E CrMo9 B 42
DIN 8575:	E CrMo9 B 20+
AWS A-5.4:	E 505-15
EN ISO 3580-A:	E CrMo9 B42 H5
EN ISO 3580-B:	E 62 15-9C1M H5

EVB 9 CrMo

Description and application:

Cr and Mo-alloyed basic electrode for welding creep resistant steels and steel castings for working temperatures up to 600°C. The weld metal is resistant to high hydrogen pressure. The electrode is recommended for applications in oil and chemical industry.

Base materials:

	DIN:	W.Nr.:
Heat and H2 resistant steel:	X12CrMo9.1	1.7386
	X12CrMo7	1.7368
Steel castings:	GSX12CrMo10.1	

Heat treatment:

Stress relieved: 760 °C / 1 h and then cooled on the air.

Coating type:

Basic

Welding current:

DC +

Welding positions:

Redrying temperature:

400ºC / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.10	0.30	0.90	9.0	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 550	MPa (N/mm2)
Tensile strength	Rm:	680 – 780	MPa (N/mm2)
Elongation	A5:	> 15	%
Impact energy	KV :	> 50	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 85	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB CrMoV

Classification:

EN 1599:	≈E Cr Mo V1 B
DIN 8575:	E Cr Mo V1B 20 +
AWS/ ASME	
EN ISO 3580-A:	E CrMoV1 B32 H5
EN ISO 3580-B:	≈E 55 16-GH5

Description and application:

Basic electrode alloyed with Cr, Mo and V, suitable for welding similar cast steels. Electrode runs with a stable arc, low spatter and easy removal slag. It has uniform bead appearance.
Observe specifications on preheating and post weld heat treatment of base materials.

Base materials:

Low alloy cast steels of similar composition - GS 17 CrMoV 5 11

Heat treatment: 700°C / 6h in oven, cooling in the oven until 300°C

Coating type:
basic

Welding current:
DC +
AC (OCV > 70V)

Welding positions:

Redrying temperature:
300-350°C

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V
0.11	0.40	0.95	1.4	0.95	0.25

Hydrogen content / 100 g weld metal: <5ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 450	MPa(N/mm2)
Tensile strength	Rm:	> 600	MPa(N/mm2)
Elongation	A5:	> 15	%
Impact energy	KV :	> 50	J (+20 °C)

Approvals:

TÜV

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	60-90	4.2	21.0	21
3.2	450	90-130	5.8	29.0	47
4.0	450	140-180	5.6	28.0	71
5.0	450	190-230	5.7	28.5	114
6.0	450	250-310	5.7	28.5	163

* approximate data

Classification:
EN 1599: EZ CrMo 3V B42 H5
EN ISO 3580-A: E Z B 42 H5
EN ISO 3580-B: ≈E 62 16-3C1 MV H5

elektrode jesenice d.o.o.

EVB 3 CrMoV

Description and application:
Mo and Cr and V alloyed basic electrode for welding creep resistant steels and steel castings for working temperatures up to 600°C.

Base materials:

	DIN:
Creep resistant steels	10CrMo11
Finegrained steel	17CrMoV10

Heat treatment:
Preheating and interpass temperature should be 200-250°C. Stress relieved: 690 - 730 °C 7/ 2h then cooled in the oven till 300°C.

Coating type:
Basic

Welding current:
DC + (OCV > 70V)

Welding positions:

Redrying temperature:
400°C / 1 h
350°C / 2 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V
0.1	0.35	0,60	3,0	1,0	0,25

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 550	MPa (N/mm2)
Tensile strength	Rm:	660- 740	MPa (N/mm2)
Elongation	A5:	> 17	%
Impact energy	KV :	> 50	J (+20°C)
Hydrogen content:		< 5 ml / 100 g weld metal	

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 95	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

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Classification:

EN 1599:	≈E CrMo91B42
AWS A-5.5:	≈E 9016-B9
EN ISO 3580-A:	≈E CrMo91 B42 H5
EN ISO 3580-B:	≈E 62 15-9C1MV1 H5

EVB 9 CrMoV

Description and application:

Cr and Mo-alloyed basic electrode for welding creep resistant heat treated 9-12% chromium steels, especially for steels T 91 and T 92, for working temperatures up to 600°C. Preheat and interpass temperatures 200-300°C.

Base materials:

	DIN:	W.Nr.:	ASTM
Heat and H_2 resistant boiler, tube and pipe steels:	X 12 CrMo9.1 X 20 CrMoV 12.1	1.7386 1.4922 1.4935	A 199 Gr.T9 A 335 Gr.P9 A 351 A 213/213 M Gr.T/P91 Gr.T/P92

Heat treatment:

Stress relieved: 750 °C / 2 h, oven-cooling down to 300 °C and then cooled on the air.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	Ni	V	W
0.06	0.35	0.60	9.0	0.9	0.9	0.2	0.2

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 500	MPa(N/mm2)
Tensile strength	Rm:	650 – 850	MPa(N/mm2)
Elongation	A5:	> 16	%
Impact energy	KV :	> 50	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 85	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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Classification:

EN 1599:	ECrMo 91B 42
AWS 5.5:	E 9018-B9
EN ISO 3580-A:	E CrMo91 B42 H5
EN ISO 3580-B:	E 62 15-9C1MV H5

EVB 91 CrMoV

Description and application:

Cr and Mo-alloyed basic electrode for welding creep resistant heat treated 9-12% chromium steels, especially for steels T 91 and T 92, for working temperatures up to 600°C. Preheat and interpass temperatures 200-300°C.

Base materials:

	DIN:	W.Nr.:	ASTM
Heat and H_2 resistant boiler, tube and pipe steels:	X 12 CrMo9.1 X 20 CrMoV 12.1	1.7386 1.4922 1.4935	A 199 Gr.T9 A 335 Gr.P9 A 351 A 213/213 M Gr.T/P91 Gr.T/P92

Heat treatment:

Stress relieved: 750 °C / 2 h, oven-cooling down to 300 °C and then cooled on the air.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	Ni	V	Nb	N
0.09	0.3	0.90	9.0	0.9	0.4	0.2	0,06	+

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 520	MPa (N/mm)
Tensile strength	Rm:	620 – 850	MPa (N/mm)
Elongation	A5:	> 17	%
Impact energy	Av :	> 50	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 85	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9

* approximate data

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EVB Mo1Cr

Classification:

EN 1599:	
DIN 8575:	
AWS A-5.5:	E 8016-B3
ČSN 05 5010:	E Mo1Cr-15B
EN ISO 3580-A:	E Z B42 H5
EN ISO 3580-B:	≈E 55 18-1M3 H5

Description and application:

Mo and Cr-alloyed basic electrode for welding creep resistant steels and steel castings for working temperatures up to 580°C.

Base materials:

Creep resistant steels ČSN: 15 123

Heat treatment:

Stress relieved: 680-710 °C / 1 h then cooled on the air.

Coating type:

Basic

Welding current:

DC + (OCV > 70V)

Welding positions:

Redrying temperature:

400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.08	0.40	0.80	0,50	1,0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm2)
Tensile strength	Rm:	550 – 700	MPa(N/mm2)
Elongation	A_5:	> 19	%
Impact energy	KV :	> 47	J (+20°C)

Hydrogen content: < 5 ml / 100 g weld metal

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	65 – 95	3.4	17	19.8
3.25	350	100 – 130	4	20	36.4
4	450	140 – 180	5.4	27	66.7
5	450	180 – 230	5.4	27	101.9
6	450	240 – 290	5.4	27	150

* approximate data

Notes:

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MEDIUM ALLOYED RUTILE ELECTRODES FOR WELDING CREEP RESISTANT STEELS

E Ti Mo F1

E Ti MoV F2

E Ti CrMo F3

E Ti 2 CrMo F4

E Ti 5 CrMo F5

Classification:

EN 499:	E 46 A Mo R 12
DIN 8575:	E Mo R 22
AWS A-5.4:	E 8013-G
EN ISO 3580-A:	E Mo R 12
EN ISO 3580-B:	E 55 13 1M3 A
EN ISO 2560-A:	E 46 A Mo R 12
EN ISO 2560-B:	≈E 55 13-1M3 A

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ETiMo

Description and application:

Mo alloyed rutile electrode for welding creep resistant steels. Suitable for welding root beads; basic type of electrode recommended for filled welding. Suitable for working temperatures up to 500°C.

Base materials:

	DIN:	W.Nr.:
Unalloyed steels:	St 37 to St 52	1.0037 to 1.0570
Boiler plates:	H I, H II, H III	1.0345, 1.0425, 1.0435
	17 Mn4, 19 Mn5, 15 Mo3	1.0481, 1.0482, 1.5415
Pipe steels:	St 35.8, St 45.8	1.0305, 1.0405
	15 Mo3	1.5415

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo
0.06	0.30	0.45	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	$MPa(N/mm^2)$
Tensile strength	Rm:	550 – 590	$MPa(N/mm^2)$
Elongation	A5:	> 20	%
Impact energy	KV :	> 65	J (+20°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 95	4	20	18.1
3.25	350	115 – 145	4	20	34.8
4	450	145 – 190	5.4	27	68.4
5	450	200 – 240	5.4	27	110

* approximate data

elektrode jesenice d.o.o.

E TiMoV

Classification:

EN 1599:	E MoV R 12
DIN 8575:	E MoV R 22
AWS A-5.5:	E 8013-G
EN ISO 3580-A:	E MoV R 12
EN ISO 3580-B:	E 55 13 G

Description and application:

Cr, Mo and V-alloyed rutile electrode for welding similarly alloyed steels and steel castings for working temperatures up to 550°C. Suitable for welding root beads; basic type of electrode recommended for filled weld.

Base materials:

	DIN:	W.Nr.:
Boiler plates and tubes:	14 MoV63, 21 MoV53, 17 MoV84, 24 CrMoV 55 10CrSiMoV7	1.7715, 1.5404, 1.5406, 1.7733 1.8075

Heat treatment:

Stress relieved: 700 °C / 2 h and then cooled on the air.

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V
0.10	0.30	0.50	0.45	1.0	0.35

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 470	MPa(N/mm^2)
Tensile strength	Rm:	610 – 710	MPa(N/mm^2)
Elongation	A5:	> 18	%
Impact energy	KV :	> 65	J (+20°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 90	4	20	18.1
3.25	350	115 – 145	4	20	34.8
4	450	145 – 190	5.4	27	68.4
5	450	200 – 240	5.4	27	110

* approximate data

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Classification:

EN 1599:	E CrMo1 R 12
DIN 8575:	E CrMo1 R 22
AWS A-5.5:	E 8013-G
EN ISO 3580-A:	E CrMo1 R 12
EN ISO 3580-B:	E 55 13 1CM

E TiCrMo

Description and application:

Cr and Mo-alloyed rutile electrode for welding creep resistant Cr-Mo alloyed steels and steel castings for working temperatures up to 550°C. Suitable for welding root beads, basic type of electrode recommended for filled weld.

Base materials:

	DIN:	W.Nr.:
Boiler plates and tubes:	13CrMo44 15CrMo3 13CrMoV42 (HIV)	1.7335

Heat treatment:

Stress relieved: 680 °C / 2 h, oven-cooling down to 300 °C and then cooled on the air.

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.08	0.35	0.50	1.0	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490	$MPa(N/mm^2)$
Tensile strength	Rm:	590 – 690	$MPa(N/mm^2)$
Elongation	A5:	> 18	%
Impact energy	KV :	> 50	J (+20°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 95	4	20	18.1
3.25	350	115 – 145	4	20	34.8
4	450	145 – 190	5.4	27	68.4
5	450	200 – 240	5.4	27	110

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1599:	E CrMo2 R 12
DIN 8575:	E CrMo2 R 22
AWS A-5.5:	E 9013-G
EN ISO 3580-A:	E CrMo2 R 12
EN ISO 3580-B:	E 62 13 2C1M

E Ti 2CrMo

Description and application:

Cr and Mo-alloyed rutile electrode for welding creep resistant Cr-Mo alloyed steels and steel castings for working temperatures up to 600°C. Suitable for welding root beads; basic type of electrode recommended for filled weld.

Base materials:

	DIN:	W.Nr.:
Heat resistant steels:	10CrMo9.10 15CrSiMoV7 12CrSiMo8	1.7380

Heat treatment:

Stress relieved: 690 °C / 2 h, oven-cooling down to 400°C and then cooled on the air.

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.10	0.40	0.60	2.30	1.0

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 520	MPa(N/mm^2)
Tensile strength	Rm:	620 – 740	MPa(N/mm^2)
Elongation	A5:	> 18	%
Impact energy	KV :	> 50	J (+20°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 95	4	20	18.1
3.25	350	115 – 145	4	20	34.8
4	450	145 – 190	5.4	27	68.4
5	450	200 – 240	5.4	27	110

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1599:	E CrMo5 R 12
DIN 8575:	E CrMo5 R 22
AWS A-5.5:	E 8013-B6
EN ISO 3580-A:	E CrMo 5 R 12
EN ISO 3580-B:	E 62 13 5CM

E Ti 5CrMo

Description and application:

Cr and Mo-alloyed rutile electrode for welding creep resistant steels and steel castings for working temperatures up to 600°C and for steels, resistant to hydrogen pressure. Suitable for welding root beads in oil plant; basic type of electrode recommended for filled weld.

Base materials:

	DIN:	W.Nr.:
Heat and H2 resistant steels:	12CrMo9.15	1.7380

Heat treatment:

Stress relieved: 730 °C / 2 h and then cooled on the air.

Coating type:
Rutile

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
120°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.10	0.50	0.80	5.00	0.50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 520	MPa(N/mm^2)
Tensile strength	Rm:	640 – 740	MPa(N/mm^2)
Elongation	A5:	> 17	%
Impact energy	KV :	> 47	J (+20°C)

Approvals:

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 90	4	20	18.1
3.25	350	115 – 145	4	20	34.8
4	450	145 – 190	5.4	27	68.4
5	450	200 – 240	5.4	27	110

* approximate data

HIGH ALLOYED FERRITIC STAINLESS STEEL ELECTRODES

INOX B 13 Fe G1

INOX B 13/1 Fe G2

INOX B 13/4 Fe G3

INOX B 13/6 Fe G4

INOX B 17 Fe G5

INOX B 17 MoFe G6

elektrode jesenice d.o.o.

Classification:
EN 1600: E 13 B 43
DIN 8556 : E 13 MPB 30+130
AWS A-5.4: E 410-15
ISO 3581:
W.Nr.: 1.4009

INOX B 13 Fe

Description and application:
Basic flux alloyed electrode for welding similar corrosion resisting, martensitic-ferritic steels, steel castings and for hardfacing exhaust valves.

Base materials:

Martensitic-ferritic steels	DIN	W.Nr.:
Corrosion resistant steels:	X 6 Cr 13	1.4000
	X 6 CrAl 13	1.4002
	X 10 Cr 13	1.4006
	X 15 Cr 13	1.4024
Alloyed steel castings:	G-X 10 Cr 13	1.4006

Heat treatment:
Preheating cca.150°C, interpass temperature 180-260 °C, tempering temperature depending on the relevant base metal and material thickness.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
420°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr
0.07	13

Mechanical properties:

		tempered*
Tensile strength	Rm:	>450 MPa(N/mm^2)
Elongation	A5:	> 20 %
Hardness:		cca. 350 HB as welded

*Tempering: 840-870°C/2h, oven-cooling down to 595°C (55°C/h), then cooled on the air

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length Mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
/						
	2.5	300	60 – 90	4	20	17.9
	3.25	350	90 – 120	4.4	22	37.6
	4	450	110 – 160	5.4	27	73
	5	450	150 – 190	5.4	27	106

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 1600: E 13 1 B 43
DIN 8556 : E 13 1 MPB 30+130
A-5.4:
ISO 3581:
W.Nr.: ≈ 1.4018

INOX B 13/1 Fe

Description and application:

Basic flux alloyed electrode for welding similar corrosion resisting, martensitic-ferritic steels and steel castings and for hardfacing.Suitable in constructions of hydroturbines, compressors and steam power plants. Resistant to corrosion from water, steam and sea water atmosphere.

Base materials:

Martensitic-ferritic steels	DIN	W.Nr.:
Corrosion resistant steels:	X 6 Cr 13	1.4000
	X 6 CrAl 13	1.4002
	X 10 Cr 13	1.4006
	X 15 Cr 13	1.4024
Alloyed steel castings:	G-X 10 Cr 13	1.4006

Heat treatment:

Preheating temperature 150 - 200°C, interpass temperature 180 - 400°C, tempering temperature 650 – 750°C, depending on the relevant base metal and material thickness.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
420°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Ni	Mo
0.05	13	1.5	0.3

Mechanical properties:

		as welded	tempered*
Yield strength	R_{eL} / Rp $_{0.2}$:	> 740 MPa(N/mm^2)	>450 MPa(N/mm^2)
Tensile strength	Rm:	950-1100 MPa(N/mm^2)	650-800 MPa(N/mm^2)
Elongation	A5:	> 6 %	> 15 %
Impact energy	KV :	> 15 J (+20°C)	> 47 J +20°C)

*Tempering: 700° / 2h, then cooled on the air

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length Mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
/						
	2.5	300	60 – 90	4	20	17.9
	3.25	350	90 – 120	4.4	22	37.6
	4	450	110 – 160	5.4	27	73
	5	450	150 – 190	5.4	27	106

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 13 4 B 43
DIN 8556 :	E 13.4 MPB 30+130
AWS A-5.4:	E 410 NiMo-15
ISO 3581:	E 13.4 B 130 36 X
W.Nr.:	≈ 1.4351

INOX B 13/4 Fe

Description and application:

Basic flux alloyed electrode for welding similar corrosion resisting, martensitic-ferritic steels and steel castings and for hardfacing. Suitable in constructions of hydroturbines, compressors and steam power plants. Resistant to corrosion from water, steam and sea water atmosphere.

Base materials:

Martensitic-ferritic steels	DIN	W.Nr.:
Corrosion resistant steels:	X 6 Cr 13	1.4000
	X 5 CrNi 13 4	1.4313
	X 20 Cr 13	1.4021
Alloyed steel castings:	G-X 5 CrNi 13 4	1.4313
	G-X 5 CrNi 13 6	
	G-X 5 CrNiMo 12 4	
	G-X 5 CrNiMo 13 4	1.4407

Heat treatment:

Preheating and interpass temperature 100 - 160°C, tempering temperature 580 – 620°C, depending on the relevant base metal and material thickness.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
420°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Ni	Mo
0.06	13	4	0.5

Mechanical properties:

		as welded	tempered*
Yield strength R_{eL} / $Rp_{0.2}$:		>830 MPa(N/mm^2)	>620 MPa(N/mm^2)
Tensile strength	Rm:	1080-1230 MPa(N/mm^2)	830-980 MPa(N/mm^2)
Elongation	A5:	> 6 %	> 15 %
Impact energy	KV :	> 24 J (+20°C)	> 47 J (+20°C)
Hardness:		300-400 HB	250-350 HB

*Tempering: 600° / 2h, then cooled on the air

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Welding and packing data:

	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
	2.5	300	60 – 90	4	20	17.9
	3.25	350	90 – 120	4.4	22	37.6
	4	450	110 – 160	5.4	27	73
	5	450	150 – 190	5.4	27	106

Approvals:

/

* approximate data

Classification:
EN 1600:
DIN 8556 :
AWS A-5.4:
ISO 3581:

INOX B 13/6 Fe

Description and application:

Basic flux alloyed electrode for welding similar corrosion resisting, martensitic, martensitic-ferritic steels and steel castings. Suitable in constructions of hydroturbines compressors and steam power plants. Resistant to corrosion from water, steam and sea water atmosphere.

Base materials:

Martensitic-ferritic steels	DIN	W.Nr.:
Corrosion resistant steels:	X 6 Cr 13	1.4000
Alloyed steel castings:	G-X 5 CrNi 13 4 G-X 5 CrNi 13 6	1.4313

Heat treatment:

Preheating and interpass temperature 100 - 160°C, tempering temperature 580 – 620°C, depending on the relevant base metal and material thickness.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
420°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Ni	Mo
0.07	13	6	0.5

Mechanical properties:

		as welded	tempered*
Yield strength	R_{eL} / $Rp_{0.2}$:	> 740 MPa(N/mm2)	>600 MPa(N/mm^2)
Tensile strength	Rm:	950-1100 MPa(N/mm^2)	750-960 MPa(N/mm^2)
Elongation	A5:	> 8 %	15%
Impact energy	KV :	> 24 J (+20°C)	> 47 J (+20°C)

*Tempering: 600° / 2h, then cooled on the air

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	60 – 90	4	20	17.9
3.25	350	90 – 120	4.4	22	37.6
4	450	110 – 160	5.4	27	73
5	450	150 – 190	5.4	27	106

* approximate data

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Classification:
EN 1600: E 17 B 43
DIN 8556 : E 17 MPB 30+130
AWS A-5.4: E 430-15
ISO 3581: E 17 B 130 36 X
W.Nr.: ≈1.4015

INOX B 17 Fe

Description and application:
Basic flux alloyed electrode for welding and building up 17%Cr-alloyed steel, where leakage and corrosion resistance for working temperatures up to 450°C is required. Suitable for hardfacing exhaust valves.

Base materials:

Ferritic-martensitic steels	DIN	W.Nr.:
Chemical corrosion resistant steels:	X 6 Cr 17	1.4016
	X 6 CrTi 17	1.4510
	X 6 CrNb 17	1.4511
	X 10 CrSi 18	1.4741
	X 10 CrAl 18	1.4742

Heat treatment:
Preheating and interpass temperature 200 – 300°C, tempering temperature 650 - 750°C, depending on the relevant base metal and material thickness.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
420°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Ni
0.10	16.5	0.5

Mechanical properties:

Tempered: 750°C/2h/furnace

Yield strength R_{eL} / $Rp_{0.2}$: > 440 MPa(N/mm^2)

Tensile strength Rm: 590 - 740 MPa(N/mm^2)

Hardness: 250 – 300 HB as welded
cca. 200 HB tempered 750°C/2h/furnace

The hardness of the deposit depending on the relevant welding conditions and the chemical compositions of the base metal.

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length Mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
/						
	2.5	300	60 – 80	3.4	17	19.8
	3.25	350	80 – 120	4	20	40.8
	4	450	120 – 160	5.2	26	76.5
	5	450	160 – 190	5.2	26	123.8

* approximate data

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Classification:
EN 1600: -
DIN 8556 : -
AWS A-5.4: ≈ E 430 Mo-15
ISO 3581: E 17.0.1B 130 36 X
W.Nr.: 1.4115

INOX B 17 MoFe

Description and application:

Basic flux alloyed electrode for welding and building up Cr-Mo-alloyed and non alloyed steels , where leakage and corrosion resistance for working temperatures up to 550°C is required. Suitable for hardfacing exhaust valves. Sea water resistant, scaling resistant up to 900°C

Base materials:

Ferritic steels and steel castings	DIN	W.Nr.:
Chemical corr.resistant st.	X 20 CrNi 17.2	1.4057
Quenched and tempered st.	41 Cr 4	1.7035
Alloyed steel castings	G-X 22 CrNi 17	1.4059
	GS-C 25	1.0619

Heat treatment:

Preheating and interpass temperature 100 – 200°C (for joint welding operations 250 - 400°C), depending on the relevant base metal and material thickness.
Tempering temperature 650 - 750°C to improve the toughness values in the weld metal and in the transition zone.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
420°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Ni	Mo
0.15	16.5	0.5	1.1

Mechanical properties:

Hardness: cca. 400 – 450 HB as welded
cca. 250 – 350 HB tempered 700°C/2h/furnace

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length Mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	60 – 80	3.4	17	18.1
3.25	350	80 – 120	4	20	40.4
4	450	120 – 160	5.2	26	76.5
5	450	160 – 200	5.2	26	123.8

* approximate data

Notes:

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HIGH ALLOYED AUSTENITIC AND AUSTENITIC – FERRITIC STAINLESS STEEL ELECTRODES

INOX R 19/9 Nb H1

INOX B 19/9 Nb H2

INOX R 19/9 NC H3

INOX R 19/12/3 Nb H4

INOX R 19/12/3 NC H5

INOX B 19/12/3 Nb H6

INOX R 19/13/4 L H7

INOX R 22/9/3 LN H8

INOX R 20/10/3 L H9

INOX R 20/25 L H10

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Classification:

EN 1600:	E 19 9 Nb R 12
DIN 8556 :	E 19.9 Nb R 26
AWS A-5.4:	E 347-17
ISO 3581:	E 19.9 Nb R 26
W.Nr.::	1.4551

INOX R 19/9 Nb

Description and application:

Rutile, Nb-stabilised electrode for welding nonstabilised and stabilised stainless steels. Resistant to intergranular corrosion up to 400°C, resistant to oxidation up to 800°C and high hot cracking resistance of the weld metal.

Base materials:

	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 5 CrNi 18 10	1.4301	304
	X 6 CrNiTi 18 10	1.4541	321
	X 6 CrNiNb 18 10	1.4550	347
Alloyed steel castings:	G-X 6CrNi 18 9	1.4308	-
	G-X 5 CrNiNb 18.9	1.4552	-
	G-X 10 CrNi 18 8	1.4312	A157

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 6

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Nb
≤ 0.04	≤ 1.0	0.7	19	10	> 8 x %C

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	> 590 – 690	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 47 J (+20°C) > 32 J (-60°C)	typical: 70 J

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
BV: UP	2	250	30 – 50	3.5	14	
DNV: 347	2.5	300	50 – 85	4	16	18.1
TÜV	3.25	350	70 – 125	4.5	18	35.4
CR	4	350	110 – 165	4.5	18	53.6
SŽ	5	350	165 - 230	4.5	18	81.8

- approximate data

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Classification:

EN 1600:	E 19 9 Nb B 22
DIN 8556 :	E 19.9 Nb B 20+
AWS A-5.4:	E 347-15
ISO 3581:	E 19.9 Nb B 20+
W.Nr.:	1.4551

INOX B 19/9 Nb

Description and application:

Basic, Nb-stabilised electrode for welding nonstabilised and stabilised stainless steels. Resistant to intergranular corrosion up to 400°C. High ductility and high cracking resistance of the weld metal.

Base materials:

	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 5 CrNi 18 10	1.4301	304
	X 6 CrNiTi 18 10	1.4541	321
	X 6 CrNiNb 18 10	1.4550	347
Alloyed steel castings:	G-X 6CrNi 18 9	1.4308	-
	G-X 5 CrNiNb 18.9	1.4552	-
	G-X 10 CrNi 18 8	1.4312	A157

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 8

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Nb
0.06	0.40	1.8	19	10	> 8 x %C

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	> 590 – 690	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 47 J (+20°C)	typical: 70J

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	250	40 – 60	3.5	14	
2.5	300	50 – 80	4	16	
3.25	350	80 – 110	4.5	18	
4	350	110 – 140	4.5	18	
5	350	140 - 180	4.5	18	

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 19 9 LR 12
DIN 8556 :	E 19.9 LR 26
AWS A-5.4:	E 308L-17
ISO 3581:	E 19.9 LR 26
W.Nr.:	1.4316

INOX R 19/9 NC

Description and application:

Austenitic rutile, low carbon electrode for welding nonstabilised and stabilised stainless steels. Resistant to intergranular corrosion up to 350°C, resistant to oxidation up to 800°C and good low-temperature ductility down to temperature –196°C.

Base materials:

	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 5 CrNi 18 10	1.4301	304
	X 2 CrNi 19 11	1.4306	304 L
	X 6 CrNiTi 18 10	1.4541	321
	X 6 CrNiNb 18 10	1.4550	347
Alloyed steel castings:	G-X 6CrNi 18 9	1.4308	-
	G-X 5 CrNiNb 18.9	1.4552	-

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 5

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
≤ 0.03	0.8	0.7	19	10

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 340	MPa(N/mm^2)
Tensile strength	Rm:	> 540 – 640	MPa(N/mm^2)
Elongation	A5:	> 35	%
Impact energy	KV :	> 47 J (+20°C) typical: 70J > 32 J (-196°C)	

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
BV: UP	2	250	30 – 50	3.5	14	
DNV: 308L	2.5	300	50 – 85	4	16	18.1
RS: 308L	3.25	350	70 – 125	4.5	18	35.4
TÜV	4	350	110 – 165	4.5	18	53.6
CR	5	350	165 - 230	4.5	18	81.8
SŽ						

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 19 12 3 Nb R 12
DIN 8556 :	E 19.12.3 Nb R 26
AWS A-5.4:	E 318-17
ISO 3581:	E 19.12.3 Nb R 26
W.Nr.:	1.4576

INOX R 19/12/3 Nb

Description and application:

Austenitc rutile, Nb-stabilised electrode for welding nonstabilised and stabilised stainless steels.
Resistant to intergranular corrosion up to 400°C, resistant to oxidation up to 800°C and good hot cracking resistance of the weld metal.

Base materials:

	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 5 CrNiMo 17 12 2	1.4401	316
	X 5 CrNiMo 17 13 3	1.4436	316
	X 6 CrNiMoTi 17 12 2	1.4571	316Ti
	X 6 CrNiMoNb 17 12 2	1.4581	316Cb
	X 10 CrNiMoTi 18 12	1.4573	316Ti
	X 10 CrNiMoNb 18 12	1.4583	316Cb
Alloyed steel castings:	G-X 6CrNiMo 18 10	1.4408	A157
	G-X 5 CrNiMoNb 18.10	1.4581	316L

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 10

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo	Nb
≤0.04	≤ 1.0	0.7	18.5	11.5	2.7	> 8 x %C

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	> 590 – 690	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	Av :	> 47 J (+20°C)	typical: 60J

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet Kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	250	30 – 50	3.5	14	
2.5	300	50 – 85	4	16	18.1
3.25	350	70 – 125	4.5	18	35.4
4	350	110 – 165	4.5	18	53.6
5	350	165 - 230	4.5	18	81.8

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 19 12 3 LR 12
DIN 8556 :	E 19.12.3 LR 26
AWS A-5.4:	E 316L-17
ISO 3581:	E 19.12.3 LR 26
W.Nr.:	1.4430

INOX R 19/12/3 NC

Description and application:

Austenitic rutile, low carbon electrode for welding nonstabilised and stabilised stainless steels. Resistant to intergranular corrosion up to 350°C, resistant to oxidation up to 800°C and good low-temperature ductility down to temperature –120°C.

Base materials:

	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 2 CrNiMo 17 13 2	1.4404	316L
	X 5 CrNiMo 17 12 2	1.4401	316
	X 5 CrNiMo 17 13 3	1.4436	316
	X 6 CrNiMoTi 17 12 2	1.4571	316Ti
	X 6 CrNiMoNb 17 12 2	1.4580	316 Cb
	X 10 CrNiMoTi 18 12	1.4573	316Ti
	X 10 CrNiMoNb 18 12	1.4583	316Cb
Alloyed steel castings:	G-X 6 CrNiMo 18 10	1.4408	
	G-X 5 CrNiMoNb 18.10	1.4581	

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 8

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
≤ 0.03	0.8	0.7	18.5	11.5	2.7

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 380	MPa(N/mm^2)
Tensile strength	Rm:	> 560 – 660	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 47 J (+20°C) typical: 60J > 32 J (-120°C)	

Welding and packing data:

Approvals:	Welding parameters			Packing		
ABS: 316L-17 **DNV: 316L** **TÜV** **SŽ** **BV**	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
	2	250	30 – 50	3.5	14	
	2.5	300	50 – 85	4	16	18.1
	3.25	350	70 – 125	4.5	18	35.4
	4	350	110 – 165	4.5	18	53.6
	5	350	165 - 230	4.5	18	81.8

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 19 12 3 Nb B 22
DIN 8556 :	E 19.12.3 Nb B20+
AWS A-5.4:	E 318-15
ISO 3581:	E 19.12.3 Nb B 20+
W.Nr.:	1.4576

INOX B 19/12/3 Nb

Description and application:

Austenitc basic, Nb-stabilised electrode for welding nonstabilised and stabilised stainless steels.
Resistant to intergranular corrosion up to 400°C, resistant to oxidation up to 800°C and good hot cracking resistance of the weld metal.

Base materials:

	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 5 CrNiMo 17 12 2	1.4401	316
	X 5 CrNiMo 17 13 3	1.4436	316
	X 6 CrNiMoTi 17 12 2	1.4571	316Ti
	X 6 CrNiMoNb 17 12 2	1.4581	316Cb
	X 10 CrNiMoTi 18 12	1.4573	316Ti
	X 10 CrNiMoNb 18 12	1.4583	316Cb
Alloyed steel castings:	G-X 6CrNiMo 18 10	1.4408	A157
	G-X 5 CrNiMoNb 18.10	1.4581	316L

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 9

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo	Nb
≤0.04	0,6	1	19	11	2,7	> 8 x %C

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	> 600 – 750	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	Av :	> 47 J (+20°C)	typical: 70J

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet Kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	250	40 – 60	3.5	14	
2.5	300	50 – 80	4	16	18.1
3.25	350	80 – 110	4.5	18	35.4
4	350	110 – 140	4.5	18	53.6
5	350	140 - 180	4.5	18	81.8

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	≈E 19 13 4 LR 12
DIN 8556:	≈E 19.13.4 LR 23
AWS A 5.4:	E 317L -17
ISO 3581:	E 19.13.4 LR
W.Nr.:	1.4453

INOX R 19/13/4 L

Description and application:

Rutile low carbon electrode for welding corrosion resisting steels with higher Mo content. Electrode has very good welding properties, weld metal has excellent corrosion resistance.

Base materials:

X5 CrNiMo 17 13	W.-Nr.	1.4449
X2 CrNiMoN 17 13 5		1.4439
X2 CrNiMoN 17 13 3		1.4429
X10CrNiMoNb 18 12		1.4583
X4 CrNiMoN 22 15		1.3951
X4 CrNiMoN 19 16 5		1.3964

Heat treatment:

Preheating and post weld heat treatment is not required by the weld metal.
Interpass temperatures shall not exceed 150ºC.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
250°C /2h

Ferrite content: FN ≈ 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo	N
≤0.03	<0.8	0.8	18	14.5	4.0	+

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 450	MPa(N/mm^2)
Tensile strength	Rm:	> 600	MPa(N/mm^2)
Elongation	A5:	28	%
Impact energy	KV :	> 50	J (+20 °C)
		> 40	J (-140 ° C)

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	250	30-50	3	12	11.2
2.5	300	50-85	3.5	14	18.9
3.25	350	70-125	4	16	35
4	350	110-165	4.5	18	56.8
5	350	160-230	4.5	18	82.3

* approximate data

Classification:
EN 1600: E 22 9 32 NL 32
DIN 8556 : -
AWS A 5.4 E 2209 L -17
W.Nr.: 1.4462

INOX R 22/9/3 LN

Description and application:

Rutile-basic coated electrode for the welding ferritic-austenitic duplex steels. Mainly used in off-shore engineering and in the chemical industry. The weld metal has excellent resistance to stress corrosion cracking due to its high ferritic content and good resistance to pitting.

Base materials:

Ferritic-austenitic duplex steels:
W.Nr.: 1.4462 (X 2 CrNiMoN 22 5)
1.4462 with 1.4583 (X 10 CrNiMoNb 18 12
1.4462 with HI/HII, StE 255, 17 Mn 4, StE 355, 15 Mo 3

Coating type:
Rutile-basic

Welding current:
AC
DC +/-

Welding positions:

Redrying temperature:
300°C /2h

Ferrite content: FN ≈ 35

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo	N
≤ 0.03	≤ 0.9	0.8	23	9	3.2	0.17

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 540	MPa(N/mm^2)
Tensile strength	Rm:	> 680 – 890	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47 J	(+20 °C)

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	250	50-85	3.5	14	18.9
3.25	350	70-125	4	16	35
4	350	110-165	4.5	18	56.8
5	350	160-230	4.5	18	82.3

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 1600: ≈E 20 10 3 R 12
DIN 8556: ≈E 20 10 3 LR 23
AWS A 5.4: E 308MoL -17
ISO 3581: ≈E 20.10.3 LR
W. Nr.: 1.4431

INOX R 20/10/3L

Description and application:
Rutile low carbon electrode for welding mild and low alloyed steels to stainless or austenitic manganese steels, it is also suitable for stainless cladding. Weld material has corrosion resistance to acids and salt water

Base materials:
Austenitic manganese steels
Joining mild or low alloyed steels to austenitic or austenitic manganese steels
Cladding on carbon steels and manganese steels

Heat treatment:

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
250°C /2h

Ferrite content: FN ≈13-19

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
≤0.03	<0.9	0.8	20	10	2.8

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	> 620	MPa(N/mm^2)
Elongation	A5:	> 25	%
Impact energy	KV :	> 55	J (+20 °C)

Welding and packing data:

	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
Approvals:	2	250	30-50	3	12	11.2
	2.5	300	50-85	3.5	14	18.9
	3.25	350	70-125	4	16	35
	4	350	110-165	4.5	18	56.8
	5	350	160-230	4.5	18	82.3

- approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 20 25 5 Cu NL R 23
DIN 8556:	E 20 25 5 L Cu R
AWS A 5.4:	E 385 -17
ISO 3581:	E 20.25.5 L Cu R
W.Nr.:	≈ 1.4549

INOX R 20/25 L

Description and application:

Rutile electrode for welding austenitic steels. The weld metal has very low carbon content and copper addition. Electrode has very good welding properties, weld metal has excellent corrosion resistance toward acids and good pitting resistance in neutral chloride solutions.

Base materials:

X 1 NiCrMoCu 25 20	W.- Nr. 1.4539
G-X 7 NiCrMoCuNb 25 20	1.4500
X 4 NiCrMoCuNb 20 18 2	1.4505
X 5 NiCrMoCuTi 20 18	1.4506
G-X 2 NiCrMoCuN 25 20	1.4536
X 2 Cr Ni Mo Cu 25 20 6	1.4529

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
250°C /2h

Ferrite content: FN ≈ 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Cu	Mo	N
≤0.03	0.9	1.5	20.5	25	1.5	4.5	+

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	510 - 680	MPa(N/mm^2)
Elongation	A5:	> 25	%
Impact energy	KV :	65	J (+20 °C)
		50	J (-140 ° C)

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	30-50	3	12	11.2
2.5	300	50-85	3.5	14	19
3.25	350	70-125	4	16	35
4	350	110-165	4.5	18	56
5	350	160-230	4.5	18	82.3

* approximate data

Notes:

elektrode jesenice d.o.o.

HIGH ALLOYED HEAT RESISTANT STAINLESS STEEL ELECTRODES

INOX R 25/4 Fe I1

INOX R 25/14 NC I2

INOX R 25/14/3 NC I3

INOX R 25/20 ..... I4

INOX B 25/20 ..... I5

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 25 4 R 43
DIN 8556 :	E 25.4 MPR 33 160
AISI:	446
ISO 3581:	E 25.4 R 160 33 X
W.Nr.:	≈ 1.4820

INOX R 25/4 Fe

Description and application:

Rutile ferritic-austenitic flux-alloyed electrode for welding heat and corrosion resistant stainless steels up to 1100 °C. Resistant to S-content atmosphere. Preheating and interpass temperatures 200 - 400°C, depending on the relevant base metal and material thickness.

Base materials:

Ferit.-aust. and Ferit.-pearl.steel	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 20 CrNiSi 25.4	1.4821	327
	X 10CrAl7	1.4713	
	X 10CrAl13	1.4724	405
	X 10CrAl18	1.4742	
	X 10CrAl24	1.4762	442/446
Alloyed steel castings:	G-X30CrSi6	1.4710	
	G-X40CrSi17	1.4740	
	G-X40CrNiSi27.4	1.4823	A 297 HC

Coating type:

Rutile

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.10	0.8	1.0	25	5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490	MPa(N/mm^2)
Tensile strength	Rm:	650 – 750	MPa(N/mm^2)
Elongation	A5:	> 15	%
Impact energy	KV :	-	

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
	2.5	300	70-110	3.5	14	20.4
	3.25	350	110-160	4	16	40
	4	450	150-200	5.2	26	75

* approximate data

Classification:

EN 1600:	E 23 12 LR 12
DIN 8556 :	E 23.12 LR 26
AWS A-5.4:	E 309L-17
ISO 3581:	E 23.12 LR 26
W.Nr.:	1.4332

elektrode jesenice d.o.o.

INOX R 25/14 NC

Description and application:

Rutile, low carbon electrode for welding analogous, heat resistant steels and steel castings. Scaling resistant up to 1000°C. Suitable for joining dissimilar steels (unalloyed steels with stainless steels), welding steam boiler construction, hardening plants, the crude oil industry and the ceramics industry.

Base materials:

		W.Nr.:	AISI/ASTM:
Austenitic, ferritic-pearl. steels	DIN:		
Chemical corr.resistant steel:	X 15 CrNiSi 20 12	1.4828	309
	X 7 CrNi 23 14	1.4833	
	X 10 CrAl 7	1.4713	-
	X 10 CrAl 13	1.4724	405
	X 10 CrAl 18	1.4742	-
Alloyed steel castings:	G-X 30 CrSi 6	1.4710	-
	G-X 40 CrSi 17	1.4740	-
	G-X 40CrNiSi 22 9	1.4826	-

Heat treatment:

Preheating and interpass temperatures for ferritic steels 200 - 300°C.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 15

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
≤ 0.04	≤ 0.9	0.7	23	13

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	> 550 – 650	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 47 J (+20°C)	

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	250	40 – 55	3.5	14	
2.5	300	40 – 80	4	16	17.7
3.25	350	70 – 100	4.5	18	35.7
4	350	110 – 160	4.5	18	54.9
5	350	160 - 230	4.5	18	84.9

* approximate data

Classification:

EN 1600:	E 23 12 2 LR 12
DIN 8556 :	E 23.13.2 LR 26
AWS A-5.4:	E 309MoL-17
ISO 3581:	E 23.13.2 LR 26
W.Nr.:	1.4459

elektrode jesenice d.o.o.

INOX R 25/14/3 NC

Description and application:

Austenitic-ferritic rutile, low carbon electrode for welding corrosion and heat resistant stainless steels and steel castings up to 1150°C. Suitable for joining dissimilar steels.

Base materials:

- High-strength, unalloyed and alloyed constructional steels and heat treatable steels among themselves or among each other.
- Unalloyed and alloyed boiler steels or constructional steels with highly alloyed chromium, CrNi and CrNiMo steels.
- Combination between ferritic and austenitic steels for steam boiler and pressure vessel constructions.
- Weld claddings: for the first layer of corrosion resistant weld claddings on HI, HII,StE 255, 17Mn4, StE 355-StE500
- For the first layer of corrosion resistant weld claddings on high.temperature, heat treated, fine-grained constructional steels.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 20

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
≤ 0.04	0.8	0.6	23	13	3

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490	MPa(N/mm^2)
Tensile strength	Rm:	> 670 – 810	MPa(N/mm^2)
Elongation	A5:	> 25	%
Impact energy	KV :	> 47 J (+20°C)	

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	250	40 – 55	3.5	14	
2.5	300	40 – 80	4	16	17.7
3.25	350	70 – 100	4.5	18	35.7
4	350	110 – 160	4.5	18	54.9
5	350	160 - 230	4.5	18	84.9

* approximate data

Approvals:

BV: UP
DNV: 309 Mo
TÜV
SŽ
CR

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 25 20 R 12
DIN 8556 :	E 25 20 R 26
AWS A-5.4:	E 310-16
ISO 3581:	E 25.20 R 26
W.Nr.:	1.4842

INOX R 25/20

Description and application:

Rutile coated, austenitic electrode for welding 309 and 310-type stainless steels. Scaling resistant up to 1200°C.

Base materials:

Aust. and Ferrit.-pearl. steels DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel: X 15 CrNiSi25.20	1.4841	310/314
X 12CrNi25.21	1.4845	310S
X 15CrNiSi20.12	1.4828	309
X 10CrAl7, X 10CrAl13	1.4713, 1.4724	-, 405
X 10CrAl18, X 10CrAl24	1.4742, 1.4762	-, 442/446
Alloyed steel castings: G-X30CrSi6,G-40CrSi17	1.4710, 1.4740	
G-X15CrNiSi25.20	1.4741	A 297 HF
G-X40CrNiSi25.12	1.4837	
G-X40CrNiSI22.9	1.4826	

Heat treatment:

Preheating and interpass temperatures for ferritic steels 200 - 300°C, depending on the relevant base metal and material thickness. The temperature range between 650 and 900°C should be avoided owing to the risk of embrittlement. Thick-walled weldments to be carried out by means of the basic electrode INOX B 25/20.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.11	0.5	2	25	20

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 300	MPa(N/mm^2)
Tensile strength	Rm:	> 540 – 640	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 50 J	(+20°C)

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	35 – 50	3.5	14	
2.5	300	65 – 80	4	16	17.1
3.25	350	90 – 120	4.5	18	34.6
4	350	115 – 150	4.5	18	51.7
5	350	160 – 210	4.5	18	

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 25 20 B 42
DIN 8556 :	E 25 20 B 20+
AWS A-5.4:	E 310-15
ISO 3581:	E 25.20 B 20+
W.Nr.:	1.4842

INOX B 25/20

Description and application:

Basic coated, austenitic electrode for welding 309 and 310-type stainless steels. Scaling resistant up to 1200°C. Cryogenic resistance down to -196°C.

Base materials:

(Aust. and Ferit.-pearl. steel)	DIN:	W.Nr.:	AISI/ASTM:
Chemical corr.resistant steel:	X 15 CrNiSi25.20	1.4841	310/314
	X 12CrNi25.21	1.4845	310S
	X 15CrNiSi20.12	1.4828	309
	X 10CrAl7, X 10CrAl13	1.4713, 1.4724	-, 405
	X 10CrAl18, X 10CrAl24	1.4742, 1.4762	-, 442/446
Alloyed steel castings:	G-X30CrSi6,G-40CrSi17	1.4710, 1.4740	
	G-X15CrNiSi25.20	1.4741	A 297 HF
	G-X40CrNiSi25.12	1.4837	
	G-X40CrNiSI22.9	1.4826	

Heat treatment:

Preheating and interpass temperatures for ferritic steels 200 - 300°C, depending on the relevant base metal and material thickness. The temperature range between 650 and 900°C should be avoided owing to the risk of embrittlement.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.10	0.2	2	25	20

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 300	MPa(N/mm^2)
Tensile strength	Rm:	> 540 – 640	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	Av :	> 70 J	(+20°C)

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2	300	35 – 45	3.5	14	11.8
2.5	300	65 – 80	4	16	16.8
3.25	350	90 – 120	4.5	18	33.3
4	350	115 – 150	4.5	18	50.0
5	350	160 – 210	4.5	18	83.3

* approximate data

INOX R 22/12/3 Fe J1

INOX B 18/8/6 ..... J2

INOX R 18/8/6 Fe J3

INOX R 18/8/6 ..... J4

INOX R 29/9 ..... J5

INOX R 29/9 Fe J6

INOX B 70/15 ..... J7

Classification:
EN 1600: -
DIN 8556 : -
AWS A-5.4: E 309 Mo-16
ISO 3581: E 23.12.2 R 160 33X

INOX R 22/12/3 Fe

Description and application:

Austenitic-ferritic rutile flux-alloyed electrode for joint welding corrosion and heat resistant steels and steel castings. Suitable for joining dissimilar steels, also as a buffer layer on stainless clads on unalloyed steels.

Base materials:

Austen. and Ferrit.-pearl.steels	DIN	W.Nr.:	AISI/ASTM:
Chemical corr.resistant st.:	X 15 CrNiSi 20 12	1.4828	309
	X 10CrAL 7	1.4713	
	X 10CrAl 13	1.4724	405
	X 10CrAl 18	1.4742	
Alloyed steel castings:	G-X 40 CrNiSi 22 9	1.4826	
	G-X 30 CrSi 6	1.4710	
	G-X 40 CrSi 17	1.4740	

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Metal recovery: cca.160 %

Ferrite content: FN ≈ 25

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0.05	0.8	0.8	23	13	2,8

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	> 570 – 670	MPa(N/mm^2)
Elongation	A5:	> 25	%
Impact energy	KV :	> 40 J	(+20°C)

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
DNV : 309Mo	1.6	250	40 – 55	3.5	17.5	8.6
ABS: 309Mo-16	2	300	55 – 80	4	16	16
SŽ	2.5	300	70 – 110	4	16	26
BV	3.25	350	110 – 165	4.5	18	50.6
	4	450	150 – 225	5.2	26	96.3
	4	350	150 – 225	4.5		
	5	450	190 - 290	5.2	26	162.5

* approximate data

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Classification:

EN 1600:	E 18 8 Mn B 22
DIN 8556 :	E 18 8 Mn B 20+
AWS A-5.4:	≈E 307-15
ISO 3581:	E 18.8 Mn B 20+
W.Nr.:	1.4370

INOX B 18/8/6

Description and application:

Basic coated, austenitic electrode for welding low and high alloyed steels. Scaling resistant up to 800°C and low-temperature toughness down to -100°C. Preheating and postweld heat treatment as required by the base metal.

Base materials:

- Wear resistant steels – high carbon content
- High strength unalloyed and alloyed constructional steels + SS
- High manganese steels
- Unalloyed and alloyed boiler grade steels or constructional steels with highly alloyed Cr and CrNi steels.
- Interpass for hardfacing and repair of cavitation foults

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.12	0.8	7	19	9

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 350	MPa(N/mm^2)
Tensile strength	Rm:	> 590 – 690	MPa(N/mm^2)
Elongation	A5:	> 40	%
Impact energy	KV :	> 80 J	(+20°C)

Welding and packing data:

	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
Approvals:						
SŽ	2	250	45 – 65	3.5	14	
	2.5	300	65 – 70	3.5	14	15.7
	3.25	350	90 – 120	4.5	18	29.3
	4	350	115 – 150	4.5	18	43.3
	5	450	160 – 210	6	30	68.7

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 18 8 Mn R 53
DIN 8556 :	E 18 8 Mn MPR 33 160
AWS A-5.4:	≈ E 307-16
ISO 3581:	E 18.8 Mn R 160 33X
W. Nr.:	1.4370

INOX R 18/8/6 Fe

Description and application:

Austenitic rutile, flux-alloyed, high-efficiency electrode for joining dissimilar steels, for welding corrosion resistant steels and steels that are not readily weldable. This electrode yields tough between-layers in hardsurfacing operations. The weld metal has strain hardenability, cracking resistance, cavitation resistance, thermal shock resistance, scaling resistance up to 800°C and low temperature toughness down to -100°C.

Base materials:

- High carbon steels
- High strength alloyed and alloyed heat treatable steels
- High Manganese steels
- Constructional steels and ferritic, austenitic steels
- Repair for cavitation foults
- Interpass for hardfacing

Heat treatment:

Preheating and postweld heat treatment as required by the base metal.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300ºC / 2h

Metal recovery: cca.160 %

Ferrite content: 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.08	< 1.2	7	19	9

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 350	MPa(N/mm^2)
Tensile strength	Rm:	> 590 – 690	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 50 J	(+20°C)
		> 32 J	(-10°C)

Welding and packing data:

Approvals:

TÜV
DB

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
2	250/300	55 – 80	3.5 / 4	14 / 16	
2.5	250/300	70 – 110	3.5 / 4	14 / 16	20.7/24.2
3.25	350	110 – 165	4.5	18	49.5
4	350	150 – 200	4.5	18	71.4
5	350	190 - 290	4.5	18	115.4

* approximate data

Classification:

EN 1600:	E 18 8 Mn R 12
DIN 8556 :	E 18 8 Mn R 26
AWS A-5.4:	E 307-16
ISO 3581:	E 18 8 Mn R
W.Nr.:	1.4370

elektrode jesenice d.o.o.

INOX R 18/8/6

Description and application:

Austenitic rutile- basic, electrode for joining dissimilar steels, for welding corrosion resistant steels and steels that are not readily weldable. This electrode yields tough between-layers in hard -surfacing operations. The weld metal has strain harden-ability, cracking resistance, cavitation resistance, thermal shock resistance, scaling resistance up to 800°C and low temperature toughness down to -100°C.

Base materials:

- High carbon steels
- High strength alloyed and alloyed heat treatable steels
- High Manganese steels
- Constructional steels and ferritic, austenitic steels
- Repair for cavitation foults
- Interpass for hardfacing

Heat treatment:

Preheating and post-weld heat treatment as required by the base metal.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.1	< 1.2	5	18	8.5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 350	MPa(N/mm^2)
Tensile strength	Rm:	590 - 690	MPa(N/mm^2)
Elongation	A5:	> 25	%
Impact energy	KV :	> 60 J	(+20°C)

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
2	250	30-50	3.5	14	
2.5	300	50 – 85	4	16	18.1
3.25	350	70-125	4.5	18	35.4
4	350	110-165	4.5	18	53.6
5	350	165-230	4.5	18	81.8

* approximate data

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Classification:

EN 1600:	E 29 9 R 12
DIN 8556 :	E 29 9 R 26
AWS A-5.4:	E 312-17
ISO 3581:	E 29.9 R 26
W.Nr.:	1.4337

INOX R 29/9

Description and application:

Rutile, austenitic ferritic electrode for welding dissimilar and »difficult to weld« steels. Suitable for interpass hardfacing. Because of high mechanical strength and starain hardenability suitable for wear resistant buildups on gear wheels, shafts,… The weld metals has excellent cavitation and cracking resistance.

Base materials:

- Hardwelding steels
- High-strength unalloyed and alloyed steels
- Structural, spring, tool and heat treatable steels
- High manganese steels

Heat treatment:

Preheating and postweld heat treatment as required by the base metal.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Ferrite content: FN ≈ 40

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.11	≤ 0.9	0.9	29	9

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 500	MPa(N/mm^2)
Tensile strength	Rm:	> 740 – 840	MPa(N/mm^2)
Elongation	A5:	> 20	%
Hardness	cca.235 HB	as welded	

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
SŽ	2	250	50 – 60	4	14	9,9
	2.5	300	55 – 85	4	16	16.4
	3.25	350	80 – 120	4.5	18	32.8
	4	350	110 – 150	4.5	18	48.9
	5	350	160 – 200	4.5	18	72.3

* approximate data

elektrode jesenice d.o.o.

Classification:

EN 1600:	E 29 9 R 12
DIN 8556 :	E 29 9 R - 26
AWS A-5.4:	E 312-26
W. Nr.:	1.4337

INOX R 29/9 Fe

Description and application:

Rutile sintetic austenitic ferritic electrode with high recovery (160%) for welding dissimilar and »difficult to weld« steels. Suitable for interpass hardfacing. Because of high mechanical strength and starain hardenability suitable for wear resistant buildups on gear wheels, shafts,… The weld metals has excellent cavitation and cracking resistance.

Base materials:

- Hardwelding steels
- High-strength unalloyed and alloyed steels
- Structural, spring, tool and heat treatable steels
- High manganese steels

Heat treatment:

Preheating and postweld heat treatment as required by the base metal.

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Metal recovery: cca.160%

Ferrite content: FN ≈ 40

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni
0.15	≤ 0.9	1	29	9

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 500	MPa(N/mm^2)
Tensile strength	Rm:	> 740 – 840	MPa(N/mm^2)
Elongation	A_5:	> 20	%
Hardness	cca.235 HB	as welded	

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
1.6	250	40 – 55	3.5	17.5	8.6
2	300	55 – 80	4	16	16
2.5	300	70 – 110	4	16	26
3.25	350	110 – 165	4.5	18	50.6
4	450	150 – 225	5.2	26	96.3
4	350	150 – 225	4.5		
5	450	190 - 290	5.2	26	162.5

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 1736 : EL NiCr15FeMn
AWS A-5.11: E NiCrFe-3
ISO
W.Nr.: ≈2.4620

INOX B 70/15

Description and application:

Special basic coated Ni-base core wire electrode for welding in low-temperatury industry and in atomic industry. Suited for service temperatures for –196°C to 600°C, otherwise up to scaling resistance temperature of 1200°C (S-free atmosphere). Thermal shock resistant to fully austenitic steels, highly resistant to hot cracking and corrosion resistant at high temperautes.
Preheating as required by the base metal, interpass temperatures 125 - 150°C.

Base materials:

- Unalloyed and alloyed, high-temperature, creep resisting, low-temperature steels to X 8 Ni 9
- High-alloyed Cr and CrNi steels, particularly for joint welding of dissimilarly alloyed materials, Ni and Ni-alloys and nickel-steel combinations.
- Joint welding cooper with stainless steel.

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
250 - 300ºC / 1-2h

Ferrite content: FN ≈ 0

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Nb	Fe	Ni
0.06	0.5	6.5	15	2	7	Rest

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 390	MPa(N/mm^2)
Tensile strength	Rm:	> 620 – 720	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 60 J	(-196°C)
Hardness:	≅ 170 HB		

Welding and packing data:

Approvals:

/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	75 – 100	3.5	14	22.9
3.25	350	100 – 140	4.5	18	43.4
4	350	140 – 180	4.5	18	69.8
5	350	170 – 210	5.5	22	88

* approximate data

UTOP 38 ..... K1

UTOP 55 ..... K2

TOOLDUR K3

E DUR 250 ..... K4

E DUR 300 ..... K5

E DUR 400 ..... K6

E DUR 500 ..... K7

E DUR 600 ..... K8

E DUR 60R K9

E DUR 600Si K10

TOOLDUR Co K11

E DUR 13 Cr K12

Classification:
EN 14 700: E Fe 3
DIN 8555: E 3-UM-40 T
AWS :

UTOP 38

Description and application:

Basic Mo, Cr, V flux-alloyed electrode with high toughness, wear , heavy impact resistance and easy machinable weld metal.
It is suitable for hardfacing cold and hot working tools, for correction of cavities, like die blocks, dies and containers for metal tube and rod extrusion tools for manufacture of hollow bodies, screws, nuts, rivers and bolts, pressure die casting dies, die insert, …

Base materials:

Alloyed tool steels

Heat treatment:

Coating type:

Basic

Welding current:

DC +

Welding positions:

Redrying temperature:

400ºC / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mo	V	W
0.13	5.0	4.3	0.2	+

Mechanical properties:

Hardness:
Welded: 36-42 HRC (typical: 37 HRC)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton Kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	17.3
3.25	350	110-135	4.4	22	34.6
4	450	130-170	5.4	27	72
5	450	180-220	5.4	27	110.2

* approximate data

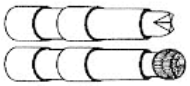
elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 4
DIN 8555: E 6-UM-60 T
AWS :

UTOP 55

Description and application:
Basic Mo, Cr, V flux-alloyed electrode with high toughness, wear and heavy impact resistance. The weld metal can be treated with grinding and cut after soft annealing.
It is suitable for hardfacing cold and hot working tools, like die blocks, dies and containers for metal tube and rod extrusion, tools for manufacture of hollow bodies, screws, nuts, rivers and bolts, pressure die casting dies, die insert, hot shear blades…

Base materials:



Alloyed tool steels

Heat treatment:

Coating type:
Basic

Welding current:

DC +

Welding positions:

Redrying temperature:
400°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mo	V	W
0.4	5.0	4.8	0.6	+

Mechanical properties:

Hardness:
Welded: 55-60 HRC (typical: 57 HRC)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	70-90	4	20	17.1
3.25	350	110-135	4.4	22	35.2
4	450	130-170	5.4	27	66.7
5	450	180-220	5.4	27	135

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 4
DIN 8555: E 4-UM-60 –65 S
AWS A 5.13: E Fe5-B

TOOLDUR

Description and application:
Basic Mo, Cr, W,V flux-alloyed electrode for building up new and resurfacing warn parts of tools and machines also at high temperatures.
It is suitable for building up and repairing tools of high speed steel, for resurfacing beads, shears, knives…
The weld metal can be treated with grinding and cut after soft annealing.

Base materials:


Alloyed tool steels
High speed Mo steels

Heat treatment:
The ground material should be preheated to 600-700°C
Hardening: 1180-1240°C (air)
Stress relief: 510-540°C/ 2X1h (air)
Soft annealing: 820-850°C/2-4h (furnace)

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:


Redrying temperature:
300°C / 2h

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	W	V
0.7	0.5	0.5	4.4	7.0	1.2	0.9

Mechanical properties:

Hardness:
Welded: 50-64 HRC (typical: 61 HRC)
Hardened: 62-66 HRC
Soft annealed: 25-30 HRC

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	70-100	4	20	20.8
3.25	350	100-150	4	20	35.7
4	350	130-185	5.4	27	53.5

* approximate data

:

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 3
DIN 8555: E 1-UM-250
AWS :

E DUR 250

Description and application:

Basic, Cr flux-alloyed electrode for surfacing applications where medium hardness is required. It gives wear and heavy impact resistant weld metal, suitable for machine parts exposed to wear, cog wheels, tracks etc…
The deposit can not be hardened.

Base materials:

Steels
Cast steels

Heat treatment:

Coating type:

Basic

Welding current:

DC +

Welding positions:

Redrying temperature:

400°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mn
0.13	1.3	1.3

Mechanical properties:

Hardness: 230-300 HB (typical: 270 HB)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	18.5
3.25	350	100-135	4	20	34.8
4	450	130-170	5.4	27	74
5	450	180-220	5.4	27	112.5
6	450	230-270	5.4	27	158.8

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700 : E Fe 1
DIN 8555: E 1-UM-300
AWS :

E DUR 300

Description and application:

Basic, Cr flux-alloyed electrode for surfacing applications where medium hardness is required. It gives wear and heavy impact resistant weld metal, suitable for machine parts exposed to wear, cog wheels, tracks etc…

Base materials:

Steels
Cast steels

Heat treatment:

Coating type:

Basic

Welding current:

DC +

Welding positions:

Redrying temperature:

400°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mn
0.18	1.2	1.5

Mechanical properties:

Hardness: 280-350 HB (typical: 320 HB)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	16.5
3.25	350	100-135	4	20	32.5
4	450	130-170	5	25	58.1
5	450	180-220	5.4	27	100
6	450	230-270	5.4	27	142

* approximate data

elektrode jesenice d.o.o.

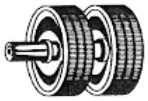
Classification:
EN 14 700 : E Fe 3
DIN 8555: E 1-UM-400
AWS :

E DUR 400

Description and application:

Basic, Cr-Mn flux-alloyed electrode for surfacing applications. It gives wear and heavy impact resistant weld metal, suitable for machine parts exposed to wear, machines for structural engineering, cog wheels, chain wheels, tracks etc…

Base materials:



Steels
Cast steels

Heat treatment:

Coating type:

Basic

Welding current:

DC +

Welding positions:

Redrying temperature:

400°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mn
0.25	1.3	1.7

Mechanical properties:

Hardness: 350-450 HB (typical: 390 HB)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	18
3.25	350	100-135	4	20	36
4	450	130-170	5.4	27	68.4
5	450	180-220	5.4	27	108
6	450	230-270	5.4	27	154.3

* approximate data

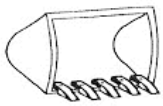
elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 3
DIN 8555: E 1-UM-50
AWS:

E DUR 500

Description and application:
Basic coated electrode for very hard buildups on excavator components such as bucket edges, chain links, cutting tools, dies, etc.

Base materials:



Steels
Cast steels

Coating type:
Basic

Welding current:
DC +

Welding positions:

Redrying temperature:
400°C / 1 h

Typical all weld metal properties:

Chemical composition, wt %:

C	Mn	Cr
0.4	2.0	2.3

Mechanical properties:

Hardness: 47 - 52 HRC (tipical: 51 HRC)

Interpass temperature for the weld metal approx.350°C.
The hardness of the deposit is greatly influenced by the degree of dilution with the base metal (depending on the relevant welding condition) and by its chemical composition. The influences of these factors decreases as the number of layers gets higher.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70 – 90	4	20	18
3.25	350	100 – 135	4	20	36
4	450	130 – 170	5.4	27	68.4
5	450	180 – 220	5.4	27	108
6	450	230 – 270	5.4	27	154.3

* approximate data

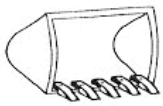
elektrode jesenice d.o.o.

Classification:
EN 14 700 : E Fe 8
DIN 8555: E 6-UM-60
AWS :

E DUR 600

Description and application:
Electrode is used for surfacing of steel parts when heavy impact resistance is needed. Welding material posses higher abrasion resistance.
Suitable for surfacing parts exposed to heavy abrasive wear by stone, coal, sand etc…
The weld metal can be treated with grinding and cut after soft annealing.

Base materials:



Steels
Cast steels

Heat treatment:

Coating type:
Basic

Welding current:

DC +

Welding positions:

Redrying temperature:
400°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr
0.5	8.5

Mechanical properties:

Hardness: 57-62 HRC (typical: 59 HRC)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

SŽ

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	18
3.25	350	100-135	4	20	36
4	450	140-180	5.4	27	68.4
5	450	180-230	5.4	27	108
6	450	240-280	5.4	27	154.3

* approximate data

elektrode jesenice d.o.o.

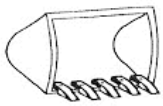
Classification:
EN 14 700: E Fe 8
DIN 8555: E 6-UM-55

E DUR 60 R

Description and application:

Rutile electrode is used for surfacing of steel parts when heavy impact resistance is needed. Welding material posses higher abrasion resistance.
Suitable for surfacing parts exposed to heavy abrasive wear by stone, coal, sand etc…
The weld metal can be treated with grinding and cut after soft annealing.

Base materials:



Steels
Cast steels

Coating type:

Rutile

Welding current:

DC + (DC -)
AC

Welding positions:

Redrying temperature:

350°C / 1h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0.5	0.5	0.5	5	1

Mechanical properties:

Hardness: 55- 60 HRC (typical: 60 HRC)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	18
3.25	350	100-135	4	20	36
4	450	140-180	5.4	27	68.4
5	450	180-230	5.4	27	108
6	450	240-280	5.4	27	154.3

* approximate data

elektrode jesenice d.o.o.

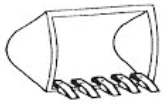
Classification:
EN 14 700: E Fe 8
DIN 8555: E 6-UM-55
AWS :

E DUR 600Si

Description and application:

Basic Cr and Si alloyed electrode is used for surfacing of steel parts when heavy impact resistance is needed.
Welding material posses higher abrasion resistance.
Suitable for surfacing parts exposed to heavy abrasive wear by stone, coal, sand etc…
The weld metal can be treated with grinding and cut after soft annealing.

Base materials:



Steels
Cast steels

Coating type:

Basic

Welding current:

DC +

Welding positions:

Redrying temperature:

350°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr
0.5	3	0,5	8

Mechanical properties:

Hardness: 55-59 HRC (typical: 58 HRC)
Wear coeff.: 0,8%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	18
3.25	350	100-135	4	20	36
4	450	140-180	5.4	27	68.4
5	450	180-230	5.4	27	108
6	450	240-280	5.4	27	154.3

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 3
DIN 8555: ~ E 3-UM-50CTZ
AWS :

TOOLDUR Co

Description and application:

Special electrode with Co, for hot wear resistant surfacing on hot working tools, where high temperature change and stress are present, as: cast tools, trimming tools, extrusion press tools, hot flow presses for steels, hot shearing- machines.. Optimal operating temperatures are till 650ºC, resistant to scaling to 900ºC, weld metal is nitratable. The weld metal is machinable. When surfacing low alloy steel, 3-4 layers are required.

Base materials:

Low alloyed steels
Alloyed tool steels
High temperature steels and cast steels

Heat treatment:

Preheating: 150-400ºC according to weld.
Hardening: 1100-1150ºC (air)
Soft- annealing: 850-900ºC
Tempering: 700ºC

Coating type:

Rutile-basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300ºC / 2h

Metal recovery:

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo	Co	Fe
0,2	0,5	0,2	9	1	4,5	12,5	rest

Mechanical properties:

Hardness: untreated 48-52 HRC
Hardened 48-52 HRC
Soft-annealed about 34HRC
Tempered 38-42 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
2.5	350	70-100	4	20	20,8
3.25	350	100-150	4	20	35,7
4	350	160-185	5,4	27	53,5

* approximate data

:

elektrode jesenice d.o.o.

Classification:
EN 14 700 : E Fe 8
DIN 8555: E 5-UM-CGP
AWS :

E DUR Cr 13

Description and application:

Electrode is used for surfacing of steel parts when heavy impact and moderate wear and corrosion resistance up to 400°C is needed. Suitable for surfacing parts of press tools, mixer arms, valve seats, feed gears, cutting edges, knives, track rollers... The weld metal is martensitic and can be treated with grinding, it can be shaped with hard metal cutting tool immediately after welding, before weld metal has cooled down to 200°C.

Steels
Cast steels
Alloyed tool steels

Heat treatment:

Preheat and inter-pass temperature at least 200°C, soft annealing 820°C, hardening 950-1000°C with cooling in compressed air or oil.

Coating type:
Basic

Welding current:

DC +

Welding positions:

Redrying temperature:
350°C / 1h

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr
0.3	0,5	0,8	13

Mechanical properties:

Hardness: 49-56 HRC

The hardness of the deposit depending on the relevant welding condition and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-90	4	20	
3.25	350	90-120	4,4	22	37,6
4	450	110-160	5.4	27	73
5	450	150- 190	5.4	27	106

* approximate data

Notes:

ABRADUR 54 ..... **L1**

ABRADUR 58 ..... **L2**

ABRADUR 60 ..... **L3**

ABRADUR 64 ..... **L4**

ABRADUR 65 ..... **L5**

ABRADUR 66 ..... **L6**

CrWC 600 ..... **L7**

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 8
DIN 8555: ≈E 6-UM-55-G
AWS :

ABRADUR 54

Description and application:

Electrode is used when hard deposits with excellent abrasion at high compressive stresses , heavy impact and high metal to metal wear resistance is needed.
It is suitable for hardfacing crusher hammers, mixers, crushers, dredging parts, gears, ploughshares, cams.. .
Weld metal is very difficult machinable.

Base materials:

Austenitic manganese steels
Steels

Heat treatment:

Preheating is not required.

Coating type:

Basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300ºC / 2h

Metal recovery:

110%

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Cr
0.5	1.7	9.5

Mechanical properties:

Hardness: 52-56 HRC typical: 55 HRC (20°C)
30 HRC (500°C)

Wear coeff.: 70%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
3.25	350	80-150	4	20	40.3
4	450	125-190	5.4	27	77
5	450	180-255	5	25	119
6	450	250-320			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 14
DIN 8555: ~ E 10-UM-60-GR
AWS :

ABRADUR 58

Description and application:

Electrode produces hard deposits extremely resistant to abrasive and moderate impact.
It is suitable for hardfacing crushing and earthmoving equipment, soft ore crushers, conveyor screws, bucket teeth and lips.
Welding of buffer layers with Inox B 18/8/6 or Mn17Cr13 electrodes is recommended.
The weld metal can be treated with grinding.

Base materials:

Austenitic manganese steels

Heat treatment:

Preheating is not required.

Coating type:

Rutile

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300°C / 2h

Metal recovery:

180%

Typical weld metal properties:

Chemical composition, wt %:

C	Cr
3.2	32

Mechanical properties:

Hardness: 57-62 HRC typical: 59 HRC (20°C)

Wear coeff.: 2%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
2.5	350	65-95	4.5	22.5	33
3.25	350	110-140	4.5	22.5	55.6
4	450	160-200	5	25	111
5	450	210-270	5	25	172.5

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 14
DIN 8555: E 10-UM-60-GR
AWS :

ABRADUR 60

Description and application:

Rutile-coated chromium carbide electrode produces hard deposits extremely resistant to abrasive and moderate impact. It is suitable for hardfacing crushing and earthmoving equipment, soft ore crushers, conveyor
screws, bucket teeth and lips.
Welding of buffer layers with Inox 18/8/6 or Mn17Cr13 electrodes is recommended.
The weld metal can be treated with grinding.

Base materials:

Austenitic manganese steels

Heat treatment:

Preheating is not required.

Coating type:

Rutile

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300°C / 2h

Metal recovery:

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	V
3.6	32	0,7

Mechanical properties:

Hardness: 59-64 HRC typical: 60 HRC (20°C)

Wear coeff.: ε = 40%
ΔG= 0,9

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
2.5	350	65-95	4.5	22.5	33
3.25	350	110-140	4.5	22.5	55.6
4	450	160-200	5	25	111
5	450	210-270	5	25	172.5

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700 : E Fe 15
DIN 8555: ≈E 10-UM-65-GR
AWS :

ABRADUR 64

Description and application:

Electrode produces hard deposits extremely resistant to abrasive with moderate impact up to 450°C.
It is suitable to hardfacing in the brick and cement making industry, screws of refractory material presses conveyor belt guides, screws, mill blades and scratches, centre risers, excavator cogs...
Welding of buffer layers with Inox B 18/8/6 or EMn17Cr13 electrodes is recommended.
The weld metal can be treated with grinding.

Base materials:

Steel
Cast steel

Heat treatment:

Preheating is not required.

Coating type:

Basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300°C / 2h

Metal recovery:

190%

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Nb
6	26	7.5

Mechanical properties:

Hardness: 62-65 HRC typical: 64 HRC (20°C)

Wear coeff.: 0.5%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
3.25	350	110-140	4	20	55.5
4	450	160-200	4	20	111
5	450	210-270	5	25	172.5

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 16
DIN 8555: ~E 10-UM-65-G
AWS :

ABRADUR 65

Description and application:

Electrode produces hard deposits extremely resistant to abrasive wear against the minerals at medium impact up to 500°C.
It is suitable to hardfacing on earth moving equipment, pump bodies, ploughshares, nut oil presses, conveyor belt guides, mill blades and scratches, clinker mills, centre risers..
Welding of buffer layers with Inox B 18/8/6 or E Mn17Cr13 electrodes is recommended.
The weld metal can be treated with grinding.

Base materials:

Steels
Cast steels

Heat treatment:

Preheating is not required.

Coating type:

Basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300°C / 2h

Metal recovery:

120%

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mo
4.3	9.5	2.0

Mechanical properties:

Hardness: 62-67 HRC typical: 65 HRC (20°C)
Wear coeff.: 2%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	100-130	4.4	22	37.8
4	450	160-190	4.4	22	59
5	450	220-250	4.5	22.5	88

* approximate data

elektrode jesenice d.o.o.

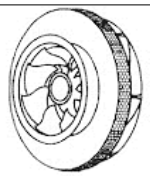
Classification:
EN 14 700: E Fe 16
DIN 8555: ≈E 10-UM-65-GR
AWS :

ABRADUR 66

Description and application:

Electrode produces extremely hard deposits extremely resistant to abrasive wear against the minerals at medium impact up to 600°C.
It is suitable to hardfacing on earth moving equipment, wearing parts in the cement and brick making industry, fire grate bars, fire grate teeth in the iron and steel industry.
Welding of buffer layers with Inox 18/8/6 or EMn17Cr13 electrodes is recommended.
The weld metal can be treated with grinding.

Base materials:



Steels
Cast steels

Heat treatment:

Preheating is not required.

Coating type:

Basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

300°C / 2h

Metal recovery:

235%

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	Mo	Nb	W	V
6.0	22.0	6.0	6.0	2.0	1.0

Mechanical properties:

Hardness: 62-67 HRC typical: 66 HRC (20°C)
50 HRC (600°C)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	100-130	4	20	65.8
4	350	160-190	5.4	26	
4	450	160-190	5.4	27	128
5	450	220-250	5.4	24	200

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 16
DIN 8555: ≈E 10-UM-60-C
AWS :

CrWC 600

Description and application:
Electrode produces extremely hard deposits resistant to abrasive wear against the minerals and other materials. Weld metal is not recommended to shock-loadings.
Welding of buffer layers with INOX B 18/8/6 and combination welding with E DUR 600 is recommended.
It is suitable to weld string beads on earth moving, cement mill and brick making equipment.

Base materials:
Steels
Cast steel
Austenitic manganese steels

Heat treatment:
Preheating is not required.

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:


Redrying temperature:
300°C / 2h

Typical weld metal properties:

Chemical composition, wt %:

C	Cr	W
3.8	28	4.5

Mechanical properties:

Hardness: 57-62 HRC typical: 60 HRC (20°C)

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	100-130	4	20	47.5
4	450	160-190	5.2	26	96.3
5	450	220-250	5.2	26	157.6

* approximate data

elektrode jesenice d.o.o.

MANGANESE ALLOYED HARDFACING ELECTRODES

E Mn 14 ..... M1

E Mn 14 Cr 4 ..... M2

E Mn 17 Cr 13 ..... M3

E Mn 17 Cr 10 Nb 3 ..... M4

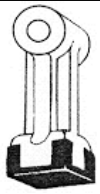
elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 9
DIN 8555: E 7-UM-200-KP
AWS :

E Mn14

Description and application:
Electrode is used for joining and surfacing of steel parts when heavy impact and friction resistance is needed.
After stain hardening higher abrasion resistance is achieved.
Suitable for weld heavy crushing equipment as jaws, cones, armour and mantles of rotary crushers and for rail equipment in Mn 14%steel. It is not suitable for non austenitic steels.
The weld material can be mechanically shaped before hardening.

Base materials:



Austenitic 14% Mn steel

Heat treatment:

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Metal recovery:
110%

Typical weld metal properties:

Chemical composition, wt %:

C	Mn	Mo
1.2	12.5	0.7

Mechanical properties:

Hardness: 175-225 HB typical: 200 HB
48 HRC(stain hardened)

Wear coeff.: 75%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	450	110-135	4	20	46.7
4	450	140-175	5.2	26	72.5
5	450	180-230	5.4	27	111

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 9
DIN 8555: ≈E 7-UM-200-KP
AWS A-5.13: ≈ E Fe Mn-A

E Mn14Cr4

Description and application:

Electrode is used for joining and surfacing of steel parts when heavy impact and friction resistance is needed. It is used for welding buffer –layers when electrodes for depositing a hardfacing alloy with greater abrasion resistance are used . After stain hardening higher abrasion resistance is achieved.
Suitable for weld heavy crushing eguipment as toothed crusher rolls, ore crusher crown wheel, toothed rolls for twin rotor crusher , shovel and dredger buckets, for rail equipment in Mn steel.
The weld material can be mechanically shaped before hardening.

Base materials:

Austenitic 14% Mn steel
Low alloy steels
All hard –to-weld steels

Heat treatment:

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Metal recovery:
120%

Typical weld metal properties:

Chemical composition, wt %:

C	Mn	Cr	Ni	Mo
0.8	13.8	3.7	3.7	0.7

Mechanical properties:

Hardness: 175-225 HB typical: 200 HB
50 HRC (stain hardened)

Wear coeff.: 75%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	450	100-140	4.5	22,5	50.5
4	450	140-180	4.5	22,5	76.9
5	450	180-230	4.5	22,5	121.9

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 9
DIN :
AWS :

E Mn17Cr13

Description and application:

Electrode is used for joining and surfacing of steel parts when heavy impact and cavitation resistance up to 500°C is needed. It is used for welding buffer –layers when Abradur 54, 58, 64, 65 and 66 electrodes are used. Suitable for weld rails, points, building up dredge pumps hydraulic press pistons and crushing equipment subjected to heavy shock.
The weld material can be mechanically shaped before hardening.

Base materials:

Austenitic 14% Mn steel
Low alloy steels
All hard–to-weld steels

Heat treatment:

Coating type:
Rutile

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300ºC / 2h

Metal recovery:
140%

Typical weld metal properties:

Chemical composition, wt %:

C	Mn	Cr
0.6	16.5	13.5

Mechanical properties:

Hardness: 200-260 HB typical: 230 HB
48 HRC (stain hardened)

Wear coeff.: 70%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	450	100-140	5.4	27	64.1
4	450	150-190	5.4	27	96.2
5	450	200-250	5.4	27	135.1

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 14 700: E Fe 9
DIN :
AWS :

E Mn17Cr10Nb3

Description and application:

Electrode is used for surfacing of steel parts exposed to wear metal to metal at heavy impact, increased pressure and temperature up to 500°C. Weld material is extremely resistant toward strikes and moderately toward abrasion.
Suitable for welding hammers, bucket teeth, seat of blast, furnace bells and armour plates.
If the weld material has to be mechanically shaped before hardening, we suggest to use INOX B 18/8/6 or INOX R 18/8/6Fe electrodes for the last welding layer.

Base materials:

Austenitic 14% Mn steel
Carbon steels
Low alloy steels

Heat treatment:

For austenitic Mn steels preheating to 100°C is recommended. No stress relieving is recommended for this type of metal.
For carbon and low alloy steels preheating to 250°C is recommended. When welding thick walled components stress relieving at 550 -- 650°C is suggested, structure and mechanical properties remain the same.

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:

Redrying temperature:
300°C / 2h

Metal recovery:
140%

Typical weld metal properties:

Chemical composition, wt %:

C	Mn	Cr	Nb
1.1	16.5	9.7	2.3

Mechanical properties:

Hardness: 230-300 HB typical: 290 HB
45 HRC (stain hardened)

Wear coeff.: 12%

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	450	100-140	4.5	22,5	42
4	450	150-210	4.5	22,5	91
5	450	190-260	4.5	22,5	142

* approximate data

Notes:

elektrode jesenice d.o.o.

HIGH COBALT ALLOYED ELECTRODES AND RODS - DUROSTELS

DUROSTEL 1 E N1

DUROSTEL 1 P N2

DUROSTEL 6 E N3

DUROSTEL 6 P N4

DUROSTEL 12 E N5

DUROSTEL 12 P N6

DUROSTEL 21 E N7

DUROSTEL 21 P N8

DUROSTEL F P N9

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: E 20-UM-55-ZCT
AWS A-5.13: E CoCr-C

DUROSTEL 1 E

Description and application:

Welding electrode is recommended for hardfacing of material where high wear metal to metal resistance is requested and abrasion resistance at increased temperatures 500- 800°C, sometimes till 1100°C and where good corrosion resistance is required. The weld material is not suitable for pieces exposed to mechanical shocks. The deposit is hardest of all Durostel types.
Suitable to weld hot rolls, hot rolling glides, kneading rolls, drawling blocks, screw presses, hot shear blades, glass cutters, hot scrapers, pump and press casings, burner nozzles…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels

Coating type:

Welding Current:
AC
DC+

Welding positions:

Redrying tempetature:
300°C/2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	W	Co
2.5	30.0	12.5	rest

Mechanical properties:

Hardness : 55 HRC (20°)
37 HRC (500°)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	90-120			
4	350	110-150			
5	350	150-200			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: G/WSG-20-GO-55-ZCT
AWS A-5.13: R CoCr-C

DUROSTEL 1 P

Description and application:

Welding rod is recommended for hardfacing of material where high wear metal to metal resistance is requested and abrasion resistance at increased temperatures 500- 800°C, sometimes till 1100°C and where good corrosion resistance is required. The weld material is not suitable for pieces exposed to mechanical shocks. The deposit is hardest of all Durostel types.
Suitable to weld hot rolls, hot rolling glides, kneading rolls, drawling blocks, screw presses, hot shear blades, glass cutters, hot scrapers, pump and press casings, burner nozzles…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels

Gas welding

TIG welding

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	W	Co
2.5	30.0	12.5	rest

Mechanical properties:

Hardness : 55 HRC (20°)
37 HRC (500°)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: E 20-UM-40 ZCT
AWS A-5.13: E CoCr-A

DUROSTEL 6 E

Description and application:

Welding electrode is recommended for hardfacing of material where high wear metal to metal resistance is requested, erosion, abrasion and cavitation at increased temperatures up to 900°C and where good corrosion resistance is required. Because of excellent tenacity and hardness the weld material is extremely resistant toward thermal and mechanical shocks.
Suitable for welding exhaust valves, hot shear blades, guide rolls, kneading equipment, steam nozzles, mechanical sealings, bushings, blanking dies, press mandrels, trimming dies…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Coating type:

Welding Current:
AC
DC+

Welding positions:

Redrying temperature:
300°C/2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	W	Co
1.2	28.0	4.5	rest

Mechanical properties:

Hardness : 42 HRC (20°)
30HRC (500°)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	90-120			
4	350	110-150			
5	350	150-200			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: G/WSG-20-GO-45-ZCT
AWS A-5.13: R CoCr-A

DUROSTEL 6 P

Description and application:

Welding rod is recommended for hardfacing of material where high wear metal to metal resistance is requested, erosion, abrasion and cavitation at increased temperatures up to 900°C and where good corrosion resistance is required. Because of excellent tenacity and hardness the weld material is extremely resistant toward thermal and mechanical shocks.
Suitable for welding exhaust valves, hot shear blades, guide rolls, kneading equipment, steam nozzles, mechanical sealings, bushings, blanking dies, press mandrels, trimming dies…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Gas welding

TIG welding

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	W	Co
1.2	28.0	4.5	rest

Mechanical properties:

Hardness : 42 HRC (20°)
30 HRC (500°)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: E 20-UM-50-ZCT
AWS A-5.13: E CoCr-B

DUROSTEL 12 E

Description and application:

Welding electrode is recommended for hardfacing purposes where high wear metal to metal resistance is requested, erosion and cavitation.. The welds keep high density up to 1000°C and have good corrosion resistance and posses excellent abrasion resistance because of the low thermal expansion of the weld metal . Suitable to weld tools in wood, paper and plastic industry, mixers, feeder screws, knives, sliding guides, hot shear blades, screw presses, kneading rolls, drawing blocks, hot rolling guides, hot rolling rolls…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Coating type:

Welding current:
AC
DC+

Welding positions:

Redrying temperature:
300°C/2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	W	Co
1.5	30.0	8.0	rest

Mechanical properties:

Hardness : 48 HRC (20°)
32HRC (500°)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	90-120			
4	350	120-155			
5	350	150-190			

* approximate data

Classification:
EN 499:
DIN 8555: G/WSG-20-GO-50-ZCT
AWS A-5.13: R CoCr-B

DUROSTEL 12 P

Description and application:

Welding rod is recommended for hardfacing purposes where high wear metal to metal resistance is requested, erosion and cavitation.. The welds keep high density up to 1000°C and have good corrosion resistance and posses excellent abrasion resistance because of the low thermal expansion of the weld metal .
Suitable to weld tools in wood, paper and plastic industry, mixers, feeder screws, knives, sliding guides, hot shear blades, screw presses, kneading rolls, drawing blocks, hot rolling guides, hot rolling rolls…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Gas welding

TIG welding

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	W	Co
1.5	30.0	8.0	rest

Mechanical properties:

Hardness : 48 HRC (20°)
32HRC (500°)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: E 20-UM-300-CKZT

DUROSTEL 21E

Description and application:

Welding electrode is recommended for hardfacing purposes where high wear metal to metal resistance is requested, erosion and cavitation.. The welds keep high density up to 1150°C, have very good slide and blank properties. They are stable toward temperature changes and suitable for stain hardening.
Suitable to weld valves, reparations at steam turbines, motor valves where no preheating is possible, tools for rolling mills, agitating apparatus, mills…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Coating type:

Welding Current:
AC
DC+

Welding positions:

Redrying temperature:
300ºC/2h

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Mo	Ni	Co
0.25	28.0	5.0	2.8	rest

Mechanical properties:

Hardness : 30 HRC (20°C)
240 HB (500°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	90-120			
4	350	110-150			
5	350	150-200			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 8555: G/WSG-20-GO-300-CKZT

DUROSTEL 21P

Description and application:

Welding rod is recommended for hardfacing purposes where high wear metal to metal resistance is requested, erosion and cavitation.. The welds keep high density up to 1150°C, have very good slide and blank properties. They are stable toward temperature changes and suitable for stain hardening.
Suitable to weld valves, reparations at steam turbines, motor valves where no preheating is possible, tools for rolling mills, agitating apparatus, mills…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Gas Welding

TIG welding

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Mo	Ni	Co
0.25	28.0	5.0	2.8	rest

Mechanical properties:

Hardness : 30 HRC (20°C)
240 HB (500°C)

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *

* approximate data

Classification:
EN 499:
DIN 8555: G/WSG-20-GO-40-ZCT

DUROSTEL FP

Description and application:

Welding rod is recommended for hardfacing machine parts exposed to the erosion, cavitation and wear up to 900°C. The welds are corrosion resistant till 900°C, have very good slide and blank properties, they are stable toward temperature changes and are nonmagnetic. The weld metal is easy machinable.
Suitable to weld valves of engine motors, combustion chambers…
Welding of buffer lavers with Inox 18/8/6 electrodes is recommended.

Base materials:

Steels
Corrosion resisting steels
Cast steels

Gas welding

TIG welding

Typical all weld metal properties:

Chemical composition, wt %:

C	Cr	Ni	W	Co
1.7	26.0	23.0	12.5	rest

Mechanical properties:

Hardness : 42 HRC

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *

* approximate data

MONEL O1

MONEL C O2

SUPER Ni O3

CAST Ni O4

CAST Ni C O5

CAST NiFe O6

CAST NiFe C O7

CAST NiFe B O8

CAST NiFe10 ..... O9

CAST Fe O10

SL 250 ..... O11

elektrode jesenice d.o.o.

Classification:
EN
DIN 8573: E NiCu BG 1
AWS A-5.15: E NiCu-B
EN ISO 1071: EC NiCu-1

MONEL

Description and application:
Electrode with monel-core wire is suited for cold welding of grey cast iron and other types of cast iron. It is suitable for repair purposes. By using small electrode diameters heat input should be kept low.
The weld metal is easily machinable.

Base materials:
Grey cast iron
Cast iron

Heat treatment:
For thick walled components slightly preheating is recommended.

Coating type:

Welding current:
AC
DC -

Welding positions:

Redrying temperature:

200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni	Cu
65	30

Mechanical properties:

Tensile strength Rm: 300 MPa (N/mm2)

Hardness: 160 HB

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50-80	5	20	16.3
3.25	350	80-110	6	24	32.2
4.00	350	110-150	6	24	48.4
5.00	350	150-190	6	24	96.8

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 8573: E NiCu G3
AWS A-5.15: E NiCu-B
EN ISO 1071: EC NiCu-1 BG2

MONEL C

Description and application:
Electrode with monel-core wire is suited for cold welding of grey cast iron and other types of cast iron. It is suitable for repair purposes. By using small electrode diameters heat input should be kept low.
The weld metal is easily machinable. Electrode contents no Ba components.

Base materials:

Grey cast iron
Cast iron

Heat treatment:
For thick walled components slightly preheating is recommended.

Coating type:

Welding current:
AC
DC +

Welding positions:

Redrying temperature:

200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni	Cu
70	30

Mechanical properties:

Tensile strength Rm: 300 MPa (N/mm2)

Hardness: 160 HB

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50-80	5	20	16.3
3.25	350	80-110	6	24	32.2
4.00	350	110-150	6	24	48.4
5.00	350	150-190	6	24	96.8

* approximate data

elektrode jesenice d.o.o.

Classification:

EN
DIN 8573: E Ni BG 1
AWS A-5.15: E Ni-Cl
EN ISO 1071: EC NiCu-1

SUPER Ni

Description and application:

Electrode with pure Ni-core wire for cold welding of grey and malleable cast iron also suitable for joining them with steel. Suitable for repair purposes, repair of broken parts, building up missing parts and correction of machining errors, joining cast iron for rectification of castings. The weld material is soft and easy machinable We suggest cold impact forging to achieve stress relieving.
By using small electrode diameters heat input should be kept low. Ground material should be clean. For scoring we suggest our electrode Sekator 2 B or Sekator 2 A, grinding is not recommended.

Base materials:

Grey cast iron
Malleable cast iron

Heat treatment:

For thick walled components slightly preheating to is recommended.

Coating type:
Basic

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni
96.0

Mechanical properties:

Tensile strength Rm: 300 MPa (N/mm2)

Hardness: 160 HB

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	50-80	5	20	16
3.25	350	80-110	6	24	32.3
4.00	350	110-150	6	24	48.4
5.00	350	150-190	6	24	96.8

* approximate data

elektrode jesenice d.o.o.

CAST Ni

Classification:

EN	
DIN 8573:	E Ni BG 1
AWS A-5.15:	E Ni-Cl
EN ISO 1071:	EC NiCu-1
JUS C.H3.061:	ENiBG2

Description and application:

Electrode with pure Ni-core wire for cold welding of grey and malleable cast iron without preheating , for repair purposes, also suitable for joining them with steel, copper and monel. Suitable for repair purposes, repair of broken parts, building up missing parts and correction of machining errors, joining cast iron for rectification of castings. The weld metal is soft and easily machinable. We suggest cold impact forging to achieve stress relieving.
By using small electrode diameters heat input should be kept low. Ground material should be clean.
For scoring we suggest our electrode Sekator 2B or Sekator 2A, grinding of is not recommended.

Base materials:

Grey cast iron

Heat treatment:

For thick walled components slightly preheating is recommended.

Coating type:
Basic

Welding current:
AC
DC -

Welding positions:

Redrying temperature:

200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni
95

Mechanical properties:

Tensile strength Rm: 300 MPa (N/mm2)

Hardness: 160 HB

Welding and packing data:

	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
Approvals:	2.5	300	50-80	5	20	16
	3.25	350	80-110	5	20	32
	4.00	350	110-150	6	24	49
	5.00	350	150-190			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 8573: E Ni BG 1
AWS A-5.15: E Ni-Cl

CAST Ni C

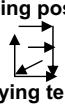
Description and application:
Nickel electrode for joining and surfacing of grey cast iron. Stable arc with clear bead appearance. Electrode provides crack resistant bead without pore formation. Chipforming machining processes can be used. Weld induced stresses can be reduced by hammer peening.
Repair and recovery of broken or worm parts made of grey and malleable cast iron. Filling of voids and blowholes, machining errors. Joining of grey cast iron to steel.

Base materials:
Grey cast iron

Heat treatment:
For thick walled components slightly preheating is recommended.

Coating type:
Basic

Welding current:
AC
DC +

Welding positions:


Redrying temperature:
200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni
98.0

Mechanical properties:

Tensile strength Rm: 300 MPa (N/mm2)

Hardness: 160 HB

Welding and packing data:

	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
Approvals:	2.5	300	50-80	5	20	16
	3.25	350	80-110	5	20	32
	4.00	350	110-150	6	24	49
	5.00	350	150-190			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 8573: E NiFe BG 1
AWS A-5.15: E NiFe-Cl
EN ISO 1071: EC NiCu-1

CAST Ni Fe

Description and application:

Electrode with Ni-Fe alloyed core wire for cold welding nodular, grey and malleable cast iron, also suitable for the rectification an repair of these grades and joining them with steel. Tensile strength is higher than tensile strength of Ni electrodes. Welding joints are suitable for after treatment.
By using small electrode diameters heat input should be kept low. The weld metal is stronger and more resistant to impurities than nickel-cored type.

Base materials:

Grey cast iron
Malleable cast iron
Nodular cast iron
Steel / grey cast iron

Heat treatment:

For thick walled components slightly preheating is recommended.

Coating type:

Basic

Welding current:

AC
DC -

Welding positions:

Redrying temperature:

200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni	Fe
53	42

Mechanical properties:

Tensile strength Rm: 450 MPa (N/mm2)

Hardness: 190 HB

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	60-80	5	20	16
3.25	350	90-110	6	24	32
4.00	350	130-170	6	24	47
5.00	350	170-200			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 8573: E NiFe BG13
AWS A-5.15: E NiFe-Cl
ISO 1071-EC: Ni Cl 1

CAST Ni Fe C

Description and application:

Electrode with Ni-Fe alloyed core wire for cold welding nodular, grey and malleable cast iron, also suitable for the rectification an repair of these grades and joining them with steel. Tensile strength is higher than tensile strength of Ni electrodes. Welding joints are suitable for after treatment.
By using small electrode diameters heat input should be kept low. The weld metal is stronger and more resistant to impurities than nickel-cored type. Electrode contents no Ba components,

Base materials:

Grey cast iron
Malleable cast iron
Nodular cast iron
Steel / grey cast iron

Heat treatment:

For thick walled components slightly preheating is recommended.

Coating type:

Basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

Ni	Fe
53	43

Mechanical properties:

Tensile strength Rm: 450 MPa (N/mm2)

Hardness: 190 HB

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	60-80	5	20	16
3.25	350	90-110	6	24	32
4.00	350	130-170	6	24	47
5.00	350	170-200			

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN 8573: E NiFe B G1
AWS A 5.15: E Ni Fe-Cl
EN ISO 1071: E NiCu-1

CAST Ni Fe B

Description and application:

Electrode with Ni-Fe bimetal core wire for cold welding nodular, grey and malleable cast iron, also suitable for the rectification an repair of these grades and joining them with steel. Tensile strength is higher than tensile strength of Ni electrodes. Welding joints are suitable for after treatment.
By using small electrode diameters heat input should be kept low. The weld metal is stronger and more resistant to impurities than nickel-cored type. It has better welding characteristics than Cast NiFe electrode.

Base materials:

Grey cast iron
Malleable cast iron
Nodular cast iron

Coating type:
Basic

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
180°C

Typical all weld metal properties:

Chemical composition, wt %:

Ni	Fe
54	42

Mechanical properties:

Tensile strength	Rm:	450	MPa (N/mm2)
Hardness:		180	HB

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ Carton kg	Weight/ 1000 pcs kg *
	2.5	300	60-80	5	20	16.1
	3.25	350	90-110	6	24	31.9
	4	350	130-170	6	24	46.8

* approximate data

Classification:
EN
DIN 8573: ≈E Ni BG 22
≈E NiFe BG1
AWS A-5.15: ≈E Ni-Cl
≈E NiFe-Cl

elektrode jesenice d.o.o.

CAST Ni Fe10

Description and application:

Electrode with pure Ni-core wire for cold welding of cast iron and joining cast iron to steel. Specially suited for welding spheroidal cast iron. Electrode is more resistant to impurities and has good weldability on oily cast iron. This electrode can be used for combination welding with CAST Ni electrode.

By using small electrode diameters heat input should be kept low. To avoid overheating the seams should not be longer than 10 times the electrode diameter.
For scoring we suggest our electrode Sekator 2 B or Sekator 2 A, grinding of is not recommended.
Welding joints are suitable for after treatment.

Base materials:

Grey cast iron
Steel / grey cast iron

Heat treatment:

For thick walled components slightly preheating is recommended.

Coating type:
Basic

Welding current:
AC
DC -

Welding positions:

Redrying temperature:
200°C/1h

Typical all weld metal properties:

Chemical composition, wt %:

C	Fe	Cu	Ni
1.1	8	0.5	rest

Mechanical properties:

Tensile strength Rm: cca. 450 MPa (N/mm2)

Hardness: cca. 180 HB

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	70-100	5	20	16
3.25	350	100-130	6	24	32
4.00	350	130-150	6	24	47
5.00	350	150-170			

* approximate data

Classification:
DIN 8573: ~E NiFe BG11
AWS A-5.15: ~E St
≈EN ISO 1071: EC St 1

CAST Fe

Description and application:

Electrode with iron core wire for cold welding repair on poorly weldable or slag containing old cast iron, nodular, grey and malleable cast iron, where Ni base electrodes do not give a solid bond. It is specially suitable for buffering layers before welding them with Cast Ni, Cast NiFe welding consumables.
The weld deposit can be machined by grinding. It is not corrosion resistant.

Base materials:

Grey cast iron
Malleable cast iron
Nodular cast iron
Steel / grey cast iron

Heat treatment:

For thick walled components slightly preheating is recommended.

Coating type:

Basic

Welding current:

AC
DC +

Welding positions:

Redrying temperature:

180ºC/1h

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Fe
0,2	0,1	0,7	rest

Mechanical properties:

Hardness: 160 - 200 HB

Welding and packing data:

Approvals:	Welding parameters			Packing		
	ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
	2.5	300	60-80	5	20	15
	3.25	350	90-110	6	24	29
	4.00	350	120-140	6	24	

* approximate data

elektrode jesenice d.o.o.

SL 250

Classification:
EN
DIN 8573: E (FeC-2) BG 49
AWS
EN ISO 1071: EC FeC-2-7

Description and application:
Thick coated electrode with mild steel core wire and 200% recovery suitable for welding large sections of preheated grey cast iron up to the quality of SL 25-type of material. Suitable for reparations of moulds. Weld material is machinable after slow cooling.

Base materials:
Grey cast iron

Heat treatment:
Plates should be preheated to 600°C.

Coating type:

Welding current:
DC +

Welding positions:

Redrying temperature:
350°C / 2h

Metal recovery:
200-210%

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni
3.2	3.7	0.6	0.6

Mechanical properties:

Tensile strength Rm: 270 MPa (N/mm2)

Hardness: max. 250 HB

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	60-80			
3.25	350	80-140			
4.00	450	110-160			
5.00	450	150-210			
6.00	450	210-250			

* approximate data

elektrode jesenice d.o.o.

ELECTRODES FOR WELDING
COPPER AND ALUMINIUM ALLOYS

BRON CuSn P1

BRON CuAl P2

BRON CuMn P3

EL Cu P4

ALU 99.5 ..... P5

ALU Mn P6

ALU 5 Si P7

ALU 12 Si P8

elektrode jesenice d.o.o.

Classification:
EN
DIN 1733: E CuSn-7
AWS A-5.6: ECuSn-A
EN ISO 1071: E CuSn 2 B 2
W.Nr.: ≈ 2.1025

BRON CuSn

Description and application:
Electrode for welding of Cu and Cu-alloys, cast iron and also joining them with steel. Suitable for repair and constructions of parts in castings like valves, pumps, housings and bearing surfaces.

Base materials:

Bronze:	CuSn2	W.-Nr. 2.1010
	CuSn6	2.1020, 2.1030
	G-CuSn10	
Copper		
Grey cast iron		

Heat treatment:
Bigger plates should be preheated to 200-400°C. Bronze castings must be cooled slowly.

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:

300°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

Cu	Sn	Mn	P
93	6	0.1	0.2

Mechanical properties:

Tensile strength Rm: 300 - 350 MPa(N/mm^2)

Hardness: 70- 110 HB

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	40-70	5	20	15.8
3.25	350	80-120	5	20	31.9
4.00	350	120-150	5	20	47.7
5.00	350	130-190	6	30	85.7

* approximate data

elektrode jesenice d.o.o.

BRON CuAl

Classification:
EN
DIN 1734: ≈E CuAl-8
AWS A-5.6: E CuAl-A2
EN ISO 1071: E CuAl 2 B2
W.Nr.: ≈ 2.0326

Description and application:

Electrode for welding and surfacing of Al-bronze, for surfacing Al-bronze on steel, for joining steel to copper and its alloys.
The alloy has high strength, good wear and corrosion resistance, particularly in salt water.

Base materials:

Al-bronze
Copper

Heat treatment:

Preheating from 200 till 350°C is recommended .

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:

300ºC / 2h

Typical all weld metal properties:

Chemical composition, wt %:

Cu	Al
90	7

Mechanical properties:

Tensile strength Rm: 480 MPa(N/mm^2)

Hardness: 140 - 160 HB

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	40-70	5	20	15.8
3.25	350	80-120	5	20	31.9
4.00	350	120-150	5	20	47.7
5.00	350	130-190	6	30	85.7

* approximate data

elektrode jesenice d.o.o.

BRON CuMn

Classification:
DIN 1733: ≈ES-CuMn13Al
DIN 8555: E 31– 200 cn
AWSA-5.6: E CuMnNiAl
EN ISO 1071: E CuAlMn 2 B2
W.Nr.: ≈ 2.1368

Description and application:

Electrode for joining and surfacing of Al-bronze, for welding steel and cast iron to copper and bronze. The welds are erosion and corrosion resistant specially in seawater. Suitable for welding screws, pumps and pipe line fittings in the shipbuilding and chemical industry.

Base materials:

Copper alloys with Mn, Ni and Al
Grey cast iron
Low alloyed steels

Heat treatment:

Bigger plates should be preheated to 200°C.

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:

300°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

Cu	Mn	Ni	Fe	Al
75	13	2.5	2.5	7.8

Mechanical properties:

Tensile strength Rm: 640 – 735 MPa(N/mm^2)

Hardness: 200 - 300 HB

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	300	40-70	5	20	15.8
3.25	350	80-120	5	20	31.9
4.00	350	120-150	5	20	47.7
5.00	350	130-190	6	30	85.7

* approximate data

elektrode jesenice d.o.o.

EL Cu

Classification:
EN
DIN 1733: ~E CuMn2
AWS A-5.6: ~E Cu

Description and application:
Electrode for welding and cladding on Cu, Cu-alloys and cast iron, and for joining Cu and Copper alloys with steel.

Base materials :
Copper: WNr 2.0040; 2.0070; 2.0076; 2.0090
Copper alloys
Grey cast iron

Heat treatment:
Bigger plates should be preheated to 400-600°C, after welding easy cooling is recommended.

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:

300°C / 2h

Typical all weld metal properties:

Chemical composition, wt %:

Cu	Sn	Mn	Si
96	0.7	2.5	0.25

Mechanical properties:

Tensile strength	Rm:	cca 200	MPa(N/mm^2)
Elongation	A5:	cca 28%	

Approvals :
/

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight / carton kg	Wight / 1000 pcs kg *
2.5	300	40-70	5	20	15.8
3.25	350	80-120	5	20	31.9
4.00	350	120-150	5	20	47.7
5.00	350	130-190	6	30	85.7

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN1732: EL-Al 99,5
AWS-5.3: E 1100
W.Nr.: 3.0259

ALU 99,5

Description and application:
Electrode for welding pure aluminium and its alloys. Suitable for welding container, apparatus constructions.
Material is corrosion resistant.
Slag residues should be removed to ensure non-corrosive weld beads.

Base materials:

Aluminium and its alloys
Al 99,5 Al 99

Heat treatment:
To obtain welds without pore formation, plates with thickness above 5 mm should be preheated to 200 - 250°C.

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:
100 – 150°C / 1 - 2h

Typical all weld metal properties :

Chemical composition,wt%

Al	Si	Fe
99.5	< 0.3	< 0.4

Mechanical properties:

Yield strength:	R_{eL} / $Rp_{0.2}$:	> 20 MPa(N/mm^2)
Tensile strength:	Rm	> 60 MPa(N/mm^2)
Elongation	A5:	> 25%

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	50-90	2	8	9.4
3.25	350	70-110	2	8	13.5
4	350	90-130	2	8	19.4

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN1732: S-AlMn
AWS-5.3: E 3003

ALU Mn

Description and application:
Electrode recommended for welding aluminium- manganese and aluminium magnesium alloys .Suitable for welding vehicle, container, storage vessel, apparatus construction and seawater resistant welds in the shipbuilding industry.
Slag residues should be removed to ensure non-corrosive weld beads.

Base materials:
Aluminium alloys with Mn and Mg: AlMn0,6, AlMn1, AlMnCu
AlMgMn,
AlMg1,
AlMg3,
AlMg5

Heat treatment:
To obtain welds without pore formation, plates with thickness above 5 mm should be preheated to 200 - 250°C.

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:
100-150°C/12h

Typical all weld metal properties :

Chemical composition,wt%

Al	Mn	Si	Fe
97.5	1.2	< 0.5	< 0.7

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	>	80	MPa(N/mm^2)
Tensile strength	Rm:	>	120	MPa(N/mm^2)
Elongation	A5:	>	10	%

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	60-90	2	8	9.4
3.25	350	80-110	2	8	13.5
4	350	110-150	2	8	19.4
5	450	150-180	2	8	40.8

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN1732: EL-AlSi-5
AWS-5.3: E 4042
W.Nr.: ≈ 3.2245

ALU 5 Si

Description and application:
Electrode recommended for welding pure aluminium and aluminium alloys with less than 2% of alloying elements; also suitable for aluminium castings with Si content to 7%.
Slag residues should be removed to ensure non-corrosive weld beads.

Base materials:
Aluminium
Aluminium alloys with < 2% alloying elements
Al-alloy castings <7%
Al Si 5, AlMgSi0.5, AlMgSi0.8, AlMgSi1, AlMg1SiCu, AlCuMg

Heat treatment:
To obtain welds without pore formation, plates with thickness above 5 mm should be preheated to 200 - 250°C.

Coating type:

Welding current:
DC +

Welding positions:

Redrying temperature:
100 – 150 °C / 1 - 2h

Typical all weld metal properties :

Chemical composition,wt%

Al	Si	Fe
94.5	5	< 0.4

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 70	MPa(N/mm^2)
Tensile strength	Rm:	> 140	MPa(N/mm^2)
Elongation	A5	> 12	%

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	50-90	2	8	9.4
3.25	350	70-110	2	8	13.5
4	350	90-130	2	8	19.4

Approvals:

* approximate data

elektrode jesenice d.o.o.

Classification:
EN
DIN1732: EL-AlSi 12
AWS-5.3
W.Nr.: ≈ 3.2285

ALU 12 Si

Description and application:
Electrode recommended for welding aluminium alloys and aluminium castings with Si content to 12%. Suitable for repair purposes.
Slag residues should be removed to ensure non-corrosive weld beads.

Base materials:
Aluminium alloys G-AlSi12, G-AlSi12(Cu), G-AlSi11
G-AlSi8Cu3, G-AlMg3Si

Heat treatment:
To obtain welds without pore formation, plates with thickness above 5 mm should be preheated to 200 - 250°C.

Coating type:

Welding current:

DC +

Welding positions:

Redrying temperature:
100 – 150 °C / 1 - 2h

Typical all weld metal properties :

Chemical composition,wt%

Al	Si	Fe
87.5	12	< 0.5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	cca. 80	MPa(N/mm^2)
Tensile strength	Rm:	cca. 170	MPa(N/mm^2)
Elongation	A5	cca. 13	%

Welding and packing data:

Approvals:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	50-90	2	8	9.4
3.25	350	70-110	2	8	13.5
4	350	90-130	2	8	19.4

* approximate data

Notes:

elektrode jesenice d.o.o.

ELECTRODES FOR CUTTING, GOUGING AND PREHEATING

SEKATOR 1 ..... Q1

SEKATOR 2 A Q2

SEKATOR 2 B Q3

TERMO Q4

Classification:
EN 499:
DIN 1913:
AWS A-5.1:

SEKATOR 1

Description and application:
Flux coated electrode for cutting of all types of steels, cast iron, iron, copper and its alloys.
WARNING: In small welding rooms the ventilation of air is requested!

Base materials:

Cast iron
Copper
Copper alloys
Aluminium
Steels

Coating type:
acid

Welding current:
AC
DC -

Welding positions:

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
3.25	350	130-200	4.4	22	36
4	350	180-250	4.4	22	55
5	450	250-350	6	30	111

* approximate data

Classification:
EN 499:
DIN 1913:
AWS A-5.1:

SEKATOR 2A

Description and application:
Flux coated electrode for cutting and gouging of all types of steel, cast iron, copper and its alloys.
WARNING: In small welding rooms the ventilation of air is requested!

Base materials:

Cast iron
Copper
Copper alloys
Aluminium
Aluminium alloys
Steels

Coating type:
acid

Welding current:
AC
DC -

Welding positions:

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	100-160			
3.25	350	130-200	4	20	28.2
4	350	180-250	5.2	26	52.5
5	450	250-350	5.2	26	106.1

* approximate data

elektrode jesenice d.o.o.

Classification:
EN 499:
DIN 1913:
AWS A-5.1:

SEKATOR 2B

Description and application:
Flux coated electrode for cutting and gouging of all types of steel, cast iron, copper and its alloys.
WARNING: In small welding rooms the ventilation of air is requested!

Base materials:

Cast iron
Copper
Copper alloys
Aluminium
Aluminium alloys
Steels

Coating type:
acid

Welding current:
AC
DC -

Welding positions:

Approvals:

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight/ carton kg	Weight/ 1000 pcs kg *
2.5	350	100-160			
3.25	350	130-200	4	20	28.2
4	350	180-250	5.2	26	52.5
5	450	250-350	5.2	26	106.1

* approximate data

Classification :
EN 499:
DIN 1913:
AWS A-5.1:

TERMO

Description and application :

Special preheating electrode suitable for local preheating of small and middle sized pieces. It can be used instead of oxy- acetilene preheating in workshops and repair activities, mostly for preheating, local PWHT of welds, preheating before bending or levelling….No weld metal is produced, the slag can be easily removed. Needs higher current sets, the arc should be upright with 15-30mm length.

Base materials:

steels
cast iron
copper
copper alloys
aluminium
aluminium alloys

Coating type :

special

"Welding" current :

AC
DC +/ -

"Welding" positions :

Approvals :

/

Welding and packing data:

Welding parameters			Packing		
ϕ mm	Length mm	Current A	Weight/ Packet kg	Weight / cartoon kg	Weight / 1000 pcs kg *
2.5	350	70-120			
3.25	450/350	100-150	4	20	48
4	450/350	150-240	5.2	26	73

* approximate data

Notes:

AR 18.5 ..... R1

AR D1 ..... R2

AR 18.1 ..... R3

AB 100 ..... R4

FB TT R5

FB 12.2 ..... R6

FB CrNi R7

CS Cr 6 ..... R8

CS CrNi R9

AB Cr R10

CS 350 ..... R11

FB 33 ..... R12

FB 578 ..... R13

Classification:

EN 760	SA AR 1 88 AC
DIN 32 522	B AR 1 88 AC 10 SKM
ASME/AWS A5.17	F7A0-EM12K
A5.23	F7A0-EA2-A2

elektrode jesenice d.o.o.

AR 18.5

Description and application:
It's an aluminate-rutil type flux for welding general structural steels, pressure vessel steels and pipe steels as well as fine grain steels with a yield strength of up to 355 N/mm^2. It's suited for high-speed welding with the twin-wire process, as well as to tandem and multi-wire welding. It can be used also for welding with the two-run technique. It's also particularly useful for welding tube-web-tube joints of finned tubes. Because of its good slag detachability there's a common application for the welding of fillets. The weld metal isn't susceptible to porosity when welding surface contaminated by rust, scale…
Grain size: 0.2 – 1.6 mm, Density: 1.5 kg/dm^3

BASE MATERIALS	DIN	W.Nr.
General structural steels	St37-2 to RSt37-2 St44-2, St44-3 St52-3	1.0037 to 1.0038 1.0044, 1.0144 1.0570
Pipe steels	StE210.7 to StE290.7, StE320.7, StE360.7 St35 to St45.8 St52, St52-4	1.0307 to 1.0484 1.0409, 1.0582 1.0308 to 1.0405 1.0580, 1.0581
Boiler steels	HI, HII, 17Mn4, 19Mn5 15Mo3	1.0345, 1.0426 1.0481,1.0482 1.5415
Shipbuilding steels	A,B,D	1.0440, 1.0472,
Fine-grain steels	StE255 to StE355	1.0461, 1.0562,

Chemical composition of flux **Basicity index (Boniszewski): 0.50**

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaF_2
30 %	55 %	5%

Typical all weld metal properties:

Chemical analysis (wt%)

Wire	C	Si	Mn	Mo
EPP 2	0.06	0.60	1.45	/
EPP 2 Mo	0.06	0.60	1.45	0.50

Mechanical properties

Wire	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 0°
EPP 2	>420	530 - 630	>24	> 47
EPP 2 Mo	>440	580 - 680	>22	> 47

Welding current: AC, DC+ ; up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: plastic bags, contents 25 kg

Approvals:

Wire	CRS	ABS	BV	GL	LR	DNV	SŽ
EPP 2	2TM	2TM	A2TM	2TM	2TM	IITM	*

Classification:

EN 760	SA AR 1 97 AC
DIN 32 522	B AR 1 97 10 SKM
ASME/AWS A5.17	F7A0-EM12K
A5.23	F7A0-EA2-A2

elektrode jesenice d.o.o.

AR D1

Description and application:
It's an aluminate-rutil type flux for welding general structural steels, pressure vessel steels and pipe steels as well as fine grain-steels with a yield strength of up to 355 N/mm^2. It's suited for twin-wire, tandem and multi-wire welding at high-speeds. It can be used also with the two-run technique, especially when welding thin-walled spiral tubes. Wires containing Mo increase the weld-metal toughness. It may equally well be used for welding tube-web-tube joints or finned tubes. Because of its good slag detachability it's very commonly used when welding fillets. The weld metal isn't susceptible to porosity when welding on surface contaminated by rust, scale…
Grain size: 0.2 – 1.6 mm, Density: 1.6 kg/dm^3

BASE MATERIALS	DIN	W.Nr.
General structural steels	St37-2 to RSt37-2 St44-2, St44-3, St52-3	1.0037 to 1.0038 1.0044, 1.0144 1.0570
Pipe steels	StE210.7 to StE290.7, StE320.7, StE360.7 St35 to St45.8 St52, St52-4	1.0307 to 1.0484 1.0409, 1.0582 1.0308 to 1.0405 1.0580, 1.0581
Boiler steels	HI, HII, 17Mn4, 19Mn5 15Mo3	1.0345, 1.0426 1.0481,1.0482 1.5415
Shipbuilding steels	A,B,D	1.0440, 1.0472,
Fine-grain steels	StE255 to StE355	1.0461, 1.0562,

Chemical composition of flux **Basicity index (Boniszewski): 0.50**

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaF_2
30 %	55 %	5%

Typical all weld metal properties:

Chemical analysis (wt%)

Wire	C	Si	Mn	Mo
EPP 2	0.06	0.60	1.35	/
EPP 2 Mo	0.06	0.60	1.35	0.50

Mechanical properties

Wire	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 0°
EPP 2	>400	500 - 600	>22	>47
EPP 2 Mo	>450	580 - 680	>18	>47

Welding current: AC, DC+ ; up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: plastic bags, contents 25 kg

Approvals:

Wire	CRS	ABS	BV	GL	LR	DNV	SŽ	TÜV
EPP 2	1YTM	2YTM	A2YTM	1YTM	1YTM	IIYTM	*	*

Classification:

EN 760	SA AR 1 88 AC
DIN 32 522	B AR 1 88 AC 10 SKM
ASME/AWS A5.17	F7A2-EM12K
A5.23	F8A2-EA2-A2

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AR 18.1

Description and application:
It's an aluminate-rutil type flux for welding general structural steels, pressure vessel steels and pipe steels as well as fine grain-steels with a yield strength of up to 355 N/mm^2. It's suited for twin-wire, tandem and multi-wire welding at high-speeds. It's especially well used for two-run technique and fillets, for example for lproduction of large pipes and thin- walled spiral tubes. Because of its good slag-detachability it's very commonly used when welding fillets.
Grain size: 0.2 – 1.6 mm, Density: 1.6 kg/dm^3

BASE MATERIALS	DIN	W.Nr.
General structural steels	St37-2 to RSt37-2 St44-2, St44-3, St52-3	1.0037 to 1.0038 1.0044, 1.0144 1.0570
Pipe steels	StE210.7 to StE290.7, StE320.7, StE360.7 St35 to St45.8 St52, St52-4	1.0307 to 1.0484 1.0409, 1.0582 1.0308 to 1.0405 1.0580, 1.0581
Boiler steels	HI, HII, 17Mn4, 19Mn5 15Mo3	1.0345, 1.0426 1.0481,1.0482 1.5415
Shipbuilding steels Fine-grain steels	A,B,D StE255 to StE355	1.0440, 1.0472, 1.0461, 1.0562,

Chemical composition of flux **Basicity index (Boniszewski): 0.40**

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaF_2
30 %	55 %	5%

Typical all weld metal properties:

Chemical analysis (wt%)

Wire	C	Si	Mn	Mo
EPP 2	0.06	0.70	1.4	/
EPP 2 Mo	0.06	0.70	1.4	0.50

Mechanical properties

Wire	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 0°
EPP 2	>450	530 – 630	>22	>47
EPP 2 Mo	>490	610 - 710	>18	>47

Welding current: AC, DC+ ; up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: plastic bags, contents 25 kg

Approvals:

Wire	CRS	ABS	BV	GL	LR	DNV	SŽ	RS
EPP 2	2YTM	2YTM	A2YTM	2YTM	2TM,2YTM	IIYTM	*	3YTM

Classification:

EN 760	SA AB 1 76 AC
DIN 32 522	B AB 1 76 AC 10
ASME/AWS A5.17	F6A2-EM12K
A5.17	F7A4-EM13K
A5.23	F7A4-EA2-A2

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AB 100

Description and application:
It's an aluminate-basic type flux for welding general structural steels, pressure wessel steels, pipe steels as well as fine-grain steels with a yield strength of up to 430 N/mm^2. It can be used for single-wire and multi-wire welding as well as when welding with the two-run technique. The slag removes easily.
Grain size: 0.2 – 2 mm Density: 1.3 kg/dm^3

BASE MATERIALS	DIN	W.Nr.
General structural steels	St37-2, USt37-2	1.0037, 1.0036
	RSt37-2, St37-3	1.0038, 1.0116
	St44-2,St44-3,St52-3	1.0044, 1.0144
Pipe steels	StE210.7, StE240.7,	1.0307 to 1.0457
	StE320.7 to StE360.7	1.0409 to 1.0582
	St35 to St35.8	1.0308, 1.0309
	St45 to St52-4	1.0408 to 1.0581
Boiler steels	HI, HII,	1.0345, 1.0426,
	17Mn4, 19Mn5, 15Mo3	1.0481, 1.0482, 1.5415
Shipbuilding steels	A to E	1.0440 to 1.0476
Fine-grain steels	StE255, WStE255,	1.0461, 1.0462,
	StE285, WstE285	1.0486, 1.0487,
	StE315, WStE315	1.0505, 1.0506,
	StE355, WStE355	1.0562, 1.0565
	StE380, WStE380,	1.8900, 1.8930,
	StE420, WStE420	1.8902, 1.8932

Chemical composition of flux **Basicity index (Boniszewski): 0.80**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
25 %	20 %	45 %	10%

Typical all weld metal properties:
Chemical analysis (wt%)

Wire	C	Si	Mn	Mo
EPP 2	0.06	0.40	1.20	/
EPP 2 Mo	0.06	0.40	1.20	0.50
EPP 3	0.06	0.45	1.50	/

Mechanical properties

Wire	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 0°
EPP 2	>380	500-600	>24	> 47
EPP 2 Mo	>430	540-640	>22	> 47
EPP 3	>400	520-620	>20	> 47

Welding current: AC, DC+ ; up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: plastic bags, contents 25 kg

Approvals:

Wire	CRS	ABS	BV	GL	LR	DNV	SŽ
EPP 2	2TM	2TM	A2TM	2TM	2TM	IITM	*
EPP 3	2YTM	2YTM	A2YTM	2YTM	2M, 2YM	IIYTM	*

Classification:

EN 760	SA FB 1 55 AC H5
DIN 32 522	B FB 1 55 AC 12 MHP 5
ASME/AWS A5.17	F6A4-EM12K
A5.17	F7A6-EM13K
A5.23	F8A6-EA2-A2

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FB TT

Description and application:

It's a fluorid-basic type flux most suited to welded joints on high-tensile, fine-grain steels as well as steels are tough at sub-zero temperatures and resistant to ageing. It's particularly well-suited for welding with tandem and multi-wire processes, but not for two-run technik. It's also suitable for production welding offshore components. The resulting slag is short allowing circumferential welding. Regularly shaped welds are deposited without of area or interface notches.
Grain size: 0.2 – 1,8 mm, Density: 1.2 kg/dm^3

BASE MATERIALS	DIN	W.Nr.
Shipbuilding steels	A,B,D,E,	1.0440 to 1.0476
Fine-grain steels	StE255 to StE420	1.0461 to 1.8902
	WStE255 to WstE420	1.0462 to 1.8932
	StE460, WStE420	1.8905, 1.8935
	StE500, WStE500	1.8907, 1.8937
	TStE255 to TStE420	1.0463 to 1.8912
	TStE460, TStE500	1.8915, 1.8917
Boiler steels	15Mo3	1.5415
	13CrMo44	1.7335
	10CrMo910	1.7380
	12CrMo195	1.7362
Heat resistant steels	10Ni14	1.5637
	TTSt35N,TTSt35V	
Ageing resistant steel	TTSt41N,TTSt41V	
	ASt35,Ast41	1.0346,1.0426
	ASt45,ASt52	1.0436, 1.057

It's suitable for welding in combination with flux-cored wires (f. e. fine-grain steels….)

Chemical composition of flux **Basicity index (Boniszewski): 3.1**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
15 %	40 %	20 %	25%

Typical all weld metal properties:
Chemical analysis (wt%)

WIRE	C	Si	Mn	Mo	Ni
EPP 2	0,06	0.20	0,9		
EPP 3	0,06	0.25	1,2		
EPP 2 Mo	0,06	0.20	0,9	0.50	

Mechanical properties

WIRE	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	MPa(N/mm^2)	A5 (%)	KV (J) 20°	0°	-20°	-40°	-60°
EPP 2	>330	450 - 550	>28	>160	>140	>80	>30	
EPP 3	>430	530 – 630	>22	>160	>140	>80	>70	>30
EPP 2 Mo	>500	580 – 680	>20	>120	>100	>80	>50	>30

Welding current: AC, DC+ up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: plastic bags, contents 25 kg

Approvals:

WIRE	CRS	ABS	BV	GL	LR	DNV	SŽ	DB	TÜV	RS
EPP 2	3M	3M	A3M	3M	3M	IIIM	*	*	*	
EPP 3	3YM	3YM	A3YM	3YM	3M,3YM	IIIYM	*	*	*	
EPP2Mo	3YM	3YM	A3YM	3YM		IIIYM	*		*	3YM

Classification:

EN 760	SA FB 1 65 AC H5
DIN 32 522	B FB 1 65 AC 12 MHP 5
ASME/AWS A5.17	F6A4-EM12K
A5.17	F7A6-EM13K
A5.23	F7A4-EA2-A2

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FB 12.2

Description and application:
It's a fluorid-basic type flux for welding general structural steels, pressure wessel steels, pipe steels and fine-grain steels with a yield strength of up to 430 N/mm^2. It can be used for single-, twin-, or multi-wire welding as well as when welding with the two-run technique. It's suitable for production of large pipes. The slag removes easily.
Grain size: 0.2 – 1,8 mm, Density: 1.2 kg/dm^3

BASE MATERIALS	DIN	W.Nr.
General structural	St37-2, RSt37-3	1.0037,
steels	RSt37-3, St44-3	1.0144
	St52-3	1.0570
Pipe steels	StE210.7 to StE290.7	1.0307 to 1.0484
	StE320.7 to StE385.7	1.0409 to 1.8970
	StE415.7 to StE480.7	1.8972 to 1.8977
	St35 to St45.8	1.0308 to 1.0405
	St52, St52-4	1.0580, 1.0581,
	API X42 to X70	
Boiler steels	HI, HII,	1.0345, 1.0425
	19Mn5	1.0482
	15Mo3	1.5415
Fine-grain steels	StE255 to StE315	1.0461 to 1.0505
	WStE255 to WStE315	1.0462 to 1.0506
	StE355, WStE355	1.0562, 1.0565
	StE380, WStE380,	1.8900, 1.8930
	StE420, WStE420	1.8902, 1.8932

It's suitable for welding and surfacing in combination with flux-cored wires (f. e. fine-grain steels….)

Chemical composition of flux **Basicity index (Boniszewski): 1.70**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
20 %	30 %	25 %	20%

Typical all weld metal properties:
Chemical analysis (wt%)

WIRE	C	Si	Mn	Mo
EPP 2	0,06	0.25	1,10	/
EPP 2 Mo	0,06	0.25	1,10	0.50
EPP 3	0,06	0.25	1,50	/

Mechanical properties

WIRE	R_{eL} / Rp $_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 20°	0°	-20°	-40°	-60°
EPP 2	>360	510 – 600	>24	>150	>110	>90		
EPP2Mo	>430	550 – 650	>20	>90	>90	>70	>40	
EPP 3	>400	530 – 630	>24	>160	>130	>100	>70	>30

Welding current: AC, DC+, up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: plastic bags, contents 25 kg
Approvals:

WIRE	CRS	ABS	BV	GL	LR	DNV	SŽ	TÜV	RINA	PRS
EPP 2	3M			3M			*	*	3M	
EPP 3		2YT,3YM	A3YM	3YM	3M,3YM	IIYM,IIIYM	*		2YT/3YM	3YM,3YTM

Classification:
EN 760 SA FB 2 63 DC
DIN 32 522 B FB 5 63745 DC 8K

FB CrNi

Description and application:
It's a special fluorid-basic type flux for welding stainless and heat-resistant steels, also ELC quality. In conjunction with wire electrodes to DIN 8556 it's used for welding of stainless and heat resistant steels.
Grain size: 0.2 – 2 mm, Density: 1.4 kg / dm^3.

BASE MATERIAL	W.n.	WELDING WIRE	W.Nr.
X 2 Cr Ni 19 11	1.4306	EPP 19/9 NC	1.4316
X 5 CrNi 18 10	1.4301	EPP 19/9 NC	1.4316
X 6 Cr NiTi 18 10	1.4541	EPP 19/9 Nb	1.4551
X 5 Cr Ni Nb 18 9	1.4543	EPP 19/9 Nb	1.4551
X 6 Cr Ni Nb 18 10	1.4550	EPP 19/9 Nb	1.4551
X 12 Cr Ni Ti 18 9	1.4878	EPP 19/9 Nb	1.4551
X 2 Cr Ni Mo 17 13 2	1.4404	EPP 19/12/3 NC	1.4430
X 2 Cr Ni Mo 18 14 3	1.4435	EPP 19/12/3 NC	1.4430
X 5 Cr Ni Mo 17 12 2	1.4401	EPP 19/12/3 NC	1.4430
X 6 Cr Ni Mo Ti 17 12 2	1.4571	EPP 19/12/3 Nb	1.4576
X 10 Cr Ni Mo Ti 18 12	1.4573	EPP 19/12/3 Nb	1.4576
X 6 CrNiMoNb 17 12 2	1.4580	EPP 19/12/3 Nb	1.4576
X 10 CrNiMoNb 18 12	1.4583	EPP 19/12/3 Nb	1.4576

Chemical composition of flux **Basicity index (Boniszewski): 1.60**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
30 %	30 %	10 %	25%

Typical all weld metal properties:
Chemical analysis (wt%)

WIRE	C	Cr	Ni	Mo	Nb
EPP 19/9 NC	< 0.03	18	9		
EPP 19/9 Nb	0.07	18	9		> 8 xC
EPP 19/12/3 NC	< 0.03	18	10	2.5	
EPP 19/12/3 Nb	0.07	18	10	2.5	> 8 xC

Mechanical properties

WIRE	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	MPa(N/mm^2)	A5 (%)	KV (J) 20° C
EPP 19/9 NC	> 320	> 550	> 35	> 75
EPP 19/9 Nb	> 350	> 575	> 30	> 65
EPP 19/12/3 NC	> 320	> 550	> 30	> 75
EPP 19/12/3 Nb	> 350	> 600	> 30	> 65

Welding current: DC+, up to 800 A

Redrying temperature: 350°C / 2 h

Packing: plastic bags, contents 25 kg

Approvals: TÜV

Classification:

EN 760	SA CS 1 96 AC
DIN 32 522	B CS 1 96 AC 12B

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CS Cr 6

Description and application:
It's a calcium-silicate flux for hardsurfacing with wires and flux-cored wires or strips. It's suitable for high current, up to 1200 A. Slag detachability is good also from hot plates.
Grain size: 0.2 – 1.6 mm, Density: 1.4 kg / dm^3

Chemical composition of flux **Basicity index (Boniszewski): 1.00**

$SiO_2 + TiO_2$	CaO + MgO	$Al_2O_3 + MnO$	CaF_2
35 %	30 %	25 %	10%

Chemical analysis and hardness (acc. to DIN 8555)

Wire	C	Si	Mn	Cr	Mo	HARDNESS HB
FILTUB DUR 212	0.08	0.70	1.0	5.0	0.9	350 - 400

Welding current: AC, DC+ DC-; up to 1200 A

Redrying temperature: 350°C / 2 h

Packing: plastic bags, contents 25 kg

Approvals:

Classification:

EN 760	SA CS 2 99 AC
DIN 32 522	B CS 5 99545 AC 10KMB

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CS CrNi

Description and application:
It's an agglomerated flux for joint welding or cladding with Cr CrNi and CrNiMo wires or strips. It's suitable for cladding in chemical and petrochemical industry. The flux for cladding can be also used on DC-current.
Grain size: 0.2 – 2 mm, Density: 1.4 kg / dm^3.

BASE MATERIAL	W.n.	WELDING WIRE	W.Nr.
X 2 Cr Ni 19 11	1.4306	EPP 19/9 NC	1.4316
X 5 CrNi 18 10	1.4301	EPP 19/9 NC	1.4316
X 6 Cr NiTi 18 10	1.4541	EPP 19/9 Nb	1.4551
X 5 Cr Ni Nb 18 9	1.4543	EPP 19/9 Nb	1.4551
X 6 Cr Ni Nb 18 10	1.4550	EPP 19/9 Nb	1.4551
X 12 Cr Ni Ti 18 9	1.4878	EPP 19/9 Nb	1.4551
X 2 Cr Ni Mo 17 13 2	1.4404	EPP 19/12/3 NC	1.4430
X 2 Cr Ni Mo 18 14 3	1.4435	EPP 19/12/3 NC	1.4430
X 5 Cr Ni Mo 17 12 2	1.4401	EPP 19/12/3 NC	1.4430
X 6 Cr Ni Mo Ti 17 12 2	1.4571	EPP 19/12/3 Nb	1.4576
X 10 Cr Ni Mo Ti 18 12	1.4573	EPP 19/12/3 Nb	1.4576
X 6 CrNiMoNb 17 12 2	1.4580	EPP 19/12/3 Nb	1.4576
X 10 CrNiMoNb 18 12	1.4583	EPP 19/12/3 Nb	1.4576

Chemical composition of flux **Basicity index (Boniszewski): 1.00**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
35 %	25 %	25 %	10%

Typical all weld metal properties:
Chemical analysis (wt%)

WIRE	C	Cr	Ni	Mo	Nb
EPP 19/9 NC	< 0.03	18	9		
EPP 19/9 Nb	0.07	18	9		> 8 xC
EPP 19/12/3 NC	< 0.03	18	10	2.5	
EPP 19/12/3 Nb	0.07	18	10	2.5	> 8 xC

Mechanical properties

WIRE	R_{eL} / $Rp_{0.2}$ % MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 20° C
EPP 19/9 NC	> 320	> 550	> 35	> 55
EPP 19/9 Nb	> 350	> 575	> 30	> 45
EPP 19/12/3 NC	> 320	> 550	> 30	> 55
EPP 19/12/3 Nb	> 350	> 600	> 30	> 45

Welding current: AC, DC+, DC-, up to 1000 A

Redrying temperature: 350°C / 2 h

Packing: plastic bags, contents 25 kg

Approvals:

Classification:

EN 760	SA AB 2 65 AC
DIN 32 522	B AB 5 65545 AC10 B

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AB Cr

Description and application:
It's an aluminate-basic type flux for submerged-arc cladding with Cr, CrNi and CrNiMo strips and unalloyed SA-wires. It' s suitable for corrosion and wear resistant parts. Surface is smooth and flat.
Grain size: 0.2 – 2 mm, Density: 1.3 kg / dm ^{3}.

Chemical composition of flux **Basicity index (Boniszewski): 0.70**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
30 %	20 %	30 %	5%

Chemical analysis (wt%) and hardness

Strip / wire	C	Si	Mn	Cr	Ni	Hardness
INOX TR 19/9	0.08	0.70	1.10	17.5	6.0	180 - 220 HB
INOX TR Cr 17	0.07	0.90	0.70	16.5	-	160 - 200 HB
EPP 2	0.05	0.50	0.90	-	-	200 - 250 HB

With strips: two layers; with EPP 2 according to DIN 8555.

Welding current: AC, DC+ ; up to 1000 A

Redrying temperature: 350°C / 2 h

Packing: plastic bags, contents 25 kg

Approvals:

Classification:

EN 760	CS 3 97 AC
DIN 32 522	B CS 3 97 CCrMo AC 8

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CS 350

Description and application:

It's an agglomerated alloy-fortified surfacing flux intended for use with low-alloyed SA-wires. The alloying effect is greatly depended on welding parameters. The optimum parameters with wire ϕ 4 mm are: 600 A, 32 V, 50 cm/min. It's suitable for wear- and strike- resistant parts (for example for welding of coupling parts, piston rod ends and excavator parts). The greater hardness is reached with Mn, Cr and Mo alloyed wires.
Grain size: 0.2 – 2 mm, Density: 1.2 kg / dm ^{3}.

Chemical composition of flux **Basicity index (Boniszewski): 1.1**

$SiO_2 + TiO_2$	CaO + MgO	$Al_2O_3 + MnO$	CaF_2
35 %	25 %	15 %	10%

Chemical analysis (wt%) and hardness (according to DIN 8555)

Wire	C	Si	Mn	Cr	Mo	Hardness
EPP 1	0.25	0.50	1.70	3.0	0.40	350 - 400 HB
EPP 2	0.25	0.90	2.00	3.0	0.40	400 - 500 HB

Welding current: AC, DC+ ; up to 800 A

Redrying temperature: 350°C / 2 h

Packing: plastic bags, contents 25 kg

Approvals:

Classification:
EN 760 S A AF 2 54 DC
DIN 32 522 B FB 6 54255 DC 8K

elektrode jesenice d.o.o.

FB 33

Description and application:
It's a fluorid-basic flux for welding stainless, heat-resistant and nc-steels in conjunction with wires to DIN 8556. Welds are clean and have smooth surface. There's good slag detachability so it's suitable for welding fillets.
Grain size: 0.2 – 1.6 mm, Density: 1.4 kg / dm^3

Base materials	W.n.	Welded with wire	W.n.
X 2 Cr Ni 19 11	1.4306	EPP 19/9 NC	1.4316
X 5 CrNi 18 10	1.4301	EPP 19/9 NC	1.4316
X 6 Cr NiTi 18 10	1.4541	EPP 19/9 Nb	1.4551
X 5 Cr Ni Nb 18 9	1.4543	EPP 19/9 Nb	1.4551
X 6 Cr Ni Nb 18 10	1.4550	EPP 19/9 Nb	1.4551
X 12 Cr Ni Ti 18 9	1.4878	EPP 19/9 Nb	1.4551
X 2 Cr Ni Mo 17 13 2	1.4404	EPP 19/12/3 NC	1.4430
X 2 Cr Ni Mo 18 14 3	1.4435	EPP 19/12/3 NC	1.4430
X 5 Cr Ni Mo 17 12 2	1.4401	EPP 19/12/3 NC	1.4430
X 6 Cr Ni Mo Ti 17 12 2	1.4571	EPP 19/12/3 Nb	1.4576
X 10 Cr Ni Mo Ti 18 12	1.4573	EPP 19/12/3 Nb	1.4576
X 6 CrNiMoNb 17 12 2	1.4580	EPP 19/12/3 Nb	1.4576
X 10 CrNiMoNb 18 12	1.4583	EPP 19/12/3 Nb	1.4576

Chemical composition of flux **Basicity index (Boniszewski): 1.80**

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaF_2
10 %	35 %	50%

Tipical all weld metal properties:
Chemical analysis (%):

Žica	C	Cr	Ni	Mo	Nb
EPP 19/9 NC	< 0.03	18	9		
EPP 19/9 Nb	0.07	18	9		> 8 xC
EPP 19/12/3 NC	< 0.03	18	10	2.5	
EPP 19/12/3 Nb	0.07	18	10	2.5	> 8 xC

Mechanical properties:

Wire	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) +20° C
EPP 19/9 NC	> 320	> 550	> 35	> 75
EPP 19/9 Nb	> 350	> 575	> 30	> 65
EPP 19/12/3 NC	> 320	> 550	> 30	> 75
EPP 19/12/3 Nb	> 350	> 600	> 30	> 65

Welding current: DC+, do 800 A

Redrying temperature: 350°C / 2 h

Packing: plastic bags, contents 25 kg

Approvals: TÜV

Classification:

EN 760	SA FB 1 75 AC
DIN 32 522	B FB 1 75 AC
ASME/AWS A5.17	F6A4-EM12K
A5.17	F7A6-EM13K
A5.23	F7A4-EA2-A2

elektrode jesenice d.o.o.

FB 578

Description and application:
It's an fluoride-basic type flux for welding and surfacing of general structural steels, pressure wessel steels, pipe steels as well as fine-grain steels with a yield strength of up to 430 N/mm^2. The slag removes easily.
Grain size: 0.2 – 1,8 mm Density: 1.5 kg/dm^3

Chemical composition of flux **Basicity index (Boniszewski): 2.00**

$SiO_2 + TiO_2$	CaO + MgO	Al_2O_3 + MnO	CaF_2
25 %	35 %	15 %	15%

Typical all weld metal properties:
Chemical analysis (wt%)

Wire	C	Si	Mn	Cr	Mo
EPP 2	0.05	0.40	1.0	/	/
FILTUB DUR 212	0.10	0.50	1.0	4.0	0.8

Mechanical properties

Wire	R_{eL} / Rp $_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV (J) 0°	-20°	-40°	Hardness (HRC)
EPP 2	> 360	480-580	>22	>90	>60	>47	
FILTUB DUR 212							40

Welding current: AC, DC+ ; up to 1000 A
Redrying temperature: 350°C / 2 h
Packing: paper bags with PVC inserted sacks, contents 25 kg

Approvals:

elektrode jesenice d.o.o.

WELDING RODS FOR TIG – WELDING
WELDING WIRES FOR MAG(CO_2) – WELDING
WELDING WIRES FOR GMA – WELDING

TIG / MAG – WELDING:

TIG VAC 60 / VAC 60 …….. S4

TIG VAC 65 / VAC 65 …….. S5

VAC 60 Ni …….. S6

VAC 60 Ti …… S7

VAC 60 CuNi …. S8

TIG / MIG – WELDING:

TIG Mo / MIG Mo S1

TIG CrMo / MIG CrMo …… S2

TIG 2 CrMo / MIG 2 CrMo ……. S3

MIG 65 …… S9

MIG 75 …… S10

MIG 90 …….. S11

MIG 17 ……..… S12

TIG 19/9 Nb Si / MIG 19/9 Nb Si …….. S13

TIG 19/9 NC Si / MIG 19/9 NC Si …….. S14

TIG 19/12/3 NbSi / MIG 19/12/3 Nb Si ……. S15

TIG 19/12/3 NC Si / MIG 19/12/3 NC Si ……. S16

TIG 25/14 NC Si / MIG 25/14 NC Si ……. S17

TIG 18/8/6 Si / MIG 18/8/6 Si …….. S18

TIG 25/20 / MIG 25/20 …… S19

TIG 29/9 / MIG 29/9 …… S20

TIG 70/15 ……..…….. S 21

TIG 22/9/3 LN ……..…….. S 22

TIG Cu / MIG Cu S23

TIG CuAl8 / MIG CuAl8 ..... S24

TIG CuSn6 / MIG CuSn6 ..... S25

TIG CuAg / MIG CuAg S26

TIG CuMn / MIG CuMn S27

TIG CuSi3 / MIG CuSi3 ..... S28

elektrode jesenice d.o.o.

TIG Mo
MIG Mo

Classification:

EN 1668	W 2Mo
EN 12070	W Mo Si
DIN 8575	SG Mo
AWS A5.28:	ER 80 S-G
EN 440	G2 Mo
W. Nr.	1.5424
EN ISO 636-A	W 46 2 W2Mo
EN ISO 636-B	W 55 2 W2M3
EN ISO 21952-A	W MoSi
EN ISO 21952-A	G MoSi
EN ISO 21952-B	W 1M3
EN ISO 21952-B	G 1M3

Description and application:
With Mo-alloyed rod and wire for welding of heat-resistant, unalloyed and low-alloyed structural steels with tensile strenght up to 590 N/mm^2. It's well used for welding pipe-lines, high-pressure boilers, armour parts and for repairing in thermo-energetic devices. It can be used up to process-temperature of 500°C.

Base materials

	DIN	W.n.
General structural steels	St37 – St42	1.0038 - 1.0570
Pipe steels	St35.8, St45.8 15Mo3	1.0305, 1.0405, 1.5415
Boiler steels	HI - HIII, 17Mn4	1.0345 - 1.0435, 1.0481

Chemocal analysis of wire (wt %)

C	Si	Mn	Mo
0,10	0,60	1,15	0,50

Mechanical properties

R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV -20°C(J)
>480	560 - 720	> 22	>47

Suitable shielding gases :
TIG-process Ar (I1 to EN 439)
MIG- process Ar + 18% CO_2 (M21)

Rod sizes available : 2,0; 2,5; 3,0; (ϕ mm) lenght:: 1000 mm
Wire sizes available: 1,0; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV, DB, CR, BV, DNV, LR, RS, SŽ (for TIG Mo)

elektrode jesenice d.o.o.

TIG CrMo
MIG CrMo

Classification:

EN 12070:	W CrMo1Si
	G CrMo1Si
DIN 8575	SG CrMo1
AWS A5.28:	ER 80 S-B2
W.Nr.	1.7339
EN ISO 21952-A	W CrMo1Si
EN ISO 21952-B	W 1CM3

Description and application:

With Cr and Mo-alloyed rod for TIG welding of heat-resistant, unalloyed and low-alloyed structural steels up to process-temperature of 500°C. . It's well used for welding pipe-lines, high-pressure boilers, armour parts and for repairing in thermo-energetic devices. It can be used up to process-temperature of 550°C.

Base materials	DIN	W.Nr.
Pipe steels	15CrMo3	1.5415
Boiler steels	13CrMo44	1.7335

Chemical analysis of wire (wt%)

C	Si	Mn	Cr	Mo
0,10	0,60	1,00	1,2	0,52

Mechanical properties

R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV +20°C(J)
> 305	> 450	> 22	> 100

Stress-releaving: 720°C / 30 min, cooled in oven to 300°, then air

Suitable shielding gases :

	TIG-process	Ar (I1 to EN 439)
	MIG- process	Ar + 18% CO_2 (M21)

Rod sizes available : 2,0; 2,4; 3,0; (ϕ mm) lenght:: 1000 mm

Wire sizes available: 1,0; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV (for TIG CrMo)

elektrode jesenice d.o.o.

TIG 2CrMo
MIG 2CrMo

Classification:

EN 12070	W CrMo2 Si
	G CrMo2 Si
DIN 8575	SG CrMo2
AWS A5.28:	ER 90S-G
W.Nr	1.7384
EN ISO 21952-A	W CrMo2Si
EN ISO 21952-A	W 2C1M3

Description and application:

With Cr and Mo-alloyed wire for TIG welding of heat-resistant, up to process-temperature of 600°C. It's well used for welding pipe-lines, high-pressure boilers, armour parts and for repairing in thermo-energetic devices.

Base materials	DIN	W.Nr.
Heat resistant steel	10CrMo 9-10	1.7380
	10CrSiMoV44	1.8075

Chemical analysis of wire (wt%)

C	Si	Mn	Cr	Mo
0,08	0,60	0,92	2,45	1,00

Mechanical properties

R_{eL} / Rp $_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV +20°C(J)
> 355	> 540	> 22	> 100

Stress-releaving: 720°C / 30 min, cooled in oven to 300°, then air.

Suitable shielding gases : TIG-process Ar (I1 to EN 439)
MIG- process Ar + 18% CO_2 (M21)

Rod sizes available : 2,0; 2,4; 3,0; (ϕ mm) lenght:: 1000 mm
Wire sizes available: 1,0; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV (for TIG 2CrMo)

elektrode jesenice d.o.o.

VAC 60
TIG VAC 60

Classification:

EN 440	G 42 4 C/M G3Si1
EN 1668	W 42 4 W3Si1
DIN 8559	SG 2
	WSG 2
W.Nr	1.5125
ASME/AWS SFA A5.18	ER 70 S-6
EN ISO 636-A	W 42 4 W3Si1
EN ISO 636-B	W 49 4 WE
EN ISO 14341-A	G42 4M/C G3Si1
EN ISO 14341-B	G 49A 4 M/C G6

Description and application:

Solid copper coated, CTOD tested welding wire for welding in gas shielding atmospheres. Suitable for welding unalloyed steels with tensile straight below 530 N/mm^2 like boiler plate, fine-grained steels, pipe steels, shipbuilding steels and cast steels.

Base materials:

Description:	DIN, AISI:	EN:
Unalloyed steels	St 33 to St 60.2	10025
Fine-grained steels	St E 255 to St E 355	-
	W St E 255 to W St E 355	-
Boiler and vessel plate	H I, H II, 17Mn4, 19Mn5	10028-2
Pipe steels	St 35 to St 52.4	-
	E St E 210.7 to St E 360.7	-
Shipbuildibg steels	A, B, D, E	10025
Cast steel	GS 38 to GS 52	-

Chemical composition of welding wire (wt. %) :

C	Si	Mn	P	S
0,08	0,90	1,50	<0,025	<0,025

Mechanical properties of all weld metal:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa(N/mm^2)
Tensile strength	Rm:	500 - 640	MPa(N/mm^2)
Elongation	A_5:	>20	%
Impact energy	KV :	>47	J (-40°C)

Suitable shielding gases: **MAG-process** 100% CO_2, Ar + 18% CO_2, CO_2 + Ar + O_2 (C1, M21, M22 - M33 according to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,6 ; 0,8 ; 0,9 ; 1,0 ; 1,2 ; 1,6 ϕ mm)
Rod sizes available: 1.6; 2,0 ; 2,5; 3,0 (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Wire is packed in drums – 250kg. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV, DB, CR, ABS, BV, GL, LR, DNV,SŽ, (for VAC 60)
TÜV , (for TIG VAC 60)

elektrode jesenice d.o.o.

VAC 65
TIG VAC 65

Classification:

EN 440	G 46 4 C/M G4Si1
EN1668	W 46 4 W4Si1
DIN 8559	SG 3
	W SG 3
W.Nr	1.5130
ASME/AWS A - 5.18	ER 70 S-6
EN ISO 636-A	W 46 4 W4Si1
EN ISO 636-B	W 55A 4 W6
EN ISO 14341-A*	G46 4M/C G4Si1
EN ISO 14341-B*	G 55A 4 M/C G6

Description and application:

Solid copper coated, CTOD tested wire for welding in gas shielding atmospheres. Slightly higher silicon and manganese alloyed than VAC 60. The higher contains of silicon and manganese increase the yield stress and tensile strength of weld metal (compared with VAC 60). The high silicon content promotes a low sensitivity to surface impurities and contributes to smooth weld. Suitable for welding unalloyed and low alloyed construction steels with tensile straight below 640 N/mm^2 like boiler plate, fine-grained steels, pipe steels, shipbuilding steels and cast steels.

Base materials:

Description:	DIN, AISI:	EN:
Unalloyed steels	St 33 to St 60.2	10025
Fine-grained steels	St E 255 to St E 355	-
	W St E 255 to W St E 355	-
Boiler and vessel plate	H I, H II, 17Mn4, 19Mn5	10028-2
Pipe steels	St 35 to St 52.4	-
	E St E 210.7 to St E 360.7	-
Shipbuilding steels	A, B, D, E	10025

Chemical composition of welding wire (wt. %) :

C	Si	Mn	P	S
0,08	1,00	1,70	<0,025	<0,025

Mechanical properties of all weld metal:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm^2)
Tensile strength	Rm:	530 - 680	MPa(N/mm^2)
Elongation	A_5:	> 20	%
Impact energy	KV :	> 47	J (-40°C)

Suitable shielding gases: **MAG-process** 100% CO_2, Ar + 18% CO_2, CO_2 + Ar + O_2
(C1, M21, M22 - M33 according to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,6 ; 0,8 ; 0,9 ; 1,0 ; 1,2 ; 1,6 (ϕ mm)
Rod sizes available: 1.6; 2,0 ; 2,5; 3,0 (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound.
Wire can bi packed in drums.
Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV, DB, (for VAC 65)

elektrode jesenice d.o.o.

Classification:

EN 440	G 42 4 C/M G 3Ni1
ASME/WS A5.28	ER 80 S-Ni1
EN ISO 14341-A*	G 42 4M/C G3Ni1
EN ISO 14341-B*	G 49A 4 M/C GN2

VAC 60 Ni

Description and application:

Solid nickel alloyed copper coated welding wire for welding in gas shielding atmospheres. Suitable for welding high grade structural steels with tensile straight up to 685 N/mm^2 and for low temperature application.

Base materials:

Description:	DIN, AISI:	EN:
Alloyed, for construction	St E 380 to St E 500	-
Special alloyed, for constructions	W St E 380 to W St E 500	-
	T St E 380 to T St E 500	-
Unalloyed	17Mn4, 19Mn5	-
Weatherproof steels	(CORTEN, Patinax)	-

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Ni	P	S
0,08	0,80	1,50	1,10	<0,025	<0,025

Mechanical properties of all weld metal:

Yield strength	R_{eL} / Rp $_{0.2}$:	> 420	MPa(N/mm^2)
Tensile strength	Rm:	500 - 640	MPa(N/mm^2)
Elongation	A5:	> 20	%
Impact energy	KV :	>47	J (-40°C)

Suitable shielding gases: 100% CO_2, Ar + 18% CO_2, CO_2 + Ar + O_2
(C1, M21, M22 - M33 according to EN 439)

Wire sizes available: 0,8 ; 0,9 ; 1,0 ; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A5. 18 and EN 759.
Iron or plastic spools, normal or precision layer wound.

Approvals:

elektrode jesenice d.o.o.

VAC 60 Ti

Classification:

EN 440	G 42 2 C/M G 3Si1+Ti
W. Nr	1.5125
ASTM/AWS SFA 5.18	ER 70 S-2
EN ISO 14341-A*	≈G 42 2 M/A/C G3Ni1
EN ISO 14341-B*	≈G 49A 2 M/A/C G11

Description and application:

Wire electrodes of the ER 70 S - 2 classification are primarily used for single - pas welding of killed, semi - killed, rimmed steels, but may be used for some multi - pass applications. Because of the added deoxidants, it can be used for welding steels with rusty or dirty surface or for welding of galvanized steel-plates.

Base materials:

Description:	DIN, AISI:	EN:
Unalloyed steels	St 33 to St 52.3	10025
Fine-grained steels	St E 255 to St E 355	-
Boiler and vessel plate	H I, H II	10028-2

Chemical composition of welding wire (wt. %) :

C	Si	Mn	P	S	Ti
0,06	0,80	1,5	<0,020	<0,020	0,12

Mechanical properties of weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 440	MPa(N/mm^2)
Tensile strength	Rm:	> 510	MPa(N/mm^2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 47	J (-20°C)

Suitable shielding gases: Ar + 18% CO_2; Ar + 5% CO_2 (thin plates) - M21 according to EN 439
C1 according to EN 439 (dick plates)
Ar + 5% CO_2 + 5% O_2 (recommended for galvanized plates)

Wire sizes available: 0,6; 0,8; 0,9; 1,0 ; 1,14; 1,2; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A5. 18 and EN 759.
Iron or plastic spools, normal or precision layer wound.

Approvals: TÜV

elektrode jesenice d.o.o.

Classification:

EN 440	G 42 2 M/C G0
ASME/AWS A5.28	ER 80 S-G
EN ISO 14341-A*	G 42 2 M/C GO
EN ISO 14341-B*	G 49A 2 M/C GO

VAC 60 CuNi

Description and application:

Solid nickel and copper alloyed copper coated welding wire for welding in gas shielding atmospheres. Suitable for welding atmosphere resistance steels, fine-grained steels with yield strength up to 460 N/mm^2 and unalloyed and low alloyed steels with tensile straight up to 685 N/mm^2.

Base materials:

Description:	DIN, AISI:	EN:
Special alloyed, for constructions	WT St 37, WT St 52	10025
	(CORTEN A B C)	-
	(Patinox 37)	-
	(RBH 35)	-
	(HSB 37, HSB 55C)	-
	(A cor 37, A cor50)	-

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Ni	Cu	P	S
0,10	0,90	1,50	0,50	0,50	<0,025	<0,025

Mechanical properties of weld metal:

Yield strength	R_{eL} / Rp $_{0.2}$:	> 430	MPa(N/mm^2)
Tensile strength	Rm:	540 - 640	MPa(N/mm^2)
Elongation	A5:	> 20	%
Impact energy	KV :	>47	J (-20°C)

Suitable shielding gases: 100% CO_2, Ar + 18% CO_2, CO_2 + Ar + O_2
(C1, M21, M22 - M33 according to EN 439)

Wire sizes available: 1,0 ; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A5. 18 and EN 759.
Iron or plastic spools, normal or precision layer wound.

Approvals: TÜV

elektrode jesenice d.o.o.

MIG 65

Classification:

EN	-
DIN	-
ASME/AWS SFA 5.28	ER 80 S-Ni1
ISO	-
EN ISO 16834-A	G 55 2A Mn3Ni1Mo
EN ISO 16834-B	G 62A 2 N2M2T

Description and application:

Ni and Mo alloyed metal inert gas welding wire is suitable for welding fine - grained micro alloyed steels with Rp up to 550 N/mm^2.

Base materials:

Description:	DIN, AISI:	EN:
Special alloyed for constructions	E St E 380 1.8911 E St E 490 1.8919 T St E 500 1. 8917	- - -

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Ni	Mo
0,08	0,70	1,20	1,10	0,30

Mechanical properties of weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 540	MPa(N/mm^2)
Tensile strength	Rm:	> 630	MPa(N/mm^2)
Elongation	A5:	> 18	%
Impact energy	KV :	100	J (-20°C)

Suitable shielding gases: Ar + 18% CO_2,
(M21 according to EN 439)

Wire sizes available: 0,8 ; 0,9 ; 1,0 ; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A 5.18 and EN 759.
Iron or plastic spools, normal or precision layer wound.

Approvals:

elektrode jesenice d.o.o.

Classification:

EN 12534	Mn3Ni1CrMo
DIN	-
ASME/AWS SFA 5.28	ER 100 S-1
EN ISO 16834-A	G 69 4M Mn3Ni1CrMo
EN ISO 16834-B	G 69A 4M N3M2

MIG 75

Description and application:

Mn, Ni and Mo alloyed metal inert gas, CTOD tested wire, is suitable for welding fine - grained steels with high tensile straight and Rp up to 690 N/mm^2, like steels St E 550 V W. Nr. 1.8926 and St E 690 V W. Nr. 1.8928. Suitable shielding gas is mixture Ar and CO_2.

Base materials:

Description:	DIN, AISI:	EN:
Special alloyed for constructions	St E 550 V 1.8926 St E 690 V 1.8928	10137-2 10137-2

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni	Mo
0,08	0,60	1,70	0,25	1,50	0,30

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 690	MPa(N/mm^2)
Tensile strength	Rm:	770 - 940	MPa(N/mm^2)
Elongation	A5:	> 17	%
Impact energy	KV :	> 47	J (-40°C)

Suitable shielding gases: Ar + 18% CO_2, (M21 according to EN 439)

Wire sizes available: 1,0 ; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound.

Approvals: TÜV, DB, GL

elektrode jesenice d.o.o.

MIG 90

Classification:

EN 12 534	89 6M GMn4Ni2CrMo
ASME/AWS SFA 5.28	ER 120 S-G
EN ISO 16834-A	G89 6 M Mn4Ni2CrMo
EN ISO 16834-B	G 83A 6 M N4M4T

Description and application:

Mn, Ni, Cr and Mo alloyed metal inert gas welding wire is suitable for welding of higher-strength, heat treated, fine - grained constructional steels with a minimum yield strength of 890 N/mm^2

Base materials:

High-strength fine grained steels	S890Q, XABO 890, MICRAL 890

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni	Mo
0,10	0,8	1,8	0,35	2,0	0,5

Mechanical properties of all weld metal (wt. %) :

Yield strength	Rp_{eL} / $Rp_{0.2}$:	> 890	N/mm2
Tensile strength	Rm:	940-1180	N/mm2
Elongation	A5:	> 15	%
Impact energy	Av :	> 47	J (-60°C)

Suitable shielding gases: Ar + 15 - 25% CO_2, (M21 according to EN 439)

Wire sizes available: 1,0 ; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A5. 18 and EN 759 - basket spools precision layer wound.

Approvals:

elektrode jesenice d.o.o.

Classification:

EN 12072	G17
W. Nr:	1.4016
ASME/AWS A 5.9	ER 430
EN 10088-3 97	X6 Cr17
EN ISO 14343-A	G17
EN ISO 14343-B	SS430

MIG 17

Description and application:

Solid 17% Cr alloyed welding wire for welding and surfacing similar rust free ferit steels for temperatures up to 450°C. Weld metal is scale resistant and sea water resistant up to 900°C. It's suitable particularly for surfacing of valves.

Base materials:

Description:
Rust corrosion resistance steels with 13 - 18 % Cr. Other stainless steels and casts

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr
< 0,07	0,7	0,5	17

Mechanical properties of all weld metal (wt. %) :

Hardness HB	180 - 300

Suitable shielding gases: Ar + 1 – 3 % O_2, Ar + 8 % CO_2,
(M21, M13, M11 according to EN 439)

Wire sizes available: 0,8 ; 0,9 ; 1,0 ; 1,2 ; 1,6 (ϕ mm)

Form of delivery: Wire electrodes are spooled in accordance with AWS A5. 18 and EN 759.
Iron or plastic spools, normal or precision layer wound.

Approvals:

elektrode jesenice d.o.o.

MIG 19/9 Nb Si
TIG 19/9 Nb Si

Classification:

EN 12072	G 19 9 Nb Si
	W 19 9 Nb Si
DIN 8556	SG X5CrNi Nb19 9
W. Nr.	1.4551
ASME/AWS A 5.9	ER 347 Si
ISO	19/9 Nb Si
EN ISO 14343-A	G 19 9 NbSi
EN ISO 14343-A	W 19 9 NbSi
EN ISO 14343-B	SS 347 Si

Description and application:

Stabilized austenitic wire for metal gas welding of stabilized 18/8 CrNi steels, corrosion resistant. It's used for welding of devices, vessels and parts in chemical, pharmacy, cellulose and nuclear industry up to working temperature of 400°C. Welded material has oxidation resistance up to 800°C.

Base materials:

Description:	DIN:	W.n.	EN:
Alloyed corrosion resistant	X5CrNi 18 9	1. 4301	10088
	X2CrNi 18 9	1.4306	10088
	X10CrNiNb18 9	1.4550	10088

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni	Nb
0,06	0,80	2,0	19,0	9,0	0.70

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 350	MPa(N/mm^2)
Tensile strength	Rm:	570 - 670	MPa(N/mm^2)
Elongation	A_5:	> 30	%
Impact energy	KV :	> 60	J (20 °C)

Suitable shielding gases: MIG-process Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1,0; 1,2; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,4 (2,5) ; 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG 19/9 NC Si
TIG 19/9 NC Si

Classification:

EN 12072	G 19 9 L Si
	W 19 9 L Si
DIN 8556	SG X2CrNi 19 9
W. Nr.	1.4316
ASME/AWS A 5.9	ER 308 L Si
ISO	19/9 L Si
EN ISO 14343-A	G 19 9 LSi
EN ISO 14343-A	W 19 9 LSi
EN ISO 14343-B	SS 308 LSi

Description and application:

Austenitic wire for metal inert gas welding. It is suitable for welding corrosion resistant 18/8 CrNi steels for devices, vessels and parts in chemical, pharmacy and cellulose industry for temperature up to 350°C. Welded material has oxidation resistance up to 800°C and ductility to - 196°C.

Base materials:

Description:	DIN:	W.n.	EN:
Alloyed corrosion resistant	X5CrNi 18 9	1. 4301	10088
	X2CrNi 18 9	1.4306	10088
	X10CrNiNb18 9	1.4550	10088

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni
< 0,025	0,80	2,0	19,0	9,0

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 320	MPa(N/mm^2)
Tensile strength	Rm:	550 - 650	MPa(N/mm^2)
Elongation	A_5:	> 30	%
Impact energy	KV :	> 80	J (20 °C)
		>32	J (-196 °C)

Suitable shielding gases: **MIG-process** Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1; 1,2; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,5 ; 3,0 (3,25) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV (MIG and TIG)
DB (MIG)

MIG 19/12/3 NbSi
TIG 19/12/3 NbSi

Classification:

EN 12072	G 19 12 3 Nb Si W 19 12 3 Nb Si
DIN 8556	SG X5CNiMoNb 19 12
W. Nr.	1.4576
AWS A5.9	ER 318 Si
ISO	19/12/3 Nb Si
EN ISO 14343-A	G 19 12 3 NbSi
EN ISO 14343-A	W 19 12 3 NbSi
EN ISO 14343-B	≈S 318

Description and application:

It's a stabile austenitic wire for metal inert gas welding. It is suitable for welding of corrosion resistant CrNi(Mo) steels in different devices, vessels and parts in chemical-, cellulose-, colour-, food processing- and sinthetic plastic materilas- industry, up to prosessing temperature 400°C.

Base materials:

W.Nr.	DIN:	EN:
1.4401	X5 CrNiMo 17 12	X5 CrNiMo 17-12-2
1.4436	X5 CrNiMo 17 13 3	X3 CrNiMo 17-13-3
1.4571	X6 CrNiMoTi 17 12 2	X6 CrNiMoTi 17 12 2
1.4573	X10 CrNiMoTi 18 12	(X10 CrNiMoTi 18 12)
1.4580	X6 CrNiMoNb 17 12 2	X6 CrNiMoNb 17-12-2
1.4583	X10 CrNiMoNb 18 12	(X10 CrNiMoNb 18 12)

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni	Mo	Nb
0,06	0,80	1,40	19,0	12.0	2.60	0,7

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 350	MPa(N/mm^2)
Tensile strength	Rm:	570 - 670	MPa(N/mm^2)
Elongation	A_5:	> 30	%
Impact energy	KV :	> 65	J (+20 °C)

Suitable shielding gases: **MIG-process** Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1; 1,2; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,5 ; 3,0 ; 4,0 (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG 19/12/3 NCSi
TIG 19/12/3 NCSi

Classification:

EN 12072	G 19 12 3 L Si
	W 19 12 3 L Si
DIN 8556	SG X2CrNiMo19 12
W. Nr.	1.4430
ASME/AWS A.5.9.	ER 316 L Si
ISO	19/12/3 L Si
EN ISO 14343-A	G 19 12 3 LSi
EN ISO 14343-A	W 19 12 3 LSi
EN ISO 14343-B	SS 316 LSi

Description and application:

Austenitic wire for metal inert gas welding. It is suitable for welding corrosion resistant 18/8 CrNi steels for devices, vessels and parts in chemical, pharmacy and cellulose industry for temperature up to 350°C. Welded material has oxidation resistance up to 800°C and ductility to - 196°C.

Base materials:

Description	DIN:	W.Nr.
Corrosion resistant steel	X5CrNiMo 17 12 2	1. 4401
	X5CrNiMo 17 13 3	1.4436
	X6 CrNiMoTi 17 12 2	1.4571

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni	Mo
< 0,025	0,80	1.75	19	11.5	2.75

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 320	MPa(N/mm^2)
Tensile strength	Rm:	550 - 650	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 80	J (20 °C)
		>32	J (-110 °C)

Suitable shielding gases: **MIG-process** Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1; 1,2; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,5 ; 3,0 (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV (MIG and TIG)
DB (MIG)

MIG 25/14 NC Si
TIG 25/14 NC Si

Classification:

EN 12072	G 23 12 L Si
	W 23 12 LSi
DIN 8556	SG X2CrNi 24 12
W. Nr.	1.4332
ASME/AWS A 5.9	ER 309 L Si
EN ISO 14343-A	G 23 12 LSi
EN ISO 14343-A	W 23 12 LSi
EN ISO 14343-B	SS 309 LSi

Description and application:

Wire electrodes of the ER 309 L Si classification are primarily used for welding similar alloys in wrought or cast form. This electrode is also suitable for welding of "8 – 18" steel when severe corrosion conditions exist which require higher alloy content weld metal. MIG 25/14 NC Si is especially recommended for joining dissimilar steels such as "18 – 8" to mild steel and for stainless surfacing of mild steal, carbon steel and low alloy steel.

Base materials:

Description:
High alloyed steel
Steels with high tensile straight
Austenitic manganese steels
Other difficult to weld steels

Chemical compositio of welding wire (wt. %) :

C	Si	Mn	Cr	Ni
< 0,025	0,80	1,60	23,5	13,5

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / Rp $_{0.2}$:	>380	MPa(N/mm^2)
Tensile strength	Rm:	550 - 700	MPa(N/mm^2)
Elongation	A5:	>22	%
Impact energy	KV :	>40	J (20 °C)

Suitable shielding gases: MIG-process Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1,0; 1,2; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,4; (2,5) 3,0; (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG 18/8/6 Si
TIG 18/8/6 Si

Classification:

EN 12072	G 18 8 Mn
	W 18 8 Mn
DIN 8556	SG X15CrNiMn 18 8
W. Nr.	1.4370
ASME/AWS A 5.9	≈ER 307Si
ISO	18/8 Mn 6
EN ISO 14343-A	G 18 8 Mn
EN ISO 14343-A	W 18 8 Mn
EN ISO 14343-B	≈SS 307

Description and application:

Solid wires for welding dissimilar steels, armour plate, austenitic manganese steels and generally difficult to weld steels. Buttering before hardsurfacing. The weld metal remains austenitic and tough also in diluted condition. The tough weld metal is able to absorb high welding stresses, which is important particularly when welding rigid structures. Good mechanical properties, excellent ductility.

Base materials:

Description:
High alloyed steel
Steels with high tensile straight
Austenitic manganese steels
Other difficult to weld steels

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni
0,08	0,80	7,0	18,5	9,0

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 380	MPa(N/mm^2)
Tensile strength	Rm:	560 - 660	MPa(N/mm^2)
Elongation	A5:	35	%
Impact energy	KV :	> 40	J (20 °C)

Suitable shielding gases: MIG-process Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9 ; 1,0; 1,2 ; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,4 ; (2,5) 3,0 (3,25) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV, DB (for MIG)

elektrode jesenice d.o.o.

MIG 25/20
TIG 25/20

Classification:

EN 12072	G 25 20
	W 25 20
DIN 8556	SG X12CrNi 25 20
W. Nr.	1.4842
ASME/AWS A 5.9	ER 310
EN ISO 14343-A	G 25 20
EN ISO 14343-A	W 25 20
EN ISO 14343-B	SS 310

Description and application:

Austenit welding wire for metal inert gas welding. The most suitable shielding gas is argon. Welding wire is suitable for welding fire resistance steels with 25% Cr and 20% Ni and for welding fire resistance ferrite Cr – steels which are not exposed to gases with sulphurs compound. Weld has fire resistance up to 1200°C.

Base materials:

Description:	DIN, AISI:		EN:
Special alloyed - fire resistant	X15 CrNi Si 20 12	1.4828	-
	X15 CrNi Si 25 20	1.4841	10095
	X12 CrNi 25 21	1.4845	10095
	X10 CrAl 24	1.4762	10095

Chemical composition welding wire (wt. %) :

C	Si	Mn	Cr	Ni
0,12	0,50	1,75	25,0	20,0

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 300	MPa(N/mm^2)
Tensile strength	Rm:	540 - 640	MPa(N/mm^2)
Elongation	A5:	>30	%
Impact energy	KV :	>70	J (20 °C)

Suitable shielding gases: MIG-process Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1,0; 1,2; 1,6 (ϕ mm)

Rod sizes available: 1,6 ; 2,0 ; 2,4 ; (2,5) 3,0 ; (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG 29/9
TIG 29/9

Classification:

EN 12072	G 29 9
	W 29 9
DIN 8556	SG X10CrNi 30 9
W. Nr.	1.4337
ASME/AWS A 5.9	ER 312
EN ISO 14343-A	G 29 9
EN ISO 14343-A	W 29 9
EN ISO 14343-B	SS 312

Description and application:

Solid wires for welding dissimilar steels, armour plate, high carbon steel, spring steel and generally difficult to weld steels. Welded material has cracking resistance and good mechanical properties.

Base materials:

Description:
High alloyed steel
Steels with high tensile straight
Austenitic manganese steels
Other difficult to weld steels

Chemical composition of welding wire (wt. %) :

C	Si	Mn	Cr	Ni
< 0,14	0,40	1,75	30,5	9,0

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 540	MPa(N/mm^2)
Tensile strength	Rm:	740 - 850	MPa(N/mm^2)
Elongation	A5:	>18	%
Impact energy	KV :	>30	J (20 °C)

Suitable shielding gases: MIG-process Ar + 1 – 3 % O_2, Ar + 2,5 % CO_2 (M11, M13 accord. to EN 439)
TIG-process Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 0,9; 1,0; 1,2; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0 ; 2,4 (2,5); 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and DIN 8559. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg

Approvals:

elektrode jesenice d.o.o.

TIG 70/15

Classification:
EN

DIN 1736	SG Ni Cr 20 Nb
W. Nr.	2.4806
ASME/AWS A 5.14	ER Ni Cr-3

Description and application:

It's a special TIG welding rod for nickel – base alloys, high-temperature and creep resistant materials, heat resistant and cryogenic materials, joining of dissimilar steels and problem steels. It's suitable for the service temperature range –196° do 550°C, otherwise resistant to scaling up to 1200°C (S-free atmosphere).
It isn't suspectible to embrittlement. Deposited metal is fully austenitic, resistant to thermal shocks and corrosion. It has law coefficient of thermal expension and good impact values at low temperature

Base materials:

High – alloyed Cr- Cr-Ni steel
9%-Ni, 1,5-5% Ni – steels and other Ni - alloys
Unalloyed steels with high alloyed Ni - steels
''Difficult to weld'' steels
Copper and copper alloys with steels

Chemical composition of welding rod (wt.%):

Ni	Cr	Nb	Mn	Si	C
>67	20,0	2,5	3,0	< 0,3	< 0,03

Mechanical properties of all weld metal (wt.%):

Yield strength	R_{eL} / $Rp_{0.2}$:	>360	MPa(N/mm^2)
Tensile strength	Rm:	600 – 750	MPa(N/mm^2)
Elongarion	A_5:	>35	%
Impact energy	KV :	>100	J (-196 °C)

Suitable shielding gas: Ar (I1 po EN 439)

Rod sizes available: 2,0 ; 2,4 ; 3,2 ; 4 (ϕ mm) length: 1000 mm

Form of delivery: Paper carton, weight 25 kg

Classification:

EN 12072	W 22 9 3 LN
W. Nr.	1.4462
ASME/AWS A 5.9	ER 2209

elektrode jesenice d.o.o.

TIG 22/9/3 LN

Description and application:

It's a special TIG welding rod for welding ferritic- austenitic duplex steels, mainly used in petrol and chemical industy and in shipyard and ''offshore'' construction. It has excellent stress and pitting corrosion resistance (sea water and acidic solution)

Base materials:

-Feritno-avstenitna duplex jekla: 1.4462
- Varjenje različnih jekel: 1.4462 z 1.4583
1.4462 z HI/HII, StE255, 17Mn4, 15Mo3

Chemical composition of welding rod (wt.%):

C	Si	Mn	Cr	Mo	Ni	N
< 0,03	0,6	1,7	22,5	3,0	9,0	0,13

Mechanical properties of all weld metal (wt.%):

Yield strength	R_{el} / $Rp_{0.2}$:	>510	MPa(N/mm^2)
Tensile strength	Rm:	680 – 890	MPa(N/mm^2)
Elongarion	A5:	>20	%
Impact energy	KV :	>47	J (+20°C)

Suitable shielding gas: Ar (I1 acc. EN 439)

Rod sizes available: 2,0 ; 2,4 ; 3.2 ; (ϕ mm) length: 1000 mm

Form of delivery: Paper carton, weight 25 kg.

elektrode jesenice d.o.o.

MIG Cu
TIG Cu

Classification:

DIN 1733	SG-CUSN
W. Nr.	2.1006
ASME/AWS A 5.7	ER CuSn

Description and application:

It's a copper welding wire for joining copper and cast base materials.

Base materials:

Copper and copper alloys

Chemical composition of welding wire (wt. %) :

Cu	Sn	Other
rest	0,8	< 0,50

Mechanical properties of all weld metal (wt. %) :

Tensile strength	Rm:	210 - 245	MPa(N/mm^2)
Hardness		100	HB

Suitable shielding gases: Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 1,0; 1,2 ; 1,6 (ϕ mm)

Rod sizes available: 1,6 ; 2,0; 2,5 ; 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG CuAl 8
TIG CuAl 8

Classification:

DIN 1733	SG-CuAl8
W. Nr.	2.0921
ASME/AWS A 5.7	ER CuAl-A1

Description and application:

A high quality bronze aluminium wire for joining and coating similar materials, cast steels, nickel alloys, especially suitable for metalspraying.

Base materials:

Aluminium bronze: CuAl5, CuAl8
Cast steels
Nickel alloys
Brass, special brass (CuZn 20Al)

Chemical composition of welding wire (wt. %) :

Cu	Al	Ni	Mn	Fe	Other
rest	8,0	< 0,80	1,0	< 0,5	< 0,50

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 150	MPa(N/mm^2)
Tensile strength	Rm:	390 - 450	MPa(N/mm^2)
Elongation	A5:	> 45	%
Hardness		130	HB

Suitable shielding gases: Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 1,0; 1,2 ; 1,6 (ϕ mm)

Rod sizes available: 1,6 ; 2,0; 2,5 ; 3,0 (3,25) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG CuSn 6
TIG CuSn 6

Classification:

DIN 1733	SG-CuSn6
W. Nr.	2.1022
ASME/AWS A 5.7	ER CuSn-A

Description and application:

A high quality bronze wire with high tin content for MIG and TIG welding processes, especially for surfacing, giving increased hardness, can also be used for repairing worn surfaces in similar base materials.

Base materials:

Copper and copper alloys (CuSn2, CuSn6, CuSn8, CuSn6Zn…)
Grey cast iron
Tin –bronze and combination with other bronzes

Chemical composition of welding wire (wt. %) :

Cu	Sn	P	Fe	Other
rest	6,0	< 0,35	< 0,10	< 0,50

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 180	MPa(N/mm^2)
Tensile strength	Rm:	330 - 370	MPa(N/mm^2)
Elongation	A5:	> 35	%
Hardness		100	HB

Suitable shielding gases: Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 1,0; 1,2 ; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0; 2,5 ; 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG CuAg
TIG CuAg

Classification:

DIN 1733	SG-CuAg
W. Nr.	2.1211
ASME/AWS A 5.7	-

Description and application:

It's a silver-alloyed copper welding wire for joining or surfacing of copper alloyed materials.

Base materials:

Copper alloys according to DIN 1787 and DIN 17 666

Chemical composition of welding wire (wt. %) :

Cu	Ag	P	Mn	Fe	Other
rest	1,0	< 0,04	<0,1	< ,03	< 0,50

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 80	MPa(N/mm^2)
Tensile strength	Rm:	> 200	MPa(N/mm^2)
Elongation	A5:	> 20	%
Hardness		200	HB

Suitable shielding gases: Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 1,0; 1,2 ; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0; 2,5 ; 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG CuMn
TIG CuMn

Classification:

DIN 1733	SG-CuMn13Al7
W. Nr.	2.1367
ASME/AWS A 5.7	ER CuMnNiAl

Description and application:

It's a high manganese-nickel-aluminium bronze welding wire for joining or repairing of cast or wrought base materials of similar composition.

Base materials:

Aluminium bronzes with high Mn-content
Manganese-steel casting
Cast iron

Chemical composition of welding wire (wt. %) :

Cu	Al	Ni	Mn	Fe	Other
rest	8,0	< 3,0	13,0	< 4,0	< 0,50

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 400	MPa(N/mm^2)
Tensile strength	Rm:	800 - 900	MPa(N/mm^2)
Elongation	A5:	> 10	%
Hardness		200	HB

Suitable shielding gases: Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 1,0; 1,2 ; 1,6 (ϕ mm)
Rod sizes available: 1,6 ; 2,0; 2,5 ; 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

MIG CuSi 3
TIG CuSi 3

Classification:

DIN 1733	SG-CuSi3
W. Nr.	2.1461
ASME/AWS A 5.7	ER CuSi-A

Description and application:

It's suitable for welding of copper, copper-silicon and copper-zinc base materials to themselves and also to steel.

Base materials:

Brass
Materials acc. to DIN 17 666: CuSi2Mn, CuSi3Mn, CuMn2, CuMn5
Hot-dip galvanized steels

Chemical composition of welding wire (wt. %) :

Cu	Si	Sn	Mn	Fe	Other
rest	3,0	< 1,5	0,5	< 0,5	< 0,50

Mechanical properties of all weld metal (wt. %) :

Yield strength	R_{eL} / $Rp_{0.2}$:	> 120	MPa(N/mm^2)
Tensile strength	Rm:	330 - 370	MPa(N/mm^2)
Elongation	A5:	> 40	%
Hardness		90	HB

Suitable shielding gases: Ar (I1 according to EN 439)

Wire sizes available: 0,8 ; 1,0; 1,2 ; 1,6 (ϕ mm)

Rod sizes available: 1,6 ; 2,0; 2,5 ; 3,0 (3,2) (ϕ mm) length: 1000 mm

Form of delivery: Welding wires are spooled in accordance with AWS A5. 18 and EN 759. Iron or plastic spools, normal or precision layer wound. Welding rods are packed in paper carton, weight 25 kg.

Approvals:

elektrode jesenice d.o.o.

WELDING RODS FOR OXYACETILENE - WELDING

VP 37 ..... **T1**

VP 40 ..... **T2**

VP 42 ..... **T3**

VP Mo **T4**

VP CrMo **T5**

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VP 37

Classification:

EN 12536:	O I
DIN 8554:	G I
ASME/AWS A5.2 :	R 45
ISO	
W.Nr.:	1.1116

Description and application:

It's a copper-coated unalloyed rod for the gas welding of unalloyed steels with a minimum tensile strength of 340 MPa. It's suited in trade and industry for welding plates, pipes and other profiles for normal loading. Joints are homogenous and soft, the mechanical treatment is very good.

Base materials

	DIN	W.Nr.
General structural steels	St33 – St52	1.0035 - 1.0561
Pipe steels	St35,St35.8	1.0308, 1.0305

Chemical analysis of wire (wt%)

C	Si	Mn
< 0,10	< 0,20	0,50

Mechanical properties

Hardness-HB	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm (N/mm^2)	A5 (%)	KV 20°C(J)
100 - 200	>260	360 - 450	> 20	> 35 after normalizing > 65

Rod sizes available: 1,6; 2,0; 3,0; 4,0; 5,0; 6,0 (ϕ mm) length: 1000 mm

Packing: Welding rods are packed in paper carton, weight 25 kg.

Approvals: TÜV

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VP 40

Classification:

EN 12536:	O II
DIN 8554:	G II
ASME/AWS A5.2 :	R 45
ISO	
W.Nr.:	1.0459

Description and application:

It's a copper-coated unalloyed rod for the gas welding of unalloyed steels: in trade and industry for welding plates, pipes and other profiles for normal loading. Plates are thicker as at VP 37.

Base materials

	DIN	W.Nr.
General structural steels	St37-2 – St44-3	1.0037 - 1.0144
Pipe steels	St37.0 - St44.4	1.0038

Chemical analysis of wire (wt%)

C	Si	Mn
< 0,10	< 0,20	1,0

Mechanical properties

Hardness-HB	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV 20°C(J)
110 - 130	>300	390 - 440	> 20	> 50

Rod sizes available: 1,6; 2,0; 3,0; 4,0; 5,0; 6,0 (ϕ mm) length: 1000 mm

Packing: Welding rods are packed in paper carton, weight 25 kg.

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VP 42

Classification:

EN 12536:	O III
DIN 8554:	G III
ASME/AWS A5.2 :	R 60
ISO	
W.Nr.:	1.6215

Description and application:

It's a copper-coated with Mn, Ni and Mo alloyed rod for gas welding of unalloyed general steels, pipe steels and boiler plates

Base materials

	DIN	W.Nr.
General structural steels	St33 – St52-3	1.0035 - 1.0561
Pipe steels	St35.8, St45.8	1.0305 – 1.0405
Boiler plates	HII, HII, HIII, 17Mn4	1.0345, 1.0425, 1.0435, 1.0481

Chemical analysis of wire (wt%)

C	Si	Mn	Ni
< 0,15	< 0,25	1,10	0,70

Mechanical properties

Hardness-HB	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	Av 20°C(J)
110 - 130	>310	410 - 560	> 22	>47 after normalizing > 80

Rod sizes available: 1,6; 2,0; 3,0; 4,0; 5,0; (ϕ mm) length: 1000 mm

Packing: Welding rods are packed in paper carton, weight 25 kg.

Approvals: CR, GL, SŽ, TÜV

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Classification:

EN 12536:	O IV
DIN 8554:	G IV
ASME/AWS A5.2 :	R 65
ISO	
W.Nr.:	1.5425

VP Mo

Description and application:

It's a copper-coated with Mn and Mo alloyed rod for gas welding of low-alloyed structural and fire resistance steels up to process-temperature of 500°C.

Base materials

	DIN	W.Nr.
General structural steels	St37 – St42	1.0038 - 1.0570
Pipe steels	St35.8, St45.8 15Mo3	1.0305, 1.0405, 1.5415
Boiler steels	HI - HIII, 17Mn4	1.0345 - 1.0435, 1.0481

Chemical analysis of wire (wt%)

C	Si	Mn	Mo
< 0,15	<0,25	1,0	0,5

Mechanical properties

Hardness-HB	R_{eL} / $Rp_{0,2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV 20°C(J)
160 - 200	>295	440 - 540	> 18	>47

Rod sizes available: 2,0; 2.5; 3,0; 4,0; (ϕ mm) length: 1000 mm

Packing: Welding rods are packed in paper carton, weight 25 kg.

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Classification:

EN 12536:	O V
DIN 8554:	G V
ASME/AWS A5.2 :	R 65
ISO	
W.Nr.:	1.7346

VP CrMo

Description and application:

It's a copper-coated with Cr and Mo alloyed rod for gas welding of heat-resistant steels up to process-temperature of 550°C. It's used for welding of vapour boilers, pipe-lines and repairing in thermo-energetic devices. It's also used for welding of cementation- and quenched steels with equal composition.

Base materials

	DIN	W.Nr.
Boiler steels	HIV, 13 CrMo44	1.7335

Chemical analysis of wire (wt%)

C	Si	Mn	Mo	Cr
< 0,15	< 0,25	1,0	0,5	1,0

Mechanical properties

Hardness-HB	R_{eL} / $Rp_{0.2}$ MPa(N/mm^2)	Rm MPa(N/mm^2)	A5 (%)	KV 20°C(J)
160 - 200	>295	490 - 590	> 18	>47

Rod sizes available: 2,0; 2.5; 3,0; 4,0; (ϕ mm) length: 1000 mm

Packing: Welding rods are packed in paper carton, weight 25 kg.

EPP 2	**U1**
EPP 2 Mo	
EPP 2 Ni	
EPP 3	
EPP 17 Cr	
EPP 19/9 NC	
EPP 19/12/3 NC	
EPP 18/8/6	
INOX TR Cr 17	
INOX TR 19/9	

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WIRES / STRIPS

FOR SUBMERGED ARC WELDING

Description and application:

Low alloyed, copper coated welding wires and high Cr and Ni alloyed welding wires for submerged arc welding.
High alloyed strips for cladding.

Classification:

Low alloyed welding wires:

Wire:	DIN 8557	ASME/AWS:	EN 756:
EPP 2	S 2	A 5. 17 EM 12 K	S2
EPP 2 Mo	S 2 Mo	A 5. 23 EA 2	S2 Mo
EPP 3	S 3	A 5. 17 EM 13 K	S3

High Cr and Ni alloyed welding wires:

Wire:	DIN: 8556	ASME/AWS A5.9	EN 12072: EN 10088*
EPP 17 Cr		ER 430	S 17 X6 Cr17 *
EPP 19/9 NC	UP - X2 CrNi 19.9	ER 308 L	S 19 9 L
EPP 19/12/3 NC	UP - X2 CrNiMo 19.12	ER 316 L	S 19 12 3 L
EPP 18/8/6	UP - X15 CrNiMn 18.8	≅ ER 307	S 18 8 Mn

Chemical composition of welding wires/strips (wt. %) :

Wire/strip:	C	Si	Mn	Cr	Ni	Mo
EPP 2	0,10	0,15	1,00			
EPP 2 Mo	0,10	0,15	1,00			0,50
EPP 3	0,11	0,2	1,5			
EPP17 Cr / INOX TR 17Cr	0,07	0,7	0,5	17		
EPP 19/9 NC	0,025	0,40	1,60	19,0	9,0	
INOX TR 19/9	0.05	0.40	1.80	20.0	9.5	
EPP 19/12/3 NC	< 0,025	0,40	1,60	19,0	12,0	2,8
EPP 18/8/6	0,12	0,60	7,00	18,0	8,0	

Wire sizes available:
EPP 2,0 ; 2,5 ; 3,0 ; 4,0 ; 5,0 (ϕ mm)
INOX TR 30 x 0.5, 60 x 0.5 (mm)

Form of delivery:
Wires - coil sizes and weight: 280 x 420 mm, 30 kg

Strips - weight: 20 – 25 kg

FLUX-CORED WIRES FOR MIG-MAG WELDING:

1. METALIC TYP:
FILTUB 12 M V1
FILTUB 32 M V2

2. RUTILE TYP:
FILTUB 4 R V3
FILCORD 4 R V4
FILTUB 5 R V5
FILTUB 6 R V6
FILTUB 7 R V7
FILTUB 8 R V8

3. BASIC TYP:
FILTUB 12 B V9
FILTUB 14 B V10
FILTUB 16 B V11
FILTUB 18 B V12
FILTUB 19 B V13
FILTUB 25 B V14
FILTUB 28 B V15
FILTUB 32 B V16
FILTUB 36 B V17
FILTUB 38 B V18
FILTUB 40 B V19
FILTUB 42 B V20

4. FOR HARDFACING:
FILTUB DUR 3 ..... V21
FILTUB DUR 4 ..... V22
FILTUB DUR 5 ..... V23
FILTUB DUR 12 ..... V24
FILTUB DUR 14 ..... V25
FILTUB DUR 15.1 ..... V26
FILTUB DUR 16 ..... V27
FILTUB UTOP 38 ..... V28
FILTUB UTOP 55 ..... V29
FILTUB UTOP Co V30
FILTUB UTOP Mo1 ..... V31

FLUX-CORED WIRE FOR S.A.-WELDING
FILTUB 112 ..... V32
FILTUB 114 ..... V33
FILTUB 116 ..... V34
FILTUB 118 ..... V35
FILTUB 128 ..... V36
FILTUB 132 ..... V37
FILTUB 136 ..... V38
FILTUB 138 ..... V39
FILTUB 140 ..... V40

FOR HARDFACING:

FILTUB DUR 205 …… …….. V41
FILTUB DUR 212 …… …….. V42
FILTUB DUR 214 …….. V43
FILTUB DUR 215 …… …….. V44
FILTUB DUR 12Cr2NiMo …….. V45
FILTUB DUR 13Cr3NiMoV …… V46
FILTUB DUR 17 Cr …….. V47

FLUX-CORED WIRE FOR WELDING STAINLESS STEELS

FILCORD 308 L V48
FILCORD 316 L V49
FILCORD 309 L V50

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Classification:
AWS A-5.20 : E 71 T – 1M
EN 758 : T 46 4 M M 2
EN ISO 17632-A : T46 4MM1 H5
EN ISO 17632-B : T554T151MA H5

FILTUB 12 M

Description and application:

FILTUB 12M is metal-cored wire recommended for welding similar types of steels , including fine-grained steels. Because metal cored wires do not result in a slag covering the weld , they combine the benefits of the high deposition rates found in flux cored wires and the high efficiency rates of solid wires .Particularly suitable for robot and automatic welding. Features of this wire included good bead appearance with small spatter , no slag and therefore without cleaning between runs, good restricking characteristics and high mechanical properties at low temperatures .

Base materials:

Art of steel	DIN :	W.Nr. :
Non-alloyed steels :	St 33 , St 37-2 , St 44-2 , St 52-3	1.0033 , 1.0037 , 1.0044 , 1.0553
Boiler plates :	H I , H II , 17Mn4	1.0345 , 1.0425 , 1.0481
Pipe steels :	St 37-0 to St 52-0 , St 37-4 to St 52-4	1.0254 to 1.0421 , 1.0255 to 1.0581
	St 210.7 to St 415.7	1.0307 to 1.8972
	StE 290.7 TM to StE 480.7 TM	1.429 to 1.8977
Steels to API-Norm :	X 42 to X 70	
Shipbuilding steels :	A , B , D , E	1.0440 , 1.0472 , 1.0475 , 1.0476
	AH 32 to EH 36	1.0513 to 1.0589
Finegrained steels :	StE 255 to StE 460	1.0461 to 1.0562
	WStE 255 to WStE 460	1.0462 to 1.8937
Steel castings :	GS-38 , GS-45 , GS-52	1.0420 , 1.0443 , 1.0552

Heat treatment:

Type of wire :

metal cored

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	
0,05	0,55	1,40	

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	$MPa(N/mm^2)$
Tensile strength	Rm:	540 - 640	$MPa(N/mm^2)$
Elongation	A5:	> 24	%
Impact energy	KV :	> 120	J (+ 20°C)
	KV :	> 80	J (- 20°C)
	KV :	> 47	J (- 40 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	100 - 300	18 - 30	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
1,4	130 - 320	20 - 32	2,8 - 8,8	
1,6	150 - 400	22 - 34	3,0 - 9,0	

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Classification:
AWS-SFA-5.29 : E 111 T1-K 4H4
EN 12535 : T 69 4 Mn 2Ni Cr Mo M M 1 H5
EN ISO 18762-A: T 69 4 Mn2NiCrMoMM1 H5
EN ISO 18762-B: T 76 4 T5-1MA-N4C1M2 H5

FILTUB 32M

Description and application:

FILTUB 32M is metal-cored medium alloy flux-cored wire recommended for welding high-strength fine-grain structural steels and creep resistant fine-grain structural steels . Optimal results are obtained at a heat input of E ≤ 18 kJ / cm and at an interpass temperature of 100 - 150 °C . Features of this wire included stable arc with no spatter , regular bead appearance and no slag .Especially is suitable for automated and robotized applications.

Base materials:

Art of steel	DIN :	W.Nr. :
Creep resistant finegrained steels :	NAXTRA 63 , NAXTRA 70 T 1 , T 1A , T 1B (TStE 690)	1.8954 , 1.8964 1.8920 , 1.8921 , 1.8922

Heat treatment:

Type of wire :

metal-cored

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0,05	0,40	1,50	0,50	2,20	0,50

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	Rp 0.2 %:	> 690	N/mm2
Tensile strength	Rm:	760 - 900	N/mm2
Elongation	A5:	> 16	%
Impact energy	Av :	> 80	J (+20°C)
	Av :	> 70	J (± 0°C)
	Av :	> 60	J (- 20°C)
	Av :	> 55	J (- 40°C)
	Av :	> 47	J (- 60°C)

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	150 - 320	20 - 32	3,0 - 10,0	K 300 , D 300
	1,4	170 - 360	22 - 36	2,8 - 8,8	lay to lay
	1,6	200 - 390	24 - 37	4,0 - 10,0	weight :
					approx. 15 kg

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FILTUB 4 R

Classification:
AWS-SFA-5.20 : E 71 T - 1
EN 758 : T 46 4 P M 1 /
T 46 4 P C 1
EN ISO 17632-A : T464C/M1 H5
EN ISO 17632-B : T554T1-C/MA H5

Description and application:

FILTUB 4R is rutile flux-cored wire suitable for welding similar types of steels including fine-grain structural steels, shipbuildung steels and pipe steels. It features good weldability in all positions, low spatter losses, excellent bead appearance and good slag detachability. The welding with high current consequently giving a high deposition rate .

Base materials:

Art of steel	DIN :	W.Nr. :
Non-alloyed steels :	St 33 , St 37-2 , St 44-2 , St 52-3	1.0033 , 1.0037 , 1.0044 , 1.0553
Boiler plates :	H I , H II , 17Mn4	1.0345 , 1.0425 , 1.0481
Pipe steels :	St 37-0 to St 52-0 , St 37-4 to St 52-4	1.0254 to 1.0421 , 1.0255 to 1.0581
	St 210.7 to St 415.7	1.0307 to 1.8972
	StE 290.7 TM to StE 480.7 TM	1.0429 to 1.8977
Shipbuilding steels :	A , B , D , E	1.0440 , 1.0472 , 1.0475 , 1.0476
	AH 32 to EH 36	1.0513 to 1.0589
Steels to API-Norm :	X 42 to X 70	
Finegrained steels :	StE 255 to StE 460	1.0461 to 1.0562

Heat treatment:

Type of wire :

rutile

Welding current:

DC +

Welding positions:

Shielding gas : (EN 439)

CO_2 ; M 21
consumption 10 - 12 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	
0,05	0,55	1,20	

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 470	MPa(N/mm^2)
Tensile strength	Rm:	540 - 640	MPa(N/mm^2)
Elongation	A_5:	> 23	%
Impact energy	KV :	> 110	J (+20 °C)
	KV :	> 70	J (-20 °C)
	KV :	> 55	J (-40 °C)

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
CR : 3YS					
ABS : 3YSA	1,2	130 - 250	22 - 28	3,0 - 10,0	K 300 , D 300
BV : 3A3YM	1,4	150 - 300	22 - 30	2,8 - 8,8	lay to lay
GL : 3YS	1,6	200 - 400	25 - 34	4,0 - 10,0	weight :
LR					approx. 15 kg
DNV : IIIYMS					
SŽ/UIC					

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Classification:
AWS,ASME SFA-5.20 : E 71 T - 1
EN 758 : T 42 2 P C
EN ISO 17632-A : T464C/M1 H10
EN ISO 17632-B : T5541-T1-C/MA H10

FILCORD 4R

Description and application:

FILCORD 4R is rutile flux-cored wire suitable for welding similar types of steels including fine-grain structural steels, shipbuildung steels and pipe steels. It features good weldability in all positions, low spatter losses, excellent bead appearance and good slag detachability. The welding with high current consequently giving a high deposition rate .

Base materials:

Art of steel	DIN :	W.Nr. :
Non-alloyed steels :	St 33 , St 37-2 , St 44-2 , St 52-3	1.0033 , 1.0037 , 1.0044 , 1.0553
Boiler plates :	H I , H II , 17Mn4	1.0345 , 1.0425 , 1.0481
Pipe steels :	St 37-0 to St 52-0 , St 37-4 to St 52-4	1.0254 to 1.0421 , 1.0255 to 1.0581
	St 210.7 to St 415.7	1.0307 to 1.8972
	StE 290.7 TM to StE 480.7 TM	1.0429 to 1.8977
Shipbuilding steels :	A , B , D , E	1.0440 , 1.0472 , 1.0475 , 1.0476
	AH 32 to EH 36	1.0513 to 1.0589
Steels to API-Norm :	X 42 to X 70	
Finegrained steels :	StE 255 to StE 460	1.0461 to 1.0562

Heat treatment:

Type of wire :

rutile

Welding current:

DC +

Welding positions:

Shielding gas : (EN 439)

CO_2
consumption 20 - 25 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	
0,035	0,50	1,45	

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 470	MPa(N/mm^2)
Tensile strength	Rm:	540 - 640	MPa(N/mm^2)
Elongation	A5:	> 23	%
Impact energy	KV :	> 110	J (+20 °C)
	KV :	> 70	J (-20 °C)

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	120 - 300	22 - 28	3,0 - 10,0	K 300 , D 300
	1,4	150 - 350	22 - 30	2,8 - 8,8	lay to lay
	1,6	180 - 450	25 - 34	4,0 - 10,0	weight :
					approx. 15 kg

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Classification:
AWS A-5.29 :E 71 T1-G
EN 758 :T 46 A 1 NiCrCuP M 1
EN ISO 17632-A :T504 ZPC/M1H5
EN ISO 17632-B :T554T1-1C/MA-NCC1 H5

FILTUB 5R

Description and application:

FILTUB 5R is rutile flux-cored wire suitable for welding steel resistant to atmosferic corrosion such as CORTEN, Patinax, Acor, etc. Features of this wire includes good weldability in positions, good bead appearance and easy slag removal .

Base materials:

Art of steel		W.Nr. :
Weather corrosion resistant steels :	WTSt 37-3 , WTSt 52-3 CORTEN A , B , C Patinax 37 Acor 37 , Acor 50 ČSN 15217	1.8961 , 1.8963 1.8962 , 1.8963 1.8960 1.8960 , 1.8962 1.8963

Heat treatment:

Type of wire :

rutile

Welding current:

DC +

Welding positions:

Shielding gas :
(EN 439)

M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Cr	Cu
0,07	0,50	0,90	0,60	0,50	0,40

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm^2)
Tensile strength	Rm:	530 - 680	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 47	J (- 40 °C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	130 - 250	22 - 28	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	150 - 300	22 - 30	2,8 - 8,8	
	1,6	200 - 400	25 - 34	4,0 - 10,0	

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FILTUB 6 R

Classification:
AWS A-5.29 : E 70 T1-G
EN 758 :T 42 A 1 Ni P C 1 /
T 42 A 1 Ni P M 1
EN ISO 17632-A :T42A ZPC/M 1 H5
EN ISO 17632-B :T49Y T1-1C/MA-G H5

Description and application:

FILTUB 6R is rutile flux-cored wire suitable for welding weatherproof steels. For welding thick workpieces and for use under high resistant conditions is better suited FILTUB 40B. Features of this wire include good weldability in positions, good bead appearance and easy slag removal.

Base materials:

Art of steel	DIN	W.Nr. :
Weather corrosion resistant steels :	WTSt 37-3 , WTSt 52-3 CORTEN A , B , C Patinax 37 Acor 37 , Acor 50 RBH 35	1.8961 , 1.8963 1.8962 , 1.8963 1.8960 1.8960 , 1.8962

Heat treatment:

Type of wire :

rutile

Welding current:

DC +

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Cu
0,05	0,40	1,10	1,20	0,50

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 430	MPa(N/mm^2)
Tensile strength	Rm:	520 - 620	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 80	J (+20 °C)
Hardness:			

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	130 - 250	22 - 28	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
1,4	150 - 300	22 - 30	2,8 - 8,8	
1,6	200 - 400	25 - 34	4,0 - 10,0	

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FILTUB 7 R

Classification:
AWS-SFA-5.29 :E 81 T1 - Ni1
EN 758 :T 46 4 1Ni P M1
BS 7084-89 : T561 GPH
EN ISO 17632-A :T46 6 1NiPM1 H5
EN ISO 17632-B :T556T1-1MA-N1 H5

Description and application:

FILTUB 7R is rutile nickel alloy tubular flux-cored wire suitable for welding fne-grain structural steels and high strength steels up to tensile strength 580 N / mm^2 and good notch toughness up to - 40°C. Its features include good weldability in all positions for diameters Φ 1,2 and 1,4 mm, good slag detachability, fine bead appearance and low spatter losses . Particularly suitable for mechanised circumferential pipe welding .

Base materials:

Art of steel	DIN	W.Nr. :
Constructional steels and	St 37.2 , St 44.2 , St 52.3	1.0037 , 1.0044 , 1.0570
boiler plates :	H I , H II , 17Mn4	1.0345 , 1.0425 , 1.0481
Pipe steels :	St 37-0 to St 52-0	1.0254 to 1.0481
	St 37-4 to St 52-4	1.0255 to 1.0581
	StE 210.7 to StE 415.7	1.0319 to 1.8972
	StE 290.7 to StE 480.7	1.484 to 1.8977
Steels to API-Norm :	X 42 to X 80	
Shipbuildung steels :	AH 32 to AH 36	1.0513 to 1.0583
Fine-grain structural steels	StE 255 to STE 460	1.0461 to 1.8905
	EStE 255 to EStE 460	1.1103 to 1.8918

Heat treatment:

Type of wire :

rutile

Welding current:

DC +

Welding positions:

Shielding gas : (EN 439)

M 21
consumption : 10 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	
0,05	0,50	1,20	1,0	

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490	MPa(N/mm^2)
Tensile strength	Rm:	560 - 660	MPa(N/mm^2)
Elongation	A5:	> 23	%
Impact energy	KV :	> 110	J (+ 20°C)
	KV :	> 80	J (- 20°C)
	KV :	> 60	J (- 40°C)
	KV :	> 47	J (- 60°C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	130 - 250	22 - 28	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	150 - 300	22 - 30	2,8 - 8,8	
	1,6	200 - 400	25 - 34	4,0 - 10,0	

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FILTUB 8 R

Classification:
AWS-SFA-5.29 : E 81 T1-A1
EN 758 : T 46 A Mo P M 2
EN ISO 17634-A : TMoPC/M1 H5
EN ISO 17634-B : T49T1-1C/M-2M3 H5
EN ISO 17632-A : T46 AMoPM1 H5
EN ISO 17632-B : T55YT1-1MA-2M3 H5

Description and application:

FILTUB 8R is rutile molibden alloy tubular flux-cored wire recommended for welding creep resistant boiler plates, pressure pipe steels and fine-grain structural steels resistant to creep up to 520°C. Rutile all-positional flux-cored wire with high deposition rate by welding with high currents. Features of this wire included stabile arc with minimal spatter, good slag detachability and fine bead appearance.

Base materials:

Art of steel	DIN :	W.Nr. :
Boiler plates :	H I , H II , H III 17Mn4 , 19Mn5	1.0345 , 1.0425 , 1.0435 1.0481 , 1.0482
Pipe steels :	St 35.8 , St 45.8 15Mo3	1.0305 , 1.0405 1.5415
Steels to API-Norm :	X 42 to X 80	
Finegrained steels	StE 255 to StE 460	1.0461 to 1.8905

Heat treatment:

Type of wire :

rutile

Welding current:

DC +

Welding positions:

Shielding gas : (EN 439)

M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo	
0,05	0,35	1,20	0,60	

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 490	MPa(N/mm^2)
Tensile strength	Rm:	550 - 650	MPa(N/mm^2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 75	J (+20 °C)
Hardness:			

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	130 - 250	22 - 28	3,0 - 10,0	K 300 , D 300
	1,4	150 - 300	22 - 30	2,8 - 8,8	lay to lay
	1,6	200 - 400	25 - 34	4,0 - 10,0	weight :
					approx. 15 kg

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Classification:
AWS-SFA-5.20 : E 70 T – 5 H5
EN 758 : T 42 4 B C 3 /
T 42 4 B M 3
BS 7084-89 : T 540 GBH
EN ISO 17632-A : T424BM/C3 H5
EN ISO 17632-B : T494T5.3M/CA H5

FILTUB 12 B

Description and application:

FILTUB 12B is basic flux-cored wire suitable for welding non-alloyed structural steels, boiler plates, pipe steels age-resistant steels, shipbuildung steels and fine-grain structural steels. Also is suitable for welding steels with high C content. Its features include high grade mechanical properties at low temperatures, low hydrogen quality weld metal with a high resistance to cracking in joints under restraint, good weldability, low spatter and easy slag removal .

Base materials:

Art of steel	DIN :	W.Nr. :
Non-alloyed steels :	St 33 to St 70	1.0033 to 1.0070
Boiler plates :	H I , H II , 17Mn4 , 19Mn5	1.0345 , 1.0425 , 1.0481 , 1.0482
Pipe steels :	St 37-0 to St 52-0 , St-37-4 to St-52-4	1.0254 to 1.0421 , 1.0255 to 1.0581
	StE 210.7 to StE 360.7	1.307 to 1.0582
Steels to API-Norm :	X 42 to X 80	
Age-resistant steels :	Ast 35 to Ast 45	1.0346 to 1.0436
Shipbuildung steels :	A , B , D , E	1.0440 , 1.0472 , 1.0475 , 1.0476
Steel castings :	GS-38 to GS-60	1.0420 to 1.0558
Finegrained steels :	StE 255 to StE 355	1.0461 to 1.0562
	WStE 255 to WStE 355	1.0462 to 1.0565
	TStE 255 to TStE 355	1.0463 to 1.0566

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	
0,05	0,35	1,40	

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 420	MPa(N/mm^2)
Tensile strength	Rm:	510 - 610	MPa(N/mm^2)
Elongation	A_5 :	> 26	%
Impact energy	KV :	> 160	J (+ 20 °C)
	KV :	> 100	J (- 20 °C)
	KV :	> 60	J (- 40 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300
1,4	170 - 290	22 - 30	2,8 - 8,8	lay to lay
1,6	200 - 350	24 - 34	4,0 - 10,0	weight :
				approx. 15 kg

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Classification:
AWS A-5.29 : E 80 T5-G
EN 758 : T 46 2 Mo B C 3 /
T 46 2 Mo B M 3
EN ISO 17634-A : TMoBC/M1 H5
EN ISO 17634-B : T49T5-0M/C-2M3 H5
EN ISO 17632-A : T46 4MoBC/M3 H5
EN ISO 17632-B : T554T53M/CA-2M3 H5

FILTUB 14 B

Description and application:

FILTUB 14B is basic flux-cored wire recommended for welding creep resistant boiler plates, pipe steels and fine-grain structural steels up to operating temperatures of 500°C. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability .

Base materials:

Art of steel	DIN :	W.Nr. :
Boiler plates and	17Mn4 , 19Mn5 , 15Mo3	1.0481 , 1.0482 , 1.5415
Pipe steels :	16Mo5 , St 45.8 , StE 360.7	1.5423 , 1.0405 , 1.0582
	StE 385.7 , StE 415.7	1.8970 , 1.8972
Steels to API-Norm :	X 52 , X 56 , X 60	
Finegrained steels :	StE 355 to StE 460	1.0562 to 1.8905
	WStE 355 to WStE 460	1.0565 to 1.8935
	TStE 355 to TStE 460	1.0566 to 1.8915
Steel castings :	GS-52 , GS-60 , GS-20Mn5	1.0552 , 1.0558 , 1.1120
	GS-22Mo4	1.5419

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo
0,05	0,40	1,40	0,50

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 480	MPa(N/mm^2)
Tensile strength	Rm :	540 - 640	MPa(N/mm^2)
Elongation	A_5 :	> 23	%
Impact energy	KV :	> 110	J (+ 20°C)
	KV :	> 80	J (- 20°C)
	KV :	> 45	J (- 40°C)

Welding and packing data:

Approvals:

Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300
1,4	170 - 290	22 - 30	2,8 - 8,8	lay to lay
1,6	200 - 350	24 - 34	4,0 - 10,0	weight :
				approx. 15 kg

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Classification:
AWS A-5.29 :E 80 T5-B2
EN 12071 :T Cr Mo 1 B C (M) 3
EN ISO 17634-A :TCrMo1BM/C 3H5
EN ISO 17634-B :T55T5-OM/C-1CM-H5

FILTUB 16 B

Description and application:

FILTUB 16B is basic flux-cored wire recommended for welding creep resistant CrMo-alloy boiler plates, pipe steels and cast steels for service temperatures up to 500°C. Preheating dependent on thicknes 160 - 190 °C is essential followed by post weld heat treatment at 700°C. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN :	W.Nr. :
Boiler plates and tubes :	H IV L , 13CrMo44 16CrMoV4 , 11CrMo55	1.0447 , 1.7335 1.7728 , 1.7339
Steel for the cementation :	15Cr3 , 16MnCr5 20MnCr5 , 15CrMo5	1.7015 , 1.7131 1.7147 , 1.7262
Steel castings :	GS-17CrMo55 , GS-22CrMo54 GS-17CrMnMo55	1.7357 , 1.7354 1.7352

Heat treatment:

Tempered at 700°C 1h / cooled in oven down to 300°C .

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas :
(EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,06	0,40	1,0	1,20	0,50

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm^2)
Tensile strength	Rm:	550 - 650	MPa(N/mm^2)
Elongation	A_5:	> 20	%
Impact energy	KV :	> 110	J (+20°C)
Hardness:			

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	170 - 290	22 - 30	2,8 - 8,8	
	1,6	200 - 350	24 - 34	4,0 - 10,0	

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Classification:
AWS-SFA-5.29 :E 80 T5-G
EN 12071 :T Cr Mo 2 B C (M) 3
EN ISO 17634-A :TCrMo2BM/C 3H5
EN ISO 17634-B :T62T5-OM/C-2C1M-H5

FILTUB 18 B

Description and application:

FILTUB 18B is basic flux-cored wire recommended for welding creep resistant 2,2 % Cr and 1,0 % Mo alloy boiler plates and pipe steels for service temperatures up to 600°C. Preheat and interpass temperatures 175 ± 15°C. Postweld annealing at 690 - 720°C 1 - 2 h and cooling down to 300°C in furnace. Feattures of this wire included stablearc with low spatter, regular bead appearance and good slag detachability .

Base materials:

Art of steel	DIN :	W.Nr. :
Heat resistant steels :	10CrMo 9.10 , 10CrSiMoV 12CrSiMo8	1.7380 , 1.8075
Steel castings :	GS-17CrMo9.10 , GS-12CrMo9.10 GS-19CrMo9.10	1.7379 , 1.7380 1.7382

Heat treatment:

Tempered at 700°C 1 h / cooled in oven down to 300°C .

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,06	0,40	0,90	2,20	1,0

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 550	MPa(N/mm^2)
Tensile strength	Rm:	640 - 750	MPa(N/mm^2)
Elongation	A5:	> 16	%
Impact energy	KV :	> 47	J (+20 °C)
Hardness:			

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	170 - 290	22 - 30	2,8 - 8,8	
	1,6	200 - 350	24 - 34	4,0 - 10,0	

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Classification:
AWS-SFA-5.29 : E 90 T5-G
EN 12071 : T Cr Mo 2 B C (M) 3

FILTUB 19 B

Description and application:

FILTUB 19B is basic flux-cored wire recommended for welding creep resistant 3,0 % Cr Mo V alloyed boiler plates and pipe steels for service temperatures up to 600°C. Preheat and interpass temperatures 200 - 250 °C. Postweld annealing at 690 - 710°C 1 - 2 h and cooling down to 300°C. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN :	W.Nr. :
Creep resistant finegrained steels	10CrMo11 17CrMoV10	1.7276 1.7766

Heat treatment:

Tempered 5 h on 650ºC / air-cooled + 17 h on 690ºC / air-cooled

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V
0,10	0,25	0,60	3,0	0,30	0,15

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 450	MPa(N/mm^2)
Tensile strength	Rm:	550 - 650	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 140	J (+20 °C)
	KV :	> 120	J (± 0 °C)
	KV :	> 100	J (- 20 °C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	170 - 290	22 - 30	2,8 - 8,8	
	1,6	200 - 350	24 - 34	4,0 - 10,0	

Classification:
AWS-SFA-5.29 : E 90 T5-G
EN 758 : -

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FILTUB 25 B

Description and application:

FILTUB 25B is basic flux-cored wire recommended for welding creep resistant CrMoV-alloy steels and cast steels for service temperatures up to 550°C. Preheat and interpass temperatures 170 - 200°C. Postweld annealing at 690 - 710°C 1 - 2 h and cooling down to 300°C in furnace. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability .

Base materials:

Art of steel	DIN :	W.Nr.:
Creep resistant steels :	21CrMoV5 11 , 14CrMoV6 9 15CrMoV5 9	1.8070 , 1.7735
Cast steels :	GS-17CrMoV 5 11 S	1.7706

Heat treatment:

Tempered 2 h at 700°C / cooled in oven down to 300°C .

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	Ni	V
0,08	0,30	0,90	1,20	1,00	0,40	0,25

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 500	MPa(N/mm^2)
Tensile strength	Rm:	660 - 800	MPa(N/mm^2)
Elongation	A5:	> 15	%
Impact energy	KV :	> 50	J (+20 °C)
Hardness:			

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	170 - 290	22 - 30	2,8 - 8,8	
	1,6	200 - 350	24 - 34	4,0 - 10,0	

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FILTUB 28 B

Classification:
AWS-SFA-5.29 :E 90 T5-G
EN 758 :T 50 6 1 Ni Mo B C 3 /
T 50 6 1 Ni Mo B M 3
EN ISO 18276-A :T5561NiMoBC/M 3H5
EN ISO 18276-B :T626T4-3C/M-N2M2 H5

Description and application:

FILTUB 28B is medium alloy basic flux cored wire recommended for welding fine-grain structural steels and creep resistant fine-grain structural steels up to yield strength of 600 N / mm^2. Features of this wire included excellent mechanical properties at low temperatures, stable arc with low spatter, regular bead appearance and good slag detachability .

Base materials:

Art of steel	DIN :	W.Nr. :
Finegrained steels :	StE 460 , StE 500	1.8905 , 1.8907
	WStE 500 , TStE 460	1.8937 , 1.8915
Creep resistant	TStE 500	1.8917
finegrained steels :	NAXTRA 56 , NAXTRA 63	1.8944 , 1.8954
	HY 80	1.6780
Heat-treated	WB 35 , WB 36	1.8817 , 1.6368
finegrained steels :	BHW 35 , BHW 38	1.8807

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l/min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Mo
0,05	0,35	1,40	1,20	0,40

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 560	MPa(N/mm^2)
Tensile strength	Rm:	650 - 750	MPa(N/mm^2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 120	J (+ 20°C)
	KV :	> 110	J (± 0°C)
	KV :	> 80	J (- 20°C)
	KV :	> 60	J (- 40°C)
	KV :	> 47	J (- 60 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
1,4	170 - 290	22 - 30	2,8 - 8,8	
1,6	200 - 350	24 - 34	4,0 - 10,0	

Classification:
AWS-SFA-5.29 : E 110 T5-K 4
EN 12535 : T 69 6 Mn 2Ni Cr Mo B M(C) 3
EN ISO 18276-A :T696Mn2NiCrMoBM/C 3H5
EN ISO 18276-B :T766T5-3M/CA-N4C1M2 H5

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FILTUB 32 B

Description and application:

FILTUB 32B is basic medium alloy flux-cored wire recommended for welding high-strength fine-grain structural steels and creep resistant fine-grain structural steels. Optimal results are obtained at a heat input of E ≤ 15 kJ / cm and at an interpass temperature of 100 - 150 °C. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN :	W.Nr. :
Creep resistant finegrained steels :	NAXTRA 63 , NAXTRA 70 T 1 , T 1A , T 1B (TStE 690)	1.8954 , 1.8964 1.8920 , 1.8921 , 1.8922

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0,05	0,35	1,40	0,40	2,20	0,40

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 690	MPa(N/mm^2)
Tensile strength	Rm:	750 - 850	MPa(N/mm^2)
Elongation	A5:	> 16	%
Impact energy	KV :	> 80	J (+20°C)
	KV :	> 70	J (± 0°C)
	KV :	> 60	J (- 20°C)
	KV :	> 55	J (- 40°C)
	KV :	> 47	J (- 60°C)

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300
	1,4	170 - 290	22 - 30	2,8 - 8,8	lay to lay
	1,6	200 - 350	24 - 34	4,0 - 10,0	weight :
					approx. 15 kg

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Classification:
AWS-SFA-5.29 : E 80 T5-G
EN 758 : T 42 6 2Ni B M 3
EN ISO 17632-A :T428 2NiBM3 H5
EN ISO 17632-B :T498T5-3MA-N5 H5

FILTUB 36 B

Description and application:

FILTUB 36B is medium alloy highly basic type flux cored wire recommended for welding fine grain structural steels and cryolitic steels. Optimal results are obtained at a heat input of E ≤ 12 kJ / cm and interpass temperatures schould not exceed 120°C. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN :	W.Nr. :
Finegrained steels :	TStE 255 to TStE 380 EstE 255 to EStE 380	1.0463 to 1.8910 1.1103 to 1.8911
Cryolitic steels :	TTSt 35N , TTSt 35V TTSt 41N , TTSt 41V TTSt 45N , TTSt 45V 14Ni6 , 10Ni14 16Ni14	1.1101 , 1.1101 1.5622 , 1.5637 1.5639

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	
0,05	0,25	0,.90	2,50	

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 440	MPa(N/mm^2)
Tensile strength	Rm :	520 - 620	MPa(N/mm^2)
Elongation	A5:	> 26	%
Impact energy	KV :	> 160	J (+ 20 °C)
		> 100	J (- 40 °C)
		> 47	J (- 80 °C)

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300
	1,4	170 - 290	22 - 30	2,8 - 8,8	lay to lay
	1,6	200 - 350	24 - 34	4,0 - 10,0	weight :
					approx. 15 kg

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Classification:
AWS-SFA-5.29 :E 120 T5-G
EN 758 : -
EN ISO 18276-A :T894Mn2Ni1CrMoBM3 H5
EN ISO 18276-B :T834T5-3MA-N4C2M2 H5

FILTUB 38 B

Description and application:

FILTUB 38B is medium alloy highly basic type flux cored wire recommended for welding high-strength fine grain structural steels with yield strength up to 880 N / mm^2. Optimal results are obtained at a heat input of E ≤ 15 kJ / cm and interpass temperatures schould not exceed 150°C. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN	W.Nr. :
Finegrained steels :	StE 460 , StE 500	1.8905 , 1.8907
	WStE 500 , TStE 460	1.8937 , 1.8915
Creep resistant	TStE 500	1.8917
finegrained steels :	NAXTRA 56 , NAXTRA 63	1.8944 , 1.8954
	HY 80	1.6780
	WB 35 , WB 36	1.5403 , 1.6368
	BHW 35 , BHW 38	1.8807
	XABO 620 , XABO 890 , XABO 960	1.8914 , 1.8925 , 1.8933

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0,05	0,45	1,60	1.0	2,10	0,40

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 880	MPa(N/mm^2)
Tensile strength	Rm:	940 - 1050	MPa(N/mm^2)
Elongation	A5 :	> 14	%
Impact energy	KV :	> 60	J (± 0°C)
	KV :	> 55	J (- 20°C)
	KV :	> 47	J (- 40°C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
1,4	170 - 290	22 - 30	2,8 - 8,8	
1,6	200 - 350	24 - 34	4,0 - 10,0	

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Classification:
AWS-SFA-5.29 : E 80 T5-G
EN 758 : T 46 6 1Ni B C 3
≈EN ISO 17632-A :T466ZBM/C 3H5
≈EN ISO 17632-B :T556T5-3M/CA-G H5

FILTUB 40 B

Description and application:

FILTUB 40B is highly basic medium alloy lux-cored wire recommended for welding NiCu-alloyed steels, resistant to atmospheric corrosion and fine-grain structural steels such as Corten , Patinax , Acor and similar Features of this wire included excellent mechanical properties at low temperatures, stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN :	W.Nr. :
Weather corroion resistant steels :	StE 420 , StE 460 ACOR 37-2 , ACOR 37-3 , ACOR 52-3 CORTEN A,B Patinax 37	1.8902 , 1.8905 1.8960 , 1.8961 , 1.8963 1.8962 , 1.8963 1.8960
Fine-grain structural steels :	WStE 420 , WStE 460 TStE 420 , TStE 460 EStE 420 , EStE 460	1.8932 , 1.8935 1.8912 , 1.8915 1.8913 , 1.8918

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	P	S	Ni	Cu
0,05	0,35	1,20	> 0,020	> 0,020	1,20	0,50

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 470	MPa(N/mm^2)
Tensile strength	Rm:	540 - 640	MPa(N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 130	J (+ 20°C)
	KV :	> 90	J (- 20°C)
	KV :	> 47	J (- 60°C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
1,4	170 - 290	22 - 30	2,8 - 8,8	
1,6	200 - 350	24 - 34	4,0 - 10,0	

Classification:
AWS A-5.29 : E 110 T5 - G
EN 758 : -

FILTUB 42 B

Description and application:

FILTUB 42B is highly basic medium alloy flux-cored wire recommended for welding and hardsurfacing of forming and stamping tools dies, rollers and similar components. Preheating and interpass temperatures should be adjusted depending on the base material. Mechanical properties of weld metal dependent upon heat treatment. Features of this wire included stable arc with low spatter, regular bead appearance and good slag detachability.

Base materials:

Art of steel	DIN :	W.Nr. :
Machine and tool steels :	34CrNiMo6 , 30CrNiMo8 , 34CrMo4 25CrMo4 , 28NiCrMo4 ,28NiCrMo5 5 32NiCrMo8 5	1.6582 , 1.6580 , 1.7220 1.7218 , 1.6513 , 1.6732 1.6581
Steel castings :	GS-24CrNiMo3 2 5	1.6552

Heat treatment:

Tempered 2 h at 640ºC / cooled in oven down to 300ºC .

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0,12	0,35	1,10	1,00	2,20	1,00

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 720	MPa(N/mm^2)
Tensile strength	Rm:	840 - 950	MPa(N/mm^2)
Elongation	A5:	> 15	%
Impact energy	KV :	> 55	J (+ 20 °C)
Hardness:			

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	150 - 250	20 - 27	3,0 - 10,0	K 300 , D 300 lay to lay weight : approx. 15 kg
1,4	170 - 290	22 - 30	2,8 - 8,8	
1,6	200 - 350	24 - 34	4,0 - 10,0	

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Classification:
DIN 8555 : MSG 1-GF-C1-250/
MSG 1-GF-M21-250
EN 14700 : T Fe1

FILTUB DUR 3

Description and application:

FILTUB DUR 3 is rutil medium alloyed flux-cored wire recommended for wear-resistant and impact-resistant surfacing in the medium hardness range. It is also useful as a buffer layer of difficult-to-weld steels. The temperature betwen runs schould not exceed 250°C. The deposit is good machineable and suitable for flame and induction hardening.
Suitable for surfacing parts of: caterpilar track rollers, guide rolls, railway tyres, runing wheels, etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

rutile

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	
0,16	0,40	1,40	0,80	

Mechanical properties:

Hardness: 225 - 275 HB

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	180 - 340	24 - 30	3,0 - 8,0	
	1,6	220 - 420	26 - 32	4,0 - 9,5	

Classification:
DIN 8555 : MSG 1 – GF – M21 – 300
MSG 1 – GF – C1 – 300

FILTUB DUR 4

Description and application:

FILTUB DUR 4 is metal cored medium alloyed flux-cored wire recommended for hardsurfacing of steels in the medium hardness range. The deposit is tough, free of cracks and porosity and therefre is highly resistant to deformation and impact . On base materials with low weldability is recommended depositing a buffer layer with FILTUB 12B. The temperature betwen runs schould not exceed 250°C. Machineable with ordinary cutting tools is posible. Suitable for surfacing parts of: crane wheels, wheels for mine trucks, pulleys, rollers, wobblers, catterpillar track rollers etc.

Base materials:

Steels Cast steels	

Heat treatment:

Type of wire :

Metal cored

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	
0,20	0,60	1,50	1,20	

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Hardness: 275 - 325 HB

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
	1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
	1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
					approx. 15 kg

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Classification:
DIN 8555 : MSG 1-GF-C1-350 P/
MSG 1-GF-M21-350 P
EN 14700 : T Fe1

FILTUB DUR 5

Description and application:

FILTUB DUR 5 is rutil medium alloyed flux-cored wire recommended for hardsurfacing of steels in the medium hardness range. The deposit is tough, free of cracks and porosity and therefre is highly resistant to deformation and impact. On base materials with low weldability is recommended depositing a buffer layer with FILTUB 12B. The temperature betwen runs schould not exceed 250°C. Machineable with ordinary cutting tools is posible. Suitable for surfacing parts of: crane wheels, wheels for mine trucks, pulleys, rollers, wobblers, catterpillar track rollers etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

rutile

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	
0,23	0,60	1,50	1,60	

Mechanical properties:

Hardness: 325 - 375 HB

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
				approx. 15 kg

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Classification:
DIN 8555 : MSG 5-GF-C1-40 P /
MSG 5-GF-M21-40 P
EN 14700 : T Fe7

FILTUB DUR 12

Description and application:

FILTUB DUR 12 is basic medium alloyed flux-cored wire recommended for wear resistant surfacing. The deposit is tough, free of cracks and porosity and therefore is highly resistant to deformation and impact. On the base material with low weldability is recommended depositing a buffer layer with FILTUB 12B. The temperature betwen runs should not exceed 250°C. The weld metal is still machineable by means of sintered carbide tools.
Suitable for surfacing parts of: supports, bearing surfaces, rollers, excavator parts etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,12	0,60	1,50	5,50	1,00

Mechanical properties:

Hardness: 37 - 42 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
	1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
	1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
					approx. 15 kg

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Classification:
DIN 8555 : MSG 6-GF-C1-55 GP/
MSG 6-GF-M21-55 GP
EN 14700 : T Fe8

FILTUB DUR 14

Description and application:

FILTUB DUR 14 is metalcored medium alloyed flux-cored wire recommended for high wear resistant surfacing.
The deposit is tough, free of cracks and porosity and therefore is highly resistant to deformation and impact.
On base material with low weldability is recommended depositing a buffer layer with FILTUB 12B.
The preheat and interpass temperature must be at least 200°C. Weld deposit can be machined only by grinding.
Suitable for surfacing parts of: mixer blades and vessels, grab and bucket teeths, crusher hammers and jaws etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

metalcored

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,35	0,60	1,20	5,50	0,80

Mechanical properties:

Hardness: 48 - 53 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	180 - 340	24 - 30	3,0 - 8,0	
	1,6	220 - 420	26 - 32	4,0 - 9,5	

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Classification:
DIN 8555 : MSG 6 –GF-M21- 55-P

FILTUB DUR 15.1

Description and application:

FILTUB DUR 15.1 is metalcored medium alloy flux-cored wire recommended for hardsurfacing which martensitic deposit giving a very good resistance to solid erosion wear with heavy impact . .The deposit is tough , free of cracks and porosity and therefore is highly resistant to deformation and impact . On base material with low weldability is recommended depositing a buffer layer with FILTUB 12B or FILTUB DUR 3 . The preheat and interpass temperature must be at least 250°C
Suitable for surfacing parts of : impact rockdrills , bucket teeth and lips , screw conveyours , etc .

Base materials:

Steels Cast steels	

Heat treatment:

Type of wire :

metalcored

Welding current:

DC + / (-)

Welding positions:

Shielding gas :
(EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr
0,50	2,70	0,50	9,50

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Hardness: 53 - 56 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,6	180 - 320	23 - 29	3,5 - 7,5	K 300 , D 300 lay to lay weight : approx. 15 kg
	2,0	200 - 380	24 - 30	3,0 - 7,0	

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Classification:
DIN 8555 : MSG 6-GF-C1-60 GP/
MSG 6-GF-M21-60 GP
EN 14700 : T Fe13

FILTUB DUR 16

Description and application:

FILTUB DUR 16 is metalcored medium alloy flux-cored wire recommended for highly wear resistant surfacing. The deposit is tough, free of cracks and porosity and therefore is highly resistant to deformation and impact.
On base material with low weldability is recommended depositing a buffer layer with FILTUB 12B or FILTUB DUR 3. The preheat and interpass temperature must be at least 200°C. Weld deposit can be machined only by grinding.
Suitable for surfacing parts of: mixer blades and vessels, grab and bucket teeths, crusher hammers and jaws, etc .

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

metalcored

Welding current:

DC + / (-)

Welding positions:

Shielding gas :
(EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,45	0,60	1,60	5,50	0,80

Mechanical properties:

Hardness: 56 - 60 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300 lay to lay weight : approx. 15 kg
	1,4	180 - 340	24 - 30	3,0 - 8,0	
	1,6	220 - 420	26 - 32	4,0 - 9,5	

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Classification:
DIN 8555 : MSG 5-GF-C1-40 P /
MSG 5-GF-M21-40 P
EN 14700 : T Fe3

FILTUB UTOP 38

Description and application:

FILTUB UTOP 38 is basic medium alloy flux-cored wire recommended for hot and cold work tools surfacing. The deposit is tough, free of cracks and porosity and therefore is highly resistant to deformation and impact. The weld metal is still machineable by means of sintered carbide tools. On the base material with low weldability is recommended depositing a buffer layer with FILTUB 12B.
Suitable for hardsurfacing cold and hot working tools such as: screws, nuts, dies and containers for metal tube and rod extrusion tools for manufacture of hollow bodies, pressure die casting dies, etc.

Base materials:

Alloyed tool steels

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V	W
0,13	0,40	0,90	5,0	4,0	0,20	0,15

Mechanical properties:

Hardness: 36 - 42 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
				approx. 15 kg

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Classification:
DIN 8555 : MSG 6-GF-C1-55 GP /
MSG 6-GF-M21-55 GP
EN 14700 : T Fe8

FILTUB UTOP 55

Description and application:

FILTUB UTOP 55 is basic medium alloy flux-cored wire recommended for hardsurfacing of cold and hot-working steel tools up to operating temperatures of 550°C. The deposit is tough, free of cracks and therefore is highly resistant to deformation and impact. Weld deposit can be machined only by grinding. On base material with low weldability is recommended depositing a buffer layer with FILTUB 12B.
Suitable for hardsurfacing cold and hot working tools such as: screws, nuts, dies and containers for metal tube and rod extrusion tools for manufacture of hollow bodies, hot shear blades, pressure die casting dies etc.

Base materials:

Alloyed tool steels

Heat treatment:

Type of wire :

basic

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo	V	W
0,50	0,40	0,90	5,0	5,0	0,60	0,15

Mechanical properties:

Hardness: 53 - 60 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
				approx. 15 kg

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Classification:
DIN 8555: MSG 6-GF-M21-55-GP
MSG 6-GF-C1-55-GP

FILTUB UTOP Co

Description and application:

FILTUB UTOP 55 is metalcored medium alloy flux-cored wire recommended for hardsurfacing of cold and hot-working steel tools up to operating temperatures of 550°C. The deposit is tough, free of cracks and therefore is highly resistant to deformation and impact. Weld deposit can be machined only by grinding. On base material with low weldability is recommended depositing a buffer layer with FILTUB 12B.
Suitable for hardsurfacing cold and hot working tools such as: screws, nuts, dies and containers for metal tube and rod extrusion tools for manufacture of hollow bodies, hot shear blades, pressure die casting dies etc.

Base materials:

Alloyed tool steels	

Heat treatment:

Type of wire :

metalcored

Welding current:

DC + / (-)

Welding positions:

Shielding gas : (EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Nb	W	Co
> 0,35	1,0	1,0	1,8	0,8	8,0-9,0	1,8-2,3

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Hardness: 53 - 60 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal .

Welding and packing data:

Approvals:	Welding parameters ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	Packing
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
	1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
	1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
					approx. 15 kg

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Classification:
DIN 8555 :MSG 5 – GF – M21 – 50-GP
MSG 5 – GF – C1 – 50-GP
EN 14700 :T Fe3

FILTUB UTOP Mo1

Description and application:

FILTUB UTOP Mo1 is metalcored medium alloy flux-cored wire recommended for hardsurfacing of cold and hot working steel tools up to operating temperatures of 550°C. The deposit is tough, free of cracks and therefore is highly resistant to deformation and impact. On base material with low weldability is recommended depositing a buffer layer with FILTUB 12B.
Suitable for hardsurfacing cold and hot working tools such as: screws, nuts, dies and containers for metal tube and rod extrusion tools for manufacture of hollow bodies, hot shear blades, pressure dies, casting dies etc.

Base materials:

Alloyed tool steels	

Heat treatment:

Type of wire :

metalcored

Welding current:

DC + / (-)

Welding positions:

Shielding gas :
(EN 439)

CO_2 , M 21
consumption : 12 - 18 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo	Cu	W	V
0,42	1,0	0,35	5,06	0,24	1,28	0,25	0,35	0,24

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Hardness: 48 - 53 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	1,2	130 - 250	23 - 28	2,5 - 8,0	K 300 , D 300
	1,4	180 - 340	24 - 30	3,0 - 8,0	lay to lay
	1,6	220 - 420	26 - 32	4,0 - 9,5	weight :
					approx. 15 kg

Classification:
AWS-SFA-5.23 : F 7 A 4-EC-G

FILTUB 112

Description and application:

FILTUB 112 is basic low-alloy flux-cored wire recommended for submerged arc welding non-alloyed structural steels, boiler plates, pipe steels and fine-grain structural steels. Also is suitable for welding steels with high C content as a buffer layer. This wire is used in conjuction with welding flux FB T .

Base materials:

Art of steel	DIN :	W.Nr. :
Non-alloyed steels :	St 33 to St 70	1.0033 to 1.0070
Boiler plates :	H I , H II , 17Mn4 , 19Mn5	1.0345 , 1.0425 , 1.0481 , 1.0482
Pipe steels :	St 37-0 to St 52-0 , St-37-4 to St-52-4	1.0254 to 1.0421 , 1.0255 to 1.0581
	StE 210.7 to StE 360.7	1.0307 to 1.0582
Finegrained steels :	StE 255 to StE 355	1.0461 to 1.0562
	WStE 255 to WStE 355	1.0462 to 1.0565
	TStE 255 to TStE 355	1.0463 to 1.0566

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	
0,05	0,20	1,60	

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm^2)
Tensile strength	Rm:	550 - 650	MPa(N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 160	J (± 0 °C)
	KV :	> 140	J (- 20 °C)
	KV :	> 100	J (- 40 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ; K 415
				Weight : appr. 25 kg

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Classification:
AWS-SFA-5.23 : F 7 A 4-EC-A 4

FILTUB 114

Description and application:

FILTUB 114 is basic medium alloy flux-cored wire recommended for submerged arc welding creep resistant steels, designed for creep strength at service temperatures up to 500°C. This wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Boiler plates and	17Mn4 , 19Mn5 , 15Mo3	1.0481 , 1.0482 , 1.5415
pipe steels :	16Mo5 , St 45.8 , StE 360.7	1.5423 , 1.0405 , 1.0582
	StE 385.7 , StE 415.7	1.8970 , 1.8972
Finegrained steels :	StE 355 to StE 460	1.0562 to 1.8905
	WStE 355 to WStE 460	1.0565 to 1.8935
	TStE 355 to TStE 460	1.0566 to 1.8915
Steel castings :	GS-52 , GS-60 , GS-20Mn5	1.0552 , 1.0558 , 1.1120
	GS-22Mo4	1.5419

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Mo	
0,05	0,20	1,40	0,5	

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 450	MPa(N/mm^2)
Tensile strength	Rm:	540 - 640	MPa(N/mm^2)
Elongation	A5:	> 24	%
Impact energy	KV :	> 180	J (+ 20 °C)
	KV :	> 160	J (± 0 °C)
	KV :	> 140	J (- 20 °C)
	KV :	> 80	J (- 40 °C)

Welding and packing data:

Approvals:

Welding parameters				
ϕ m	Current A	Arc voltage V	Wire feed rate m / min	**Packing**
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

Classification:
AWS-SFA-5.23 : F 8 P 0-EC-B 2

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FILTUB 116

Description and application:

FILTUB 116 is basic medium alloy flux-cored wire recommended for submerged arc welding creep resistant steels designedfor creep strength at service temperatures up to 600°C. The weld metal must be postweld annealing at 690 - 720°C and coolingdown to 300°C in furnace. The wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Boiler plates and tubes :	H IV L , 13CrMo44 16CrMoV4 , 11CrMo55	1.0447 , 1.7335 1.7728 , 1.7339
Steel for the cementation :	15Cr3 , 16MnCr5 20MnCr5 , 15CrMo5	1.7015 , 1.7131 1.7147 , 1.7262
Steel castings :	GS-17CrMo55 , GS-22CrMo54 GS-17CrMnMo55	1.7357 , 1.7354 1.7352

Heat treatment:

Tempered 2 h at 700ºC / cooled in oven down to 300ºC .

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,05	0,20	1,0	1,20	0,50

Hydrogen content / 100 g weld metal: < 5 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 410	MPa(N/mm^2)
Tensile strength	Rm:	530 - 600	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 110	J (+ 20 °C)

Welding and packing data:

Approvals:

Welding parameters				
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	**Packing**
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ; K 415
				Weight : appr. 25 kg

Classification:
AWS-SFA-5.23 : F8 PO-EC-B3

FILTUB 118

Description and application:

FILTUB 118 is basic medium alloy flux-cored wire recommended for submerged arc welding creep resistant CrMo, CrMoV steels and similar cast steels, designed for creep strength at service temperatures up to 600°C. The weld metal must be postweld annealing at 690 - 720 °C , 1 - 2 h and cooling down to 300°C infurnace. The wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Heat resistant steels :	10CrMo 9.10 , 10CrSiMoV 12CrSiMo8	1.7380 , 1.8075
Steel castings :	GS-17CrMo9.10 , GS- 12CrMo9.10 GS-19CrMo9.10	1.7379 , 1.7380 1.7382

Heat treatment:

Tempered at 720º 1 h / cooled in oven down to 300ºC .

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Mo
0,09	0,20	0,80	2,40	1,0

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 440	MPa(N/mm^2)
Tensile strength	Rm:	560 - 630	MPa(N/mm^2)
Elongation	A5:	> 21	%
Impact energy	KV :	> 100	J (+ 20 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

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Classification:
AWS-SFA-5.23 : F 9 A 8-EC-G

FILTUB 128

Description and application:

FILTUB 128 is basic medium alloy flux-cored wire recommended for submerged arc welding fine-grain structural steels, creep resistant and heat-treated fine-grain structural steels. The mechanical properties are dependent on the working conditions. Optimal results are obtained at a heat input of E < 22 kJ / cm and interpass temperatures must not exceed 150° . The wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Finegrained steels :	StE 460 , StE 500	1.8905 , 1.8907
	WStE 500 , TStE 460	1.8937 , 1.8915
Creep resistant	TStE 500	1.8917
finegrained steels :	NAXTRA 56 , NAXTRA 63	1.8944 , 1.8954
	HY 80	1.6780
Heat-treated	WB 35 , WB 36	1.8817 , 1.6368
finegrained steels :	BHW 35 , BHW 38	1.8807

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Mo
0,05	0,20	1,40	1,20	0,40

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 550	MPa(N/mm^2)
Tensile strength	Rm:	630 - 730	MPa(N/mm^2)
Elongation	A5:	> 20	%
Impact energy	KV :	> 160	J (+ 20°C)
	KV :	> 120	J (- 20°C)
	KV :	> 100	J (- 40°C)
	KV :	> 60	J (- 60°C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
	4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
					Weight : 22 - 29 kg ;
					K 415
					Weight : appr. 25 kg

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Classification:
AWS-SFA-5.23 : F 11 A 8-EC-F5

FILTUB 132

Description and application:

FILTUB 132 is basic medium alloy flux-cored wire recommended for submerged arc welding of high-strength fine-grainstructural steels. The mechanical properties are dependent on the working conditions. Optimal results are obtained at a heat input of E > 18 kJ / cm and interpass temperatures must not exceed 150°C. The wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Creep resistant finegrained steels :	NAXTRA 63 , NAXTRA 70 T 1 , T 1A , T 1B (TStE 690)	1.8954 , 1.8964 1.8920 , 1.8921 , 1.8922

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0,05	0,20	1,40	0,60	2,5	0,40

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 680	MPa(N/mm^2)
Tensile strength	Rm:	740 - 820	MPa(N/mm^2)
Elongation	A5:	> 16	%
Impact energy	KV :	> 120	J (+20 °C)
	KV :	> 90	J (- 20 °C)
	KV :	> 70	J (- 40 °C)
	KV :	> 47	J (- 60 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

Classification:
AWS-SFA-5.23 : F 7 A15-EC-Ni 2

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FILTUB 136

Description and application:

FILTUB 136 is basic medium alloy flux-cored wire recommended for submerged arc welding fine-grain structural steels and cryolitic steels. The mechanical properties are dependent on the working conditions. Optimal results are obtained at a heat input of E < 15 kJ / cm and interpass temperatures must not exceed 150°C. The wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Finegrained steels :	TStE 255 to TStE 380	1.0463 to 1.8910
	EstE 255 to EStE 380	1.1103 to 1.8911
Cryolitic steels :	TTSt 35N , TTSt 35V	1.1101 , 1.1101
	TTSt 41N , TTSt 41V	
	TTSt 45N , TTSt 45V	
	14Ni6 , 10Ni14	1.5622 , 1.5637
	16Ni14	1.5639

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	P	S	Ni
0,04	0,15	0,80	> 0,015	> 0,015	2,50

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 370	MPa(N/mm^2)
Tensile strength	Rm:	480 - 580	MPa(N/mm^2)
Elongation	A5 :	> 26	%
Impact energy	KV :	> 140	J (- 20 °C)
	KV :	> 120	J (- 40 °C)
	KV :	> 100	J (- 60 °C)
	KV :	> 80	J (- 80 °C)
	KV :	> 47	J (-105 °C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
	4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
					Weight : 22 - 29 kg ;
					K 415
					Weight : appr. 25 kg

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Classification:
AWS-SFA-5.23 : F 12 A 4 - EC - G

FILTUB 138

Description and application:

FILTUB 138 is basic medium alloy flux-cored wire recommended for submerged arc welding finegrained, creep resistant finegrained and heat-treated finegrained steels. The mechanical properties are dependent on the working conditions. Optimal results are obtained at a heat input of E < 15 kJ / cm and interpass temperatures must not exceed 150° . The wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN	W.Nr. :
Finegrained steels :	StE 460 , StE 500	1.8905 , 1.8907
	WStE 500 , TStE 460	1.8937 , 1.8915
Creep resistant	TStE 500	1.8917
finegrained steels :	NAXTRA 56 , NAXTRA 63	1.8944 , 1.8954
	HY 80	1.6780
Heat-treated	WB 35 , WB 36	1.5403 , 1.6368
finegrained steels :	BHW 35 , BHW 38	1.8807
	XABO 620 , XABO 890 , XABO 960	1.8914 , 1.8925 , 1.8933

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Cr	Ni	Mo
0,08	0,35	1,50	0,80	2,50	0,40

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 870	MPa(N/mm^2)
Tensile strength	Rm:	950 - 1100	MPa(N/mm^2)
Elongation	A_5:	> 12	%
Impact energy	KV :	> 60	J (± 0 °C)
	KV :	> 50	J (- 20 °C)
	KV :	> 47	J (- 40 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ; K 415
				Weight : appr. 25 kg

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Classification:
AWS A-5.2 :E 80 T5 – G
EN 12073 :T 42 6 2Ni B M 3 H5

FILTUB 140

Description and application:

FILTUB 140 is basic medium alloy flux-cored wire recommended for submerged arc welding NiCu-alloyed steels resistant to atmosferic corrosion and fine-grain structural steels such as Corten, Patinax, Acor and similar. This wire is used in conjuction with welding flux FB TT.

Base materials:

Art of steel	DIN :	W.Nr. :
Weather corroion resistant steels :	StE 420 , StE 460	1.8902 , 1.8905
	ACOR 37-2 , ACOR 37-3 , ACOR 52-3	1.8960 , 1.8961 , 1.8963
	CORTEN A,B	1.8962 , 1.8963
	Patinax 37	1.8960
Fine-grain structural steels :	WStE 420 , WStE 460	1.8932 , 1.8935
	TStE 420 , TStE 460	1.8912 , 1.8915
	EStE 420 , EStE 460	1.8913 , 1.8918

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB TT

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	Ni	Cu
0,05	0,20	1,30	1,20	0,50

Hydrogen content / 100 g weld metal: < 3 ml

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 460	MPa(N/mm^2)
Tensile strength	Rm:	540 - 620	MPa(N/mm^2)
Elongation	A5:	> 22	%
Impact energy	KV :	> 120	J (+ 20 °C)

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
				Weight : 22 - 29 kg ; K 415
				Weight : appr. 25 kg

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Classification:
DIN 8555 : UP1 - GF - BFB1 65 - 350
E3N 14700: T Fe3

FILTUB DUR 205

Description and application:

FILTUB DUR 205 is basic medium alloy flux-cored wire recommended for submerged arc hardsurfacing highly wear resistant applications. The deposit is tough, free of cracks and porosity and therefore is highly resistant to deformation and impact. On the base material with low weldability is recommended depositing a buffer layer with FILTUB 112. The wire is used in conjunction with welding flux FB 12.2.
Suitable for : steel mill rolls, conveyer belt wheels and rolls, rolls of caterpillar crane wheel rims, guide rolls, idling wheels dredger buckets cylinder etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB 12.2

Interpass temperature :

< 400 ºC

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr	Mo
3	0,15	0,50	1,60	2,8	0,6
8	0,18	0,50	1,90	3,4	0,7

Mechanical properties:

Hardness : 350 - 380 HB

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : good with carbide tipped tools

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
	4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
	5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ; K 415
					Weight : appr. 25 kg

elektrode jesenice d.o.o.

Classification:
DIN 8555 : UP5-GF-BFB4 652 – 40
EN 14700 :T Fe3

FILTUB DUR 212

Description and application:

FILTUB DUR 212 is basic medium alloy flux-cored wire recommended for submerged arc hardsurfacing highly wear resistant applications. The deposit is tough, free of cracks and porosity and therefore is highly resistant to deformation and impact. On the base material with low weldability is recommended depositing a buffer layer with FILTUB 112. The wire is used in conjunction with welding flux FB 12.2. Suitable for: steel mill rolls, conveyer belt wheels and rolls, rolls of caterpillar crane wheel rims, guide rolls, idling wheels dredger buckets cylinder etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB 12.2

Interpass temperature :

< 400 °C

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr	Mo
3	0,08	0,35	1,40	5,0	0,85
8	0,08	0,35	1,20	6,0	1,0

Mechanical properties:

Hardness : 37 - 42 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : good with carbide tipped tools

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

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Classification:
DIN 8555 : UP6-BFB4 652 - 50

FILTUB DUR 214

Description and application:

FILTUB DUR 214 is basic medium alloy flux-cored wire recommended for submerged arc hardsurfacing of steel machine parts subject to friction (metal to metal) and wearing at temperature up to 600°C. The weld metal is free of cracking and porosity and has a high resistance to load and impact conditions. On base material with low weldability is recommended depositing a buffer layer with FILTUB 112. This wire is used in conjunction with welding flux FB 12.2.
Suitable for: sheet rolls, shape rolls for hot steel rolling, guilotine knives etc.

Base materials:

Steels
Steel castings

Heat treatment:

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB 12.2

Interpass temperature :

< 400 °C

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr	Mo	Co	V	W	Ni
2	0,35	0,35	1,10	7,0	4,5	2,1	0,6	1,2	2,2
4	0,40	0,35	1,20	8,0	5,0	2,3	0,7	1,3	2,5

Mechanical properties:

Hardness : 46 - 52 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : machinable with carbide tools only after pre-heating at 400°C.

Welding and packing data:

Approvals:

Welding parameters				
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	**Packing**
				Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

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Classification:
DIN 8555 : UP6-GF-BFB4 652 – 55
EN 14700 T Fe8

FILTUB DUR 215

Description and application:

FILTUB DUR 215 is basic medium alloy flux-cored wire recommended for suberged arc hardsurfacing of parts which have high resistance to wear and corrosion. The weld metal is free of cracking and porosity and has a high resistance to load and impact conditions. On base material with low weldability is recommended depositing a buffer layer with FILTUB 112. The wire is used in conjunction with welding flux FB 12.2.
Suitable for: roll bodies, components for pumps, water turbines, valves, rails, baffle and wearing plates etc.

Base materials:

Steels
Steel castings

Heat treatment :

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB 12.2

Interpass temperature :

< 400 °C

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr
2	0,45	0,40	1,10	11,0
4	0,50	0,40	1,20	12,5

Mechanical properties:

Hardness : 50 - 55 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : by grinding

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
	3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
	4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
	5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ;
					K 415
					Weight : appr. 25 kg

Classification:
DIN 8555 : UP 5-GF-BFB 165 - 400

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FILTUB DUR 12Cr2NiMo

Description and application:

FILTUB 12Cr2NiMo is basic medium alloyed flux-cored wire recommended for submerged arc hardsurfacing of parts which have high resistance to metal-to-metal wear, corrosion and thermal fatigue. On the base material with low weldability is recommended depositing a buffer layer with FILTUB 112. The wire is used in conjunction with welding flux FB TT.
Suitable for: continuous casting rolls, hidraulic plugers, brake drums etc.

Base materials:

Steels
Steel castings

Heat treatment :

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB 12.2

Interpass temperature :

< 400ºC

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr	Ni	Mo
2	0,10	0,40	1,10	11,5	1,8	0,9
4	0,08	0,40	1,20	12,5	2,2	1,1

Mechanical properties:

Hardness : 380 - 420 HB

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : good with carbide tipped tools

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

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Classification:
DIN 8555 : UP5-GF-FB 165 - 40

FILTUB DUR 13Cr3NiMoV

Description and application:

FILTUB 13Cr3NiMoV is basic medium alloyed flux-cored wire recommended for submerged arc hardsurfacing of parts which have high resistance to metal-to-metal wear, corrosion and thermal fatigue. On the base material with low weldability is recommended depositing a buffer layer with FILTUB 112. The wire is used in conjunction with welding flux FB 12.2.
Suitable for: continuous casting rolls, hidraulic plugers, brake drums etc.

Base materials:

Steels
Steel castings

Heat treatment :

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

FB 12.2

Interpass temperature :

< 350 °C

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr	Ni	Mo	V
2	0,12	0,40	1,10	12,0	2,6	0,9	0,25
4	0,10	0,40	1,20	13,0	3,0	1,0	0,25

Mechanical properties:

Hardness : 42 - 44 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : good with carbide tipped tools

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ; K 415
				Weight : appr. 25 kg

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Classification:
DIN 8555 : UP5-GF-BCS 256 - 40

FILTUB DUR 17 Cr

Description and application:

FILTUB DUR 17Cr is basic 17Cr-alloy flux-cored wire recommended for submerged arc hardsurfacing of parts which have high resistance to corrosion at high temperatures, wear and thermal fatigue. On base material with low weldability is recommended depositing a buffer layer with FILTUB 112. The wire is used in conjunction with welding flux AB Cr.
Suitable for: continuous casting rolls and other rollin equipment, steam turbine parts, valve seats etc.

Base materials:

Steels
Steel castings

Heat treatment :

Type of wire :

basic

Welding current:

DC + and AC

Welding flux :

AB Cr

Interpass temperature :

< 350 °C

Typical weld metal properties:

Chemical composition, wt %:

Layer	C	Si	Mn	Cr
2	0,08	0,60	1,10	16,0
4	0,06	0,80	1,20	17,5

Mechanical properties:

Hardness : 38 - 42 HRC

The hardness of the deposit depending on the relevant welding conditions and the chemical composition of the base metal.

Machinability : good with carbide tipped tools

Welding and packing data:

Approvals:

Welding parameters				Packing
ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
3,2	350 - 600	26 - 33	1,2 - 2,4	Wire coil sizes :
4,0	400 - 800	27 - 39	0,8 - 2,2	420x280x90
5,0	450 - 850	29 - 41	0,6 - 1,8	Weight : 22 - 29 kg ;
				K 415
				Weight : appr. 25 kg

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Classification:
AWS-SFA-5.22 : E 308L TO – 1
: E 308L TO – 4
EN ISO 17633-A :T19 9LR M/C5
EN ISO 17633-B :TS308L-F M/C0

FILCORD 308L

Description and application:

FILCORD 308L is rutile flux-cored wire suitable for welding austenitic 19/9 CrNi stainless steels. Resistant to intergranular corrosion at operating temperatures up to 350°C. It features: stable arc, low spatter, selfdetaching slag, flat notch – free weld interface and used in all – position welding.

Base materials:

Art of steel	DIN :	W.Nr. :
Alloyed corrosion resistant	X 5 CrNi 18 10 , X 6 CrNiTi 18 10 X 5 CrNi 18 12 , X 5 CrNiNb 18 9 X 2 CrNi 19 11 , X 6 CrNiNb 18 10 X 2 CrNiN 18 10 , G-X 5 CrNiNb 18 9	1.4301 , 1.4541 1.4303 , 1.4543 1.4306 , 1.4550 1.4311 , 1.4552

Heat treatment:

Type of wire :

rutil

Welding current:

DC +

Welding positions:

Shielding gas : (EN 439)

CO_2 ; M 21
consumption 18 - 22 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	P	S	Ni	Cr
< 0,04	0,75	1,50	< 0,030	< 0,005	10,0	19,5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 350	MPa(N/mm^2)
Tensile strength	Rm:	560 - 620	MPa(N/mm^2)
Elongation	A5:	> 35	%
Impact energy	KV :	> 60	J (+20 °C)
	KV :	> 50	J (-20 °C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
TÜV	1,2	110 - 190	23 - 29		K 300 , D 300
	1,6	130 - 220	22 - 30		lay to lay
	1,6	250 - 290	27 - 30		weight :
					approx. 15 kg

Classification:
AWS A -5.22 : E 316L T0 – 1
: E 316L T0 – 4
EN ISO 17633-A :T19 12 3LR M/C5
EN ISO 17633-B :TS316L-F M/C0

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FILCORD 316 L

Description and application:

FILCORD 316L is rutile flux-cored wire suitable for welding instabilised and stabilised 19/12/3 stainless steels. Resistant to intergranular corrosion at operating temperatures up to 400°C. It features: stable arc, low spatter, selfdetaching slag , flat notch – free weld interface and used in all – position welding.

Base materials:

Art of steel	DIN :	W.Nr. :
Alloyed corrosion resistant	X 5 CrNiMo 17 12 2 , X 6 CrNiMoTi 17 12 2 X 2 CrNiMo 17 13 2 , X 10 CrNiMoTi 18 12 X 2 CrNiMoN 17 12 2 , X 10 CrNiMoNb 18 10 X 2 CrNiMo 18 14 3 , G-X 5 CrNiMoNb 18 10 X 5 CrNiMo 17 13 3 , X 10 CrNiMoNb 18 12	1.4401 , 1.4571 1.4404 , 1.4573 1.4406 , 1.4580 1.4435 , 1.4581 1.4436 , 1.4583

Heat treatment:

Type of wire :

rutil

Welding current:

DC +

Welding positions:

Shielding gas :
(EN 439)

CO_2 ; M 21
consumption 18 - 22 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	P	S	Ni	Cr	Mo
< 0,04	0,80	1,30	< 0,030	< 0,005	12,0	19,0	2,5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 380	MPa(N/mm^2)
Tensile strength	Rm:	580 - 640	MPa(N/mm^2)
Elongation	A5:	> 32	%
Impact energy	KV : KV :	> 60 > 55	J (+20 °C) J (-20 °C)

Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
TÜV	0,9	110 - 190	23 - 29		K 300 , D 300
	1,2	130 - 220	23 - 29		lay to lay
	1,6	250 - 290	27 - 30		weight :
					approx. 15 kg

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FILCORD 309 L

Classification:
AWS-SFA-5.22 : E 309L T0 – 1
: E 309L T0 – 4
EN ISO 17633-A :T23 12LR M/C5
EN ISO 17633-B :TS309L-F M/C0

Description and application:

FILCORD 309L is rutile flux-cored wire suitable for MAG welding dissimilar stainles steels and for joining high alloyed CrNiMo – steels with unalloyed steels. Suited for service temperatures from - 60°C to 300°C. It features: stable arc, low spatter, selfdetaching slag, flat notch – free weld interface and used in all – position welding.

Base materials:

Art of steel	DIN :	W.Nr. :
Heat resisting steels	X 10 CrAl 7 , X 10 CrAl 13 X 10 CrAl 18 , G-X 40 CrNiSi 22 9 , X 15 CrNiSi 20 12 G-X 25 CrNiSi 20 14 , G-X 40 CrNiSi 25 12	1.4713 , 1.4724 1.4742 1.4826 , 1.4828 1.4832 , 1.4837

Heat treatment:

Type of wire :

rutil

Welding current:

DC +

Welding positions:

Shielding gas :
(EN 439)

CO_2 ; M 21
consumption 18 - 22 l / min

Typical all weld metal properties:

Chemical composition, wt %:

C	Si	Mn	P	S	Ni	Cr
< 0,05	0,75	1,50	< 0,030	< 0,008	12,5	22,5

Mechanical properties:

Yield strength	R_{eL} / $Rp_{0.2}$:	> 360	MPa(N/mm^2)
Tensile strength	Rm:	560 - 620	MPa(N/mm^2)
Elongation	A5:	> 30	%
Impact energy	KV :	> 60	J (+20 °C)
	KV :	> 50	J (-20 °C)

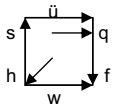
Welding and packing data:

Approvals:	Welding parameters				Packing
	ϕ mm	Current A	Arc voltage V	Wire feed rate m / min	
TÜV	0,9	110 - 190	23 - 29		K 300 , D 300
	1,2	130 - 220	23 - 29		lay to lay
	1,6	250 - 290	27 - 30		weight :
					approx. 15 kg

KEY TO SYMBOLS

W.Nr. Werkstoffnummer

Welding positions



ü overhead
s vertical-up
q horizontal-vertical
h horizontal
f vertical-down
w downhand

Type of current

AC	alternating current
DC +	direct current (electrode positive)
DC -	direct current (electrode negative)

Hardness

HB	Brinell hardness
HRC	Rockwell C hardness

Mechanical properties of the all-weld-metal

Rp 0.2%	yield strength in N/mm^2
Rm	tensile strength in N/mm^2
A5	elongation in %
Av	impact enery Joule

APPROVALS OF WELDING CONSUMABLES

TÜV	Technischer Überwachungsverein Süddeutschland (Germany)
DB	Deutsche Bahn (German Railways**)**
GL	Germanischer Lloyd
LR	Lloyd's Register of Shipping
ABS	American Bureau of Shipping
BV	Bureau Veritas
DNV	Det Norske Veritas
CWB	Canadian Welding Bureau
RINA	Registro Italiano Navale (Italy)
MRS	Russian Maritime Register of Shipping (Russia)
PRS	Polski Rejestr Statkow (Poland)
UDT	Urzad Dozoru Technicznego (Poland)
SZU	Strojirensky Zkušebni Ustav v Brne (Czech Republic)
CR	Croatian Register of Shipping (Croatia**)**
SŽ	Slovenian Railways

Lettering code:

Y	approved for higher tensile steels
H or H 15	Hydrogen level in weld metal of < 10 ml H_2/100g (glycerine method) < 15 ml H_2/100 g (mercury method)
HH or H10	Hydrogen level in weld metal of < 5 ml H_2/100 g (glycerine method) < 10 ml H_2/100 g (mercury method)
H5	Hydrogen level in weld metal of < 5 ml H_2/100 g (mercury method)
S or SA	approved for semi-automatic welding
A	approved for automatic welding
T	approved for the two-run technique e.g.butt weld with one pass each side
M	approved for the multi-run technique (>two passes)
TM	approved for both two-run and multi-run technique

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APPROVALS OF WELDING CONSUMABLES

Welding electrodes	ABS	BV	GL	LR	DNV	TÜV	DB
CELEX						*	
CELEX Mn						*	
RUTILEN 12	1	1		1	1	*	*
RUTILEN 13	2	2	2	2	2	*	*
RUTILEN Z						*	*
RUTILEN 1000 S			1			*	*
RUTILEN X						*	*
RUTILEN 2000 S						*	*
EMONA	3	3	3	3	3	*	*
SAVA 150						*	
SAVA 150 AR	3Y	3Y	3Y	3Y	3 (to NV E36)	*	
SAVA 200	2Y	2Y		2Y	2Y		
SAVA GV 130	2Y	2Y	2Y	2Y	2Y		
EVB 50	4YHH	4YHH	4YH10	3/3YH	4YH10	*	*
EVB 55							*
EVB S					3YH10	*	*
EVB 60	3Y40	3Y40HH	3Y40H15	3/3YH	3Y40H15	*	
EVB Ni				3/4Y		*	
EVB Mo						*	
EVB CrMo						*	*
EVB CrMoV						*	
INOX R 19/9 NC		UP			308L	*	
INOX R 19/9 Nb		UP			347	*	
INOX R 19/12/3 NC	316 L-17				316L-17	*	
INOX R 22/12/3 Fe	309 Mo-16				309Mo-16		
INOX R 25/14/3 NC		UP			309	*	
INOX R 18/8/6 Fe						*	*
Welding electrodes	**CR**	**RS**	**SŽ/UIC**	**RINA**	**PRS**	**SZU**	
RUTILEN 12	1		*			*	
RUTILEN 13	2		*			*	
EMONA	3	3	*		3	*	
SAVA 150 AR				3 Y			
SAVA 200	2Y	2Y	*				
SAVA GV 130	2Y	2Y	*				
EVB 50	3YHH	3YHH	*	4 Y HH	3H10,4YH10	*	
EVB S			*				
EVB 60	3Y40	3Y46	*		3H10,3Y40H10	*	
EVB Ni	3YH		*				
EVB Mo	3YH		*				
EVB 2 CrMo	*		*				
INOX R 19/9 NC	*	308L	*				
INOX R 19/9 Nb	*		*				
INOX R 19/12/3 NC			*				
INOX R 22/12/3 Fe			*				
INOX R 29/9			*				
INOX R 25/14/3 NC	*		*				
INOX B 18/8/6			*				
E DUR 250			*				
E DUR 300			*				
E DUR 400			*				
E DUR 600			*				

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APPROVALS OF WELDING CONSUMABLES

Welding rods and wires	ABS	BV	GL	LR	DNV	TÜV	DB
VAC 60 / C1, M21	3YSA	SA3YM	3YS	3S/3YS	IIIYMS	*	*
VAC 65 / C1, M21						*	*
MIG 19/9 NC Si						*	*
MIG 19/12/3 NC Si						*	*
MIG 18/8/6 Si						*	*
MIG 75			4Y69S			*	*
TIG Mo		UP		3/3Y	IIIYMS	*	*
TIG CrMo						*	
TIG VAC 60						*	
VP 37						*	
VP 42			GIII			*	
FILTUB 4 R / C 1, M21	3YSA	SA3YM	3YS		IIIYMS		
FILCORD 308 L						*	
FILCORD 316 L						*	
FILCORD 309 L						*	
FILTUB 4 R / C 1, M21	3YSA	SA3YM	3YS	3S / 3YS	IIIYMS		
Welding rods and wires	**CR**	**RS**	**SŽ**	**RINA**	**PRS**		
VAC 60 / C1, M21	3YMS		*		3S/3YS		
MIG 18/8/6 Si							
TIG Mo	3	3Y46MS	*	3YMS			
VP 42	2		*				
FILTUB 4 R / C 1, M21	3YS		*				

Welding fluxes	ABS	BV	GL	LR	DNV	TÜV	CR
AB 100 / EPP2	2TM	A2YTM	2TM	2TM	IITM		2TM
/ EPP3	2YTM	A2YTM	2YTM	2M/2YM	IIYTM		2YTM
AR 18.5 / EPP 2	2YTM	A2YTM	2YTM	2YT	IIYTM		2YTM
AR 18.1 / EPP 2	2YTM	A2YTM	2YTM	2TM/2YTM	IIYTM		2YTM
AR D1 / EPP 2	2YTM	A1,1YTM	1YTM	1YTM	IIYTM	*(S2)	1YTM
FB TT / EPP 2	3M	A3M	3M	3M	IIIM	*	3M
/ EPP 3	3YM	A3YM	3YM	3M/3YM	IIIYM	*(S3)	3YM
/ EPP 2 Mo	3YM	A3YM	3YM		IIIYM	*(S2Mo)	3YM
FB 12.2 / EPP 2			3M			*(S2)	3M
/ EPP3	2YT,3YM	A3YM	3YM	3M/3YM/3YT	IIYT(IIIYM)		
Welding fluxes	**RS**	**SŽ/UIC**	**RINA**	**PRS**	**DB**		
AB 100 / EPP2		*					
/ EPP3		*					
AR 18.5 / EPP 2		*					
AR 18.1 / EPP 2	3YTM	*					
AR D1 / EPP 2		*					
FB TT / EPP 2		*			*		
/ EPP 3		*			*		
/ EPP 2 Mo	3YM	*					
FB 12.2 / EPP 2		*	3M				
/ EPP3		*	2YT/3YM	3YM,3YTM			

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Guide to EN 499 – 1995
(EN ISO 2560 – A)

Symbol	Tensile Strength N/mm^2	Yield Strength min.N/mm^2	Elongation min.%
35	440-570	355	22
38	470-600	380	20
42	500-640	420	20
46	530-680	460	20
50	560-720	500	18

Symbol	Welding position
1	All positions
2	All positions, except vertical down
3	Flat butt weld, flat fillet weld, horizontal-vertical fillet weld
4	Flat butt weld, flat fillet weld
5	Vertical down and positions according to symbol 3

Symbol	Metal recovery %	Type of current
1	< 105	AC + DC
2	< 105	DC
3	> 105 ≤ 125	AC + DC
4	> 105 ≤ 125	DC
5	> 125 ≤ 160	AC + DC
6	> 125 ≤ 160	DC
7	> 160	AC + DC
8	> 160	DC

E 46 3 1 Ni B 5 4 H5

Covered electrode for manual metal-arc welding

Symbol	Coating type
A	Acid
B	Basic
C	Cellulosic
R	Rutile
RR	Rutile (thick coated)
RC	Rutile-Cellulosic
RA	Rutile-Acid
RB	Rutile-Basic

Symbol	Hydrogen content ml/100 g deposited metal, max.
H5	5
H10	10
H15	15

Symbol	Impact Energy Charpy-V Temp.°C for 47Jmin.
Z	No requirements
A	+ 20
0	0
2	- 20
3	- 30
4	- 40
5	- 50
6	- 60

Symbol	Chemical composition *		
	Mn	Mo	Ni
No symbol	2.0	-	-
Mo	1.4	0.3 – 0.6	-
MnMo	> 1.4 – 2.0	0.3 – 0.6	-
1Ni	1.4	-	0.6 – 1.2
2Ni	1.4	-	1.8 – 2.6
3Ni	1.4	-	> 2.6 – 3.8
Mn1Ni	> 1.4 – 2.0	-	0.6 – 1.2
1NiMo	1.4	0.3 – 0.6	0.6 – 1.2
Z	Any other agreed composition		

* If not specified Mo<0.2, Ni<0.3, Cr<0.2, V<0.05, Nb<0.05, Cu<0.3. Single values shown in the table mean maximum values.

Alloy symbol	Minimum proof strength $Rp_{0,2}$ N/mm^2	Minimum tensile strength Rm N/mm^2	Minimum [1] Elongation A %	Post weld heat treatment
13	250	450	15	[2]
13 4	500	750	15	[3]
17	300	450	15	[4]
19 9	350	550	30	
19 9 L	320	510	30	
19 9 Nb	350	550	25	
19 12 2	350	550	25	None
19 12 3 L	320	510	25	
19 12 3 Nb	350	550	25	
19 13 4 N L	350	550	25	
22 9 3 N L	450	550	20	
25 7 2 N L	500	700	15	None
25 9 3 Cu N L	550	620	18	
25 9 4 N L	550	620	18	
18 15 3 L	300	480	25	
18 16 5 N L	300	480	25	
20 25 5 Cu N L	320	510	25	None
20 16 3 Mn N L	320	510	25	
25 22 2 N L	320	510	25	
27 31 4 Cu L	240	500	25	
18 8 Mn	350	500	25	
18 9 Mn Mo	350	500	25	
20 10 3	400	620	20	
23 12 L	320	510	25	None
23 12 Nb	350	550	25	
23 12 2 L	350	550	25	
29 9	450	650	15	
16 8 2	320	510	25	
19 9 H	350	550	30	
25 4	400	600	15	
22 12	350	550	25	None
25 20	350	550	20	
25 20 H	350	550	10 [5]	
36 18	350	550	10 [5]	

1) Gauge length is equal to five times the test specimen diameter.
2) 840°C to 870°C for 2 h – Furnace cooling down to 600°C then air cooling.
3) 580°C to 620°C tor 2 h – Air cooling.
4) 760°C to 790°C for 2 h, furnace cooling down to 600°C then air cooling.
5) These electrodes have high carbon in the all-weld metal for service at high temperatures. Room temperature elongation has little relevance to such applications.

NOTE: All-weld metal can have elongation and toughness lower than those of the parent metal.

E 19 12 2 R 3 4

E	19	12	2	R	3	4
Covered electrode for manual metal-arc welding		Type of electrode covering		Symbol for weld metal recovery and type of current		Symbol for welding position

Symbol	Coating type
R	Rutile
B	Basic

Symbol	Weld metal recovery %	Type of current [1] [2]
1	≤ 105	a.c. and d.c.
2	≤ 105	d.c.
3	> 105 ≤ 125	a.c. and d.c.
4	> 105 ≤ 125	d.c.
5	> 125 ≤ 160	a.c. and d.c.
6	> 125 ≤ 160	d.c.
7	> 160	a.c. and d.c.
8	> 160	d.c.

Symbol	Welding position
1	All positions
2	All positions, except vertical down
3	Flat butt weld, flat fillet weld, horizontal vertical fillet weld
4	Flat butt weld, flat fillet weld
5	Vertical down and positions according to symbol 3

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Guide to DIN 1913 - 1984

Symbol	Tensile Strength N/mm^2	Yield Strength min.N/mm^2	Elongation min.%
43	430-550	355	22
51	510-610	380	22

Metal recovery to nearest 10%
≥ 105% for rutile and acid-rutile types
≥ 120% for basic types

Covered electrode for manual metal-arc welding

First digit	Impact Energy Temp. °C for 28 J min.	Second digit	Impact Energy Temp. °C for 47 J min.
0	Not specified	0	Not specified
1	+20	1	+20
2	0	2	0
3	-20	3	-20
4	-30	4	-30
5	-40	5	-40

E 51 32 RR11 190

Symbol	Welding position	Current Type	Coating	
			Type	Thickness
A2	1	5	Acid	Thin
R2	1	5	Rutile	Thin
R3	2(1)	2	Rutile	Medium
R(C)3	1	2	Rutile-cellulosic	Medium
C4	1	0+(6)	Cellulosic	Medium
RR5	2	2	Rutile	Thick
RR(C)5	1	2	Rutile-cellulosic	Thick
RR6	2	2	Rutile	Thick
RR(C)6	1	2	Rutile-cellulosic	Thick
A7	2	5	Acid	Thick
AR7	2	5	Acid-rutile	Thick
RR(B)7	2	5	Basic-rutile	Thick
RR8	2	2	Rutile	Thick
RR(B)8	2	5	Basic-rutile	Thick
B9	1	0+(6)	Basic	Thick
B(R)9	1	6	Basic + others	Thick
B10	2	0+(6)	Basic	Thick
B(R)10	2	6	Basic + others	Thick
RR11	4(3)	5	Rutile	Thick ≥ 105% recovery
AR11	4(3)	5	Acid + rutile	Thick ≥ 105% recovery
B12	4(3)	0+(6)	Basic	Thick ≥ 120% recovery
B(R)12	4(3)	0+(6)	Basic + others	Thick ≥ 120% recovery

Symbol	Welding positions
1	All positions
2	All positions except vertical-down
3	Flat butt and fillet, horizontal-vertical fillet
4	Flat butt and fillet

Code for type of current				
Elektrode polaritiy	DC only	DC and AC AC, OCV min.V		
		50	70	80
+/-	0	1	4	7
-	0 -	2	5	8
+	0 +	3	6	9

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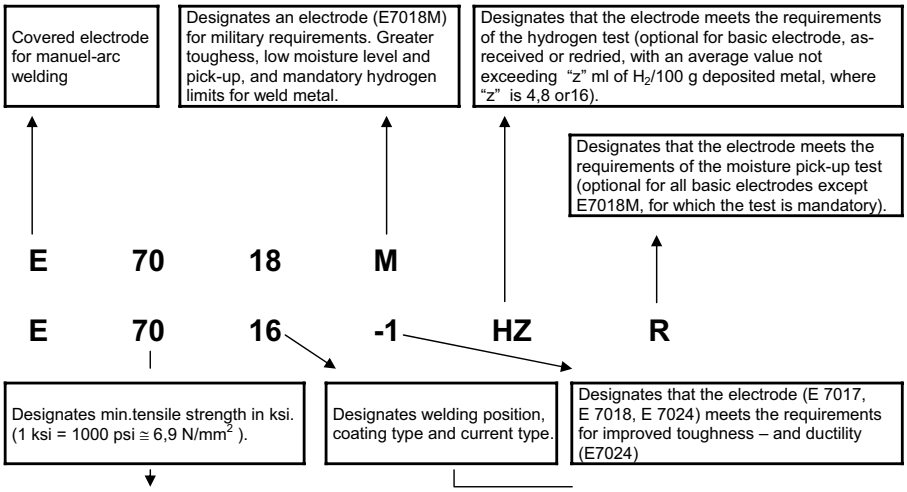
Guide to AWS-A 5.1 - 1991



AWS Classifi-cation	Tensile Strength min.		Yield Strength min.		Elongation min.%	Impact Enery Charpy-V J/°C	Welding Position	Type of coating	Type of Current	
	ksi	N/mm²	ksi	N/mm²					AC	DC
E 6010	60	414	48	331	22	27 / -29	1	Cellulosic	-	+ pol
E 6011	60	414	48	331	22	27 / -29	1	Cellulosic	x	+ pol
E 6012	60	414	48	331	17	Not spec.	1	Rutile	x	- pol
E 6013	60	414	48	331	17	Not spec.	1	Rutile	x	+/- pol
E 6019	60	414	48	331	22	27 / -18	1	Rutile/Acid	x	+/- pol
E 6020	60	414	48	331	22	Not spec.	2	Acid	x	c) +/- pol
E 6022	60	414	Not spec.	Not spec.	Not spec.	Not spec.	2	Acid	x	- pol
E 6027	60	414	48	331	22	27 / -29	2	Acid,high recovery	x	c) +/- pol
E 7014	70	482	58	399	17	Not spec.	1	Rutile,iron powder	x	+/- pol
E 7015	70	482	58	399	22	27 / -29	1	Basic	-	+ pol
E 7016	70	482	58	399	22	27 / -29	1	Basic	x	+ pol
E 7016-1	70	482	58	399	22	27 / -46	1	Basic	x	+ pol
E 7018	70	482	58	399	22	27 / -29	1	Basic,iron powder	x	+ pol
E 7018-1	70	482	58	399	22	27 / -46	1	Basic,iron powder	x	+ pol
E 7018 M	a)	482	b)	b)	24	67 / -29	1	Basic,iron powder	-	+ pol
E 7024	70	482	58	399	17	Not spec.	2	Rutile, high recovery	x	+/- pol
E 7027	70	482	58	399	22	27 / -29	2	Acid,high recovery	x	c) +/- pol
E 7028	70	482	58	399	22	27 / -29	2	Basic,high recovery	x	+ pol
E 7048	70	482	58	399	22	27 / -29	4	Basic,iron powder	x	+ pol

a) Nominal value 70 ksi (482 N/mm²)
b) Limits are 53-72 ksi (365-496 N/mm²)
For ϕ 2,4 mm the limit is max.77 ksi (531 N/mm²)
c) H-V fillets: - pol

Code	Welding position
1	All positions except vertical-down
2	Flat and H-V fillets
4	All positions but in the vertical, V-down only

In addition there are requirements on:
- Chemical composition of the weld metal
- Radiographic tests

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Guide to EN 760 – 1996

Classification of agglomerated welding fluxes

Symbol	Flux type
F	fused
A	agglomerated
M	mixed

Symbol	Flux type according to composition
MS	Manganese – Silicate
CS	Calcium - Silicate
ZS	Zirconium – Silicate
RS	Rutile – Silicate
AR	Aluminate – Rutile
AB	Aluminate – Basic
AS	Aluminate – Silicate
AF	Aluminate-Fluoride-Basic
FB	Fluoride – Basic
Z	Any other composition

Metalurgical behaviour	Symbol	Contribution from flux on all-weld metal (%)
Burn - out	1	over 0.7%
	2	0.5 - 0.7%
	3	0.3 - 0.5%
	4	0.1 - 0.3%
Burn-out/Pick-up	5	0 – 0.1%
Pick-up	6	0.1 - 0.3%
	7	0.3 - 0.5%
	8	0.5 - 0.7%
	9	over 0.7%

S A CS 1 67 AC H10

Symbol for the flux used in submerged arc welding process

Properties of welding fluxes	
Symbol	Metalurgical behaviour
1	-for welding and surfacing of unalloyed and lowalloyed steels (general structural, high tensile, some heat-resistant steels); there aren't any alloying elements added, except Si and Mn (burn-out or pick-up according to table)
2	- for welding and surfacing of Cr- in Cr-Ni stainless steel, heat-resistant steels and Ni and Ni-alloy
3	- mainly for surfacing, (burn-out and pick-up of added elements according to table)

Type of current	
Symbol	Current
AC	Alternating
DC	Direct

Hydrogen content (ISO3690)	
Symbol	ml/ 100 g
H5	5
H10	10
H 15	15

Table 1: Classification of shielding gases for welding and cutting

Symbol[1]		Composition in volume %						Application	Note
Group	Symbol	Oxidizing		Inert		Reducing	Unreactive		
		CO_2	O_2	Ar	He	H_2	N_2		
R	1			Rest[2]		> 0 – 15		TIG-welding, plasma-welding and cutting, for root passes	Reducing
	2			Rest[2]		> 15 – 35			
I	1			100				MIG, TIG, plasma-welding, for root passes	Inert
	2				100				
	3			Rest	> 0 – 95				
M1	1	> 0 – 5		Rest[2]		> 0 – 15		MAG	Less oksidizing
	2	> 0 – 5		Rest[2]					
	3		> 0 – 3	Rest[2]					
	4	> 0 – 5	> 0 – 3	Rest[2]					
M2	1	> 0 – 25		Rest[2]					
	2		> 3 – 10	Rest[2]					
	3	> 0 – 5	> 3 – 10	Rest[2]					
	4	> 5 – 25	> 3 – 8	Rest[2]					
M3	1	> 25 – 50		Rest					More oksidizing
	2		> 10 – 15	Rest[2]					
	3	> 5 – 50	> 8 – 15	Rest[2]					
	1	100							
	2	Rest	> 0 – 30						
F	1						100	Plasma-cutting, for root passes	Unreaktiv. Reducing
	2					> 0 – 50	Rest		

[1]) As other unmentioned componens are added, gas is special and additionally designated with letter »S«..
[2]) Argon can be substituted up to 95% with He. It's additionally designated with suitable symbol – see table 2

Table 2: Designation according to gas-composition of group R and M (He-content)

Symbol	He – content in volume %
1	> 0 – 33
2	> 33 – 66
3	> 66 – 95

EXAMPLE:

ISO 2560 – B – E55 18-N2 A U H5

ISO 2560-B:	the number of this International Standard, classification by tensile strength and 27 J impact energy
E:	covered electrode/manual metal arc welding (see 4.1)
55:	tensile strength (see Table 1B)
18:	basic iron powder coating suitable for a.c. and d.c. (+), in all positions except vertical down (see Table 4B)
-N2:	1% Ni as the principale alloying element (see Table 3B)
A:	as welded
U:	supplemental impact requirement of 47 J at the basic 27 J impact test temperature
H5:	hydrogen content (see table 7)

Table 1B

Symbol	Minimum tensile strength N/mm^2
43	430
49	490
55	550
57	570

Table 7

Symbol	Hydrogen content max. ml/100g of deposited weld metal
H5	5
H10	10
H15	15

EN ISO 2560 – B

Table 3B

Alloy symbol	Chemical composition Principal alloy element(s)	Nominal level mas. %
No symbol, -1 ali –P1	Mn	1
-1M3	Mo	0,5
-3M2	Mn Mo	1,5 0,4
-3M3	Mn Mo	1,5 0,5
-N1	Ni	0,5
-N2	Ni	1
-N3	Ni	1,5
-3N3	Mn Ni	1,5 1,5
-N5	Ni	2,5
-N7	Ni	3,5
-N13	Ni	6,5
-N2M3	Ni Mo	1 0,5
-NC	Ni Cu	0,5 0,4
-CC	Cr Cu	0,5 0,4
-NCC	Ni Cr Cu	0,2 0,6 0,5
-NCC1	Ni Cr Cu	0,6 0,6 0,5
-NCC2	Ni Cr Cu	0,3 0,2 0,5
-G	Any other agreed composition	

Table 4B

Symbol	Type of covering	Welding positions[a]	Type of current
03	rutile basic	all[b]	AC and DC(±)
10	cellulosic	all	DC(+)
11	cellulosic	all	AC and DC(+)
12	rutile	all[b]	AC and DC(-)
13	rutile	all[b]	AC and DC(±)
14	rutile + iron powder	all[b]	AC and DC(±)
15	basic	all[b]	DC (+)
16	basic	all[b]	AC and DC(+)
18	basic + iron powder	all[b]	AC and DC(+)
19	Ilmenit	all[b]	AC and DC(±)
20	iron oxide	PA, PB	AC and DC(-)
24	rutile + iron powder	PA, PB	AC and DC(±)
27	iron oxide + iron powder	PA, PB	AC and DC(-)
28	basic + iron powder	PA,PB,PC	AC and DC(+)
40	not specified	Manufacturer's recommendations	
48	basic	all	AC and DC(+)

NOTE A description of the characteristic of each of the types of covering is given in annex C

[a] Positions are defined in ISO 6947. PA = flat, PB =horizontal vertical fillet, PC = horizontal, PG = vertical down

[b] All positions may or may not include vertical down welding. This shall be specified in the manufacturer's trade literature.

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Guide to EN ISO 3580 – A

EXAMPLE:

ISO 3580–A – E CrMo1 B4 4 H5

ISO 3580-A:	number of this International Standard and classification by chemical composition
E:	covered electrode/manual metal arc welding
CrMo1:	chemical composition of all-weld metal (see Table 1)
B:	is the type of electrode covering (see 4.4A)
4:	recovery and type of current (see 4A)
4:	is the welding position (Table 5)
H5:	is the hydrogen content (see Table 6)

4.4A Classification by chemical composition

Two symbols are used to denote the type of covering:	
R	rutile covering
B	basic covering
NOTE A description of the characteristics of each of the types of covering is given in Annex D.	

Table 4A

Symbol	Nominal electrode efficiency %	Type of current [a, b]
1	≤ 105	AC and DC
2	≤ 105	DC
3	> 105 and ≤ 125	AC and DC
4	> 105 and ≤ 125	DC

[a] AC means alternating current; DC means direct current

[b] In order to demonstrate operability on alternating current, tests shall be carried out with a no load voltage no higher than 65 V.

Table 5

Symbol	Positions [a]
1	PA, PB, PC, PD, PE, PF, PG
2	PA, PB, PC, PD, PE, PF
3	PA, PB
4	PA, PB, PG

[a] Positions are defined in ISO 6947.

Table 6

Symbol	Hydrogen content max. ml/100g of deposited weld metal
H5	5
H10	10
H15	15

Table 1 — Symbol for chemical composition of all-weld metal

Chemical composition symbol[a] for classification according to		Chemical composition, % [b, c]								
Chemical composition ISO 3580-A[d]	Tensile strength and chemical composition ISO 3580-B[e]	C	Si	Mn	P	S	Cr	Mo	V	Other elements
Mo	(1M3)	0,10	0,80	0,40 to 1,50	0,030	0,025	0,2	0,40 to 0,70	0,03	—
(Mo)	1M3	0,12	0,80	1,00	0,030	0,030	—	0,40 to 0,65	—	—
MoV		0,03 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,30 to 0,60	0,80 to 1,20	0,25 to 0,60	—
CrMo0,5	(CM)	0,05 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,40 to 0,65	0,40 to 0,65	—	—
(CrMo0,5)	CM	0,05 to 0,12	0,80	0,90	0,030	0,030	0,40 to 0,65	0,40 to 0,65	—	—
	C1M	0,07 to 0,15	0,30 to 0,60	0,40 to 0,70	0,030	0,030	0,40 to 0,60	1,00 to 1,25	0,05	—
CrMo1	(1CM)	0,05 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,90 to 1,40	0,45 to 0,70	—	—
(CrMo1)	1CM	0,05 to 0,12	0,80	0,90	0,030	0,030	1,00 to 1,50	0,40 to 0,65	—	—
CrMo1L	(1CML)	0,05	0,80	0,40 to 1,50	0,030	0,025	0,90 to 1,40	0,45 to 0,70	—	—
(CrMo1L)	1CML	0,05	1,00	0,90	0,030	0,030	1,00 to 1,50	0,40 to 0,65	—	—
CrMoV1		0,05 to 0,15	0,80	0,70 to 1,50	0,030	0,025	0,90 to 1,30	0,90 to 1,30	0,10 to 0,35	—
CrMo2	(2C1M)	0,05 to 0,12	0,80	0,40 to 1,30	0,030	0,025	2,0 to 2,6	0,90 to 1,30	—	—
(CrMo2)	2C1M	0,05 to 0,12	1,00	0,90	0,030	0,030	2,00 to 2,50	0,90 to 1,20	—	—
CrMo2L	(2C1ML)	0,05	0,80	0,40 to 1,30	0,030	0,025	2,0 to 2,6	0,90 to 1,30	—	—
(CrMo2L)	2C1ML	0,05	1,00	0,90	0,030	0,030	2,00 to 2,50	0,90 to 1,20	—	—
	2CML	0,05	1,00	0,90	0,030	0,030	1,75 to 2,25	0,40 to 0,65	—	—
	2C1MV	0,05 to 0,15	0,60	0,40 to 1,50	0,030	0,030	2,00 to 2,60	0,90 to 1,20	0,20 to 0,40	Nb 0,010 to 0,050
	3C1MV	0,05 to 0,15	0,60	0,40 to 1,50	0,030	0,030	2,60 to 3,40	0,90 to 1,20	0,20 to 0,40	Nb 0,010 to 0,050
CrMo5	(5CM)	0,03 to 0,12	0,80	0,40 to 1,50	0,025	0,025	4,0 to 6,0	0,40 to 0,70	—	—
(CrMo5)	5CM	0,05 to 0,10	0,90	1,00	0,030	0,030	4,0 to 6,0	0,45 to 0,65	—	Ni 0,40[e]
	5CML	0,05	0,90	1,00	0,030	0,030	4,0 to 6,0	0,45 to 0,65	—	Ni 0,40[e]

Table 1 (*continued*)

Chemical composition symbol[a] for classification according to		**Chemical composition, % [b, c]**								
Chemical composition ISO 3580-A[d]	Tensile strength and chemical composition ISO 3580-B[e]	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Mo**	**V**	**Other elements**
CrMo9	(9C1M)	0,03 to 0,12	0,60	0,40 to 1,30	0,025	0,025	8,0 to 10,0	0,90 to 1,20	0,15	Ni 1,0
(CrMo9)	9C1M	0,05 to 0,10	0,90	1,00	0,030	0,030	8,0 to 10,5	0,85 to 1,20	—	Ni 0,40[e]
	9C1ML	0,05	0,90	1,00	0,030	0,030	8,0 to 10,5	0,85 to 1,20	—	Ni 0,40[e]
CrMo91	(9C1MV)	0,06 to 0,12	0,60	0,40 to 1,50	0,025	0,025	8,0 to 10,5	0,80 to 1,20	0,15 to 0,30	Ni 0,40 to 1,00 Nb 0,03 to 0,10 N 0,02 to 0,07
(CrMo91)	9C1MV	0,08 to 0,13	0,30	1,25	0,01	0,01	8,0 to 10,5	0,85 to 1,20	0,15 to 0,30	Ni 1,0 Cu 0,25 Al 0,04 Nb 0,02 to 0,10 N 0,02 to 0,07
(CrMo91)	9C1MV1	0,03 to 0,12	0,60	1,00 to 1,80	0,025	0,025	8,0 to 10,5	0,80 to 1,20	0,15 to 0,30	Ni 1,0 Cu 0,25 Al 0,04 Nb 0,02 to 0,10 N 0,02 to 0,07
CrMoWV12		0,15 to 0,22	0,80	0,40 to 1,30	0,025	0,025	10,0 to 12,0	0,80 to 1,20	0,20 to 0,40	Ni 0,8 W 0,40 to 0,60
Z	G	Any other agreed composition								

[a] A designation in parentheses [e.g., (CrMo1) or (1CM)] indicates a near match in the other designation system, but not an exact match. The correct designation for a given composition range is the one without parentheses. A given product may, by having a more restricted chemical composition which fulfils both sets of designation requirements, be assigned both designations independently, provided that the mechanical property requirements of Table 2 are also satisfied.

[b] Single values shown in the table are maximum values.

[c] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

[d] If not specified: Ni < 0,3 %, Cu < 0,3 %, Nb < 0,01 %.

[e] Elements listed without specified values shall be reported, if intentionally added. The total of these unspecified elements and all other elements found in the course of routine chemical analysis shall not exceed 0,50 %.

EXAMPLE:

ISO 3580–B – E 5518-1CM H5

ISO 3580-B:	number of this International Standard and classification by tensile strength and chemical composition
E:	covered electrode/manual metal arc welding
55:	deposited weld metal tensile strength (see 4.3B and Table 2)
18:	type of covering (see Table 3B)
1CM:	chemical composition of all-weld metal (see Table 1)
H5:	hydrogen content (see Table 6)

4.3B Classification by tensile strength and chemical composition

The symbol for tensile strength shall be 49 for 490 MPa minimum tensile strength, 52 for 520 MPa minimum tensile strength, 55 for 550 MPa minimum tensile strength or 62 for 620 MPa minimum tensile strength. The complete mechanical property requirements that shall be fulfilled by the various compositions are specified in Table 2.

Table 3B

Symbol	Type of covering	Welding positions[a]	Type of current [b]
10[c]	cellulosic	all	DC(+)
11[c]	cellulosic	all	AC in DC(+)
13[c]	rutile	all[d]	AC in DC(±)
15	basic	all[d]	DC (+)
16	basic	all[d]	AC in DC(+)
18	basic + metal powder	all except PG	AC in DC(+)
19[c]	Ilmenit	all[d]	AC in DC(±)
20[c]	iron oxide	PA, PB	AC in DC(-)
27[c]	iron oxide + iron powder	PA, PB	AC in DC(-)

[a] Positions are defined in ISO 6947. PA = flat, PB =horizontal vertical fillet, PC = horizontal, PG = vertical down

[b] AC means alternating current; DC means direct current

[c] Composition designator 1M3 only.

d All positions may or may not include vertical down welding. This shall be specified in the manufacturer's trade literature.

Table 6

Symbol	**Hydrogen content max. ml/100g of deposited weld metal**
H5	5
H10	10
H15	15

Table 1 — Symbol for chemical composition of all-weld metal

Chemical composition symbol[a] for classification according to		Chemical composition, % [b, c]								
Chemical composition ISO 3580-A[d]	Tensile strength and chemical composition ISO 3580-B[e]	C	Si	Mn	P	S	Cr	Mo	V	Other elements
Mo	(1M3)	0,10	0,80	0,40 to 1,50	0,030	0,025	0,2	0,40 to 0,70	0,03	—
(Mo)	1M3	0,12	0,80	1,00	0,030	0,030	—	0,40 to 0,65	—	—
MoV		0,03 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,30 to 0,60	0,80 to 1,20	0,25 to 0,60	—
CrMo0,5	(CM)	0,05 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,40 to 0,65	0,40 to 0,65	—	—
(CrMo0,5)	CM	0,05 to 0,12	0,80	0,90	0,030	0,030	0,40 to 0,65	0,40 to 0,65	—	—
	C1M	0,07 to 0,15	0,30 to 0,60	0,40 to 0,70	0,030	0,030	0,40 to 0,60	1,00 to 1,25	0,05	—
CrMo1	(1CM)	0,05 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,90 to 1,40	0,45 to 0,70	—	—
(CrMo1)	1CM	0,05 to 0,12	0,80	0,90	0,030	0,030	1,00 to 1,50	0,40 to 0,65	—	—
CrMo1L	(1CML)	0,05	0,80	0,40 to 1,50	0,030	0,025	0,90 to 1,40	0,45 to 0,70	—	—
(CrMo1L)	1CML	0,05	1,00	0,90	0,030	0,030	1,00 to 1,50	0,40 to 0,65	—	—
CrMoV1		0,05 to 0,15	0,80	0,70 to 1,50	0,030	0,025	0,90 to 1,30	0,90 to 1,30	0,10 to 0,35	—
CrMo2	(2C1M)	0,05 to 0,12	0,80	0,40 to 1,30	0,030	0,025	2,0 to 2,6	0,90 to 1,30	—	—
(CrMo2)	2C1M	0,05 to 0,12	1,00	0,90	0,030	0,030	2,00 to 2,50	0,90 to 1,20	—	—
CrMo2L	(2C1ML)	0,05	0,80	0,40 to 1,30	0,030	0,025	2,0 to 2,6	0,90 to 1,30	—	—
(CrMo2L)	2C1ML	0,05	1,00	0,90	0,030	0,030	2,00 to 2,50	0,90 to 1,20	—	—
	2CML	0,05	1,00	0,90	0,030	0,030	1,75 to 2,25	0,40 to 0,65	—	—
	2C1MV	0,05 to 0,15	0,60	0,40 to 1,50	0,030	0,030	2,00 to 2,60	0,90 to 1,20	0,20 to 0,40	Nb 0,010 to 0,050
	3C1MV	0,05 to 0,15	0,60	0,40 to 1,50	0,030	0,030	2,60 to 3,40	0,90 to 1,20	0,20 to 0,40	Nb 0,010 to 0,050
CrMo5	(5CM)	0,03 to 0,12	0,80	0,40 to 1,50	0,025	0,025	4,0 to 6,0	0,40 to 0,70	—	—
(CrMo5)	5CM	0,05 to 0,10	0,90	1,00	0,030	0,030	4,0 to 6,0	0,45 to 0,65	—	Ni 0,40[e]
	5CML	0,05	0,90	1,00	0,030	0,030	4,0 to 6,0	0,45 to 0,65	—	Ni 0,40[e]

Table 1 (*continued*)

Chemical composition symbol[a] for classification according to		**Chemical composition, %** [b, c]								
Chemical composition ISO 3580-A[d]	Tensile strength and chemical composition ISO 3580-B[e]	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Mo**	**V**	**Other elements**
CrMo9	(9C1M)	0,03 to 0,12	0,60	0,40 to 1,30	0,025	0,025	8,0 to 10,0	0,90 to 1,20	0,15	Ni 1,0
(CrMo9)	9C1M	0,05 to 0,10	0,90	1,00	0,030	0,030	8,0 to 10,5	0,85 to 1,20	—	Ni 0,40[e]
	9C1ML	0,05	0,90	1,00	0,030	0,030	8,0 to 10,5	0,85 to 1,20	—	Ni 0,40[e]
CrMo91	(9C1MV)	0,06 to 0,12	0,60	0,40 to 1,50	0,025	0,025	8,0 to 10,5	0,80 to 1,20	0,15 to 0,30	Ni 0,40 to 1,00 Nb 0,03 to 0,10 N 0,02 to 0,07
(CrMo91)	9C1MV	0,08 to 0,13	0,30	1,25	0,01	0,01	8,0 to 10,5	0,85 to 1,20	0,15 to 0,30	Ni 1,0 Cu 0,25 Al 0,04 Nb 0,02 to 0,10 N 0,02 to 0,07
(CrMo91)	9C1MV1	0,03 to 0,12	0,60	1,00 to 1,80	0,025	0,025	8,0 to 10,5	0,80 to 1,20	0,15 to 0,30	Ni 1,0 Cu 0,25 Al 0,04 Nb 0,02 to 0,10 N 0,02 to 0,07
CrMoWV12		0,15 to 0,22	0,80	0,40 to 1,30	0,025	0,025	10,0 to 12,0	0,80 to 1,20	0,20 to 0,40	Ni 0,8 W 0,40 to 0,60
Z	G	Any other agreed composition								

[a] A designation in parentheses [e.g., (CrMo1) or (1CM)] indicates a near match in the other designation system, but not an exact match. The correct designation for a given composition range is the one without parentheses. A given product may, by having a more restricted chemical composition which fulfils both sets of designation requirements, be assigned both designations independently, provided that the mechanical property requirements of Table 2 are also satisfied.

[b] Single values shown in the table are maximum values.

[c] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

[d] If not specified: Ni < 0,3 %, Cu < 0,3 %, Nb < 0,01 %.

[e] Elements listed without specified values shall be reported, if intentionally added. The total of these unspecified elements and all other elements found in the course of routine chemical analysis shall not exceed 0,50 %.

Table 2 — Mechanical properties of all-weld metal

Chemical composition symbol[a] for classification according to		**Minimum yield strength** [c]	**Minimum tensile strength**	**Minimum** [d] **elongation**	**Impact energy** J at + 20 °C		**Heat treatment of all-weld metal**		
Chemical composition ISO 3580-A	Tensile strength and chemical composition ISO 3580-B[b]	MPa	MPa	%	Minimum average from three test specimens	Minimum single value[e]	Preheat and interpass temperature °C	Postweld heat treatment of test assembly Temperature[f] °C	Time min
Mo	(1M3)	355	510	22	47	38	< 200	570 to 620	60[g]
(Mo)	49XX-1M3	390	490	22	—	—	90 to 110	605 to 645	60[h]
(Mo)	49YY-1M3	390	490	20	—	—	90 to 110	605 to 645	60[h]
MoV		355	510	18	47	38	200 to 300	690 to 730	60[g]
CrMo0,5	(55XX-CM)	355	510	22	47	38	100 to 200	600 to 650	60[g]
(CrMo0,5)	55XX-CM	460	550	17	—	—	160 to 190	675 to 705	60[h]
	55XX-C1M	460	550	17	—	—	160 to 190	675 to 705	60[h]
CrMo1	(55XX-1CM) (5513-1CM)	355	510	20	47	38	150 to 250	660 to 700	60[g]
(CrMo1)	55XX-1CM	460	550	17	—	—	160 to 190	675 to 705	60[h]
(CrMo1)	5513-1CM	460	550	14	—	—	160 to 190	675 to 705	60[h]
CrMo1L	(52XX-1CML)	355	510	20	47	38	150 to 250	660 to 700	60[g]
(CrMo1L)	52XX-1CML	390	520	17	—	—	160 to 190	675 to 705	60[h]
CrMoV1		435	590	15	24	19	200 to 300	680 to 730	60[g]
CrMo2	(62XX-2C1M) (6213-2C1M)	400	500	18	47	38	200 to 300	690 to 750	60[g]
(CrMo2)	62XX-2C1M	530	620	15	—	—	160 to 190	675 to 705	60[h]
(CrMo2)	6213-2C1M	530	620	12	—	—	160 to 190	675 to 705	60[h]
CrMo2L	(55XX-2C1ML)	400	500	18	47	38	200 to 300	690 to 750	60[g]
(CrMo2L)	55XX-2C1ML	460	550	15	—	—	160 to 190	675 to 705	60[h]
	55XX-2CML	460	550	15	—	—	160 to 190	675 to 705	60[h]
	62XX-2C1MV	530	620	15	—	—	160 to 190	725 to 755	60[g]
	62XX-3C1MV	530	620	15	—	—	160 to 190	725 to 755	60[h]
CrMo5	(55XX-5CM)	400	590	17	47	38	200 to 300	730 to 760	60[g]
(CrMo5)	55XX-5CM	460	550	17	—	—	175 to 230	725 to 755	60[h]
	55XX-5CML	460	550	17	—	—	175 to 230	725 to 755	60[h]
CrMo9	(62XX-9C1M)	435	590	18	34	27	200 to 300	740 to 780	120[g]
(CrMo9)	62XX-9C1M	530	620	15	—	—	205 to 260	725 to 755	60[h]
	62XX-9C1ML	530	620	15	—	—	205 to 260	725 to 755	60[h]
CrMo91	(62XX-9C1MV)	415	585	17	47	38	200 to 300	750 to 770	120 to 180

Table 2 (*continued*)

Chemical composition symbol[a] for classification according to		**Minimum yield strength** [c]	**Minimum tensile strength**	**Minimum** [d] **elongation**	**Impact energy** J at + 20 °C		**Heat treatment of all-weld metal**		
Chemical composition ISO 3580-A	Tensile strength and chemical composition ISO 3580-B[b]	MPa	MPa	%	Minimum average from three test specimens	Minimum single value[e]	Preheat and interpass temperature °C	Postweld heat treatment of test assembly Temperature[f] °C	Time min
(CrMo91)	62XX-9C1MV	530	620	15	—	—	230 to 290	725 to 755	60[h]
(CrMo91)	62XX-9C1MV1	530	620	15	—	—	205 to 260	725 to 755	60[h]
CrMoWV12		550	690	15	34	27	250 to 350[i] or 400 to 500[i]	740 to 780	120[g]
Z	G	As agreed between purchaser and supplier							

[a] A designation in parentheses [e.g., (CrMo1) or (1CM)] indicates a near match in the other designation system, but not an exact match. The correct designation for a given composition range is the one without parentheses. A given product may, by having a more restricted chemical composition that fulfils both sets of mechanical property requirements, be classified in both systems independently, provided that the chemical composition requirements of Table 1 are also satisfied.

[b] XX stands for coating types 15, 16 or 18. YY stands for coating types 10, 11, 19, 20 or 27. See Table 3B.

[c] For yield strength, the lower yield, R_{eL}, shall be used when yielding occurs; otherwise the 0,2 % proof strength, $R_{p0,2}$, shall be used.

[d] Gauge length is equal to five times the test specimen diameter.

[e] Only one single value lower than the minimum average is permitted.

[f] The test assembly shall be cooled in the furnace to 300 °C at a rate not exceeding 200 °C/h.

[g] Tolerance shall be plus or minus 10 min.

[h] Tolerance shall be zero, plus 10 min. The heating rate in the furnace shall be 85 °C to 275 °C/h.

[i] Immediately after welding the specimen is to be allowed to cool down to 120 °C to 100 °C and kept at this temperature for at least 1 h.

EXAMPLE:

ISO 17632–A – T 46 3 1Ni B M 1 H5

ISO 17632-A:	is the number of this International Standard, with classification by yield strength and 47 J impacts
T:	indicates a tubular cored electrode/metal arc welding
46:	represents the tensile properties (see Table 1A)
3:	indicates impact property of 47 J, minimum (see Table 3)
1Ni:	is the chemical composition of all-weld metal (see Table 4A)
B:	is the type of electrode core (see Table 5A)
M:	is the shielding gas
1:	is the welding position (see Table 6A)
H5:	is the hydrogen content (see Table 7)

Table 1A

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
35	355	440 to 570	22
38	380	470 to 600	20
42	420	500 to 640	20
46	460	530 to 680	20
50	500	560 to 720	18

[a] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.
[b] Gauge length is equal to five times the test specimen diameter.

Table 7

Symbol	Hydrogen content max. ml/100g of deposited weld metal
H5	5
H10	10
H15	15

Table 3

Symbol	Temperature for minimum average impact energy of 47 J [a, b] or 27 J [c] °C
Z[a]	No requirements
A[b] or Y[c]	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60
7	-70
8	-80
9	-90
10	-100

[a] Only the symbol Z is used for electrodes for the single-run technique.
[b] Classification by yield strength and 47 J impact energy.
[c] Classification by tensile strength and 27 J impact energy.

Table 6A

Symbol	Welding positions [a]
1	PA, PB, PC, PD, PE, PF & PG
2	PA, PB, PC, PD, PE & PF
3	PA & PB
4	PA
5	PA, PB & PG

[a] PA = Flat position
PB = Horizontal vertical position
PC = Horizontal position
PD = Horizontal overhead position
PE = Overhead position
PF = Vertical up position
PG = Vertical down position

Table 5A

Symbol	Characteristics	Types of weld	Shielding gas
R	Rutile, slow-freezing slag	Single and multiple pass	Required
P	Rutile, fast-freezing slag	Single and multiple pass	Required
B	Basic	Single and multiple pass	Required
M	Metal powder	Single and multiple pass	Required
V	Rutile or basic/fluoride	Single and multiple pass	Not required
W	Basic/fluoride, slow-freezing slag	Single and multiple pass	Not required
Y	Basic/fluoride, fast-freezing slag	Single and multiple pass	Not required
Z	Other types		

NOTE A description of the characteristics of each of the types of core is given in Annex B

Table 4A — Symbol for chemical composition of all-weld metal (classification by yield strength and 47 J impact energy)

Composition designation	Chemical composition (percentage mass fraction) [a, b]											
	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	Al [c]	Cu
No symbol	—	2,0	—	—	—	0,2	0,5	0,2	0,08	0,05	2,0	0,3
Mo	—	1,4	—	—	—	0,2	0,5	0,3 to 0,6	0,08	0,05	2,0	0,3
MnMo	—	1,4 to 2,0	—	—	—	0,2	0,5	0,3 to 0,6	0,08	0,05	2,0	0,3
1Ni	—	1,4	0,80	—	—	0,2	0,6 to 1,2	0,2	0,08	0,05	2,0	0,3
1,5Ni	—	1,6	—	—	—	0,2	1,2 to 1,8	0,2	0,08	0,05	2,0	0,3
2Ni	—	1,4	—	—	—	0,2	1,8 to 2,6	0,2	0,08	0,05	2,0	0,3
3Ni	—	1,4	—	—	—	0,2	2,6 to 3,8	0,2	0,08	0,05	2,0	0,3
Mn1Ni	—	1,4 to 2,0	—	—	—	0,2	0,6 to 1,2	0,2	0,08	0,05	2,0	0,3
1NiMo	—	1,4	—	—	—	0,2	0,6 to 1,2	0,3 to 0,6	0,08	0,05	2,0	0,3
Z [d]	—	—	—	—	—	—	—	—	—	—	—	—

[a] Single values shown in the table are maximum values.

[b] The results shall be rounded to the same number of significant figures as in the specified value using rule A in accordance with Annex B of ISO 31-0:1992.

[c] Self-shielded electrodes only.

[d] Any other agreed composition.

EXAMPLE:

ISO 17632–B – T554T5-1MA-N2-UH5

ISO 17632-B:	is the number of this International Standard, with classification by tensile strength and 27 J impacts
T:	indicates a tubular cored electrode
55:	represents the tensile properties (see Table 1B)
4:	indicates impact properties of 27 J, minimum (see Table 3)
T5:	is the usability designator (see Table 5B)
1:	is the welding position (see Table 6B)
M:	is the shielding gas
A:	indicates tested as-welded condition
N2:	is the chemical composition of all-weld metal (see Table 4B)
U:	indicates (optional designator that the weld deposit in the as-welded condition will have impact properties of 47 J minimum at the classification test temperature
H5:	is the hydrogen content (see Table 7)

Table 1B

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
43	330	430 to 600	20
49	390	490 to 670	18
55	460	550 to 740	17
57	490	570 to 770	17

[a] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.
[b] Gauge length is equal to five times the test specimen diameter.

Table 7

Symbol	Hydrogen content max. ml/100g of deposited weld metal
H5	5
H10	10
H15	15

Table 3

Symbol	Temperature for minimum average impact energy of 47 J [a, b] or 27 J [c] °C
Z[a]	No requirements
A[b] or Y[c]	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60
7	-70
8	-80
9	-90
10	-100

[a] Only the symbol Z is used for electrodes for the single-run technique.
[b] Classification by yield strength and 47 J impact energy.
[c] Classification by tensile strength and 27 J impact energy.

Table 6B

Symbol	Welding positions [a]
0	PA & PB
1	PA, PB, PC, PD, PE, PF or PG, or PF + PG

[a] PA = Flat position
PB = Horizontal vertical position
PC = Horizontal position
PD = Horizontal overhead position
PE = Overhead position
PF = Vertical up position
PG = Vertical down position

Table 4B — Symbol for chemical composition of all-weld metal (Classification by tensile strength and 27 J impact energy)

Composition designation	Chemical composition (percentage mass fraction) [a, b, c]											
	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al [d]
No symbol	0,18 [e]	2,00	0,90	0,030	0,030	0,20 [f]	0,50 [f]	0,30 [f]	—	0,08 [f]	2,0
K	0,20	1,60	1,00	0,030	0,030	0,20 [f]	0,50 [f]	0,30 [f]	—	0,08 [f]	—
2M3	0,12	1,50	0,80	0,030	0,030	—	—	0,40 to 0,65	—	—	1,8
3M2	0,15	1,25 to 2,00	0,80	0,030	0,030	—	—	0,25 to 0,55	—	—	1,8
N1	0,12	1,75	0,80	0,030	0,030	—	0,30 to 1,00	0,35	—	—	1,8
N2	0,12	1,75	0,80	0,030	0,030	—	0,80 to 1,20	0,35	—	—	1,8
N3	0,12	1,75	0,80	0,030	0,030	—	1,00 to 2,00	0,35	—	—	1,8
N5	0,12	1,75	0,80	0,030	0,030	—	1,75 to 2,75	—	—	—	1,8
N7	0,12	1,75	0,80	0,030	0,030	—	2,75 to 3,75	—	—	—	1,8
CC	0,12	0,60 to 1,40	0,20 to 0,80	0,030	0,030	0,30 to 0,60	—	—	0,20 to 0,50	—	1,8
NCC	0,12	0,60 to 1,40	0,20 to 0,80	0,030	0,030	0,45 to 0,75	0,10 to 0,45	—	0,30 to 0,75	—	1,8
NCC1	0,12	0,50 to 1,30	0,20 to 0,80	0,030	0,030	0,45 to 0,75	0,30 to 0,80	—	0,30 to 0,75	—	1,8
N1M2	0,15	2,00	0,80	0,030	0,030	0,20	0,40 to 1,00	0,20 to 0,65	—	0,05	1,8
N2M2	0,15	2,00	0,80	0,030	0,030	0,20	0,80 to 1,20	0,20 to 0,65	—	0,05	1,8
N3M2	0,15	2,00	0,80	0,030	0,030	0,20	1,00 to 2,00	0,20 to 0,65	—	0,05	1,8
G [g]	—	—	—	—	—	—	—	—	—	—	—

[a] Single values shown in the table are maximum values.

[b] The results shall be rounded to the same number of significant figures as in the specified value using rule A in accordance with Annex B of ISO 31-0:1992.

[c] The weld metal shall be analysed for the specific elements for which values as shown in this table.

[d] Self-shielded electrodes only.

[e] 0,30 % for self-shielded electrodes.

[f] The analysis of these elements shall be reported only if added intentionally.

[g] Any other agreed composition.

Table 5B — Usability characteristics (classification by tensile strength and 27 J impact energy)

Usability designator	Shielding gas	Operating polarity	Transfer of droplet	Type of core	Welding position [a]	Characteristics	Type of weld
T1	Required	d.c.(+)	Spray type	Rutile	0 or 1	Low spatter loss, flat to slightly convex bead and high deposition rates	Single and multiple pass
T2	Required	d.c.(+)	Spray type	Rutile	0	Similar to "T1" type, higher manganese and/or silicon for improved performance	Single pass
T3	Not required	d.c.(+)	Globular type	Not specified	0	Very high welding speeds	Single pass
T4	Not required	d.c.(+)	Globular type	Basic	0	Very high deposition rates, excellent resistance to hot cracking and low penetration	Single and multiple pass
T5	Required	d.c.(+)	Globular type	Lime-fluoride	0 or 1	Slightly convex bead, a thin slag without completely covering the weld bead, good impact properties and hot and cold crack resistance compared with "T1"	Single and multiple pass
T6	Not required	d.c.(+)	Spray type	Not specified	0	Good impact properties, good penetration into the root of the weld and excellent slag removal even in a deep groove	Single and multiple pass
T7	Not required	d.c.(–)	Small droplet to spray type	Not specified	0 or 1	High deposition rates and excellent resistance to hot cracking	Single and multiple pass
T8	Not required	d.c.(–)	A small droplet or spray type	Not specified	0 or 1	Very good low temperature impact properties	Single and multiple pass
T10	Not required	d.c.(–)	Small droplet	Not specified	0	High travel speeds on any thickness	Single pass
T11	Not required	d.c.(–)	Spray type	Not specified	0 or 1	Some electrodes are designed for thin plate only. The manufacturer should be consulted regarding any plate thickness limitations.	Single and multiple pass
T12	Required	d.c.(+)	Spray type	Rutile	0 or 1	Similar to "T1" type, improved impact properties and lower manganese requirements	Single and multiple pass
T13	Not required	d.c.(–)	Short arc transfer	Not specified	0 or 1	Welding for open gap root passes	Single pass
T14	Not required	d.c.(–)	Spray type	Not specified	0 or 1	High speed welding on coated sheet steels	Single pass
T15	Required	d.c.(+)	Very fine droplet spray type	Metal	0 or 1	Core consisting of metal alloys and iron powder, and minimal slag cover	Single and multiple pass
TG [b]	As agreed between purchaser and supplier						

NOTE A description of the usability characteristics of the electrodes is given in Annex C.

[a] See Table 6B.

[b] For electrodes that are not covered by any currently defined usability designator.

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Guide to EN ISO 14341 – A

EXAMPLE:

ISO 14341–A – G 46 5 M G3Si1

ISO 14341-A:	number of this International Standard and classification according to yield strength and impact energy of 47 J (°C)
G:	welding process type – gas-shielded metal arc welding
46:	tensile properties of all-weld metal (see Table 1)
5:	impact property – requirements of all-weld metal (see Table 2)
M:	shielded gas (acc. to EN ISO 14175)
G3Si1:	chemical composition of wire (see Table 3)

Table 1

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
35	355	440 to 570	22
38	380	470 to 600	20
42	420	500 to 640	20
46	460	530 to 680	20
50	500	560 to 720	18

[a] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.
[b] Gauge length is equal to five times the test specimen diameter.

Table 2

Symbol	Temperature for minimum average impact energy of 47 J [a,b] or 27 J [a] (°C)			
Z	No requirements		5	-50
A [a] or Y [b]	+20		6	-60
0	0		7	-70
2	-20		8	-80
3	-30		9	-90
4	-40		10	-100

[a] Three specimen must reach average impact energy of 47J, only one of them min 32J .
[b] Among five specimen the highest and the lowest values aren't taken be in account; the average of other thee must be 27 J, only one them can be min 20J. .

Table 3 — Symbol for chemical composition of wires

	Chemical composition, mass **%** [a,b, c]											
symbol	**C**	**Si**	**Mn**	**P**	**S**	**Ni**	**Cr**	**Mo**	**V**	**Cu**	**Al**	**Ti+Zr**
G0	Any other defined requirements											
G2Si	0,06 to 0,14	0,50 to 0,80	0,90 to 1,30	0,025	0,025	0,15	0,15	0,15	0,03	0,35	0,02	0,15
G3Si1	0,06 to 0,14	0,70 to 1,00	1,30 to 1,60	0,025	0,025	0,15	0,15	0,15	0,03	0,35	0,02	0,15
G3Si2	0,06 to 0,14	1,00 to 1,30	1,30 to 1,60	0,025	0,025	0,15	0,15	0,15	0,03	0,35	0,02	0,15
G4Si1	0,06 to 0,14	0,80 to 1,20	1,60 to 1,90	0,025	0,025	0,15	0,15	0,15	0,03	0,35	0,02	0,15
G2Ti	0,04 to 0,14	0,40 to 0,80	0,90 to 1,40	0,025	0,025	0,15	0,15	0,15	0,03	0,35	0,05 to 0,20	0,05 to 0,25
G2Al	0,08 to 0,14	0,30 to 0,50	0,90 to 1,30	0,025	0,025	0,15	0,15	0,15	0,03	0,35	0,35 to 0,75	0,15
G3Ni1	0,06 to 0,14	0,50 to 0,90	1,00 to 1,60	0,020	0,020	0,80 to 1,50	0,15	0,15	0,03	0,35	0,02	0,15
G2Ni2	0,06 to 0,14	0,40 to 0,80	0,80 to 1,40	0,020	0,020	2,10 to 2,70	0,15	0,15	0,03	0,35	0,02	0,15
G2Mo	0,08 to 0,12	0,30 to 0,70	0,90 to 1,30	0,020	0,020	0,15	0,15	0,40 to 0,60	0,03	0,35	0,02	0,15
G4Mo	0,06 to 0,14	0,50 to 0,80	1,70 to 2,10	0,025	0,025	0,15	0,15	0,40 to 0,60	0,03	0,35	0,02	0,15

[a] If not specified: Cr < 0,15%; Cu < 0,35 %; V < 0,03 %. Copper from steel and copper from coating shall not exceed 0,35 % (mass).

[b] Single values shown in the table are maximum values.

[c] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

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Guide to EN ISO 14341 – B

EXAMPLE:

ISO 14341–B – G 49A 6 M G3

ISO 14341-B:	number of this International Standard and classification according to tensile strength and impact energy of 27 J (°C)
G:	welding process type – gas-shielded metal arc welding
49A:	tensile properties and elongation in as-welded condition (Table1)
6:	impact property – requirements of as-welded condition (Table 2)
M:	shielded gas (acc. to EN ISO 14175)
G3:	chemical composition of wire (Table 3)

Table 1

Symbol [a]	Minimum yield strength [b] MPa	Tensile strength MPa	Minimum elongation [c] %
43X	330	430 to 600	20
49X	390	490 to 670	18
55X	460	550 to 740	17
57X	490	570 to 770	17

[a] Instead of X: ''A'' –results from testing in as-welded condition
''P'' - results from testing in heat-treatment condition.

[b] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.

[c] Gauge length is equal to five times the test specimen diameter.

Table 2

Symbol	Temperature for minimum average impact energy of 47 J [a,b] or 27 J [a] (°C)			
Z	No requirements		5	-50
A [a] or Y [b]	+20		6	-60
0	0		7	-70
2	-20		8	-80
3	-30		9	-90
4	-40		10	-100

[a] Three specimen must reach average impact energy of 47J, only one of them min 32J .

[b] Among five specimen the highest and the lowest values aren't taken be in account; the average of other thee must be 27 J, only one them can be min 20J. .

Table 3 — Symbol for chemical composition of wires

	Chemical composition, mass % [a,b, c]											
symbol	**C**	**Si**	**Mn**	**P**	**S**	**Ni**	**Cr**	**Mo**	**V**	**Cu**	**Al**	**Ti+Zr**
G0	Any other defined requirements											
G2	0,07	0,40 to 0,70	0,90 to 1,40	0,025	0,030	—	—	—	—	0,50	0,05 to 0,15	Ti: 0,05 to 0,15 Ti: 0,02 to 0,12
G3	0,06 to 0,15	0,45 to 0,75	0,90 to 1,40	0,025	0,035	—	—	—	—	0,50	—	—
G4	0,06 to 0,15	0,65 to 0,85	1,00 to 1,50	0,025	0,035	—	—	—	—	0,50	—	—
G6	0,06 to 0,15	0,80 to 1,15	1,40 to 1,85	0,025	0,035	—	—	—	—	0,50	—	—
G7	0,07 to 0,15	0,50 to 0,80	1,50 to 2,00	0,025	0,035	—	—	—	—	0,50	—	—
G11	0,02 to 0,15	0,55 to 1,10	1,40 to 1,90	0,030	0,030	—	—	—	—	0,50	—	0,02 to 0,30
G12	0,02 to 0,15	0,55 to 0,10	1,25 to 1,90	0,030	0,030	—	—	—	—	0,50	—	—
G13	0,02 to 0,15	0,55 to 1,10	1,35 to 1,90	0,030	0,030	—	—	—	—	0,50	0,10 to 0,50	0,02 to 0,30
G14	0,02 to 0,15	1,00 to 1,35	1,30 to 1,60	0,030	0,030	—	—	—	—	0,50	—	—
G15	0,02 to 0,15	0,40 to 1,00	1,00 to 1,60	0,030	0,030	—	—	—	—	0,50	—	0,02 to 0,15
G16	0,02 to 0,15	0,40 to 1,00	0,90 to 1,60	0,030	0,030	—	—	—	—	0,50	—	—
G17	0,02 to 0,15	0,20 to 0,55	1,50 to 2,10	0,030	0,030	—	—	—	—	0,50	0,10 to 0,50	0,02 to 0,30
G18	0,02 to 0,15	0,50 to 1,10	1,60 to 2,40	0,030	0,030	—	—	—	—	0,50	—	0,02 to 0,30
G1M3	0,12	0,30 to 0,70	1,30	0,025	0,025	0,020	—	0,40 to 0,65	—	0,35	—	—
G2M3	0,12	0,30 to 0,70	0,60 to 1,40	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
G2M31	0,12	0,30 to 0,90	0,80 to 1,50	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
G3M3T	0,12	0,40 to 1,00	0,80 to 1,50	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	Ti: 0,02 to 0,30
G3M1	0,02 to 0,15	0,30 to 0,70	0,60 to 1,40	0,025	0,025	—	—	0,10 to 0,45	—	0,50	—	—
G3M1T	0,12	0,40 to 1,00	1,40 to 2,10	0,025	0,025	—	—	0,10 to 0,45	—	0,50	—	Ti: 0,02 to 0,30
G4M31	0,05 to 0,15	0,50 to 0,80	1,60 to 2,10	0,025	0,025	—	—	0,40 to 0,65	—	0,40	—	—

Table 3 *(continued)*

	Chemical composition, mass **%** [a,b, c]											
symbol	**C**	**Si**	**Mn**	**P**	**S**	**Ni**	**Cr**	**Mo**	**V**	**Cu**	**Al**	**Ti+Zr**
G4M3T	0,12	0,50 to 0,80	1,60 to 2,20	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	Ti: 0,02 to 0,30
GN1	0,12	0,20 to 0,50	1,25	0,025	0,025	0,60 to 1,00	—	0,35	—	0,35	—	—
GN2	0,12	0,40 to 0,80	1,25	0,025	0,025	0,80 to 1,10	0,15	0,35	0,05	0,35	—	—
GN3	0,12	0,30 to 0,80	1,20 to 1,60	0,025	0,025	1,50 to 1,90	—	0,35	—	0,35	—	—
GN5	0,12	0,40 to 0,80	1,25	0,025	0,025	2,00 to 2,75	—	—	—	0,35	—	—
GN7	0,12	0,20 to 0,50	1,25	0,025	0,025	3,00 to 3,75	—	0,35	—	0,35	—	—
GN71	0,12	0,30 to 0,80	1,25	0,025	0,025	3,00 to 3,75	—	—	—	0,35	—	—
GN9	0,10	0,50	1,40	0,025	0,025	4,00 to 4,75	—	0,35	—	0,35	—	—
GNCC	0,12	0,60 to 0,90	1,00 to 1,65	0,030	0,030	0,10 to 0,30	0,50 to 0,80	—	—	0,20 to 0,60	—	—
GNCCT	0,12	0,60 to 0,90	1,10 to 1,65	0,030	0,030	0,10 to 0,30	0,50 to 0,80	—	—	0,20 to 0,60	—	Ti: 0,02 to 0,30
GNCCT1	0,12	0,50 to 0,80	1,20 to 1,80	0,030	0,030	0,10 to 0,40	0,50 to 0,80	0,02 to 0,30	—	0,20 to 0,60	—	Ti: 0,02 to 0,30
GNCCT2	0,12	0,50 to 0,90	1,10 to 1,70	0,030	0,030	0,40 to 0,80	0,50 to 0,80	—	—	0,20 to 0,60	—	Ti: 0,02 to 0,30
GN1M2T	0,12	0,60 to 1,00	1,70 to 2,30	0,025	0,025	0,40 to 0,80	—	0,20 to 0,60	—	0,50	—	Ti: 0,02 to 0,30
GN1M1T	0,12	0,30 to 0,80	1,10 to 1,90	0,025	0,025	0,80 to 1,60	—	0,10 to 0,45	—	0,50	—	Ti: 0,02 to 0,30
GN2M2T	0,05 to 0,15	0,30 to 0,90	1,10 to 1,80	0,025	0,025	0,70 to 1,20	—	0,20 to 0,60	—	0,50	—	Ti: 0,02 to 0,30
GN2M3T	0,05 to 0,15	0,30 to 0,90	1,40 to 2,10	0,025	0,025	0,70 to 1,20	—	0,40 to 0,65	—	0,50	—	Ti: 0,02 to 0,30
GN2M4T	0,12	0,50 to 1,00	1,70 to 2,30	0,025	0,025	0,80 to 1,30	—	0,55 to 0,85	—	0,50	—	Ti: 0,02 to 0,30

[a] The total of all other non-listed elements (except Fe) shall not exceed 0,50 %.

[b] Single values shown in the table are maximum values.

[c] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

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Guide to EN ISO 14343 – A, B

ISO 14343-A	ISO 14343-B
International Standard number with classification according to the system A	International Standard number with classification according to the system B
Classification according to nominal composition	Classification according to alloy type

EXAMPLES:

ISO 14343-A - G 20 10 3 and/or S 20 10 3	ISO 14343-B –SS308Mo
A wire electrode for gas-shielded arc welding, also applicable to submerged arc welding, has a chemical composition within the limits for the alloy symbol 20 10 3 and within the limits for the alloy symbol 308Mo of Table 1	

ISO 14343-A - G 20 10 3	ISO 14343-B –SS308Mo
A rod for gas tungsten arc welding has a chemical composition within the limits for the alloy symbol 20 10 3 and within the limits for the alloy symbol 308Mo of Table 1	

ISO 14343-A - G 19 12 3 L Si	ISO 14343-B –SS316LSi
A wire electrode for gas-shielded arc welding has a chemical composition within the limits for the alloy symbol 19 12 3 L Si and within the limits for the alloy symbol 316LSi.	

G - gas-shielded metal arc welding W - gas tungsten arc welding P - plasma arc welding S - submerged arc welding L - laser beam welding	SS – **S**olid wire **S**tainless and heat resistant
20 10 3 19 12 3 L Si } Table 1 – Chemical composition of product	SS308Mo SS316LSi } Table 1 – Chemical composition of product

Table 1 — Symbol for chemical composition of wires

Alloy designation[a] for classification acc. to		Chemical composition, % *(m/m)* [b,c]											
Nominal composition [f] ISO 14343-A	Alloy Type ISO 14343-B	C	Si	Mn	P	S	Cr	NI	Mo	N	Cu	Nb [e]	Other
Martensitic/ferritic types													
	409	0,08	0,8	0,8	0,03	0,03	10,5 to 13,5	0,6	0,5	—	0,75	—	Ti:10xC to 1,5
	409Nb	0,12	0,5	0,6	0,03	0,03	10,5 to 13,5	0,6	0,75	—	0,75	8 x C to 1,0	—
13	(410)	0,15	1,0	1,0	0,03	0,02	12,0 to 15	0,3	0,3	—	0,3	—	—
(13)	410	0,12	0,5	0,6	0,03	0,03	11,5 to 13,5	0,6	0,75	—	0,75	—	—
13L		0,05	1,0	1,0	0,03	0,02	12,0 to 15	0,3	0,3	—	0,3	—	—
13 4	(410NiMo)	0,05	1,0	1,0	0,03	0,02	11,0 to 14	3,0 to 5,0	0,4 to 1,0	—	0,3	—	—
(13 4)	410NiMo	0,06	0,5	0,6	0,03	0,03	11,0 to 12,5	4,0 to 5,0	0,4 to 0,7	—	0,75	—	—
	420	0,25 to 0,40	0,5	0,6	0,03	0,03	12,0 to 14,0	0,75	0,75	—	0,75	—	—
17	(430)	0,12	1,0	1,0	0,03	0,02	16,0 to 19,0	0,3	0,3	—	0,3	—	—
(17)	430	0,10	0,5	0,6	0,03	0,03	15,5 to 17,0	0,6	0,75	—	0,3	—	—
	430Nb	0,10	0,5	0,6	0,03	0,03	15,5 to 17,0	0,6	0,75	—	0,3	8 x C to 1,2	—
18LNb	430LNb	0,02	0,5	0,8	0,03	0,02	17,8 to 18,8	0,3	0,3	0,02	0,3	0,05+7(C+N) up to 0,5	—
Austenitic types													
	308	0,08	0,65	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
	308Si	0,08	0,65 to 1,00	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
19 9L	(308L)	0,03	0,65	1,0 to 2,5	0,03	0,02	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
(19 9L)	308L	0,03	0,65	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
19 9LSi	(308LSi)	0,03	0,65 to 1,2	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,3	—	0,3	—	—
(19 9LSi)	308LSi	0,03	0,65 to 1,0	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—

Table 1 *(continued)*

Alloy designation[a] for classification acc. to		**Chemical composition, % *(m/m)*** [b,c]											
Nominal composition [f] ISO 14343-A	Alloy Type ISO 14343-B	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**NI**	**Mo**	**N**	**Cu**	**Nb** [e]	**Other**
19 9Nb	(347)	0,08	0,65	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,3	—	0,3	10 x C to 1,0	—
(19 9Nb)	347	0,08	0,65	1,0 to 2,5	0,03	0,03	19,0 to 21,5	9,0 to 11,0	0,75	—	0,75	10 x C to 1,0	—
19 9NbSi	(347Si)	0,08	0,65 to 1,2	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,3	—	0,3	10 x C to 1,0	—
(19 9NbSi)	347Si	0,08	0,65 to 1,0	1,0 to 2,5	0,03	0,03	19,0 to 21,5	9,0 to 11,0	0,75	—	0,75	10 x C to 1,0	—
	347L	0,03	0,65	1,0 to 2,5	0,03	0,03	19,0 to 21,5	9,0 to 11,0	0,75	—	0,75	10 x C to 1,0	—
	316	0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	10 x C to 1,0	—
	316Si	0,08	0,65 to 1,0	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
19 12 3 L	(316L)	0,03	0,65	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,3	—	—
(19 12 3 L)	316L	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
19 12 3 LSi	(316LSi)	0,03	0,65 to 1,2	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,3	—	—
(19 12 3 LSi)	316LSi	0,03	0,65 to 1,0	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
	316LCu	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	1,0 to 2,5	—	—
19 12 3 Nb	(318)	0,08	0,65	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,3	10 x C to 1,0	—
(19 12 3 Nb)	318	0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	10 x C to 1,0	—
	318L	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	10 x C to 1,0	—
19 12 3 NbSi		0,08	0,65 to 1,2	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,3	10 x C to 1,0	—
	317	0,08	0,65	1,0 to 2,5	0,03	0,03	18,5 to 20,5	13,0 to 15,0	3,0 to 4,0	—	0,75	—	—
(18 15 3 L)	317L	0,03	0,65	1,0 to 2,5	0,03	0,03	18,5 to 20,5	13,0 to 15,0	3,0 to 4,0	—	0,75	—	—
	321	0,08	0,65	1,0 to 2,5	0,03	0,03	18,5 to 20,5	9,0 to 10,5	0,75	—	0,75	—	Ti: 9xC to 1,0

Table 1 *(continued)*

Alloy designation[a] for classification acc. to		Chemical composition, % *(m/m)* [b,c]											
Nominal composition [f] ISO 14343-A	Alloy Type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [e]	Other
Ferritic-austenitic types, sometimes referred to as austenitic-ferritic types													
22 9 3 NL	(2209)	0,03	1,0	2,5	0,03	0,02	21,0 to 24,0	7,0 to 10,0	2,5 to 4,0	0,10 to 0,20	0,3	—	—
(22 9 3 NL)	2209	0,03	0,90	2,5 to 2,0	0,03	0,02	21,5 to 23,5	7,5 to 9,5	2,5 to 3,5	0,08 to 0,20	0,75	—	—
25 7 2 L		0,03	1,0	2,5	0,03	0,02	24,0 to 27,0	6,0 to 8,0	1,5 to 2,5	—	0,3	—	—
25 9 3CuNL		0,03	1,0	2,5	0,03	0,02	24,0 to 27,0	8,0 to 11,0	2,5 to 4,0	0,10 to 0,20	1,5 to 2,5	—	—
25 9 4NL		0,03	1,0	2,5	0,03	0,02	24,0 to 27,0	8,0 to 10,5	2,5 to 4,5	0,20 to 0,30	1,5	—	W 1,0
Fully austenitic types [f]													
18 15 3L [f]	(317) [f]	0,03	1,0	1,0 to 4,0	0,03	0,02	17,0 to 20,0	13,0 to 16,0	2,5 to 4,0	—	0,3	—	—
18 16 5NL [f]	(317) [f]	0,03	1,0	1,0 to 4,0	0,03	0,02	17,0 to 20,0	16,0 to 19,0	3,5 to 5,0	0,10 to 0,20	0,3	—	—
19 13 4L [f]	(317L) [f]	0,03	1,0	1,0 to 5,0	0,03	0,02	17,0 to 20,0	12,0 to 15,0	3,0 to 4,5	—	0,3	—	—
19 13 4NL [f]		0,03	1,0	1,0 to 5,0	0,03	0,02	17,0 to 20,0	12,0 to 15,0	3,0 to 4,5	0,10 to 0,20	0,3	—	—
20 25 5CuL [f]	(385) [f]	0,03	1,0	1,0 to 4,0	0,03	0,02	19,0 to 22,0	24,0 to 27,0	4,0 to 6,0	—	1,0 to 2,0	—	—
(20 25 5CuL) [f]	385 [f]	0,025	0,50	1,0 to 2,5	0,02	0,03	19,5 to 21,5	24,0 to 26,0	4,2 to 5,2	—	1,2 to 2,0	—	—
20 25 5CuNL [f]		0,03	1,0	1,0 to 4,0	0,03	0,02	19,0 to 22,0	24,0 to 27,0	4,0 to 6,0	0,10 to 0,20	1,0 to 2,0	—	—
20 16 3 MnL [f]		0,03	1,0	5,0 to 9,0	0,03	0,02	19,0 to 22,0	15,0 to 18,0	2,5 to 4,5	—	0,3	—	—
20 16 3 MnNL [f]		0,03	1,0	5,0 to 9,0	0,03	0,02	19,0 to 22,0	15,0 to 18,0	2,5 to 4,5	0,10 to 0,20	0,3	—	—
25 22 2 N L [f]		0,03	1,0	3,5 to 6,5	0,03	0,02	24,0 to 27,0	21,0 to 24,0	1,5 to 3,0	0,10 to 0,20	0,3	—	—
27 31 4 Cu L [f]	(383) [f]	0,03	1,0	1,0 to 3,0	0,03	0,02	26,0 to 29,0	30,0 to 33,0	3,0 to 4,5	—	0,7 to 1,5	—	—
(27 31 4 Cu L) [f]	383 [f]	0,025	0,50	1,0 to 2,5	0,02	0,03	26,5 to 28,5	30,0 to 33,0	3,2 to 4,2	—	0,7 to 1,5	—	—
	320 [f]	0,07	0,60	2,5	0,03	0,03	19,0 to 21,0	32,0 to 36,0	2,0 to 3,0	—	3,0 to 4,0	8 x C to 1,0	—
	320LR [f]	0,025	0,15	1,5 to 2,0	0,015	0,02	19,0 to 21,0	32,0 to 36,0	2,0 to 3,0	—	3,0 to 4,0	8 x C to 0,40	—

Table 1 *(continued)*

Alloy designation[a] for classification acc. to		**Chemical composition, % *(m/m)*** [b,c]											
Nominal composition [f] ISO 14343-A	Alloy Type ISO 14343-B	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Nl**	**Mo**	**N**	**Cu**	**Nb** [e]	**Other**
Special types – Often used to dissimilar metal joining													
	307 [f]	0,04 to 0,14	0,65	3,3 to 4,8	0,03	0,03	19,5 to 22,0	8,0 to 10,7	0,5 to 1,5	—	0,75	—	—
18 8 Mn [f]		0,20	1,2	5,0 to 8,0	0,03	0,03	17,0 to 20,0	7,0 to 10,0	0,3	—	0,3	—	—
20 10 3	(308Mo)	0,12	1,0	1,0 to 2,5	0,03	0,02	18,0 to 21,0	8,0 to 12,0	1,5 to 3,5	—	0,3	—	—
(20 10 3)	308Mo	0,08	0,65	1,0 to 2,5	0,03	0,02	18,0 to 21,0	9,0 to 12,0	2,0 to 3,0	—	0,75	—	—
	308LMo	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 21,0	9,0 to 12,0	2,0 to 3,0	—	0,75	—	—
23 12 L	(309L)	0,03	0,65	1,0 to 2,5	0,03	0,02	22,0 to 25,0	11,0 to 14,0	0,3	—	0,3	—	—
(23 12 L)	309L	0,03	0,65	1,0 to 2,5	0,03	0,02	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
23 12 LSi	(309LSi)	0,03	0,65 to 1,2	1,0 to 2,5	0,03	0,02	22,0 to 25,0	11,0 to 14,0	0,3	—	0,3	—	—
(23 12 LSi)	309LSi	0,03	0,65 to 1,0	1,0 to 2,5	0,03	0,02	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
23 12 Nb		0,08	1,0	1,0 to 2,5	0,03	0,02	22,0 to 25,0	11,0 to 14,0	0,3	—	0,3	10 x C to 1,0	—
	309LNb	0,03	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	10 x C to 1,0	—
	309Mo	0,12	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	2,0 to 3,0	—	0,75	—	—
23 12 2 L	(309LMo)	0,03	1,0	1,0 to 2,5	0,03	0,02	21,0 to 25,0	11,0 to 15,5	2,0 to 3,5	—	0,3	—	—
(23 12 2 L)	309LMo	0,03	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	2,0 to 3,0	—	0,75	—	—
29 9	(312)	0,15	1,0	1,0 to 2,5	0,03	0,02	28,0 to 32,0	8,0 to 12,0	0,3	—	0,3	—	—
(29 9)	312	0,15	0,65	1,0 to 2,5	0,03	0,03	28,0 to 32,0	8,0 to 10,5	0,75	—	0,75	—	—
Heat resisting types													
16 8 2	(16-8-2)	0,10	1,0	1,0 to 2,5	0,03	0,02	14,5 to 16,5	7,5 to 9,5	1,0 to 2,5	—	0,3	—	—
(16 8 2)	16-8-2	0,10	0,65	1,0 to 2,5	0,03	0,03	14,5 to 16,5	7,5 to 9,5	1,0 to 2,0	—	0,75	—	—
19 9 H	(19-10H)	0,04 to 0,08	1,0	1,0 to 2,5	0,03	0,02	18,0 to 21,0	9,0 to 11,0	0,3	—	0,3	—	—

Table 1 *(continued)*

Alloy designation[a] for classification acc. to		Chemical composition, % *(m/m)* [b,c]											
Nominal composition [f] ISO 14343-A	Alloy Type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [e]	Other
(19 9 H)	19-10H	0,04 to 0,08	0,65	1,0 to 2,0	0,03	0,03	18,5 to 20,0	9,0 to 11,0	0,25	—	0,75	0,05	Ti 0,05
(19 9 H)	308H	0,04 to 0,08	0,65	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,50	—	0,75	—	—
19 12 3 H	(316H)	0,04 to 0,08	1,0	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,3	—	—
(19 12 3 H)	316H	0,04 to 0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
22 12 H	(309)	0,04 to 0,15	2,0	1,0 to 2,5	0,03	0,02	21,0 to 24,0	11,0 to 14,0	0,3	—	0,3	—	—
(22 12 H)	309	0,12	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
	309Si	0,12	0,65 to 1,0	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
25 4		0,15	2,0	1,0 to 2,5	0,03	0,02	24,0 to 27,0	4,0 to 6,0	0,3	—	0,3	—	—
25 20 [f]	(310) [f]	0,08 to 0,15	2,0	1,0 to 2,5	0,03	0,02	24,0 to 27,0	18,0 to 22,0	0,3	—	0,3	—	—
(25 20) [f]	310 [f]	0,08 to 0,15	0,65	1,0 to 2,5	0,03	0,03	25,0 to 28,0	20,0 to 22,5	0,75	—	0,75	—	—
	310S [f]	0,08	0,65	1,0 to 2,5	0,03	0,03	25,0 to 28,0	20,0 to 22,5	0,75	—	0,75	—	—
	310L [f]	0,03	0,65	1,0 to 2,5	0,03	0,03	25,0 to 28,0	20,0 to 22,5	0,75	—	0,75	—	—
25 20 H [f]		0,35 to 0,45	2,0	1,0 to 2,5	0,03	0,02	24,0 to 27,0	18,0 to 22,0	0,3	—	0,3	—	—
25 20 Mn [f]		0,08 to 0,15	2,0	2,5 to 5,0	0,03	0,02	24,0 to 27,0	18,0 to 22,0	0,3	—	0,3	—	—
18 36 H [f]	(330)	0,18 to 0,25	0,4 to 2,0	1,0 to 2,5	0,03	0,02	15,0 to 19,0	33,0 to 37,0	0,3	—	0,3	—	—
(18 36 H) [f]	330	0,18 to 0,25	0,65	1,0 to 2,5	0,03	0,03	15,0 to 17,0	34,0 to 37,0	0,75	—	0,75	—	—

Table 1 *(continued)*

Alloy designation[a] for classification acc. to		**Chemical composition, % *(m/m)*** [b,c]											
Nominal composition [f] ISO 14343-A	Alloy Type ISO 14343-B	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Ni**	**Mo**	**N**	**Cu**	**Nb** [e]	**Other**
Precipitation hardening type													
	630	0,05	0,75	0,25 to 0,75	0,03	0,03	16,0 to 16,75	4,5 to 5,0	0,75	—	3,25 to 4,0	0,15 to 0,30	—

[a] A designation in parentheses e.g. (308L) or (19/9L) indicates a near match in the other designation system, but not an exact match. The correct designation for a given composition range is the one not in parentheses. A given product may, by having a more restricted chemical composition which fulfils both sets of designation requirements, be assigned both designations independently.

[b] Single values shown in the table are maximum values.

[c] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

[d] Wire electrodes not listed in the table shall be symbolisied similarly and prefixed by the letter Z.

[e] Up to 20% of the amount of Nb can be replaced by Ta.

[f] The all-weld metal is in most cases fully austenitic and therefore can be susceptible to microfissuring or hot cracking. The occurrence of fissuring/cracking is reduced by increasing the weld metal Mn-level and in recognition of this the Mn-range is extended for a number of grades.

EXAMPLE 1:

ISO 16834–A – G 62 6 M Mn4Ni1Mo

ISO 16834-A:	number of this International Standard and classification according to yield strength and impact energy of 47 J (°C)
G:	welding process type – gas-shielded metal arc welding (Table 1)
62:	tensile properties of all-weld metal (Table 2)
6:	impact property – requirements of all-weld metal (Table 3)
M:	shielded gas (Table 4)
Mn4Ni1Mo:	chemical composition of wire (Table 5)

EXAMPLE 2:

ISO 16834–A – W 55 6 Mn4Ni1MoT

ISO 16834-A:	number of this International Standard and classification according to yield strength and impact energy of 47 J (°C)
W:	welding process type – gas-shielded metal arc welding (Table 1)
55:	tensile properties of all-weld metal (Table 2)
6:	impact property – requirements of all-weld metal (Table 3)
Mn4Ni1Mo:	chemical composition of wire (Table 5)
T	All-weld metal values in heat treatment condition

Table 1

Symbol	Welding process type
G	gas-shielded metal arc welding
W	gas-tungsten arc welding

Table 2

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
55	550	640 to 820	18
62	620	700 to 890	18
69	690	770 to 940	17
79	790	880 to 1080	16
89	890	940 to 1180	15

[a] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.

[b] Gauge length is equal to five times the test specimen diameter.

Table 5 — Symbol for chemical composition of wires

	Chemical composition, mass **%** [a,b]										
Symbol	**C**	**Si**	**Mn**	**P**	**S**	**Ni**	**Cr**	**Mo**	**Cu**	**V**	**Other elements**
Z	Any other defined requirements										
Mn3NiCrMo	0,14	0,60 to 0,80	1,30 to 1,80	0,015	0,018	0,50 to 0,65	0,40 to 0,65	0,15 to 0,30	0,30	0,03	0,25
Mn3Ni1CrMo	0,12	0,40 to 0,70	1,30 to 1,80	0,015	0,018	1,20 to 1,60	0,20 to 0,40	0,20 to 0,30	0,35	0,05 to 0,13	0,25
Mn3Ni1Mo	0,12	0,40 to 0,80	1,30 to 1,90	0,015	0,018	0,80 to 1,30	0,15	0,25 to 0,65	0,30	0,03	0,25
Mn3Ni1,5Mo	0,08	0,20 to 0,60	1,30 to 1,80	0,015	0,018	1,40 to 2,10	0,15	0,25 to 0,55	0,30	0,03	0,25
Mn3Ni1Cu	0,12	0,20 to 0,60	1,20 to 1,80	0,015	0,018	0,80 to 1,25	0,15	0,20	0,30 to 0,65	0,03	0,25
Mn3Ni1MoCu	0,12	0,20 to 0,60	1,20 to 1,80	0,015	0,018	0,80 to 1,25	0,15	0,20 to 0,55	0,30 to 0,65	0,03	0,25
Mn3Ni2,5CrMo	0,12	0,40 to 0,70	1,30 to 1,80	0,015	0,018	2,30 to 2,80	0,20 to 0,60	0,30 to 0,65	0,30	0,03	0,25
Mn4Ni1Mo	0,12	0,50 to 0,80	1,60 to 2,10	0,015	0,018	0,80 to 1,25	0,15	0,20 to 0,55	0,30	0,03	0,25
Mn4Ni2Mo	0,12	0,25 to 0,60	1,60 to 2,10	0,015	0,018	2,00 to 2,60	0,15	0,30 to 0,65	0,30	0,03	0,25
Mn4Ni1,5CrMo	0,12	0,50 to 0,80	1,60 to 2,10	0,015	0,018	1,30 to 1,90	0,15 to 0,40	0,30 to 0,65	0,30	0,03	0,25
Mn4Ni2CrMo	0,12	0,60 to 0,90	1,60 to 2,10	0,015	0,018	1,80 to 2,30	0,20 to 0,45	0,45 to 0,70	0,30	0,03	0,25
Mn4Ni2,5CrMo	0,13	0,50 to 0,80	1,60 to 2,10	0,015	0,018	2,30 to 2,80	0,20 to 0,60	0,30 to 0,65	0,30	0,03	0,25

[a] If not specified:: Ti < 0,10%; Zr < 0,10%; Al < 0,12 %. Copper from steel and copper from coating shall not exceed the stated value .

[b] Single values shown in the table are maximum values.

Table 3

Symbol	Temperature for minimum average impact energy of 47 J [a,b] or 27 J [a] (°C)			
Z	No requirements		3	-30
A [a] or Y [b]	+20		4	-40
0	0		5	-50
2	-20		6	-60

[a] Three values must reach average impact energy of 47J, only one of them min 32J .

[b] Among five values the highest and the lowest values aren't taken be in account; the average of other thee must be 27 J, only one them can be min 20J. .

Table 4

Symbol	Shielded gas
M	Mixture: Ar+ 20-25% CO_2 (without He)
A	Mixture Ar + 1-5% O_2
C	CO_2
G	Other gas, defined between supplier and customer

EXAMPLE 1:

ISO 16834-B – G 69A 6 M N2M3T

ISO 16834-B:	number of this International Standard and classification according to tensile strength and impact energy of 27 J (°C)
G:	welding process type – gas-shielded metal arc welding (Table 1)
69A:	tensile properties and elongation in post-heat treatment condition (Table 2)
6:	impact property – requirements in post-heat treatment condition (Table 3)
M:	shielded gas (Table 4)
N2M3T:	chemical composition of wire (Table 5)

EXAMPLE 2:

ISO 16834-B – W 62P 6 N2M3

ISO 16834-B:	number of this International Standard and classification according to tensile strength and impact energy of 27 J (°C)
W:	welding process type – gas-shielded metal arc welding (Table 1)
62P:	tensile properties and elongation in post-heat treatment condition (Table 2)
6:	impact property – requirements in post-heat treatment condition (Table 3)
N2M3:	chemical composition of wire (Table 3)

Table 1

Symbol	Welding process type
G	gas-shielded metal arc welding
W	gas-tungsten arc welding

Table 4

Symbol	Shielded gas
M	Mixture: Ar+ 20-25% CO_2 (without He)
A	Mixture Ar + 1-5% O_2
C	CO_2
G	Other gas, defined between supplier and customer

Table 2

Symbol [a]	Minimum yield strength [b] MPa	Tensile strength MPa	Minimum elongation [c] %
59X	490	590 to 790	16
62X	530	620 to 820	15
69X	600	690 to 890	14
76X	680	760 to 960	13
78X	680	780 to 980	13
83X	745	830 to 1030	12

[a] Instead of X: ''A'' - as-welded condition
''P'' - heat-treatment condition
''AP'' - from both conditions

[b] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.

[c] Gauge length is equal to five times the test specimen diameter.

Table 3

Symbol	Temperature for minimum average impact energy of 47 J [a,b] or 27 J [a] (°C)			
Z	No requirements		5	-50
A [a] or Y [b]	+20		6	-60
0	0		7	-70
2	-20		8	-80
3	-30		9	-90
4	-40		10	-100

[a] Three values must reach average impact energy of 47J, only one of them min 32J .

[b] Among five values the highest and the lowest values aren't taken be in account; the average of other thee must be 27 J, only one them can be min 20J. .

Table 5 — Symbol for chemical composition of wires

Symbol	Chemical composition in % (m/m) [a,b]									
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	Ti
	Any other analyses not defined in this International Norm									
2M3	0,12	0,30 to 0,70	0,60 to 1,40	0,025	0,025	—	—	0,40 to 0,65	0,50	—
3M1	0,05 to 0,15	0,40 to 1,00	1,40 to 2,10	0,025	0,025	—	—	0,10 to 0,45	0,50	—
3M1T	0,12	0,40 to 1,00	1,40 to 2,10	0,025	0,025	—	—	0,10 to 0,45	0,50	0,02 to 0,30
3M3	0,12	0,60 to 0,90	1,10 to 1,60	0,025	0,025	—	—	0,40 to 0,65	0,50	—
3M31	0,12	0,30 to 0,90	1,00 to 1,85	0,025	0,025	—	—	0,40 to 0,65	0,50	—
3M3T	0,12	0,40 to 1,00	1,00 to 1,85	0,025	0,025	—	—	0,40 to 0,65	0,50	0,02 to 0,30

Table 5 *(continued)*

Symbol	Chemical composition in % (m/m) [a,b]									
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	Ti
4M3	0,12	0,30	1,50 to 2,00	0,025	0,025	—	—	0,40 to 0,65	0,50	—
4M31	0,05 to 0,15	0,50 to 0,80	1,60 to 2,10	0,025	0,025	—	—	0,40 to 0,65	0,40	—
4M3T	0,12	0,50 to 0,80	1,60 to 2,20	0,025	0,025	—	—	0,40 to 0,65	0,50	0,02 to 0,30
N1M2T	0,12	0,60 to 1,00	1,70 to 2,30	0,025	0,025	0,40 to 0,80	—	0,20 to 0,60	0,50	0,02 to 0,30
N1M3	0,12	0,20 to 0,80	1,00 to 1,80	0,025	0,025	0,30 to 0,90	—	0,40 to 0,65	0,50	—
N2M1T	0,12	0,30 to 0,80	1,10 to 1,90	0,025	0,025	0,80 to 1,60	—	0,10 to 0,45	0,50	0,02 to 0,30
N2M2T	0,05 to 0,15	0,30 to 0,90	1,00 to 1,80	0,025	0,025	0,70 to 1,20	—	0,20 to 0,60	0,50	0,02 to 0,30
N2M3	0,12	0,30	1,10 to 1,60	0,025	0,025	0,80 to 1,20	—	0,40 to 0,65	0,50	—
N2M3T	0,05 to 0,15	0,30 to 0,90	1,40 to 2,10	0,025	0,025	0,70 to 1,20	—	0,40 to 0,65	0,50	0,02 to 0,30
N2M4T	0,12	0,50 to 1,00	1,70 to 2,30	0,025	0,025	0,80 to 1,30	—	0,55 to 0,85	0,50	0,02 to 0,30
N3M2 [c]	0,08	0,20 to 0,55	1,25 to 1,80	0,010	0,010	1,40 to 2,10	0,30	0,25 to 0,55	0,25	0,10
N4M2[d]	0,09	0,20 to 0,55	1,25 to 1,80	0,010	0,010	1,40 to 2,10	0,30	0,25 to 0,55	0,25	0,10
N4M3T	0,12	0,45 to 0,90	1,40 to 1,90	0,025	0,025	1,50 to 2,10	—	0,40 to 0,65	0,50	0,01 to 0,30
N4M4T	0,12	0,40 to 0,90	1,60 to 2,10	0,025	0,025	1,90 to 2,50	—	0,40 to 0,90	0,50	0,02 to 0,30
N5M3 [e]	0,10	0,25 to 0,60	1,40 to 1,80	0,010	0,010	2,00 to 2,80	0,60	0,35 to 0,56	0,25	0,10
N5M3T	0,12	0,40 to 0,90	1,40 to 2,00	0,025	0,025	2,40 to 3,10	—	0,40 to 0,70	0,50	0,02 to 0,30
N7M4T	0,12	0,30 to 0,70	1,30 to 1,70	0,025	0,025	3,20 to 3,80	0,30	0,60 to 0,90	0,50	0,02 to 0,30
C1M1T	0,02 to 0,15	0,50 to 0,90	1,10 to 1,60	0,025	0,025	—	0,30 to 0,60	0,10 to 0,45	0,40	0,02 to 0,30
N3C1M4T	0,12	0,35 to 0,75	1,25 to 1,70	0,025	0,025	1,30 to 1,80	0,30 to 0,60	0,50 to 0,75	0,50	0,02 to 0,30
N4CM2T	0,12	0,20 to 0,60	1,30 to 1,80	0,025	0,025	1,50 to 2,10	0,20 to 0,50	0,30 to 0,60	0,50	0,02 to 0,30
N4CM21T	0,12	0,20 to 0,70	1,10 to 1,70	0,025	0,025	1,80 to 2,30	0,05 to 0,35	0,25 to 0,60	0,50	0,02 to 0,30
N4CM22T	0,12	0,65 to 0,95	1,90 to 2,40	0,025	0,025	2,00 to 2,30	0,10 to 0,30	0,35 to 0,55	0,50	0,02 to 0,30

Table 5 *(continued)*

Symbol	Chemical composition in % (m/m) [a,b]									
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	Ti
N5CM3T	0,12	0,20 to 0,70	1,10 to 1,70	0,025	0,025	2,40 to 2,90	0,05 to 0,35	0,35 to 0,70	0,50	0,02 to 0,30
N5C1M3T	0,12	0,40 to 0,90	1,40 to 2,00	0,025	0,025	2,40 to 3,00	0,40 to 0,60	0,40 to 0,70	0,50	0,02 to 0,30
N6CM2T	0,12	0,30 to 0,60	1,50 to 1,80	0,025	0,025	2,80 to 3,00	0,05 to 0,30	0,25 to 0,50	0,50	0,02 to 0,30
N6C1M4	0,12	0,25	0,90 to 1,40	0,025	0,025	2,65 to 3,15	0,20 to 0,50	0,55 to 0,85	0,50	—
N6C2M2T	0,12	0,20 to 0,50	1,50 to 1,90	0,025	0,025	2,50 to 3,10	0,70 to 1,00	0,30 to 0,60	0,50	0,02 to 0,30
N6C2M4	0,12	0,40 to 0,60	1,80 to 2,00	0,025	0,025	2,80 to 3,00	1,00 to 1,20	0,50 to 0,80	0,50	0,04
N6CM3T	0,12	0,30 to 0,70	1,20 to 1,50	0,025	0,025	2,70 to 3,30	0,10 to 0,35	0,40 to 0,65	0,50	0,02 to 0,30

[a] The total of all other non-listed elements (except Fe) shall not exceed 0,50 %.

[b] Single values shown in the table are maximum values.

c V 0,05; Zr 0,10; AL 0,10

d V 0,04; Zr 0,10; AL 0,10

e V 0,03; Zr 0,10; AL 0,10

EXAMPLE:

ISO 636–A – W 46 3 W3Si1

ISO 636-A:	number of this International Standard and classification according to yield strength and impact energy of 47 J (°C)
W:	welding process type – gas tungsten arc welding
46	tensile properties of all-weld metal (Table 1)
3	impact property – requirements of all-weld metal (Table 2)
G3Si1:	chemical composition of wire (see Table 3)

Table 1

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
35	355	440 to 570	22
38	380	470 to 600	20
42	420	500 to 640	20
46	460	530 to 680	20
50	500	560 to 720	18

[a] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.
[b] Gauge length is equal to five times the test specimen diameter.

Table 2

Symbol	Temperature for minimum average impact energy of 47 J [a,b] or 27 J [a] (°C)			
Z	No requirements		5	-50
A [a] or Y [b]	+20		6	-60
0	0		7	-70
2	-20		8	-80
3	-30		9	-90
4	-40		10	-100

[a] Three specimen must reach average impact energy of 47J, only one of them min 32J .
[b] Among five specimen the highest and the lowest values aren't taken be in account; the average of other thee must be 27 J, only one them can be min 20J. .

Table 3 — Symbol for chemical composition of wires

symbol	Chemical composition, mass % [a,b]										
	C	Si	Mn	P	S	Ni	Cr	Mo	V	Al	Ti+Zr
W0	Any other defined requirements										
W2Si	0,06 to 0,14	0,50 to 0,80	0,90 to 1,30	0,025	0,025	0,15	0,15	0,15	0,03	0,02	0,15
W3Si1	0,06 to 0,14	0,70 to 1,00	1,30 to 1,60	0,025	0,025	0,15	0,15	0,15	0,03	0,02	0,15
W4Si1	0,06 to 0,14	0,80 to 1,20	1,60 to 1,90	0,025	0,025	0,15	0,15	0,15	0,03	0,02	0,15
W2Ti	0,04 to 0,14	0,40 to 0,80	0,90 to 1,40	0,025	0,025	0,15	0,15	0,15	0,03	0,05 to 0,20	0,05 to 0,25
W3Ni1	0,06 to 0,14	0,50 to 0,90	1,00 to 1,60	0,020	0,020	0,80 to 1,50	0,15	0,15	0,03	0,02	0,15
W2Ni2	0,06 to 0,14	0,40 to 0,80	0,80 to 1,40	0,020	0,020	2,10 to 2,70	0,15	0,15	0,03	0,02	0,15
W2Mo	0,08 to 0,12	0,30 to 0,70	0,90 to 1,30	0,020	0,020	0,15	0,15	0,40 to 0,60	0,03	0,02	0,15

[a] Single values shown in the table are maximum values.

[b] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

elektrode jesenice d.o.o.

Guide to EN ISO 636 – B

EXAMPLE:

ISO 636–B – W 55A 6 W3

ISO 636-B:	number of this International Standard and classification according to tensile strength and impact energy of 27 J (°C)
W:	welding process type – gas tungsten arc welding
55A:	tensile properties and elongation in as-welded condition (Table1)
6:	impact property – requirements of as-welded condition (Table 2)
W3:	chemical composition of wire (Table 3)

Table 1

Symbol [a]	**Minimum yield strength** [b] **MPa**	**Tensile strength MPa**	**Minimum elongation** [c] **%**
43X	330	430 to 600	20
49X	390	490 to 670	18
55X	460	550 to 740	17
57X	490	570 to 770	17

[a] Instead of X: ''A'' - values from testing in as-welded condition
''P'' - values from testing in heat-treatment condition.

[b] For yield strength the yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.

[c] Gauge length is equal to five times the test specimen diameter.

Table 2

Symbol	**Temperature for minimum average impact energy of 47 J** [a] **or 27 J** [b] **(°C)**			
Z	No requirements		5	-50
A [a] or Y [b]	+20		6	-60
0	0		7	-70
2	-20		8	-80
3	-30		9	-90
4	-40		10	-100

[a] Classification according to yield strength and impact energy of 47J;

[b] Classification according to tensile strength and impact energy of 47J.

Table 3 — Symbol for chemical composition of wires

	Chemical composition, mass **%** [a,b, c]											
symbol	**C**	**Si**	**Mn**	**P**	**S**	**Ni**	**Cr**	**Mo**	**V**	**Cu**	**Al**	**Ti+Zr**
W0	Any other defined requirements											
W2	0,07	0,40 to 0,70	0,90 to 1,40	0,025	0,035	—	—	—	—	0,50	0,05 to 0,15	Ti: 0,05 to 0,15 Ti: 0,02 to 0,12
W3	0,06 to 0,15	0,45 to 0,75	0,90 to 1,40	0,025	0,035	—	—	—	—	0,50	—	—
W4	0,07 to 0,15	0,65 to 0,85	1,00 to 1,50	0,025	0,035	—	—	—	—	0,50	—	—
W6	0,06 to 0,15	0,80 to 1,15	1,40 to 1,85	0,025	0,035	—	—	—	—	0,50	—	—
W12	0,02 to 0,15	0,55 to 0,10	1,25 to 1,90	0,030	0,030	—	—	—	—	0,50	—	—
W16	0,02 to 0,15	0,40 to 1,00	0,90 to 1,60	0,030	0,030	—	—	—	—	0,50	—	—
W1M3	0,12	0,30 to 0,70	1,30	0,025	0,025	0,020	—	0,40 to 0,65	—	0,35	—	—
W2M3	0,12	0,30 to 0,70	0,60 to 1,40	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
W2M31	0,12	0,30 to 0,90	0,80 to 1,50	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
W2M32	0,05	0,30 to 0,90	0,80 to 1,40	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
W3M1T	0,12	0,40 to 1,00	1,40 to 2,10	0,025	0,025	—	—	0,10 to 0,45	—	0,50	—	Ti: 0,02 to 0,30
W3M3	0,12	0,60 to 0,90	1,10 to 1,60	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
W4M3	0,12	0,30	1,50 to 2,00	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
W4M31	0,05 to 0,15	0,50 to 0,80	1,60 to 2,10	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	—
W4M3T	0,12	0,50 to 0,80	1,60 to 2,20	0,025	0,025	—	—	0,40 to 0,65	—	0,50	—	Ti: 0,02 to 0,30
WN1	0,12	0,20 to 0,50	1,25	0,025	0,025	0,60 to 1,00	—	0,35	—	0,35	—	—
WN2	0,12	0,40 to 0,80	1,25	0,025	0,025	0,80 to 1,10	0,15	0,35	0,05	0,35	—	—
WN3	0,12	0,30 to 0,80	1,20 to 1,60	0,025	0,025	1,50 to 1,90	—	0,35	—	0,35	—	—
WN5	0,12	0,40 to 0,80	1,25	0,025	0,025	2,00 to 2,75	—	—	—	0,35	—	—
WN7	0,12	0,20 to 0,50	1,25	0,025	0,025	3,00 to 3,75	—	0,35	—	0,35	—	—

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Guide to EN ISO 636 – B

	Chemical composition, mass % [a,b, c]											
symbol	**C**	**Si**	**Mn**	**P**	**S**	**Ni**	**Cr**	**Mo**	**V**	**Cu**	**Al**	**Ti+Zr**
		0,50				3,75						
WN71	0,12	0,40 to 0,80	1,25	0,025	0,025	3,00 to 3,75	—	—	—	0,35	—	—
WN9	0,10	0,50	1,40	0,025	0,025	4,00 to 4,75	—	0,35	—	0,35	—	—
WNCC	0,12	0,60 to 0,90	1,00 to 1,65	0,030	0,030	0,10 to 0,30	0,50 to 0,80	—	—	0,20 to 0,60	—	—
WNCC1	0,12	0,20 to 0,40	0,40 to 0,70	0,030	0,030	0,50 to 0,80	0,50 to 0,80	—	—	0,30 to 0,75	—	—
WNCCT	0,12	0,60 to 0,90	1,00 to 1,65	0,030	0,030	0,10 to 0,30	0,50 to 0,80	—	—	0,20 to 0,60	—	Ti: 0,02 to 0,30
WNCCT1	0,12	0,50 to 0,80	1,20 to 1,80	0,030	0,030	0,10 to 0,40	0,50 to 0,80	0,02 to 0,30	—	0,20 to 0,60	—	Ti: 0,02 to 0,30
WNCCT2	0,12	0,50 to 0,90	1,10 to 1,70	0,030	0,030	0,40 to 0,80	0,50 to 0,80	—	—	0,20 to 0,60	—	Ti: 0,02 to 0,30
WN1M2T	0,12	0,60 to 1,00	1,70 to 2,30	0,025	0,025	0,40 to 0,80	—	0,20 to 0,60	—	0,50	—	Ti: 0,02 to 0,30
WN1M3	0,12	0,20 to 0,80	1,10 to 1,90	0,025	0,025	0,30 to 0,90	—	0,40 to 0,65	—	0,50	—	—
WN2M3	0,12	0,30	1,10 to 1,60	0,025	0,025	0,80 to 1,20	—	0,40 to 0,65	—	0,50	—	—

[a] The total of all other non-listed elements (except Fe) shall not exceed 0,50 %.

[b] Single values shown in the table are maximum values.

[c] The results shall be rounded to the same number of significant figures as in the specified value using the rule A in accordance with Annex B of ISO 31-0:1992.

Chemical and mechanical properties of weld metal

Chemical and mechanical properties refer to typical values for test specimens, taken from all-weld metal material. They represent the average values from a large number of tests.

Mechanical testing

Test plate preparation and specimen location for all-weld testing are prepared according to EN and AWS norms.

Two type of test specimen are prepared:
→ cylindrical test pieces for tensile testing and
→ square Charpy V test pieces for impact energy testing.

The tensile test is used to determine:
→ Tensile strength,
→ Yield strength and
→ Elongation.

The impact test is used to determine:
→ Fracture toughness properties

The **Tensile Strength** is the maximum stress which the material under test can be subjected to before fracture occurs and is designated Rm and measured in units N/mm^2.

The **Yield Strength** is the applied stress at which the material under test starts to yield plastically, producing a permanent deformation after the load is removed. The catalogue values refer to a residual deformation of 0.2 % and are designated Rp 0.2% and measured in units N/mm^2.

The **Elongation** is a measurement of the weld metals ability to deform before fracture occurs. It is designated A_5 and measured as a percentage of the original test specimen length, which is normally five times the specimen diameter.

Impact energy – Impact testing is used to determine weld metal toughness at a given temperature, under impact loading conditions, and is a measurement of the materials resistance to brittle fracture. Impact energy is determined using a V-Notch test specimen according to the Charpy-V method and is designated Av and measured in the unit joule (J).

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COMPARATIVE HARDNESS TABLE

Brinell-hardness	Rockwell-hardness	Rockwell-hardness	Vickers-hardness
HB	HRB	HRC	HV
96	53		96
103	58,2		103
111	64,0		111
116	67,0		116
121	70,0		121
126	72,4		126
130	74,8		131
137	77,2		137
143	79,5		143
149	81,7		149
156	84,1		156
163	85,4		163
170	88,2		170
179	90,4		179
187	92,2		187
197	94,2		197
207	96,2		207
217	97,8		217
229	99,6	19,0	229
241	101,0	21,2	241
255	103,0	23,8	255
269	105,0	26,0	269

Brinell-hardness	Rockwell-hardness	Rockwell-hardness	Vickers-hardness
HB	HRB	HRC	HV
285	107,0	28,3	285
302	109,0	30,5	302
321		32,8	321
341		35,0	341
363		37,4	364
388		40,2	393
415		43,2	430
444		47,0	466
478		49,0	510
541		52,0	560
555		56,0	640
600		59,0	695
611		59,3	704
622		60,5	726
632		61,5	750
643		62,5	774
654		63,5	800
665		64,5	826
676		65,5	855
688		67,0	903
694		68,0	940

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STORAGE AND RE-DRYING

Storage

Coated electrodes should principally be kept in their original packing until use.
The withdrawal of electrode packages form stock should be based on the “first-in / first-out” principle.

In order to protect the electrodes against humidity, induced damage, they should be stored in a dry place, under climatically controlled conditions of 17-25°C and a maximum relative humidity of 60%.

Recommendable maximum storage time is 3 years.

Re-drying

Electrodes and fluxes need redying before use. The re-drying temperature of electrodes and fluxes are indicated on the labels of the electrode and flux packing and on the technical specification of the electrode.

Electrodes in metal box packaging do not need redrying before use provided the original package is unbroken. No special storage climate control is necessary for these types. Cellulose-coated electrodes must principally not be re-drying.

Electrodes, which exhibit poor arc stability, heavy spatter or difficult slag removal have probably been damaged by moisture pick-up and normal operability can be restored by redrying.

For all types of electrodes we recommend after re-drying immediately prior to welding. Recommended is that basic coated and high alloyed electrodes and fluxes are during use stored in heating oven at temperatures between 70 and 120°C.

Packing

Coated electrodes are supplied in two types of packing:
→ cardboard box with shrink plastic wrapping for unalloyed, low and medium alloyed electrodes,
→ metal box for high alloyed electrodes and cellulose coated electrodes.

Weight of the cardboard box is between 4 – 6 kg and the metal box 3 – 4,5 kg, which depends from diameter of electrode. Boxes are packed into cardboard box (4 or 5 units together).

Fluxes are packed into three-layer paper bag with plastic inserted piece. Weight is 25 kg.

Wires and rods are packed:
- welding rods for oxyacetilene-welding are packed into 25 kg binding, only diameter 1,6 mm is packed in cardboard boxes
- high and low-alloyed TIG wires are packed in 5 kg - PVC bags, 5 such packets are put together in cardboard-package
- welding wire is spooled on various spools type – plastic or steel basket, each spool is packed in polyetilene bag and packed in cardboard box
- welding wire could be delivered in drums (about 250 kg)
- SAW wire is wounded on coil or spooled on basket spools (K 415 or K435) or on D760 – spools (about 300 kg)

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REDRYING TEMPERATURES

PRODUCT	Temperature / time	PRODUCT	Temperature / time
CELEX	NOT PERMITTED	EVB Mo	100 °C / 1h + 300 – 350 °C / 2h or 400 °C / 1 h or 250 °C / 4 h
CELEX Mn		EVB MoV	
CELEX Mo		EVB Mo1Cr	
CELEX Ni		EVB CrMo	
CELEX NiMo		EVB CrMoV	
CEL Fe		EVB 2 CrMo	
CEL Mo		EVB 5 CrMo	
		EVB 9 CrMo	
		EVB 9 CrMoV, EVB 91 CrMoV	
NEUTRAL	100 – 120 °C / 2 h or 140 °C / 1 h	INOX R 19/9 Nb	300 – 320°C/ 2h Temperature slowly oven-heat slowly oven-cooling 20°C→100°C→300°C (1h) (1h)
RAPID		INOX R 19/9 NC	
JADRAN S		INOX R 19/12/3 Nb	
RUTILEN 12		INOX R 19/12/3 NC	
RUTILEN Z		INOX R 19/13/4 L	
RUTILEN 1000 S		INOX R 22/9/3 LN	
EMONA		INOX R 20/10/3 L	
RUTILEN 13		INOX R 25/4 Fe	
RUTILEN X		INOX R 25/14 NC	
RUTILEN 2000 S		INOX R 25/14/3 NC	
RUTILEN K		INOX R 25/20	
RUTILEN S		INOX R 20/25 L	
E Ti Mo		INOX R 22/12/3 Fe	
E Ti MoV		INOX R 18/8/6 Fe	
E Ti CrMo		INOX R 29/9, INOX R 29/9 Fe	
E Ti 2 CrMo		INOX B 19/9Nb	
E Ti 5 CrMo		INOX B 19/12/3 Nb	
		INOX B 25/20	
SAVA 130	120 – 140 °C / 2 h or 250 °C / 1 h	INOX B 18/8/6	
SAVA 150		INOX B 70/15	
SAVA 180		INOX R 18/8/6	
SAVA 200		INOX B 13 Fe	420 °C / 2 h or 350 °C / 4 h
SAVA GV 130		INOX B 13/1 Fe	
SAVA GV 160		INOX B 13/4 Fe	
SAVA 150 B		INOX B 13/6 Fe	
SAVA 150 AR			380 °C / 2 h or 400 °C / 1 h
		INOX B 17 Fe	
EVB 50	100 °C / 1h + 300 – 350 °C / 2 h or 400 °C / 1 h or 250 °C / 4 h	INOX B 17 MoFe	
EVB 55			400 °C / 1 h or 250 °C / 4h
EVB 45		UTOP 38	
EVB 47		UTOP 55	
EVB S		TOOLDUR	
GALEB 50		E DUR 250	
EVB K		E DUR 300	
EVB 60		E DUR 400	
EVB 65		E DUR 500	
EVB Ni		E DUR 600, E DUR 600 Si	
EVB CuNi		E DUR 60 R	
EVB CuNiCr			
EVB NiMo		ABRADUR 54	300 °C / 1 - 2 h or 250 °C / 4 h
GALEB 70		ABRADUR 58	
EVB 2.5 Ni		ABRADUR 64, ABRADUR 60	
EVB 2.5 NiMo		ABRADUR 65	
EVB 75		ABRADUR 66	
EVB CrNiMo		CrWC 600	
EVB 80, EVB SP2		E Mn14, E Mn14 Cr4	
EVB 100, EVB 100 extra		E Mn17 Cr13, E Mn17 Cr10 Nb3	

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REDRYING TEMPERATURES

PRODUCT	Temperature / time	PRODUCT	Temperature / Time
MONEL	150 °C / 2 - 3 h or 180 °C / 1 h	ALU 99.5	100-150 °C / 1–2 h
SUPER Ni		ALU Mn	
CAST Ni		ALU 5 Si	
CAST NiFe, CAST NiFe B		ALU 12 Si	
CAST NiFe10			NOT NECESSARY
CAST NiC		SEKATOR 1	
CAST Fe		SEKATOR 2 A	
SL 250, SL 9V		SEKATOR 2 B	
EL Cu		TERMO	
	300 °C / 1 h or 200 °C / 2 – 3 h		
BRON CuSn			
BRON CuAl			
BRON CuMn			
	350 °C / 2 h or 250 °C / 4 h or 400 °C / 1 h	FB TT	350 °C / 2 h or 250 °C / 4 h or 400 °C / 1 h
AR 18.5		FB 12.2	
AR D1		FB 33, FB CrNi	
AR 18.1		FB 578	
	350 °C / 2 h or 250 °C / 4 h or 400 °C / 1 h	CS Cr 6	350 °C / 2 h or 250 °C / 4 h or 400 °C / 1 h
AB 100		CS CrNi	
AB Cr		CS 350	

Welding fluxes should be baked before use in shallow trays (less than 15 cm deep) at 350°C / 2 h in an oven with free air circulation.

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WELDING SAFETY

Arc welding is a safe occupation when sufficient measures are taken to protect the welder from potential hazards. When these measures are overlooked or ignored, however, welders can encounter such dangers as electric shock, overexposure to arc radiation, fumes and gases, and fire and explosion; any of which may result in fatal injuries.

Arc welding can be hazardous. Protect yourself and others from possible serious injury or death. Be sure that all installation, operation, maintenance and repair procedures are performed only by qualified individuals.

Hazard	Factors to Consider	Precaution Summary
Electric shock can kill 	• Wetness • Welder in or on workpiece • Confined space • Electrode holder and cable insulation	• Insulate welder from workpiece and ground using dry insulation. Rubber mat or dry wood. • Wear dry, hole-free gloves. (Change as necessary to keep dry.) • Do not touch electrically "hot" parts or electrode with bare skin or wet clothing. • If wet area and welder cannot be insulated from workpiece with dry insulation, use a semiautomatic, constant-voltage welder or stick welder with voltage reducing device. • Keep electrode holder and cable insulation in good condition. Do not use if insulation is damaged or missing.
Fumes and gases can be dangerous 	• Confined area • Positioning of welder's head • Lack of general ventilation • Electrode types, i.e., manganese, chromium, etc. See MSDS • Base metal coatings, galvanize, paint	• Use ventilation or exhaust to keep air breathing zone clear, comfortable. • Use helmet and positioning of head to minimize fume in breathing zone. • Read warnings on electrode container and material safety data sheet (MSDS) for electrode. • Provide additional ventilation/exhaust where special ventilation requirements exist. • Use special care when welding in a confined area. • Do not weld unless ventilation is adequate.

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WELDING SAFETY

Hazard	Factors to Consider	Precaution Summary
Welding sparks can cause fire or explosion 	• Containers which have held combustibles • Flammable materials	• Do not weld on containers which have held combustible materials (unless strict AWS F4.1 procedures are followed). Check before welding. • Remove flammable materials from welding area or shield from sparks, heat. • Keep a fire watch in area during and after welding. • Keep a fire extinguisher in the welding area. • Wear fire retardant clothing and hat. Use earplugs when welding overhead.
Arc rays can burn eyes and skin 	• Process: gas-shielded arc most severe	• Select a filter lens which is comfortable for you while welding. • Always use helmet when welding. • Provide non-flammable shielding to protect others. • Wear clothing which protects skin while welding.
Confined space 	• Metal enclosure Wetness • Restricted entry • Heavier than air gas • Welder inside or on workpiece	• Carefully evaluate adequacy of ventilation especially where electrode requires special ventilation or where gas may displace breathing air. • If basic electric shock precautions cannot be followed to insulate welder from work and electrode, use semiautomatic, constant-voltage equipment with cold electrode or stick welder with voltage reducing device. • Provide welder helper and method of welder retrieval from outside enclosure.

WELDING SAFETY

Hazard	Factors to Consider	Precaution Summary
General work area hazards 	• Cluttered area	• Keep cables, materials, tools neatly organized.<
	• Indirect work (welding ground) connection	• Connect work cable as close as possible to area where welding is being performed. Do not allow alternate circuits through scaffold cables, hoist chains, or ground leads.
	• Electrical equipment	• Use only double insulated or properly grounded equipment. • Always disconnect power to equipment before servicing.
	• Engine-driven equipment	• Only use in open, well ventilated areas. • Keep enclosure complete and guards in place. • See Lincoln service shop if guards are missing. • Turn off engine before refueling. • If using auxiliary power, OSHA may require GFI protection or assured grounding program (or isolated windings if less than 5KW).
	• Gas cylinders	• Never touch cylinder with the electrode. • Never lift a machine with cylinder attached. • Keep cylinder upright and chained to support.

HAZARDOUS SUBSTANCES IN WELDING

Hazardous substances in welding and allied processes are respirable air polluting substances generated by welding, cutting and allied processes, which at an intolerable concentration may be injurious to health. In the accident prevention regulation “Welding, cutting and allied processes” (VBG 15), they are expressed by the term “substances hazardous to health” and are regarded as hazardous substances (Gefahrstoffen) within the meaning of the hazardous substances ordinance (Gefahrstoffverordnung - GefStoffV).

Hazardous substances can be classified with respect to their occurrence and effects. They are generated by welding and allied processes in the form of gasses and/or particles. Particulate substances are dispersed as minute solid particles in the air. The following fractions are distinguished on the basis of particle size for all particles present in the air (according to DIN EN 481):

- Inhalable fraction (total dust) – the fraction of particles which is inhaled through the mouth and nose into the body (particle sizes up to 100 μm)
- Respirable fraction (fine dust) – the fraction of particles capable of penetrating into the alveoli - air sacs (particle size up to 10 μm)

Airborne particles generated by welding are very small. In general, they have a diameter of less than 1 μm (in most cases less than 0,1 μm), are therefore respirable and called “welding fume”.

In welding, hazardous substances always occur in the form of mixtures of substance. The determination of these limit values is therefore very complicated. This is why, in practice, specific key components related to process- and welding material are often use. Limit values for mixtures of substances have to be determined according to TRGS 403 Assessement of mixtures of substances in the workplace atmosphere (“Bewertung von Stoffgemischen in der Luft am Arbeitsplatz”).

Gaseous and particulate substances generated by welding, cutting and allied processes can be classified according to their effects on different organs of the human body as follows:

- lung stressing (inert substances) – long-term intake of high concentrations leads to a restricted lung function which is due to a decrease in the exchange of oxygen, due to dust deposited in the lung. These dust deposits are generally not pathogenic, they are reversible. This substances are for example: Fe-oxides, Al-oxides.
- toxic (poisonous) substances – have a toxic effect on the human body, if a certain dose (=amount per unit weight of the body) is exceeded. This is a dose-effect-relationship. Slight poisoning leads to mild health disorders; high concentrations of these substance in the inhaled air may cause very serious poisoning which results in death. This substances are for example: CO, NO, NO_2, O_3, metal-oxides such as Cu, Pb, Zn in form of fume and dust.
- carcinogenic (cancer-causing) substances – are substances which are known to cause malignant tumors. The risk of cancer normally depends on a number of factors, e.g. genetic predisposition, environmental pollution. There is no inevitability about the effect but the risk of cancer is greater as the dose increases. The latent period may last for years or decades. This substances are for example: Cr VI-compounds, Ni-oxide, Co-oxide, Cd-oxide, Be-oxide, formaldehyde.

Hazardous substances generated by welding and allied processes arise from: filler materials, parent materials, shielding gases, coatings, contamination, ambient air, and at high temperature (of the arc or flame) by physical and/or chemical processes such as: evaporation, condensation, oxidation, decomposition, pyrolysis, combustion.

The type and amount of the hazardous substances generated depend on the material and the process. The chemical composition of the materials used has a direct influence on the chemical composition of the particulate hazardous substances. The processes in use affect the generation of gaseous hazardous substances. The amount and kind of hazardous substances are also influenced – apart from the processes and materials used – by surface coatings and contamination as well as by the following factors: current (voltage), type of current (ac/dc), diameter of electrode, type of coating, inclination angle of the electrode, type of welding.

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HAZARDOUS SUBSTANCES IN WELDING

Health effects are acute and cronic.
Acute, short term effects of the inhalation of the various components of welding fumes and gases can generally be related to a particular process and exposure. Such effects are well documented (metal fume fever, caused by inhalation of zinc oxide fumes, copper, aluminium, magnesium, exposure to ozone, to nitrogen oxides).

Chronic, log term effects have, however, received less attention because of the confounding effects due to population dynamics, for example, job mobility, and from the masking of welding-related health effects by other factors such as cigarette smoking. These effects are on respiratory system (various components of welding fumes), nervous system (welding fume components, lead, manganese), cardiovascular system (carbon monoxide), skin–dermatitis (chromium VI-compounds), carcinogenic effects (chromium VI, nickel, ozone are suspect carcinogen).The particulate form of fume may be carcinogenic, but no definitive human or animal study results are available.

Technical protective measures should be taken (singly or in combination) to minimise health hazards due to the welder's exposure at the workplace (choice of low fume emission processes, choice of low emission materials, optimisation of working conditions, technical safety devices, ventilation).

Personal protective equipment is intended to protect the welder directly and, in many cases, to be a necessary supplement to the technical protective measures (welder's hand and face shields, respiratory protective equipment).

Warning: Protect yourself and others!
Take precautions when welding. Ask for your employer's safety practices which should be based on manufacturer's hazard data. Keep exposure as low as possible when welding and cutting!

FUME and GASES can be dangerous to your health.
- Do not breathe fumes and gases!
- Keep your head out of the fumes!
- Use enough ventilation or exhaust at the arc or both to keep fumes and gases from your breathing zone and general area! If ventilation is questionable, use air sampling to determine the need for corrective measures!

ARC RAYS can injure eyes and burn skin.
- Protect your eyes from welding light by wearing a welder's helmet fitted with a filter shade that is suitable for the type of welding you are doing.
- ALWAYS wear safety glasses with side shields or goggles when chipping or grinding a work piece if you are not wearing a welding helmet.
- Wear tightly woven work-weight fabrics to keep UV radiation from reaching your skin; cover your head.

Use enough ventilation, wear correct eye, ear and body protection!

Sources:
BG Arbeitsgemeinschaft der Metall-Berufsgenossenschaften