böhler welding
by voestalpine

utp
by voestalpine

DIGITAL CONSUMABLES CATALOGUE

voestalpine Böhler Welding
www.voestalpine.com/welding

voestalpine
ONE STEP AHEAD.

CATALOGUE USER GUIDE

With this manual we are setting new standards of usability and customer experience in the world of welding technology. Integrated videos, quick links and clearly arranged tables open up new possibilities to get to know our highly demanding and most popular used products in an interactive way.

The new manual is a hybrid of what you know as well as used to and the advantages of a digital handbook. You can jump directly to the desired content, search in our online shop or get the datasheet with just few clicks. No more tedious flipping pages anymore.

General information

DOWNLOAD

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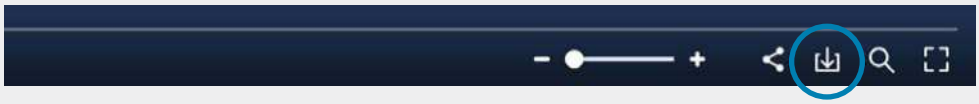

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Explanation use of interactive icons

FIRST PAGE		VIDEO	
	Navigate to page one from every single page you are on.		Videos are included throughout the book to show you outstanding services or products.
LAST PAGE		**CART**	
	This symbol is used to feature the last page straight away.		To get detailed information about pruducts you will see this symbol. There is also a link to our online shop.
NAVIGATE TO PAGE		**TEXT TAG**	
	If you see this symbol or if your mouse cursor turns into a hand then you will navigate directly to the page described.		Tagged text sections or product will find this icon throughout the manual.
CAPTION		**TAG**	
	The plus symbol indicates that there are further comments or captions.		Should you come across a shopping cart then you will be forwarded to our online shop.

DATASHEET INFORMATION

If the cursor turns into a hand on the product name of a product overview page then you are able to view & download the relevant datasheet.

BÖHLER Q E 6013 RT	Covered electrode, mild steel, rutile coated
BÖHLER Q E 6013 RC	Covered electrode, mild steel, rutile-cellulosic coated

CONTENT


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1 JOIN! voestalpine Böhler Welding

We are a leader in the welding industry with over 100 years of experience, more than 50 subsidiaries and more than 4,000 distribution partners around the world. Our extensive product portfolio and welding expertise combined with our global presence guarantees we are close when you need us.
Having a profound understanding of your needs enables us to solve your demanding challenges with Full Welding Solutions – perfectly synchronized and as unique as your company.

Lasting Connections – Perfect alignment of welding machines, consumables and technologies combined with our renowned application and process know-how provide the best solution for your requirements: A true and proven connection between people, products and technologies. The result is what we promise: Full Welding Solutions for Lasting Connections.

Tailor-Made Protectivity™ – Proven under the toughest conditions: Our products protect metal surfaces from wear and corrosion.
With over 60 years of experience and the broadest product portfolio in the industry, we are your preferred partner for the supply of wear and corrosion resistant protection solutions.
We deliver what we promise: Tailor-Made Protectivity™.

1.1 Böhler Welding

Perfect alignment of welding machines, consumables and technologies combined with our renowned application and process know-how provide the best solution for your requirements: A true and proven connection between people, products and technologies.

The result is what we promise:
Full Welding Solutions
for Lasting Connections.

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Today’s energy generation would be unthinkable
without welding consumables.
Welding would be unthinkable without Böhler Welding.

utp
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1.2 UTP

Proven under the toughest conditions:
Our products protect metal surfaces from wear and corrosion. With over 60 years of experience and the broadest product portfolio in the industry, we are your preferred partner for the supply of wear and corrosion resistant protection solutions.

We deliver what we promise:
Tailor-Made Protectivity™.

click here

Today’s raw materials production & processing would be unthinkable without UTP wear protection and corrosion resistant consumables.

1.3 Full Welding Solutions

Base materials, welding machines, consumables and more – many components contribute to perfect welding results. However, a Full Welding Solution by Böhler Welding is much more than the sum of its parts. We are recognized as the leading authority in weld metallurgy and this is the solid trusted base on which our solutions are built. Our competent and committed specialists accompany the entire process and remain at the customer's side until the work is done.

JOIN! Your Full Welding Solution

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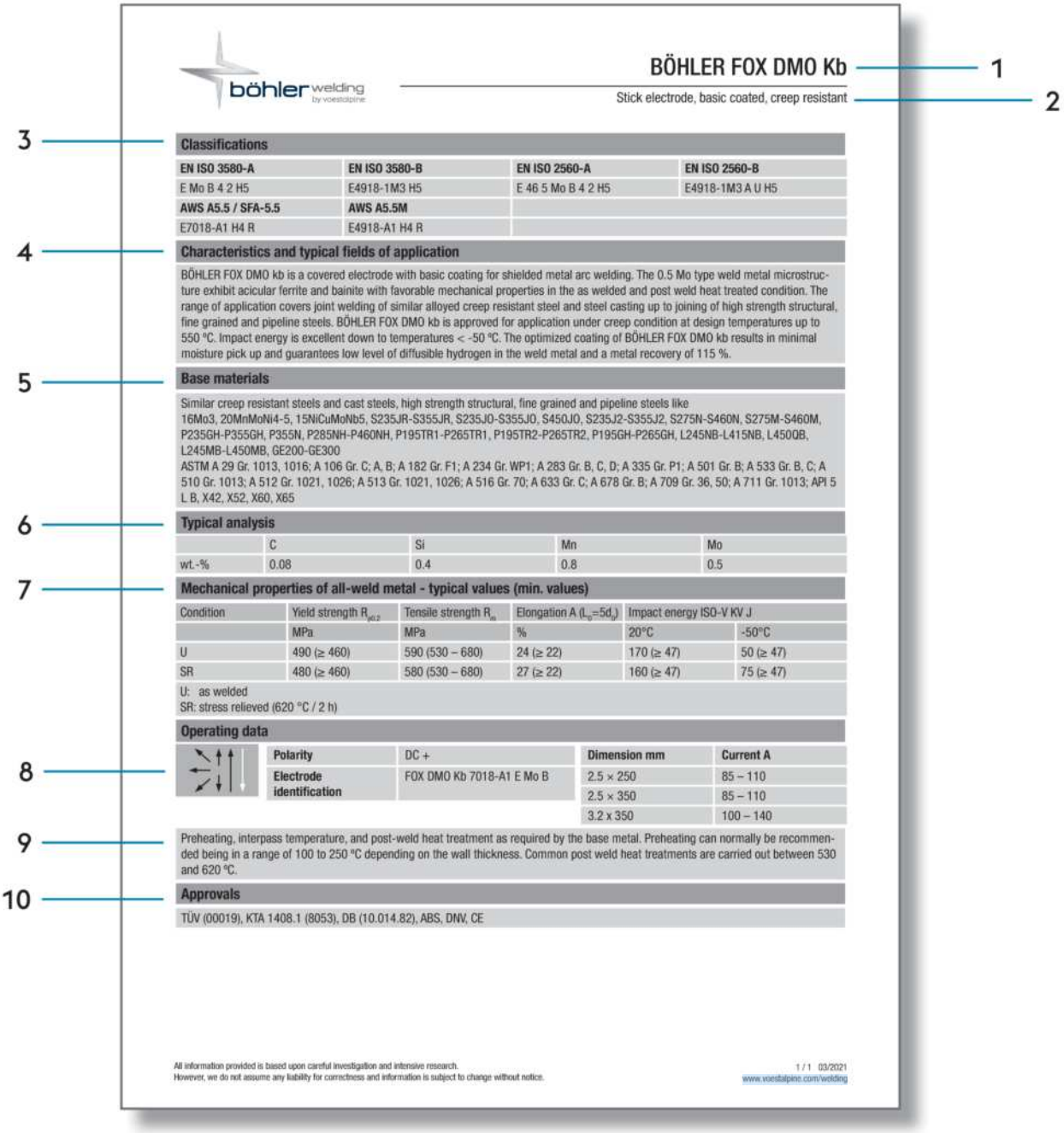
Metallurgical know-how
On-site / Off-site service
Consumables

2 ABOUT THE BOOK

2.1 Explanation datasheet



böhler welding by voestalpine

BÖHLER FOX DMO Kb — 1

Stick electrode, basic coated, creep resistant — 2

3 **Classifications**

EN ISO 3580-A	EN ISO 3580-B	EN ISO 2560-A	EN ISO 2560-B
E Mo B 4 2 H5	E4918-1M3 H5	E 46 5 Mo B 4 2 H5	E4918-1M3 A U H5
AWS A5.5 / SFA-5.5	**AWS A5.5M**		
E7018-A1 H4 R	E4918-A1 H4 R		

4 **Characteristics and typical fields of application**

BÖHLER FOX DMO kb is a covered electrode with basic coating for shielded metal arc welding. The 0.5 Mo type weld metal microstructure exhibit acicular ferrite and bainite with favorable mechanical properties in the as welded and post weld heat treated condition. The range of application covers joint welding of similar alloyed creep resistant steel and steel casting up to joining of high strength structural, fine grained and pipeline steels. BÖHLER FOX DMO kb is approved for application under creep condition at design temperatures up to 550 °C. Impact energy is excellent down to temperatures < -50 °C. The optimized coating of BÖHLER FOX DMO kb results in minimal moisture pick up and guarantees low level of diffusible hydrogen in the weld metal and a metal recovery of 115 %.

5 **Base materials**

Similar creep resistant steels and cast steels, high strength structural, fine grained and pipeline steels like
16Mo3, 20MnMoNi4-5, 15NiCuMoNb5, S235JR-S355JR, S235J0-S355J0, S450J0, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE300
ASTM A 29 Gr. 1013, 1016; A 106 Gr. C; A, B; A 182 Gr. F1; A 234 Gr. WP1; A 283 Gr. B, C, D; A 335 Gr. P1; A 501 Gr. B; A 533 Gr. B, C; A 510 Gr. 1013; A 512 Gr. 1021, 1026; A 513 Gr. 1021, 1026; A 516 Gr. 70; A 633 Gr. C; A 678 Gr. B; A 709 Gr. 36, 50; A 711 Gr. 1013; API 5 L B, X42, X52, X60, X65

6 **Typical analysis**

	C	Si	Mn	Mo
wt.-%	0.08	0.4	0.8	0.5

7 **Mechanical properties of all-weld metal - typical values (min. values)**

Condition	Yield strength $R_{p0.2}$	Tensile strength R_m	Elongation A (L_0=5d_0)	Impact energy ISO-V KV J	
	MPa	MPa	%	20°C	-50°C
U	490 (≥ 460)	590 (530 – 680)	24 (≥ 22)	170 (≥ 47)	50 (≥ 47)
SR	480 (≥ 460)	580 (530 – 680)	27 (≥ 22)	160 (≥ 47)	75 (≥ 47)

U: as welded
SR: stress relieved (620 °C / 2 h)

Operating data

8

Polarity	DC +
Electrode identification	FOX DMO Kb 7018-A1 E Mo B

Dimension mm	Current A
2.5 × 250	85 – 110
2.5 × 350	85 – 110
3.2 x 350	100 – 140

9 Preheating, interpass temperature, and post-weld heat treatment as required by the base metal. Preheating can normally be recommended being in a range of 100 to 250 °C depending on the wall thickness. Common post weld heat treatments are carried out between 530 and 620 °C.

10 **Approvals**

TÜV (00019), KTA 1408.1 (8053), DB (10.014.82), ABS, DNV, CE

All information provided is based upon careful investigation and intensive research.
However, we do not assume any liability for correctness and information is subject to change without notice.

1 / 1 03/2021
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1 **Product name** – Product designation

2 **Product specification** – Type of alloy

3 **Name of standard** – EN ISO and AWS classification, material number if applicable

4 **Poperties and application areas** – Properties to be emphasised such as resistance to corrosion or redrying data and typical areas of application

5 **Base materials** – e.g. base materials whose suitability has been tested by TÜV

6 **Reference analysis of the weld metal** – Chemical composition by weight %

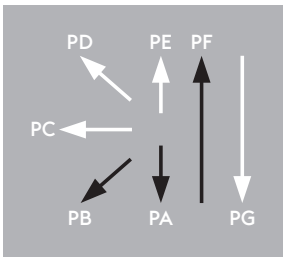
7 **Mechanical properties of the weld metal** – Min. values at a room temperature of 20 °C

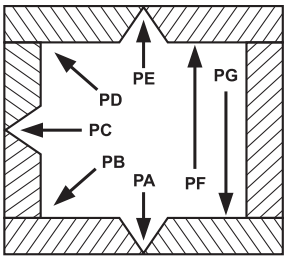
8 **Operating instructions** – How to weld: possible welding position, polarity, dimensions

9 **Instructions for welding**

10 **Approval** – Existing approvals

Signs and symbols





Welding positions acc. to EN ISO 6947

PA Horizontal welding of butt weld and fillet weld in flat position
PB Horizontal welding of fillet weld (downhand position)
PC Transverse position
PD Horizontal overhead position
PE Overhead position
PF Vertical up position
PG Vertical down position

Welding position recommended
Welding position non-recommended

2.2 JOIN!online

voestalpine Böhler Welding is setting new standards of usability and customer experience in the world of welding technology. 24 hours a day, 7 days a week, 365 days a year: as of right now, voestalpine Böhler Welding is available online around the clock.

Many of the products of the Product Selection Tables in this manual are linked to our newly installed online shop JOIN!online.
In addition to many other advantages, you have the opportunity to discover our complete product portfolio, search for products or download files such as the data sheet – 24 hours a day – 7 days a week – 365 days a year.

click here

EASE OF USE

- Discover our complete product portfolio – from welding consumables through welding machines all the way to welding helmets and other accessories.
- An advanced search function helps you find products or alternatives as quickly as possible.
- As an alternative to the search function, you can also easily navigate to the products you are looking for via the product category menus.
- Save time with the help of the intuitive and user-friendly interface.
- Choice of different ways to add an article to your shopping cart. Depending on requirements, you can add individual items from the details page, create a quick order or upload a CSV file.
- You will receive a complete manual with explanations of all shop functionalities. In addition, the FAQs are accessible directly in the shop and visible only to you as a registered user.
- If you need any additional assistance, you can use the contact form at any time to get help from an expert advisor.

TIME SAVINGS, EFFICIENCY AND PERSONALISATION

» The facility for comparing products and their key properties directly with one another helps you to make the right choice and saves you time.

» The product data sheets are available to download directly from the product details page in each case.

» Third-party approvals – such as TÜV data sheets or DB approval certificates – can also be downloaded directly from the product details page.

» For direct delivery to your customers, you can select their addresses from a drop-down list in the shop itself.

» A role concept with various functionalities configurable by you optimises the shop experience and its use to suit your requirements.

» You can set individual authorisations, cost centres, limits, etc. so that your internal processes are catered for right from when you place the order.

» You can assign and use your own article numbers in the shop. (E.g. search or order directly using your own article numbers.)

» At article level, you can also add your own notes to individually customise the shop to your requirements.

» As a registered user, you can see your own list prices and/or customer-specific prices for better guidance.

» You can also simulate a current price enquiry because the checkout process prior to order submission takes into account and shows all current pricing terms (alloy surcharges, volume discounts, etc.) applicable on that date.

» The current status of your order can be checked at any time in the shop.

» You can view your individual purchase history over the last 12 months. You can also use the “Re-order” function to open a previous order as a template and amend it as required or submit it unchanged as a new order.

3 PRODUCT SELECTION TABLES

3.1 Böhler Welding description of product names

Product	< 460 MPa	Pipe steels	> 460 MPa	Creep reistant	
Covered electrodes	BÖHLER FOX BÖHLER Q Phoenix	BÖHLER FOX	BÖHLER FOX	BÖHLER FOX Phoenix Thermanit	
TIG rods	BÖHLER EML BÖHLER EMK		BÖHLER	BÖHLER Union Thermanit	
Solid wires	BÖHLER EMK BÖHLER Q ECOspark 3Dprint	Pipeshield X	Union X 3Dprint	BÖHLER Union Thermanit 3Dprint	
Seamless FCW	diamondspark	diamondspark	diamondspark	diamondspark	
Folded FCW	BÖHLER Q	Pipeshield		FOXcore	
SAW solid wires	Union	Union	Union	Union Thermanit	
SAW seamless	diamondspark	diamondspark	diamondspark	diamondspark	
SAW flux	UV	UV	UV	UV Marathon	

3.1.1 Product name description

3Dprint +	BÖHLER CAT +	BÖHLER Q +	FOXcore +
Avesta +	BÖHLER EMK +	diamondspark +	Marathon +
BÖHLER +	BÖHLER FOX +	ECOspark +	Phoenix +

	Martensitic and ferritic	Austenitic	Dissimilar joints, special applications & heat resistant	Duplex, super duplex & nickel alloys	Aluminium
	BÖHLER FOX Thermanit Avesta	BÖHLER FOX BÖHLER Q Thermanit Avesta	BÖHLER FOX Thermanit Avesta	BÖHLER FOX Avesta	
	Thermanit BÖHLER CAT	Thermanit BÖHLER Q	Thermanit	Thermanit UTP A	Union Al
	Thermanit BÖHLER CAT 3Dprint	Thermanit BÖHLER Q 3Dprint	Thermanit	Thermanit UTP A 3Dprint	Union Al 3Dprint
	FOXcore BÖHLER CAT	FOXcore	FOXcore		
	Thermanit	Thermanit	Thermanit	Thermanit	
	Marathon	Marathon	Marathon	Marathon	

	Pipeshield (FCW)	+	Union	+	UV +
	Pipeshield X (solid wires)	+	Union Al	+	
	Thermanit	+	Union X	+	

3.2 UTP description of product names

Name	Type	Welding process
UTP 65	Stick electrode	SMAW
UTP **A** 6222 Mo	Solid wire / rod	GMAW / GTAW
UTP Robotic 600	Seamless gas shielding flux-cored wire	FCAW-G
UTP Robotic 300 NG	Seamless self shielding flux-cored wire	FCAW-S
UTP **PLASweld**™ Ferro55	Metal powder	PTA & Laser welding
UTP **COLDmelt**™ Base 20	Metal powder	Flame Spraying
UTP **SIMmelt**™ NiBas 40	Metal powder	Flame Spraying
UTP **SUBmelt**™ NiBasW35	Metal powder	Flame Spraying
RECORD XXX	Agglomerated welding powder for hardfacing	SAW
RECORD RT XXX	Submerged arc strip cladding agglomerated flux for Wear Protection applications	SASC
RECORD ES XXXX	Stainless steel and high alloyed agglomerated flux	ESSC
RECORD EST XXX	Electroslag strip cladding	ESSC
RECORD ES XXXX-1	Single layer stainless steel and high alloyed agglomerated flux	ESSC
RECORD EST XXX-1	Single layer stainless steel and high alloyed agglomerated flux	ESSC
RECORD INT XXX	Stainless steel agglomerated flux	SASC
RECORD NFT XXX	Nickel base agglomerated flux	SASC
RECORD S XXXX	Stainless steel and high alloyed agglomerated flux	SASC
SOUDOTAPE	Strip electrode	SASC/ESSC

WEARstick		Covered electrodes for wear protection	SMAW
WEARtig		TIG rods for wear protection	GTAW
WEARmig		Solid wires for wear protection	GMAW
WEARcore		Gas-shielded folded flux-cored wires for wear protection	FCAW
WEARcore **x-O**		Self-shielded folded flux-cored wires for wear protection	FCAW-S
WEARspray **x-M**		Arc spraying cored wires (spraying without fusion) for wear & corrosion protection will be renamed to WEARcore x-M	Arc spraying
WEARspray **x-MF**		All arc spraying cored wires (spraying with subsequent fusion) for wear and corrosion protection will be renamed to WEARcore x-M	SAW
WEARmig **x-S**		Sub-arc folded flux-cored wires for wear protection for wear protection will be renamed to WEARmig x-S	SAW
WEARcore **x-S**		Sub-arc cored wires for wear protection for wear protection will be renamed to WEARcore x-S	SAW
Multi-purpose	**Dur**	The name addition Dur stands for standard products for abrasion	
Extreme abrasion	**XD**	The name addition XD stands for products for extreme wear protection	
Tool steels	**Tool**	The name addition Tool stands for products for tool steel applications	
Cobalt alloys	**Co**	The name addition Co stands for products for cobalt alloys	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3.3 Böhler Welding unalloyed selection table – < 460 MPa

	SMAW	GTAW	GMAW	Rutile flux cored wires – Seamless	Metal cored wires – Seamless	
< 460 MPa	BÖHLER FOX ETI	BÖHLER EML 5	ECOspark 420	diamondspark 42 RC	diamondspark 46 MC	
	BÖHLER FOX EV 40	BÖHLER EMK 6	ECOspark 460	diamondspark 44 RC-SR (C1)	diamondspark 52 MC	
	BÖHLER FOX EV 47	BÖHLER EMK 8	ECOspark 4-NC	diamondspark 46 RC	diamondspark 54 MC	
	BÖHLER FOX EV 50		ECOspark 6-NC	diamondspark 46 RC (C1)	diamondspark GUARD 420 MC*	
	BÖHLER FOX EV 50-W		ECOspark 8-NC	diamondspark 52 RC		
	BÖHLER FOX EV 55		BÖHLER EMK 6	diamondspark 53 RC		
	BÖHLER FOX Green		BÖHLER EMK 8	diamondspark GUARD 420 RC*		
	BÖHLER FOX HL 180 Ti		BÖHLER Q G 3			
	BÖHLER FOX K 55		BÖHLER Q G 4			
	BÖHLER FOX KE					
	BÖHLER FOX Multifer 180					
	BÖHLER FOX OHV					
	BÖHLER FOX Red AR 160					
	BÖHLER FOX Red BR 160					
	BÖHLER FOX Red R 160					
	BÖHLER FOX SPE					
	BÖHLER FOX SUM					
	BÖHLER FOX Yellow					
	BÖHLER Q E 6013 RC					
	BÖHLER Q E 6013 RT					
	BÖHLER Q E 7018					
	BÖHLER Q E 7018-1					
	PHOENIX 120 K					
	PHOENIX BLAU					
	PHOENIX Grün T					
	PHOENIX SPEZIAL D					

*Product not part of the handbook selection tables

Basic flux cored wires – Seamless	SAW wire	SAW cored wire	SAW flux	SAW combination wire / flux	SAW combination cored wire / flux
diamondspark 44 BC	Union S 1	diamondspark S 55 HP	UV 305	Union S 2 - UV 305	diamondspark S 55 HP - UV 306
diamondspark 52 BC	Union S 2	diamondspark S 56 HP	UV 306	Union S 2 - UV 306	diamondspark S 55 HP - UV 418 TT
	Union S 2 Si		UV 309 P	Union S 2 - UV 400	diamondspark S 56 HP - UV 400
	Union S 3		UV 310 P	Union S 2 - UV 420 TT-LH	
	Union S 3 Si		UV 400	Union S 2 Si - UV 309 P	
			UV 418 TT	Union S 2 Si - UV 310 P	
			UV 419 TT-W	Union S 2 Si - UV 400	
			UV 422 TT-LH	Union S 2 Si - UV 418 TT	
			UV 511 TT	Union S 2 Si - UV 419 TT-W	
			UV 420 TT	Union S 3 Si - UV 418 TT	
			UV 420 TT-LH	Union S 3 Si - UV 419 TT-W	
			UV 420 TTR	Union S 3 Si - UV 422 TT-LH	
			UV 420 TTR-W		
			UV 420 TTR-C		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

3.4 Böhler Welding unalloyed selection table – > 460 MPa

	SMAW	GTAW	GMAW	Rutile flux cored wires – Seamless	Metal cored wires – Seamless	
> 460 MPa	BÖHLER FOX EV 60	Union I NI 1 MoCr	Union X 55	diamondspark Ni1 RC	diamondspark Ni1 MC	
	BÖHLER FOX EV 62	Union I MoMn	Union X 69	diamondspark Ni1 RC (C1)	diamondspark Ni3 MC*	
	BÖHLER FOX EV 63	BÖHLER NiCrMo 2,5-IG	Union X 85	diamondspark Ni1 RC-SR	diamondspark NiCu1 MC*	
	BÖHLER FOX EV 64		Union X 85 T	diamondspark Ni1,5 RC (C1)*	diamondspark 550 MC*	
	BÖHLER FOX EV 65		Union X 90	diamondspark Ni2 RC*	diamondsparl 620 MC*	
	BÖHLER FOX EV 70		Union X 96	diamondspark NiCu1 RC	diamondspark 700 MC	
	BÖHLER FOX EV 70 MO		BÖHLER X 70-IG	diamondspark 550 RC*	diamondspark 900 MC	
	BÖHLER FOX EV 73		BÖHLER NiMo 1-IG	diamondspark 620 RC*	diamondspark 960 MC	
	BÖHLER FOX EV 75		Union Ni 1 MoCr	diamondspark 700 RC	diamondspark 1100 MC	
	BÖHLER FOX EV 85		Union MoNI	diamondspark 700 RC (C1)*	BÖHLER alform® 700 L-MC*	
	BÖHLER FOX EV 105		Union NiMoCr	diamondspark 700 RC-SR*	BÖHLER alform® 900 L-MC*	
	BÖHLER FOX NiMo		BÖHLER alform® 1100-IG		BÖHLER alform® 960 L-MC*	
	BÖHLER FOX NiCuCr		BÖHLER alform® 700-IG		BÖHLER alform® 1100 L-MC*	
			BÖHLER alform® 960-IG			
			BÖHLER NiCrMo 2,5-IG			
			BÖHLER NICU 1-IG			

*Product not part of the handbook selection tables

Basic flux cored wires – Seamless	SAW wire	SAW cored wire	SAW flux	SAW combination wire / flux	SAW combination cored wire / flux
diamondspark Ni1 BC*	Union S 2 Ni 2,5	diamondspark S NiCu1	UV 305	Union S 2 Ni 2,5 - UV 418 TT	diamondspark S NiCu1 - UV 306
diamondspark NiCu1 BC*	Union S 2 Ni 3,5	diamondspark S 550 HP	UV 306	Union S 2 Ni 3,5 - UV 418 TT	diamondspark S NiCu1 - UV 400
diamondspark 550 BC*	Union S 1 Ni 11	diamondspark S 700 HP	UV 309 P	Union S 1 Ni 11 - UV 511 TT	diamondspark S NiCu1 - UV 418 TT
diamondspark 700 BC*	Union S 3 TiB	diamondspark S 770	UV 310 P	Union S 2 Mo - UV 309 P	diamondspark S 550 HP - UV 400
diamondspark 900 BC*	Union S 3 MoTiB	diamondspark S 900 HP	UV 400	Union S 2 Mo - UV 310 P	diamondspark S 550 HP - UV 422 TT-LH
	Union S 2 NiMo 1	diamondspark S 960 HP	UV 418 TT	Union S 4 Mo - UV 309 P	diamondspark S 550 HP- UV 420 TTR-C
	Union S 3 NiMo		UV 419 TT-W	Union S 4 Mo - UV 310 P	diamondspark S 700 HP - UV 422 TT-LH
	Union S 3 NiMo 1		UV 422 TT-LH	Union S 3 TiB - UV 309 P	diamondspark S 770 - UV 418 TT
	Union S Ni1MoCr		UV 511 TT	Union S 3 TiB - UV 310 P	diamondspark S 770 - UV 422 TT-LH
	Union S 3 NiMoCr		UV 420 TT	Union S 3 MoTiB - UV 309 P	diamondspark S 900 HP - UV 422 TT-LH
			UV 420 TT-LH	Union S 3 MoTiB - UV 310 P	diamondspark S 960 HP - UV 422 TT-LH
			UV 420 TTR	Union S 3 MoTiB - UV 419 TT-W	
			UV 420 TTR-W	Union S 2 NiMo 1 - UV 418 TT	
			UV 420 TTR-C	Union S 2 NiMo 1 - UV 419 TT-W	
				Union S 2 NiMo 1 - UV 420 TTR-C	
				Union S 3 NiMo - UV 420 TTR	
				Union S 3 NiMo - UV 420 TTR-W	
				Union S 3 NiMo 1 - UV 418 TT	
				Union S 3 NiMo 1 - UV 419 TT-W	
				Union S 3 NiMo 1 - UV 420 TTR-C	
				Union S 3 NiMo 1 - UV 420 TTR-W	
				Union S Ni1MoCr - UV 420 TTR-C	
				Union S 3 NiMoCr - UV 418 TT	
				Union S 3 NiMoCr - UV 422 TT-LH	

3.5 Böhler Welding stainless steel selection table – EN ISO

EN ISO	SMAW	GTAW/GMAW	
19 12 3 Nb	BÖHLER FOX SAS 4	Thermanit A-318	
	BÖHLER FOX SAS 4-A		
19 12 3 Nb Si		Thermanit A-318 Si	
19 13 4 L	Avesta 317L/SNR	Thermanit 317L	
	BÖHLER FOX ASN 5		
	BÖHLER FOX ASN 5-A		
20 10 3	BÖHLER FOX CN 19/9 M	Thermanit 20/10	
20 16 3 Mn N L	Thermanit 19/15 H	Thermanit 19/15	
Z 20 16 3 Mn N L		Thermanit 19/15 H	
20 25 5 Cu L		Thermanit 20/25 Cu	
20 25 5 Cu N L	Thermanit 20/25 CuW		
	Avesta 904L		
	BÖHLER FOX CN 20/25 M		
	BÖHLER FOX CN 20/25 M-A		
21 10 N	Avesta 253 MA	Thermanit 21/10 N	
22 9 3 N L	Avesta 2205	Thermanit 22/09	
	Avesta 2205 BASIC		
	BÖHLER FOX CN 22/9 N-B		
	BÖHLER FOX CN 22/9 N		
22 12 H		Thermanit 309 H	
22 12	BÖHLER FOX FF		
	BÖHLER FOX FF-A		

SAW	FCAW	MCAW
Thermanit A-317	FOXcore 318-T0	
Marathon 213	FOXcore 318-T1	
Marathon 431		
Marathon 805		
Thermanit 317L	FOXcore 317L-T0	
	FOXcore 317L-T1	
Thermanit 20/10		
Marathon 805		
Marathon 203		
Marathon 213		
Thermanit 19/15		
Marathon 104		
Marathon 213		
Thermanit 20/25 Cu		
Marathon 104		
Thermanit 21/10 N		
Marathon 805		
Marathon 805	FOXcore 2209-T0	
Thermanit 22/09	FOXcore 2209-T1	
Marathon 431	FOXcore 2209-T1 HD	
Thermanit 309 H		
Marathon 104		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

3.6 Böhler Welding stainless steel selection table – AWS

AWS	SMAW	GTAW/GMAW	
316L	BÖHLER FOX EAS 4 M	Thermanit GE-316L	
	BÖHLER FOX EAS 4 M-A		
	Avesta 316L/SKR		
	Avesta 316L/SKR-4D		
316L	BÖHLER FOX EAS 4 M (LF)	Thermanit GE-316L Cryo	
316LSi		Thermanit GE-316L Si	
318	BÖHLER FOX SAS 4	Thermanit A-308	
	BÖHLER FOX SAS 4-A		
318 (mod.)		Thermanit A-308 Si	
317L	BÖHLER FOX ASN 5	Thermanit 317L	
	BÖHLER FOX ASN 5-A		
308Mo (mod.)	BÖHLER FOX CN 19/9 M	Thermanit 20/10	
316LMn	Thermanit 19/15 H	Thermanit 19/15	
316LMn (mod.)		Thermanit 19/15 H	
385	Thermanit 20/25 CuW	Thermanit 20/25 Cu	
	Avesta 904L		
385 (mod.)	BÖHLER FOX CN 20/25 M		
	BÖHLER FOX CN 20/25 M-A		
2209	Avesta 2205	Thermanit 22/09	
	Avesta 2205 BASIC	Thermanit 22/09 Si	
	Avesta 2205-PW AC/DC		
	BÖHLER FOX CN 22/9 N-B		
	BÖHLER FOX CN 22/9 N		
309 (mod.)		Thermanit 309 H	

SAW	FCAW	MCAW
Thermanit GE-316L	FOXcore 316L-T0	FOXcore 316L-MC
Marathon 431	FOXcore 316L-T1	
Marathon 213	FOXcore 316L-T1 Cryo	
Marathon 805	FOXcore 316L-T0 DG	
Marathon 203	FOXcore 316L-T1 C1	
Thermanit GE-316L Cryo		
Marathon 203		
Marathon 213		
Thermanit A-308	FOXcore 318-T0	
Marathon 213	FOXcore 318-T1	
Marathon 431		
Marathon 805		
Thermanit 317L	FOXcore 317L-T0	
Marathon 805	FOXcore 317L-T1	
Thermanit 20/10		
Marathon 805		
Marathon 203		
Marathon 213		
Thermanit 19/15		
Marathon 104		
Marathon 213		
Thermanit 20/25 Cu		
Marathon 104		
Marathon 805	FOXcore 2209-T0	
Thermanit 22/09	FOXcore 2209-T1	
Marathon 431	FOXcore 2209-T1 HD	
Thermanit 309 H		
Marathon 104		

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3.7 Böhler Welding creep resistant CrMo selection table

Alloy/Grade	SMAW	GTAW/GMAW	
SA106 A,B,C (P265GH,P355GH)	BÖHLER FOX EV 50 / DMO Kb*		
Grade 1 (15Mo3)	BÖHLER FOX DMO Kb*	BÖHLER DMO-IG*	
	BÖHLER FOX DMO Ti		
	Phoenix Chromo 1		
0.8Mo-0.3V (14MoV63)	BÖHLER FOX DMV 83 Kb*	BÖHLER DMV 83-IG*	
Grade 11/12 (13CrMo4-5)	BÖHLER FOX DCMS Kb*	BÖHLER DCMS-IG*	
1Mo-1.25Cr-0.2V (G17CrMoV5-10)	BÖHLER FOX DCMV*		
Grade 22 (10CrMo9-10)	BÖHLER FOX CM2 Kb*	BÖHLER CM 2-IG	
	Phoenix SH Chromo 2 KS		
Grade 22V (13CrMoV9-10)	BÖHLER FOX CrMo 2V*	Union I CrMo 2 V	
Grade 23 (7CrWVMoNb9-6)		Union I P23*	
Grade 24 (7CrMoVTiB10-10)		Union I P24*	
Grade 5 (X12CrMo5)	BÖHLER FOX CM 5 Kb*	BÖHLER CM 5-IG*	
Grade 9 (X11CrMo9-1)	BÖHLER FOX CM 9 Kb*	BÖHLER CM 9-IG*	
Grade 91 (X10CrMoVNb9-1)	BÖHLER FOX C 9 MV*	Thermanit MTS 3	
	BÖHLER FOX C 9 MV LNi*	Thermanit MTS 3-LNi	
Grade 911 (X11CrMoWVNb9-1-1)	BÖHLER FOX C 9 MVW*	Thermanit MTS 911*	
Grade 92 (X10CrWMoVNb9-2)	Thermanit MTS 616*	Thermanit MTS 616	
	Thermanit MTS 616 LNi*	Thermanit MTS 616-LNi	
Grade 93 (MARBN)	BÖHLER FOX MTS 93	Thermanit MTS 93	
CB2 (GX12CrMoCoVNbB9-2-1)	Thermanit MTS 5 Co 1	Thermanit MTS 5 Co 1	
X20 (X20CrMoV12-1)	BÖHLER FOX 20 MVW*	Thermanit MTS 4 / MTS 4 Si	
VM12-SHC (X12CrCoWMoVNb12-2-2)		Thermanit MTS 5 CoT*	
Super VM12 (X15CrCoWMoVNbBN11-2-2)		Thermanit MTS 5 CoTB	

Thermanit MTS 5 Co 1 – product not part of the handbook selection tables

* VdTUV approval available

SAW wire and flux	FCAW/MCAW
Union S 2 / UV 420 TT-LH*	diamondspark 52 RC*
UV 400	diamondspark 52 MC*
UV 305*	
Union S 3 Si / UV 418 TT*	
Union S 2 Mo / UV 418 TT*	FOXcore DMO RC* - diamondspark DMO RC
UV 420 TT-LH*	diamondspark DMO MC
UV 420 TTR*	diamondspark DMO BC*
UV 400*	
UV 305*	
Union S 2 CrMo / UV 420 TT-LH*	FOXcore DCMS RC* - diamondspark DCMS RC
UV 420 TTR(-W)*	diamondspark DCMS BC
UV 305*	diamondspark DCMS MC*
	diamondspark DCMV BC*
Union S 1 CrMo 2 / UV 420 TT-LH*	FOXcore CM 2 RC* - diamondspark CM 2 RC
UV 420 TTR(-W)*	diamondspark CM 2 BC
UV 305*	diamondspark CM 2 MC*
Union S 1 CrMo 2 V / UV 430 TTR W*	
Union S P23 / UV 305*	
Union S P24 / UV 305*	
Union S 1 CrMo 5 / UV 420 TT-LH*	
UV 420 TTR-C*	
Union S 1 CrMo 9 / Marathon 543*	
Thermanit MTS 3 / Marathon 543*	FOXcore C 9 MV RC*
	FOXcore C 9 MV MC
Thermanit MTS 911 / Marathon 543*	FOXcore C 9 MVW RC
Thermanit MTS 616 / Marathon 543*	FOXcore P92 RC
Thermanit MTS 93 / Marathon 593*	
	FOXcore CB 2 RC*
Thermanit MTS 4 / Marathon 543*	
Thermanit MTS 5 CoTB / Marathon 512*	

3.8 UTP Nickel alloys selection table

3.8.1 Nickel alloys

			Welding process		
Alloy	**Alloy type**	**Alloy composition**	**SMAW**	**GMAW/GTAW**	
Pure nickel	200	Ni99,2	UTP 80 Ni	UTP A 80 Ni	
NiCu	400	NiCu30Fe	UTP 80 M	UTP A 80 M	
NiCr	600	NiCr15Fe	UTP 7015	Thermanit Nicro 82	
			UTP 7015 Mo		
			Thermanit Nicro 82		
	690	NiCr29Fe	Thermanit 690	Thermanit 690	
NiCrMo	59	NiCr23Mo16Al	UTP 759 Kb	UTP A 759	
	C-22	NiCr21Mo14W		UTP A 722	
	C-276	NiMo16Cr15W	UTP 776 Kb	UTP A 776	
		NiCr14Mo7Fe	UTP 7013 Mo		
		NiCr14Mo7Fe	Thermanit 620		
		NiCr14Mo7Fe	UTP Soudonel D		
	C-4	NiMo16Cr16Ti			
	825	NiCr21Mo		UTP A 4221	
		NiCr29Fe26Mo		Thermanit 30/40 E	
	625	NiCr21Mo9Nb	UTP 6222 Mo	UTP A 6222 Mo	
				UTP A 6222 Mo-3	
	686	NiCr21Mo16W		Thermanit 686	
NiCrCoMo	617	NiCr22Co12Mo	UTP 6170 Co	UTP A 6170 Co	

	SAW		ESSC		SASC	
	Wire	**Flux**	**Strip electrode**	**Flux**	**Strip electrode**	**Flux**
			SOUDOTAPE NiTi	RECORD EST 200	SOUDOTAPE NiTi	RECORD Ni T
	UTP A 80 M	RECORD NiCu TW	SOUDOTAPE NiCu7	RECORD EST 400	SOUDOTAPE NiCu7	Record NiCu TW
	Thermanit Nicro 82	RECORD NiCrW 412	SOUDOTAPE NiCr3	RECORD EST 201	SOUDOTAPE NiCr3	RECORD NFT 201
		RECORD NiCrW 3000	SOUDOTAPE NiCr3	RECORD EST 236		
			SOUDOTAPE NiCrFe7	RECORD EST NiCrFe7	SOUDOTAPE NiCrFe7	RECORD NFT NiCrFe7
			SOUDOTAPE 690	RECORD EST 690	SOUDOTAPE 690	RECORD NFT 690
			SOUDOTAPE NiCrMo59	RECORD EST 259		
			SOUDOTAPE NiCrMo22	RECORD EST 259		
			SOUDOTAPE NiCrMo4	RECORD EST 259		
			SOUDOTAPE NiCrMo4	RECORD EST 276		
			SOUDOTAPE NiCrMo7	RECORD EST 259		
			SOUDOTAPE 825HS	RECORD EST 825H HS		
			SOUDOTAPE 825HS	RECORD EST 825-1 HS		
	UTP UP 6222 Mo	RECORD NiCrW 412	SOUDOTAPE 625	RECORD ES6625	SOUDOTAPE 625	RECORD NFT 201
	UTP UP 6222 Mo	RECORD NiCrW 3000	SOUDOTAPE 625	RECORD ES6625-1		
			SOUDOTAPE 625	RECORD EST 625-1		
			SOUDOTAPE 625	RECORD EST 625-1 LD		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

3.8.2 UTP Nickel alloys selection table

	Welding process					
			SAW		SASC	
Alloy	SMAW	GMAW/GTAW	Wire	Flux	Strip electrode	Flux
Pure copper	UTP 39	UTP A 38				
		UTP A 381				
CuSi3		UTP A 384				
CuAl8		UTP A 34	UTP A 34	RECORD CuAlW		
CuMn13Al7Fe3Ni2	UTP 34 N	UTP A 34 N				
CuNi30	UTP 387	UTP A 387	UTP A 387	RECORD CuNi30 TW	SOUDOTAPE CuNi30	RECORD CuNi30 TW
CuAl8Ni2Fe2Mn2		UTP A 3422				
CuAl9Ni5Fe3Mn2		UTP A 3444				
CuSn6P	UTP 32	UTP A 32				
CuSn12P		UTP A 320				

3.8.3 UTP strip cladding of stainless steels

Material	ISO class	Steel number	Process	Strip electrodes	Flux
318	19 12 3 Nb	-14576	ESSC	SOUDOTAPE 316L	RECORD EST 130
	19 12 3 Nb	-14576	ESSC	SOUDOTAPE 21.13.3L	RECORD EST 130
347	19 9 Nb	14550	SASC	SOUDOTAPE 347	RECORD INT 109
	19 9 Nb	14550	ESSC	SOUDOTAPE 347	RECORD EST 122
	19 9 Nb	14550	ESSC	SOUDOTAPE 347	RECORD EST 136
	19 9 Nb	14550	ESSC	SOUDOTAPE 347	RECORD EST 347-1
	19 9 Nb	14550	ESSC	SOUDOTAPE 21.11LNb	RECORD EST 122
	19 9 Nb	14550	ESSC	SOUDOTAPE 21.11LNb	RECORD EST 129
	19 9 Nb	14550	ESSC	SOUDOTAPE 21.11LNb	RECORD EST 347-1 HS
	19 9 Nb	14550	ESSC	SOUDOTAPE 21.11LNb	RECORD EST 130
	19 9 Nb	14550	ESSC	SOUDOTAPE 24.12LNb	RECORD EST 136
	19 9 Nb	14550	ESSC	SOUDOTAPE 24.12LNb	RECORD EST 129
	19 9 Nb	14550	ESSC	SOUDOTAPE 24.12LNb	RECORD EST 347-1 HS
2209	22 9 3 N L	-14462	SASC	SOUDOTAPE 22.9.3L	RECORD INT 109
307	18 8 Mn	14370	ESSC	SOUDOTAPE 308L	RECORD EST 307
254SMo	20 18 7 Cu N L	14547	ESSC	SOUDOTAPE 254SMo	RECORD EST 122
308L	19 9 L	14316	SASC	SOUDOTAPE 308L	RECORD INT 101
	19 9 L	14316	SASC	SOUDOTAPE 308L	RECORD INT 109

Material	ISO class	Steel number	Process	Strip electrodes	Flux
308L	19 9 L		ESSC	SOUDOTAPE 308L	RECORD EST 122
	19 9 L		ESSC	SOUDOTAPE 308L	RECORD EST 136
	19 9 L		ESSC	SOUDOTAPE 308L	RECORD EST 308-1
	19 9 L		ESSC	SOUDOTAPE 22.11L	RECORD EST 122
309L	23 12 L	-14833	SASC	SOUDOTAPE 309L	RECORD INT 109
	23 12 L	-14833	ESSC	SOUDOTAPE 309L	RECORD EST 309-1
310MoLN	25 22 2 N L	-14466	SASC	SOUDOTAPE 310MM	RECORD 13 BLFT
	25 22 2 N L	-14466	ESSC	SOUDOTAPE 310MM	RECORD EST 122
	25 22 2 N L	-14466	ESSC	SOUDOTAPE 310MM	RECORD EST 310MM HS
316L	19 12 3 L	14404	SASC	SOUDOTAPE 316L	RECORD INT 101
	19 12 3 L	14404	SASC	SOUDOTAPE 316L	RECORD INT 109
	19 12 3 L	14404	ESSC	SOUDOTAPE 316L	RECORD EST 122
	19 12 3 L	14404	ESSC	SOUDOTAPE 316L	RECORD EST 136
	19 12 3 L	14404	ESSC	SOUDOTAPE 316L	RECORD EST 316-1
	19 12 3 L	14404	ESSC	SOUDOTAPE 21.13.3L	RECORD EST 122
	19 12 3 L	14404	ESSC	SOUDOTAPE 21.13.3L	RECORD EST 136
	19 12 3 L	14404	ESSC	SOUDOTAPE 21.13.3L	RECORD EST 316-1
317L	(18 15 3 L)	-14438	SASC	SOUDOTAPE 317L	RECORD INT 101
	(18 15 3 L)	-14438	ESSC	SOUDOTAPE 316L	RECORD EST 122Mo
	(18 15 3 L)	-14438	ESSC	SOUDOTAPE 316L	RECORD EST 317-2
	(18 15 3 L)	-14438	ESSC	SOUDOTAPE 317L	RECORD EST 122
	(18 15 3 L)	-14438	ESSC	SOUDOTAPE 21.13.3L	RECORD EST 136Mo
	(18 15 3 L)	-14438	ESSC	SOUDOTAPE 21.13.3L	RECORD EST 317-1
385	(20 25 5 Cu N L)	14539	SASC	SOUDOTAPE 20.25.5LCu	RECORD INT 101
-385	20 25 5 Cu N L	14539	ESSC	SOUDOTAPE 20.25.5LCu	RECORD EST 122
385	(20 25 5 Cu N L)	14539	ESSC	SOUDOTAPE 20.25.5LCu	RECORD EST 385-1
-320	20 34 2 Cu Mn Nb	24660	ESSC	SOUDOTAPE 825HS	RECORD EST 320
-2209	(22 9 3 N L)	14462	ESSC	SOUDOTAPE 22.6.3L	RECORD EST 122
	(22 9 3 N L)	14462	ESSC	SOUDOTAPE 22.6.3L	RECORD EST 4462-1
2209	22 9 3 N L	-14462	ESSC	SOUDOTAPE 22.6.3L	RECORD EST 2209-1
	22 9 3 N L	-14462	ESSC	SOUDOTAPE 22.9.3L	RECORD EST 122
	22 9 3 N L	-14462	ESSC	SOUDOTAPE 22.9.3L	RECORD EST 4462-1
2594	25 10 4 N L	-14410	ESSC	SOUDOTAPE 25.8.4L	RECORD ES 2507

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4 BÖHLER WELDING CONSUMABLES PRODUCT CONTENT

4.1 SMAW – Stick electrodes

4.1.1 Mild steel – Rutile

Product name	Short description	Chemical composition (typical values) in %		
		C	Si	Mn
BÖHLER Q E 6013 RT	Covered electrode, mild steel, rutile coated	0.08	0.35	0.55
BÖHLER Q E 6013 RC	Covered electrode, mild steel, rutile-cellulosic coated	0.08	0.4	0.5
BÖHLER FOX Green	Covered electrode, mild steel, rutile coated, for welding of thin sheets	0.08	0.35	0.5
BÖHLER FOX SUM	Covered electrode, mild steel, thick rutile coated	0.07	0.3	0.5
BÖHLER FOX ETI	Covered electrode, mild steel, rutile coated	0.07	0.4	0.5
BÖHLER FOX OHV	Covered electrode, mild steel, rutile-cellulosic coated	0.06	0.4	0.45
BÖHLER FOX KE	Covered electrode, mild steel, rutile coated, mixed type	0.06	0.3	0.5
BÖHLER FOX SPE	Covered electrode, mild steel, rutile-basic coated	0.08	0.2	0.45
BÖHLER FOX Yellow	Covered electrode, mild steel, rutile-basic coated	0.08	0.2	0.55
Phoenix Blau	Covered electrode, mild steel, rutile-cellulosic coated	0.09	0.35	0.5
Phoenix Grün T	Covered electrode, mild steel, rutile coated, well suited for tack welding	0.08	0.35	0.55

AWS	EN/ISO	Approvals	JOIN!online
A5.1 / SFA-5.1	**2560-A**	TÜV (12914), DB (10.014.101), DNV, CE	
E6013	E 42 0 RR 1 2		
A5.1 / SFA-5.1	**2560-A**	TÜV (12677), DB (10.014.50), DNV, CE	
E6013	E 42 0 RC 1 1		
A5.1 / SFA-5.1	**2560-A**	DB (10.014.51), CE	
E6012	E 42 0 R 1 2		
A5.1 / SFA-5.1	**2560-A**	CE	
E6013	E 38 0 RR 1 2		
A5.1 / SFA-5.1	**2560-A**	TÜV (01097), DB (10.014.102/01), ABS, BV, DNV, LR, CE	
E6013	E 42 0 RR 1 2		
A5.1 / SFA-5.1	**2560-A**	TÜV (05687), DB (10.014.12), ABS, DNV, LR, CE	
E6013	E 38 0 RC 1 1		
A5.1 / SFA-5.1	**2560-A**	LR (2m)	
E6013	E 38 0 RC 1 1		
A5.1 / SFA-5.1	**2560-A**	TÜV (00731), DB (10.014.03), ABS, BV, DNV, LR, CE	
E6013	E 38 2 RB 1 2		
A5.1 / SFA-5.1	**2560-A**	TÜV (01591), DB (10.014.56), ABS, BV, DNV, LR, CE	
E6013	E 38 2 RB 1 2		
A5.1 / SFA-5.1	**2560-A**	TÜV (00425), DB (10.014.86), DNV, CE	
E6013	E 42 0 RC 1 1		
A5.1 / SFA-5.1	**2560-A**	TÜV (00350), DB (10.014.52), ABS, BV, LR, DNV, CE	
E6013	E 42 0 RR 1 2		

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4.1.2 Mild steel – Basic low hydrogen

Product name	Short description	Chemical composition (typical values) in %		
BÖHLER Q E 7018	Covered electrode, mild steel, basic coated, down to -40°C	C	Si	Mn
		0.07	0.5	1.1
BÖHLER Q E 7018-1	Covered electrode, mild steel, basic coated, down to -50°C	C	Si	Mn
		0.07	0.5	1.1
BÖHLER FOX EV 40	Covered electrode, mild steel, basic coated, extra low strength	C	Si	Mn
		0.06	0.3	1.0
BÖHLER FOX EV 47	Covered electrode, mild steel, basic coated, lower strength	C	Si	Mn
		0.06	0.3	0.9
BÖHLER FOX EV 50	Covered electrode, mild steel, basic coated, down to -50°C	C	Si	Mn
		0.08	0.4	1.2
BÖHLER FOX EV 50-W	Covered electrode, mild steel, basic coated, suitable for AC current	C	Si	Mn
		0.07	0.5	1.1
BÖHLER FOX EV 55	Covered electrode, mild steel, basic coated, higher strength	C	Si	Mn
		0.07	0.35	1.4
BÖHLER FOX K 55	Covered electrode, mild steel, basic coated; special for rail frogs	C	Si	Mn
		0.07	0.4	1.35
Phoenix 120 K	Covered electrode, mild steel, basic coated, suitable for DC +/- and AC	C	Si	Mn
		0.07	0.35	1.2
Phoenix Spezial D	Covered electrode, mild steel, basic coated, double coated electrode	C	Si	Mn
		0.06	0.65	1.05

AWS	EN/ISO	Approvals	JOIN!online
A5.1 / SFA-5.1	**2560-A**	TÜV (19742), DB (10.014.103), DNV, CE	
E7018 H4R	E 42 4 B 4 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (12451), DB (10.014.100), DNV, CE, (CWB on demand)	
E7018-1 H4	E 42 5 B 4 2 H5		
A5.1 / SFA-5.1	**2560-A**	CE	
E6018 (mod.)	E 35 4 B 4 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (01098), DB (10.014.09), ABS, BV, DNV, LR, RINA, CE	
E7016-1 H4R	E 38 4 B 4 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (00426), DB (10.014.02), ABS, BV, DNV, LR, RINA, CWB (Ø 3.2-6.0 mm), CE	
E7018-1H4R	E 42 5 B 4 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (04180), DNV	
E7016-1H4R	E 42 5 B 1 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (03654), CE	
E7018-1 H4R	E 46 5 B 4 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (01807), DB (81.014.02), CE	
E7016	E 46 4 B 3 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (00348), DB (10.014.83), ABS, BV, DNV, LR	
E7018-1	E 42 5 B 3 2 H5		
A5.1 / SFA-5.1	**2560-A**	TÜV (10572), DB (10.138.12), CE	
E7016	E 42 3 B 1 2 H10		

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4.1.3 Mild steel – High recovery

Product name	Short description	Chemical composition (typical values) in %		
BÖHLER FOX Red R 160	Covered electrode, mild steel, rutile coated, 160% high efficiency	C	Si	Mn
		0.07	0.35	0.65
BÖHLER FOX Red AR 160	Covered electrode, mild steel, rutile-acid coated, 160% high efficiency	C	Si	Mn
		0.08	0.3	0.9
BÖHLER FOX Red BR 160	Covered electrode, mild steel, rutile-basic coated, 160% high efficiency	C	Si	Mn
		0.08	0.4	0.85
BÖHLER FOX Multifer 180	Covered electrode, mild steel, rutile coated, 180% high efficiency	C	Si	Mn
		0.07	0.33	0.7
BÖHLER FOX HL 180 Ti	Covered electrode, mild steel, rutile coated, 180% high efficiency	C	Si	Mn
		0.07	0.5	0.8

4.1.4 Pipeline – Cellulosic

Product name	Short description	Chemical composition (typical values) in %			
BÖHLER FOX CEL	Covered electrode, mild steel, cellulose coated, pipeline welding, low strength	C	Si	Mn	
		0.12	0.14	0.5	
BÖHLER FOX CEL+	Covered electrode, mild steel, cellulose coated, for root-pass pipeline welding on DC +	C	Si	Mn	
		0.17	0.15	0.6	
BÖHLER FOX CEL Mo	Covered electrode, mild steel, cellulose coated, Mo-alloyed, pipeline welding	C	Si	Mn	Mo
		0.1	0.14	0.4	0.5
BÖHLER FOX CEL 70-P	Covered electrode, mild steel, cellulose coated, pipeline welding with very intense arc, low-middle	C	Si	Mn	Ni
		0.15	0.1	0.45	0.17
BÖHLER FOX CEL 75	Covered electrode, mild steel, cellulose coated, pipeline welding, low-middle strength	C	Si	Mn	
		0.14	0.14	0.7	
BÖHLER FOX CEL 80-P	Covered electrode, mild steel, cellulose coated, pipeline welding with very intense arc, middle-high	C	Si	Mn	Ni
		0.15	0.15	0.7	0.8
BÖHLER FOX CEL 85	Covered electrode, mild steel, cellulose coated, pipeline welding, middle-high strength	C	Si	Mn	Ni
		0.14	0.15	0.75	0.7
BÖHLER FOX CEL 90	Covered electrode, mild steel, cellulose coated, pipeline welding, highest strength	C	Si	Mn	Ni
		0.17	0.15	0.9	0.8

AWS	EN/ISO	Approvals	JOIN!online
A5.1 / SFA-5.1	**2560-A**	TÜV (00349), DB (10.014.53) ABS, BV, DNV, LR, CE	
E7024-1	E 42 0 RR 5 3		
A5.1 / SFA-5.1	**2560-A**	TÜV (00535), DB (10.014.84), ABS, BV, DNV, LR, CE	
E7024-1	E 42 2 RA 5 3		
A5.1 / SFA-5.1	**2560-A**	TÜV (01700), DB (10.014.85) ABS, BV LR, DNV, CE	
E7028	E 42 2 RB 5 3		
A5.1 / SFA-5.1	**2560-A**	TÜV (01598), DB (10.014.97), ABS, BV LR, DNV, CE	
E7024	E 42 0 RR 7 3		
A5.1 / SFA-5.1	**2560-A**	ABS, DNV, LR, CE	
E7024	E 38 0 RR 7 4		

AWS	EN/ISO	Approvals	JOIN!online
A5.1 / SFA-5.1	**2560-A**	TÜV (01281), DNV, CE	
E6010	E 38 3 C 2 1		
A5.1 / SFA-5.1	**2560-A**	TÜV (19380), CE	+
E6010	E 38 2 C 2 1		
A5.5 / SFA-5.5	**2560-A**	TÜV (01325), ABS, CE	
E7010-A1	E 42 3 Mo C 2 5		
A5.5 / SFA-5.5	**2560-A**	TÜV (11180), CE	+
E7010-P1	E 42 3 C 2 5		
A5.5 / SFA-5.5	**2560-A**	CE	
E7010-P1	E 42 3 C 2 5		
A5.5 / SFA-5.5	**2560-A**	TÜV (11181), CE	+
E8010-P1 E8010-G	E 46 3 1Ni C 2 5		
A5.5 / SFA-5.5	**2560-A**	TÜV (01361), ABS, CE	
E8010-P1	E 46 4 1Ni C 2 5		
A5.5 / SFA-5.5	**2560-A**	TÜV (01324), CE	
E9010-P1 E9010-G	E 50 3 1Ni C 2 5		

4.1.5 Pipeline – Basic vertical down

Product name	Short description	Chemical composition (typical values) in %				
BÖHLER FOX BVD 85	Basic vertical down stick elekctrode, low-alloyed, pipeline welding	C	Si	Mn	Ni	
		0.05	0.4	1.1	0.9	
BÖHLER FOX BVD 90	Basic vertical down stick elekctrode, low-alloyed, pipeline welding, middle strenght	C	Si	Mn	Ni	
		0.05	0.3	1.2	2.2	
BÖHLER FOX BVD 100	Basic vertical down stick elekctrode, low-alloyed, pipeline welding, high strength	C	Si	Mn	Ni	
		0.07	0.4	1.2	2.3	

4.1.6 Pipeline – Basic vertical up

Product name	Short description	Chemical composition (typical values) in %					
BÖHLER FOX EV PIPE	Covered electrode, mild steel, basic coated, pipeline vertical up welding, low strengths	C	Si	Mn			
		0.06	0.6	0.9			
BÖHLER FOX EV 50 PIPE	Covered electrode, mild steel, basic coated, pipeline vertical up welding, low strengths	C	Si	Mn			
		0.06	0.55	1.0			
BÖHLER FOX EV 60 PIPE	Covered electrode, mild steel, basic coated, pipeline vertical up welding, middle strength	C	Si	Mn	Ni		
		0.07	0.6	1.2	0.9		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.5 / SFA-5.5	**2560-A**	TÜV (03531), CE	
	E8045-P2 H4 R E8018-G H4 R	E 46 5 1Ni B 4 5 H5		
	A5.5 / SFA-5.5	**18275-A**	TÜV (03402), GAZPROM, CE	
	E9018-G H4 R E9045-P2 H4 R (mod.)	E 55 5 Z2Ni B 4 5 H5		
	A5.5 / SFA-5.5	**18275-A**	TÜV (06333), CE	
	E10018-G E10045-P2 (mod.)	E 62 5 Z2Ni B 4 5		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.1 / SFA-5.1	**2560-A**	TÜV (07620), DB (10.014.77), CE, NAKS, GAZPROM	
	E7016-1	E 42 4 B 1 2		
	A5.1 / SFA-5.1	**2560-A**		
	E7016	E 42 3 B 3 2		
	A5.5 / SFA-5.5	**2560-A**	BV, CE	
	E8016-G H4R	E 50 4 1Ni B 1 2 H5		

4.1.7 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %							
BÖHLER FOX EV 60	Covered electrode, basic coated, high-strength, 1% Ni alloyed	C	Si	Mn	Ni				
		0.07	0.4	1.15	0.9				
BÖHLER FOX EV 62	Covered electrode, basic coated, high-strength, 1% Ni alloyed	C	Si	Mn	Ni				
		0.07	0.25	1.5	0.95				
BÖHLER FOX EV 63	Covered electrode, basic coated, high-strength, un-alloyed	C	Si	Mn					
		0.08	0.7	1.7					
BÖHLER FOX EV 64	Covered electrode, basic coated, high-strength, NiMo-alloyed	C	Si	Mn	Ni	Mo	S	Cu	P
		0.06	0.3	1.4	0.95	0.5	≤ 0.01	≤ 0.08	≤ 0.01
BÖHLER FOX EV 65	Covered electrode, basic coated, high-strength, NiMo-alloyed	C	Si	Mn	Ni	Mo			
		0.06	0.3	1.2	0.8	0.35			
BÖHLER FOX EV 70	Covered electrode, basic coated, high-strength, NiMo-alloyed	C	Si	Mn	Ni	Mo			
		0.04	0.3	1.2	0.9	0.4			
BÖHLER FOX EV 70 Mo	Covered electrode, low-alloyed, basic coated, high-strength, Mo-alloyed	C	Si	Mn	Mo				
		0.06	0.4	1.6	0.5				
BÖHLER FOX EV 73	Covered electrode, basic coated, high-strength, 2%NiMo-alloyed	C	Si	Mn	Ni	Mo			
		0.06	0.25	1.4	1.8	0.45			
BÖHLER FOX EV 75	Covered electrode, basic coated, high-strength, NiCrMo-alloyed	C	Si	Mn	Ni	Cr	Mo		
		0.05	0.4	1.6	2.0	0.4	0.4		
BÖHLER FOX EV 85	Covered electrode, basic coated, high-strength, NiCrMo-alloyed	C	Si	Mn	Ni	Cr	Mo		
		0.05	0.4	1.7	2.1	0.4	0.5		
BÖHLER FOX EV 105	Covered electrode, basic coated, high-strength, NiCrMo-alloyed	C	Si	Mn	Ni	Cr	Mo		
		0.08	0.4	1.45	2.2	0.8	0.5		
BÖHLER FOX NiCuCr	Covered electrode, low-alloyed, basic coated, weather-resistant	C	Si	Mn	Ni	Cr	Cu		
		0.05	0.4	0.7	0.6	0.6	0.45		
BÖHLER FOX NiMo	Covered electrode, low-alloyed, basic coated, high-strength, NiMo-alloyed	C	Si	Mn	Ni	Mo			
		0.09	0.3	1.9	0.9	0.4			

AWS	EN/ISO	Approvals	JOIN!online
A5.5 / SFA-5.5	**2560-A**	TÜV (01524), DNV, CRS, VG 95132, ABS, CE	
E8018-C3 H4R	E 46 6 1Ni B 4 2 H5		
A5.5 / SFA-5.5	**2560-A**	TÜV (00531), DB (10.014.58) ABS, BV, DNV, LR, VG 95132-1, CE	
E8018-G (E8018-C3 mod.)	E 50 6 Mn1Ni B 4 2 H5		
A5.5 / SFA-5.5	**2560-A**	TÜV (00730), DB (10.014.07 / 81.014.01), CE	
E8018-G H4R	E 50 4 B 4 2 H5		
A5.5 / SFA-5.5	**2560-A**	TÜV (00512), KTA (08100), CE	
E9018-G	E 50 4 Z1NiMo B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	TÜV (01802), NAKS, VG 95132, BV, ABS, CE	
E8018-G H4R E8018-D1 H4R	E 55 6 1NiMo B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	TÜV (00112),CE	
E9018-G H4R E9018-D1 H4R (mod.)	E 55 6 1NiMo B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	TÜV (01178), DB (10.014.91, 82.014.04), CE	
E9018-G E9018-D1 (mod.)	E 55 3 MnMo B T 4 2 H10		
A5.5 / SFA-5.5	**18275-A**	TÜV (00547), DB (10.014.57), DNV, WIWEB (HY80 acc. AWS A5.5), CE	
E10018M	E 55 5 2NiMo B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	CE	
E10018-G H4R E10018M H4R (mod.)	E 62 6 Mn2NiCrMo B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	TÜV (04313), DB (10.014.22), BV, CE	
E11018-G H4R E11018M H4R (mod.)	E 69 6 Mn2NiCrMo B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	CE	
E12018-G (E12018M mod.)	E 89 4 Mn2Ni1CrMo B 4 2 H5		
A5.5 / SFA-5.5	**2560-A**	CE	
E8018-W2 H4R	E 46 4 Z1NiCrCu B 4 2 H5		
A5.5 / SFA-5.5	**18275-A**	CE	
E10018-D2 H4	E 62 4 Mn1NiMo B 4 2 H5		

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4.1.8 Low alloy steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %			
BÖHLER FOX 2,5 Ni	Covered electrode, low-alloyed, basic coated, cryogenic, 2.5% Ni	C	Si	Mn	Ni
		0.04	0.3	0.8	2.4
BÖHLER FOX 3,5 Ni	Covered electrode, low-alloyed, basic coated, cryogenic, 3.5% Ni	C	Si	Mn	Ni
		0.04	0.3	0.8	3.4

4.1.9 Low alloy – Creep resistant

Product name	Short description	Chemical composition (typical values) in %							
BÖHLER FOX Black	Covered electrode, acid coated, galvanizing steel	C	Si	Mn	Mo				
		0.1	0.08	0.60	0.45				
BÖHLER FOX DMO Ti	Covered electrode, rutile coated, creep resistant, 0.5% Mo	C	Si	Mn	Mo				
		0.07	0.4	0.7	0.5				
BÖHLER FOX DMO Kb	Covered electrode, basic coated, creep resistant, 0.5% Mo	C	Si	Mn	Mo				
		0.08	0.4	0.8	0.5				
BÖHLER FOX DMV 83 Kb	Covered electrode, basic coated, creep resistant, CrMoV	C	Si	Mn	Cr	Mo	V		
		0.065	0.35	1.2	0.4	1.0	0.5		
BÖHLER FOX DCMS Kb	Covered electrode, basic coated, creep resistant, 1% Cr, 0.5% Mo	C	Si	Mn	Cr	Mo	Sn	P	As
		0.09	0.3	0.8	1.2	0.5	≤ 0.005	≤ 0.010	≤ 0.005
BÖHLER FOX DCMV	Covered electrode, basic coated, creep resistant, CrMoV	C	Si	Mn	Cr	Mo	V		
		0.12	0.3	0.9	1.2	1.0	0.22		
BÖHLER FOX CM 2 Kb	Covered electrode, basic coated, creep resistant, 2.2% Cr, 1% Mo	C	Si	Mn	Cr	Mo	Sn	P	As
		0.08	0.3	0.7	2.2	1.0	≤ 0.006	≤ 0.010	≤ 0.005
BÖHLER FOX CM 5 Kb	Covered electrode, rutile coated, creep resistant, 5% Cr, 0.5% Mo	C	Si	Mn	Cr	Mo			
		0.08	0.3	0.8	5.0	0.6			
BÖHLER FOX CM 9 Kb	Covered electrode, basic coated, creep resistant, 9% Cr, 1% Mo	C	Si	Mn	Cr	Mo			
		0.08	0.25	0.65	9.0	1.0			
BÖHLER FOX C 9 MV	Covered electrode, basic coated, creep resistant, P91	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.1	0.2	0.6	0.5	8.5	0.9	0.05	0.2
BÖHLER FOX C 9 MV LNi	Covered electrode, basic coated, creep resistant, P91, Low Ni	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.1	0.2	0.8	0.1	9.0	1.1	0.05	0.2
BÖHLER FOX C 9 MVW	Covered electrode, basic coated, creep resistant, P911	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.1	0.2	0.6	0.6	8.5	1.0	0.05	1.0
BÖHLER FOX 20 MVW	Covered electrode, basic coated, creep resistant, X20CrMoV	C	Si	Mn	Ni	Cr	Mo	V	W
		0.18	0.3	0.7	0.55	11.0	0.9	0.25	0.5

AWS	EN/ISO	Approvals	JOIN!online
A5.5 / SFA-5.5	**2560-A**	TÜV (00147), DB (10.014.16), ABS, BV, DNV, LR, WIWEB, CE	
E8018-C1 H4R	E 46 8 2Ni B 4 2 H5		
A5.5 / SFA-5.5	**2560-A**	DNV, CE	
E7018-C2L H4	E 42 6 3Ni B 3 2 H5		

		AWS	EN/ISO	Approvals	JOIN!online
		A5.5 / SFA-5.5	**2560-A**	CE	
		E7020-G	E 42 0 Mo A 1 2		
			3580-A	TÜV (00018), DB (10.014.90), BV, DNV, CE	
			E Mo R 1 2		
		A5.5 / SFA-5.5	**3580-A**	TÜV (00019), KTA 1408.1 (8053), DB (10.014.82), ABS, DNV, CE	
		E7018-A1 H4 R	E Mo B 4 2 H5		
		A5.5 / SFA-5.5	**3580-A**	TÜV (01094), NAKS, CE	
		E8018-G	E MoV B 4 2 H5		
Sb		**A5.5 / SFA-5.5**	**3580-A**	TÜV (00728), DB (10.014.42), ABS, DNV, NAKS (Ø 3.2 mm; Ø 4.0 mm), CE	
≤ 0.005		E8018-B2 H4	E CrMo1 B 4 2 H5		
		A5.5 / SFA-5.5	**3580-A**	TÜV (06077), LTSS, CE	
		E9018-G	E Z CrMoV1 B 4 2 H5		
Sb		**A5.5 / SFA-5.5**	**3580-A**	TÜV (00722), DB (10.014.81), ABS, DNV, CE, NAKS (Ø 3.2; Ø 4.0 mm)	
≤ 0.005		E9018-B3 H4 R	E CrMo2 B 4 2 H5		
		A5.5 / SFA-5.5	**3580-A**	TÜV (00725), CE	
		E8018-B6 H4 R	E CrMo5 B 4 2 H5		
		A5.5 / SFA-5.5	**3580-A**	TÜV (02183), CE	
		E8018-B8 H4	E CrMo9 B 4 2 H5		
N		**A5.5 / SFA-5.5**	**3580-A**	TÜV (06762), CE	
0.04		E9015-B91 H4	E CrMo91 B 4 2 H5		
N		**A5.5 / SFA-5.5**	**3580-A**	CE	
0.04		E9015-B91 H4	E Z CrMo91 B 4 2 H5		
V	**N**	**A5.5 / SFA-5.5**	**3580-A**	TÜV (09176), CE	
0.2	0.04	E9015-B92 H4 (mod.)	E ZCrMoWVNb 9 1 1 B 4 2 H5		
			3580-A	TÜV (01082), KTA 1408.1 (8088), CE	
			E CrMoWV12 B 4 2 H5		

Product name	Short description	Chemical composition (typical values) in %							
BÖHLER FOX CrMo 2V	Covered electrode, basic coated, creep resistant, 2.5%Cr, 1%Mo, V	C	Si	Mn	Mo	Cr	V	Nb	
		0.09	0.25	0.75	1.0	2.5	0.25	0.01	
Thermanit MTS 616	Covered electrode, basic coated, creep resistant, P92	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.11	0.2	0.6	0.6	8.8	0.5	0.04	1.7
Thermanit MTS 616 LNi	Covered electrode, basic coated, creep resistant, P92, Low Ni	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.11	0.2	0.8	0.1	8.8	0.5	0.04	1.6
Phoenix Chromo 1	Covered electrode, basic coated, creep resistant, 1% Cr, 0.5% Mo	C	Si	Mn	Cr	Mo	Sn	P	As
		0.06	0.25	0.85	1.2	0.5	< 0.005	< 0.012	< 0.010
Avesta 308/308H AC/DC	Covered electrode, high-alloyed, austenitic stainless, creep resistant	C	Si	Mn	Ni	Cr			
		0.06	0.7	1.1	10	20			
BÖHLER FOX CN 16/13	Covered electrode, high-alloyed, austenitic stainless, creep resistant	C	Si	Mn	Ni	Cr	Nb		
		0.14	0.5	3.8	13.0	16.0	1.5		
BÖHLER FOX CN 18/11	Covered electrode, high-alloyed, austenitic stainless, creep resistant	C	Si	Mn	Ni	Cr	FN		
		0.05	0.3	1.3	10.4	19.4	3 - 8		
Phoenix SH Chromo 2 KS	Covered electrode, basic coated, creep resistant, 2.2%Cr, 1%Mo, V	C	Si	Mn	Cr	Mo	S	Sn	P
		0.07	0.22	0.75	2.2	0.9	≤ 0.010	≤ 0.005	≤ 0.012
Thermanit Chromo 9 V	Covered electrode, basic coated, creep resistant, P91	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.1	0.2	0.6	0.5	8.5	0.9	0.05	0.2
Thermanit Chromo 9 V Mod.	Covered electrode, basic coated, creep resistant, P91	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.1	0.2	0.8	0.1	9.0	1.1	0.05	0.2

		AWS	EN/ISO	Approvals	JOIN!online
		A5.5 / SFA-5.5	**3580-A**	VdTÜV (10230)	+
		E9015-G	E Z CrMo2V B 4 2 H5		
V	**N**	**A5.5 / SFA-5.5**	**3580-A**	TÜV (09289), IBR, CE	
0.2	0.04	E9015-B92 H4/ E9015-G	E Z CrMoWVNb9 0.5 2 B 4 2 H5		
V	**N**	**A5.5 / SFA-5.5**	**3580-A**		+
0.2	0.05	E9015-B92 H4/ E9015-G	E Z CrMoWVNb9 0.5 2 B 4 2 H5		
Sb		**A5.5 / SFA-5.5**	**3580-A**	TÜV (01752), IBR, CE	
< 0.005		E8018-B2 H4	E CrMo1 B 4 2 H5		
		A5.4 / SFA-5.4	**3581-A**	TÜV (12841), CE	
		E308H-17	E 19 9 R 4 2		
			3581-A	TÜV (00550), CE	
			E Z 16 13 Nb B 4 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (00138), KTA 1408.1 (08067), CE	
		E308-15	E 19 9 B 4 2		
As	**Sb**	**A5.5 / SFA-5.5**	**3580-A**	TÜV (01823), CE	
≤ 0.010	≤ 0.005	E9015-B3 H4	E CrMo2 B 4 2 H5		
N		**A5.5 / SFA-5.5**	**3580-A**	TÜV (06173), CE	
0.04		E9015-B91 H4	E CrMo91 B 4 2 H5		
N		**A5.5 / SFA-5.5**	**3580-A**	CE	+
0.04		E9015-B91 H4	E Z CrMo91 B 4 2 H5		

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4.1.10 Stainless steel – Austenitic steels

Product name	Short description	Chemical composition (typical values) in %				
		C	Si	Mn	Ni	Cr
Avesta 308L/MVR	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 308L	0.025	0.7	0.7	10.0	19.7
Avesta 309L	Covered electrode, high-alloyed, austenitic stainless, special applications, 309L	0.02	0.7	0.8	12.7	23.1
Avesta 316L/SKR	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 316L	0.02	0.8	0.7	12.0	18.0
Avesta 316L/SKR-4D	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 316L, pipe welding	0.02	0.8	0.7	12.2	18.2
Avesta 904L	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 1.4539/904L	0.02	0.7	1.2	25.0	20.5
BÖHLER FOX ASN 5	Covered electrode, basic coated, high-alloyed, austenitic stainless, 317L	0.04	0.5	2.5	17.0	18.5
BÖHLER FOX ASN 5-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 317L	0.025	0.7	1.2	17.0	18.0
BÖHLER FOX CN 19/9 M	Covered electrode, high-alloyed, austenitic stainless, special applications, 308Mo	0.04	0.7	0.8	10.3	20.2
BÖHLER FOX CN 20/25 M	Covered electrode, basic coated, high-alloyed, austenitic stainless, 1.4539/904L	≤ 0.04	0.4	3.8	25.0	20.0
BÖHLER FOX CN 20/25 M-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 1.4539/904L	0.03	0.7	1.7	25.0	20.1
BÖHLER FOX CN 24/13	Covered electrode, high-alloyed, austenitic stainless, special applications	0.03	0.3	1.3	12.0	23.8
BÖHLER FOX EAS 2	Covered electrode, basic coated, high-alloyed, austenitic stainless, 308L	0.03	0.4	1.3	9.6	19.8
BÖHLER FOX EAS 2 (LF)	Covered electrode, basic coated, high-alloyed, austenitic stainless, 308L, Low Ferrite	0.03	0.4	1.3	10.5	19.5
BÖHLER FOX EAS 2-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 308L	0.03	0.8	0.8	10.2	19.8
BÖHLER FOX EAS 2-VD	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 308L, for vertical down weldin	0.02	0.7	0.7	10.5	19.8
BÖHLER FOX EAS 4 M	Covered electrode, basic coated, high-alloyed, austenitic stainless, 316L	0.03	0.4	1.2	11.8	18.8
BÖHLER FOX EAS 4 M (LF)	Covered electrode, basic coated, high-alloyed, austenitic stainless, 316L, Low Ferrite	0.03	0.4	1.2	12.8	18.5
BÖHLER FOX EAS 4 M-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 316L	0.03	0.8	0.8	11.5	18.8

				AWS	EN/ISO	Approvals	JOIN!online
				A5.4 / SFA-5.4	**3581-A**	TÜV (01064), DB (30.014.17), DNV, CE	
				E308L-17	E 19 9 L R 3 2		
FN				**A5.4 / SFA-5.4**	**3581-A**	TÜV (03023), DB (30.014.19), DNV, CWB, CE	
12 -17				E309L-17	E 23 12 L R 3 2		
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (01073), DB (30.014.18), DNV, CE	
2.8				E316L-17	E 19 12 3 L R 3 2		
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (10710), CE	
2.6				E316L-17	E 19 12 3 L R		
Mo	**Cu**			**A5.4 / SFA-5.4**	**3581-A**	TÜV (03496), DB (30.014.23), CE	+
4.5	1.5			E385-17	E 20 25 5 Cu N L R 3 2		
Mo	**Nb**	**FN**		**A5.4 / SFA-5.4**	**3581-A**	TÜV (00016)	
4.3	0.17	≤ 0.5		E317L-15 (mod.)	E 18 16 5 N L B 2 2		
Mo	**Nb**	**FN**		**A5.4 / SFA-5.4**	**3581-A**	TÜV (07118), CE	
4.5	0.13	≤ 0.5		E317L-17 (mod.)	E 18 16 5 N L R 3 2		
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (01086), DB (30.014.03), ABS, DNV, LR, CE	
3.2				E308Mo-17 (mod.)	E 20 10 3 R 3 2		
Mo	**Cu**	**N**	**PRE_N**	**A5.4 / SFA-5.4**	**3581-A**	TÜV (04882), CE	
6.3	1.4	0.14	≥ 44	E385-15 (mod.)	E 20 25 5 Cu N L B 2 2		
Mo	**Cu**	**N**	**PRE_N**	**A5.4 / SFA-5.4**	**3581-A**	TÜV (06634), CE	
6.2	1.4	0.17	≥ 45	E385-17 (mod.)	E 20 25 5 Cu N L R 3 2		
				A5.4 / SFA-5.4	**3581-A**	DB (30.014.11), CE	
				E309L-15	E 23 12 L B 2 2		
FN				**A5.4 / SFA-5.4**	**3581-A**	TÜV (00152), DB (30.014.10), CE	
4-1				E308L-15	E 19 9 L B 2 2		
				A5.4 / SFA-5.4	**3581-A**		+
				E308L-15	E 19 9 L B 2 2		
				A5.4 / SFA-5.4	**3581-A**	TÜV (01095), DB (30.014.15), ABS, DNV, CWB, CE	
				E308L-17	E 19 9 L R 3 2		
				A5.4 / SFA-5.4	**3581-A**	CWB, CE	
				E308L-17	E 19 9 L R 1 5		
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (00772), DNV, CE	
2.7				E316L-15	E 19 12 3 L B 2 2		
Mo				**A5.4 / SFA-5.4**	**3581-A**	CE	
2.4				E316L-15	E Z 19 12 3 L B 2 2		
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (00773), DB (30.014.14), ABS, DNV, LR, CWB, RINA, CE	
2.7				E316L-17	E 19 12 3 L R 3 2		

Product name	Short description	Chemical composition (typical values) in %				
BÖHLER FOX EAS 4 M-VD	Covered electrode, rutile coated, high-alloyed, austenitic stainless, 316L, for vertical down weldin	C	Si	Mn	Ni	Cr
		0.03	0.7	0.7	12.0	19.0
BÖHLER FOX EASN 25M-A	Covered electrode, high-alloyed, austenitic stainless, special applications, 310Mo	C	Si	Mn	Ni	Cr
		0.035	0.4	4.2	22.7	24.7
BÖHLER FOX SAS 2	Covered electrode, basic coated, high-alloyed, austenitic stainless, stabalized, 347-type	C	Si	Mn	Ni	Cr
		0.03	0.4	1.3	10.2	19.8
BÖHLER FOX SAS 2-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, stabalized, 347-type	C	Si	Mn	Ni	Cr
		0.03	0.8	0.8	10.0	19.5
BÖHLER FOX SAS 4	Covered electrode, basic coated, high-alloyed, austenitic stainless, stabalized, 316-type	C	Si	Mn	Ni	Cr
		0.03	0.4	1.3	11.8	18.8
BÖHLER FOX SAS 4-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, stabalized, 318-type	C	Si	Mn	Ni	Cr
		0.03	0.8	0.8	12.0	19.0
BÖHLER Q E 308L-17	QLine Covered electrode, rutile coated, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr
		0.03	0.8	0.8	10.2	19.8
BÖHLER Q E 316L-17	QLine Covered electrode, rutile coated, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr
		0.03	0.8	0.8	11.5	18.8
Thermanit 19/15 H	Covered electrode, basic coated, high-alloyed, austenitic stainless, 316LMn	C	Si	Mn	Ni	Cr
		≤ 0.04	< 0.5	6.0	16.5	20.0
Thermanit 25/22 H	Covered electrode, basic coated, high-alloyed, austenitic stainless, 310Mo	C	Si	Mn	Ni	Cr
		< 0.035	< 0.4	5.0	22.0	24.5

				AWS	EN/ISO	Approvals	JOIN!online
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (09089), DNV, CWB, CE	
2.7				E316L-17	E 19 12 3 L R 1 5		
Mo	**N**			**A5.4 / SFA-5.4**	**3581-A**	CE	
2.4	0.12			E310-16 (mod.)	E 25 22 2 N L R 1 2		
Nb				**A5.4 / SFA-5.4**	**3581-A**	TÜV (01282), DB (30.014.04), ABS, DNV, CE	
0.42				E347-15	E 19 9 Nb B 2 2		
Nb				**A5.4 / SFA-5.4**	**3581-A**	TÜV (01105), DB (30.014.06), ABS, DNV, CWB, CE	
0.32				E347-17	E 19 9 Nb R 3 2		
Mo	**Nb**			**A5.4 / SFA-5.4**	**3581-A**	TÜV (00774), DB (30.014.05), ABS, DNV, CE	
2.7	0.41			E318-15	E 19 12 3 Nb B 2 2		
Mo	**Nb**			**A5.4 / SFA-5.4**	**3581-A**	TÜV (00777), DB (30.014.07), CE	
2.7	0.31			E318-17	E 19 12 3 Nb R 3 2		
				A5.4 / SFA-5.4	**3581-A**	TÜV (10647), ABS, DNV, CE	
				E308L-17	E 19 9 L R 3 2		
Mo				**A5.4 / SFA-5.4**	**3581-A**	TÜV (10648), ABS, DNV, CE	
2.7				E316L-17	E 19 12 3 L R 3 2		
Mo	**N**			**A5.4 / SFA-5.4**	**3581-A**	TÜV (01813), DB (30.138.08), CE	
3.0	0.18			E316LMn-15	E 20 16 3 Mn N L B 2 2		
Mo	**N**			**A5.4 / SFA-5.4**	**3581-A**	TÜV (04171), CE	
2.2	0.15			E310-15 (mod.)	E Z 25 22 2 N L B 2 2		

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4.1.11 Stainless steel – Ferritic steels

Product name	Short description	Chemical composition (typical values) in %				
BÖHLER FOX KW 10	Covered electrode, high-alloyed, ferritic stainless, 410 type	C	Si	Mn	Cr	
		0.08	0.7	0.8	13.5	
BÖHLER FOX SKWA	Covered electrode, high-alloyed, ferritic stainless, 430 type	C	Si	Mn	Cr	
		0.08	0.4	0.3	17.0	
BÖHLER FOX SKWAM	Covered electrode, high-alloyed, ferritic stainless, special applications	C	Si	Mn	Cr	Mo
		0.22	0.3	0.4	17.0	1.3

4.1.12 Stainless steel – Martensitic steels

Product name	Short description	Chemical composition (typical values) in %			
BÖHLER FOX CN 13/1	Covered electrode, high-alloyed, soft-martensitic stainless	C	Si	Mn	Ni
		0.04	0.25	0.65	1.5
BÖHLER FOX CN 13/4	Covered electrode, high-alloyed, soft-martensitic stainless	C	Si	Mn	Ni
		0.035	0.3	0.5	4.5
BÖHLER FOX CN 13/4 Supra	Covered electrode, high-alloyed, soft-martensitic stainless, core wire alloyed	C	Si	Mn	Ni
		0.03	0.3	0.6	4.5
BÖHLER FOX CN 16/6 M-HD	Covered electrode, high-alloyed, soft-martensitic stainless	C	Si	Mn	Ni
		0.03	0.3	0.6	5.8

	AWS	EN/ISO	Approvals	JOIN!online
	A5.4 / SFA-5.4	**3581-A**		
	E410-15 (mod.)	E 13 B 2 2		
	A5.4 / SFA-5.4	**3581-A**	KTA 1408.1 (8098.00), CE	
	E430-15	E 17 B 2 2		
		3581-A	KTA 1408.1 (08043.03), DB, CE	
		E Z 17 Mo B 2 2		

		AWS	EN/ISO	Approvals	JOIN!online
Cr	**Mo**		**3581-A**	CE	
11.5	0.2		E Z 13 1 B 6 2		
Cr	**Mo**	**A5.4 / SFA-5.4**	**3581-A**	TÜV (03232), CE	
12.2	0.5	E410NiMo-15	E 13 4 B 6 2		
Cr	**Mo**	**A5.4 / SFA-5.4**	**3581-A**	TÜV (09081), CE	
12.2	0.5	E410NiMo-15	E 13 4 B 4 2		
Cr	**Mo**		**3581-A**	TÜV (19071), CE	
15.5	1.2		E Z 16 6 Mo B 6 2 H5		

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4.1.13 Stainless steel – Duplex

Product name	Short description	Chemical composition (typical values) in %							
Avesta 2205	Covered electrode, rutile coated, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.02	0.8	0.7	9.4	22.6	3.0	0.16	≥ 35
Avesta 2205 Basic	Covered electrode, basic coated, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.03	0.6	1.2	8.9	22.8	3.1	0.16	≥ 35
Avesta 2205-PW AC/DC	Covered electrode, rutile coated, high-alloyed, duplex stainless, all position	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.02	0.8	0.8	9.5	23.0	3.1	0.18	≥ 35
Avesta 2507/P100	Covered electrode, rutile coated, high-alloyed, superduplex stainless	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.02	0.8	0.9	9.8	24.8	3.6	0.22	≥ 40
Avesta 2507/P100 Rutile	Covered electrode, rutile coated, high-alloyed, superduplex stainless	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.03	0.4	1.0	9.3	24.8	3.7	0.23	≥ 40
BÖHLER FOX CN 22/9 N	Covered electrode, rutile coated, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.02	0.8	0.9	9.0	22.6	3.1	0.17	≥ 35
BÖHLER FOX CN 22/9 N-B	Covered electrode, basic coated, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo	N	PRE_N
		0.03	0.3	1.1	8.8	22.6	3.1	0.16	≥ 35
BÖHLER FOX CN 25/9 CuT	Covered electrode, basic coated, high-alloyed, superduplex stainless	C	Si	Mn	Ni	Cr	Mo	N	Cu
		0.03	0.5	1.0	9.5	25.0	3.7	0.22	0.7

		AWS	EN/ISO	Approvals	JOIN!online
		A5.4 / SFA-5.4	**3581-A**	TÜV (07139), DB (10.014.20), CWB, CE	
		E2209-17	E 22 9 3 N L R		
FN		**A5.4 / SFA-5.4**	**3581-A**	CE	
40		E2209-15	E 22 9 3 N L B 2 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (04486), DNV, CWB, CE	
		E2209-17	E 22 9 3 N L R		
FN		**A5.4 / SFA-5.4**	**3581-A**	CE	
45		E2594-17	E 25 9 4 N L R 3 2		
FN		**A5.4 / SFA-5.4**	**3581-A**	CE	
45		E2594-16	E 25 9 4 N L R 4 2		
FN		**A5.4 / SFA-5.4**	**3581-A**	TÜV (03636), ABS, DNV, LR, RINA, CE	
30-60		E2209-17	E 22 9 3 N L R 3 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (07084), CE	
		E2209-15	E 22 9 3 N L B 2 2		
W	**PRE_N**	**A5.4 / SFA-5.4**	**3581-A**	CE	
0.7	≥ 40	E2595-15	E 25 9 4 N L B 2 2		

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4.1.14 Stainless steel – Special applications & dissimilar joints

Product name	Short description	Chemical composition (typical values) in %					
Avesta 383 AC/DC	Covered electrode, high-alloyed, austenitic stainless, especially for phosphoric acid applications	C	Si	Mn	Ni	Cr	Mo
		0.02	0.9	0.9	32.0	27.0	3.7
BÖHLER FOX A 7	Covered electrode, basic coated, high-alloyed, austenitic stainless, special applications, 307 type	C	Si	Mn	Ni	Cr	FN
		0.09	0.7	6.5	8.8	18.6	40
BÖHLER FOX A 7-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, special applications, 307 type	C	Si	Mn	Ni	Cr	Mo
		0.1	1.5	4.0	8.5	19.5	0.7
BÖHLER FOX CN 17/4 PH	Covered electrode, high-alloyed, precipitation hardening stainless	C	Si	Mn	Ni	Cr	Mo
		0.03	0.3	0.6	5.1	16.0	0.4
BÖHLER FOX CN 23/12 Mo-A	Covered electrode, high-alloyed, austenitic stainless, special applications, 309-Mo type	C	Si	Mn	Ni	Cr	Mo
		0.02	0.7	0.8	12.5	23.0	2.7
BÖHLER FOX CN 23/12-A	Covered electrode, high-alloyed, austenitic stainless, special applications, 309 type	C	Si	Mn	Ni	Cr	FN
		0.02	0.7	0.8	12.5	23.2	12-17
BÖHLER FOX CN 24/13 Nb	Covered electrode, high-alloyed, austenitic stainless, special applications, 309 type, Nb stabalized	C	Si	Mn	Ni	Cr	Nb
		0.03	0.4	1.0	12.5	24.2	0.85
BÖHLER FOX CN 29/9	Covered electrode, basic coated, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	
		0.11	1.0	0.7	10.2	29.0	
BÖHLER FOX CN 29/9-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	
		0.11	0.9	0.7	9.5	28.8	
BÖHLER Q E 309L-17	Covered electrode, high-alloyed, austenitic stainless, special applications, 309 type	C	Si	Mn	Ni	Cr	
		0.02	0.7	0.8	12.5	23.2	
Thermanit 30/10 W	Covered electrode, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	N
		0.1	1.1	0.8	9.0	29.0	0.1

		AWS	EN/ISO	Approvals	JOIN!online
Cu		**A5.4 / SFA-5.4**	**3581-A**		
1.0		E383-17	E 27 31 4 Cu L R		
		A5.4 / SFA-5.4	**3581-A**	TÜV (06786), DB (30.014.24), DNV, CE	
		E307-15 (mod.)	E 18 8 Mn B 2 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (02078)	
		E307-16 (mod.)	E Z 18 9 MnMo R 3 2		
Nb	**Cu**	**A5.4 / SFA-5.4**	**3581-A**	CE	
0.2	3.2	E630-15 (mod.)	E Z 17 4 Cu B 4 3 H5		
		A5.4 / SFA-5.4	**3581-A**	TÜV (01362), ABS, RINA, DNV, BV, LR, CE	
		E309LMo-17	E 23 12 2 L R 3 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (01771), DB (30.014.08), ABS, BV, LR, DNV, CWB, CE	
		E309L-17	E 23 12 L R 3 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (00141), CE	
		E309Nb-15	E 23 12 Nb B 2 2		
		A5.4 / SFA-5.4	**3581-A**	DB (30.014.11), SEPROZ, CE	
		E312-16	E 29 9 R 1 2		
		A5.4 / SFA-5.4	**3581-A**	DB (30.014.16, 20.014.07), CE	
		E312-17	E 29 9 R 3 2		
		A5.4 / SFA-5.4	**3581-A**	TÜV (19715), ABS, DNV, CE	
		E309L-17	E 23 12 L R 3 2		
		A5.4 / SFA-5.4	**3581-A**	DB (30.138.06), CE	
		E312-16 (mod.)	E 29 9 R 1 2		

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4.1.15 Stainless steel – Heat resistant

Product name	Short description	Chemical composition (typical values) in %			
		C	Si	Mn	Ni
Avesta 253MA	Covered electrode, high-alloyed, austenitic stainless, heat resistance up to 1100°C	0.08	1.5	0.7	10.5
Avesta 308/308H AC/DC	Covered electrode, rutile coated, high-alloyed, austenitic stainless, creep resistant	C	Si	Mn	Ni
		0.06	0.7	1.1	10.0
BÖHLER FOX E 347 H	Covered electrode, basic coated, core wire alloyed for austenitic stainless steel of type 347H	C	Si	Mn	Ni
		0.05	0.3	1.3	10.2
BÖHLER FOX E 308 H	Covered electrode, rutile-basic coated for creep resistant austenitic steels for temperatures up to 700°C	C	Si	Mn	Ni
		0.05	0.6	0.8	10.2
BÖHLER FOX FA	Covered electrode, high-alloyed, austenitic stainless, heat resistant up to 1100°C for similar Mo - free 25% Cr(Ni) steels	C	Si	Mn	Ni
		0.1	0.5	1.2	5.4
BÖHLER FOX FF	Covered electrode, basic coated, high-alloyed, austenitic stainless, heat resistant up to 950°C	C	Si	Mn	Ni
		0.1	1.0	1.1	12.2
BÖHLER FOX FF-A	Covered electrode, rutile coated, high-alloyed, austenitic stainless, heat resistant 309 type	C	Si	Mn	Ni
		0.1	0.8	0.9	12.5
BÖHLER FOX FFB	Covered electrode, basic coating, high-alloyed, austenitic stainless, cryogenic (-196°C) and heat resistant up to 650°C	C	Si	Mn	Ni
		0.12	0.6	3.2	20.5
BÖHLER FOX FFB-A	Covered electrode, rutile coating, high-alloyed, austenitic stainless, heat resistant up to 650°C	C	Si	Mn	Ni
		0.12	0.5	2.2	21.0
Thermanit ATS 4	Covered electrode, basic caated, high-alloyed, austenitic stainless, creep resistant,	C	Si	Mn	Ni
		0.05	0.3	1.6	9.5

				AWS	EN/ISO	Approvals	JOIN!online
Cr	**N**				**3581-A**	CE	
22.0	0.18				E 21 10 N R		
Cr				**A5.4 / SFA-5.4**	**3581-A**	TÜV (12841), CE	
20.0				E308H-17	E 19 9 R 4 2		
Cr	**Nb**	**FN**		**A5.4 / SFA-5.4**	**3581-A**	CE	
19.0	0.56	3-8		E347-15	E 19 9 Nb B		
Cr				**A5.4 / SFA-5.4**	**3581-A**	TÜV (11178), CE	
19.8				E308H-16	E 19 9 H R 4 2		
Cr					**3581-A**	CE	
25.0					E 25 4 B 2 2		
Cr				**A5.4 / SFA-5.4**	**3581-A**	TÜV (09090), CE	
22.5				E309-15	E 22 12 B 2 2		
Cr				**A5.4 / SFA-5.4**	**3581-A**	TÜV (09091), ABS (309-17), CE	
22.5				E309-17	E 22 12 R 3 2		
Cr				**A5.4 / SFA-5.4**	**3581-A**	TÜV (00143), CE	
25.0				E310-15 (mod.)	E 25 20 B 2 2		
Cr				**A5.4 / SFA-5.4**	**3581-A**	CE	
26.0				E310-16	E 25 20 R 3 2		
Cr				**A5.4 / SFA-5.4**	**3581-A**	TÜV (01526), CE	
18.5				E308H-15	E 19 9 H B 2 2		

4.2 GTAW – TIG Rods

4.2.1 Mild steel

Product name	Short description	Chemical composition (typical values) in %		
		C	Si	Mn
BÖHLER EMK 6	TIG Rod, mild steel	0.08	0.9	1.45
		C	Si	Mn
BÖHLER EMK 8	TIG rod, mild steel	0.1	1.0	1.7
		C	Si	Mn
BÖHLER EML 5	TIG Rod, mild steel	0.1	0.6	1.2

4.2.2 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %					
		C	Si	Mn	Ni	Cr	Mo
BÖHLER NiCrMo 2,5-IG	TIG Rod, low-alloyed, high strength	0.08	0.6	1.4	2.5	0.3	0.4
		C	Si	Mn	Mo		
Union I MoMn	TIG Rod, low-alloyed, high strength	0.09	0.65	1.8	0.52		
		C	Si	Mn	Ni	Cr	Mo
Union I Ni 1 MoCr	TIG Rod, low-alloyed, high strength	0.08	0.5	1.6	0.9	0.27	0.4

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.18 / SFA-5.18	**636-A**	I1	TÜV (19288), CE	
	ER70S-6	W 3Si1			
	A5.18 / SFA-5.18	**636-A**	I1		
	ER70S-6	W 4Si1			
	A5.18 / SFA-5.18	**636-A**	I1	TÜV (01096), DB (42.132.84), Equinor, CE	
	ER70S-3	W 2 Si			

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.28 / SFA-5.28	**16834-A**	I1		
	ER110S-G	W 69 6 I1 Mn3Ni2.5CrMo			
	A5.28 / SFA-5.28	**636-A**	I1, I3		
	ER90S-D2	W 50 3 Z4MoSi			
	A5.28 / SFA-5.28	**16834-A**	I1		
	ER100S-G	55 6 ZMn3Ni 0.9 MoCr			

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4.2.3 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %										
BÖHLER CM 2-IG	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo	Sn	P	As	Sb		
		0.08	0.6	0.9	2.5	1.0	≤ 0.006	≤ 0.010	≤ 0.010	≤ 0.005		
BÖHLER CM 5-IG	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo						
		0.08	0.4	0.5	5.6	0.6						
BÖHLER CM 9-IG	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo						
		0.07	0.4	0.5	9.0	1.0						
BÖHLER DCMS-IG	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo	Sn	P	As	Sb		
		0.1	0.6	1.0	1.2	0.5	≤ 0.006	≤ 0.015	≤ 0.010	≤ 0.005		
BÖHLER DMO-IG	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Mo							
		0.1	0.6	1.1	0.5							
BÖHLER DMV 83-IG	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo	V					
		0.08	0.6	0.9	0.45	0.85	0.35					
Thermanit MTS 3	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	V			
		0.1	0.3	0.5	0.5	9.0	1.0	0.06	0.2			
Thermanit MTS 3-LNi	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	V	Mn+Ni		
		0.1	0.3	0.7	< 0.3	9.0	1.0	0.06	0.2	≤ 1.0		
Thermanit MTS 4 Si	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	W	V	Ni		
		0.2	0.3	0.6	0.4	11.0	1.0	0.5	0.3	0.4		
Thermanit MTS 5 CoT	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	W	V	Co	N
		0.16	0.4	0.4	0.4	11.4	0.3	0.055	1.5	0.2	1.55	0.04
Thermanit MTS 616	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	W	V	N	Ni
		0.1	0.25	0.5	0.5	8.5	0.4	0.06	1.6	0.2	0.04	0.5
Union ER 90S-B3	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo						
		0.09	0.55	0.6	2.55	1.05						
Union I CrMo 2 V	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo	Nb	V				
		0.1	0.25	1.0	2.3	1.0	0.15	0.25				
Union I CrMo 910 Spezial	TIG rod, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo	Cu					
		0.1	0.1	0.5	2.4	1.0	0.1					

		AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
		A5.28	**21952-A**	I1	TÜV (1564), CE, (ø 2.4 mm; ø 3.0 mm)	
		ER90S-G	W CrMo2Si			
		A5.28	**21952-A**	I1	TÜV (0724), CE	
		ER80S-B6	W CrMo5Si			
		A5.28 / SFA-5.28	**21952-A**	I1	TÜV (2182), CE	
		ER80S-B9	WZ CrMo9 Si			
		A5.28	**21952-A**	I1	TÜV (0727), CE, (ø 2.4 mm; ø 3.0 mm)	
		ER80S-G / ER80S-B2 (mod.)	W CrMo1Si			
		A5.28 / SFA-5.28	**21952-A**	I1	TÜV (00020), KTA 1408.1 (8066), DB (42.132.70), BV (UP), DNV, CRS, CE	
		ER70S-A1 (ER80S-G)	W MoSi			
		A5.28 / SFA-5.28	**21952-A**	I1	TÜV (1093), CE	
		ER90S-G	W MoVSi			
		A5.28 / SFA-5.28	**21952-A**	I1	TÜV (06166), CE	
		ER90S-B91	W CrMo 9 1			
		A5.28 / SFA-5.28	**21952-A**	I1		+
		ER90S-B91	W CrMo 9 1			
		A5.28 / SFA-5.28	**21952-A**	I1	TÜV (02624), CE	
		ER90S-G	W CrMoWV 12 Si			
	B	**A5.28 / SFA-5.28**	**21952-A**	I1	TÜV (10578), CE	
	0.003	ER110S-G	W Z CrCoW 11 2 2			
		A5.28	**21952-A**	I1	TÜV (09290), CE	
		ER90S-B92	W Z CrMoWVNb 9 0.5 1.5			
		A5.28 / SFA-5.28	**21952-A**	I1		+
		ER90S-B3	W CrMo2			
		A5.28 / SFA-5.28	**21952-A**	I1		+
		ER90S-G	ZCrMoV2 1			
		A5.28 / SFA-5.28		I1		
		ER90S-G				

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4.2.4 Low alloy steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %					
BÖHLER 2,5 Ni-IG		C	Si	Mn	Ni		
		0.08	0.6	1.0	2.4		
BÖHLER ER 80 S Ni 1-IG		C	Si	Mn	Ni	Mo	
		0.09	0.6	1.1	0.95	0.25	
BÖHLER Ni 1-IG		C	Si	Mn	Ni		
		0.07	0.7	1.4	0.9		
Union I 1,2 Ni		C	Si	Mn	Ni		
		0.1	0.7	1.4	1.3		
Union I 3,5 Ni		C	Si	Mn	Ni		
		0.1	0.15	0.9	3.3		

4.2.5 Stainless steel – Martensitic steels

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 13/04 Si	TIG rods high-alloyed, martensitic	C	Si	Mn	Ni	Cr	Mo
		0.01	0.7	0.7	4.7	12.3	0.5
Thermanit 16/05 Mo	TIG rods high-alloyed, martensitic	C	Si	Mn	Ni	Cr	Mo
		0.02	0.4	1.4	5.5	16.0	1.0

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.28 / SFA-5.28	**636-A**	I1	TÜV (01081), DNV, BV, Equinor, CE	
ER80S-Ni2	W 46 8 2Ni2			
A5.28 / SFA-5.28	**636-A**	I1		
ER80S-Ni1	W Z2Ni1Mo			
A5.28 / SFA-5.28	**636-A**	I1	TÜV (12808), CE	
ER80S-G [ER80S-Ni1 (mod.)]	W Z3Ni1			
A5.28 / SFA-5.28	**636-A**	I1	TÜV (00513), DB (42.132.49), DNV, KTA 1408.1 (08012), CE	
ER80S-G	W 46 6 3Ni1			
A5.28 / SFA-5.28	**636-A**	I1		
ER80S-G [ER80S-Ni3(mod.)]	W 46 10 W0			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (01582), CE	
ER410NiMo (mod.)	W 13 4			
	14343-A	I1		
	W 16 5 1			

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4.2.6 Stainless steel – Austenitic steels

Product name	Short description	Chemical composition (typical values) in %						
BÖHLER A 7 CN-IG	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.07	0.8	6.8	8.8	19.2		
BÖHLER Q T 308L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.5	1.8	10.0	20.0		
BÖHLER Q T 308L-Si	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.8	1.8	10.0	20.0		
BÖHLER Q T 309L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.02	0.5	1.7	13.2	23.5		
BÖHLER Q T 316L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		≤ 0.02	0.5	1.8	12.3	18.5	2.8	
BÖHLER Q T 316L-Si	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.9	1.7	12.0	18.5	2.6	
Thermanit 18/17 E Mn	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.4	5.5	17.2	19.0	4.3	0.16
Thermanit 19/15 H	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		< 0.04	< 0.5	6.0	16.5	20.0	3.0	0.18
Thermanit 20/16 SM	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.03	0.7	7.5	17.5	22.0	3.6	0.24
Thermanit 20/25 Cu	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Cu
		< 0.025	0.2	2.5	25.0	20.5	4.8	1.5
Thermanit 21/10 N	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	FN
		0.07	1.6	0.6	10.0	21.0	0.2	2
Thermanit 21/33 So	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Nb	
		0.12	0.2	4.8	32.5	21.8	1.2	
Thermanit 25/04	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.06	0.8	0.8	5.0	26.0		
Thermanit 25/22 H	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.02	0.2	6.0	22.5	25.0	2.2	0.13
Thermanit 308 Mo	TIG Rod, stainless, high-alloyed, special applications	C	Si	Mn	Ni	Cr	Mo	
		0.06	0.7	1.3	10	20.0	3.3	
Thermanit 309 H	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.1	1.1	1.6	11.5	22.5		
Thermanit 309L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.02	0.5	1.7	13.2	23.5		
Thermanit 309L Mo	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.35	1.5	15.0	21.5	2.7	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9	**14343-A**	I1	TÜV (00023), DB (43.132.54), DNV, VG 95132, CE, NAKS	
ER307 (mod.)	W 18 8 Mn			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19792), DB (43.132.90), CE	
ER308L	W 19 9 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19794), DB (43.132.89), CE	
ER308LSi	W 19 9 L Si			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19795), DB (43.132.92), CE	
ER309L	W 23 12 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19797), DB (43.132.95), CE	
ER316L	W 19 12 3 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19799), DB (43.132.95), CE	
ER316LSi	W 19 12 3 L Si			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (11506), CE	
ER317L(mod.)	Z 18 16 5 N L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (01813), DB (30.132.12), Stamicarbon, Snamprogretti	
ER316LMn	20 16 3 Mn N L			
A5.9 / SFA-5.9	**14343-A**	I1	DNV, WIWEB, CE	+
	W Z 22 17 8 4 N L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (04301), CE	+
ER385	W 20 25 5 Cu L			
	14343-A	I1		
	W 21 10 N			
	14343-A	I1	TÜV (07256), CE	
	WZ 21 33 Mn Nb			
	14343-A	I1		
	W 25 4			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (04875), Stamicarbon, Snamprogretti, CE	
ER310 (mod.)	W 25 22 2 N L			
A5.9 / SFA-5.9	**14343-A**	I1		
ER308Mo (mod.)	W 20 10 3			
A5.9 / SFA-5.9	**14343-A**	I1		
ER309 (mod.)	W 22 12 H			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19602), DB (43.132.78), DNV, ABS, BV, NAKS, CE	
ER309L	W 23 12 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19688); CE	+
ER309LMo(mod.)	W 23 12 2 L			

4.2.6 Stainless steel – Austenitic steels

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 310	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Ferrit	
		0.13	0.4	1.8	20.8	25.8	0	
Thermanit 310 Mn	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.13	0.9	3.2	20.5	25.0		
Thermanit 317L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.4	1.7	13.5	19.0	3.5	
Thermanit A-318	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Nb
		0.04	0.4	1.7	11.5	19.5	2.7	≥ 12×C
Thermanit GE-316L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		≤ 0.02	0.5	1.8	12.3	18.5	2.8	
Thermanit GE-316L Si	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Fn
		0.02	0.9	1.7	12.0	18.5	2.6	7
Thermanit H-347	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Nb	
		0.05	0.5	1.8	9.5	19.5	≥ 12×C	
Thermanit H-347 Si	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Nb	
		0.05	0.85	1.2	10.0	19.5	≥ 12×C	
Thermanit JE-308L	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.5	1.8	10.0	20.0		
Thermanit JE-308L Si	TIG rod, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.8	1.8	10.0	20		

4.2.7 Stainless steel – Ferritic steels

Product name	Short description	Chemical composition (typical values) in %					
BÖHLER CAT 430L Cb-IG	TIG rods high-alloyed, special	C	Si	Mn	Cr	Nb	
		0.02	0.5	0.5	18	0.46 (≥ 12 × C)	
BÖHLER CAT 430L CbTi-IG	TIG rods high-alloyed, special	C	Si	Mn	Cr	Nb	Ti
		0.02	0.5	0.5	18	≥ 12×C	0.4

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	I1		
ER310	G 25 20			
A5.9 / SFA-5.9	**14343-A**	I1		
ER310(mod.)	W 25 20 Mn			
A5.9 / SFA-5.9	**14343-A**	I1		
ER317L	G 19 13 4 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (09474), DB (43.132.27), DNV, CE	
ER318	W 19 12 3 Nb			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (09500), DB (43.132.20), DNV; ABS, BV, CE	
ER316L	W 19 12 3 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (00488), DB (43.132.35), DNV, CE	
ER316LSi	W 19 12 3 L Si			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (09475), DB (43.132.21), CE	
ER347	W 19 9 Nb			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (00604), DB (43.132.06), CE	
ER347Si	W 19 9 Nb Si			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (09451), DB (43.132.19), DNV, ABS, BV, CE	
ER308L	W 19 9 L			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (04164), DB (43.132.08), DNV, ABS, BV, CE	
ER308LSi	W 19 9 L Si			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	I1		
ER430(mod.)	Z18 Nb L			
A5.9	**14343-A**	I1	DB (43.132.57), CE	
ER430(mod.)	W Z 18 Nb Ti L			

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4.2.8 Stainless steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %						
Thermanit GE-316L Cryo	TIG rods high-alloyed, controlled ferrite	C	Si	Mn	Ni	Cr	Mo	FN
		0.02	0.5	1.8	12.3	18.5	2.8	3 - 6
Thermanit JE-308L Cryo	TIG rods high-alloyed, controlled ferrite	C	Si	Mn	Ni	Cr	FN	
		0.02	0.45	1.8	10.0	20.0	3 - 8	

4.2.9 Stainless steel – Special applications

Product name	Short description	Chemical composition (typical values) in %				
Thermanit X	TIG rod, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Cr	Ni
		0.08	0.8	7.0	19.0	9.0
BÖHLER Q T 307	TIG rod, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Cr	Ni
		0.08	0.8	7.0	19.0	9.0

4.2.10 Stainless steel – Duplex

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 22/09	TIG rods high-alloyed, duplex	C	Si	Mn	Cr	Mo	Ni
		0.02	0.4	1.7	22.5	3.2	8.8
Thermanit 23/07	TIG rods high-alloyed, lean duplex	C	Si	Mn	Cr	Mo	Ni
		0.02	0.4	0.5	23.5	< 0.5	7.0
Thermanit 25/09	TIG rods high-alloyed, super duplex	C	Si	Mn	Cr	Mo	Ni
		0.02	0.35	0.4	25	4.0	9.5
Thermanit 25/09 CuT	TIG rods high-alloyed, super duplex	C	Si	Mn	Cr	Mo	Ni
		0.02	0.35	0.9	25.5	3.8	9.5

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	I1		+
ER316L	W 19 12 3 L			
A5.9 / SFA-5.9	**14343-A**	I1		+
ER308L	W 19 9 L			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (01234), DB (43.132.26), DNV, CE	🛒
ER307 (mod.)	W 18 8 Mn			
A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19791), DB (43.132.87), CE	+
ER307 (mod.)	W 18 8 Mn			

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
N			**A5.9 / SFA-5.9**	**14343-A**	I1	TÜV (03343), ABS, DNV, LR, CE	🛒
0.15			ER2209	W 22 9 3 NL			
N			**A5.9 / SFA-5.9**	**14343-A**	I1	TÜV (19716), CE	🛒
0.14			ER2307	W 23 7 N L			
N	**Cu**	**W**	**A5.9 / SFA-5.9**	**14343-A**	I1		🛒
0.25	≤ 0.50	≤ 0.50	ER 2594	W 25 9 4 N L			
N	**Cu**	**W**	**A5.9**	**14343-A**	I1	TÜV (18929), ABS, DNV, CE	🛒
0.22	0.5	0.6	ER 2594	W 25 9 4 N L			

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4.2.11 Stainless steel – High temperature

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 19/10 H	TIG rods medium-alloyed, high temperature	C	Si	Mn	Ni	Cr	
		0.05	0.4	1.8	9.3	18.8	
Thermanit 304 H Cu	TIG rods medium-alloyed, high temperature	C	Si	Mn	Ni	Cr	Mo
		0.1	0.4	3.2	16.0	18.0	0.8
Thermanit 308 H	TIG rods medium-alloyed, high temperature	C	Si	Mn	Cr	Ni	FN
		0.05	0.4	1.8	20.0	9.0	10

4.2.12 Non-ferrous – Aluminium

Product name	Short description	Chemical composition (typical values) in %							
Union Al 99,7	TIG rods aluminium	Si	Mn	Ti	Cu	Al	Zn	Fe	Mg
		< 0.2	< 0.03	< 0.03	< 0.04	> 99.7	< 0.04	< 0.25	< 0.03
Union Al Si 12	TIG rods aluminium	Si	Mn	Ti	Cu	Zn	Fe	Mg	
		11.0-13.0	< 0.15	< 0.15	< 0.6	< 0.2	< 0.6	< 0.1	
Union Al Si 5	TIG rods aluminium	Si	Mn	Ti	Cu	Zn	Fe	Mg	
		4.5-6.0	< 0.15	< 0.15	< 0.3	< 0.15	< 0.6	< 0.2	
Union Al Si 7 Mg	TIG rods aluminium	Si	Mn	Ti	Cu	Fe	Mg	Al	
		6.5-7.5	< 0.05	0.04-0.15	< 0.05	< 0.1	0.3-0.45	Bal.	
Union AlMg 3	TIG rods aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg
		< 0.4	< 0.5	< 0.3	< 0.15	< 0.1	< 0.2	< 0.4	2.6-3.6
Union AlMg 4,5 Mn	TIG rods aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg
		< 0.4	0.6-1.0	0.05-0.25	< 0.15	< 0.1	< 0.25	< 0.4	4.3-5.2
Union AlMg 4,5 MnZr	TIG rods aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg
		< 0.25	0.7-1.1	0.05-0.25	< 0.15	< 0.05	< 0.15	< 0.4	4.5-5.2
Union AlMg 5	TIG rods aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg
		< 0.25	0.05-0.2	0.05-0.2	0.06-0.2	< 0.1	< 0.1	< 0.4	4.5-5.5
Union AlMg 5 Mn	TIG rods aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg
		< 0.25	0.6-1.0	0.05-0.2	0.05-0.2	< 0.1	< 0.2	< 0.4	5.0-5.5
Union AlMg 6 Zr	TIG rods aluminium	Fe	Mn	Ti	Al	Zn	Mg	Zr	
		< 0.2	0.8-0.9	0.02-0.2	Bal.	< 0.2	5.5-6.1	0.08-0.12	

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
			A5.9 / SFA-5.9	**14343-A**	I1	TÜV (19654), CE	+
			ER19-10H	W 19 9 H			
Nb	**Cu**	**N**	**A5.9**	**14343-A**	I1	TÜV (11219), CE	🛒
0.4	3.0	0.2	ER308H (mod.)	W Z 18 16 1 Cu H			
			A5.9 / SFA-5.9	**14343-A**	I1		+
			ER308H	W 19 9 H			

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.10 / SFA-5.10	**18273**	I1, I3		🛒
	ER1070	S Al 1070 (Al99.7)			
	A5.10 / SFA-5.10	**18273**	I1, I3		🛒
	ER4047 A	S Al 4047A (AlSi12(A))			
	A5.10 / SFA-5.10	**18273**	I1, I3	DB (61.132.02), CE	🛒
	ER4043A	S Al 4043A (AlSi5(A))			
	A5.10 / SFA-5.10	**18273**	I1, I3		+
	ER4010 (ER4008)	S Al Z (AlSi7Mg)			
	A5.10 / SFA-5.10	**18273**	I1, I3		🛒
	ER5754	S Al 5754 (AlMg3)			
	A5.10 / SFA-5.10	**18273**	I1, I3	TÜV (02196), DB (61.132.03), CE	🛒
	ER5183	S Al 5183 (AlMg4.5Mn0.7(A))			
Zr	**A5.10 / SFA-5.10**	**18273**	I1, I3	DB (61.132.04), CE	🛒
0.1-0.2	ER5087	S Al 5087 (AlMg4.5MnZr(A))			
	A5.10 / SFA-5.10	**18273**	I1, I3	TÜV (02198), DB (61.132.01), CE	🛒
	ER5356	S Al 5356 (AlMg5Cr(A))			
	A5.10 / SFA-5.10	**18273**	I1, I3	TÜV (19087)	+
	ER5556A	S Al 5556A (AlMg5Mn1(A))			
		18273	I1, I3		+
		S Al Z (AlMg6Zr)			

4.3 GMAW – Solid wires

4.3.1 Mild steel

Product name	Short description	Chemical composition (typical values) in %			
BÖHLER Q G 3	Solid wire, mild steel	**C**	**Si**	**Mn**	
		0.1	1.0	1.7	
BÖHLER Q G 4	Solid wire, mild steel	**C**	**Si**	**Mn**	
		0.1	1.0	1.7	
BÖHLER EMK 6	Solid wire, mild steel, G3 Si 1	**C**	**Si**	**Mn**	
		0.08	0.9	1.45	
BÖHLER EMK 8	Solid wire, mild steel, G4 Si 1	**C**	**Si**	**Mn**	
		0.1	1.0	1.7	
ECOspark 420	Solid wire, mild steel, engineerd surface	**C**	**Si**	**Mn**	
		0.08	0.9	1.45	
ECOspark 460	Solid wire, mild steel, engineerd surface	**C**	**Si**	**Mn**	
		0.01	1.0	1.7	
ECOspark 4-NC	Solid wire, mild steel, non coppered	**C**	**Si**	**Mn**	
		0.07	0.7	1.20	
ECOspark 6-NC	Solid wire, mild steel, non coppered	**C**	**Si**	**Mn**	
		0.08	0.9	1.45	
ECOspark 8-NC	Solid wire, mild steel, non coppered	**C**	**Si**	**Mn**	
		0.1	1.0	1.7	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.18 / SFA-5.18	**14341-A**	M21, C1	TÜV (19788), DB (42.132.89), DNV, CE	
ER70S-6	G 42 3 M21 3Si1 G 38 2 C1 3Si1			
A5.18 / SFA-5.18	**14341-A**	M21, C1	TÜV (19789), DB (42.132.90), DNV, CE	
ER70S-6	G 46 4 M21 4Si1 G 46 2 C1 4Si1			
A5.18	**14341-A**	M2, M32, C1	TÜV (03036), DB (42.132.80), ABS, DNV, LR, CE	
ER70S-6	G 42 4 M21 3Si1 G 42 4 C1 3Si1			
A5.18	14341-A	M2, M32, C1	TÜV (3038), DB (42.132.82), ABS, DNV, LR, CE	
ER70S-6	G 46 4 M21 4Si1 G 46 4 C1 4Si1			
A5.18 / SFA-5.18	14341-A	C1, M2, M3	TÜV (19669), DB (42.132.86), ABS, CWB, CE	
ER70S-6	G 42 5 M21 3Si1 G 42 4 C1 3Si1			
A5.18 / SFA-5.18	**14341-A**	M2, M3, C1	TÜV (19670), DB (42.132.88), DNV (IV YS), ABS, CE	
ER70S-6	G 46 5 M21 4Si1 G 46 4 C1 4Si1			
A5.18 / SFA-5.18	**14341-A**	C1, M21		
ER70S-3	G 38 3 M21 2Si G 35 2 C 2Si			
A5.18 / SFA-5.18	**14341-A**	C1, M21, M33	TÜV (19913), DB (32.132.95), CWB, CE	
ER70S-6	G 42 4 M21 3Si1 G 42 4 C1 3Si1			
A5.18 / SFA-5.18	**14341-A**	C1, M21, M34	TÜV (19914), DB (42.132.96), CE	
ER70S-6	G 46 4 M21 4Si1 G 46 4 C1 4Si1			

4.3.2 Pipeline steel

Product name	Short description	Chemical composition (typical values) in %					
Pipeshield X 60	Solid wire, mild steel	**C**	**Si**	**Mn**	**Ti**		
		0.08	0.85	1.5	+		
Pipeshield X 70	Solid wire, mild steel	**C**	**Si**	**Mn**	**S**	**P**	
		0.069	0.95	1.65	≤ 0.015	≤ 0.015	
Pipeshield X 80	Solid wire, mild steel	**C**	**Si**	**Mn**	**Ni**	**Ti**	**S**
		0.065	0.69	1.55	0.9	+	≤ 0.015
Pipeshield X 90	Solid wire, mild steel	**C**	**Si**	**Mn**	**Ni**	**Mo**	
		0.08	0.6	1.8	0.9	0.3	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.18 / SFA-5.18	**14341-A**	M21, C1		+
ER70S-6	G 42 4 M21 3Si1 G 42 2 C1 3Si1			
A5.18 / SFA-5.18	**14341-A**	M2, C1	TÜV (19421), CE	+
ER70S-6	G 46 4 M21 4Si1 G 46 2C1 4Si1			
A5.28 / SFA-5.28	**14341-A**	M21, C1	TÜV (19757), CE	+
ER80S-G [ER80S-Ni1(mod.)]	G 50 6 M21 Z3Ni1 G 46 4 C1 Z3Ni1			
A5.28 / SFA-5.28	**16834-A**	M21, C1		+
ER90S-G	G 55 6 M21 Mn3Ni1Mo G 55 4 C1 Mn3Ni1Mo			

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4.3.3 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %						
BÖHLER NiCrMo 2,5-IG	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.08	0.6	1.4	2.5	0.3	0.4	
BÖHLER NiCu 1-IG	Solid wire, low-alloyed, weathering steel	C	Si	Mn	Ni	Cu		
		0.1	0.5	1.1	0.9	0.4		
BÖHLER NiMo 1-IG	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo		
		0.08	0.6	1.8	0.9	0.3		
BÖHLER X 70-IG	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	V
		0.1	0.6	1.6	1.3	0.25	0.25	0.1
Union MoNi	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo		
		0.1	0.65	1.55	1.1	0.4		
Union Ni 1 MoCr	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.08	0.5	1.6	0.9	0.27	0.4	
Union NiMoCr	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.08	0.6	1.7	1.5	0.2	0.5	
Union X 55	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.09	0.7	1.5	0.55	0.5	0.25	
Union X 69	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.09	0.55	1.5	1.4	0.35	0.25	
Union X 85	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.09	0.7	1.7	1.85	0.3	0.6	
Union X 85 T	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.08	0.6	1.4	2.45	0.27	0.4	
Union X 90	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.1	0.8	1.8	2.3	0.35	0.6	
Union X 96	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.12	0.82	1.9	2.35	0.45	0.55	
BÖHLER alform® 700-IG	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.09	0.7	1.7	1.85	0.3	0.6	
BÖHLER alform® 960-IG	Solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.12	0.8	1.9	2.35	0.45	0.55	
BÖHLER alform® 1100-IG	Solid wire, high strength	C	Si	Mn	Ni	Cr	Mo	
		0.12	0.8	1.9	2.35	0.45	0.55	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.28 / SFA-5.28	**16834-A**	M21	DB (42.132.73), ABS, BV, DNV, LR (suppl. list), CE	
ER110S-G	G 69 6 M21 Mn3Ni2.5CrMo			
A5.28 / SFA-5.28	**14341-A**	M21, C1	DB (42.132.69), CE	
ER80S-G	G 42 4 M21 Z3Ni1Cu			
A5.28	**16834-A**	M21, C1,	TÜV (11763), DB (42.132.76), DNV, CE	
ER90S-G	G 55 6 M21 Mn3Ni1Mo G 55 4 C1 Mn3Ni1Mo			
A5.28 / SFA-5.28	**16834-A**	M21	TÜV (05547), DB (42.132.77), ABS, BV, DNV, CE, LR (suppl. list)	
ER110S-G	G 69 5 M21 Mn3Ni1CrMo			
A5.28 / SFA-5.28	**16834-A**	M2, M3, C1	TÜV (00926), DB (42.132.09), DNV, WIWEB, VG 95132-1, CE	
ER90S-G	G 62 5 M21 Mn3Ni1Mo			
A5.28 / SFA-5.28	**16834-A**	M21		
ER100S-G	55 6 ZMn3Ni 0.9 MoCr			
A5.28 / SFA-5.28	**16834-A**	M21, C1	TÜV (02760), DB (42.132.08), ABS, BV, DNV, LR, VG 95132-1, CE	
ER100S-G [ER100S-1(mod.)]	G 69 6 M21 Mn4Ni1.5CrMo			
A5.28 / SFA-5.28	**16834-A**	M21	TÜV (19636), CE	
ER100S-G	G 55 5 M Mn3NiCrMo			
A5.28 / SFA-5.28	**16834-A**	M21	TÜV (18928), DB (42.132.59), CE	
ER100S-G	G 69 4 M21 Mn3Ni1CrMo			
A5.28 / SFA-5.28	**16834-A**	M2, M3, C1	DB (42.132.21), CE	
ER110S-G	G 79 5 M21 Mn4Ni1.5CrMo			
A5.28 / SFA-5.28	**16834-A**	M21, C1	DB (42.132.74), ABS, DNV, CE	
ER110S-G	G 69 6 M21 Mn3Ni2.5CrMo			
A5.28 / SFA-5.28	**16834-A**	M2, M3	TÜV (07675), DB (42.132.12), CE	
ER120S-G	G 89 6 M21 Mn4Ni2CrMo			
A5.28 / SFA-5.28	**16834-A**	M2	DB (42.132.26), CE	
ER120S-G	G 89 5 M21 Mn4Ni2.5CrMo			
A5.28 / SFA-5.28	**16834-A**	M21	DB (42.132.60), CE	
ER110S-G	G 79 5 M21 Mn4Ni1.5CrMo			
A5.28 / SFA-5.28	**16834-A**	M21	DB (42.132.64), CE	
ER120S-G	G 89 5 M21 Mn4Ni2.5CrMo			
A5.28 / SFA-5.28	**16834-A**	M21		
ER120S-G	89 5 M Mn4Ni2.5CrMo			

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4.3.4 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %								
BÖHLER CM 2-IG	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo				
		0.08	0.6	0.95	2.6	1.0				
BÖHLER CM 5-IG	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo				
		0.06	0.4	0.5	5.6	0.6				
BÖHLER CM 9-IG	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo				
		0.07	0.5	0.5	9.0	1.0				
BÖHLER DCMS-IG	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo				
		0.11	0.6	1.0	1.2	0.5				
BÖHLER DMO-IG	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Mo					
		0.1	0.6	1.1	0.5					
BÖHLER DMV 83-IG	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo	V			
		0.08	0.6	0.9	0.45	0.82	0.35			
Thermanit MTS 3	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	V	
		0.1	0.3	0.5	0.5	9.0	1.0	0.06	0.2	
Thermanit MTS 3-LNi	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	V	N
		0.11	0.25	0.65	<0.15	9.0	0.95	0.06	0.2	0.04
Thermanit MTS 4 Si	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	W	V	
		0.2	0.3	0.6	0.4	11.0	1.0	0.5	0.3	
Thermanit MTS 616	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	Nb	V	N
		0.1	0.25	0.5	0.5	8.5	0.4	0.06	0.2	0.04
Thermanit MTS 911	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo	W	V	
		0.1	0.3	0.5	0.5	9.0	1.0	1.0	0.2	
Union ER 90S-B3	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo				
		0.09	0.55	0.6	2.55	1.05				
Union I CrMo 910 Spezial	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo				
		0.09	0.55	0.9	2.55	1.0				
Union I MoMn	Solid wire, low-alloyed, creep resistant	C	Si	Mn	Mo					
		0.09	0.65	1.8	0.52					

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.28 / SFA-5.28	**21952-A**	M21, C1	TÜV (01085), DB (42.132.70),CE	
ER90S-G	G CrMo2Si			
A5.28 / SFA-5.28	**21952-A**	M21		
ER80S-B6	G CrMo5Si			
A5.28 / SFA-5.28	**21952-A**	M21		
ER80S-B8	G CrMo9Si			
A5.28 / SFA-5.28	**21952-A**	M21 , C1	TÜV (01091), DB (42.132.79),CE	
ER80S-G	G CrMo1Si			
A5.28 / SFA-5.28	**21952-A**	M21 , C1	TÜV (00021), DB (42.132.70), CE	
ER80S-G (ER70S-A1)	G MoSi			
A5.28 / SFA-5.28	**21952-A**	M21 , C1	TÜV (01322),CE	
ER80S-G	G MoVSi			
A5.28 / SFA-5.28	**21952-A**	M12, (M13)		
ER90S-B91	G CrMo 9 1			
A5.28 / SFA-5.28	**21952-A**	M2, M3		
ER90S-B91	G CrMo 9 1			
A5.28 / SFA-5.28	**21952-A**	M12, (M13)		
EG [ER90S-B9(mod.)]	G CrMoWV 12 Si			
A5.28 / SFA-5.28	**21952-A**	M12, (M13)		
ER90S-B92	G Z CrMoWVNb 9 0.5 1.5			
A5.28 / SFA-5.28	**21952-A**	M12, (M13)		
ER90S-G	GZ CrMoWVNb 9 1 1			
A5.28 / SFA-5.28	**21952-A**	M2		
ER90S-B3	G CrMo2			
A5.28 / SFA-5.28	**21952-A**	M1 - M3, C1		
ER90S-G [ER90S-B3(mod.)]	G CrMo2Si			
A5.28 / SFA-5.28	**21952-A**	M1 - M3, C1		
ER90S-D2	G ZMn4MoSi			

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4.3.5 Stainless steel – High temperature

Product name	Short description	Chemical composition (typical values) in %								
Thermanit 19/10 H	Solid wire high-alloyed, high temperature	C	Si	Mn	Ni	Cr				
		0.05	0.3	1.8	9.3	18.8				
Thermanit 308 H	Solid wire high-alloyed, high temperature	C	Si	Mn	Ni	Cr	FN			
		0.05	0.4	1.8	9.0	20.0	9			
Thermanit 304 H Cu	Solid wire high-alloyed, high temperature	C	Si	Mn	Ni	Cr	Mo	Nb	Cu	N
		0.1	0.4	3.2	16.0	18.0	0.8	0.4	3.0	0.2
Thermanit 309 H	Solid wire high-alloyed, high temperature	C	Si	Mn	Ni	Cr				
		0.1	1.1	1.6	11.5	22.5				

4.3.6 Stainless steel – Austenitic steels

Product name	Short description	Chemical composition (typical values) in %						
BÖHLER Q G 308L-Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.9	1.7	10.2	20.0		
BÖHLER Q G 309L-Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.03	0.9	2.0	13.0	24.0		
BÖHLER Q G 316L-Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.8	1.7	12.4	18.4	2.8	
BÖHLER A 7 CN-IG	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.08	0.9	7.0	9.0	19.2		
Thermanit 309L	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.5	1.7	13.2	24.0		
Thermanit 309L Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.03	0.9	2.0	13.0	24.0		
Thermanit A-318 Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	Nb
		0.05	0.8	1.5	12.0	19.0	2.8	≥ 12×C
Thermanit GE-316L	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.4	1.7	12.4	18.4	2.8	
Thermanit GE-316L Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.8	1.7	12.4	18.4	2.8	
Thermanit H-347	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Nb	
		0.05	0.5	1.8	9.5	19.5	≥ 12×C	
Thermanit H-347 Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Nb	
		0.06	0.8	1.5	9.5	19.5	≥ 12×C	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**		TÜV (19689), CE	
ER19-10H	G 19 9 H			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER308H	G 19 9 H			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER308H (mod.)	G Z 18 16 1 Cu H			
A5.9 / SFA-5.9	**14343-A**			
ER309 (mod.)	G 22 12 H			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (19793), DB (43.132.88), CE	
ER308LSi	G 19 9 L Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (19796), DB (43.132.91), CE	
ER309LSi	23 12 L Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (19798), DB (43.132.93), CE	
ER316LSi	G 19 12 3 L Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (00024), DB (43.132.44), CE	
ER307 (mod.)	18 8 Mn			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (19604), DB (43.132.77), CE	
ER309L	G 23 12 L			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (12312), DNV, CE	
ER309LSi	G 23 12 L Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (00601), DB (43.132.02), CE	
ER318 (mod.)	G 19 12 3 Nb Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER316L	19 12 3 L			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (00489), DB (43.132.10), DNV, ABS, BV, LR (spec. List), CE	
ER316LSi	G 19 12 3 L Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER347	19 9 Nb			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (00604), DB (43.132.06), CE	
ER347Si	G 19 9 Nb Si			

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Product name	Short description	Chemical composition (typical values) in %						
Thermanit JE-308L	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.5	1.7	10.0	20.0		
Thermanit JE-308L Si	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		≤ 0.02	0.9	1.7	10.2	20.0		
Thermanit 18/17 E Mn	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	N
		0.02	0.4	5.5	17.2	19.0	4.3	0.16
Thermanit 19/15	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	N
		0.03	0.5	7.5	15.5	20.5	3.0	0.18
Thermanit 20/16 SM	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	N
		0.03	0.7	7.3	18.0	22.2	3.6	0.24
Thermanit 20/25 Cu	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	Cu
		< 0.025	0.2	2.5	25.0	20.5	4.8	1.5
Thermanit 21/10 N	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	N	FN
		0.07	1.6	0.5	10.7	21.0	0.16	2
Thermanit 25/04	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.06	0.8	0.8	5.0	26.0		
Thermanit 30/10	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.15	0.5	1.6	9.0	30.0		
Thermanit 310	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.13	0.4	1.8	20.8	25.8		
Thermanit 310 Mn	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		
		0.13	0.9	3.2	20.5	24.6		
Thermanit 317L	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	FN
		0.02	0.4	1.7	13.5	19.0	3.5	9.0

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER308L	G 19 9 L			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (00555), DB (43.132.08), DNV, ABS, BV, CE	
ER308LSi	G 19 9 L Si			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (11507), CE	
ER317L(mod.)	Z 18 16 5 N L			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (10267), DB (43.132.12), DNV, CE	
ER316LMn	G 20 16 3 Mn N L			
	14343-A	M12, M13	WIWEB, DNV, CE	
	G Z 22 17 8 4 N L			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (04302), CE	
ER385	G 20 25 5 Cu L			
	14343-A	M12, M13		
	G 21 10 N			
	14343-A	M12, M13		
	G 25 4			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER312	G 29 9			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER310	G 25 20			
A5.9 / SFA-5.9	**14343-A**	M13		
ER310 (mod.)	G 25 20 Mn			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER317L	G 19 13 4 L			

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4.3.7 Stainless steel – Special applications

Product name	Short description	Chemical composition (typical values) in %						
BÖHLER Q G 307	Solid wire, high-alloyed, special applications	C	Si	Mn	Ni	Cr		
		0.08	0.8	7.0	9.0	19.0		
Thermanit X	Solid wire, high-alloyed, special applications	C	Si	Mn	Ni	Cr		
		0.08	0.8	7.0	9.0	19.0		
Thermanit 308 Mo	Solid wire, high-alloyed, special applications	C	Si	Mn	Ni	Cr	Mo	
		0.06	0.7	1.3	10.0	20.0	3.3	
Thermanit 309L Mo	Solid wire, high-alloyed, special applications	C	Si	Mn	Ni	Cr	Mo	FN
		0.02	0.35	1.5	15.0	21.5	2.7	8

4.3.8 Stainless steel – Duplex

Product name	Short description	Chemical composition (typical values) in %								
Thermanit 22/09	Solid wire, high-alloyed, duplex	C	Si	Mn	Ni	Mo	N	FN	Cr	PRE_N
		0.02	0.5	1.6	8.5	3.1	0.17	50	22.8	> 35
Thermanit 23/07	Solid wire, high-alloyed, lean duplex	C	Si	Mn	Ni	Cr	Mo	N		
		0.02	0.4	0.5	7.0	23.5	< 0.5	0.14		
Thermanit 25/09	Solid wire, high-alloyed, super duplex	C	Si	Mn	Ni	Cr	Mo	Cu	W	N
		0.015	0.35	0.4	9.5	25	4.0	≤ 0.50	≤ 0.50	0.25
Thermanit 25/09 CuT	Solid wire, high-alloyed, super duplex	C	Si	Mn	Ni	Cr	Mo	Cu	W	N
		0.02	0.35	0.9	9.5	25.5	3.8	0.5	0.6	0.22

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	M12, M13, M21	TÜV (19790), DB (43.132.86), CE	
ER307(mod.)	G 18 8 Mn			
A5.9 / SFA-5.9	**14343-A**	M12, M13, M21	TÜV (05651), DB (43.132.01), DNV, VG 95132-1, CE	
ER307(mod.)	G 18 8 Mn			
A5.9 / SFA-5.9	**14343-A**	M12, M13	TÜV (19800), DB (43.132.96), CE	
ER308Mo(mod.)	G 20 10 3			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER309LMo(mod.)	G 23 12 2 L			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9	**14343-A**	M12, M13	TÜV (03342), DB (43.132.36), DNV, CE	
ER2209	G 22 9 3 N L			
A5.9	**14343-A**	M12, M13		
ER2307	G 23 7 N L			
A5.9	**14343-A**	Ar + 1 – 2% O_2 Ar + 2 – 3% CO_2 Z-ArHeC-30/0.25		
ER2594	G 25 9 4 N L			
A5.9	**14343-A**	M12 max. 0.5% CO_2 Z-ArHeC-30/0.25	TÜV (19525), ABS, CE	
ER2594	G 25 9 4 N L			

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4.3.9 Stainless steel – Ferritic steels

Product name	Short description	Chemical composition (typical values) in %					
BÖHLER CAT 430L Cb-IG	Solid wire, high-alloyed, ferritic stainless	C	Si	Mn	Cr	Nb	
		0.02	0.5	0.5	18.0	0.46 (≥12 × C)	
BÖHLER CAT 430L CbTi-IG	Solid wire, high-alloyed, ferritic stainless	C	Si	Mn	Cr	Nb	Ti
		0.02	0.5	0.5	18.0	≥ 12xC	0.4
BÖHLER CAT 439L Ti-IG	Solid wire, high-alloyed, ferritic stainless	C	Si	Mn	Cr	Ti	
		0.02	0.8	0.8	18.0	0.35 (≥ 12 × C)	
Thermanit 1720	Solid wire, high-alloyed, ferritic stainless	C	Si	Mn	Ni	Cr	Mo
		0.2	0.65	0.55	0.4	17.0	1.1

4.3.10 Stainless steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %						
Thermanit GE-316L Cryo	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	Mo	FN
		≤ 0.02	0.35	1.9	12.8	18.5	2.6	3-6
Thermanit JE-308L Cryo	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr		FN
		0.02	0.5	1.7	10.5	20.0		3-6
Thermanit 17/15 TT	Solid wire, high-alloyed, stainless, austenitic	C	Si	Mn	Ni	Cr	W	
		0.2	0.4	10.5	14.0	17.5	3.5	

4.3.11 Stainless steel – Martensitic steels

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 13/04 Si	Solid wire, stainless, high-alloyed, martensitic	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.7	0.5	4.7	12.3	0.5	
Thermanit 14 K Si	Solid wire, stainless, high-alloyed, martensitic	C	Si	Mn	Ni	Cr		
		0.08	0.9	0.65	0.4	14.0		
Thermanit 16/05 Mo	Solid wire, stainless, high-alloyed, martensitic	C	Si	Mn	Ni	Cr	Mo	
		0.02	0.35	1.3	5.5	16.0	1.0	
Thermanit 1610 Si	Solid wire, stainless, high-alloyed, martensitic	C	Si	Mn	Cr	Ti		
		0.06	1.0	0.6	17.5	18xC		

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER430 (mod.)	G Z 18 L Nb			
A5.9	**14343-A**	M12, M13	DB (43.132.57), CE	
ER430 (mod.)	G Z 18 Nb Ti L			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER439	G Z 18 L Ti			
	14343-A	I1, M13	TÜV (08107), CE	
	G Z 17 Mo			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	Argon +max. 2.5 % CO_2		
ER316L	G 19 12 3 L			
A5.9 / SFA-5.9	**14343-A**	Argon +max. 2.5 % CO_2		
ER308L	G 19 9 L			
A5.9	**14343-A**	M12, M13, M14	TÜV (02890), ABS, BV, DNV, LR, RINA, CE	
EG	G Z 17 15 Mn W			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER410NiMo (mod.)	G 13 4			
A5.9 / SFA-5.9	**14343-A**	M12, M13		
ER410 (mod.)	G Z 13			
	14343-A	M12, M13		
	G 16 5 1			
A5.9 / SFA-5.9	**14343-A**	M12, M13	DB (43.132.04), CE	
ER 430 (mod.)	Z 17 Ti			

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4.3.12 Non-ferrous – Aluminium

Product name	Short description	Chemical composition (typical values) in %								
Union Al 99,5 Ti	Solid wire, aluminium	Si	Mn	Ti	Cu	Al	Zn	Fe	Mg	
		< 0.25	< 0.05	0.1-0.2	< 0.05	99.5	< 0.07	< 0.4	< 0.05	
Union Al 99,7	Solid wire, aluminium	Si	Mn	Ti	Cu	Al	Zn	Fe	Mg	
		< 0.2	< 0.03	< 0.03	< 0.04	> 99.7	< 0.04	< 0.25	< 0.03	
Union AlSi 12	Solid wire, aluminium	Si	Mn	Ti	Cu	Zn	Fe	Mg		
		11-13	<0.15	<0.15	<0.3	<0.2	<0.6	<0.1		
Union AlSi 5	Solid wire, aluminium	Si	Mn	Ti	Cu	Zn	Fe	Mg		
		4.5-6.0	<0.15	<0.15	<0.3	<0.1	<0.6	<0.2		
Union AlSi 7 Mg	Solid wire, aluminium	Si	Mn	Ti	Cu	Zn	Fe	Mg		
		6.5-7.5	<0.05	0.04-0.1	<0.05	<0.05	<0.1	0.3-0.4		
Union AlCu 6 Mn	Solid wire, aluminium	Si	Mn	Ti	Cu	Zn	Fe	Mg	Zr	
		< 0.2	0.2-0.4	0.1-0.2	5.8-6.8	< 0.1	< 0.3	< 0.02	0.1-0.25	
Union AlMg 2,7 Mn 0,8	Solid wire, aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg	
		< 0.25	0.5-0.8	0.05-0.2	0.05-0.15	< 0.1	< 0.25	< 0.4	2.4-2.8	
Union AlMg 3	Solid wire, aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg	
		< 0.4	< 0.5	< 0.3	< 0.15	< 0.1	< 0.2	< 0.4	2.6-3.6	
Union AlMg 4,5 Mn	Solid wire, aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg	Zr
		< 0.4	0.6-1.0	0.05-0.25	< 0.15	< 0.1	< 0.25	< 0.4	4.3-5.2	0.1-0.2
Union AlMg 4,5 MnZr	Solid wire, aluminium	Si	Mn	Cr	Ti	Cu	Zn	Mg	Zr	
		< 0.25	0.7-1.1	0.05-0.25	< 0.15	< 0.05	< 0.25	4.5-5.2	0.1-0.2	
Union AlMg 5	Solid wire, aluminium	Si	Mn	Cr	Ti	Cu	Zn	Fe	Mg	
		< 0.25	0.05-0.2	0.05-0.2	0.06-0.2	< 0.1	< 0.1	< 0.4	4.5-5.5	
Union AlMg 5 Mn	Solid wire, aluminium	Si	Mn	Cr	Ti	Cu	Al	Zn	Fe	Mg
		< 0.25	0.6-1.0	0.05-0.2	0.05-0.2	< 0.1	Bal.	< 0.2	< 0.4	5.0-5.5
Union AlMg 6 Zr	Solid wire, aluminium	Si	Mn	Ti	Zn	Fe	Mg			
		<0.2	0.8-0.9	0.02-0.2	0.08-0.12	<0.2	0.8-0.9			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.10 / SFA-5.10	**18273**	I1, I3		+
ER1450	S Al 1450 (Al99,5Ti)			
A5.10 / SFA-5.10	**18273**	I1, I3		+
ER1070	S Al 1070 (Al99.7)			
A5.10 / SFA-5.10	**18273**	I1, I3		🛒
ER4047A	S Al 4047A (AlSi12(A))			
A5.10 / SFA-5.10	**18273**	I1, I3	DB (61.132.02), CE	🛒
ER4043A	S Al 4043A (AlSi5(A))			
A5.10 / SFA-5.10	**18273**	I1, I3		+
ER4018	S Al 4018 (AlSi7Mg)			
A5.10 / SFA-5.10	**18273**	I1, I3		+
ER2319	S Al 2319 (AlCu6MnZrTi)			
A5.10 / SFA-5.10	**18273**	I1, I3		🛒
ER5554	S Al 5554 (AlMg2.7Mn)			
A5.10 / SFA-5.10	**18273**	I1, I3		🛒
ER5754	S Al 5754 (AlMg3)			
A5.10 / SFA-5.10	**18273**	I1, I3	TÜV (02195), DB (61.132.03), ABS, BV, DNV, LR, CE	🛒
ER5183	S Al 5183 (AlMg4.5Mn0.7(A))			
A5.10 / SFA-5.10	**18273**	I1, I3	DB (61.132.04), DNV, CE	🛒
ER5087	S Al 5087 (AlMg4.5MnZr(A))			
A5.10 / SFA-5.10	**18273**	I1, I3	TÜV (02197), DB (61.132.01), ABS, BV, DNV, LR, CE	🛒
ER5356	S Al 5356 (AlMg5Cr(A))			
A5.10 / SFA-5.10	**18273**	I1, I3		+
ER5556A	S Al 5556A (AlMg5Mn1(A))			
	18273	I1, I3		+
	S Al Z (AlMg6Zr)			

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4.3.13 Wire arc additive

Product name	Short description	Chemical composition (typical values) in %							
3Dprint AM 35	WAAM solid wire, unalloyed	C	Si	Mn					
		0.1	0.3	1.05					
3Dprint AM 46	WAAM solid wire, unalloyed	C	Si	Mn					
		0.1	1.0	1.7					
3Dprint AM 50	WAAM solid wire, low-alloyed, cryogenic	C	Si	Mn	Ni				
		0.1	0.65	1.4	1.35				
3Dprint AM 62	WAAM solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo			
		0.1	0.65	1.55	1.1	0.4			
3Dprint AM 70	WAAM solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo		
		0.08	0.6	1.7	1.5	0.2	0.5		
3Dprint AM 80 HD	WAAM solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo		
		0.09	0.4	1.7	2.0	0.35	0.6		
3Dprint AM 90	WAAM solid wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo		
		0.1	0.8	1.8	2.3	0.35	0.6		
3Dprint AM P22	WAAM solid wire, low-alloyed, creep resistant	C	Si	Mn	Cr	Mo			
		0.08	0.5	1.0	2.5	1.0			
3Dprint AM Tool 40	WAAM solid wire, low-alloyed, wear resistant	C	Si	Mn	Cr	Mo	Fe		
		0.1	0.4	0.6	6.5	3.3	Bal.		
3Dprint AM Tool 45	WAAM solid wire, low-alloyed, wear resistant	C	Si	Mn	Cr	Mo	Ti	Fe	
		0.25	0.5	0.7	5.0	4.0	0.6	Bal.	
3Dprint AM Tool 55	WAAM solid wire, low-alloyed, wear resistant	C	Si	Mn	Cr	Mo	Ti	Fe	
		0.35	0.3	1.2	7.0	2.0	0.3	Bal.	
3Dprint AM 15-5 PH	WAAM solid wire, stainless, martensitic	C	Si	Mn	Ni	Cr	Mo	Nb	Cu
		0.04	0.5	0.55	4.8	14.6	< 0.3	0.28	3.4
3Dprint AM 17-4 PH	WAAM solid wire, stainless, martensitic	C	Si	Mn	Ni	Cr	Nb	Cu	
		0.02	0.35	0.45	4.6	16.3	0.25	3.3	
3Dprint AM 2205	WAAM solid wire, stainless, high-alloyed, duplex	C	Si	Mn	Ni	Cr	Mo	N	
		0.025	0.5	1.3	5.0	22.0	3.0	0.14	
3Dprint AM 2209	WAAM solid wire, stainless, high-alloyed, duplex	C	Si	Mn	Ni	Cr	Mo	N	
		0.025	0.5	1.6	9.0	23.0	3.0	0.14	
3Dprint AM 304L	WAAM solid wire, stainless,austenitic	C	Mn	Ni	Cr	N			
		0.02	1.6	10.0	20.0	< 0.1			
3Dprint AM 316L	WAAM solid wire, stainless,austenitic	C	Si	Mn	Ni	Cr	Mo	N	
		0.015	0.45	1.6	12.0	18.5	2.6	0.04	
3Dprint AM 410 NiMo	WAAM solid wire, stainless, martensitic	C	Si	Mn	Ni	Cr	Mo		
		0.01	0.4	0.5	4.8	12.2	0.5		

		Material Type	Approvals	JOIN!online
		S355 - 10Mn4 - 1.1108		+
		S460 - 8MnSi7 - 1.5113	ABS	+
		S500 - 10NiMnSi5-5		+
		S620 - 10MnNiMoSi6-4-4		+
		S700 - 8MnNiMoCrSi7-6-5	DNV	+
		S800 - 10NiMnMoCr8-7-6		+
		S890 - 10MnNiMoCrSi7-9-6		+
		P22 - 10CrMo9-10 - 1.7339		🛒
		FE3 - 40-T		+
		FE3 - 40-T		+
		Fe8 - 55-ST		+
		S15500 - AMS 5659 - AMS 5862 - 1.4545 - X5CrNiCu15-5		+
		AISi 630 - S17400 - X5CrNiCuNb17-4-4 - 1.4548		🛒
		S31803 - S322205 - X2CrNiMoN22-5-3 - 1.4462		+
		ER2209 - X2CrNiMoN22-9-3 - ~1.4462		+
		AISi 304 - X2CrNi19-11 - 1.4306		+
		AISi 316L - X2CrNiMo17-12-2 - 1.4404		+
		AISi 410 - X3CrNi13-4		+

Product name	Short description	Chemical composition (typical values) in %							
3Dprint AM 430	WAAM solid wire, stainless, high-alloyed, ferritic	C	Si	Mn	Cr				
		0.07	0.8	0.7	17.5				
3Dprint AM 625	WAAM solid wire, stainless, Ni-alloy	C	Si	Mn	Ni	Cr	Mo	Nb	Fe
		< 0.3	< 0.25	< 0.25	Bal.	22.0	9.0	3.5	< 2.0
3Dprint AM 718	WAAM solid wire, stainless, Ni-alloy	C	Si	Mn	Ni	Cr	Mo	Nb	Al
		0.05	< 0.1	< 0.1	Bal.	17.6	3.0	5.2	0.45
3Dprint AM Cryo 316L	WAAM solid wire, stainless, low temperature	C	Si	Mn	Ni	Cr	Mo	N	FN
		0.015	0.45	1.8	12.0	18.5	2.6	0.04	3-6
3Dprint AM Al2219	WAAM solid wire, aluminium	Mn	Ti	Cu	Al	Mg	Zr		
		0.35	0.14	6.3	Bal.	<0.2	0.18		
3Dprint AM Cu6328	WAAM solid wire, Cu-alloy	Cu	Al	Fe	Mn	Ni			
		Bal.	9.0	3.5	1.0	4.5			
3Dprint AM Ti-5	WAAM solid wire, titanium	Ti	C	V	N	Al	Fe	H	O
		Bal.	< 0.05	4.0	< 0.03	6.0	< 0.15	< 0.01	0.18

			Material Type	Approvals	JOIN!online
			AISi 430 - S43000 - X6Cr17 - 1.4016		+
			Alloy 625 - N6625 - AMS5869 - NiCr22Mo9Nb - 2.4831		+
	Ti	Fe	Alloy 718 - Ni19Fe19Nb5Mo3 - N7718 - 2.4668		+
	0.95	19.5			
			AISi 316L - X2CrNiMo17-12-2 - 1.4404		+
			AlCu6MnZrTi - Al2219		+
			CuAl9Ni5 - C63280 - Cu6328 - 2.0923		+
			Ti6402 - Titan Grade 5 - TiAl6V4B - R56400 - 3.7175		+

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4.4 FCAW-G – Gas-shielded flux-cored wires

4.4.1 Mild steel – Rutile

Product name	Short description	Chemical composition (typical values) in %			
BÖHLER Q 71 RC	Flux-cored wire, mild steel, rutile, all welding position, M21 and 100% CO_2 shielding gases	C	Si	Mn	
		0.06	0.5	1.2	
		0.05	0.45	1.1	
diamondspark 42 RC	Flux-cored wire, seamless, mild steel, rutile, flat and horizontal positions, M21 and 100% CO_2 shielding gases	C	Si	Mn	
		0.04	0.5	1.55	
		0.03	0.35	1.3	
diamondspark 44 RC-SR (C1)	Flux-cored wire, seamless, mild steel, rutile, all welding position, 100% CO_2, stress released condition	C	Si	Mn	Ni
		0.04	0.4	1.3	0.4
diamondspark 46 RC	Flux-cored wire, seamless, mild steel, rutile, all welding position, M21 and 100% CO_2 shielding gases	C	Si	Mn	
		0.06	0.45	1.3	
		0.05	0.35	1.2	
diamondspark 46 RC (C1)	Flux-cored wire, seamless, mild steel, rutile, all welding position, 100% CO_2 shielding gases	C	Si	Mn	
		0.065	0.45	1.3	
diamondspark 52 RC	Flux-cored wire, seamless, mild steel, rutile, all welding position, M21 and 100% CO_2 shielding gases, down to -40°C	C	Si	Mn	
		0.06	0.4	1.45	
		0.04	0.35	1.25	
diamondspark 53 RC	Flux-cored wire, seamless, mild steel, rutile, all welding position, M21 and 100% CO_2 shielding gases, down to -50°C	C	Si	Mn	Ni
		0.06	0.45	1.3	0.35
		0.05	0.35	1.0	0.3

4.4.2 Mild steel – Basic

Product name	Short description	Chemical composition (typical values) in %		
diamondspark 44 BC	Flux-cored wire, seamless, mild steel, basic type, all welding position	C	Si	Mn
		0.07	0.4	1.4
		0.06	0.3	1.3
diamondspark 52 BC	Flux-cored wire, seamless, mild steel, basic type, flat and horizontal positions	C	Si	Mn
		0.07	0.55	1.4
		0.06	0.5	1.2

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.20 / SFA-5.20	**17632-A**	M21, C1	TÜV (11164), DB (42.014.35), ABS, LR, DNV, BV, CWB, RINA, CE	
E71T-1M/T-9M/T-12M JH8	T 46 4 P M21 1 H10			
E71T-1/T-9/T-12C-JH4	T 42 2 P C1 1 H5			
A5.20 / SFA-5.20	**17632-A**	M21, C1	ABS, CWB, CE	
E70T-1M/T-9M H4	T 46 2 R M21 3 H5			
E70T-1C-T-9C H4	T 42 0 R C1 3 H5			
A5.20 / SFA-5.20	**17632-A**	C1	ABS, CWB, DNV, BV, LR, CE	
E71T-12C JH4	T 42 5 P C1 1 H5			
A5.20 / SFA-5.20	**17632-A**	M21, C1	TÜV (1932), DB (42.052.24), DNV, ABS, LR, BV, CE	
E71T-1M/T-9M H4	T 46 3 P M21 1 H5			
E71T-1C/T-9C H4	T 42 2 P C1 1 H5			
A5.20 / SFA-5.20	**17632-A**	C1	TÜV (06221), DB (42.052.07), DNV, ABS, LR, BV, RINA, RS, CE	
E71T-1C/T-9C H4/ E71T-9C H4	T 46 3 P C1 1 H5			
A5.20 / SFA-5.20	**17632-A**	M21, C1	TÜV (06219), DB (42.052.03), ABS, DNV, LR, BV, RINA, RS, CE; D1.8 seismic supplement	
E71T-1M/T-9M/T-12M JDH4	T 46 4 P M21 1 H5			
E71T-1C/T-9C/T-12C DH4	T 46 2 P C1 1 H5			
A5.20 / SFA-5.20	**17632-A**	M21, C1	TÜV (12897), DB (42.052.25), DNV, LR, RINA, CWB, CE	
E71T-1M/T-9M/T-12M JH4	T 46 5 P M21 1 H5			
E71T-1C/T-9C/T-12C H4	T 42 2 P C1 1 H5			

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.20 / SFA-5.20	**17632-A**	M21, C1	TÜV (06202), CE	
E71T-5M JH4	T 42 4 B M21 1 H5			
E71T-5C JH4	T 42 4 B C1 1 H5			
A5.20 / SFA-5.20	**17632-A**	M21, C1	TÜV (06218), DB (42.052.04), DNV, ABS, LR, BV, RINA, CE	
E70T-5M JH4	T 46 4 B M21 3 H5			
E70T-5C JH4	T 42 4 B C1 3 H5			

Further product information available in our webshop. For shopping possibilities contact our local sales team.

4.4.3 Mild steel – Metal cored

Product name	Short description	Chemical composition (typical values) in %			
BÖHLER Q 70 MC	Metal-cored wire, mild steel, down to -30°C	C	Si	Mn	
		0.07	0.7	1.5	
BÖHLER Q Zn GS	Metal-cored wire, mild steel,for single layer welding of galvanized	C	Si	Mn	Al
		0.3	0.3	1.1	1.8
diamondspark 46 MC	Metal-cored wire, seamless, mild steel, down to -30°C	C	Si	Mn	
		0.06	0.8	1.5	
diamondspark 52 MC	Metal-cored wire, seamless, mild steel, down to -40°C	C	Si	Mn	
		0.07	0.7	1.5	
diamondspark 54 MC	Metal-cored wire, seamless, mild steel, M21 and 100% CO_2 shielding gases, down to 60°C	C	Si	Mn	
		0.07	0.75	1.4	
		0.06	0.55	1.2	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.18 / SFA-5.18	**17632-A**	M21, M20	TÜV (12542), DB (42.014.65), DNV, LR, BV, ABS, CWB, CE	
E70C-6M H4	T 46 3 M M21 1 H5			
A5.18 / SFA-5.18	**17632-A**	M21, M20	CE	
E70C-GS	T3T Z M M21 1			
A5.18 / SFA-5.18	**17632-A**	M21, M20	TÜV (09023), DB (42.052.08), ABS, BV, DNV, LR, CWB, RINA, CE	
E70C-6M H4	T 46 3 M M21 1 H5			
	T 46 3 M M20 1 H5			
A5.18 / SFA-5.18	**17632-A**	M21, M20	TÜV (11163), DB (42.052.26), ABS, BV, DNV, CWB, LR, CE	
E70C-6M H4	T46 4 M M21 1 H5			
	T46 5 M M20 1 H5			
A5.18 / SFA-5.18	**17632-A**	M21, C1	TÜV (06220), DB (42.052.02), DNV, ABS, LR, BV, RINA, CWB, CE	
E70C-6M H4	T 46 6 M M21 1 H5			
E70C-6C H4	T 42 5 M C1 1 H5			

4.4.4 Pipeline – Rutile

Product name	Short description	Chemical composition (typical values) in %				
diamondspark X60 RC-Pipe	Flux-cored wire, seamless, for automatic pipeline welding, rutile type	C	Si	Mn	Ni	
		0.05	0.4	1.3	0.85	
diamondspark X70 RC-Pipe	Flux-cored wire, seamless, for automatic pipeline welding, rutile type, for X70 Base material	C	Si	Mn	Ni	
		0.06	0.4	1.45	1.45	
diamondspark X70 RC-Pipe (N)	Flux-cored wire, seamless, for automatic pipeline welding, rutile type, for X70 Base material, meet the NACE requirements	C	Si	Mn	Ni	Mo
		0.05	0.35	1.6	0.85	0.25
diamondspark X80 RC-Pipe	Flux-cored wire, seamless, for automatic pipeline welding, rutile type, for X80 Base material	C	Si	Mn	Ni	Mo
		0.04	0.45	1.45	1.6	0.15

4.4.5 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %							
FOXcore CB 2 RC	Flux-cored wire, low-alloyed, creep resistant, rutile type, for cast material COST CB2	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.12	0.2	0.8	0.2	9.0	1.4	0.03	0.2
FOXcore DMO RC	Flux-cored wire, low-alloyed, creep resistant, rutile type, 0,5% Mo alloyed	C	Si	Mn	Mo				
		0.04	0.25	0.75	0.5				
FOXcore DCMS RC	Flux-cored wire, low-alloyed, creep resistant, rutle type, 1% Cr and 0,5% Mo alloyed	C	Si	Mn	Cr	Mo	Sn	P	As
		0.06	0.22	0.75	1.2	0.47	< 0.005	< 0.005	< 0.005
FOXcore CM 2 RC	Flux-cored wire, low-alloyed, creep resistant, rutile type, 2.25% Cr and 1% Mo alloyed	C	Si	Mn	Cr	Mo	Sn	P	As
		0.08	0.25	0.8	2.25	1.1	< 0.005	< 0.005	< 0.005
FOXcore C 9 MV RC	Flux-cored wire, high-alloyed, creep resistant, rutile type, for the ASTM steels T91 / P91	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.1	0.2	0.7	0.2	9.0	1.0	0.04	0.2
FOXcore C 9 MVW RC	Flux-cored wire, high-alloyed, creep resistant, rutile type, for tempered 9% chromium steels	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.1	0.3	0.6	0.7	9.0	1.0	0.03	1.0
FOXcore P92 RC	Flux-cored wire, low-alloyed, creep resistant, rutile type, for tempered 9-12% chromium steels	C	Si	Mn	Ni	Cr	Mo	W	V
		0.1	0.2	0.6	0.5	9.0	0.5	1.5	0.2
FOXcore C 9 MV MC	Metal cored wire, high-alloyed, creep resistant, for creep resistant martensitic 9-12% chromium steels	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.1	0.3	0.6	0.7	9.0	1.0	0.05	0.2
diamondspark DMO BC	Flux cored wire, seamless, creep resistant, basic type, 0,5% Mo alloyed	C	Si	Mn	Mo				
		0.08	0.35	1.0	0.5				
diamondspark DMO RC	Flux cored wire, seamless, creep resistant, rutile type, 0,5% Mo alloyed	C	Si	Mn	Mo				
		0.06	0.2	0.75	0.4				
diamondspark DMO MC	Metal cored wire, seamless, creep resistant, 0,5% Mo alloyed	C	Si	Mn	Mo				
		0.09	0.35	1.1	0.5				

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.29 / SFA-5.29	**17632-A**	M21	TÜV (19491), CE	+
E81T1-Ni1M-JH4	T 50 6 1Ni P M21 1 H5			
A5.29 / SFA-5.29	**18276-A**	M21	TÜV (19765), CE	+
E91T1-K2M-JH4	T55 5 Mn1.5Ni P M21 1 H5			
A5.29 / SFA-5.29	**18276-A**	M21	CE	+
E91T1-GM-JH4	T55 6 Z P M21 1 H5			
A5.29 / SFA-5.29	**18276-A**	M21	CE	+
E101T1-K2M-JH4	T 62 4 Mn1.5Ni P M21 1 H5			

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
Co	**N**	**B**	**A5.29 / SFA-5.29**	**17634-A**	M21	TÜV (19464), CE	
1.0	0.02	0.006	E91T1-GM	T ZCrMoCo9VNbNB P M21 1			
			A5.29 / SFA-5.29	**17634-A**	M21	TÜV (11120), DB (42.014.61), CE	
			E81T1-A1M-H8	T MoL P M21 1 H10			
Sb			**A5.29 / SFA-5.29**	**17634-A**	M21	TÜV (11162), IBR, CE	
< 0.005			E81T1-B2M-H8	T CrMo1 P M21 1 H10			
Sb			**A5.29 / SFA-5.29**	**17634-A**	M21	TÜV (11812), CE	
< 0.005			E91T1-B3M-H8	T CrMo2 P M21 1 H10			
N			**A5.29 / SFA-5.29**	**17634-A**	M21	TÜV (19235)	
0.04			E91T1-B9M-H4	T ZCrMo9VNb P M21 1 H5			
V	**N**		**A5.29 / SFA-5.29**	**17634-A**	M21		
0.2	0.04		E91T1-GM	T ZCrMoW9VNb P M21 1			
Nb	**N**		**A5.29 / SFA-5.29**	**17634-B**	M21		
0.04	0.04		E91T1-GM	T Z CrWMo9VNb P M21 1			
N			**A5.28 / SFA-5.28**	**17634-A**	M21		
0.04			E90C-B9-H4	T69T15-1G-9C1MV			
			A5.29 / SFA-5.29	**17634-A**	M21	TÜV (12254), CE	
			E80T5-GM-H4	T Mo B M21 3 H5			
			A5.29 / SFA-5.29	**17634-A**	M21	TÜV (12205), CE	
			E81T1-A1M-H4	T55 0 T1-1M21-2M3-PH5			
			A5.28 / SFA-5.28	**17634-A**	M21	TÜV (07157), DB (42.052.09), CE	
			E80C-GH4	T Mo M M21 1 H5			

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4.4.6 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %							
diamondspark DCMS BC	Flux cored wire, seamless, creep resistant, basic type, 1% Cr and 0,5% Mo alloyed	C	Si	Mn	Cr	Mo			
		0.06	0.45	1.1	1.2	0.5			
diamondspark DCMS RC	Flux cored wire, seamless, creep resistant, rutile type	C	Si	Mn	Cr	Mo			
		0.07	0.3	0.7	1.1	0.4			
diamondspark DCMS MC	Metal cored wire, seamless, creep resistant, 1% Cr and 0,5% Mo alloyed	C	Si	Mn	Cr	Mo			
		0.06	0.4	1.1	1.2	0.5			
diamondspark CM 2 BC	Flux cored wire, seamless, creep resistant, basic type, 2.25% Cr and 1% Mo alloyed	C	Si	Mn	Cr	Mo			
		0.07	0.45	1.1	2.2	1.0			
diamondspark CM 2 MC	Metal cored wire, seamless, creep resistant, 2.25% Cr and 1% Mo alloyed	C	Si	Mn	Cr	Mo			
		0.06	0.35	1.1	2.2	1.0			
diamondspark CM 2 RC	Flux cored wire, seamless, creep resistant, rutile type, 2.25% Cr and 1% Mo alloyed	C	Si	Mn	Cr	Mo			
		0.06	0.4	0.8	2.2	1.0			
diamondspark CM 5 BC	Flux cored wire, seamless, creep resistant, basic type, 5% Cr and 0,5% Mo alloyed	C	Si	Mn	Cr	Mo			
		0.07	0.45	1.1	5.0	0.5			
diamondspark DCMV BC	Flux cored wire, seamless, creep resistant, basic type, Chromium-Molybdenum-Vanadium alloyed	C	Si	Mn	Ni	Cr	Mo	V	
		0.1	0.5	1.1	0.4	1.2	0.9	0.2	
diamondspark DCMV RC	Flux cored wire, seamless, creep resistant, rutile type, Chromium-Molybdenum-Vanadium alloyed	C	Si	Mn	Ni	Cr	Mo	V	
		0.1	0.5	1.1	0.45	1.2	0.9	0.2	

4.4.6 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %					
diamondspark 550 BC	Flux cored wire, seamless, high strength, basic type, Nickel-Molybdenum alloyed, yield strength> 550 Mpa	C	Si	Mn	Ni	Mo	
		0.05	0.35	1.4	1.2	0.4	
diamondspark 700 BC	Flux cored wire, seamless, high strength, basic type, Nickel-Chromium-Molybdenum alloyed, yield strength> 690 Mpa	C	Si	Mn	Ni	Cr	Mo
		0.06	0.4	1.4	2.2	0.4	0.4
diamondspark 900 BC	Flux cored wire, seamless, high strength, basic type, Nickel-Chromium-Molybdenum alloyed, yield strength> 890 Mpa	C	Si	Mn	Ni	Cr	Mo
		0.06	0.4	1.4	2.2	0.4	0.4
diamondspark 550 RC	Flux cored wire, seamless, high strength, rutile type, Nickel-Manganese alloyed, yield strength > 550 Mpa	C	Si	Mn	Ni	Mo	
		0.05	0.35	1.6	0.85	0.2	
diamondspark 620 RC	Flux cored wire, seamless, high strength, rutile type, Nickel-Molybdenum alloyed, yield strength > 620 Mpa	C	Si	Mn	Ni	Mo	
		0.05	0.3	1.3	1.5	0.3	
diamondspark 700 RC	Flux cored wire, seamless, high strength, rutile type, Nickel-Chromium-Molybdenum alloyed, yield strength > 690 Mpa	C	Si	Mn	Ni	Mo	
		0.07	0.4	1.7	2.0	0.15	

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
			A5.29 / SFA-5.29	**17634-A**	M21	CE	
			E80T5-B2M-H4	T CrMo1 B M21 3 H5			
			A5.29 / SFA-5.29	**17634-A**	M21		
			E81T1-B2M-H4	T CrMo1 P M21 1 H5			
			A5.28 / SFA-5.28	**17634-A**	M21	TÜV (07158), CE	
			E80C-B2H4	T CrMo1 M M21 1 H5			
			A5.29 / SFA-5.29	**17634-A**	M21	CE	
			E90T5-B3M-H4	T CrMo2 B M21 4 H5			
			A5.28 / SFA-5.28	**17634-A**	M21	TÜV (07159), CE	
			E90C-B3H4	T CrMo2 M M21 1 H5			
			A5.29 / SFA-5.29	**17634-A**	M21		
			E91T1-B3M-H4	T CrMo2 P M21 1 H5			
			A5.29 / SFA-5.29	**17634-A**	M21	CE	
			E80T5-B6M-H4	T CrMo5 B M21 3 H5			
			A5.29 / SFA-5.29	**17634-A**	M21	TÜV (0961), CE	
			E90T5-GM-H4	T Z B M21 3 H5			
				17634-A	M21		
				T Z P M21 1 H5			

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.29 / SFA-5.29	**18276-A**	M21	CE	
	E90T5-GM-H4	T 55 4 1NiMo B M21 3 H5			
	A5.29 / SFA-5.29	**18276-A**	M21	TÜV (07416), ABS, DNV, LR, CE	
	E110T5-K4M-JH4	T 69 6 1Mn2NiCrMo B M21 3 H5			
	A5.29 / SFA-5.29	**18276-A**	M21	CE	
	E120T5-GM-H4	T89 4 Mn2Ni1CrMo B M21 3 H5			
	A5.29 / SFA-5.29	**18276-A**	M21	CE	
	E91T1-GM-JH4	T 55 6 Z P M21 1 H5			
	A5.29 / SFA-5.29	**18276-A**	M21	CE	
	E101T1-K2M-JH4	T 62 4 Mn1.5Ni P M21 1 H5			
	A5.29 / SFA-5.29	**18276-A**	M21	TÜV (19045), ABS, DNV, BV, LR, CE	
	E111T1-GM-JH4	T 69 6 Z P M21 1 H5			

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4.4.7 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %					
diamondspark 700 RC (C1)	Flux cored wire, seamless, high strength, rutile type, Nickel-Molybdenum alloyed, yield strength > 690 Mpa, 100%CO_2 shielding gas	C	Si	Mn	Ni	Mo	
		0.05	0.3	1.85	2.2	0.15	
diamondspark 700 RC-SR	Flux cored wire, seamless, high strength, rutile type, yield strength > 690 Mpa, stress released condition	C	Si	Mn	Ni	Mo	
		0.04	0.25	1.8	2.3	0.4	
diamondspark 550 MC	Metal cored wire, seamless, high strength, Nickel-Molybdenum alloyed, yield strength > 550 Mpa	C	Si	Mn	Ni	Mo	
		0.06	0.45	1.3	1.0	0.5	
diamondspark 620 MC	Metal cored wire, seamless, high strength, Nickel-Molybdenum alloyed, yield strength > 620 Mpa	C	Si	Mn	Ni	Mo	
		0.1	0.5	1.8	0.9	0.55	
diamondspark 700 MC	Metal cored wire, seamless, high strength, Nickel-Chromium-Molybdenum alloyed, yield strength > 690 Mpa	C	Si	Mn	Ni	Cr	Mo
		0.07	0.7	1.6	2.0	0.35	0.3
diamondspark 900 MC	Metal cored wire, seamless, high strength, Nickel-Chromium-Molybdenum alloyed, yield strength > 890 Mpa	C	Si	Mn	Ni	Cr	Mo
		0.06	0.7	1.9	2.1	0.5	0.4
diamondspark 960 MC	Metal cored wire, seamless, high strength, Nickel-Chromium-Molybdenum alloyed, yield strength > 960 Mpa	C	Si	Mn	Ni	Cr	Mo
		0.06	0.7	1.9	2.2	0.6	0.5
diamondspark 1100 MC	Metal cored wire, seamless, high strength, Nickel-Chromium-Molybdenum alloyed, yield strength > 1100 Mpa	C	Si	Mn	Ni	Cr	Mo
		0.09	0.4	1.4	2.7	0.7	0.5
BÖHLER alform® 700 L-MC	Metal cored wire, seamless, high strength, designed for alform® 700 M base material	C	Si	Mn	Ni	Cr	Mo
		0.07	0.7	1.6	2.0	0.35	0.3
BÖHLER alform® 900 L-MC	Metal cored wire, seamless, high strength, designed for alform® 900 x-treme base material	C	Si	Mn	Ni	Cr	Mo
		0.06	0.7	1.9	2.1	0.5	0.4
BÖHLER alform® 960 L-MC	Metal cored wire, seamless, high strength, designed for alform® 960 x-treme base material	C	Si	Mn	Ni	Cr	Mo
		0.06	0.7	1.9	2.2	0.6	0.5
BÖHLER alform® 1100 L-MC	Metal cored wire, seamless, high strength, designed for alform® 1100 x-treme base material	C	Si	Mn	Ni	Cr	Mo
		0.09	0.4	1.4	2.7	0.7	0.5

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.29 / SFA-5.29	**18276-A**	C1	CE	+
E111T1-GC-JH4	T 69 4 Z P C1 1 H5			
A5.29 / SFA-5.29	**18276-A**	M21	CE	+
E111T1-K3-H4	T 69 6 Mn2NiMo P M21 1 H5			
A5.28 / SFA-5.28	**18276-A**	M21	CE	🛒
E90C-K3H4	T 55 6 1NiMo M M21 1 H5			
A5.28 / SFA-5.28	**18276-A**	M21, I1	ABS, DNV	+
E100C-GH4	T 62 4 Z M M21 1 H5			
A5.28 / SFA-5.28	**18276-A**	M21, M20	TÜV (12822), DB (42.052.28), CWB, DNV, LR, CE	🛒
E110C-K4H4	T 69 6 Mn2NiCrMo M M21 1 H5			
A5.28 / SFA-5.28	**18276-A**	M21	TÜV, DB, CE	🛒
E120C-GH4	T 89 5 ZMn2NiCrMo M M21 1 H5			
	18276-A	M21	TÜV, DB, CE	🛒
	T 89 4 ZMn2NiCrMo M M21 1 H5			
	18276-B	M21		+
	T Z 2 T15-1M21A-N4C1M2-H5			
A5.28 / SFA-5.28	**18276-A**	M21, M20	TÜV, DB, CWB, DNV, LR, CE	🛒
E110C-K4H4	T 69 6 Mn2NiCrMo M M21 1 H5			
A5.28 / SFA-5.28	**18276-A**	M21	TÜV, DB, CE	🛒
E120C-GH4	T 89 5 ZMn2NiCrMo M M21 1 H5			
	18276-A	M21	TÜV, DB, CE	+
	T 89 4 ZMn2NiCrMo M M21 1 H5			
	18276-B	M21		+
	TZ2T15-1M21A-N4C1M2-H5			

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4.4.7 Low alloy steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %				
		C	Si	Mn	Ni	
diamondspark Ni1 BC	Flux cored wire, seamless, high strength, basic type, 1%Nickel alloyed, down to -60°C	0.06	0.45	1.35	0.95	
diamondspark Ni1 RC	Flux cored wire, seamless, high strength, rutile type, 1%Nickel alloyed, down to -60°C	C	Si	Mn	Ni	
		0.05	0.45	1.3	0.85	
diamondspark Ni1 RC (C1)	Flux cored wire, seamless, high strength, rutile type, 1%Nickel alloyed, down to -40°C, 100%CO_2 shielding gas	C	Si	Mn	Ni	
		0.07	0.35	1.1	0.85	
diamondspark Ni1 RC-SR	Flux cored wire, seamless, high strength, basic type, 1%Nickel alloyed, stress released condition, down to -60°C	C	Si	Mn	Ni	
		0.07	0.45	1.3	0.85	
diamondspark Ni1,5 RC (C1)	Flux cored wire, seamless, high strength, basic type, 1,5%Nickel alloyed, down to -60°C, 100%CO_2 shielding gas	C	Si	Mn	Ni	
		0.04	0.3	1.2	1.5	
diamondspark Ni2 RC	Flux cored wire, seamless, high strength, rutile type, 2%Nickel alloyed, down to -60°C	C	Si	Mn	Ni	
		0.06	0.45	1.3	2.0	
diamondspark Ni1 MC	Metal cored wire, seamless, high strength, 1%Nickel alloyed, down to -60°C	C	Si	Mn	Ni	
		0.06	0.5	1.3	0.9	
diamondspark Ni3 MC	Metal cored wire, seamless, high strength, 3%Nickel alloyed, down to -60°C	C	Si	Mn	Ni	
		0.04	0.3	1.0	3.0	

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.29 / SFA-5.29	**17632-A**	M21, C1	CE	
E80T5-Ni1M-JH4	T 46 6 1Ni B M21 3 H5			
A5.29 / SFA-5.29	**17632-A**	M21	TÜV (06226), DB (42.052.11), DNV, ABS, LR, BV, RINA, RS, CWB, CE	
E81T1-Ni1M-JH4	T 50 6 1Ni P M21 1 H5			
A5.29 / SFA-5.29	**17632-A**	C1	TÜV (12887), ABS, DNV, LR, CE	
E81T1-Ni1C-JH4	T 46 4 1Ni P C1 1 H5			
A5.29 / SFA-5.29	**17632-A**	M21	TÜV (19046), ABS, DNV, LR, CE	
E81T1-Ni1M-JH4	T 50 6 1Ni P M21 1 H5			
A5.29 / SFA-5.29	**17632-A**	C1	ABS, BV, LR, DNV, RS	
E81T1-K2C-JH4	T 50 6 1.5Ni P C1 1 H5			
A5.29 / SFA-5.29	**17632-A**	M21	ABS, DNV, LR, RS, CE	
E81T1-Ni2M-JH4	T 50 6 2Ni P M21 1 H4			
A5.28 / SFA-5.28	**17632-A**	M21	TÜV (06205), DB (42.052.15), ABS, DNV, CWB, CE	
E80C-Ni1 H4	T 50 6 1Ni M M21 1 H5			
A5.28 / SFA-5.28	**17632-A**	M21	CE	
E80C-Ni3 H4	T46 6 3Ni M M21 1 H5			

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4.4.8 Low alloy steel – Weather resistant

Product name	Short description	Chemical composition (typical values) in %				
diamondspark NiCu1 BC	Flux cored wire, seamless, weather resistant, basic type, Copper-Nickel alloyed	C	Si	Mn	Ni	Cu
		0.05	0.45	1.2	1.2	0.5
diamondspark NiCu1 RC	Flux cored wire, seamless, weather resistant, rutile type, Copper-Nickel alloyed	C	Si	Mn	Ni	Cu
		0.05	0.4	1.2	1.1	0.5
diamondspark NiCu1 MC	Metal cored wire, seamless, weather resistant, Copper-Nickel alloyed	C	Si	Mn	Ni	Cu
		0.06	0.45	1.2	0.5	0.5

4.4.9 Stainless steel – Austenitic steels

Product name	Short description	Chemical composition (typical values) in %				
FOXcore 308L-T0	Flux-cored wire, E 308L Type, high-alloyed, austenitic stainless, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.5	10.5	19.8
FOXcore 308L-T0 DG	Flux-cored wire, E 308L type, high-alloyed, austenitic stainless, flat and horizontal positions, mix and 100% CO_2 shielding gases	C	Si	Mn	Ni	Cr
		0.03	0.7	1.5	10.5	19.5
FOXcore 308L-T1	Flux-cored wire, E 308L type, high-alloyed, austenitic stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.5	10.5	19.8
FOXcore 308L-T1 C1	Flux-cored wire, E 308 L type, high-alloyed, austenitic stainless, all welding position, 100%CO_2 shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.6	1.6	10.6	19.9
FOXcore 308L-MC	Metal-cored wire, E 308L type, high-alloyed, austenitic stainless, mix shielding gas, down to -196°C	C	Si	Mn	Ni	Cr
		0.025	0.6	1.4	10.5	19.8
FOXcore 316L-T0	Flux-cored wire, E 316L type, high-alloyed, austenitic stainless, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.5	12.0	19.0
FOXcore 316L-T0 DG	Flux-cored wire, E 316L type, high-alloyed, austenitic stainless, flat and horizontal positions, mix and 100% CO_2 shielding gases	C	Si	Mn	Ni	Cr
		0.03	0.7	1.3	12.1	18.4
FOXcore 316L-T1	Flux-cored wire, E 316L type, high-alloyed, austenitic stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.5	12.0	19.0
FOXcore 316L-T1 C1	Flux-cored wire, E 316L type, high-alloyed, austenitic stainless, all welding position, 100%CO_2 shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.6	1.3	12.4	18.5
FOXcore 316L-MC	Metal-cored wire, E 316L type, high-alloyed, austenitic stainless, mix shielding gas, down to -120°C	C	Si	Mn	Ni	Cr
		0.025	0.6	1.4	12.2	18.8
FOXcore 347-T0	Flux-cored wire, E 347 type, high-alloyed, stabilized austenitic stainless, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.6	1.4	10.6	19.5
FOXcore 347-T1	Flux-cored wire, E 347 type, high-alloyed, stabilized austenitic stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.4	10.4	19.0

AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
A5.29 / SFA-5.29	**17632-A**	M21	CE	
E80T5-WGM H4	T 46 6 Z B M21 3 H5			
A5.29 / SFA-5.29	**17632-A**	M21	CE	
E81T1-WGM H4	T 46 4 Z P M21 1 H5			
A5.28 / SFA-5.28	**17632-A**	M21	CE	
E80C-G H4	T 46 6 Z M M21 1 H5			

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
FN			**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (05348), DB (43.014.14), DNV, CE	
3-12			E 308LT0-4(1)	T 19 9 L R M21 (C1) 3			
FN			**A5.22 / SFA-5.22**	**17633-A**	M21, C1	TÜV (19685), DB (43.014.53), CWB, ABS, CE	
3-12			E308LT0-4(1)	T 19 9 L R M21 (C1) 3			
FN			**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (09117), DB (43.014.23), ABS, CWE, DNV, NAKS, CE	
3-12			E308LT1-4(1)	T 19 9 L P M21 (C1) 1			
			A5.22 / SFA-5.22	**17633-A**	C1	CE	
			E308LT1-1	T 19 9 L P C1 1			
FN			**A5.22 / SFA-5.22**	**17633-A**	M21	TÜV (09987), CWB, CE	
3-12			EC308L	T 19 9 L M M12 2			
Mo	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (05349), DB (43.014.15), DNV, LR (M21), CE	
2.7	3-12		E316LT0-4(1)	T 19 12 3 L R M21 (C1) 3			
Mo	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21, C1	TÜV (19660), CWB, DNV, ABS, CE	
2.6	3-12		E316LT0-4/(1)	T 19 12 3 L R M21 / (C1) 3			
Mo	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (09118), DB (43.014.24), LR (M21), DNV, ABS, BV (M21 + Ø 1.2 mm), NAKS, CE	
2.7	4-13		E316LT1-4(1)	T 19 12 3 L P M21 (C1) 1			
Mo			**A5.22 / SFA-5.22**	**17633-A**	C1	CE	
2.8			E316LT1-1	T 19 12 3 L R C1 1			
Mo	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21	TÜV (09988), CWB, CE	
2.7	3-12		EC316L	T 19 12 3 L M M12 2			
Nb	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (09740), CE	
0.37	5-12		E 347T0-4(1)	T 19 9 Nb R M21 (C1) 3			
Nb	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (10059), CE	
0.35	5-12		E347T1-4(1)	T 19 9 Nb P M21 (C1) 1			

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Product name	Short description	Chemical composition (typical values) in %				
FOXcore 318-T0	Flux-cored wire, E 318 type, high-alloyed, stabilized austenitic stainless, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.6	1.3	12.2	18.8
FOXcore 318-T1	Flux-cored wire, high-alloyed, stabilized austenitic stainless FCW for welding of CrNiMo(Ti/Cb) austenitic stainless steels,	C	Si	Mn	Ni	Cr
		0.03	0.6	1.3	12.2	18.8
FOXcore 317L-T0	Flux-cored wire, E 317L type, high-alloyed, austenitic stainless for welding of corrosion resistant austenitic stainless steels with higher Mo content or claddings on mild steels, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.3	13.1	18.8
FOXcore 317L-T1	Flux-cored wire, E 317L type, high-alloyed, austenitic stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.3	13.1	18.8

4.4.10 Stainless steel – Duplex

Product name	Short description	Chemical composition (typical values) in %					
FOXcore 2307-T0	Flux-cored wire, E 2307 type, high-alloyed, lean duplex stainless, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr	Mo
		0.025	0.7	1.2	8.8	24.2	0.4
FOXcore 2307-T1	Flux-cored wire, E 2307 type, high-alloyed, lean duplex stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr	Mo
		0.025	0.6	1.1	9.1	24.9	0.4
FOXcore 2209-T0	Flux-cored wire, E 2209 type, high-alloyed, duplex stainless, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr	Mo
		0.024	0.7	0.9	8.9	22.8	3.2
FOXcore 2209-T1	Flux-cored wire, E 2209 type, high-alloyed, duplex stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr	Mo
		0.026	0.6	1.1	9.0	23.0	3.2
FOXcore 2209-T1 HD	Flux-cored wire, E 2209 type, high-alloyed, duplex stainless, all welding position, mix shielding gas, down to -50°C	C	Si	Mn	Ni	Cr	Mo
		0.029	0.7	0.9	9.0	23.2	3.2
FOXcore 2594-T1	Flux-cored wire, E 2594 type,high-alloyed, superduplex stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr	Mo
		0.025	0.7	0.9	9.4	25.2	3.7
FOXcore 2594-T1 HD	Flux-cored wire, E 2594 type, high-alloyed, superduplex stainless, all welding position, mix shielding gas, down to -50°C	C	Si	Mn	Ni	Cr	Mo
		0.03	0.7	0.9	9.8	25.3	3.7

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
Mo	**Nb**	**FN**		**17633-A**	M21, (C1)	CE	
2.7	0.29	5 - 13		T 19 12 3 Nb R M21 (C1) 3			
Mo	**Nb**	**FN**		**17633-A**	M21, (C1)	CE	
2.7	0.46	5 -13		T 19 12 3 Nb P M21 (C1) 1			
Mo	**FN**	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CE	
3.4	2 - 10	2 - 10	E317LT0-4(1)	T Z 19 13 4 N L R M21 (C1) 3			
Mo	**FN**	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	BV (C1 + Ø 1.2 mm), CE	
3.4	2 - 10	2 - 10	E317LT1-4(1)	T Z 19 13 4 N L P M21 (C1) 1			

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
N	**FN**		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (11411), ABS (C1) , CE	
0.14	30-45		E2307T0-4(1)	T 23 7 N L R M21 (C1) 3			
N	**FN**	**PRE_N**	**A5.22 / SFA-5.22**	**17633-A**	M21 , (C1)	ABS (C1), CE	
0.14	> 30	≥ 27	E2307T1-4(1)	T 23 7 N L P M21 (C1) 1			
N	**FN**	**PRE_N**	**A5.22 / SFA-5.22**	**17633-A**	M21 , (C1)	TÜV (07133), DB (43.014.31), BV (C1 + Ø 1.2 mm), CWB, DNV, LR, RINA (M21), ABS, CE	
0.14	40-55	≥ 35	E2209T0-4(1)	T 22 9 3 N L R M21 (C1) 3			
N	**FN**	**PRE_N**	**A5.22 / SFA-5.22**	**17633-A**	M21 , (C1)	TÜV (07666), BV, CWB, DNV, LR, ABS, CCS, CE	
0.14	40-60	≥ 35	E2209T1-4(1)	T 22 9 3 N L P M21 (C1) 1			
N	**FN**	**PRE_N**	**A5.22 / SFA-5.22**	**17633-A**	M21 , (C1)	CE	
0.14	40-45	≥ 35	E2209T0-4(1)	T 22 9 3 N L R M21 (C1)			
N	**FN**	**PRE_N**	**A5.22 / SFA-5.22**	**17633-A**	M21 , (C1)	CE	
0.24	35-55	≥ 41	E2594T1-4(1)	T 25 9 4 N L P M21 (C1) 2			
N	**FN**	**PRE_N**	**A5.22 / SFA-5.22**	**17633-A**	M21 , (C1)	CE	
0.23	41-52	≥ 41	E2594T1-4(1)	T 25 9 4 N L P M21 (C1) 2			

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4.4.11 Stainless steel – Ferritic steels

Product name	Short description	Chemical composition (typical values) in %				
BÖHLER CAT 430L Cb Ti-MC	Metal-cored wire, high-alloyed, ferritic stainless, double-stabilized with Nb and Ti for exhaust systems	C	Si	Mn	Cr	Nb
		0.02	0.5	0.7	18.5	0.55
BÖHLER CAT 439L Ti-MC	Metal-cored wire, EC 439 type, high-alloyed, ferritic stainless	C	Si	Mn	Cr	Ti
		0.02	0.5	0.7	18.5	0.85

4.4.12 Stainless – Heat & creep resistant

Product name	Short description	Chemical composition (typical values) in %				
FOXcore 308 H-T0	Flux-cored wire, E 308H type, high-alloyed, austenitic stainless, creep resistant, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.05	0.5	1.3	9.7	19.0
FOXcore 308 H-T1	Flux-cored wire, E 308 type, high-alloyed, austenitic stainless, creep resistant, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.05	0.6	1.4	10.4	19.6
FOXcore 309L H-T0	Flux-cored wire, E 309L type, high-alloyed, special applications, heat resistant, Bismuth-free weld deposit and controlled ferrite content	C	Si	Mn	Ni	Cr
		0.030	0.6	1.3	12.2	23.0
FOXcore 309L H-T1	Flux-cored wire,E 309L type, high-alloyed, special applications, heat resistant, Bismuth-free weld deposit, controlled ferrite content, all welding position	C	Si	Mn	Ni	Cr
		0.035	0.7	1.3	12.5	23.0
FOXcore 309L Nb H-T0	Flux-cored wire, E 309L Nb type, high-alloyed, special applications, heat resistant, Bismuth-free weld deposit, controlled ferrite content	C	Si	Mn	Ni	Cr
		0.034	0.7	1.3	12.5	22.3
FOXcore 347L H-T0	Flux-cored wire, E 347 type, high-alloyed, austenitic stainless, heat resistant, Bismuth-free weld deposit, controlled ferrite content, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.030	0.6	1.3	10.5	18.5
FOXcore 347 H-T1	Flux-cored wire, E 347H type, high-alloyed, austenitic stainless, heat resistant, Bismuth-free weld deposit, controlled ferrite content, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.045	0.6	1.3	10.5	18.5

4.4.13 Stainless – Low temperature

Product name	Short description	Chemical composition (typical values) in %				
FOXcore 308L-T1 Cryo	Flux-cored wire, E 308L type, high-alloyed, austenitic stainless, cryogenic, all welding position, mix shielding gas, down to -196°C	C	Si	Mn	Ni	Cr
		0.025	0.7	1.4	10.8	18.9
FOXcore 316L-T1 Cryo	Flux-cored wire, E 316L type, high-alloyed, austenitic stainless, cryogenic, all welding position, mix shielding gas, down to -196°C	C	Si	Mn	Ni	Cr
		0.03	0.7	1.4	12.5	18.1

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
Ti	**A5.22 / SFA-5.22**	**17633-A**	M21, M13	CE	+
0.35	EC430 (mod.), EC 439Nb	T Z 17 Nb Ti L M M12/M13 1			
	A5.22 / SFA-5.22	**17633-A**	M12, M13	CE	+
	EC439	T Z 17 Ti L M M12/M13 1			

		AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (11179), CE	🛒
3-8		E308HT0-4(1)	T Z 19 9 H R M21 (C1) 3			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (11151), CE	🛒
2-8		E308HT1-4(1)	T Z 19 9 H P M21 (C1) 1			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CE	+
10-19		T 23 12 L R M21 (C1) 3	T 23 12 L R M21 (C1) 3			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CE	+
10-23		E309LT1-4(1)	T 23 12 L P M21 (C1) 1			
Nb	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21	CE	+
0.9	10-19	E309LNbT0-4	T 23 12 Nb R M21 3			
Nb	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CE	🛒
0.45	2-7	E347T0-4(1)	T 19 9 Nb R M21 (C1) 3			
Nb	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CE	🛒
0.45	2-7	E347HT1-4(1)	T 19 9 Nb P M21 (C1) 1			

		AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CE	🛒
2 - 4		E308LT1-4(1)	T 19 9 L P M21 (C1) 1			
Mo	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (12823), RINA (M21), DNV (M21), LR (M21), CE	🛒
2.1	2 - 4	E316LT1-4(1)	T Z 19 12 3 L P M21 (C1) 1			

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4.4.14 Stainless – Martensitic steels

Product name	Short description	Chemical composition (typical values) in %				
FOXcore 13/4-T1	Flux-cored wire, E 410NiMo type, high-alloyed, soft-martensitic stainless, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	0.9	4.5	12.0
FOXcore 13/4-MC	Metal-cored wire, EC 410 NiMo type, high-alloyed, soft-martensitic stainless	C	Si	Mn	Ni	Cr
		0.023	0.7	0.9	4.6	12.0
FOXcore 13/4-MC F	Metal-cored wire, E410NiMo type, high-alloyed, soft-martensitic stainless, foundries application	C	Si	Mn	Ni	Cr
		0.023	0.7	0.9	4.6	12.2
FOXcore 13/4-MC HD	Metal-cored wire, EC 410 NiMo type, high-alloyed, soft-martensitic stainless, high impact values for heat-treated weld metal and a very low hydrogen content	C	Si	Mn	Ni	Cr
		0.014	0.3	0.6	4.7	12.0

4.4.15 Special applications & dissimilar joints

Product name	Short description	Chemical composition (typical values) in %				
FOXcore 307-MC	Metal-cored wire, EC 307 type, high-alloyed, austenitic stainless, special applications, dissimilar joints, good resistance to embrittlement down to -60°C	C	Si	Mn	Ni	Cr
		0.1	0.6	6.3	9.2	18.8
FOXcore 307-T0	Flux-cored wire, E 307L type, high-alloyed, austenitic stainless, special applications, high ductility and elongation, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.1	0.8	6.8	9.5	18.8
FOXcore 307-T1	Flux-cored wire, E 307L type, high-alloyed, austenitic stainless, special applications, high ductility and elongation, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.1	0.8	6.8	9.0	18.8
FOXcore 309L-T0	Flux-cored wire, E 309L type, high-alloyed, austenitic stainless, special applications for dissimilar joints of Cr and CrNi(Mo)-steels, unalloyed or low-alloyed steels and for cladding of unalloyed or low-alloyed base metals, preferably in flat or horizontal position	C	Si	Mn	Ni	Cr
		0.03	0.7	1.4	12.5	23.0
FOXcore 309L-T0 DG	Flux-cored wire, E 309 type, high-alloyed, austenitic stainless, special applications for surfacing low-alloyed steels and for dissimilar welds between mild steel and stainless steels, mix and 100% CO_2 shielding gases	C	Si	Mn	Ni	Cr
		0.03	0.7	1.2	12.5	23.1
FOXcore 309L-T1	Flux-cored wire, E 309L type, high-alloyed, austenitic stainless, special applications, primarily intended for surfacing low-alloyed steels and for dissimilar welds between mild steel and CrNi stainless steels, all welding position	C	Si	Mn	Ni	Cr
		0.03	0.7	1.4	12.5	23.0
FOXcore 309L-T1 C1	Flux-cored wire, E 309L type, high-alloyed, austenitic stainless, special applications, primarily intended for cladding low-alloyed steels and for dissimilar welds between mild steel and stainless steels, all welding position, 100%CO_2 shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.6	1.3	12.4	23.0
FOXcore 309L-MC	Metal-cored wire, EC 309L type, high-alloyed, austenitic stainless, special applications, for welding dissimilar joints between high-alloyed Cr and corrosion resistant austenitic CrNi(Mo) steels and mild or low-alloyed steels.	C	Si	Mn	Ni	Cr
		0.025	0.6	1.4	12.5	23.0
FOXcore 309LMo-T0	Flux-cored wire, E 309LMo type, high-alloyed, austenitic stainless, special applications, for welding and cladding, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.6	1.4	13.5	23.0
FOXcore 309LMo-T1	Flux-cored wire, E 309LMo type, high-alloyed, austenitic stainless, special applications, for welding and cladding, all welding position, mix shielding gas	C	Si	Mn	Ni	Cr
		0.03	0.7	1.4	12.5	23.0

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
Mo	**A5.22 / SFA-5.22**	**17633-A**	M21, C1	TÜV (18993), CE	
0.5	E410NiMoT1-4(1)	T 13 4 P M21 (C1) 1 H5			
Mo	**A5.22 / SFA-5.22**	**17633-A**	M12	TÜV (12880), LR (M21, supplementary list), CE	
0.6	EC410NiMo (mod.)	T 13 4 M M12 2			
Mo	**A5.22 / SFA-5.22**	**17633-A**	M12	CE	
6	EC410NiMo (mod.)	T 13 4 M M12 2			
Mo	**A5.22 / SFA-5.22**	**17633-A**	M12	CE	
0.5	EC410NiMo (mod.)	T 13 4 M M12 2			

		AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
FN		**A5.22 / SFA-5.22**	**17633-A**	M12	TÜV (10871), DB (43.014.27), CE	
2-7		EC307 (mod.)	T 18 8 Mn M M12 1			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (11101), CE	
2-8		E307T0-G	T 18 8 Mn R M21 (C1) 3			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (11102), CE	
2-8		E307T1-G (mod.)	T 18 8 Mn P M21 (C1) 2			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (05350), DB (43.014.16), DNV, LR, BV, CE	
12-23		E309LT0-4(1)	T 23 12 L R M21 (C1) 3			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, C1	TÜV (19617), DB (43.014.41), CWB, DNV, LR, RINA (M21), BV, CE	
12-23		E309LT0-4/1	T 23 12 L R M21 / C1 3			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21	TÜV (09115), DB (43.014.22), DNV, LR, RINA (M21), BV (Ø 1.2 mm), ABS, CCS (C1), CE	
12-23		E309LT1-4(1)	T 23 12 L P M21 (C1) 1			
		A5.22 / SFA-5.22	**17633-A**	C1	CE	
		E309LT1-1	T 23 12 L P C1 1			
FN		**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	CWB, CE	
12-23		EC309L	T 23 12 L M M12 2			
Mo	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (05351), DB (43.014.17), ABS (M21), DNV, LR (M21), RINA (M21), CWB, CE	
2.7	22-35	E309LMoT0-4(1)	T 23 12 2 L R M21 (C1) 3			
Mo	**FN**	**A5.22 / SFA-5.22**	**17633-A**	M21, (C1)	TÜV (09116), BV (C1 + Ø 1.2 mm), LR, DNV, CWB, ABS (M21), CE	
2.7	23-35	E309LMoT1-4(1)	T 23 12 2 L P M21 (C1) 1			

4.5 FCAW-S – Self-shielded flux-cored wires

4.5.1 Mild steel

Product name	Short description	Chemical composition (typical values) in %			
		C	Si	Mn	Al
diamondspark 31 NG	Flux cored wire, seamless, self-shielded, unalloyed, for on-site fabrication without toughness requirements, all welding position, high resistance to rust	0.25	0.4	1.0	1.5

4.5.2 Pipe steel

Product name	Short description	Chemical composition (typical values) in %				
		C	Si	Mn	Ni	Al
BÖHLER Pipeshield 71 T8-FD	Self-shielded flux cored wire mild steel, for X60 Base material, for pipe welding in vertical down position (5G)	0.045	0.20	1.3	0.8	0.8
BÖHLER Pipeshield 81 T8-FD	Self-shielded flux-cored wire, low alloyed, for X70 Base material, for pipe welding in vertical down position (5G)	C	Si	Mn	Ni	Al
		0.04	0.25	1.6	2.25	0.9

	AWS	EN/ISO	Approvals	JOIN!online
	A5.20 / SFA-A5.20	**17632-A**	CE	
	E71T-11	T46 Z Y NO 1 H10		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.29/SFA-5.29	**17632-A**		
	E71T8-K6	T38 3 Z1Ni Y NO 1 H10		
	A5.29 / FA-5.29	**17632-A**		
	E81T8-G	T46 3 Z2Ni Y NO 1 H10		

4.6 SAW – Solid wires

4.6.1 Mild steel

Product name	Short description	Chemical composition (typical values) in %			
Union S 2	SAW wire, mild steel	C	Si	Mn	
		0.1	0.07	1.1	
Union S 2 Si	SAW wire, mild steel	C	Si	Mn	
		0.1	0.3	1.1	
Union S 3	SAW wire, mild steel	C	Si	Mn	
		0.1	0.07	1.5	
Union S 3 Si	SAW wire, mild steel	C	Si	Mn	
		0.1	0.3	1.65	

4.6.2 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %					
Thermanit MTS 3	SAW wire, low alloyed, creep resistant	C	Si	Mn	Cr	Mo	Ni
		0.11	0.25	0.5	9.0	0.95	0.45
Union S 1 CrMo 2	SAW wire, low alloyed, creep resistant	C	Si	Mn	Cr	Mo	
		0.12	0.08	0.55	2.5	1.0	
Union S 1 CrMo 2 V	SAW wire, low alloyed, creep resistant	C	Si	Mn	Cr	Mo	Nb
		0.1	0.1	1.3	2.3	1.0	0.02
Union S 1 CrMo 5	SAW wire, low alloyed, creep resistant	C	Si	Mn	Cr	Mo	
		0.08	0.3	0.5	5.8	0.6	
Union S 1 CrMo 9	SAW wire, low alloyed, creep resistant	C	Si	Mn	Cr	Mo	
		0.08	0.4	0.5	9.1	1.0	
Union S 2 CrMo	SAW wire, low alloyed, creep resistant	C	Si	Mn	Cr	Mo	
		0.12	0.1	0.8	1.25	0.55	
Union S 2 Mo	SAW wire, low alloyed, creep resistant	C	Si	Mn	Mo		
		0.1	0.15	1.05	0.55		
Union S 3 Mo	SAW wire, low alloyed, creep resistant	C	Si	Mn	Mo		
		0.1	0.15	1.5	0.5		
Union S 4 Mo	SAW wire, low alloyed, creep resistant	C	Si	Mn	Mo		
		0.11	0.1	2.0	0.5		
Thermanit MTS 3-LNi	SAW wire, low alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo
		0.11	0.25	0.65	-	9.0	0.95

AWS	EN/ISO	JOIN!online
A5.17 / SFA-5.17	**14171-A**	
EM12	S2	
A5.17 / SFA-5.17	**14171-A**	
EM12K	S2Si	
A5.17 / SFA-5.17	**14171-A**	
EH10	S3	
A5.17 / SFA-5.17	**14171-A**	
EH12K	S3Si	

				AWS	EN/ISO	JOIN!online
Nb	**V**	**N**		**A5.23 / SFA-5.23**	**24598-A**	
0.06	0.2	0.04		EB91	S S CrMo91	
				A5.23 / SFA-5.23	**24598-A**	
				EB3R	S S CrMo2	
V				**A5.23 / SFA-5.23**	**24598-A**	
0.3				EG	S S ZCrMoV2	
				A5.23 / SFA-5.23	**24598-A**	
				EB6	S S CrMo5	
				A5.23 / SFA-5.23	**24598-A**	
				EB8	S S CrMo9	
				A5.23 / SFA-5.23	**24598-A**	
				EB2R	S S CrMo1	
				A5.23 / SFA-5.23	**14171-A**	
				EA2	S2Mo	
				A5.23 / SFA-5.23	**14171-A**	
				EA4	S3Mo	
				A5.23 / SFA-5.23	**14171-A**	
				EA3	S4Mo	
Nb	**V**	**N**		**A5.23 / SFA-5.23**	**24598-A**	
0.06	0.2	0.045		EB91	S S ZCrMo91	

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4.6.2 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %					
Thermanit MTS 4	SAW wire, low alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo
		0.25	0.15	0.9	0.6	11.2	0.9
Thermanit MTS 616	SAW wire, low alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo
		0.11	0.15	0.5	0.45	8.8	0.45
Thermanit MTS 616 LNi	SAW wire, low alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo
		0.1	0.2	0.5	0.2	8.8	0.5
Thermanit MTS 911	SAW wire, low alloyed, creep resistant	C	Si	Mn	Ni	Cr	Mo
		0.11	0.25	0.45	0.45	9.0	1.0

4.6.3 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %					
Union S Ni1MoCr	SAW wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo	Cr
		0.1	0.55	1.55	0.95	0.5	0.25
Union S 2 NiMo 1	SAW wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo	
		0.11	0.15	1.1	0.95	0.25	
Union S 3 MoTiB	SAW wire, low-alloyed, high strength	C	Si	Mn	Mo	Ti	B
		0.07	0.3	1.2	0.55	0.14	0.013
Union S 3 TiB	SAW wire, low-alloyed, high strength	C	Si	Mn	Ti	B	
		0.07	0.3	1.55	0.15	0.013	
Union S 3 NiMo	SAW wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo	
		0.09	0.1	1.6	1.5	0.45	
Union S 3 NiMo 1	SAW wire, low-alloyed, high strength	C	Si	Mn	Ni	Mo	
		0.12	0.2	1.75	0.95	0.55	
Union S 3 NiMoCr	SAW wire, low-alloyed, high strength	C	Si	Mn	Ni	Cr	Mo
		0.14	0.05	1.75	2.1	0.35	0.6

				AWS	EN/ISO	JOIN!online
W	V	N		A5.23 / SFA-5.23	24598-A	
0.5	0.25	0.3		EG	S S CrMoWV12	
Nb	W	V	N	A5.23 / SFA-5.23	24598-A	
0.06	1.65	0.2	0.04	EG (EB91(mod.))	S S ZCrMoWVNb 9 0.5 1.5	
Nb	W	V	N	A5.23 / SFA-5.23	24598-A	
0.05	1.7	0.2	0.06	EG (EB91(mod.))	S S ZCrMoWVNb 9 0.5 1.5	
Nb	W	V	N	A5.23 / SFA-5.23	24598-A	
0.06	1.0	0.2	0.04	EG (EB91(mod.))	S S ZCrMoWVNb 9 1 1	

AWS	EN/ISO	JOIN!online
A5.23 / SFA-5.23	26304-A	
EG	SZ3Ni0.9MoCr	
A5.23 / SFA-5.23	14171-A	
ENi1	SZ2Ni1Mo0.3	
A5.23 / SFA-5.23	14171-A	
EA2TiB	S2MoTiB	
A5.23 / SFA-5.23	14171-A	
EG	SZ	
A5.23 / SFA-5.23	14171-A	
EG [EF1(mod.)]	S3Ni1.5Mo	
A5.23 / SFA-5.23	26304-A	
EF3	S3Ni1Mo	
A5.23 / SFA-5.23	26304-A	
EG [EF6 (mod.)]	SZ3Ni2.5CrMo	

4.6.4 Low alloy steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %			
Union S 1 Ni 11	SAW wire, low-alloyed, cryogenic	C	Si	Mn	Ni
		0.04	0.3	0.8	11.5
Union S 2 Ni 2,5	SAW wire, low-alloyed, cryogenic	C	Si	Mn	Ni
		0.09	0.1	1.0	2.3
Union S 2 Ni 3,5	SAW wire, low-alloyed, cryogenic	C	Si	Mn	Ni
		0.08	0.15	0.9	3.25

4.6.5 Stainless steel – Austentic steels

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 17/15 TT	SAW wire, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	W	
		0.2	0.4	10.2	14.0	17.5	3.5	
Thermanit 18/17 E Mn	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.4	5.2	17.0	19.0	4.1	0.17
Thermanit 19/15	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.5	7.5	15.5	20.5	3.0	0.17
Thermanit 20/16 SM	SAW wire, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.03	0.7	7.3	18.0	22.3	3.7	0.24
Thermanit 25/22 H	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.1	6.0	22.5	25	2.2	0.12
Thermanit 317L	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.45	1.4	13.5	19.0	3.6	
Thermanit A-318	SAW wire, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Nb
		0.04	0.4	1.8	11.5	19.5	2.6	0.6
Thermanit GE-316L	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.45	1.6	12.2	18.5	2.7	
Thermanit H-347	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Nb	
		0.05	0.4	1.7	9.2	19.2	0.65	
Thermanit JE-308L	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr		
		0.015	0.45	1.6	10.0	20.0		
Thermanit JE-308L Cryo	SAW wire, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	FN	
		0.02	0.4	1.8	11.0	20.0	3 - 8	
Thermanit 20/25 Cu	SAW wire, high-alloyed, austenitic, stainless	C	Si	Mn	Ni	Cr	Mo	Cu
		0.01	0.35	1.6	25.0	20.0	4.5	1.5

AWS	EN/ISO	JOIN!online
A5.23 / SFA-5.23	**26304-A**	
EG	SZNi11	
A5.23 / SFA-5.23	**14171-A**	
ENi2	S2Ni2	
A5.23 / SFA-5.23	**14171-A**	
ENi3	S2Ni3	

AWS	EN/ISO	JOIN!online
	14343-A	
	S Z 17 15 Mn W	
A5.9 / SFA-5.9	**14343-A**	
ER317L (mod.)	S Z 18 16 5 N L	
A5.9 / SFA-5.9	**14343-A**	
ER316LN	S 20 16 3 Mn N L	
	14343-A	
	S Z 22 17 8 4 N L	
A5.9 / SFA-5.9	**14343-A**	
ER310 (mod.)	S 25 22 2 N L	
A5.9 / SFA-5.9	**14343-A**	
ER317L	S 19 13 4 L	
A5.9 / SFA-5.9	**14343-A**	
ER318	S 19 12 3 Nb	
A5.9 / SFA-5.9	**14343-A**	
ER316L	S 19 12 3 L	
A5.9 / SFA-5.9	**14343-A**	
ER347	S 19 9 Nb	
A5.9 / SFA-5.9	**14343-A**	
ER308L	S 19 9 L	
A5.9 / SFA-5.9	**14343-A**	
ER308L	S 19 9 L	
A5.9 / SFA-5.9	**14343-A**	
ER385	S 20 25 5 Cu L	

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4.6.6 Stainless – Dissimilar joints

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 30/10	SAW wire, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	
		0.1	0.4	1.9	30	9	
Thermanit 308 Mo	SAW wire, high-alloyed, austenitic stainless, specal applications	C	Si	Mn	Ni	Cr	Mo
		0.05	0.5	1.3	10.5	20.5	3.3
Thermanit 309L	SAW wire, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	
		0.01	0.35	1.8	13.5	24.0	
Thermanit 309L Mo	SAW wire, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	Mo
		0.02	0.35	1.5	15.0	21.5	2.7
Thermanit X	SAW wire, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	
		0.08	0.9	7.0	9.0	19.0	

4.6.7 Stainless – Duplex

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 22/09	SAW wire, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo
		0.015	0.4	1.5	8.8	23.3	3.2
Thermanit 23/07	SAW wire, high-alloyed, lean duplex stainless	C	Si	Mn	Ni	Cr	Mo
		0.015	0.4	0.75	7.5	23.5	0.25
Thermanit 25/09 CuT	SAW wire, high-alloyed, superduplex stainless	C	Si	Mn	Ni	Cr	Mo
		0.015	0.4	0.9	9.5	26.0	3.8

4.6.8 Stainless – Ferritic steels

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 1720	SAW wire, high-alloyed, ferritic, stainless	C	Si	Mn	Cr	Mo	Ni
		0.2	0.6	0.6	17.5	4.0	0.4

AWS	EN/ISO	JOIN!online
A5.9 / SFA-5.9	**14343-A**	
ER312	S 29 9	
A5.9 / SFA-5.9	**14343-A**	
ER308Mo (mod.)	S 20 10 3	
A5.9 / SFA-5.9	**14343-A**	
ER309LMo (mod.)	S 23 12 2 L	
A5.9 / SFA-5.9	**14343-A**	
ER309LMo (mod.)	S 23 12 2 L	
A5.9 / SFA-5.9	**14343-A**	
ER307 (mod.)	S 18 8 Mn	

			AWS	EN/ISO	JOIN!online
N			**A5.9 / SFA-5.9**	**14343-A**	
0.15			ER2209	S 22 9 3 N L	
N			**A5.9 / SFA-5.10**	**14343-A**	
0.15			**ER2307**	**S 23 7 N L**	
Cu	**W**	**N**	**A5.9 / SFA-5.11**	**14343-A**	
0.6	0.6	0.23	ER2594	S 25 9 4 N L	

AWS	EN/ISO	JOIN!online
A5.9 / SFA-5.9	**14343-A**	
ER430 (mod.)	S Z 17 Mo	

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4.6.9 Stainless – Heat resistant

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 19/10 H	SAW wire, high-alloyed, austenitic stainless,heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.05	0.4	1.6	9.3	18.8	
Thermanit 21/10 N	SAW wire, high-alloyed, heat and creep resistant	C	Si	Mn	Ni	Cr	N
		0.07	1.6	0.5	10	21	0.15
Thermanit 25/04	SAW wire, high-alloyed, austenitic stainless, heat resistant	C	Si	Mn	Ni	Cr	
		0.07	0.8	1.2	4.5	26.0	
Thermanit 308 H	SAW wire, high-alloyed, austenitic stainless,heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.05	0.4	1.7	10	20	
Thermanit 309 H	SAW wire, high-alloyed, austenitic stainless, heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.1	0.9	1.5	11.5	22.5	

4.6.10 Stainless – Martensitic steels

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 13/04 Si	SAW wire, high-alloyed, soft-martensitic stainless	C	Si	Mn	Ni	Cr	Mo
		0.01	0.7	0.7	4.8	12.3	0.5
Thermanit 16/05 Mo	SAW wire, high-alloyed, soft-martensitic stainless	C	Si	Mn	Ni	Cr	Mo
		0.02	0.35	1.3	5.5	16	1

AWS	EN/ISO	JOIN!online
A5.9 / SFA-5.9	**14343-A**	
ER19-10H	S 19 9 H	
	14343-A	
	S 21 10 N	
	14343-A	
	S 25 4	
A5.9 / SFA-5.9	**14343-A**	
ER308H	S 19 9 H	
A5.9 / SFA-5.9	**14343-A**	
ER309 (mod.)	S 22 12 H	

AWS	EN/ISO	JOIN!online
A5.9 / SFA-5.9	**14343-A**	
ER410NiMo (mod.)	S 13 4	
	14343-A	
	S 16 5 1	

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4.7 SAW – Flux-cored wires

4.7.1 Mild steel

Product name	Short description	AWS	EN/ISO
diamondspark S 55 HP	Flux-cored wire, seamless, for SAW, mild steel, high productivity	**A5.17 / SFA-5.17**	**14171-A**
		EC1	T3
diamondspark S 56 HP	Flux-cored wire, seamless, for SAW, mild steel, for multi-run technique as well as 2-run technique	**A5.17 / SFA-5.17**	**14171-A**
		EC1	TZ3

4.7.2 Low alloy steel – High strength

Product name	Short description	AWS	EN/ISO
diamondspark S 550 HP	Flux-cored wire, seamless, for SAW,low alloyed, high strength, high productivity, yield strength> 550 Mpa	**A5.23 / SFA-5.23**	**14171-A**
		ECNi5	TZ3Ni1Mo
diamondspark S 700 HP	Flux-cored wire, seamless, for SAW, low alloyed, high strength, high productivity, yield strength> 690 Mpa, Low level of diffusible hydrogen (max 4 ml/100 gr)	**A5.23 / SFA-5.23**	**26304-A**
		ECF5	TZ3Ni2.5CrMo
diamondspark S 770	Flux-cored wire, seamless, for SAW, low alloyed, high strength, for Q&T steels 690 grades with overmatching requirements	**A5.23 / SFA-5.23**	**26304-A**
		ECF5	TZ
diamondspark S 900 HP	Flux-cored wire, seamless, for SAW, low alloyed, high strength, high productivity, yield strength> 900 Mpa, Low level of diffusible hydrogen (max 4 ml/100 gr)	**A5.23 / SFA-5.23**	**26304-A**
		ECG	TZ3Ni2.5CrMoMn1.9
diamondspark S 960 HP	Flux-cored wire, seamless, for SAW, low alloyed, high strength, high productivity, yield strength> 960 Mpa, Low level of diffusible hydrogen (max 4 ml/100 gr)	**A5.23 / SFA-5.23**	**26304-A**
		ECG	TZ3Ni2.5CrMoMn
diamondspark S NiCu1	Flux-cored wire, seamless, for SAW, low alloyed, high strength, Copper-Nickel alloyed for weather resistant steels	**A5.23 / SFA-5.23**	**14171-A**
		ECG	T2Ni1Cu

	Recommended Flux	JOIN!online
	UV 306, UV 418 TT	
	UV 400	

	Recommended Flux	JOIN!online
	UV 400, UV 418 TT, UV 422 TT-LH, UV 420 TTR-C	
	UV 422 TT-LH	
	UV 418 TT, UV 422 TT-LH	
	UV 422 TT-LH	
	UV 422 TT-LH	
	UV 306, UV 400 (UV 418 TT)	

Further product information available in our webshop. For shopping possibilities contact our local sales team.

4.8 SAW – Fluxes

4.8.1 Mild and low alloy steel

Product name	Short description
Marathon 543	Highly basic flux for creep resistant wire grades P91 and P92. (9-12 %Cr); power generation
UV 305	Rutile flux for fillet welds, single pass and 2-run, high welding speed, water-walls, gas bottles , t< 12mm with unalloyed, and creep resistant wires.
UV 306	Rutile flux for general purpose applications in mild steel, typically t< 25 mm; high welding speed.
UV 309 P	Pipe mill flux especially for 2-run procedures, very low diff hydrogen & low pick up, high current carrying capacity; X42 - X80; Typical wires : Union S 2, S 2 Si, S 2 Mo, S 3 NiMo 1, S 3 TiB, S 3 MoTiB.
UV 310 P	Pipe mill flux especially for 2-run procedures, very low diff hydrogen & low pick up, "copper-tested"; X42 - X80. Typical wires : Union S 2, S 2 Si, S 2 Mo, S 3 NiMo 1, S 3 TiB, S 3 MoTiB.
UV 400	Basic flux for general purpose, fine grained steel grades, with good compromise between operative welding characteristics and mechanical properties.
UV 418 TT	High basic flux for multi-purpose applications in Mild steel and low alloyed wires for high toughness requirements in large thickness. Especially very good results with multi-wire configurations in off-shore wind foundations and towers.
UV 419 TT-W	Highly basic flux for multi-purpose applications in large thickness, especially for high toughness (as welded and PWHT)
UV 420 TT	Standard highly basic flux for as welded conditions and PWHT.
UV 420 TT-LH	Standard highly basic flux for as welded conditions and PWHT with Hdiff < 5 ml/100gr.
UV 420 TTR	Highly basic flux with high purity for nuclear reactors with Union S 3 NiMo 1 and creep resistant applications especially with Union S 2 CrMo and S 1 CrMo 2. Very low level of diffusible hydrogen.
UV 420 TTR-C	Highly basic flux with high purity, optimised to maintain (high) strength after PWHT with very long duration. Also for normalising / quenching and tempering. Reduced Carbon loss. Very low level of diffusible hydrogen.
UV 420 TTR-W	High purity flux for nuclear reactors and creep resistant applications with Union S 2 CrMo and S 1 CrMo 2. Especially designed for AC and high toughness requirements.
UV 422 TT-LH	Highly basic flux for high strength applications with very low diffusible hydrogen and high toughness at low temperatures. Off-shore, heavy lifting constructions, penn stocks.
UV 430 TTR-W	Highly basic flux with high purity, especially designed for pressure vessels with CrMo2V base metal for petrochemical industry. Optimal compromise for high toughness and high creep rupture strength properties.
UV 511 TT	Special flux for matching 9%Ni applications; N&T, Q&T. Cryogenic.

	Bas. index wt%	Grain size	EN/ISO 14174	JOIN!online
	2.9	2.0 mm	S A FB 1 55 DC H5	
	0.6	1.4 mm	S A AR 1 76 AC H5	
	0.6	1.6 mm	S A AR 1 77 AC H5	
	1.3	2.0 mm	S A AB 1 65 AC H5	
	1.5	2.0 mm	S A AB 1 55 AC H5	
	1.8	2.0 mm	S A AB 1 67 AC H5	
	2.7	2.0 mm	S A FB 1 55 AC H5	
	2.6	2.0 mm	S A FB 1 55 AC H5	
	2.5	2.5 mm	S A FB 1 65 DC	
	2.5	2.5 mm	S A FB 1 65 DC H5	
	2.9	2.0 mm	S A FB 1 65 DC H4	
	2.6	2.0 mm	S A FB 1 65 DC H4	
	2.6	2.0 mm	S A FB 1 65 AC H5	
	2.5	2.0 mm	S A FB 1 65 AC H5	
	2.8	1.6 mm	S A FB 1 55 AC	
	3	2.0 mm	S A FB 1 55 AC	

Further product information available in our webshop. For shopping possibilities contact our local sales team.

4.8.2 Stainless steel – Nickel based

Product name	Short description
Marathon 213	Fused flux. For easy slag removal and nice bead aspect with standard stabilised and non stabilised stainless wire grades.
Marathon 801	General purpose flux for standard stabilised and non stabilised stainless wire grades. Easy slag removal and nice bead aspect. The flux compensates Cr-loss.
Marathon 805	Basic flux for a nice welding performance combined with good mechanical properties. Thin fluid slag with self-releasing slag. For stabilised and non stabilised standard stainless wire grades (especially Duplex grades). The flux compensates Cr-loss.
Marathon 431	Basic welding flux for a nice welding performance combined with good mechanical properties. Thin fluid slag with self releasing slag. For stabilised and non stabilised standard stainless wire grades (especially Duplex grades).
Marathon 203	Highly basic flux for good mechanical properties and nice flat shiney weld bead surface. Only for non stabilised austenitic and soft martensitic stainless wire grades.
Marathon 444	Flux with very high basicity index, for good mechanical properties and relative high resistance to hot cracking.
Marathon 104	Flux with very high basicity index for Stainless steel and Nickelbase wire grades, with good mechanical properties and relative high resistance to hot cracking; good slag detachability and nice bead appearance. Especially recommended for cryogenic LNG applications with Thermanit NiMo C276 and 625.
Marathon 504	Neutral flux for especially for Nickelbase wire grades, with good mechanical properties and high resistance to hot cracking; very good slag detachability and nice bead appearance. Also for weld overlay.

	Bas. index wt%	Grain size	EN/ISO 14174	JOIN!online
	1.3	1.6 mm	S F CS 2 DC	
	1.3	1.6 mm	S A GS 2 DC	
	2.0	1.6 mm	S A AF 2 DC	
	2.2	1.6 mm (1.4mm)	S A FB 2 DC	
	2.3	1.6 mm (1.2mm)	S A FB 2 DC	
	2.8	1.6 mm	S A FB 2 AC	
	2.9	2,8 mm / 2,0 mm	S A FB 2 AC	
	1.1	1.6 mm	S A BA 2 AC	

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4.9 SAW – Combinations

4.9.1 Mild steel

Product name	Short description	Chemical composition (typical values) in %		
Union S 2 - UV 305	SAW wire/flux combination, mild steel	C	Si	Mn
		0.06	0.5	1.25
Union S 2 - UV 306	SAW wire/flux combination, mild steel	C	Si	Mn
		0.06	0.6	1.4
Union S 2 - UV 400	SAW wire/flux combination, mild steel	C	Si	Mn
		0.07	0.4	1.4
Union S 2 - UV 420 TT-LH	SAW wire/flux combination, mild steel	C	Si	Mn
		0.07	0.2	1.1
Union S 2 Si - UV 309 P	SAW wire/flux combination, mild steel	C	Si	Mn
		0.08	0.55	1.2
Union S 2 Si - UV 310 P	SAW wire/flux combination, mild steel	C	Si	Mn
		0.08	0.55	1.2
Union S 2 Si - UV 400	SAW wire/flux combination, mild steel	C	Si	Mn
		0.07	0.65	1.4
Union S 2 Si - UV 418 TT	SAW wire/flux combination, mild steel	C	Si	Mn
		0.07	0.3	1.1
Union S 2 Si - UV 419 TT-W	SAW wire/flux combination, mild steel	C	Si	Mn
		0.08	0.4	1.1
Union S 3 Si - UV 418 TT	SAW wire/flux combination, mild steel	C	Si	Mn
		0.08	0.3	1.55
Union S 3 Si - UV 419 TT-W	SAW wire/flux combination, mild steel	C	Si	Mn
		0.08	0.35	1.65
Union S 3 Si - UV 422 TT-LH	SAW wire/flux combination, mild steel	C	Si	Mn
		0.08	0.45	1.55

AWS	EN/ISO	Approvals	JOIN!online
A5.17 / SFA-5.17	**14171-A**		
F7AZ-EM12	S 38 0 AR S2 H5		
A5.17 / SFA-5.17	**14171-A**	TÜV (02590), DB (51.132.04), ABS, DNV GL, LR, CE	
F7A2-EM12-H4	S 42 3 AR S2 H4		
A5.17 / SFA-5.17	**14171-A**	TÜV (06170), DB (51.132.03), ABS, BV, LR, DNV GL, CE	
F7A4-EM12 / F6P4-EM12	S 38 4 AB S2 H5		
A5.17 / SFA-5.17	**14171-A**	TÜV (03358), DB (51.132.02)	
F7A8-EM12-H8 / F6P8-EM12-H8	S 38 6 FB S2 H5		
A5.23 / SFA-5.23	**14171-A**		
F6TA0G-EM12K-H4	S 3T 0 AB S2Si H4		
A5.23 / SFA-5.23	**14171-A**		
F6TA0G-EM12K-H4	S 3T 0 AB S2Si H5		
A5.17 / SFA-5.17	**14171-A**		
F7A4-EM12K / F7P6-EM12K	S 42 4 AB S2Si H5		
A5.17 / SFA-5.17	**14171-A**		
F7A8-EM12K / F6P8-EM12K	S 42 5 FB S2Si H5		
A5.17 / SFA-5.17	**14171-A**		
F7A8-EM12K / F6P8-EM12K	S 42 5 FB S2Si H5		
A5.17 / SFA-5.17	**14171-A**	TÜV (07276), DB (51.132.05), CE, DNV GL, LR, BV, ABS	
F7A8-EH12K / F7P8-EH12K	S 46 6 FB S3Si H5		
A5.17 / SFA-5.17	**14171-A**	TÜV (12935)	
F7A8-EH12K / F7P8-EH12K	S 46 6 FB S3Si H5		
A5.17 / SFA-5.17	**14171-A**		
F7A8-EH12K-H4 / 7P8-EH12K-H4	S 46 6 FB S3Si H4		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

4.9.2 Low alloy steel – Creep resistant

Product name	Short description	Chemical composition (typical values) in %							
Thermanit MTS 3 - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.09	0.22	0.7	0.45	8.9	0.95	0.05	0.18
Thermanit MTS 3 LNi - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Ni	Cr	Mo	Nb	V
		0.09	0.2	0.8	<0.15	8.9	0.95	0.05	0.18
Thermanit MTS 4 - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Ni	Cr	Mo	W	V
		0.18	0.2	0.9	0.6	11.2	0.88	0.5	0.22
Thermanit MTS 616 - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.09	0.15	0.7	0.4	8.7	0.43	0.05	1.65
Thermanit MTS 616 LNi - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.1	0.2	0.7	0.2	9.0	0.5	0.04	1.7
Thermanit MTS 911 - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Ni	Cr	Mo	Nb	W
		0.09	0.22	0.6	0.45	8.9	0.98	0.05	1.0
Union S 1 CrMo 2 - UV 305	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.07	0.35	0.8	2.3	1.0			
Union S 1 CrMo 2 - UV 420 TT-LH	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.08	0.25	0.7	2.3	0.95			
Union S 1 CrMo 2 - UV 420 TTR	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.08	0.2	0.75	2.3	1.0			
Union S 1 CrMo 2 - UV 420 TTR-C	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.1	0.2	0.8	2.4	1.0			
Union S 1 CrMo 2 - UV 420 TTR-W	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.1	0.15	0.75	2.3	1.0			
Union S 1 CrMo 2 V - UV 430 TTR-W	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo	V		
		0.1	0.1	1.2	2.3	1.0	0.,3		
Union S 1 CrMo 5 - UV 420 TT-LH	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.06	0.5	0.7	5.4	0.6			
Union S 1 CrMo 5 - UV 420 TTR-C	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.09	0.45	0.8	5.4	0.6			
Union S 1 CrMo 9 - Marathon 543	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.07	0.3	0.6	8.7	0.95			
Union S 2 CrMo - UV 305	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.07	0.4	0.9	1.15	0.5			
Union S 2 CrMo - UV 419 TT-W	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.08	0.25	0.9	1.15	0.48			
Union S 2 CrMo - UV 420 TT-LH	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.08	0.25	0.95	1.15	0.5			

		AWS	EN/ISO	Approvals	JOIN!online
N		A5.23 / SFA 5.23	24598-A	TÜV (06527), CE	
0.04		F9PZ-EB91-B91-H4	S S CrMo91 FB		
N		A5.23 / SFA 5.23	24598-A		
0.04		F9PZ-EB91-B91-H4	S S ZCrMo91 FB		
N		A5.23 / SFA 5.23	24598-A		
0.3		F9PZ-EG-G-H4	S S CrMoWV12 FB		
V	N	A5.23 / SFA 5.23	24598-A	TÜV (09391), CE	
0.18	0.04	F9PZ-EG-G-H4	S S ZCrMoWVNb9 0.5 1.5 FB		
V	N	A5.23 / SFA 5.23	24598-A		
0.2	0.05	F9PZ-EG-G-H4	S S ZCrMoWVNb9 0.5 1.5 FB		
V	N	A5.23 / SFA 5.23	24598-A	TÜV (09228), CE	
0.18	0.035	F9PZ-EG-G-H4	S S ZCrMoWVNb9 1 1 FB		
		A5.23 / SFA 5.23	24598-A	TÜV (10284), CE	
		F11AZ-EB3R-B3	S S CrMo2 AR		
		A5.23 / SFA 5.23	24598-A	TÜV (05209), DB (51.132.02), CE	
		F8P2-EBR3-B3-H8	S S CrMo2 FB		
		A5.23 / SFA 5.23	24598-A	TÜV (02734), CE	
		F9P2-EB3R-B3R-H4	S S CrMo2 FB		
		A5.23 / SFA 5.23	24598-A		
		F9P2-EB3R-B3R-H4	S S CrMo2 FB		
		A5.23 / SFA 5.23	24598-A	TÜV (06541), CE	
		F9P2-EB3R-B3R-H8	S S CrMo2 FB		
		A5.23 / SFA 5.23	24598-A	TÜV (10231), CE	
		F9PZ-EG-G	S S ZCrMoV2 FB		
		A5.23 / SFA 5.23			
		F7P0-EB6-B6-H8			
		A5.23 / SFA 5.23			
		F8PZ-EB6-B6-H4			
		A5.23 / SFA 5.23	24598-A		
		F8PZ-EB8-B8-H4	S S CrMo9 FB		
		A5.23 / SFA-5.23	24598-A	TÜV (10290), CE	
		F10AZ-EB2R-B2	S S CrMo1 AR		
		A5.23 / SFA-5.23	24598-A	TÜV (18746), CE	
		F8P2-EB2R-B2	S S CrMo1 FB		
		A5.23 / SFA 5.23	24598-A	TÜV (01794), CE	
		F8P2-EB2R-B2-H8	S S CrMo1 FB		

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Product name	Short description	Chemical composition (typical values) in %							
Union S 2 CrMo - UV 420 TTR	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.08	0.2	1.0	1.15	0.5			
Union S 2 CrMo - UV 420 TTR-C	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.1	0.2	1.0	1.15	0.55			
Union S 2 CrMo - UV 420 TTR-W	SAW wire/flux combination, low-alloyed	C	Si	Mn	Cr	Mo			
		0.08	0.2	1.0	1.1	0.5			
Union S 2 Mo - UV 305	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.06	0.5	1.2	0.5				
Union S 2 Mo - UV 306	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.06	0.6	1.4	0.5				
Union S 2 Mo - UV 400	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.06	0.35	1.35	0.5				
Union S 2 Mo - UV 418 TT	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.07	0.25	1.1	0.5				
Union S 2 Mo - UV 420 TT-LH	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.07	0.25	1.05	0.45				
Union S 3 Mo - UV 420 TT-LH	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.06	0.25	1.5	0.45				
Union S 3 Mo - UV 420 TTR	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.06	0.2	1.5	0.45				
Union S 4 Mo - UV 420 TTR	SAW wire/flux combination, low-alloyed	C	Si	Mn	Mo				
		0.07	0.2	1.85	0.45				

		AWS	EN/ISO	Approvals	JOIN!online
		A5.23 / SFA 5.23	**24598-A**	TÜV (03439), CE	
		F8P4-EB2R-B2R-H4	S S CrMo1 FB		
		A5.23 / SFA 5.23	**24598-A**		
		F8P2-EB2R-B2R-H4	S S CrMo1 FB		
		A5.23 / SFA 5.23	**24598-A**	TÜV (03439), CE	
		F8P4-EB2R-B2R-H8	S S CrMo1 FB		
		A5.23 / SFA-5.23	**14171-A**	TÜV (11214), CE	
		F8A0-EA2-A2	S 46 0 AR S2Mo H5		
		A5.23 / SFA-5.23	**14171-A**	TÜV (7739), CE	
		F8A2-EA2-A2-H4	S 46 2 AR S2Mo H4		
		A5.23 / SFA-5.23	**14171-A**	TÜV (06233), DB (51.132.03), ABS, BV, DNV GL, LRS, CE	
		F8A4-EA2-A2 / F8P4-EA2-A2	S 46 4 AB S2Mo H5		
		A5.23 / SFA-5.23	**14171-A**	TÜV (11576), DB (51.132.05), CE, LR	
		F8A6-EA2-A2 / F8P6-EA2-A2	S 46 4 FB S2Mo H5		
		A5.23 / SFA-5.23	**14171-A**	TÜV (01793), CE	
		F8A4-EA2-A2-H8 / F8P4-EA2-A2-H8	S 46 4 FB S2Mo H5		
		A5.23 / SFA-5.23	**14171-A**	TÜV (01796), CE	
		F8A4-EA4-A4-H8 / F8P6-EA4-A4-H8	S 46 4 FB S3Mo H5		
		A5.23 / SFA-5.23	**14171-A**	TÜV (03441), CE	
		F8A4-EA4-A4-H4 / F8P6-EA4-A4-H4	S 46 4 FB S3Mo H4		
		A5.23 / SFA-5.23	**14171-A**		
		F9A4-EA3-A3-H4 / F8P6-EA3-A3-H4	S 50 4 FB S4Mo H4		

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4.9.3 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %					
Union S 2 Mo - UV 309 P	SAW wire/flux combination, mild steel	C	Si	Mn	Mo		
		0.07	0.3	1.15	0.5		
Union S 2 Mo - UV 310 P	SAW wire/flux combination, mild steel	C	Si	Mn	Mo		
		0.07	0.25	1.15	0.5		
Union S 2 NiMo 1 - UV 418 TT	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.06	0.2	1.2	0.93	0.25	
Union S 2 NiMo 1 - UV 419 TT-W	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.08	0.2	1.3	0.95	0.25	
Union S 2 NiMo 1 - UV 420 TTR-C	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.09	0.25	1.3	0.93	0.25	
Union S 3 TiB - UV 309 P	SAW wire/flux combination, mild steel	C	Si	Mn	Ti	B	
		0.05	0.4	1.3	0.02	0.003	
Union S 3 TiB - UV 310 P	SAW wire/flux combination, mild steel	C	Si	Mn	Ti	B	
		0.05	0.3	1.3	0.02	0.003	
Union S 3 MoTiB - UV 309 P	SAW wire/flux combination, mild steel	C	Si	Mn	Ti	B	
		0.05	0.4	1.3	0.02	0.003	
Union S 3 MoTiB - UV 310 P	SAW wire/flux combination, mild steel	C	Si	Mn	Mo	Ti	B
		0.05	0.3	1.3	0.5	0.02	0.003
Union S 3 MoTiB - UV 419 TT-W	SAW wire/flux combination, mild steel	C	Si	Mn	Mo	Ti	B
		0.05	0.35	1.3	0.5	0.02	0.003
Union S 3 NiMo - UV 420 TTR	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.05	0.2	1.6	1.45	0.4	
Union S 3 NiMo - UV 420 TTR-W	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.05	0.2	1.6	1.45	0.4	
Union S 3 NiMo 1 - UV 418 TT	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.08	0.2	1.55	0.9	0.5	
Union S 3 NiMo 1 - UV 419 TT-W	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.08	0.25	1.6	0.9	0.5	
Union S 3 NiMo 1 - UV 420 TTR-C	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.1	0.3	1.75	0.95	0.55	
Union S 3 NiMo 1 - UV 420 TTR-W	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	
		0.08	0.25	1.7	0.9	0.55	
Union S 3 NiMoCr - UV 418 TT	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	Cr
		0.08	0.15	1.6	2	0.58	0.32
Union S Ni1MoCr - UV 420 TTR-C	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Mo	Cr
		0.09	0.5	1.7	0.9	0.45	0.24

AWS	EN/ISO	Approvals	JOIN!online
A5.23 / SFA-5.23	**14171-A**		
F8TA4G-EA2-H4	S 4T 4 AB S2Mo H4		
A5.23 / SFA-5.23	**14171-A**		
F8TA4G-EA2-H4	S 4T 4 AB S2Mo H4		
A5.23 / SFA-5.23	**14171-A**	LRS 5Y46M, DNV VY46M, ABS 5YQ460M	
F8A10-ENi1-Ni1 - F8P10-ENi1-Ni1	S 50 6 FB SZ2Ni1Mo0.3 H5		
A5.23 / SFA 5.23	**14171-A**		
F8A10-ENi1-Ni1 - F8P10-ENi1-Ni1	S 50 6 FB SZ2Ni1Mo0.3 H5		
A5.23 / SFA-5.23	**14171-A**		
F8A8-ENi1-Ni1-H4 / F8P8-ENi1-Ni1-H4	S 50 6 FB SZ2Ni1Mo0.3 H4		
A5.23 / SFA-5.23	**14171-A**		
F8TA6G-EG-H4	S 5T 5 AB SZ H4		
A5.23 / SFA-5.23	**14171-A**		
F8TA6G-EG-H4	S 5T 5 AB SZ H4		
A5.23 / SFA-5.23	**14171-A**	TÜV (10450 : UV 309 P / Union S 3 Mo + 2 x Union S 3 MoTiB)	
F9TA6G-EA2TiB-H4	S 5T 5 AB S2MoTiB H4		
A5.23 / SFA-5.23	**14171-A**		
F9TA6G-EA2TiB-H4	S 5T 5 AB S2MoTiB H4		
A5.23 / SFA-5.23	**14171-A**		
F9TA6G-EA2TiB	S 5T 5 FB S2MoTiB H5		
A5.23 / SFA-5.23	**26304-A**	TÜV (03442), CE	
F9A8-EG-F1-H4 / F9P8-EG-F1-H4	S 50 6 FB S3Ni1.5Mo H4		
A5.23 / SFA-5.23	**26304-A**		
F9A8-EG-F1-H8 / F9P8-EG-F1-H8	S 50 6 FB S3Ni1.5Mo H5		
A5.23 / SFA-5.23	**26304-A**	TÜV (11587), CE, LR, DNV	
F9A8-EF3-F3 / F9A8-EF3-F3	S 55 6 FB S3Ni1Mo H5		
A5.23 / SFA-5.23	**26304-A**		
F9A8-EF3-F3 / F9P8-EF3-F3	S 55 6 FB S3Ni1Mo H5		
A5.23 / SFA-5.23	**26304-A**		
F10A6-EF3-F3-H4 / F9P6-EF3-F3-H4	S 62 4 FB S3Ni1Mo H5		
A5.23 / SFA-5.23	**26304-A**		
F9A8-EF3-F3-N-H4 / F9P8-EF3-F3-N-H4	S 55 4 FB S3Ni1Mo H4		
A5.23 / SFA-5.23	**26304-A**	TÜV (11585), CE, ABS, BV, DB, DNV GL, LR	
F11A8-EG-F6 / F11P4-EG-F6	S 69 6 FB SZ3Ni2.5CrMo H5		
A5.23 / SFA-5.23	**26304-A**		
F10A6-EG-G-H4 / F9P6-EG-G-H4	S 62 4 FB SZ3Ni0.9MoCr H4		

4.9.3 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %					
Union S 3 NiMoCr - UV 422 TT-LH	SAW wire/flux combination, mild steel	C	Si	Mn	Ni	Cr	Mo
		0.07	0.35	1.65	2.0	0.35	0.55
Union S 4 Mo - UV 309 P	SAW wire/flux combination, mild steel	C	Si	Mn	Mo		
		0.07	0.25	1.55	0.45		
Union S 4 Mo - UV 310 P	SAW wire/flux combination, mild steel	C	Si	Mn	Mo		
		0.07	0.2	1.55	0.45		

4.9.4 Low alloy steel – Low temperature

Product name	Short description	Chemical composition (typical values) in %					
Union S 1 Ni 11 - UV 511 TT	SAW wire/flux combination, low-alloyed, cryogenic	C	Si	Mn	Ni		
		0.04	0.3	0.8	11.5		
Union S 2 Ni 2,5 - UV 418 TT	SAW wire/flux combination, low-alloyed, cryogenic	C	Si	Mn	Ni		
		0.07	0.2	1.0	2.2		
Union S 2 Ni 3,5 - UV 418 TT	SAW wire/flux combination, low-alloyed, cryogenic	C	Si	Mn	Ni		
		0.06	0.2	1.0	3.25		

AWS	EN/ISO	Approvals	JOIN!online
A5.23 / SFA-5.23	**26304-A**		
F11A10-EG-F6-H4 / F11P8-EG-F6-H4	S 69 6 FB SZ3Ni2.5CrMo H4		
A5.23 / SFA-5.23	**14171-A**		
F8TA4G-EA3-H4	S 4T 4 AB S4Mo H4		
A5.23 / SFA-5.23	**14171-A**		
F8TA4G-EA3-H4	S 4T 4 AB S4Mo H4		

AWS	EN/ISO	Approvals	JOIN!online
A5.23 / SFA-5.23	**26304-A**		
F11AZ-EG-G / F10PZ-EG-G	S 69 Z FB SZ1Ni11 H5		
A5.23 / SFA-5.23	**14171-A**	TÜV (11575), DB (), LR, DNV, ABS, BV, CE	
F8A10-ENi2-Ni2 / F7P10-ENi2-Ni2	S 46 8 FB S2Ni2 H5		
A5.23 / SFA-5.23	**14171-A**		
F7A15-ENi3-Ni3 / F7P15-ENi3-Ni3	S 42 8 FB S2Ni3 H5		

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4.9.5 Stainless steel – Austenitic steels

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 17/15 TT - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless, cryogenic	C	Si	Mn	Ni	Cr	W	
		0.18	0.5	9.3	14.0	17.2	3.4	
Thermanit 18/17 E Mn - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.5	4.5	16.8	18.5	4.1	0.15
Thermanit 20/16 SM - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.02	0.7	7.0	18.0	21.8	3.7	0.2
Thermanit 20/25 Cu - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Cu
		0.02	0.45	1.6	25.0	19.7	4.5	1.5
Thermanit 20/25 Cu - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Cu
		0.015	0.5	1.2	25.0	20.5	4.5	1.5
Thermanit 25/22 H - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	Cu
		0.015	0.5	1.2	25.0	20.5	4.5	1.5
Thermanit 317L - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.6	1.2	13.4	19.5	3.6	
Thermanit GE-316L - Marathon 203	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.55	1.3	12.1	18.0	2.7	
Thermanit GE-316L - Marathon 213	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.015	0.7	1.1	12.2	17.9	2.6	
Thermanit GE-316L - Marathon 431	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.55	1.2	12.2	18.0	2.7	
Thermanit GE-316L - Marathon 801	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.9	1.0	12.2	18.5	2.7	
Thermanit GE-316L - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.6	1.2	12.2	19	2.7	
Thermanit H-347 - Marathon 213	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Mo	
		0.05	0.6	1.3	9.2	18.7	0.5	
Thermanit H-347 - Marathon 431	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Nb	
		0.04	0.6	1.3	9.2	18.8	0.55	
Thermanit H-347 - Marathon 801	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Nb	
		0.04	0.9	1.0	9.2	19.2	0.55	
Thermanit H-347 - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Nb	
		0.04	0.6	1.3	9.2	19.5	0.55	
Thermanit JE-308L - Marathon 203	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.015	0.55	1.3	9.8	19.5		
Thermanit JE-308L - Marathon 213	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.016	0.65	1.1	9.8	19.5		

AWS	EN/ISO	Approvals	JOIN!online
			+
			+
			+
		TÜV (07213), CE	+
			+
		TÜV (06666), CE	+
			+
		TÜV (09175), CE	+
		TÜV (09613), DNV GL, LR, CE	+
		TÜV (06113), CE	+
			+
		TÜV (06036), DNV GL, CE	+
		TÜV (09613), CE	+
		TÜV (06479), CE	+
			+
			+
		TÜV (09170), CE	+
		TÜV (09612), CE	+

Product name	Short description	Chemical composition (typical values) in %						
Thermanit JE-308L - Marathon 431	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.015	0.6	1.3	9.8	19.5		
Thermanit JE-308L - Marathon 801	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.015	0.9	1.0	10.0	20.0		
Thermanit JE-308L - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless	C	Si	Mn	Ni	Cr		
		0.015	0.6	1.2	10.0	20.5		
Thermanit JE-308L Cryo - Marathon 203	SAW wire/flux combination, high-alloyed, austenitic stainless, cryogenic	C	Si	Mn	Ni	Cr	FN	
		0.02	0.5	1.5	10.8	19.5	3 - 8	
Thermanit JE-308L Cryo - Marathon 431	SAW wire/flux combination, high-alloyed, austenitic stainless, cryogenic	C	Si	Mn	Ni	Cr	FN	
		0.02	0.55	1.5	10.8	19.5	3 - 8	
Thermanit A-318 - Marathon 213	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Mo	Nb
		0.04	0.6	1.2	11.5	19.0	2.6	0.5
Thermanit A-318 - Marathon 431	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Mo	Nb
		0.04	0.5	1.3	11.5	19.0	2.6	0.5
Thermanit A-318 - Marathon 801	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Mo	Nb
		0.04	0.9	1.1	11.5	19.5	2.6	0.5
Thermanit A-318 - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, stabilized	C	Si	Mn	Ni	Cr	Mo	Nb
		0.04	0.5	1.3	11.5	20.0	2.6	0.5

	AWS	EN/ISO	Approvals	JOIN!online
			TÜV (06114), CE	+
				+
			TÜV (07632), DNV GL, CE	+
				+
				+
			TÜV (09616), CE	+
			TÜV (06985), CE	+
				+
				+

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4.9.6 Stainless steel – Dissimilar joints

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 30/10 - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr		
		0.1	0.6	1.6	8.8	30.5		
Thermanit 308 Mo - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	Mo	
		0.04	0.7	1.0	10.5	21.0	3.3	
Thermanit 309L - Marathon 213	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr		
		0.01	0.7	1.3	13.5	23.5		
Thermanit 309L - Marathon 801	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr		
		0.01	0.95	1.2	13.5	24.0		
Thermanit 309L - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.6	1.4	13.5	24.5	2.6	
Thermanit 309L Mo - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr	Mo	
		0.01	0.5	1.1	14.8	22.0	2.6	
Thermanit X - Marathon 203	SAW wire/flux combination, high-alloyed, austenitic stainless, special applications	C	Si	Mn	Ni	Cr		
		0.06	0.8	6.0	9.0	18.7		

4.9.7 Stainless steel – Duplex

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 22/09 - Marathon 431	SAW wire/flux combination, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.015	0.5	1.3	8.8	22.8	3.1	0.14
Thermanit 22/09 - Marathon 805	SAW wire/flux combination, high-alloyed, duplex stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.015	0.5	1.1	8.8	23.5	3.2	0.14
Thermanit 23/07 - Marathon 805	SAW wire/flux combination, high-alloyed, lean duplex stainless	C	Si	Mn	Ni	Cr	Mo	N
		0.015	0.7	0.6	7.4	24.0	0.25	0.13
Thermanit 25/09 CuT - Marathon 431	SAW wire/flux combination, high-alloyed, stainless, superduplex	C	Si	Mn	Ni	Cr	Mo	Cu
		0.015	0.5	0.7	9.5	25.5	3.8	0.5
Thermanit 25/09 CuT - Marathon 805	SAW wire/flux combination, high-alloyed, stainless, superduplex	C	Si	Mn	Ni	Cr	Mo	Cu
		0.015	0.5	0.7	9.5	26.0	3.8	0.5

4.9.8 Stainless steel – Ferritic steels

Product name	Short description	Chemical composition (typical values) in %						
Thermanit 1720 - Marathon 203	SAW wire/flux combination, high-alloyed, ferritic stainless	C	Si	Mn	Ni	Cr	Mo	
		0.15	0.7	0.55	0.4	17.0	1.1	

	AWS	EN/ISO	Approvals	JOIN!online
				+
				+
			TÜV (09617), CE	+
				+
				+
				+
				+

		AWS	EN/ISO	Approvals	JOIN!online
		A5.9	**14343-A**	TÜV (06112), ABS, DNV GL, LR, CE	+
		ER2209	S 22 9 3 N L		
		A5.9	**14343-A**	TÜV (05546), DNV GL, LR, CE	+
		ER2209	S 22 9 3 N L		
		A5.9	**14343-A**	TÜV (10011), CE	+
		ER2307	S 23 7 N L		
W	**N**	**A5.9**	**14343-A**	ABS, DNV GL, BV	+
0.6	0.2	ER2594	S 25 9 4 N L		
W	**N**	**A5.9**	**14343-A**		+
0.6	0.21	ER2594	S 25 9 4 N L		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.9	**14343-A**		+
	ER430 (mod.)	S Z 17 Mo		

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4.9.9 Stainless steel – Heat resistant

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 19/10 H - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless, heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.05	0.5	1.3	9.3	18.5	
Thermanit 21/10 N - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, heat and creep resistant	C	Si	Mn	Ni	Cr	N
		0.07	1.7	0.3	9.5	21.5	0.15
Thermanit 25/04 - Marathon 431	SAW wire/flux combination, high-alloyed, austenitic stainless, heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.06	0.9	0.9	4.5	25.5	
Thermanit 308 H - Marathon 805	SAW wire/flux combination, high-alloyed, austenitic stainless, heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.05	0.6	1.3	10.0	20.5	
Thermanit 309 H - Marathon 104	SAW wire/flux combination, high-alloyed, austenitic stainless, heat and creep resistant	C	Si	Mn	Ni	Cr	
		0.1	1.0	1.2	11.5	22.2	

4.9.10 Stainless steel – Martensitic steel

Product name	Short description	Chemical composition (typical values) in %					
Thermanit 13/04 Si - Marathon 203	SAW wire/flux combination, high-alloyed, martensitic stainless	C	Si	Mn	Ni	Cr	Mo
		0.01	0.8	0.7	4.7	12.0	0.5
Thermanit 16/05 Mo - Marathon 203	SAW wire/flux combination, high-alloyed, martensitic stainless	C	Si	Mn	Ni	Cr	Mo
		0.02	0.5	1.1	5.0	15.6	1.0

	AWS	EN/ISO	Approvals	JOIN!online
	A5.9	14343-A	TÜV (11232), CE	+
	ER19-10H	S 19 9 H		
		14343-A		+
		S 21 10 N		
		14343-A		+
		S 25 4		
	A5.9	14343-A		+
	ER308H	S 19 9 H		
	A5.9	14343-A		+
	ER309(mod.)	S 22 12 H		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.9	14343-A		+
	ER410NiMo(mod.)	S 13 4		
		14343-A		+
		S 16 5 1		

4.10 SAW – Combinations seamless

4.10.1 Mild steel

Product name	Short description	Chemical composition (typical values) in %		
diamondspark S 55 HP - UV 306	SAW-flux cored wire/flux combination with an aluminate-rutile flux, for welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 500 MPa.Very low level of diffusible hydrogen.	C	Si	Mn
		0.04	0.7	1.75
diamondspark S 55 HP - UV 418 TT	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity for welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 460 Mpa.Very low level of diffusible hydrogen and mechanical properties down to -60°C.	C	Si	Mn
		0,07	0,4	1,4
diamondspark S 56 HP - UV 400	SAW-flux cored wire/flux combination with an aluminate-basic flux for welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 460 Mpa. Very low diffusible hydrogen and good for high heat-input at high welding speed.	C	Si	Mn
		0.06	0.3	1.6

4.10.2 Low alloy steel – High strength

Product name	Short description	Chemical composition (typical values) in %		
diamondspark S 550 HP - UV 400	SAW-flux cored wire/flux combination with an aluminate-basic flux, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 550 MPa.	C	Si	Mn
		0.06	0.4	1.7
diamondspark S 550 HP - UV 422 TT-LH	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 550 MPa.Very low level of diffusible hydrogen.	C	Si	Mn
		0.07	0.4	1.4
diamondspark S 550 HP-UV 420 TTR-C	SAW-flux cored wire/ flux combination with an agglomerate fluoride basic flux high basicity, for joint welding of pipe steels API-5L X70 and other high-strength, quenched and tempered fine grained structural steels up to MSYS = 550 MPa. Suitable for different welding conditions: as welded, annealed, quenched and tempered, Normalized and annelead	C	Si	Mn
		0.09	0.3	1.55
diamondspark S 700 HP - UV 422 TT-LH	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 690 MPa. Very low level of diffusible hydrogen.	C	Si	Mn
		0.05	0.3	1.6
diamondspark S 770 - UV 418 TT	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 690 Mpa with requirements concerining overmatching.	C	Si	Mn
		0.06	0.3	1.7
diamondspark S 770 - UV 422 TT-LH	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 690 Mpa with requirements concerining overmatching and very low level of diffusible hydrogen.	C	Si	Mn
		0.06	0.4	1.7
diamondspark S 900 HP - UV 422 TT-LH	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 890 MPa. Very low level of diffusible hydrogen.	C	Si	Mn
		0.08	0.4	1.9
diamondspark S 960 HP - UV 422 TT-LH	SAW-flux cored wire/flux combination with a fluoride-basic flux high basicity, for joint welding of quenched and tempered fine grained structural steels up to MSYS = 960 MPa. Very low level of diffusible hydrogen.	C	Si	Mn
		0.1	0.3	1.85
diamondspark S NiCu1 - UV 306	SAW-flux cored wire/flux combination with an aluminate-rutile flux, for weather resistant applications.	C	Si	Mn
		0.04	0.6	1.5
diamondspark S NiCu1 - UV 400	SAW-flux cored wire/flux combination with an aluminate-basic flux, for weather resistant applications.	C	Si	Mn
		0.04	0.35	1.4
diamondspark S NiCu1 - UV 418 TT	SAW-flux cored wire/flux combination with a fluoride-basic flux, for weather resistant applications with higher mechanical properties requirements	C	Si	Mn
		0.06	0.45	1.2

AWS	EN/ISO	Approvals	JOIN!online
A5.17 / SFA-5.17	**14171-A**	TÜV (19473); DB (51.052.01/01)	+
F7A5-ECG-H4	S 50 4 AR T3 H5		
A5.17 / SFA-5.17	**14171-A**	TÜV (19044), DNV, LR, ABS	+
F7A8-EC1 / F7P8-EC1	S 46 6 FB T3 H5		
A5.17 / SFA-5.17	**14171-A**	TUV (19505), DB (51.052.02, 52.052.02), CE ; ABS (5YQ460M H5 ; 4Y400T H5) ; DNV, LR	+
F7A8-ECG / F7P8-ECG	S 46 6 AB TZ3 H5		

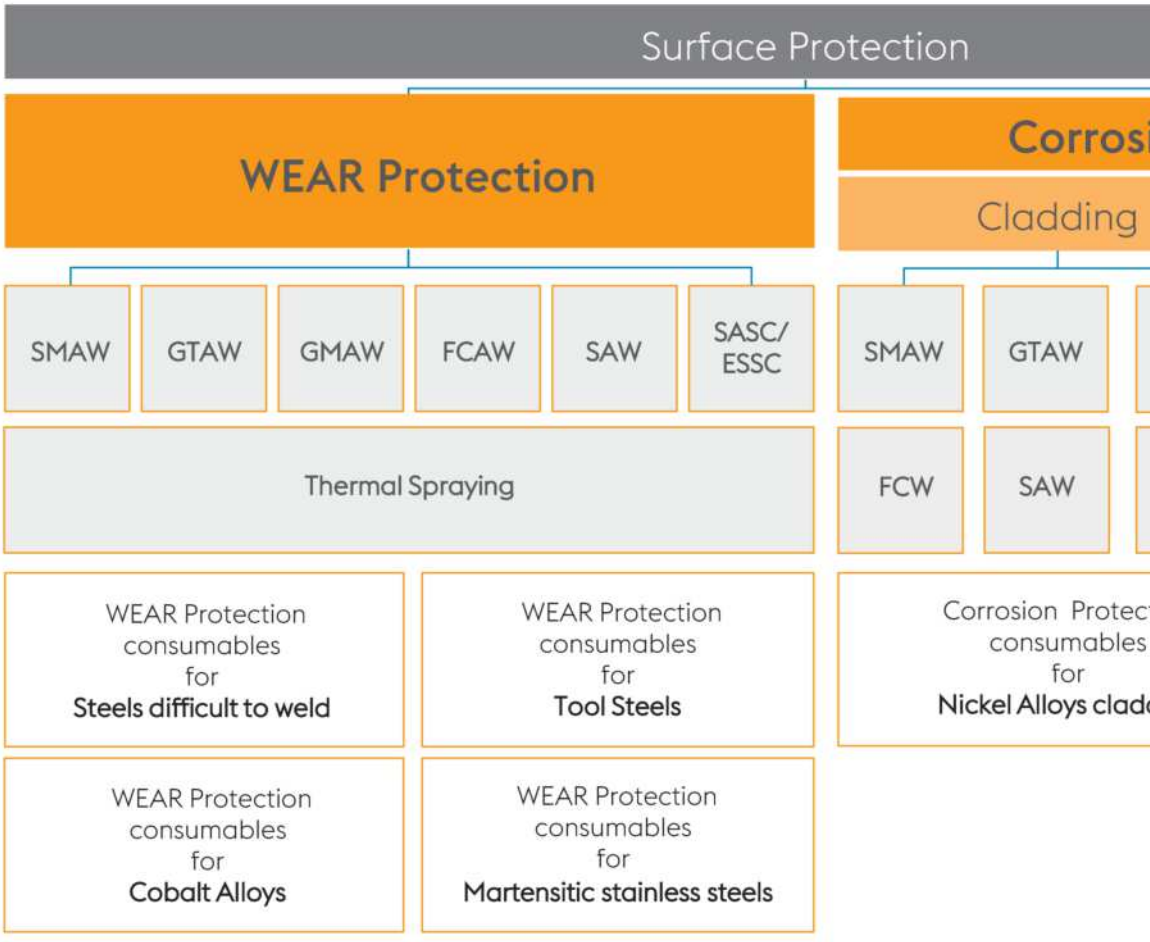
			AWS	EN/ISO	Approvals	JOIN!online
Ni	**Mo**		**A5.23 / SFA-5.23**	**14171-A**		+
0.9	0.3		F9A8-ECNi5-Ni5	S 50 6 AB TZ3Ni1Mo H5		
Ni	**Mo**		**A5.23 / SFA-5.23**	**14171-A**		+
0.9	0.3		F9A8-ECNi5-Ni5-H4	S 50 6 FB TZ3Ni1Mo H4		
Ni	**Mo**		**A5.23 / SFA-5.23**	**14171-A**	TÜV (19955)	+
0.9	0.3		F9A8-ECNi5-Ni5-H4 / F8P8-ECNI5-Ni5-H4	S 50 6 FB TZ3Ni1Mo H4		
Ni	**Cr**	**Mo**	**A5.23 / SFA-5.23**	**26304-A**	ABS, DNV GL, LRS, CE	+
2.7	0.3	0.5	F11A10-ECF5-F5 H4/ F11P6-ECF5-F5 H4	S 69 6 FB TZ H5		
Ni	**Cr**	**Mo**	**A5.23 / SFA-5.23**	**26304-A**	ABS, DNV GL, LRS, CE	+
2.5	0.5	0.5	F11A10-ECF5-F5 / F11P6-ECF5-F5	S 69 6 FB TZ H5		
Ni	**Cr**	**Mo**	**A5.23 / SFA-5.23**	**26304-A**		+
2.4	0.4	0.5	F12A6-ECF5-H4	S 69 5 FB TZ H4		
Ni	**Cr**	**Mo**	**A5.23 / SFA-5.23**	**26304-A**		+
2.6	0.5	0.6	F13A8-ECG-G-H4	S 89 6 FB TZ3Ni2.5CrMoMn1.9 H4		
Ni	**Cr**	**Mo**	**A5.23 / SFA-5.23**	**26304-A**		+
2.6	0.55	0.6	F13A8-ECG-G-H4	S 89 5 FB TZ3Ni2.5CrMoMn H4		
Ni	**Cu**		**A5.23 / SFA 5.23**	**14171-A**		+
1.0	0.55		F8A5-ECG-H4	S 46 4 AR TZ3Ni1Cu H4		
Ni	**Cu**		**A5.23 / SFA-5.23**	**14171-A**		+
1.0	0.55		F7A8-ECG	S 46 6 AB TZ3Ni1Cu H5		
Ni	**Cu**		**A5.23 / SFA-5.23**	**14171-A**		+
1.0	0.55		F7A8-ECG	S 42 6 FB T2Ni1Cu H5		

5 UTP WELDING CONSUMABLES PRODUCT CONTENT

UTP – the new brand and portfolio approach

Tailor-Made Protectivity™ – Proven under the toughest conditions: Our products protect metal surfaces from wear and corrosion. With over 70 years of experience and the broadest product portfolio in the industry, we are your preferred partner for Surface Protection solutions.

We deliver what we promise:
Surface Protection tailored to your needs.



The following products are combined under the UTP brand:

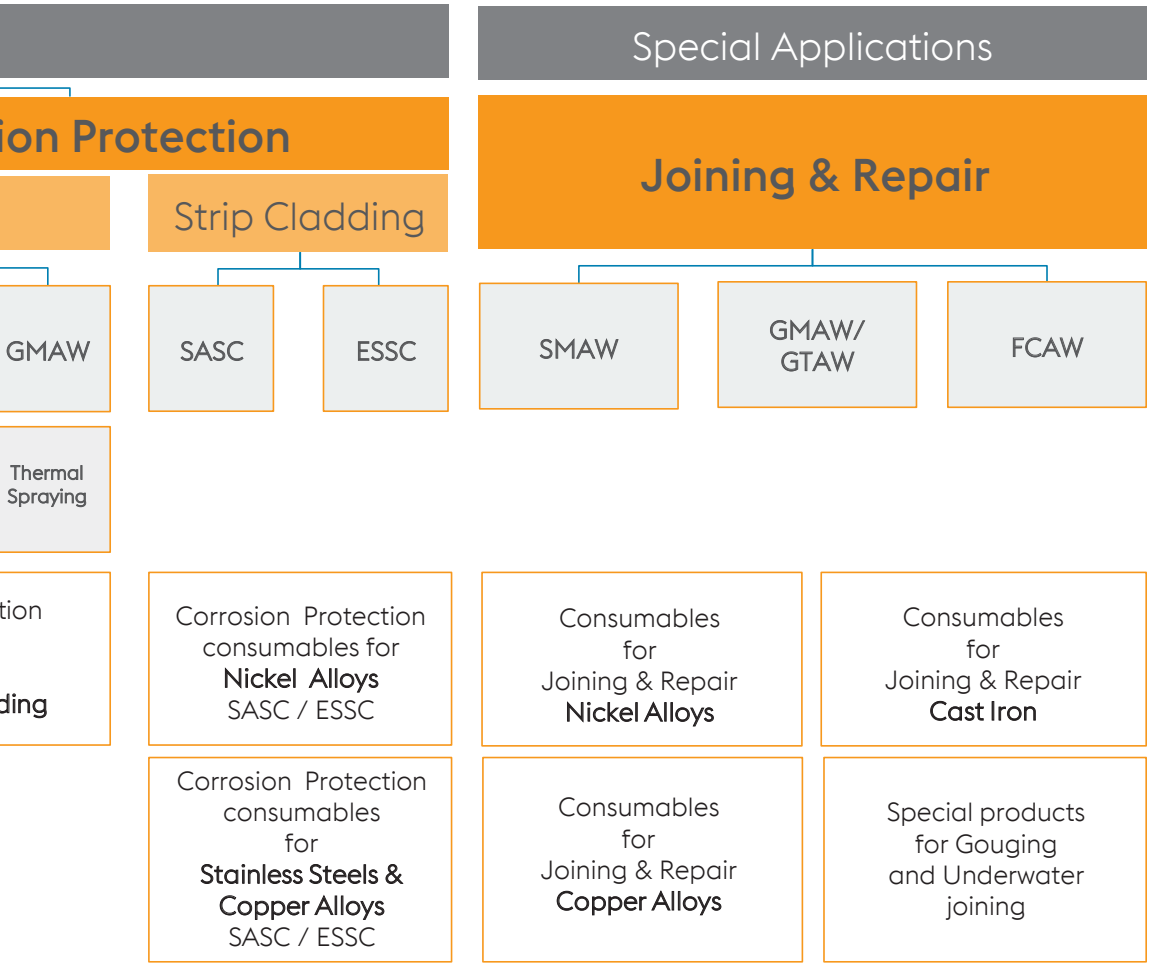
» Consumables for Surface Protection
  - Wear
  - Corrosion

» Nickel based filler materials for cladding

» Special alloys such as for cast iron or copper

» Filler metals for electro slag cladding and sub powder cladding

Thanks to the sharpening of the product groups, there is no longer any overlap in the portfolios of the category brands.



5.1 SMAW – Stick electrodes

5.1.1 WEAR protection – Difficult to weld – Multi-purpose

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARstick Dur 250	UTP DUR 250	Basic coated stick electrode for tough surfacing against rolling wear. Hardness of the weld metal approx. 270 HB	C	Si	Mn	Cr	
			0.2	1.1	1.2	0.8	
WEARstick Dur 300	UTP DUR 300	Basic coated stick electrode for tough surfacing against rolling wear. Hardness of the weld metal approx. 300 HB	C	Si	Mn	Cr	
			0.1	0.7	1	3	
WEARstick Dur 350	UTP DUR 350	Basic coated stick electrode for crack-proof, wear-resistant surfacing. Hardness of the weld metal approx. 370 HB	C	Si	Mn	Cr	
			0.2	1.2	1.4	1.8	
WEARstick Dur 580	UTP 670	Basic coated stick electrode for crack-proof, wear-resistant surfacing. Hardness of the weld metal approx. 58 HRC	C	Si	Mn	Cr	
			0.4	1	1	9.5	
WEARstick Dur 600	UTP DUR 600	Basic coated hardfacing stick electrode against impact and abrasion. Hardness of the weld metal approx. 60 HRC	C	Si	Mn	Cr	
			0.5	2.3	0.4	9	
WEARstick Dur 650	UTP DUR 650 Kb	Basic coated, tough-hard, abrasion-resistant hardfacing stick electrode. Hardness of the weld metal approx. 60 HRC	C	Si	Mn	Cr	
			0.5	0.8	1.3	7	
WEARstick MnCr13	UTP BMC	Basic coated, chromium alloyed, Mn-steel stick electrode. Hardness of the weld metal approx. 260 HB	C	Si	Mn	Cr	
			0.6	0.8	16.5	13.5	
WEARstick MnCr4	UTP 7200	Basic coated, CrNi-alloyed, Mn-hardsteel stick electrode. Hardness of the weld metal approx. 200 - 250 HB. After work-hardening 48 - 53 HRC	C	Mn	Cr	Mo	
			0.7	13	4.5	4	
WEARstick Mn18	UTP Chronos 18	Basic coated high-Mn-steel stick electrode for claddings exposed to compression and impacts. Hardness of the weld metal approx. 200 HB. After work-hardening approx. 45 HRC	C	Si	Mn	Fe	
			0.6	0.5	17.6	Bal.	
WEARstick Hydrocav	UTP HydroCav	Basic-coated stainless stick electrode against cavitation wear. Hardness of the weld metal approx. 21 HRC. After work-hardening approx. 50 HRC	C	Si	Mn	Cr	
			0.2	0.7	10	20	

				AWS	EN/ISO	Approvals	JOIN!online
	Fe				**14700**		
	Bal.				E Fe1		
	Fe				**14700**	DB (82.138.04)	
	Bal.				E Fe1		
	Fe				**14700**	DB (82.138.03)	
	Bal.				E Fe1		
	Mo	**V**	**Fe**		**14700**	DB (20.138.15)	
	0.6	1.5	Bal.		E Z Fe8		
	Fe				**14700**	DB (20.138.07)	
	Bal.				E Fe8		
	Mo	**Nb**	**Fe**		**14700**		
	1.3	0.5	Bal.		E Fe8		
	Fe				**14700**		
	Bal.				E Fe9		
	Fe			**A5.13 / SFA-5.13**	**14700**	DB (20.138.08)	
	Bal.			EFeMn-C	E Z Fe9		
					14700		
					E Z Fe9		
	Ni	**Co**	**Fe**		**14700**		
	0.2	13	Bal.		E Z Fe9		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

5.1.2 WEAR protection – Difficult to weld – Extreme abrasion

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARstick XD 60	UTP Ledurit 60	Rutile coated stick electrode for highly wear-resistant claddings against grinding abrasion combined with light impacts	C	Si	Cr	Fe	
			3	1.3	29	Bal.	
WEARstick XD 61	UTP Ledurit 61	Rutile-basic coated stick electrode for wear-resistant claddings against strong grinding abrasion combined with medium impacts	C	Si	Cr	Fe	
			3.5	1.3	32	Bal.	
WEARstick XD 63	UTP Abrasodur 43+	Basic coated high efficiency stick electrode for wear-resistant claddings against strong grinding abrasion combined with medium impacts	C	Si	Mn	Cr	
			6.5	1.5	1.5	24.5	
WEARstick XD 65	UTP Ledurit 65	High efficiency stick electrode for wear-resistant claddings against extreme sliding mineral abrasion also at elevated temperatures up to 500°C	C	Cr	Mo	W	
			4.5	23.5	6.5	2.2	

5.1.3 WEAR protection – Cobalt alloys

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARstick Co 1	UTP Celsit 701	Rutile coated stick electrode on cobalt-base, core-wire-alloyed. Excellent resistance to metal-to-metal and abrasive wear without impacts	C	Cr	W	Co	
			2.3	32.0	13.0	Bal.	
WEARstick Co 6	UTP Celsit 706	Rutile coated stick electrode on cobalt-base, core wire alloyed. Excellent resistance to metal-to-metal wear, cavitation and impacts in corrosive envrionments	C	Cr	W	Co	
			1.1	27.5	4.5	Bal.	
WEARstick Co 12	UTP Celsit 712	Rutile coated stick electrode on cobalt base, core-wire-alloyed. Excellent resistance to metal-to-metal and abrasive wear with moderate impacts	C	Cr	W	Co	
			1.6	29.0	8.5	Bal.	
WEARstick Co 21	UTP Celsit 721	Rutile coated, core-wire-alloyed stick electrode on cobalt-base. Excellent resistance to metal-to-metal wear and thermal shocks in corrosive envrionments	C	Ni	Cr	Mo	
			0.3	3.5	31.0	5.0	
WEARstick Co 25	UTP 7010	Rutile coated stick electrode for heat- and thermal shock resistant hardfacings	C	Si	Mn	Cr	
			0.1	0.5	1.2	21	

				AWS	EN/ISO	Approvals	JOIN!online
					14700		
					E Fe14		
				A5.13 / SFA-5.13	**14700**		
				E FeCr-A8 (mod.)	E Fe14		
Nb	**Fe**				**14700**		
7	Bal.				E Z Fe15		
V	**Nb**	**Fe**			**14700**		
1.5	5.5	Bal.			E Fe16		

					AWS	EN/ISO	Hardness	JOIN!online
					A5.13 / SFA-5.13	**14700**	54 - 56 HRC	
					E CoCr-C	E Co3		
					A5.13 / SFA-5.13	**14700**	40 – 42 HRC	
					E CoCr-A	E Z Co2		
					A5.13 / SFA-5.13	**14700**	48 – 50 HRC	
					E CoCr-B	E Co3		
Co					**A5.13 / SFA-5.13**	**14700**	31 – 37 HRC	
Bal.					E CoCr-E	E Co1		
Ni	**W**	**Co**	**Fe**			**14700**	approx. 230 HB	
11	14	Bal.	2			E Z Co1		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

5.1.4 WEAR protection – Tool steels

Product name		Short description	Chemical composition (typical values) in %			
New	Old					
WEARstick Tool 35	UTP 702	Basic coated maraging stick electrode for hot work tool steels and steels of similar nature	C	Si	Mn	Mo
			0.025	0.2	0.6	4.0
WEARstick Tool 40	UTP 73 G4	Basic coated stick electrode for cold and hot work tool steels. Medium weld metal hardness	C	Si	Mn	Cr
			0.1	0.5	0.6	6.5
WEARstick Tool 45	UTP 73 G3	Basic coated stick electrode for cold and hot work tool steels. Medium to hard weld metal hardness	C	Si	Mn	Cr
			0.2	0.5	0.6	5.0
WEARstick Tool 50 Co	UTP 750	Rutile coated stick electrode for hot work tool steels, stainless. Application temperature up to 650°C	C	Si	Mn	Cr
			0.2	0.5	0.2	11.5
WEARstick Tool 55	UTP 73 G2	Basic coated stick electrode for cold and hot work tool steels. High weld metal hardness	C	Si	Mn	Cr
			0.35	0.5	1.3	7.0
WEARstick Tool 58	UTP 673	Rutile coated stick electrode for cold and hot work tool steels. High weld metal hardness	C	Si	Mn	Cr
			0.3	0.8	0.4	5.0
WEARstick Tool 60	UTP 690	Rutile coated high efficiency stick electrode for high speed tool steels with high weld metal hardness	C	Si	Mn	Cr
			0.9	0.8	0.5	4.5
WEARstick Tool Cr17	UTP 665	High Cr-alloyed stick electrode for repair of tool steels, particularly cutting tools	C	Si	Mn	Cr
			0.06	0.6	0.8	17
WEARstick Tool NiCrMo+	UTP 7000	Rutile-basic coated high efficiency electrode, NiCrMo-alloy for hot working tools and forging dies	C	Si	Mn	Cr
			0.04	0.3	0.9	16.0

						AWS	EN/ISO	Hardness	JOIN!online
Co	**Ni**	**Fe**					**14700**	34 – 37 HRC	
12.0	20.0	Bal.					E Fe5		
Mo	**Fe**						**14700**	38 - 42 HRC	
3.5	Bal.						E Z Fe3		
Mo	**Fe**						**14700**	45 - 50 HRC	
4.0	Bal.						E Fe3		
Ni	**Mo**	**Co**	**Fe**				**14700**	48 – 52 HRC	
1	4.5	12.5	Bal.				E Z Fe3		
Mo	**Fe**						**14700**	55 - 58 HRC	
2.5	Bal.						E Fe8		
Mo	**W**	**V**	**Fe**				**14700**	approx. 58 HRC	
1.5	1.3	0.3	Bal.				E Z Fe3		
Mo	**W**	**V**	**Fe**			**A5.13 / SFA-5.13**	**14700**	approx. 62 HRC	
8.0	2.0	1.2	Bal.			E Fe5-B (mod.)	E Fe4		
Fe							**14700**	approx. 250 HB	
Bal.							E Fe7		
Ni	**Mo**	**Co**	**W**	**Fe**		**A5.11 / SFA-5.11**	**14700**	approx. 220 HB	
Bal.	17.0	1.5	5.0	5.0		ENiCrMo-5 (mod.)	E Z Ni 2		

5.2 GTAW – TIG Rods

5.2.1 WEAR protection – Difficult to weld – Multi-purpose

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARtig Dur 600	UTP A Dur 600	TIG rod for wear resistant weld overlays to withstand impact and abrasion. Hardness of the weld metal approx. 58 HRC	C	Si	Mn	Cr	
			0.5	3.0	0.5	9.5	

5.2.2 WEAR protection – Difficult to weld – Extreme abrasion

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARtig XD FeW60	UTP A 7560	TIG rod for GTAW or oxy-fuel welding, tungsten carbides in an iron matrix. Excellent resistance to extreme mineral abrasion. Matrix hardness: 60 HRC Carbide hardness: 2500 HV	W2C				
			60				
WEARtig XD NiW60	UTP A 7550	TIG rod for GTAW or oxy-fuel welding, tungsten carbides in a nickel matrix, Excellent resistance to friction wear by hard, abrasive materials. Matrix hardness: 55 HRC Carbide hardness: 2500 HV	W2C				
			60				

5.2.3 WEAR protection – Cobalt alloys

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARtig Co 1	UTP A CELSIT 701 N	TIG rod, hardfacing, cobalt alloy. Excellent resistance to abrasion in combination with corrosion and high temperatures. Hardness: approx. 55 HRC	C	Cr	W	Co	
			2.3	32.0	13.0	Bal.	
WEARtig Co 6	UTP A CELSIT 706 V	TIG rod, hardfacing, cobalt alloy. Excellent resistance to metal-to-metal wear, cavitation and impacts in corrosive envrionments. Hardness: approx. 42 HRC	C	Cr	W	Co	
			1.2	27.0	4.5	Bal.	
WEARtig Co 12	UTP A CELSIT 712 SN	TIG rod, hardfacing, cobalt alloy. Excellent resistance to metal-to-metal and abrasive wear with moderate impacts. Hardness: approx. 50 HRC	C	Cr	W	Co	
			1.8	29.0	8.5	Bal.	
WEARtig Co 21	UTP A CELSIT 721	TIG rod, hardfacing, cobalt alloy. Excellent resistance to metal-to-metal wear and thermal shocks in corrosive envrionments. Hardness: approx. 32 HRC	C	Ni	Cr	Mo	
			0.25	2.8	28.0	5.0	

	AWS	EN/ISO	Shielding Gas	JOIN!online
Fe		**14700**	I 1	
Bal.		S Fe8		

	AWS	EN/ISO	Shielding Gas	JOIN!online
FeC		**14700**	I 1	
40		T Fe 20		
NiCrBSi-Matrix		**14700**	I 1	
40		C Ni 20		

	AWS	EN/ISO	Shielding Gas	JOIN!online
	A 5.21	**14700**	I 1	
	ER CoCr-C	R Co3		
	A 5.21	**14700**	I 1	
	ER CoCr-A	R Z Co2		
	A 5.21	**14700**	I 1	
	~ER CoCr-B	R Co3		
Co	**A 5.21**	**14700**	I 1	
Bal.	ER CoCr-E	R Z Co1		

5.2.4 WEAR protection – Tool steels

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARtig Tool 35	UTP A 702	TIG rod for hot work tool steels and steels of similar nature, hardness after age-hardening of 50 - 54 HRC	C	Ni	Mo	Ti	
			0.02	18.0	4.0	1.6	
WEARtig Tool 40	UTP A 73 G4	TIG rod, tool stee for cold and hot work tool steels. Medium weld metal hardness, 38 - 42 HRC	C	Si	Mn	Cr	
			0.1	0.4	0.6	6.5	
WEARtig Tool 45	UTP A 73 G3	TIG rod, tool steel for cold and hot work tool steels. Medium-hard weld metal, 42 - 46 HRC	C	Si	Mn	Cr	
			0.25	0.5	0.7	5.0	
WEARtig Tool 55	UTP A 73 G2	TIG rod, tool steel for cold and hot work tool steels. High weld metal hardness, 53 - 58 HRC	C	Si	Mn	Cr	
			0.35	0.3	1.2	7.0	
WEARtig Tool 58	UTP A 673	TIG rod for cold and hot work tool steels. High weld metal hardness, 53 - 58 HRC	C	Si	Mn	Cr	
			0.35	1.0	0.4	5.0	
WEARtig Tool 60	UTP A 696	TIG rod for production and repair of tools from Mo-alloyed high-speed steel. High weld metal hardness: 60 - 64 HRC	C	Si	Mn	Cr	
			1.0	0.2	0.2	4.0	

						AWS	EN/ISO	Shielding Gas	JOIN!online
Al	**Fe**						**14700**	I1	
0.1	Bal.						S Z Fe5		
Fe							**14700**	I1	
Bal.							S Z Fe3		
Ti	**Fe**						**14700**	I1	
0.6	Bal.						S Z Fe3		
Ti	**Fe**						**14700**	I1	
0.3	Bal.						S Fe8		
W	**V**	**Fe**					**14700**	I1	
1.3	0.3	Bal.					S Fe8		
Mo	**V**	**W**	**Fe**				**14700**	I1	
8.5	2.0	1.8	Bal.				S Z Fe4		

5.3 GMAW – Solid wires

5.3.1 WEAR protection – Difficult to weld – Multi-purpose

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARmig DUR 250	UTP A DUR 250	Solid wire for wear resistant and good machinable build-ups. Weld metal hardness: approx. 250 HB (23 HRC)	C	Si	Mn	Cr	
			0.1	0.6	1.0	1.0	
WEARmig DUR 450	UTP A DUR 350	Solid wire with good impact and abrasion resistance. Medium-hard weld metal: approx. 450 HB (45 HRC)	C	Si	Mn	Cr	
			0.7	0.3	2.0	1.0	
WEARmig DUR 600	UTP A DUR 600	Solid wire for wear resistant weld overlays to withstand impact and abrasion. Hardness of the weld metal approx. 58 HRC	C	Si	Mn	Cr	
			0.5	3.0	0.5	9.5	

5.3.2 WEAR protection – Tool steels

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARmig Tool 35	UTP A 702	Solid wire for hot work tool steels and steels of similar nature. Hardness after age-hardening of 50 - 54 HRC	C	Ni	Mo	Co	
			0.02	18.0	4.0	12.0	
WEARmig Tool 40	UTP A 73 G4	Solid wire, tool stee for cold and hot work tool steels. Medium weld metal hardness, 38 - 42 HRC	C	Si	Cr	Mn	
			0.1	0.4	6.5	0.6	
WEARmig Tool 45	UTP A 73 G3	Solid wire, tool steel for cold and hot work tool steels. Medium-hard weld metal, 42 - 46 HRC	C	Si	Cr	Mn	
			0.25	0.5	5.0	0.7	
WEARmig Tool 55	UTP A 73 G2	Solid wire, tool steel for cold and hot work tool steels. High weld metal hardness, 53 - 58 HRC	C	Si	Cr	Mn	
			0.35	0.3	7.0	1.2	
WEARmig Tool 58	UTP A DUR 650	Solid wire, wear protection for cold and hot work tool steels. High weld metal hardness, approx. 58 HRC	C	Si	Cr	Mn	
			0.36	1.1	5.2	0.4	
WEARmig Tool 60	UTP A 696	Solid wire for production and repair of tools from Mo-alloyed high-speed steels. High weld metal hardness, 60 - 64 HRC	C	Si	Mn	Cr	
			1.0	0.2	0.2	4.0	
WEARmig Tool NiCrCo	UTP A 5519 Co	Solid wire, nickel alloy for surfacings on forging tools subjected to extremely high temperatures.	C	Ni	Cr	Mo	
			0.03	Bal.	20.0	4.5	

		AWS	EN/ISO	Shielding Gas	JOIN!online
Mo	**Fe**		**14700**	M 12, M 13, M 21	
1.0	Bal.		S Z Fe 1		
Ti	**Fe**		**14700**	M 12, M 13, M 21	
0.2	Bal.		S Z Fe 2		
Fe			**14700**	M 12, M 13, M 23, C 1	
Bal.			S Fe 8		

				AWS	EN/ISO	Shielding Gas	JOIN!online
Al	**Ti**	**Fe**			**14700**	M 12, M 13, I 1	
0.1	1.6	Bal.			S Z Fe5		
Mo	**Fe**				**14700**	M 12, M 13, M 21, C 1	
3.3	Bal.				S Z Fe3		
Mo	**Ti**	**Fe**			**14700**	M 12, M 13, M 21, C 1	
4.0	0.6	Bal.			S Z Fe3		
Mo	**Ti**	**Fe**			**14700**	M 12, M 13, M 21, C 1	
2.0	0.3	Bal.			S Fe8		
Mo	**W**	**V**	**Fe**		**14700**	M 12, M 13, M 21, C 1	
1.4	1.3	0.3	Bal.		S Fe8		
Mo	**V**	**W**	**Fe**		**14700**	M 12, M 13, M 21, C 1	
8.5	2.0	1.8	Bal.		S Z Fe4		
Ti	**Co**	**Al**	**Fe**		**14700**	Z-ArHeHC-30/2/0.05	
3.0	14.0	1.5	< 2.0		S Ni2		

5.4 FCAW-G – Gas-shielded flux-cored wires

5.4.1 WEAR protection – Difficult to weld – Multi-purpose

Product name		Short description	Chemical composition (typical values) in %			
New	Old					
	UTP ROBOTIC 250	Gas-shielded metal-cored wire, seamless, suited for wear-resistant parts subject to heavy impact and shock, especially suited for automated welding	C	Si	Mn	Cr
			0.1	0.6	1.8	1.0
	UTP ROBOTIC 257	Gas-shielded metal-cored wire, seamless, especially suited for automated welding, the deposit guarantees an elevated resistance to both abrasion and strong impact	C	Si	Mn	Ni
			0.45	0.7	14	1.0
	UTP ROBOTIC 352	Gas-shielded metal-cored wire, seamless, multi-purpose cored wire, especially suited for automated welding	C	Si	Mn	Cr
			0.25	0.55	1.75	1.7
	UTP ROBOTIC 600	Gas-shielded metal-cored wire, seamless, good weldability, good resistance to abrasion, minimized slag formation with easy slag removal, especially suited for automated welding	C	Si	Mn	Cr
			0.45	3.0	0.4	9.0
	UTP ROBOTIC 601	Gas-shielded metal-cored wire, seamless, especially suited for automated welding, high hardness as a result of special carbides but remains crack free	C	Si	Mn	Cr
			1.4	1.0	0.7	6.0
	UTP ROBOTIC CHROMELESS 600	Gas-shielded metal-cored wire, seamless, chromium and nickel free, for wear-resistant hardfacing applications on parts subject to a combination of pressure, impact and abrasion wear	C	Si	Mn	Cr
			0.55	0.8	0.7	< 5.0%
WEARcore Dur 600	SK 600-G	Gas shielded metal cored wire, good resistance to metal-to- metal wear with low abrasion and moderate impact loads	C	Si	Mn	Cr
			0.47	1.1	1.5	5.8
WEARcore MnCr13	SK AP-G	Gas shielded metal cored wire, multi-purpose cored wire, mainly used for rebuilding and joining of Carbon and 14% Manganese steels	C	Si	Mn	Cr
			0.4	0.3	17.0	12.0
WEARcore Hydrocav	UTP Hydrocav	Gas-shielded metal-cored wire, suitable for surfacing of parts where high resistance to cavitation, corrosion, pressure and impact is required	C	Si	Mn	Cr
			0.17	4.4	9.9	18.4

5.4.2 WEAR protection – Difficult to weld – Extreme abrasion

Product name		Short description	Chemical composition (typical values) in %			
New	Old					
	UTP ROBOTIC 6011	Gas-shielded metal-cored wire, seamless, NiB-alloyed, excellent resistance to abrasion induced by sand and minerals.	C	Si	Mn	Ni
			0.3	0.4	1.1	1.5
WEARcore XD 65	SK A 45-G	Gas shielded metal cored wire with addition of Tungsten and Vanadium designed to resist high stress grinding abrasion with low impact and solid erosion at service temperatures up to 650°C.	C	Si	Mn	Cr
			5.5	0.7	0.2	21.1
WEARcore XD NiW46	SK 900Ni RTC-G	Gas shielded metal cored wire with outstanding resistance to abrasive wear even when wear occurs in a corrosive enviroment	C	Si	Mn	Ni
			2.8	0.1	0.1	Bal.
	UTP Robotic 6010	Gas-shielded metal-cored wire, seamless, designed to deposit an alloy resistant to high stress grinding abrasion with low impact	C	Si	Mn	Cr
			0.45	0.8	0.2	22

				DIN	EN/ISO	Hardness	Shielding Gas	JOIN!online
Fe				**8555**	**14700**	250 HB	M21: Argon 82 % + CO_2 18 %	
Bal.				MSG 1-GF-250-P	T Fe 1			
Cr	**Fe**			**8555**	**14700**	250 HB	M21: Argon 82 % + CO_2 18 %	
2.0	Bal.			MSG 7-GF-250-KP	T Fe 9			
Fe				**8555**	**14700**	350 HB	M21: Argon 82 % + CO_2 18 %	
Bal.				MSG 1-GF-350-P	T Fe 1			
Fe				**8555**	**14700**	59 HRC	M21: Argon 82 % + CO_2 18 %	
Bal.				MSG 6-GF-60-GP	T Fe 8			
Nb	**Fe**			**8555**	**14700**	60 HRC	M21: Argon 82 % + CO_2 18 %	
5.5	Bal.			MSG 6-GF-60-GP	T Fe 8			
Mo	**W**	**V**	**Fe**		**14700**	60 HRC	M21: Argon 82 % + CO_2 18 %	
	< 5.0%		Bal.		TZ Fe 8			
Mo	**Fe**			**8555**	**14700**	59 HRC	M21: Argon 82 % + CO_2 18 % C1: CO_2 100 %	
0.9	Bal.			MF 6-GF-60-GP	T Fe6			
Fe				**8555**	**14700**	190 HB	M13: Argon 98 % + 2 % Oxygen	
Bal.				MF 7-GF-200-KP	T Fe9			
Co	**Fe**			**8555**	**14700**	220 HB	M12: Argon 98% + CO_2 2%	
13.7	Bal.			MF 6-GF-200-K	T Z Fe9			

				DIN	EN/ISO	Hardness	Shielding Gas	JOIN!online
Cr	**B**	**Fe**		**8555**	**14700**	64 HRC	M21: Argon 82 % + CO_2 18 %	
0.3	4.5	Bal.		MSG 2-GF-55-G	T Fe 13			
Mo	**Nb**	**W**	**V**	**8555**	**14700**	63 HRC	M13: Argon + 2% Oxygen	
6.5	6.0	2.0	0.9	MF 10-GF-65-GT	T Fe16			
W	**Fe**	**B**		**8555**	**14700**	44 HRC (matrix)	M13: Argon + 2% Oxygen M21: Argon 82 % + CO_2 18 %	
42.0	1.1	0.7		MF 22-GF-45-G	T Ni 20			
Nb	**Fe**			**8555**	**14700**	60 HRC	M21: Argon 82 % + CO_2 18 %	
0.4	Bal.			MSG 10-GF-60-CGP	T Fe 15			

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5.4.3 WEAR protection – Cobalt alloys

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore Co 1	SK STELKAY 1-G	Gas shielded metal cored wire, Cobalt base alloy, for mill guides, palm nut oil extruder, plastic extrusion screws, mixer blades, scrapers, rubber mixer	C	Si	Mn	Cr	
			2.2	1.6	0.8	27	
WEARcore Co 6	SK STELKAY 6-G	Gas shielded metal cored wire, Cobalt base alloy, for extrusion dies, hot working tools, turbine injectors, valve seats, ingot tong bits	C	Si	Mn	Ni	
			0.95	1.4	0.8	-	
WEARcore Co 6 A	SK STELKAY 6A-G	Gas shielded metal cored wire, Cobalt base alloy, for valves, valve seats in motor vehicles, hot shear blades, extruder screws, clack valves and seats, dies, punches	C	Si	Mn	Ni	
			1.35	1.4	1.2	2.3	
WEARcore Co 6 T	SK STELKAY 6T-G	Gas shielded metal cored wire, Cobalt base alloy, designed to be used with the GTAW process (TIG)	C	Si	Mn	W	
			0.95	0.8	0.8	5	
WEARcore Co 12	SK STELKAY 12-G	Gas shielded metal cored wire, hardfacing, cobalt alloy. Excellent resistance to metal-to-metal and abrasive wear with moderate impacts	C	Si	Mn	Ni	
			1.6	1.4	0.8	2.0	
WEARcore Co 21	SK STELKAY 21-G	Gas shielded metal cored wire, Cobalt base alloy, for extrusion dies, hot working tools, turbine injectors, valve seats, ingot tong bits	C	Si	Mn	Ni	
			0.3	1.2	1.0	2.4	
WEARcore Co 21 T	SK STELKAY 21T-G	Gas shielded metal cored wire, Cobalt base alloy, designed to be used with the GTAW process (TIG)	C	Si	Mn	Ni	
			0.27	1.2	1.0	2.4	
WEARcore Co 25	SK STELKAY 25-G	Gas shielded metal cored wire, Cobalt base alloy for hot working tools, forging hammers	C	Si	Mn	Ni	
			0.01	0.4	0.8	10	

					DIN	EN/ISO	Hardness	Shielding Gas	JOIN!online
W	**Co**	**Fe**			**8555**	**14700**	54 HRC	M13: Argon 98 % + 2 % Oxygen I1: Argon 100 %	
11.5	Bal.	3.3			MF 20-GF-55-CTZ	T Co3			
Cr	**W**	**Co**	**Fe**		**8555**	**14700**	40 HRC	M13: Argon 98 % + 2 % Oxygen I1: Argon 100 %	
30	4.2	Bal.	3.0		MF 20-GF-40-CTZ	T Co2			
Cr	**W**	**Co**	**Fe**		**8555**	**14700**	43 HRC	M13: Argon 98 % + 2 % Oxygen I1: Argon 100 %	
26.3	3.8	Bal.	2.7		MF 20-GF-45-CTZ	T Z Co2			
Cr	**Co**	**Fe**			**8555**	**14700**	41 HRC	I1: Argon 100 %	
31	Bal.	3			MF 20-GF-40-CTZ	T Co2			
Cr	**W**	**Co**	**Fe**		**8555**	**14700**	49 HRC	M13: Argon 98 % + 2 % Oxygen I1: Argon 100 %	
29.5	8.0	Bal.	2.5		MF 20-GF-50-CTZ	T Co3			
Cr	**Mo**	**Co**	**Fe**		**8555**	**14700**	32 HRC	M13: Argon 98 % + 2 % Oxygen I1: Argon 100 %	
28	5	Bal.	3.5		MF 20-GF-300-CTZ	T Co1			
Cr	**Mo**	**Co**	**Fe**		**8555**	**14700**	31 HRC	I1: Argon 100 %	
28	5	Bal.	3.5		MF 20-GF-300-CTZ	T Co1			
Cr	**W**	**Co**	**Fe**		**8555**	**14700**	195 HB	M13: Argon 98 % + 2 % Oxygen I1: Argon 100 %	
20	13	Bal.	3.5		MF 20-GF-200-STZ	T Z Co1			

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5.4.4 WEAR protection – Tool steels

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore Tool 50 Co	SK D35-G	Gas-shielded metal cored wire for hot work tool steels, stainless. Application temperature up to 650°C	C	Mn	Si	Cr	
			0.16	0.1	0.7	13.0	
WEARcore Tool 58	SK 650-G	Gas shielded metal cored wire for cold and hot work tool steels and parts subject to abrasion and impacts	C	Mn	Si	Cr	
			0.45	0.9	0.6	5.5	
WEARcore Tool 60	SK D20-G	Gas shielded metal cored wire, designed to deposit a molybdenum-alloyed high-speed steel	C	Si	Mn	Cr	
			0.8	0.4	0.5	4.0	
WEARcore Tool NiCrCo	SK U521-G	Gas-shielded core wire, nickel alloy for surfacings on forging tools subjected to extremely high temperatures	C	Si	Cr	Ni	
			0.01	0.3	18.5	Bal.	
UTP ROBOTIC 405	UTP AF ROBOTIC 405	Gas-shielded metal-cored wire, seamless, especially suited for automated welding, low carbon content, for forging tools	C	Si	Mn	Cr	
			0.1	0.6	1.5	5.5	
UTP ROBOTIC 453	UTP AF ROBOTIC 453	Gas-shielded metal-cored wire, seamless, especially suited for automated welding, for wear-resistant hardfacings on parts subject to abrasion, compression and high temperature	C	Si	Mn	Cr	
			0.25	0.4	1.0	5.0	
UTP ROBOTIC 503	UTP AF ROBOTIC 503	Gas-shielded metal-cored wire, seamless, especially suited for automated welding, especially suited for hot-wear resistant surfacing	C	Si	Mn	Cr	
			0.25	0.4	0.7	5.5	
UTP ROBOTIC 554	UTP AF ROBOTIC 554	Gas-shielded metal-cored wire, seamless, especially suited for automated welding, ery stable arc, low spatter emission, low amount of slag	C	Si	Mn	Cr	
			0.30	0.50	0.95	6.5	
UTP ROBOTIC 603	UTP AF ROBOTIC 603	Gas-shielded metal-cored wire, seamless, Cr-Mo-W-V alloyed, for abrasion and moderate stress-resistant surfacing applications up to 550 °C with Ar/CO_2 shielding gas	C	Si	Mn	Cr	
			0.5	1	1.1	5.5	

5.4.5 WEAR protection – Martensitic stainless steels

Product name		Short description	Chemical composition (typical values) in %			
New	Old					
WEARcore 741	SK 741-G	Gas shielded metal cored wire designed to resist metal-to-metal wear, corrosion and thermal fatigue fire cracking, surfacing of continuous casting rollers of very small diameters	C	Si	Mn	Ni
			0.06	0.7	0.6	5.5

						DIN	EN/ISO	Hardness	Shielding Gas	JOIN!online
	Mo	**Co**	**Fe**			**8555**	**14700**	50 HRC	Argon 98 % + Oxygen 2% or Argon 100%	
	2.4	14.0	Bal.			MF 6-GF-50-CT	T Z Fe7			
	Mo	**W**	**V**	**Fe**		**8555**	**14700**	58 HRC	Argon 82% + CO_2 18% or CO_2 100%	
	1.4	1.6	0.5	Bal.		MF 3-GF-60-GT	T Fe8			
	Mo	**W**	**V**	**Fe**		**8555**	**14700**	61 HRC	M13: Argon 98 % + 2 % Oxygen	
	8.3	1.7	2.2	Bal.		MF 4-GF-60-S	T Fe4			
	Mo	**Co**	**Ti**	**Al**	**Fe**	**8555**	**14700**	200 HB	Argon 98 % + Oxygen 2%	
	4.5	12.5	3.5	1.0	1.8	MF 23-GF-200-TZ	T Ni2			
	Mo	**Fe**				**8555**	**14700**	40 HRC	M21: Argon 82 % + CO_2 18 %	
	0.9	Bal.				MSG 5-GF-40-P	T Fe 3			
	Mo	**Fe**				**8555**	**14700**	44HRC	M21: Argon 82 % + CO_2 18 %	
	4.0	Bal.				MSG 3-GF-45-ST	T Fe 3			
	Mo	**Ti**	**Fe**			**8555**	**14700**	50 HRC	M21: Argon 82 % + CO_2 18 %	
	4.5	0.3	Bal.			MSG 3-GF-50-ST	T Fe 8			
	Mo	**Ti**	**Fe**			**8555**	**14700**	55 HRC	M21: Argon 82 % + CO_2 18 %	
	2.1	0.3	Bal.			MSG 3-GF-55-ST	T Fe 8			
	Mo	**V**	**W**	**Fe**		**8555**	**14700**	61 HRC	M21: Argon 82 % + CO_2 18 %	
	1.3	0.3	1.3	Bal.		MSG 3-GF-60-ST	T Fe 8			

				DIN	EN/ISO	Hardness	Shielding Gas	JOIN!online
Cr	**Mo**	**Fe**		**8555**	**14700**	40 HRC	M13: Argon 98 % + 2 % Oxygen	
13.0	0.9	Bal.		MF 5-GF-40-C	T Fe7			

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5.5 FCAW-S – Self-shielded flux-cored wires

5.5.1 WEAR protection – Difficult to weld – Multi-purpose

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore Dur 58 TiC-O	SK 258 TiC-O	Self-shielded flux cored wire, martensitic Chromium-Titanium alloy designed to resist high stress abrasion with heavy impact	C	Si	Mn	Cr	
			1.8	0.2	0.9	6.1	
WEARcore Dur 200-O	SK Soudocore S8-O	Self-shielded core wire for build-ups carbon steel and cast iron parts	C	Si	Mn	Al	
			0.28	0.1	0.4	1.5	
WEARcore Dur 400-O	SK 242-O	Self-shielded core wire for rebuilding and hard surfacing alloy of Carbon steel parts subjected to adhesive wear with impacts	C	Si	Mn	Cr	
			0.11	0.6	0.6	2.4	
WEARcore MnCr13-O	SK AP-O	Self-shielded flux cored wire, multi-purpose cored wire, mainly used for rebuilding and joining of carbon and 14% Manganese steels	C	Mn	Si	Cr	
			0.37	16.0	0.3	12.8	

5.5.2 WEAR protection – Difficult to weld – Extreme abrasion

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore XD 70-O	SK Abra-Max-O/G	Self-shielded flux cored wire designed to give an extreme resistance against high-stress-grinding abrasion and erosion without impact, hardness can be achieved in the first layer	Special Fe base alloy				
WEARcore XD 63-O	SK A43-O	Self-shielded flux cored wire designed to resist high stress grinding abrasion at service temperature not exceeding 450 °C	C	Si	Mn	Cr	
			4.9	0.7	0.2	20.5	
WEARcore XD 65-O	SK A45-O	Self-shielded flux cored wire designed to resist high stress grinding abrasion with low impact and solid erosion at service temperatures up to 650 °C	C	Si	Mn	Cr	
			5.3	0.7	0.2	22.0	
WEARcore XD 60-O	SK 255-O	Self-shielded flux cored wire designed to deposit an alloy resistant to high stress grinding abrasion with low impact	C	Si	Mn	Cr	
			4.5	0.8	0.6	27.0	

				DIN	EN/ISO	Hardness	JOIN!online
Mo	**Ti**	**Fe**		**8555**	**14700**	59 HRC	
1.4	5.5	Bal.		MF 7-GF-200-KP	T Fe9		
Fe					**14700**	190 HB	
Bal.					T Z Fe1		
Ti	**Fe**			**8555**	**14700**	40 HRC	
0.9	Bal.			MF 1-GF-40-P	T Fe1		
Fe				**8555**	**14700**	205 HB	
Bal.				MF 7-GF-200-KP	T Fe9		

				DIN	EN/ISO	Hardness	JOIN!online
C + Cr + Mo + Nb + W+ V+B				**8555**	**14700**	70 HRC	
				MF 6-GF-70-GT	T Z Fe8		
Nb	**Fe**			**8555**	**14700**	63 HRC	
6.6	Bal.	0.8		MF 10-GF-65-G	T Fe16		
Mo	**Nb**	**W**	**V**	**8555**	**14700**	65 HRC	
6.4	6.0	1.9	0.8	MF 10-GF-65-GT	T Fe16		
Fe	**B**			**8555**	**14700**	60 HRC	
bal.	0.5			MF 10-GF-60-G	T Fe16		

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5.5.3 WEAR protection – Martensitic stainless steels

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore 715-O	SK 370-O	Self-shielded cored wire depositing a ferritic-martensitic steel designed to resist metal-to-metal wear, corrosion and thermal fatigue fire cracking. Application: continuous casting rollers	C	Mn	Si	Cr	
			0.03	0.5	0.6	15.5	
WEARcore 420-O	SK 420-O	Self-shielded core wire depositing a martensitic steel containing 13 % Chromium giving a good resistance to metal-to-metal wear and corrosion. Applications: dredging pump casings, continuous casting rollers	C	Mn	Si	Cr	
			0.4	0.7	0.2	13.5	
WEARcore 430-O	SK 430-O	Self-shielded core wire depositing a ferritic steel containing 17 % Chromium designed to resist corrosion at high temperatures. Applications: continuous casting rollers from the top of the line, valve seats	C	Mn	Si	Cr	
			0.04	0.9	0.2	17.0	
WEARcore 714 N-O	SK 714 N-O	Self-shielded core wire depositing a ferritic-martensitic steel with addition of nitrogen designed to resist metal-to-metal wear, corrosion and thermal fatigue. Application: continuous casting rollers	C	Mn	Si	Cr	
			0.03	1.0	0.6	13.0	
WEARcore 741-O	SK 741-O	Self-shielded core wire a ferritic-martensitic steel containing 13 % Chromium, 5 % Nickel and 1 % Molybdenum designed to resist metal-to-metal wear, corrosion and thermal fatigue fire cracking	C	Mn	Si	Cr	
			0.02	0.6	0.6	12.6	
WEARcore 744 N-O	SK 744N-O	Self-shielded core wire especially developed to deposit in one single layer a ferritic-martensitic steel containing 12-13%Cr, 2-3%Ni and 0,5-1%Mo designed to resist metal-to-metal wear, corrosion and thermal fatigue cracking	C	Mn	Si	Cr	
			0.15	1.0	0.5	12.8	

						DIN	EN/ISO	Hardness	JOIN!online
Ni	**Mo**	**Fe**				**8555**	**14700**	42 HRC	+
5.2	0.5	Bal.				MF 5-GF-400-C	T Fe7		
Mo	**Fe**					**8555**	**14700**	54 HRC	+
0.2	Bal.					MF 6-GF-55-C	T Fe8		
Fe						**8555**	**14700**	250 HB	+
Bal.						MF 5-GF-250-C	T Fe7		
Ni	**Mo**	**N**	**Fe**			**8555**	**14700**	44 HRC	🛒
4.2	0.5	0.1	Bal.			MF 5-GF-45	T Fe7		
Ni	**Mo**	**Fe**				**8555**	**14700**	43 HRC	+
5.2	0.8	Bal.				MF 5-GF-45-C	T Fe7		
Ni	**Mo**	**Nb**	**N**	**Fe**		**8555**	**14700**	49 HRC	+
2.8	0.7	0.1	0.1	Bal.		MF 5-GF-50-C	T Fe7		

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5.6 SAW – Cored wires

5.6.1 WEAR protection – Multi-purpose

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore Dur 400-S	SK 242-S	SAW cored wire for rebuilding and hard surfacing alloy of Carbon steel parts subjected to adhesive wear with impacts	C	Si	Mn	Cr	
			0.14	0.8	1.7	2.2	
WEARcore Dur 58 Nb-S	SK 258 NbC-SA	SAW cored wire designed to deposit a crack-free martensitic alloy	C	Si	Mn	Cr	
			0.12	0.3	1.3	4	
WEARcore MnCr13-S	SK AP-S	SAW cored wire, multi-purpose cored wire mainly used for rebuilding and joining of Carbon and 14 % Manganese steels	C	Si	Mn	Cr	
			0.45	0.5	16.7	13.1	
WEARcore CrMo15-S	SK CrMo15-SA	SAW cored wire, for joining and rebuilding of mild and low alloy steels of heat resistant steel and steel casting parts	C	Si	Mn	Cr	
			0.04	0.7	0.9	1.2	

5.6.2 WEAR protection – Tool steels

Product name		Short description	Chemical composition (typical values) in %				
New	Old						
WEARcore Tool 58-S	SK 258-SA	SAW cored wire designed to give an outstanding resistance to low stress abrasion with heavy impact and high compressive stresses	C	Si	Mn	Cr	
			0.5	0.6	1.5	6.3	
WEARcore Tool 50 Co-S	SK D35-S	Special SAW cored wire designed to resist metal-to-metal wear, fatigue, oxidation, cavitation and corrosion at high temperature	C	Si	Mn	Cr	
			0.14	0.6	0.2	14.4	
WEARcore Tool 44-S	SK 258 L-SA	SAW cored wire, good resistance to metal-to-metal and low stress abrasive wear at high temperature	C	Si	Mn	Cr	
			0.17	0.4	1.6	5.6	

			DIN	EN/ISO	Hardness	Flux	JOIN!online
Mo	**V**	**Fe**	**8555**	**14700**	40 HRC	Record SA	+
0.8	0.4	Bal.	UP 1-GF-40-P	T Fe1			
Nb	**W**	**Fe**	**8555**	**14700**	60 HRC	Record SA	+
0.5	0.1	Bal.	UP 5-GF-300	T Z Fe2			
Fe			**8555**	**14700**	190 HB (as-welded)	Record SA Record SR	+
Bal.			UP 7-GF-200-KP	T Fe9			
Mo	**Fe**		**8555**	**14700**	220 HB	Record SA	+
0.5	Bal.		UP 1-GF-250	T Fe1			

			DIN	EN/ISO	Hardness	Flux	JOIN!online
Mo	**W**	**Fe**	**8555**	**14700**	57 HRC	Record SA	+
1.7	1.7	Bal.	UP 6-GF-55-GT	T Fe8			
Mo	**Co**	**Fe**	**8555**	**14700**	47 HRC	Record SA Record SR	+
2.3	13.5	Bal.	UP 5-GF-50-CT	T Z Fe7			
Mo	**W**	**Fe**	**8555**	**14700**	44 HRC	Record SA	+
1.7	1.6	Bal.	UP 6-GF-45-GT	T Z Fe7			

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5.6.3 WEAR protection – Martensitic stainless steels

Product name		Short description	Chemical composition (typical values) in %			
New	Old					
WEARcore 385-S	SK 385-SA	SAW core wire depositing a martensitic alloy designed to resist metal-to-metal wear, corrosion and thermal fatigue	C	Mn	Si	Cr
			0.30	1.2	0.4	15.1
WEARcore 410 NiMo-S	SK 410 NiMo-SA	SAW core wire designed to resist metal-to-metal wear, corrosion and thermal fatigue fire cracking, surfacing of continuous casting rollers of very small diameters	C	Mn	Si	Cr
			0.05	1.0	0.3	12.5
WEARcore 415-S	SK 415-SA	SAW core wire depositing a ferritic-martensitic steel with additions of vanadium and niobium designed to resist metal-to-metal wear, corrosion and thermal fatigue	C	Mn	Si	Cr
			0.08	0.9	0.4	13.5
WEARcore 420-S	SK 420-SA	SAW core wire depositing a martensitic steel containing 13 % Chromium giving a good resistance to metal-to-metal wear and corrosion. Applications: dredging pump casings, continuous casting rollers	C	Mn	Si	Cr
			0.27	1.3	0.3	13.5
WEARcore 430-S	SK 430C-SA	SAW core wire depositing a ferritic steel containing 17 % Chromium designed to resist corrosion at high temperatures. Applications: continuous casting rollers from the top of the line, valve seats	C	Mn	Si	Cr
			0.04	0.9	0.5	19.5
WEARcore 461 C-S	SK 461-CSA	SAW core wire depositing a ferritic-martensitic steel with additions of cobalt, tungsten and vanadium designed to resist metal-to-metal wear, corrosion and thermal fatigue fire cracking	C	Mn	Si	Cr
			0.26	0.9	0.5	12.2
WEARcore 742 N-S	SK 742 N-SK	SAW core wire depositing a ferritic-martensitic steel with addition of Nitrogen designed to enhance the resistance to thermal fatigue and intragranular corrosion by reducing the formation of carbides at grain boundaries	C	Mn	Si	Cr
			0.04	1.2	0.4	13.5
WEARcore 768-S	SK 768-S	SAW core wire depositing a ferritic-martensitic steel with addition of Nitrogen designed to enhance the resistance to thermal fatigue and intragranular corrosion by reducing the formation of carbides at grain boundaries	C	Mn	Si	Cr
			0.02	0.6	0.5	14.5

							DIN	EN/ISO	Hardness	JOIN!online
Mo	**Fe**						**8555**	**14700**	54 HRC	
0.4	Bal.						UP 6-GF-55-CG	T Fe8		
Ni	**Mo**	**Fe**					**8555**	**14700**	39 HRC	
5.0	0.9	Bal.					UP 5-GF-40-C	T Fe7		
Ni	**Mo**	**Nb**	**V**	**Fe**			**8555**	**14700**	42 HRC	
2.1	1.1	0.2	0.3	Bal.			UP 5-GF-45-C	T Fe7		
Fe							**8555**	**14700**	53 HRC	
Bal.							UP 6-GF-55-C	T Fe8		
Fe							**8555**	**14700**	175 HB	
Bal.							UP 5-GF-200-C	T Z Fe9		
Ni	**Mo**	**Co**	**W**	**V**	**Fe**		**8555**	**14700**	54 HRC	
0.4	1.4	1.8	0.9	1.0	Bal.		UP 6-GF-50-C	T Fe8		
Ni	**Mo**	**Nb**	**V**	**N**	**Fe**		**8555**	**14700**	44 HRC	
3.3	1.3	0.1	0.15	0.06	Bal.		UP 5-GF-45-C	T Fe7		
Ni	**Mo**	**Fe**					**8555**	**14700**	36 HRC	
6.2	2.7	Bal.					UP 5-GF-350-C	T Z Fe7		

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5.7 SAW – Fluxes

5.7.1 WEAR protection – SAW Fluxes

Product name	Short description
RECORD CrMo15 TW	Grade 11 (1 1/4Cr-1/2Mo) low alloy repair - Hardness 200HB
RECORD R 250	SAW flux for cladding of non- and low-alloyed steel grades
RECORD SA	SAW flux designed for hardfacing with cored wires or solid wires
RECORD SK	SAW flux for hardfacing with high Nitrogen containing flux-cored wires
RECORD SMo TW	Flux for Submerged Arc strip & wire cladding, unalloyed and medium alloyed steels
RECORD SR	SAW flux designed for hardfacing with cored wires or solid wires
UA 600	SAW flux for for welding of unalloyed and low alloyed steels
UA 601	SAW flux for for welding of unalloyed and low alloyed steels
UA 602	SAW flux for surface welding of unalloyed and low alloyed steels
UTP FX 603	SAW flux for for welding of unalloyed and low alloyed steels

EN/ISO	EN	Bas.Index wt%	Grain Size	JOIN!online
14174		1.3	0.40 – 1.4 mm	+
S A CS 3				
14174		0.63	1.8 – 6 mm	+
S A MS 3				
14174	**760**	3.4	0.4 – 1.4 mm	🛒
S A FB 1	S A FB 3			
14174	**760**	3.3	0.4 – 1.4 mm	🛒
S A FB 1	S A FB 3			
14174		1.1	0.40 – 1.4 mm	+
S A CS 3				
14174	**760**	2.0	0.4 - 1.0 mm	🛒
S A FB 2	S A FB 3			
14174		2.2	0.3 – 2.0 mm	🛒
SA AB 1 65 DC H5				
14174		2.2	0.3 – 2.0 mm	+
SA FB 1 99 DC H5				
14174		2.4	0.3 – 2.0 mm	+
SA FB 1 65 DC H5				
14174		2.1	0.3 – 2.0 mm	+
A FB 1 54 DC H5				

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5.8 ESSC – SASC Strip electrodes and fluxes

5.8.1 WEAR protection – Carbon steel strip electrode

Product name	Short description	Chemical composition (typical values) in %			
		C	Si	Mn	Fe
SOUDOTAPE A	Low Manganese carbon steel strip electrode	0.03	0.01	0.20	Rem.

5.8.2 WEAR protection – Ferritic steel & low alloys martensite fluxes

Product name	Short description	Welding process	Strip electrode
RECORD RT 159	General purpose subarc flux for hardfacing	SASC	SOUDOTAPE A
RECORD SMo TW	Grade 1 (16Mo3 - 1.5415) 0.5% Molybdenum low alloy steel subarc hardfacing flux Hardness typical 150HB	SASC	SOUDOTAPE A
RECORD CrMo15 TW	Grade 11 (13CrMo4-5) 1.25% Chromium - 0.5% Molybdenum low alloy steel subarc hardfacing flux Hardness typical 200HB	SASC	SOUDOTAPE A
RECORD CrMo22	Grade 22 (10CrMo9-10) 2.25% Chromium - 1.0% Molybdenum low alloy steel subarc hardfacing flux Hardness typical 250HB	SASC	SOUDOTAPE A
RECORD RT 350	Ferritic steel subarc hardfacing flux Hardness typical 350HB	SASC	SOUDOTAPE A
RECORD RT 600	Low alloy martensitic steel subarc hardfacing flux Hardness typical 55HRC	SASC	SOUDOTAPE A

	ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
	SFA 5.17	**14171-A**	RECORD RT 159 RECORD SMo TW RECORD CrMo15 TW RECORD CrMo 22 RECORD RT 350 RECORD RT 600	+
	(EL8)	(S1)		

	EN/ISO	JOIN!online
	14174	🛒
	S A CS 3	
	14174	+
	S A CS 3	
	14174	+
	S A CS 3	
	14174	+
	S A CS 3	
	14174	+
	S A AB 3	
	14174	+
	S A AB 3	

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5.8.3 WEAR protection – Tool steel martensite strip electrode

Product name	Short description	Chemical composition (typical values) in %			
		C	Si	Mn	Ni
SOUDOTAPE 258	High alloyed martensite with complex carbides strip electrode	0.3	0.4	1.1	0.3

5.8.4 WEAR protection – Ferritic steel & low alloys martensite fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 426	Neutral flux - Low alloy martensitic repair Hardness up to 50HRC	ESSC	SOUDOTAPE 258
RECORD RT 159	General purpose electroslag strip cladding flux for hardfacing	SASC	SOUDOTAPE 258
RECORD EST 423	Electroslag strip cladding flux with molybdenum additions for hardfacing High alloyed martensite tool steel with complex carbides Hardness up to 55HRC	ESSC	SOUDOTAPE 258

5.8.5 WEAR protection – Low carbon Ferritic stainless steel strip electrodes

Product name	Short description	Chemical composition (typical values) in %			
		C	Si	Mn	Cr
SOUDOTAPE 410L	410L 13% Chromium low carbon ferritic stainless steel strip electrode	0.03	0.4	0.4	12.7
		C	Si	Mn	Cr
SOUDOTAPE 430	430 17% Chromium low carbon ferritic stainless steel strip electrode	0.04	0.3	0.4	16.2

5.8.6 WEAR protection – Low carbon Ferritic stainless steel fluxes

Product name	Short description	Welding process	Strip electrode
RECORD RT 159	General purpose subarc flux for hardfacing	SASC	SOUDOTAPE 410L SOUDOTAPE 430
RECORD EST 426	General purpose electroslag strip cladding flux for hardfacing single layer 410 13%Cr ferritic stainless steel with SOUDOTAPE 430	ESSC	SOUDOTAPE 410L SOUDOTAPE 430

			ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Cr	Mo	W	SFA 5.21	14700	RECORD EST 426 RECORD RT 159	+
6.6	1.6	1.7	EQFe-8	B Fe8		

EN/ISO	JOIN!online
14174	🛒
ES A FB 3	
14174	+
S A CS 3	
14174	+
ES A FB 3	

	ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Fe	SFA 5.9	14343-A	RECORD EST 426 RECORD RT 159	+
Rem.	EQ410	B 13 L		
Fe	SFA 5.9	14343-A	RECORD EST 426 RECORD RT 159	+
Rem.	EQ430	B 17		

EN/ISO	JOIN!online
14174	🛒
S A CS 3	
14174	🛒
ES A FB 2B	

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5.8.7 WEAR protection – Ferritic & Martensitic stainless steel strip electrodes

Product name	Short description	Chemical composition (typical values) in %			
SOUDOTAPE 420	420 (1.4021) 13% Chromium high carbon martensitic stainless steel strip electrode	C	Si	Mn	Cr
		0.3	0.3	0.4	13.7
SOUDOTAPE 430L	430L 17% Chromium extra low carbon ferritic stainless steel strip electrode	C	Si	Mn	Cr
		0.015	0.25	0.4	16.3
SOUDOTAPE 430	430 17% Chromium low carbon ferritic stainless steel strip electrode	C	Si	Mn	Cr
		0.04	0.3	0.4	16.2

5.8.8 WEAR protection – Martensitic stainless steel fluxes

Product name	Short description	Welding process	Strip electrode
RECORD RT 162	410NiMo (S41500 - F6MN - 1.4313) martensitic stainless steel single layer subarc hardfacing flux Hardness typical 40HRC	SASC	SOUDOTAPE 430
RECORD RT 168	13 6 2 L extra low carbon Supermartensitic stainless steel subarc hardfacing flux Hardness typical 35HRC	SASC	SOUDOTAPE 430L
RECORD EST 423	Electroslag strip cladding flux with molybdenum additions for hardfacing 420Mo (~S42026) martensitic stainless steel single layer - Hardness up to 55HRC	ESSC	SOUDOTAPE 420
RECORD EST 426	General purpose electroslag strip cladding flux for hardfacing	ESSC	SOUDOTAPE 420
RECORD EST 452	410NiMo (S41500 - F6MN - 1.4313) martensitic stainless steel electroslag strip cladding flux for hardfacing Hardness typical 40HRC	ESSC	SOUDOTAPE 430
RECORD RT 152	410NiMo (S41500 - F6MN - 1.4313) martensitic stainless steel subarc hardfacing flux Hardness typical 40HRC	SASC	SOUDOTAPE 430
RECORD RT 159	General purpose subarc flux for hardfacing	SASC	SOUDOTAPE 420
RECORD RT 742	410NiMoNbV martensitic stainless steel subarc hardfacing flux Hardness typical 40HRC	SASC	SOUDOTAPE 430

	ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Fe	**SFA 5.9**	**14343-A**	RECORD EST 423 RECORD EST 426 RECORD RT 159	
Rem.	EQ420	B 13 H		
Fe	**SFA 5.9**	**14343-A**	RECORD RT 168	
Rem.	EQ430	B 17		
Fe	**SFA 5.9**	**14343-A**	RECORD EST 426 RECORD EST 452 RECORD RT 152 RECORD RT 159 RECORD RT 162 RECORD RT 742	
Rem.	EQ430	B 17		

	EN/ISO	JOIN!online
	14174	
	S A CS 3	
	14174	
	S A CS 3	
	14174	
	ES A FB 3	
	14174	
	ES A FB 2B	
	14174	
	ES A FB 3	
	14174	
	S A CS 3	
	14174	
	S A CS 3	
	14174	
	S A CS 3	

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5.8.9 WEAR protection – Cobalt alloys strip electrodes

Product name	Short description	Chemical composition (typical values) in %			
		C	Si	Mn	Ni
SOUDOTAPE SCoCr6	CoCr-A (Stellite® 6) cobalt alloy composite strip electrode	1.0	0.2	0.9	2.9
		C	Si	Mn	Ni
SOUDOTAPE SCoCr21	CoCr-E (Stellite® 21) cobalt alloy composite strip electrode	0.25	0.2	0.5	3.0

5.8.10 WEAR protection – Cobalt alloys fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 126	Cobalt alloys electroslag strip cladding flux for harfacing CoCr-A (STELLITE® 6) Cobalt alloy Hardness 40HRC CoCr-E (STELLITE® 21) Cobalt base Hardness 30HRC	ESSC	SOUDOTAPE SCoCr6 SOUDOTAPE SCoCr21

			ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Cr	**W**	**Co**	**SFA 5.21**	**14700**	RECORD EST 126	+
31.1	4.6	Rem.	EQCCoCr-A	C Co2		
Cr	**Mo**	**Co**	**SFA 5.21**	**14700**	RECORD EST 126	+
27.0	5.0	Rem.	EQCCoCr-E	C Co1		

EN/ISO	JOIN!online
14174	+
ES A FB 4	

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5.9 ESSC – SASC Weld overlay combinations

5.9.1 WEAR protection – Low alloy steels – Mild steel & low alloy steel

Weld Deposit	Hardness	Cladding process	Product combination	Short description	Number of Layers
Mild Steel	150 HB	SASC	**SOUDOTAPE A - RECORD RT 159**	Buffering low manganese carbon steel	2
1/2Mo	150 HB	SASC	**SOUDOTAPE A - RECORD SMo TW**	low alloy steel Grade 1 (1/2Mo) 16Mo3 - 1.5415	2
CrMo 1	200 HB	SASC	**SOUDOTAPE A - RECORD CrMo 15 TW**	low alloy steel Grade 11 (1 1/4Cr-1/2Mo) 13CrMo4-5	2
CrMo 2	250 HB	SASC	**SOUDOTAPE A - RECORD CrMo22**	low alloy steel Grade 22 (2 1/4Cr-1Mo) 10CrMo9-10	2
CrMo 5	350 HB	SASC	**SOUDOTAPE A - RECORD RT 350**	Hardfacing 350HB (40HRC)	3
C CrMo 5	55 HRC	SASC	**SOUDOTAPE A - RECORD RT 600**	Hardfacing 55HRC (600HB)	3

5.9.2 WEAR protection – Tool steels

Weld Deposit	Hardness	Cladding process	Product combination	Short description	Number of Layers
C CrMoW 6	50 HRC	SASC	**SOUDOTAPE 258 - RECORD RT 159**	High alloyed martensite with complex carbides for hardfacing	3
	50 HRC	ESSC	**SOUDOTAPE 258 - RECORD EST 426**	High alloyed martensite with complex carbides for hardfacing	2
C CrMoW 6 3	55 HRC	ESSC	**SOUDOTAPE 258 - RECORD EST 423**	High alloyed martensite with complex carbides for hardfacing	2

Chemical composition (typical values) in %						
C	**Si**	**Mn**	**Fe**			
0.05	0.5	1	Rem.			
C	**Si**	**Mn**	**Mo**	**Fe**		
0.04	0.5	1	0.6	Rem.		
C	**Si**	**Mn**	**Cr**	**Mo**	**Fe**	
0.04	0.4	0.5	1.3	0.6	Rem.	
C	**Si**	**Mn**	**Cr**	**Mo**	**Fe**	
0.08	0.4	0.2	2.2	0.9	Rem.	
C	**Si**	**Mn**	**Cr**	**Mo**	**Fe**	
0.08	0.3	0.3	5	0.9	Rem.	
C	**Si**	**Mn**	**Cr**	**Mo**	**Fe**	
0.3	0.9	0.3	5.3	0.7	Rem.	

Chemical composition (typical values) in %						
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Fe**
0.2	0.5	1	0.3	6.6	1.6	Rem.
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Fe**
0.2	0.6	1	0.3	6.4	1.5	Rem.
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Fe**
0.2	0.6	1	0.3	6.4	3	Rem.

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5.9.3 WEAR protection – Ferritic stainless steel

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
410	13	SASC	**SOUDOTAPE 410L - RECORD RT 159**	410 - 13%Cr M+F stainless steel 3 layers - Continuous casting rollers	3
		ESSC	**SOUDOTAPE 410L - RECORD EST 426**	410 - 13%Cr M+F stainless steel 2 layers - Continuous casting rollers	2
430	17	SASC	**SOUDOTAPE 430 - RECORD RT 159**	Ferritic Stainless steel for continuous casting rollers	3
		ESSC	**SOUDOTAPE 430 - RECORD EST 426**	Ferritic Stainless steel for continuous casting rollers	2
		SASC	**SOUDOTAPE 430 - RECORD RT 179**	430 - X6Cr17 ferritic stainless steel with 2 layers	2

5.9.4 WEAR protection – Martensitic stainless steels

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
410NiMo	13 4 Mo	SASC	**SOUDOTAPE 430 - RECORD RT 152**	410NiMo S41500 F6MN Continuous casting rollers	3
			SOUDOTAPE 430 - RECORD RT 162	410NiMo S41500 F6MN Continuous casting rollers single layer	1
		ESSC	**SOUDOTAPE 430 - RECORD EST 452**	410NiMo S41500 F6MN Continuous casting rollers	2
410NiMoNbV	13 4 2 Nb V	SASC	**SOUDOTAPE 430 - RECORD RT 742**	Martensitic stainless steel with Nb, V additions - Continuous casting pinch rolls	3
420	13 H	SASC	**SOUDOTAPE 420 - RECORD RT 159**	420 - X20Cr13 martensitic stainless steel Continuous casting rollers	3
		ESSC	**SOUDOTAPE 420 - RECORD EST 426**	420 - X20Cr13 martensitic stainless steel Continuous casting rollers	2
420Mo	13 Mo H	ESSC	**SOUDOTAPE 420 - RECORD EST 423**	420Mo - (~S42026) martensitic stainless steel Continuous casting rollers	2

5.9.5 WEAR protection – Cobalt alloys

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
CoCr-E	Co1	ESSC	**SOUDOTAPE SCoCr21 - RECORD EST 126**	CoCr-E (Stellite 21) cobalt alloy 2 layers	2
CoCr-A	Co2	ESSC	**SOUDOTAPE SCoCr6 - RECORD EST 126**	CoCr-A (Stellite 6) cobalt alloy 2 layers	2

Chemical composition (typical values) in %									Hardness	SFA-5.39 flux - electrode weld overlay designation
C	Si	Mn	Cr	Fe					200 HB	SACLAD3-EQ410/410
0.05	0.9	0.2	11.3	Rem.						
C	Si	Mn	Cr	Fe					200 HB	ESCLAD2-EQ410/410
0.03	0.5	0.2	11.9	Rem.						
C	Si	Mn	Cr	Fe					200 HB	SACLAD3-EQ430/430
0.05	0.9	0.2	15	Rem.						
C	Si	Mn	Cr	Fe					200 HB	ESCLAD2-EQ430/430
0.06	0.5	0.4	15.3	Rem.						
C	Si	Mn	Cr	Fe					200 HB	SACLAD2-EQ430/430
0.07	1.1	0.5	17.3	Rem.						

Chemical composition (typical values) in %									Hardness	SFA-5.39 flux - electrode weld overlay designation
C	Si	Mn	Ni	Cr	Mo	Fe			40 HRC	SACLAD3-EQ430/410NiMo
0.03	0.9	0.5	3.8	14	0.9	Rem.				
C	Si	Mn	Ni	Cr	Mo	Fe			40 HRC	SACLAD1-EQ430/410NiMo
0.05	1	0.6	4	13.1	0.7	Rem.				
C	Si	Mn	Ni	Cr	Mo	Fe			40 HRC	ESCLAD2-EQ430/410NiMo
0.05	0.4	0.3	3.3	14.1	0.4	Rem.				
C	Si	Mn	Ni	Cr	Mo	Nb	V	Fe	40 HRC	SACLAD3-EQ430/G
0.1	0.9	0.3	4	13.1	1.6	0.2	0.1	Rem.		
C	Si	Mn	Cr	Fe					50 HRC	SACLAD3-EQ420/420
0.3	0.8	0.2	12.2	Rem.						
C	Si	Mn	Cr	Fe					50 HRC	ESCLAD2-EQ420/420
0.3	0.3	0.3	12.6	Rem.						
C	Si	Mn	Cr	Mo	Fe				55 HRC	ESCLAD2-EQ420/420Mo
0.3	0.2	0.2	12.8	1.8	Rem.					

Chemical composition (typical values) in %									Hardness	SFA-5.39 flux - electrode weld overlay designation
C	Si	Mn	Ni	Cr	Mo	Co	Fe		30 HRC	ESCLAD2-EQCCoCr-E/CoCr-E
0.2	0.4	0.4	2.9	25.4	4.8	Rem.	3			
C	Si	Mn	Ni	Cr	W	Co	Fe		40 HRC	ESCLAD2-EQCCoCr-A/CoCr-A
1	0.3	0.5	2.7	29	4.4	Rem.	4			

5.10 SMAW – Stick electrodes

5.10.1 Corrosion protection – Pure nickel

Product name	Short description	Chemical composition (typical values) in %							
		C	Si	Mn	Ni	Ti	Al	Fe	
UTP 80 Ni	Basic coated pure Ni stick electrode for joining and surfacing on pure Ni grades, including LC nickel and Ni-alloys	< 0.02	0.8	0.25	Bal.	2.0	0.2	0.1	

5.10.2 Corrosion protection – Nickel Copper

Product name	Short description	Chemical composition (typical values) in %							
		C	Si	Mn	Ni	Ti	Fe	Cu	Al
UTP 80 M	Basic coated NiCu alloyed stick electrode for surfacing and joining of NiCu alloys	<0.05	0.7	3	Bal.	0.7	1	29	0.3

5.10.3 Corrosion protection – NiCr alloys

Product name	Short description	Chemical composition (typical values) in %							
		C	Si	Mn	Cr	Ni	Mo	Nb	Fe
Thermanit Nicro 82	Ni-base stick electrode for joining and surfacing of heat resistant Cr and CrNi steels and Ni-alloys.	0.025	<0.4	5	19	Bal.	1.5	2.2	3
Thermanit 690	Ni-base stick electrode for joining of high corrosion resistant steels with resistance in oxidizing media like nitric acid.	C	Si	Mn	Cr	Ni	Nb	Fe	
		0.03	0.5	3.8	28	Bal.	1.8	8.5	
UTP 7015 NK	High efficiency Ni-base stick electrode for repair and joining of Ni-alloys and could tough steels. Buffer-layer cladding of Ni and Co alloys.	C	Si	Mn	Cr	Ni	Mo	Nb	Fe
		0.03	0.4	4.5	15	Bal.	1.2	2	7
UTP 7015	Ni-base stick electrode for joining of different materials and for cladding of un- and low-alloyed steels.	C	Si	Mn	Cr	Ni	Nb	Fe	
		0.025	0.4	6	16	Bal.	2.2	8	
UTP 7015 Mo	Ni-base stick electrode for joining of similar heat resistant NiCrMo alloys, heat resistant austenitic steels or cryogenic steels	C	Si	Mn	Cr	Ni	Mo	Nb	Fe
		0.04	0.4	3	16	Bal.	1.5	2.2	6

	AWS	EN/ISO	Approvals	JOIN!online
	A5.11	**14172**	TÜV (No. 00190)	
	E Ni-1	E Ni 2061 (NiTi3)		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.11 / SFA-5.11	**14172**	TÜV (00248.), ABS, DNV	
	ENiCu-7	E Ni 4060 (NiCu30Mn3Ti)		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.11 / SFA-5.11	**14172**	TÜV (01775), TÜV (KTA 1408.1) (08129.00), DNV	
	EniCrFe-3 (mod.)	E Ni 6082 (NiCr20Mn3Nb)		
	A5.11 / SFA-5.11	**14172**		
	ENiCrFe-7	E Ni 6152 (NiCr30Fe9)		
	A5.11 / SFA-5.11	**14172**		
	EniCrFe-3 (mod.)	E Ni 6093 (NiCr15Fe8NbMo)		
	A5.11 / SFA-5.11	**14172**	TÜV (00875), DNV, KTA (08036)	
	ENiCrFe-3	E Ni 6182 (NiCr15Fe6Mn)		
	A5.11 / SFA-5.11	**14172**	TÜV (05259), DNV	
	ENiCrFe-2	E Ni 6093 (NiCr15Fe8NbMo)		

5.10.4 Corrosion protection – NiCrMo alloys

Product name	Short description	Chemical composition (typical values) in %							
UTP 6170 Co	Basic coated NiCrMo stick electrode for joining high temperature similar Ni-base alloys, heat resistant steels and cast steels	C	Si	Mn	Cr	Ni	Mo	Co	Ti
		0.06	0.7	0.1	21	Bal.	9	11	0.3
Thermanit 30/40 EW	Basic coated NiCrMo stick electrode for joining and cladding of matching grades as well as stabalized and unstabalized austenitic steel grades	C	Si	Mn	Cr	Ni	Mo	Cu	
		<0.03	<0.9	1.5	28	36	4.3	1.8	
Thermanit 620	Basic coated high efficiency NiCrMo stick electrode for joining 9 % Ni steels for liquefied natural gas (LNG) and 5 % Ni steels for Liquefied ethylene gas (LEG).	C	Si	Mn	Cr	Ni	Mo	W	Nb
		0.05	0.3	2.9	12,5	Bal.	5.9	1.4	1.2
UTP 7013 Mo	Basic coated high efficiency NiCrMo stick electrode for joining 9 % Ni steels for liquefied natural gas (LNG) and 5 % Ni steels for Liquefied ethylene gas (LEG).	C	Si	Mn	Cr	Ni	Mo	W	Nb
		0.05	0.5	3.5	15	Bal.	7	1.6	1.6
UTP 759 Kb	Basic coated Ni-base stick electrode for welding of parts in high corrosive media primarily in chemical process plants	C	Si	Mn	Cr	Ni	Mo	Fe	
		<0.02	< 0.02	0.5	22,5	Bal.	15,5	1	
UTP 776 Kb	Basic coated Ni-base stick electrode for welding of matching base materials like 2.4819 and surfacing on low-alloyed steels	C	Si	Mn	Cr	Ni	Mo	W	Fe
		<0.02	< 0.02	0.6	16,5	Bal.	16,5	4	5
UTP 6222 Mo	Basic coated Ni-base stick electrode for joining and surfacing on Ni-alloys, austenitic steels etc, and claddings on similar materials like 2.4856	C	Si	Mn	Cre	Ni	Mo	Nb	Fe
		0.03	0.4	0.6	22	Bal.	9	3.3	<1
UTP Soudonel D	Basic coated high efficiency NiCrMo stick electrode for joining 9 % Ni steels for liquefied natural gas (LNG) and 5 % Ni steels for Liquefied ethylene gas (LEG).	C	Si	Mn	Cr	Ni	Mo	W	Nb
		0.05	0.3	3.5	14	Bal.	6.5	1.1	0.7

			AWS	EN/ISO	Approvals	JOIN!online
	Fe	**Al**	**A5.11 / SFA-5.11**	**14172**	TÜV (04661)	
	1	0.7	ENiCrCoMo-1 (mod.)	E Ni 6117 (NiCr22Co12Mo)		
				14172	TÜV (04587)	
				E Ni Z (NiCr29Fe26Mo)		
	Fe		**A5.11 / SFA-5.11**	**14172**		
	4.8		ENiCrMo-6	E Ni 6620 (NiCr14Mo7Fe)		
	Fe		**A5.11 / SFA-5.11**	**14172**	BV, DNV	
	5		ENiCrMo-6	E Ni 6620 (NiCr14Mo7Fe)		
			A5.11 / SFA-5.11	**14172**	TÜV (06687)	
			ENiCrMo-13	E Ni 6059 (NiCr23Mo16)		
			A5.11 / SFA-5.11	**14172**	TÜV (05257)	
			ENiCrMo-4	E Ni 6276 (NiCr15Mo15Fe6W4)		
			A5.11 / SFA-5.11	**14172**	TÜV (03610), DNV, ABS, BV	
			ENiCrMo-3	E Ni 6625 (NiCr22Mo9Nb)		
	Fe		**A5.11 / SFA-5.11**	**14172**	TÜV (05466), BV, DNV	
	7.5		ENiCrMo-6	E Ni 6620 (NiCr14Mo7Fe)		

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5.11 GTAW – TIG Rods

5.11.1 Corrosion protection – Pure Nickel

Product name	Short description	Chemical composition (typical values) in %						
		C	Si	Mn	Ni	Ti	Fe	
UTP A 80 Ni	TIG rod, nickel alloy, Ni-1 type with excellent corrosion resistance	< 0.02	< 0.3	0.3	Bal.	3.3	< 0.1	

5.11.2 Corrosion protection – Nickel Copper

Product name	Short description	Chemical composition (typical values) in %						
		C	Si	Mn	Ni	Ti	Cu	Fe
UTP A 80 M	TIG rod for nickel-copper alloys such as NiCu30Fe or NiCu30Al.	< 0.02	0.3	3.2	Bal.	2.4	29.0	1.0

5.11.3 Corrosion protection – NiCr alloys

Product name	Short description	Chemical composition (typical values) in %						
		C	Si	Mn	Ni	Cr	Nb	Fe
Thermanit Nicro 82	TIG rods nickel chromium alloy, NiCr-3	0.02	0.1	3.0	> 67.0	20.0	2.5	< 2.0
		C	Si	Mn	Ni	Cr	Mo	Co
Thermanit 690	TIG rod, nickel alloy, for corrosion resistant NiCr alloys (690)	0.03	0.5	3.8	Bal.	28.0	0.1	< 0.1

		AWS	EN/ISO	Approvals	JOIN!online
		A5.14	**18274**	TÜV (00951), ABS	
		ER Ni-1	S Ni 2061 (NiTi3)		

		AWS	EN/ISO	Approvals	JOIN!online
		A5.14	**18274**	TÜV (00249), ABS, DNV	
		ER NiCu-7	S Ni 4060 (NiCu30Mn3Ti)		

		AWS	EN/ISO	Approvals	JOIN!online
		A5.14	**18274**	TÜV (01703 / 08125), DB (43.132.11), DNV	
		ERNiCr-3	S Ni 6082 (NiCr20Mn3Nb)		
		A5.14	**18274**		
		ERNiCrFe-7	S Ni 6052 (NiCr30Fe9)		

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5.11.4 Corrosion protection – NiCrMo alloys

Product name	Short description	Chemical composition (typical values) in %							
Thermanit 30/40 E	TIG rod, nickel alloy, for joining and surfacing fully austenitic steels such as X1NiCrMoCu31-27-4 and dissimilar welding to unalloyed/low-alloyed steels	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	
		0.02	0.2	2.6	Bal.	29.0	4.3	1.8	
Thermanit 686	TIG rod, nickel alloy, for highly corrosion resistant NiCrMo alloys (686)	**C**	**Si**	**Mn**	**Ni**	**Mo**	**W**	**Al**	**Fe**
		0.01	0.08	< 0.5	Bal.	16.0	3.8	0.3	< 1.0
UTP A 722	TIG rod, nickel alloy, for highly corrosion resistant NiCrMo alloys (C22)	**C**	**Si**	**Mn**	**Ni**	**Mo**	**Cu**	**W**	**V**
		< 0.01	< 0.1	< 0.5	Bal.	13.0	< 0.2	3.0	< 0.2
UTP A 759	TIG rod, nickel alloy, for corrosion resistant NiCrMo alloys (59)	**C**	**Si**	**Ni**	**Cr**	**Mo**	**Fe**		
		< 0.01	0.1	Bal.	22.5	15.5	< 0.1		
UTP A 776	TIG rod, nickel alloy, NiCrMo-4 type for corrosion resistant NiCrMo alloys (C276)	**C**	**Si**	**Ni**	**Cr**	**W**	**V**	**Fe**	
		< 0.01	0.07	Bal.	16.0	3.5	0.2	6.0	
UTP A 4221	TIG rod, nickel alloy, for highly corrosion resistant CrNi-MoCu alloys (825)	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	
		0.01	0.25	0.8	41.0	20.5	3.1	1.8	
UTP A 6222 Mo	TIG rod, nickel alloy,NiCrMo-3 type for corrosion resistant NiCrMo alloys (625)	**C**	**Si**	**Ni**	**Cr**	**Nb**	**Mo**	**Fe**	
		< 0.02	< 0.2	Bal.	22.0	3.5	9.0	≤ 0.5	

			AWS	EN/ISO	Approvals	JOIN!online
			A5.14 / SFA-5.14	**18274**	TÜV (00118)	
			ER383 (mod.)	S Ni 8025 (NiFe30Cr29Mo)		
			A5.14 / SFA-5.14	**18274**		
			ERNiCrMo-14	S Ni 6686 (NiCr21Mo16W4)		
	Co	**Fe**	**A5.14**	**18274**		
	< 2.5	3.0	ERNiCrMo-10	S Ni 6022 (NiCr21Mo13Fe4W3)		
			A5.14	**18274**	TÜV (20077), DNV	
			ERNiCrMo-13	S Ni 6059 (NiCr23Mo16)		
			A5.14	**18274**	TÜV (03461), DNV, ABS	
			ERNiCrMo-4	S Ni 6276 (NiCr15Mo16Fe6W4)		
			A5.14	**18274**		
			ERNiFeCr-1	S Ni 8065 (NiFe30Cr21Mo3)		
			A5.14	**18274**	TÜV (03461), DNV, ABS, BV	
			ERNiCrMo-3	S Ni 6625 (NiCr22Mo9Nb)		

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5.12 GMAW – Solid wires

5.12.1 Corrosion protection – Pure Nickel

Product name	Short description	Chemical composition (typical values) in %							
		C	Si	Mn	Ni	Ti			
UTP A 80 Ni	Solid wire, nickel alloy, Ni-1 type with excellent corrosion resistance	< 0.02	< 0.3	0.3	Bal.	3.3			

5.12.2 Corrosion protection – Nickel Copper

Product name	Short description	Chemical composition (typical values) in %							
		C	Si	Mn	Ni	Cu	Fe		
UTP A 80 M	Solid wire for nickel-copper alloys such as NiCu30Fe or NiCu30Al.	< 0.02	0.3	3.2	Bal.	29.0	1.0		

5.12.3 Corrosion protection – NiCr alloys

Product name	Short description	Chemical composition (typical values) in %							
		C	Si	Mn	Cr	Nb	Fe		
Thermanit Nicro 82	Solid wires nickel chromium alloy, NiCr-3	0.02	0.2	2.8	19.5	2.5	< 2.0		
		C	Si	Mn	Ni	Cr	Mo	Fe	Co
Thermanit 690	Solid wire, nickel alloy, for corrosion resistant NiCr alloys (690)	0.03	0.3	0.3	Bal.	29.0	0.1	9.0	< 0.1

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.14	**18274**	I 1, I 3, Z-ArHeHC-30/2/0.05	TÜV (00950), ABS	
	ER Ni-1	S Ni 2061 (NiTi3)			

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.14	**18274**	I 1, I 3, Z-ArHeHC-30/2/0.05	TÜV (00250), ABS	
	ER NiCu-7	S Ni 4060 (NiCu30Mn3Ti)			

	AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	A5.14	**18274**	I 1, I 3, Z-ArHeHC-30/2/0.05	TÜV (03089), DNV	
	ERNiCr-3	S Ni 6082 (NiCr20Mn3Nb)			
	A5.14	**18274**	I 1, Z-ArHeHC-30/2/0.05		
	ERNiCrFe-7	S Ni 6052 (NiCr30Fe9)			

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5.12.4 Corrosion protection – NiCrMo alloys

Product name	Short description	Chemical composition (typical values) in %							
Thermanit 686	Solid wire, nickel alloy, for corrosion resistant NiCrMo alloys (686)	C	Si	Mn	Cr	Ni	Mo	W	Fe
		0.01	0.08	< 0.5	22.8	Bal.	16.0	3.8	< 1.0
UTP A 722	Solid wire, nickel alloy, for corrosion resistant NiCrMo alloys (C22)	C	Si	Mn	Cr	Ni	Mo	W	V
		< 0.01	< 0.1	< 0.5	22.0	Bal.	13.5	3.0	< 0.2
UTP A 759	Solid wire, nickel alloy, for corrosion resistant NiCrMo alloys (59)	C	Si	Ni	Cr	Mo	Fe		
		< 0.01	0.1	Bal.	22.5	15.5	< 1.0		
UTP A 776	Solid wire, nickel alloy, NiCrMo-4 type for corrosion resistant NiCrMo alloys (C276)	C	Si	Ni	Cr	Mo	W	V	Fe
		< 0.01	0.07	Bal.	16.0	16.0	3.5	0.2	6.0
UTP A 4221	Solid wire, nickel alloy, for highly corrosion resistant CrNi-MoCu alloys (825)	C	Si	Mn	Cr	Mo	Cu	Fe	
		≤ 0.01	≤ 0.25	0.8	21.5	2.7	2.0	Bal.	
UTP A 6222 Mo	Solid wire, nickel alloy, NiCrMo-3 type for corrosion resistant NiCrMo alloys (625)	C	Si	Ni	Cr	Mo	Nb	Fe	
		< 0.02	< 0.2	Bal.	22.0	9.0	3.5	≤ 0,5	
UTP A 6222 Mo-3	Solid TIG wire, nickel alloy,NiCrMo-3 type for corrosion resistant NiCrMo alloys (625)	C	Si	Ni	Cr	Mo	Nb	Fe	
		≤ 0.02	≤ 0.2	Bal.	22.0	9.0	3.5	≤ 0.5	

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	Al		**A5.14**	**18274**	Z-ArHeHC-30/2/0.05		
	0.3		ERNiCrMo-14	S Ni 6686 (NiCr21Mo16W4)			
	Co	**Fe**	**A5.14**	**18274**	Z-ArHeHC-30/2/0.05		
	< 2.5	3.0	ERNiCrMo-10	S Ni 6022 (NiCr21Mo13Fe4W3)			
			A5.14	**18274**	Z-ArHeHC-30/2/0.05	TÜV (06065)	
			ER NiCrMo-13	S Ni 6059 (NiCr23Mo16)			
			A5.14	**18274**	Z-ArHeHC-30/2/0.05	TÜV (05586)	
			ER NiCrMo-4	S Ni 6276 (NiCr15Mo16Fe6W4)			
			A5.14	**18274**	Z-ArHeHC-30/2/0.05		
			ER NiFeCr-1	S Ni 8065 (NiFe30Cr21Mo3)			
			A5.14	**18274**	I 1, Z-ArHeHC-30/2/0.05	TÜV (03460)	
			ER NiCrMo-3	S Ni 6625 (NiCr22Mo9Nb)			
			A5.14	**18274**	I 1, I 3	ABS, BV, LR	
			ER NiCrMo-3	S Ni 6625 (NiCr22Mo9Nb)			

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5.13 FCAW-G – Gas-shielded flux-cored wires

5.13.1 Corrosion Protection – Nickel alloys

Product name	Short description	Chemical composition (typical values) in %					
FOXcore 625-T1	Flux-cored wire, high-alloyed, nickel-base, ENiCrMo3 type, for welding of nickel alloys with high molybdenum content, superaustenitic stainless steels, clad pipes, optimized for positional welding of pipes.	C	Si	Mn	Cr	Ni	Mo
		0.02	0.5	0.3	20.7	Bal.	8.5
FOXcore 625-T1 PF	Flux-cored wire, high-alloyed, nickel-base, ENiCrMo3 type, for welding of nickel alloys with high molybdenum content, superaustenitic stainless steels, 9% Ni-steels for cryogenic applications, optimized for vertical up welding in PF / 3F / 3G position	C	Si	Mn	Ni	Cr	Mo
		0.05	0.4	0.4	Bal.	21.0	8.5
FOXcore Nicro 82-T0	Flux-cored wire, high-alloyed, nickel-base, ENiCr3 / 6082 type, for welding of creep-resistant steels and nickel-base alloys, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr	Nb
		0.03	0.4	3.2	Bal.	19.5	2.5
FOXcore Nicro 83-T0	Flux-cored wire, high-alloyed, nickel-base, ENiCr3 / 6083 type, or welding of creep-resistant steels and nickel alloys, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr	Nb
		0.03	0.3	5.5	Bal.	19.7	2.4

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	Nb	**Fe**	**A5.34 / SFA-5.34**	**12153**	M21, C1	TÜV (10991), ABS, BV, DNV	
	3.3	< 1.0	ENiCrMo3T1-4 ENiGT1-1	T Ni 6625 P M21 2 T Z Ni6625 P C1 2			
	Nb	**Fe**	**A5.34 / SFA-5.34**	**12153**	M21		
	3.3	< 1.0	ENiCrMo3T1-4	T Ni 6625 P M21 2			
	Fe		**A5.34 / SFA-5.34**	**12153**	M21	TÜV (10298)	
	< 2.5		ENiCr3T0-4	T Ni 6082 R M21 3			
	Fe		**A5.34 / SFA-5.34**	**12153**	M21		
	< 2.0		ENiCrMo3T1-4	T Ni 6625 P M21 2			

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5.14 SAW – Solid wires

5.14.1 Corrosion protection – Nickel alloys

Product name	Short description	Chemical composition (typical values) in %					
		C	Si	Mn	Ni	Cr	Mo
UTP UP 6222 Mo	SAW solid wire nickel alloy, NiCrMo-3 type for corrosion resistant NiCrMo alloys (625)	< 0.02	< 0.2	0.01	Bal.	21.0	9.0
		C	Si	Mn	Ni	Cr	Mo
UTP UP 776	SAW solid wire , nickel alloy, NiCrMo-4 type for corrosion resistant NiCrMo alloys (C276)	0.02	0.25	1.0	Bal.	16.0	15.5

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
Nb			**A5.14 / SFA-5.14**	**18274**			
3.3			ERNiCrMo-3	S Ni 6625 (NiCr22Mo9Nb)			
S	**Fe**	**P**	**A5.14 / SFA-5.14**	**18274**			
0.006	6.5	0.008	ERNiCrMo-4	S Ni 6276 (NiCr15Mo16Fe6W4)			

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5.15 SAW – Fluxes

5.15.1 Corrosion Protection – Nickel alloys

Product name	Short description
RECORD IN	Flux for cladding
RECORD IND 24	Joining and cladding neutral flux for stainless and duplex
RECORD IND 27	Cr compensated flux
RECORD NiCrW 412	Developed for joining nickel base and reduce sensitivity to hot cracking (Mn content) despite lower BI
RECORD NiCrW 3000	Cladding flux for SS duplex and Ni
RECORD NiCrW	High basic flux for joining nickel

EN/ISO	Bas.Index wt%	Grain Size	JOIN!online
14174 S A AB 2	2.1	0.4 - 1.4 mm	
14174 S A FB 2	2.2	0.4 - 1.4 mm	
14174 S A FB 2	2.2	0.4 - 1.4 mm	
14174 S A AB 2	2.1	0.4 - 1.4 mm	
14174 S A FB 2	2.3	0.4 - 1.4 mm	
14174 S A FB 2	2.8	0.4 - 1.4 mm	

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5.16 ESSC – SASC Strip electrodes and fluxes

5.16.1 Corrosion protection – Nickel & Nickel-Copper alloys

Product name	Short description	Chemical composition (typical values) in %					
SOUDOTAPE NiTi	Pure Nickel strip electrode	C	Si	Mn	Ni	Ti	Al
		0.02	0.1	0.3	Rem.	4.0	0.5
SOUDOTAPE NiCu7	Nickel-Copper alloy (Monel) strip electrode	C	Si	Mn	Ni	Ti	Cu
		0.02	0.2	3.5	Rem.	2.3	29.1

5.16.2 Corrosion protection – Nickel & Nickel-Copper alloy fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 200	Ni-1 (N02200) Pure Nickel electroslag strip cladding flux	ESSC	SOUDOTAPE NiTi
RECORD Ni T	Ni-1 (N02200) Pure Nickel subarc strip cladding flux	SASC	SOUDOTAPE NiTi
RECORD EST 400	NiCu-7 (N04400) Nickel-30%Copper alloy electroslag strip cladding flux	ESSC	SOUDOTAPE NiCu7
RECORD NiCu TW	NiCu-7 (N04400) Nickel-30%Copper alloy subarc strip cladding flux	SASC	SOUDOTAPE NiCu7

5.16.3 Corrosion protection – Nickel-Iron-Chromium alloys

Product name	Short description	Chemical composition (typical values) in %					
SOUDOTAPE 825HS	825 Nickel-Iron-Chromium Alloy alloy strip electrode NiFeCr-1 (N08825) single layer with RECORD EST 825-1HS NiFeCr-1 (N08825) two layers with RECORD EST 825HS (320) 20 34 2 Cu Mn Nb super austenitic single layer with RECORD EST320	C	Si	Mn	Ni	Mo	Ti
		0.01	0.3	0.8	42.3	3.0	0.7

5.16.4 Corrosion protection – Nickel-Iron-Chromium alloy fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 825-1 HS	NiFeCr-1 (N08825) Nickel-Iron-Chromium Alloy electroslag strip cladding single layer flux	ESSC	SOUDOTAPE 825HS
RECORD EST 825H HS	NiFeCr-1 (N08825) Nickel-Iron-Chromium Alloy electroslag strip cladding high productivity flux	ESSC	SOUDOTAPE 825H SOUDOTAPE 825HS

			ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Fe			**SFA 5.14**	**18274**	RECORD EST 200 RECORD Ni T	+
0.1			(EQNi-1)	B (Ni 2061 (NiTi3))		
Al	**Fe**		**SFA 5.14**	**18274**	RECORD EST 400 RECORD NiCu TW	+
0.03	0.2		EQNiCu-7	B Ni 4060 (NiCu30Mn3Ti)		

	EN/ISO	JOIN!online
	14174	+
	ES A FB 2B	
	14174	+
	S A AB 2B	
	14174	+
	ES A FB 2B	
	14174	+
	S A CS 2B	

			ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Cu	**Fe**		**SFA 5.14**	**18274**	RECORD EST 201 RECORD EST 320 RECORD EST 825-1 HS RECORD EST 825H HS	+
2.0	Rem.		EQNiFeCr-1	B Ni 8065 (NiFe30Cr21Mo3)		

	EN/ISO	JOIN!online
	14174	+
	ES A FB 2B	
	14174	+
	ES A FB 2B	

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5.16.5 Corrosion protection – Nickel-Chromium alloys & Nickel-Chromium-Iron alloys

Product name	Short description	Chemical composition (typical values) in %					
SOUDOTAPE NiCr3	NiCr-3 (NiCr20Nb - 2.4806 - N06082) Nickel-Chromium Alloy strip electrode 2 thin layers with RECORD EST 201, RECORD EST 236. Buffer layer for other nickel alloyed weld deposit with high speed fluxes ESSC and SASC fluxes.	C	Si	Mn	Ni	Cr	Nb
		0.01	0.1	3.1	Rem.	20.1	2.7
SOUDOTAPE NiCrFe7	NiCrFe-7 (N06690) Nickel-Chromium-Iron Alloy strip electrode 2 layers with RECORD EST NiCrFe-7 3 layers with RECORD NFT NiCrFe-7	C	Si	Mn	Ni	Cr	Ti
		0.02	0.2	0.7	Rem.	29.6	0.4
SOUDOTAPE 690	NiCrFe-14 Nickel-Chromium-Iron alloy strip electrode 2 layers with RECORD EST 690 3 layers with RECORD NFT 690	C	Si	Mn	Ni	Cr	Nb
		0.02	0.2	2.8	Rem.	30.5	1.8

5.16.6 Corrosion protection – Nickel-Chromium-Iron alloy fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 690	NiCrFe-14 (N06690) Nickel-Chromium-Iron Alloy two layer electroslag strip cladding flux in combination with SOUDOTAPE 690	ESSC	SOUDOTAPE 690
RECORD EST NiCrFe7	NiCrFe-14 (N06690) Nickel-Chromium-Iron Alloy two layer electroslag strip cladding flux in combination with SOUDOTAPE NiCrFe7	ESSC	SOUDOTAPE NiCrFe7
RECORD NFT 690	NiCrFe-7 (N06690) Nickel-Chromium-Iron Alloy subarc strip cladding flux in combination with SOUDOTAPE 690	SASC	SOUDOTAPE 690
RECORD NFT NiCrFe7	NiCrFe-7 (N06690) Nickel-Chromium-Iron Alloy subarc strip cladding flux in combination with SOUDOTAPE NiCrFe7	SASC	SOUDOTAPE NiCrFe7

5.16.7 Corrosion protection – Nickel-Chromium-Molybdenum alloys

Product name	Short description	Chemical composition (typical values) in %					
SOUDOTAPE 625	NiCrMo-3 (N06625 - Inconel® 625) Nickel-Chromium-Molybdenum Alloy strip electrode 625 single layer with RECORD ES 6625-1 (Fe<7%) 625 single layer with RECORD EST 625-1 (Fe<7%) 625 single layer with RECORD EST 625-1 LD (Low thickness) 625 two layers with RECORD ES 6625 (high speed - low thickness)	C	Si	Mn	Ni	Cr	Mo
		0.01	0.1	0.1	Rem.	22.2	8.7
SOUDOTAPE NiCrMo7	NiCrMo-7 (N06455 - Hastelloy C4) Nickel-Chromium-Molybdenum Alloy strip electrode	C	Si	Mn	Ni	Cr	Mo
		0.005	0.05	0.05	Rem.	15.9	15.5
SOUDOTAPE NiCrMo59	NiCrMo-13 (N06059 - Alloy 59) Nickel-Chromium-Molybdenum Alloy strip electrode	C	Si	Mn	Ni	Cr	Mo
		0.005	0.02	0.2	Rem.	22.7	15.5

			ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Ti	**Fe**		**SFA 5.14**	**18274**	RECORD EST 201 RECORD EST 236 RECORD NFT 201	+
0.3	0.3		EQNiCr-3	B Ni 6082 (NiCr20Mn3Nb)		
Al	**Fe**		**SFA 5.14**	**18274**	RECORD EST NiCrFe7 RECORD NFT NiCrFe7	+
0.6	9.0		EQNiCrFe-7	B Ni 6052 (NiCr30Fe9)		
Ti	**Fe**	**Al**	**SFA 5.14**	**18274**	RECORD EST 690 RECORD NFT 690	+
0.4	8.8	0.1	EQNiCrFe-14	B Ni 6043 (NiCr30Fe9Nb2)		

EN/ISO 14174	**JOIN!online**
14174	+
ES A FB 2B	
14174	+
ES A FB 2B	
14174	+
S A AF 2B	
14174	+
S A AF 2B	

			ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
Nb	**Fe**		**SFA 5.14**	**18274**	RECORD ES6625 RECORD ES 6625-1 RECORD EST 625-1 RECORD EST 625-1 LD RECORD NFT 201	+
3.6	0.3		EQNiCrMo-3	B Ni 6625 (NiCr22Mo9Nb)		
Fe	**Ti**		**SFA 5.14**	**18274**	RECORD EST 259	+
1.2	0.1		EQNiCrMo-7	B Ni 6455 (NiCr16Mo16Ti)		
Fe			**SFA 5.14**	**18274**	RECORD EST 259	+
0.8			EQNiCrMo-13	B Ni 6059 (NiCr23Mo16)		

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5.16.8 Corrosion protection – Nickel-Chromium alloy & Nickel-Chromium-Molybdenum alloy fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 201	General purpose electroslag strip cladding flux for nickel alloy applications	ESSC	All Nickel alloys strip electrode
RECORD EST 236	High productivity Nickel-Chromium-Molybdenum Alloy electroslag strip cladding flux NiCr-3 (NiCr20Nb - 2.4806 - N06082) with SOUDOTAPE NiCr3	ESSC	SOUDOTAPE NiCr3
RECORD EST 501	General purpose electroslag strip cladding flux for clad plate recovery	ESSC	All Nickel alloys strip electrode
RECORD NFT 201	Nickel-Chromium-Molybdenum Alloy subarc strip cladding flux NiCr-3 (NiCr20Nb - 2.4806 - N06082) with SOUDOTAPE NiCr3 NiCrMo-3 (N06625 - Inconel® 625) with SOUDOTAPE 625	SASC	SOUDOTAPE 625 SOUDOTAPE NiCr3
RECORD ES6625	NiCrMo-3 (N06625 - Inconel® 625 - 2.4856) Nickel-Chromium-Molybdenum Alloy high productivity electroslag strip cladding flux	ESSC	SOUDOTAPE 625
RECORD ES6625-1	NiCrMo-3 (N06625 - Inconel® 625 - 2.4856) Nickel-Chromium-Molybdenum Alloy single layer electroslag strip cladding flux Deposit in conformity with ASME SFA 5.39 iron content less than 7%	ESSC	SOUDOTAPE 625
RECORD EST 625-1	NiCrMo-3 (N06625 - Inconel® 625 - 2.4856) Nickel-Chromium-Molybdenum Alloy single layer electroslag strip cladding flux High efficiency weld deposit iron content less than 7%	ESSC	SOUDOTAPE 625
RECORD EST 625-1 LD	NiCrMo-3 (N06625 - Inconel® 625 - 2.4856) Nickel-Chromium-Molybdenum Alloy single layer electroslag strip cladding flux High efficiency weld deposit iron content less than 5%	ESSC	SOUDOTAPE 625

5.16.9 Corrosion protection – Nickel-Chromium-Molybdenum-Tungsten alloys

Product name	Short description	Chemical composition (typical values) in %					
SOUDOTAPE NiCrMo4	NiCrMo-4 (N10276 - Hastelloy® C276) Nickel-Chromium-Molybdenum-Tungsten Alloy strip electrode	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Mo**
		0.005	0.05	0.5	Rem.	16.0	15.5
SOUDOTAPE NiCrMo22	NiCrMo-10 (N06022 - Hastelloy® C22) Nickel-Chromium-Molybdenum-Tungsten Alloy strip electrode	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Mo**
		0.005	0.03	0.2	Rem.	21.4	13.6

	TUV	EN/ISO 14174	JOIN!online
	04617 SOUDOTAPE NiCr3 08072 SOUDOTAPE NiCr3 Nuclear	**14174**	
		ES A FB 2B	
		14174	
		ES A FB 2B	
	09406 SOUDOTAPE 625	**14174**	
		S A AB 2B	
		14174	
		ES A FB 2B	
		14174	
		ES A FB 2B	
		14174	
		ES A FB 2B	
		14174	
		ES A FB 2B	

				ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
	W	**Fe**		**SFA 5.14**	**18274**	RECORD EST 259 RECORD EST 276	
	3.3	5.7		EQNiCrMo-4	B Ni 6276 (NiCr15Mo16Fe6W4)		
	W			**SFA 5.14**	**18274**	RECORD EST 259	
	2.7			EQNiCrMo-10	B Ni 6022 (NiCr21Mo13Fe4W3)		

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5.16.10 Corrosion protection – Nickel-Chromium-Molybdenum alloy fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 259	Nickel-Chromium-Molybdenum Alloy electroslag strip cladding flux NiCrMo-13 (N06059 - Alloy 59) with SOUDOTAPE NiCrMo59 NiCrMo-10 (N06022 - Hastelloy® C-22) with SOUDOTAPE NiCrMo22 NiCrMo-4 (N10276 - Hastelloy® C-276) with SOUDOTAPE NiCrMo4 NiCrMo-7 (N06455 - Hastelloy® C-4) with SOUDOTAPE NiCrMo7	ESSC	SOUDOTAPE NiCrMo22 SOUDOTAPE NiCrMo4 SOUDOTAPE NiCrMo59 SOUDOTAPE NiCrMo7
RECORD EST 276	NiCrMo-4 (N10276 - Hastelloy® C276) Nickel-Chromium-Molybdenum Alloy electroslag strip cladding flux	ESSC	SOUDOTAPE NiCrMo4

5.16.11 Corrosion protection – Stainless steel – Ferritic

Product name	Short description	Chemical composition (typical values) in %					
SOUDOTAPE 410L	13%Cr Ferritic stainless steel strip electrode	**C**	**Si**	**Mn**	**Cr**	**Fe**	
		0.03	0.4	0.4	12.7	Rem.	
SOUDOTAPE 430	17%Cr Ferritic stainless steel strip electrode	**C**	**Si**	**Mn**	**Cr**	**Fe**	
		0.04	0.3	0.4	16.2	Rem.	

5.16.12 Corrosion protection – Stainless steel – Ferritic stainless steel and fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 122	General purpose electroslag strip cladding flux single layer 410 13%Cr ferritic stainless steel with SOUDOTAPE 430	ESSC	SOUDOTAPE 410L SOUDOTAPE 430
RECORD RT 179	430 (X6Cr17 - 1.4016) - 17%Cr ferritic stainless steel - Hardness 200HB	SASC	SOUDOTAPE 430

	TUV	EN/ISO	JOIN!online
	09412 SOUDOTAPE NiCrMo59	**14174**	+
		ES A FB 2B	
		14174	+
		ES A FB 2B	

	ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
	SFA 5.9	**14343-A**	RECORD EST 122 RECORD INT 109	+
	EQ410	B 13 L		
	SFA 5.9	**14343-A**	RECORD EST 122 RECORD RT 179	+
	EQ430	B 17		

	TUV	EN/ISO	JOIN!online
		14174	+
		ES A FB 2B	
		14174	+
		S A CS 3	

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5.16.13 Corrosion protection – Stainless steel – Austenitic

Product name	Short description	Chemical composition (typical values) in %						
SOUDOTAPE 308L	308L (19 9 L) austenitic stainless steel strip electrode	C	Si	Mn	Ni	Cr	N	
		0.01	0.3	1.7	10.4	20.2	0.05	
SOUDOTAPE 316L	316L (19 12 3 L) austenitic stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.4	1.7	12.7	18.5	2.9	0.04
SOUDOTAPE 317L	317L (19 13 4 L) high Molybdenum stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.4	1.4	13.6	18.8	3.5	0.05
SOUDOTAPE 347	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel strip electrode	C	Si	Mn	Ni	Cr	Nb	N
		0.015	0.4	1.7	10.5	19.6	0.5	0.04
SOUDOTAPE 22.11L	22 11 L overalloyed austenitic stainless steel strip electrode. Single layer weld deposit 308L with RECORD EST 122	C	Si	Mn	Ni	Cr	N	
		0.01	0.3	1.6	11.1	21.2	0.04	
SOUDOTAPE 309L	309L austenitic stainless steel strip electrode 309L single layer with RECORD EST 309-1 Buffer layer for other stainless steel deposit with high speed ESSC fluxes and SASC fluxes	C	Si	Mn	Ni	Cr	N	
		0.01	0.4	1.7	13.4	23.7	0.05	
SOUDOTAPE 21.13.3L	21 13 3 L overalloyed austenitic stainless steel strip electrode Single layer 316L weld deposit with RECORD EST 122	C	Si	Mn	Ni	Cr	Mo	N
		0.01	0.3	1.7	13.9	20.6	2.9	0.04
SOUDOTAPE 21.11LNb	21 11 L Nb overalloyed Niobium stabilised austenitic stainless steel strip electrode. Single layer weld deposit 347 with RECORD EST 122	C	Si	Mn	Ni	Cr	Nb	N
		0.01	0.3	1.7	11.2	21.6	0.6	0.04
SOUDOTAPE 24.12LNb	24 12 L Nb overalloyed Niobium stabilised austenitic stainless steel strip electrode high productivity single layer 347 weld deposit with RECORD EST 136	C	Si	Mn	Ni	Cr	Nb	N
		0.01	0.4	2.1	12.4	23.8	0.75	0.05

ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
SFA 5.9	**14343-A**	RECORD EST 122 RECORD INT 101	
EQ308L	B 19 9 L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 130 RECORD EST 136 RECORD EST 316-1 RECORD EST 317-2 RECORD INT 101 RECORD INT 317	
EQ316L	B 19 12 3 L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD INT101	
EQ317L	B 19 13 4 L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 136 RECORD EST 347-1 RECORD INT 109	
EQ347	B 19 9 Nb		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 129 RECORD EST 501	
(EQ309L)	B 22 11 L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 136 RECORD EST 307 RECORD EST 309-1 RECORD INT 101 RECORD INT 317	
EQ309L	B 23 12 L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 122Mo RECORD EST 130 RECORD EST 136 RECORD EST 136Mo RECORD EST 316-1 RECORD EST 317-1 RECORD EST 501 RECORD INT 101Mo RECORD INT 101	
(EQ309LMo)	B 21 13 3 L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 501 RECORD INT 109	
(EQ347)	B 22 12 L Nb		
SFA 5.9	**14343-A**	RECORD EST 136 RECORD EST 347-1 HS RECORD INT 109	
EQ309LNb	B 23 12 Nb		

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5.16.14 Corrosion protection – Stainless steel – Austenitic stainless steel fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 122	General purpose electroslag strip cladding flux for stainless steel applications	ESSC	All Stainless steel strip electrodes
RECORD EST 130	318 (19 12 3 Nb) austenitic stainless steel with high Nb single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 21.13.3L SOUDOTAPE 316L
RECORD EST 136	High productivity general purpose electroslag strip cladding flux for stainless steel applications	ESSC	All Stainless steel strip electrodes
RECORD EST 136Mo	317L (18 15 3 L) double layer high productivity electroslag strip cladding flux with SOUDOTAPE 21.13.3L	ESSC	SOUDOTAPE 21.13.3L
RECORD EST 307	(307) - 18 8 Mn austenitic stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 308L SOUDOTAPE 309L
RECORD EST 316-1	316L - 19 13 3 L austenitic stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 21.13.3L SOUDOTAPE 316L
RECORD EST 317-1	317L (18 15 3 L) austenitic stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 21.13.3L
RECORD EST 317-2	317L (18 15 3 L) austenitic stainless steel electroslag strip cladding flux	ESSC	SOUDOTAPE 316L
RECORD EST 347-1	347 (19 9 Nb) austenitic stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 347
RECORD EST 347-1 HS	347 (19 9 Nb) austenitic stainless steel single layer high productivity electroslag strip cladding flux	ESSC	SOUDOTAPE 24.12LNb
RECORD INT 101	General purpose subarc strip cladding flux for stainless steel applications	SASC	All Stainless steel
RECORD INT 109	Subarc strip cladding flux for Niobium stabilised stainless steel applications	SASC	All niobium stabilised Stainless steel strip electrodes
RECORD EST 501	General purpose electroslag strip cladding flux for clad plate recovery	ESSC	All Stainless steel

	TUV	EN/ISO	JOIN!online
	12676 SOUDOTAPE 316L (Buffer 21.13.3L) 19202 SOUDOTAPE 22.11L 09411 SOUDOTAPE 21.13.3L 04615 SOUDOTAPE 21.11LNb 08071 SOUDOTAPE 21.11LNb Nuclear 04616 SOUDOTAPE 23.11.Nb 09410 SOUDOTAPE 20.25.5LCu	**14174** ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 ES A FB 2B	
		14174 S A AB 2B	
		14174 S A CS 2B	
		14174 ES A FB 2B	

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5.16.15 Corrosion protection – Stainless steel – Duplex stainless

Product name	Short description	Chemical composition (typical values) in %							
SOUDOTAPE 22.6.3L	22 6 3 L (1.4462) duplex stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	N	Cu
		0.02	0.4	1.5	5.7	22.3	3.2	0.17	0.2
SOUDOTAPE 22.9.3L	22 9 3 L duplex stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	N	
		0.01	0.5	1.6	8.6	22.9	3.0	0.15	
SOUDOTAPE 25.8.4L	25 8 4 L super duplex stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	N	Cu
		0.015	0.4	0.7	7.1	25.5	4.0	0.27	0.3

5.16.16 Corrosion protection – Stainless steel – Duplex stainless steel fluxes

Product name	Short description	Welding process	Strip electrode
RECORD EST 122	General purpose electroslag strip cladding flux for stainless steel applications	ESSC	SOUDOTAPE 22.9.3L
RECORD INT 110	2209 (22 9 3 N L) duplex stainless steel subarc strip cladding flux	SASC	SOUDOTAPE 22.6.3L
RECORD EST 4462-1	2205 (22 6 3 N L) duplex stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 22.6.3L
RECORD ES 2209	2209 (22 9 3 N L) duplex stainless steel electroslag strip cladding flux	ESSC	SOUDOTAPE 22.6.3L
RECORD ES 2209-1	2209 (22 9 3 N L) duplex stainless steel electroslag strip cladding single layer flux	ESSC	SOUDOTAPE 22.6.3L
RECORD ES 2507	2584 (25 9 4 N L) superduplex stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 25.8.4L

5.16.17 Corrosion protection – Stainless steel – Super austenitic

Product name	Short description	Chemical composition (typical values) in %							
SOUDOTAPE 310MM	25 22 2 L N austenitic stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	N	
		0.01	0.1	4.4	22.1	25.5	2.3	0.15	
SOUDOTAPE 254SMo	20 18 7 Cu N L (254SMo) austenitic stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	Cu	N
		0.01	0.4	0.5	17.9	20.0	6.1	0.6	0.2
SOUDOTAPE 20 25 5 L Cu	SOUDOTAPE 20 25 5 L Cu (385)austenitic stainless steel strip electrode	C	Si	Mn	Ni	Cr	Mo	Cu	N
		0.01	0.3	1.4	20.0	24.3	4.4	1.5	0.2

ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
SFA 5.9	**14343-A**	RECORD INT 110 RECORD EST 122 RECORD EST 4462-1 RECORD ES 2209-1 RECORD ES 2209	+
(EQ2209)	B Z 22 6 3 N L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 4462-1 RECORD INT 109	+
EQ2209	B 22 9 3 N L		
SFA 5.9	**14343-A**	RECORD ES 2507	+
(EQ2594)	B Z 25 8 4 N L		

TUV	EN/ISO	JOIN!online
	14174	🛒
	ES A FB 2B	
	14174	+
	S A CS 2B	
	14174	+
	ES A FB 2B	
	14174	+
	ES A FB 2B	
	14174	+
	ES A FB 2B	
	14174	+
	ES A FB 2B	

ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 310MM HS RECORD 13 BLFT	+
EQ310LMo	B 25 22 2 N L		
SFA 5.9	**14343-A**	RECORD EST 122	+
EQ254SMo	B Z 20 18 7 Cu N L		
SFA 5.9	**14343-A**	RECORD EST 122 RECORD EST 385-1	+
EQ385	B 20 25 5 Cu L		

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5.16.18 Corrosion protection – Stainless steel – Super austenitic stainless steel fluxes

Product name	Short description	Welding process	Strip electrode
RECORD 13 BLFT	310MoLN (X1CrNiMoN25-22-2) Fully austenitic stainless steel subarc strip cladding flux - Urea application	SASC	SOUDOTAPE 310MM
RECORD EST 310MM HS	310MoLN (X1CrNiMoN25-22-2) Fully austenitic stainless steel electroslag strip cladding flux - Urea application	ESSC	SOUDOTAPE 310MM
RECORD EST 385-1	385 (20 25 5 Cu N L) super austenitic stainless steel single layer electroslag strip cladding flux	ESSC	SOUDOTAPE 20.25.5LCu

5.16.19 Corrosion protection – Stainless steel – Super austenitic

Product name	Short description	Chemical composition (typical values) in %						
		C	Si	Mn	Ni	Ti	Cu	Fe
SOUDOTAPE CuNi30	Cu Ni 30 Fe (Alloy 67) 30%Ni copper alloy strip electrode	0.02	0.05	0.8	30.5	0.4	Rem.	0.6

5.16.20 Corrosion protection – Special alloy – Copper alloys and fluxes

Product name	Short description	Welding process	Strip electrode
RECORD CuNi30 TW	CuNi Copper-30%Nickel alloy subarc strip cladding flux	SASC	SOUDOTAPE CuNi30

	TUV	EN/ISO	JOIN!online
		14174	
		S A AB 2B	
		14174	
		ES A FB 2B	
		14174	
		ES A FB 2B	

	ASME II C	EN/ISO	Recommended Fluxes	JOIN!online
	SFA 5.7	**24373**	RECORD CuNi30 TW	
	EQCuNi	B Cu 7158 (CuNi30Mn1FeTi)		

	TUV	EN/ISO	JOIN!online
		14174	
		S A AB 4	

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5.17 ESSC – SASC Weld overlay combinations

5.17.1 Corrosion protection – Nickel alloys – Pure Nickel & Nickel-Copper alloys

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product name	Short description	Number of Layers
(Ni-1)	NiTi3	SASC	**SOUDOTAPE NiTi - RECORD Ni T**	Ni-1 (N02200) 99% nickel	3
		ESSC	**SOUDOTAPE NiTi - RECORD EST 200**	Ni-1 (N02200) 99% nickel	3
NiCu-7	NiCu30Mn3Ti	SASC	**SOUDOTAPE NiCu7 - RECORD NiCu TW**	NiCu-7 (N04400 - Monel) 30%Cu nickel alloy	2
		ESSC	**SOUDOTAPE NiCu7 - RECORD NiCu TW**	NiCu-7 (N04400 - Monel) 30%Cu nickel alloy	2

Chemical composition (typical values) in %						SFA-5.39 flux - electrode weld overlay designation	TÜV Approval
C	**Si**	**Mn**	**Ni**	**Ti**	**Fe**		
0.02	0.7	1.7	Rem.	2	2.9		
C	**Si**	**Mn**	**Ni**	**Ti**	**Fe**		
0.02	0.5	0.5	Rem.	2.4	1.2		
C	**Si**	**Mn**	**Ni**	**Cu**	**Fe**		
0.03	0.9	3.2	Rem.	28.1	3.9		
C	**Si**	**Mn**	**Ni**	**Cu**	**Fe**		
0.02	0.7	3.4	Rem.	28.2	1.8		

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5.17.2 Corrosion protection – Nickel Alloys – Nickel-Chromium-Iron & Nickel-Chromium-Molydbenum alloys

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product name	Short description	Number of Layers
NiCr-3	NiCr20Mn3Nb	SASC	**SOUDOTAPE NiCr3 - RECORD NFT 201**	NiCr-3 (NiCr20Nb - 2.4806 - N06082) Nickel-Chromium-Iron alloy 3 layers	3
		ESSC	**SOUDOTAPE NiCr3 - RECORD EST 201**	NiCr-3 (NiCr20Nb - 2.4806 - N06082) Nickel-Chromium-Iron alloy 2 thin layers	2
			SOUDOTAPE NiCr3 - RECORD EST 236	NiCr-3 (NiCr20Nb - 2.4806 - N06082) Nickel-Chromium-Iron alloy 3 layers high productivity	3
NiCrFe-7	NiCr30Fe9Nb	SASC	**SOUDOTAPE NiCrFe7 - RECORD NFT NiCrFe7**	NiCrFe-7 (N06690) Nickel-Chrome-Iron alloy 3 layers	3
			SOUDOTAPE 690 - RECORD NFT 690	NiCrFe-7 (N06690) Nickel-Chrome-Iron alloy 3 layers	3
NiCrFe-14	NiCr30Fe9Nb low Si	ESSC	**SOUDOTAPE NiCrFe7 - RECORD EST NiCrFe7**	NiCrFe-14 - NiCrFe-7 - (N06690) Low Silicon Nickel-Chrome-Iron alloy 2 layers	2
			SOUDOTAPE 690 - RECORD EST 690	NiCrFe-14 - NiCrFe-7 - (N06690) Low Silicon Nickel-Chrome-Iron alloy 2 layers	2
NiCrMo-3	NiCr22Mo9Nb	SASC	**SOUDOTAPE 625 - RECORD NFT 201**	NiCrMo-3 (N06625 - Inconel® 625) Nickel-Chrome-Molybdenum alloy 3 layers	3
		ESSC	**SOUDOTAPE 625 - RECORD ES6625**	NiCrMo-3 (N06625 - Inconel® 625) Nickel-Chrome-Molybdenum alloy 2 layers (high speed - low thickness)	2
			SOUDOTAPE 625 - RECORD ES 6625-1	NiCrMo-3 (N06625 - Inconel® 625) Nickel-Chrome-Molybdenum alloy single layer with Fe<7%	1
			SOUDOTAPE 625 - RECORD EST 625-1	NiCrMo-3 (N06625 - Inconel® 625) Nickel-Chrome-Molybdenum alloy High efficiency single layer with Fe<7%	1
			SOUDOTAPE 625 - RECORD EST 625-1 LD	NiCrMo-3 (N06625 - Inconel® 625) Nickel-Chrome-Molybdenum alloy High efficiency single layer with Fe<5% (Low thickness)	1
NiCrMo-7	NiCr16Mo15Ti	ESSC	**SOUDOTAPE NiCrMo7 - RECORD EST 259**	NiCrMo-7 (N06455 - Hastelloy C4)Nickel-Chrome-Molybdenum alloy 2 layers	2
(NiCrMo-13)	NiCr23Mo16	ESSC	**SOUDOTAPE NiCrMo59 - RECORD EST 259**	NiCrMo-13 (N06059 - Alloy 59) Nickel-Chrome-Molybdenum alloy 2 layers	2

Chemical composition (typical values) in %									SFA-5.39 flux - electrode weld overlay designation	TÜV Approval
C	Si	Mn	Ni	Cr	Ti	Fe			SACLAD3-EQNiCr-3/NiCr-3	
0.01	0.3	3.5	Rem.	19.6	0.1	1.6				
C	Si	Mn	Ni	Cr	Ti	Fe			ESCLAD2-EQNiCr-3/NiCr-3	04617 08072 Nuclear
0.01	0.3	3	Rem.	19.2	0.1	1.7				
C	Si	Mn	Ni	Cr	Ti	Fe			ESCLAD3-EQNiCr-3/NiCr-3	
0.01	0.3	3.1	Rem.	19.3	0.1	1.4				
C	Si	Mn	Ni	Cr	Nb	Ti	Al	Fe	SACLAD3-EQNiCrFe-7/NiCrFe-7	
0.03	0.7	2.7	Rem.	29	1.9	0.2	0.2	9.5		
C	Si	Mn	Ni	Cr	Ti	Al	Fe		SACLAD3-EQNiCrFe-14/NiCrFe-7	
0.03	0.6	2.7	Rem.	28.7	0.2	0.1	10.3			
C	Si	Mn	Ni	Cr	Nb	Ti	Al	Fe	ESCLAD2-EQNiCrFe-7/NiCrFe-14	
0.03	0.4	1.4	Rem.	29.4	1.5	0.1	0.1	10.2		
C	Si	Mn	Ni	Cr	Ti	Al	Fe		ESCLAD2-EQNiCrFe-14/NiCrFe-14	
0.02	0.3	2.4	Rem.	30.1	0.1	0.1	11			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		SACLAD3-EQNiCrMo-3/NiCrMo-3	09406
0.02	0.3	0.5	64	21.7	8.4	3.2	1.7			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		ESCLAD2-EQNiCrMo-3/NiCrMo-3	
0.02	0.5	0.1	62	20.6	8.3	3.3	4.8			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		ESCLAD1-EQNiCrMo-3/NiCrMo-3	09336
0.02	0.3	0.1	62.5	20.3	8.2	3.3	6.5			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		ESCLAD1-EQNiCrMo-3/NiCrMo-3	
0,02	0,5	0,2	58	22,9	8,7	3,6	6,5			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		ESCLAD1-EQNiCrMo-3/NiCrMo-3	
0.02	0.4	0.2	60	22.8	9.5	3.6	5			
C	Si	Mn	Ni	Cr	Fe				ESCLAD2-EQNiCrMo-7/NiCrMo-7	
0.01	0.4	0.1	Rem.	15	2.8					
C	Si	Mn	Ni	Cr	Al	Fe			ESCLAD2-EQNiCrMo-13/ (NiCrMo-13)	09412
0.01	0.4	0.2	Rem.	21.8	0.1	1.7				

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5.17.3 Corrosion protection – Nickel alloys – Nickel-Chromium-Molybdenum-Tungsten alloys

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
NiCrMo-10	NiCr21Mo13W3	ESSC	**SOUDOTAPE NiCrMo22 - RECORD EST 259**	NiCrMo-10 (N06022 - Hastelloy C22) Nickel-Chrome-Molybdenum-Tungsten alloy 2 layers	2
NiCrMo-4	NiCr15Mo15Fe6W4	ESSC	**SOUDOTAPE NiCrMo4 - RECORD EST 259**	NiCrMo-4 (N10276 - Hastelloy C276) Nickel-Chrome-Molybdenum-Tungsten alloy 2 layers - recommended buffer layer SOUDOTAPE NiCrMo59	2
			SOUDOTAPE NiCrMo4 - RECORD EST 276	NiCrMo-4 (N10276 - Hastelloy C276) Nickel-Chrome-Molybdenum-Tungsten alloy 2 layers - recommended buffer layer SOUDOTAPE NiCrMo59	2

5.17.4 Corrosion protection – Nickel Alloys – Nickel-Iron-Chromium alloys

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
(NiFeCr-1)	NiFe23Cr21Mo3	ESSC	**SOUDOTAPE 825HS - RECORD EST 201**	NiFeCr-1 (N08825) Nickel-Iron-Chromium alloys 2 layers	2
			SOUDOTAPE 825HS - RECORD EST 825H HS	NiFeCr-1 (N08825) Nickel-Iron-Chromium alloys 2 thin layers	2
			SOUDOTAPE 825HS - RECORD EST 825-1 HS	NiFeCr-1 (N08825) Nickel-Iron-Chromium alloys single layer	1

Chemical composition (typical values) in %									SFA-5.39 flux - electrode weld overlay designation	TÜV Approval
C	Si	Ni	Cr	Mo	W	Al	Fe		ESCLAD2-EQNiCrMo-10/ NiCrMo-10	
0.01	0.4	Rem.	20.5	13.5	2.7	0.1	3.8			
C	Si	Ni	Cr	Mo	W	Co	Al	Fe	ESCLAD2-EQNiCrMo-4/ NiCrMo-4	
0.01	0.4	Rem.	15.8	15.3	3	0.4	0.1	6.8		
C	Si	Ni	Cr	Mo	W	Co	Al	Fe	ESCLAD2-EQNiCrMo-4/ NiCrMo-4	
0.01	0.4	Rem.	15.7	15.7	3	0.4	0.1	6.5		

Chemical composition (typical values) in %									SFA-5.39 flux - electrode weld overlay designation	TÜV Approval
C	Si	Ni	Cr	Mo	Ti	Cu	Fe		ESCLAD2-EQNiFeCr-1/ (NiFeCr-1)	
0.02	0.6	41.8	21.2	2.9	0.1	1.9	29.5			
C	Si	Ni	Cr	Mo	Ti	Cu	Fe		ESCLAD2-EQNiFeCr-1/ (NiFeCr-1)	
0.02	0.6	41	21	2.9	0.1	1.9	30.8			
C	Si	Ni	Cr	Mo	Ti	Cu	Fe		ESCLAD1-EQNiFeCr-1/ (NiFeCr-1)	
0.03	0.6	38.4	19.8	2.6	0.1	1.9	34.8			

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5.17.5 Corrosion protection – Austenitic stainless steel

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product name	Short description	Number of Layers
308L	19 9 L	SASC	**SOUDOTAPE 308L - RECORD INT 101**	308L (19 9 L) with buffer layer SOUDOTAPE 309L	2
		ESSC	**SOUDOTAPE 308L - RECORD EST 122**	308L (19 9 L) with buffer layer SOUDOTAPE 22.11L	2
			SOUDOTAPE 308L - RECORD EST 136	308L (19 9 L) with buffer layer SOUDOTAPE 309L high speed	2
			SOUDOTAPE 22.11L - RECORD EST 122	308L (19 9 L) austenitic stainless steel single layer	1
308	19 9	ESSC	**SOUDOTAPE 309L - RECORD INT 101**	308 (19 9) high carbon austenitic stainless steel single layer	1
			SOUDOTAPE 309L - RECORD EST 136	308 (19 9) austenitic stainless steel single layer high speed	1
309L	23 12 L	SASC	**SOUDOTAPE 309L - RECORD INT 109**	309L (23 12 L) austenitic stainless steel 2 layers	2
		ESSC	**SOUDOTAPE 309L - RECORD EST 309-1**	309L (23 12 L) austenitic stainless steel single layer	1
316L	19 12 3 L	SASC	**SOUDOTAPE 316L - RECORD INT 101**	316L (19 12 3 L) austenitic stainless steel with buffer layer SOUDOTAPE 309L	2
		ESSC	**SOUDOTAPE 316L - RECORD EST 122**	316L (19 12 3 L) austenitic stainless steel with buffer layer SOUDOTAPE 21.13.3L	2
			SOUDOTAPE 316L - RECORD EST 136	316L (19 12 3 L) austenitic stainless steel with buffer layer SOUDOTAPE 309L (high speed)	2
			SOUDOTAPE 316L - RECORD EST 316-1	316L (19 12 3 L) austenitic stainless steel single layer	1
			SOUDOTAPE 21.13.3L - RECORD EST 122	316L (19 12 3 L) austenitic stainless steel single layer	1
			SOUDOTAPE 21.13.3L - RECORD EST 136	316L (19 12 3 L) austenitic stainless steel with buffer layer SOUDOTAPE 309L (high speed - thin layer)	2
			SOUDOTAPE 21.13.3L - RECORD EST 316-1	316L (19 12 3 L) austenitic stainless steel single layer thin	1

Chemical composition (typical values) in %									SFA-5.39 flux - electrode weld overlay designation	TÜV Approval
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	SACLAD2-EQ308L/308L	
0.03	0.8	1.4	10.5	20.1	0.1		Rem.	8		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD2-EQ308L/308L	
0.02	0.5	1.3	10.3	19.3	0.1		Rem.	7		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD2-EQ308L/308L	
0.02	0.5	1.3	10.4	19.2	0.1		Rem.	7		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD1-(EQ309L)/308L	19202
0.03	0.5	1.2	10	18.5	0.2		Rem.	6		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		ESCLAD1-EQ309L/308	
0.06	0.8	1.4	10.6	18.7			Rem.			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe		ESCLAD1-EQ309L/308	
0.04	0.5	1.3	10.9	18.9			Rem.			
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	SACLAD2-EQ309L/309L	
0.03	0.8	0.9	12.6	22.1	0.1		Rem.	8		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD1-EQ309L/309L	
0.03	0.4	1.3	12.9	22.4			Rem.	8		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	SACLAD2-EQ316L/316L	
0.03	0.8	1.4	12.4	18.7	2.4		Rem.	6		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD2-EQ316L/316L	12676
0.02	0.5	1.3	12.7	17.9	2.9		Rem.	5		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD2-EQ316L/316L	
0.02	0.5	1.3	12.2	17.8	2.3		Rem.	5		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD1-EQ316L/316L	
0.03	0.5	1.3	12.6	18.5	2.6		Rem.	6		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD1-(EQ309LMo)/316L	09411
0.03	0.5	1.3	12.5	18	2.6		Rem.	5		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD2-(EQ309LMo)/316L	
0.03	0.5	1.3	12.9	19.2	2.2		Rem.	6		
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92	ESCLAD1-(EQ309LMo)/316L	
0.04	0.4	1.3	12.8	19	2.5		Rem.	5		

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Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product name	Short description	Number of Layers
317L	(18 15 3 L)	SASC	**SOUDOTAPE 317L - RECORD INT 101**	317L (18 15 3 L) high Molybdenum austenitic stainless steel Buffer layer with SOUDOTAPE 21.13.3L	2
		ESSC	**SOUDOTAPE 316L - RECORD EST 317-2**	317L (18 15 3 L) high Molybdenum austenitic stainless steel with SOUDOTAPE 316L	2
			SOUDOTAPE 317L - RECORD EST 122	317L (18 15 3 L) high Molybdenum austenitic stainless steel Buffer layer with SOUDOTAPE 21.13.3L	2
			SOUDOTAPE 21.13.3L - RECORD EST 136Mo	317L (18 15 3 L) high Molybdenum austenitic stainless steel high speed	2
			SOUDOTAPE 21.13.3L - RECORD EST 317-1	317L (18 15 3 L) high Molybdenum austenitic stainless steel single layer	1
347	19 9 Nb	SASC	**SOUDOTAPE 347 - RECORD INT 109**	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel with buffer layer SOUDOTAPE 309L	2
		ESSC	**SOUDOTAPE 347 - RECORD EST 136**	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel high speed with buffer layer SOUDOTAPE 309L	2
			SOUDOTAPE 347 - RECORD EST 347-1	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel single layer	1
			SOUDOTAPE 21.11LNb - RECORD EST 122	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel single layer	1
			SOUDOTAPE 21.11LNb - RECORD EST 347-1 HS	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel single layer high speed	1
			SOUDOTAPE 21.11LNb - RECORD EST 130	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel single layer High Nb deposit	1
			SOUDOTAPE 24.12LNb - RECORD EST 136	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel single layer (High speed)	1
			SOUDOTAPE 24.12LNb - RECORD EST 347-1 HS	347 (19 9 Nb - 1.4550) Niobium stabilised austenitic stainless steel single layer (High speed - thin layer)	1
318	19 12 3 Nb	ESSC	**SOUDOTAPE 316L - RECORD EST 130**	318 (19 12 3 Nb) high Niobium austenitic stainless steel with buffer layer 22.11L	2
			SOUDOTAPE 21.13.3L - RECORD EST 130	318 (19 12 3 Nb) high Niobium austenitic stainless steel single layer	1
(307)	18 8 Mn	ESSC	**SOUDOTAPE 308L - RECORD EST 307**	(307) - 18 8 Mn austenitic stainless steel	2
			SOUDOTAPE 309L - RECORD EST 307	(307) - 18 8 Mn austenitic stainless steel single layer	1

Chemical composition (typical values) in %								
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.03	0.8	1.2	13.1	18.5	3.3		Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.03	0.5	1.4	13.6	18.6	3.3		Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.01	0.5	1	13.5	18.2	3.4		Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.01	0.4	1.3	13.2	18.9	3.3		Rem.	8
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.04	0.4	1.4	13	18.3	3.2		Rem.	8
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.03	0.8	0.9	10.2	18.6	0.2	0.3	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.02	0.6	1.3	10.6	18.9	0.1	0.3	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.04	0.6	1.3	9.7	18.2	0.1	0.4	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.03	0.5	1.3	10.2	19		0.4	Rem.	7
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.05	0.4	1.3	9.9	18.2		0.4	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.03	0.5	1.3	10.2	18.9		0.8	Rem.	8
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.05	0.5	1.6	9.9	18.5	0.1	0.5	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.06	0.5	1.6	10.2	18.7	0.1	0.5	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.02	0.6	1.3	12.4	18	2.6	0.4	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	FN WRC 92
0.03	0.4	1.3	12.5	18	2.8	0.4	Rem.	6
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	
0.08	0.5	4.9	9.4	19	0.1		Rem.	
C	Si	Mn	Ni	Cr	Mo	Nb	Fe	
0.09	0.5	4.4	10.6	19.3			Rem.	

SFA-5.39 flux - electrode weld overlay designation	TÜV Approval
SACLAD2-EQ317L/317L	
ESCLAD2-EQ316L/317L	
ESCLAD2-EQ317L/317L	
ESCLAD2-(EQ309LMo)/317L	
ESCLAD1-(EQ309LMo)/317L	
SACLAD2-EQ347/347	
ESCLAD2-EQ347/347	
ESCLAD1-EQ347/347	
ESCLAD1-(EQ347)/347	08071 Nuclear
ESCLAD1-(EQ347)/347	
ESCLAD1-(EQ347)/347	
ESCLAD1-EQ309LNb/347	
ESCLAD2-EQ316L/318	
ESCLAD1-(EQ309LMo)/318	
ESCLAD2-EQ308L/(307)	
ESCLAD1-EQ309L/(307)	

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5.17.6 Corrosion Protection – Duplex stainless steel

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
(2209)	22 5 3 N L	SASC	**SOUDOTAPE 22.6.3L - RECORD INT 110**	2205 (1.4462) duplex stainless steel 3 layers	3
		ESSC	**SOUDOTAPE 22.6.3L - RECORD EST 122**	2205 (1.4462) duplex stainless steel 2 layers	2
			SOUDOTAPE 22.6.3L - RECORD EST 4462-1	2205 (1.4462) duplex stainless steel single layer	1
2209	22 9 3 N L	SASC	**SOUDOTAPE 22.9.3L - RECORD INT 109**	2209 (22 9 3 N L) duplex stainless steel 2 layers	2
		ESSC	**SOUDOTAPE 22.6.3L - RECORD ES 2209**	2209 (22 9 3 N L) duplex stainless steel 2 layers	2
			SOUDOTAPE 22.6.3L - RECORD ES 2209-1	2209 (22 9 3 N L) duplex stainless steel single layer	1
			SOUDOTAPE 22.9.3L - RECORD EST 122	2209 (22 9 3 N L) duplex stainless steel 2 layers	2
2594	25 10 4 N L	ESSC	**SOUDOTAPE 25.8.4L - RECORD ES 2507**	2594 (25 9 4 N L) superduplex stainless steel single layer	1

Chemical composition (typical values) in %										SFA-5.39 flux - electrode weld overlay designation
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	SACLAD3-(EQ2209)/(2209)
0.03	0.9	1	6.9	21.3	2.9		0.16	Rem.	40	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	ESCLAD2-(EQ2209)/(2209)
0.02	0.6	1.1	6.5	21.4	2.8	0.2	0.14	Rem.	60	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	ESCLAD1-(EQ2209)/(2209)
0.04	0.5	1.1	6.5	21.8	2.9	0.2	0.14	Rem.	60	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	SACLAD2-EQ2209/2209
0.03	0.9	0.8	7.9	21.3	3		0.14	Rem.	40	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	ESCLAD2-(EQ2209)/2209
0.04	0.5	1.3	8.4	21.9	3.1	0.2	0.14	Rem.	40	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	ESCLAD1-(EQ2209)/2209
0.04	0.5	1.3	8.4	21.9	3.1	0.2	0.14	Rem.	40	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	ESCLAD2-EQ2209/2209
0.02	0.6	1.2	8.5	22.2	3		0.14	Rem.	50	
C	**Si**	**Mn**	**Ni**	**Cr**	**Mo**	**Cu**	**N**	**Fe**	**FN WRC 92**	ESCLAD1-(EQ2594)/2594
0.03	0.4	0.7	9.6	24.8	3.6	0.3	0.25	Rem.	40	

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5.17.7 Corrosion protection – Super austenitic stainless steel

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
310MoLN	25 22 2 N L	SASC	**SOUDOTAPE 310MM - RECORD 13 BLFT**	310MoLN (X1CrNiMoN25-22-2) fully austenitic stainless steel 3 layers	3
		ESSC	**SOUDOTAPE 310MM - RECORD EST 122**	310MoLN (X1CrNiMoN25-22-2) fully austenitic stainless steel 2 layers	2
			SOUDOTAPE 310MM - RECORD EST 310MM HS	310MoLN (X1CrNiMoN25-22-2) fully austenitic stainless steel 2 layers high speed	2
(254SMo)	20 18 7 Cu N L	ESSC	**SOUDOTAPE 254SMo - RECORD EST 122**	254SMo (20 18 7 Cu N L) super austenitic stainless steel 2 layers	2
(385)	20 25 5 Cu N L	ESSC	**SOUDOTAPE 20.25.5LCu - RECORD EST 122**	904L (385) super austenitic stainless steel 2 layers	2
385	20 25 5 Cu N L	ESSC	**SOUDOTAPE 20.25.5LCu - RECORD EST 385-1**	385 (20 25 5 Cu N L) super austenitic stainless steel single layer	1
(320)	20 34 2 Cu Mn Nb	ESSC	**SOUDOTAPE 825HS - RECORD EST 320**	(320) 20 34 2 Cu Mn Nb INCOLOY 20 super austenitic stainless steel single layer	1

5.17.8 Corrosion protection – Copper alloys

Weld Deposit ASME SFA-5.39	Weld deposit composition	Cladding process	Product combination	Short description	Number of Layers
(CuNi)	CuNi30Mn1FeTi	SASC	**SOUDOTAPE CuNi30 - RECORD CuNi30 TW**	CuNi (Cu Ni 30 Fe - Alloy 67) Copper - 30%Nickel alloy 3 layers with buffer SOUDOTAPE NiCu7	3

Chemical composition (typical values) in %										SFA-5.39 flux - electrode weld overlay designation
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		SACLAD3-EQ310LMo/ (310MoLN)
0.02	0.6	3.8	22.2	24.7	2.2		0.14	Rem.		
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		ESCLAD2- EQ310LMo/310MoLN
0.01	0.3	3.7	21.1	24.5	2.1		0.14	Rem.		
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		ESCLAD2- EQ310LMo/310MoLN
0.01	0.4	2.9	22.1	24.9	2.3		0.14	Rem.		
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		ESCLAD2-EQ254SMo/ (254SMo)
0.01	0.6	0.2	17.8	19.4	6	0.6	0.2	Rem.		
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		ESCLAD2-EQ385/(385)
0.01	0.5	1.1	24.1	19.2	4.4	1.5		Rem.		
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		ESCLAD1-EQ385/385
0.03	0.4	2	24.6	19.7	4.6	1.4		Rem.		
C	Si	Mn	Ni	Cr	Mo	Cu	N	Fe		ESCLAD1-EQNiFeCr-1/ (320)
0.05	0.5	0.7	36.5	21.1	2.6	3		Rem.		

Chemical composition (typical values) in %						SFA-5.39 flux - electrode weld overlay designation
C	Si	Ni	Ti	Cu	Fe	SACLAD3-EQCuNi/(CuNi)
0.02	0.3	32	0.2	Rem.	2	

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5.18 SMAW – Stick electrodes

5.18.1 Special applications – Joining & Repair – Stainless steels

Product name	Short description	Chemical composition (typical values) in %						
UTP 1925	Rutile-basic coated stick electrode, for special joining and surfacing applications with stainless steel.	C	Si	Mn	Cr	Ni	Mo	Cu
		0.025	0.8	1.5	20	25	4.5	1.5
UTP 6635 Ti	Rutile coated stick electrode for joining and surfacing of soft martensitic stainless steels like 1.4313	C	Si	Mn	Cr	Ni	Mo	
		0.03	0.3	0.5	12	4,5	0.5	
UTP 653	Rutile coated stick electrode for joining and surfacing on difficult to weld steels and for cladding on un-alloyed steels.	C	Si	Mn	Cr	Ni	Mo	
		0.1	0.8	1	23	13	2.8	
UTP 630	Rutile coated synthetic stick electrode for crack resistant joints and surfacings on hgh strength steels or hard manganes steels.	C	Si	Mn	Cr	Ni		
		0.1	0.8	6	19	9		
UTP 63	Rutile coated, fully austenitic stick electrode for repair welding of alloyed construction and heat-treated steel	C	Si	Mn	Cr	Ni		
		0.1	0.5	5.5	19	8.5		
UTP 65 D	Rutile coated, austenitic-ferritic special electrode for repair and surfacing of difficult to weld steels.	C	Si	Mn	Cr	Ni		
		0.1	1	1	30	9.5		
UTP 68 TiMo	Rutile coated synthetic high efficiency stick electrode for joining and surfacing of stainless austenitic steels.	C	Si	Mn	Cr	Ni	Mo	
		0.03	0.8	0.6	18	12	2.6	
UTP 683 LC	Rutile coated synthetic high efficiency stick electrode for dissimilar joints of austenitic and ferritic steels.	C	Si	Mn	Cr	Ni	Mo	
		0.02	0.6	0.6	19	12	2.6	

	AWS	EN/ISO	Approvals	JOIN!online
	A5.4 / SFA-5.4	**3581-A**	TÜV (04186)	
	E385-16 (mod.)	E 20 25 5 Cu N L R 3 2		
	A5.4 / SFA-5.4	**3581-A**		
	E410 NiMo-16	E 13 4 R 3 3		
	A5.4 / SFA-5.4	**3581-A**	DB (20.138.04), CE	
	E309Mo-16	E Z 23 12 L R 3 2		
	A5.4 / SFA-5.4	**3581-A**		
	E307-26 (mod.)	E 18 8 Mn R 7 3		
		3581-A		
		E 18 8 Mn R 3 2		
		3581-A		
		E Z 29 9 R 1 2		
	A5.4 / SFA-5.4	**3581-A**	TÜV (00099)	
	E316L-26	E 19 12 3 L R 7 3		
	A5.4 / SFA-5.4	**3581-A**	DB (30.138.02)	
	E316L-26	E 19 12 3 L R 7 3		

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5.18.2 Special applications – Joining & Repair – Copper alloys

Product name	Short description	Chemical composition (typical values) in %					
UTP 34 N	Basic coated multi-material bronze stick electrode for repair and build-up welding on Cu-Al alloys	Mn	Ni	Fe	Cu	Al	
		13	2.5	2,5	Bal.	7	
UTP 32	Basic coated tin-bronze stick electrode for repair and build-up welding on copper-tin alloys.	Sn	Cu				
		7	Bal.				
UTP 39	Basic coated pure copper stick electrode for joining and build-up welding of common pure, oxygen-free copper grades	Mn	Cu				
		1.5	Bal.				
UTP 387	Copper-nickel alloyed stick electrode for repair and cladding of similar alloys with a nickel content up to 30% as well as different non-ferrous metal alloys and steels	C	Si	Mn	Ni	Cu	Fe
		0.03	0.3	1.2	30.0	Bal.	0.6

5.18.3 Special applications – Joining & Repair – Cast iron

Product name	Short description	Chemical composition (typical values) in %					
UTP 8	Graphite-basic coated stick electrode for cold welding of grey and malleable cast iron.	C	Ni	Fe			
		1.2	Bal.	3.6			
UTP 83 FN	Graphite-basic coated Ni-Fe stick electrode for build-up and repair welding of all common types of cast iron.	C	Ni	Fe			
		1.3	52	Bal.			
UTP 85 FN	Graphite-basic coated Ni-Fe stick electrode for build-up and repair welding of all common types of cast iron, particularly for nodular cast iron (GGG 38-60)	C	Ni	Fe			
		1.2	54	Bal.			
UTP 86 FN	Graphite-basic coated Ni-Fe stick electrode for build-up and repair welding of lamellar gray cast iron and other types of cast iron.	C	Ni	Fe			
		1.2	Bal.	45			

	AWS	EN/ISO	Approvals	JOIN!online
	A5.13	**17777**	DB (62.138.03)	
	E CuMnNiAl (mod.)	E Cu 6338 (CuMn13Al7Fe3Ni2)		
	AWS A5.6 / SFA-5.6	**17777**		
	E CuSn-C (mod.)	E Cu 5180B (CuSn7)		
	AWS A5.6 / SFA-5.6	**17777**	DB (63.138.02)	
	E Cu (mod.)	E Cu 1893 (CuMn2)		
	AWS A5.6	**17777**	TÜV (No. 01626), DNV-GL	
	ECuNi	E Cu 7158 (CuNi30Mn2FeTi)		

	AWS	EN/ISO	Approvals	JOIN!online
	A5.15 / SFA-5.15	**1071**	DB (62.138.01)	
	ENi-CI	E C Ni CI 1		
	A5.15 / SFA-5.15	**1071**		
	ENiFe-CI	E C Ni Fe-1 1		
	A5.15 / SFA-5.15	**1071**		
	ENiFe-CI	E C Ni Fe-1 3		
	A5.15 / SFA-5.15	**1071**	DB (62.138.05)	
	ENiFe-CI	E C Ni Fe-1 3		

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5.18.4 Special applications – Joining & Repair – Heat-resistant

Product name	Short description	Chemical composition (typical values) in %							
UTP 2133 Mn	Fully austenitic NiCr stick electrode for repair and build-up welding of similar heat-resistant steels	C	Si	Mn	Cr	Ni	Nb	Fe	
		0.14	0,5	4.5	21	33	1.3	Bal.	
UTP 2535 Nb	Basic coated stick electrode with high carbon content for welding heat resistant CrNi cast steels in centrifugal and mouldcast parts	C	Si	Mn	Cr	Ni	Nb	Ti	Fe
		0.4	1	1.5	25	35	1.2	0.1	Bal.
UTP 3545 Nb	Basic-coated special stick electrode for high-temperature cast alloys with high carbon content in the petrochemical industry	C	Si	Mn	Cr	Ni	Nb	Fe	
		0.45	1	0.8	35	45	0.9	Bal.	
UTP 6225 Al	Basic coated stick electrode for repair welding on high heat resistant nickel-based steels as well as high Ni-containing cast alloys.	C	Si	Mn	Cr	Ni	Ti	Fe	Al
		0.2	0,6	0.1	25	Bal.	0.1	10	1.8
UTP 6170 Co	Nickel-based stick electrode for repair welding on high-temperature-resistant and similar alloys, as well as for creep resistant austenitic alloys and cast alloys	C	Si	Mn	Cr	Mo	Ni	Co	Al
		0.06	0.7	0.1	21.0	9.0	Bal.	11.0	0.7

5.18.5 Special applications – Joining & Repair – Gouging

Product name	Short description	Chemical composition (typical values) in %							
UTP 82 Ko	Carbon electrode for gouging and cutting								
UTP 82 AS	Thick coated stick electrode for gouging and chamfering on all steel grades with ferritic and austenitic structure, as well as cast iron								

5.18.6 Special applications – Joining & Repair – Underwater

Product name	Short description	Chemical composition (typical values) in %							
UTP Nautica 20	Coated stick electrode for welding in wet environments and for underwater welds up to 20 m water depth	C	Si	Mn	Mo				
		0.1	0,3	0.6	0.5				
UTP Nautica Cut	Coated stick electrode for cutting or chamfering in wet environments and underwater								

			AWS	EN/ISO	Approvals	JOIN!online
				EN ISO 3581-A	TÜV (07713)	
				E Z 21 33 B 4 2		
				EN ISO 3581-A		
				E Z 25 35 Nb B 6 2		
				EN ISO 14172		
				E Ni Z 6701 (NiCr35Fe15Nb0,8)		
	Y	**Zr**	**A5.11 / SFA-5.11**	**EN ISO 14172**		
	0,02	0,03	E NiCrFe-12	S Ni 6704 (NiCr25Fe10AL3YC)		
	Ti	**Fe**	**A5.11 / SFA-5.11**	**EN ISO 14172**		
	0.3	1.0	ENiCrCoMo-1 (mod.)	E Ni 6117 (NiCr22Co12Mo)	TÜV (No. 04661)	

	AWS	EN/ISO	Approvals	JOIN!online

	AWS	DIN	Approvals	JOIN!online
		2302	DVS (submitted)	
		E 42 0 Z R 10 fr		

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5.19 GTAW – TIG Rods

5.19.1 Special applications – Joining & Repair – Nickel and heat-resistant alloys

Product name	Short description	Chemical composition (typical values) in %							
Thermanit Nicro 82	TIG rod, nickel chromium alloy, NiCr-3	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Nb**	**Fe**	
		0.02	0.1	3.0	> 67.0	20.0	2.5	< 2.0	
UTP A 6170 Co	TIG rod, NiCrCo alloy, for high-temperature applications up to 1100°C	**C**	**Si**	**Ni**	**Cr**	**Ti**	**Co**	**Al**	**Fe**
		0.05	0.1	Bal.	21.5	0.3	11.0	1.3	0.5
UTP A 6225 Al	TIG Rod, nickel alloy, NiCrFe-12 type for high- heat resistant alloys, very good corrosion resistance in carburized media	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Ti**	**Al**	**Y**
		0.2	0.5	0.1	Bal.	25.0	0.15	2.0	0.08
UTP A 2535 Nb	TIG rod for joining and building up on identical and similar high heat resistant CrNi cast steels such as X40 NiCrSiNb 35 25 (1.4852) up to service temperatures of 1150°C	**Si**	**Mn**	**Cr**	**Ni**	**Nb**	**Ti**	**Zr**	**Fe**
		1.0	1.7	25.5	35.5	1.2	+	+	Bal.
UTP A 2133 Mn	TIG rod, high-alloyed, special applications, cast pipes in the petrochemical industry for service n temperatures up to 1050°C, good resistance to carburising atmosphere	**C**	**Si**	**Mn**	**Cr**	**Ni**	**Nb**	**Fe**	
		0.16	0.20	4.8	21.5	32.5	1.2	Bal.	
UTP A 3545 Nb	TIG rod, special NiCr alloy, NiCr36Fe15Nb0.8 type for high-heat resistant cast alloys	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Nb**	**Ti**	**Fe**
		0.45	1.5	0.8	45.0	35.0	0.8	0.1	Bal.

		AWS	EN/ISO	Approvals	JOIN!online
		A5.14 / SFA-5.14	**18274**	TÜV (01703 / 08125), DB (43.132.11), DNV	
		ERNiCr-3	S Ni 6082 (NiCr20Mn3Nb)		
		A5.14 / SFA-5.14	**18274**	TÜV (05450)	
		ERNiCrCoMo-1	S Ni 6617 (NiCr22Co12Mo9)		
	Zr	**A5.14**	**18274**	TÜV (10145)	
	0.05	ERNiCrFe-12	S Ni 6025 (NiCr25Fe10AlY)		
			14343		
			GZ 25 35 Zr		
			14343	TÜV (10451)	
			WZ 21 33 Mn Nb		
	Zr		**18274**		
	0.05		S Ni Z (NiCr36Fe15Nb0.8)		

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5.19.2 Special applications – Joining & Repair – Copper alloys

Product name	Short description	Chemical composition (typical values) in %							
UTP A 34	TIG rod, copper alloy, Cu 6100	Mn	Ni	Cu	Fe				
		< 0.5	< 0.5	Bal.	< 0.5				
UTP A 34 N	TIG rod, copper alloy, Cu 6338	Mn	Ni	Cu	Fe				
		13.0	2.5	Bal.	2.5				
UTP A 38	TIG rod, copper alloy, Cu 1897	Mn	Ni	Cu					
		Bal.	12.0	< 0.1					
UTP A 381	TIG rod, copper alloy, Cu 1898	Si	Mn	Ni	Sn				
		0.3	0.25	< 0.3	0.8				
UTP A 320	TIG rod, copper alloy, Cu 5410	Cu	Sn	Fe	P				
		Bal.	12.0	< 0.1	< 0.35				
UTP A 384	TIG rod, copper alloy, Cu 6560	Si	Mn	Cu	Fe				
		3.0	1.0	Bal.	< 0.3				
UTP A 387	TIG rod, copper alloy, Cu 7158	C	Mn	Ni	Cu	Fe			
		< 0.05	0.8	30.0	Bal.	0.6			
UTP A 3422	TIG rod, copper alloy, Cu 6327	Mn	Ni	Cu	Fe				
		1.8	2.5	Bal.	1.5				
UTP A 3444	TIG rod, copper alloy, Cu 6328	Mn	Ni	Cu	Fe				
		1.0	4.5	Bal.	3.5				

5.19.3 Special applications – Joining & Repair – Cast iron

Product name	Short description	Chemical composition (typical values) in %							
UTP A 8051 Ti	TIG rod, nickel alloy designed for cold welding of cast iron and dissimilar joints with steels.	C	Mn	Ni	Ti	Fe			
		0.1	3.5	55.0	0.5	Bal.			

	AWS	EN/ISO	Approvals	JOIN!online
	A5.7	**24373**		
	ER CuAl-A 1	S Cu 6100 (CuAl7)		
	A5.7	**24373**		
	ER CuMnNiAl	S Cu 6338 (CuMn13Al8Fe3Ni2)		
	A5.7	**24373**		
	ER Cu	S Cu 1897 (CuAg1)		
	A5.7	**24373**		
	ER Cu	S Cu 1898 (CuSn1)		
		24373		
		S Cu 5410 (CuSn12P)		
	A5.7	**24373**		
	ERCuSi-A	S Cu 6560 (CuSi3Mn1)		
	A5.7	**24373**	TÜV (01625), DNV	
	ER CuNi	S Cu 7158 (CuNi30Mn1FeTi)		
		24373		
		S Cu 6327 (CuAl8Ni2Fe2Mn2)		
	A5.7	**24373**	TÜV (01896)	
	ER CuNiAl	S Cu 6328 (CuAl9Ni5Fe3Mn2)		

	AWS	EN/ISO	Approvals	JOIN!online
		1071		
		S C NiFe-2		

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5.20 GMAW – Solid wires

5.20.1 Special applications – Joining & Repair – Nickel and heat-resistant alloys

Product name	Short description	Chemical composition (typical values) in %							
Thermanit Nicro 82	Solid wires, nickel chromium alloy, NiCr-3	**C**	**Si**	**Mn**	**Cr**	**Nb**	**Fe**		
		0.02	0.2	2.8	19.5	2.5	< 2.0		
UTP A 6170 Co	Solid wire, NiCrCo alloy, for high-temperature applications up to 1100°C	**C**	**Si**	**Ni**	**Cr**	**Mo**	**Ti**	**Co**	**Al**
		0.06	< 0.3	Bal.	22.0	8.5	0.4	11.5	1.0
UTP A 6225 Al	Solid wire, nickel alloy, NiCrFe-12 type for high-heat resistant alloys. Very good corrosion resistance in carburized media	**C**	**Si**	**Mn**	**Ni**	**Cr**	**Ti**	**Al**	**Fe**
		0.2	0.5	0.1	Bal.	25.0	0.15	2.0	10.0
UTP A 3545 Nb	Solid wire, special special NiCr alloy, NiCr36Fe15Nb0.8 type for high-heat resistant cast alloys	**C**	**Si**	**Mn**	**Cr**	**Nb**	**Ti**	**Fe**	**Zr**
		0.45	1.5	0.8	35.0	0.8	0.1	Bal.	0.05
UTP A 2133 Mn	Solid wire high-alloyed, special applications, cast pipes in the petrochemical industry for service temperatures up to 1050°C, good resistance to carburising atmosphere	**C**	**Si**	**Mn**	**Cr**	**Ni**	**Nb**	**Fe**	
		0.16	0.25	4.7	21.7	32.3	1.2	Bal.	
UTP A 2535 Nb	Solid wire for joining and building up on identical and similar high heat resistant CrNi cast steels such as X40 NiCrSiNb 35 25 (1.4852) up to service temperatures of 1150°C .	**C**	**Si**	**Mn**	**Cr**	**Ni**	**Nb**	**Ti**	**Zr**
		0.4	1.0	1.7	25.5	35.5	1.2	+	+

			AWS	EN/ISO	Approvals	JOIN!online
			A5.14 / SFA-5.14	**18274**	TÜV (03089), DNV	
			ERNiCr-3	S Ni 6082 (NiCr20Mn3Nb)		
	Fe		**A5.14**	**18274**	TÜV (05450)	
	1.0		ERNiCrCoMo-1	S Ni 6617 (NiCr22Co12Mo9)		
	Zr	**Y**	**A5.14**	**18274**	TÜV (10135)	
	0.05	0.08	ER NiCrFe-12	S Ni 6025 (NiCr25Fe10AlY)		
				18274		
				S Ni Z (NiCr36Fe15Nb0.8)		
				14343		
				G Z 21 33 Mn Nb		
	Fe			**14343**		
	Bal.			GZ 25 35 Zr		

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5.20.2 Special applications – Joining & Repair – Copper alloys

Product name	Short description	Chemical composition (typical values) in %							
UTP A 34	Solid wire, copper alloy, Cu 6100	Mn	Ni	Cu	Al	Fe			
		< 0.5	< 0.5	Bal.	8.0	< 0.5			
UTP A 34 N	Solid wire, copper alloy, Cu 6338	Mn	Ni	Cu	Al	Fe			
		13.0	2.5	Bal.	7.5	2.5			
UTP A 38	Solid wire, copper alloy, Cu 1897	Mn	Ni	Cu	Ag				
		<0.2	0.3	Bal.	1.0				
UTP A 320	TIG rod, copper alloy, Cu 5410	Cu	Sn	Fe	P				
		Bal.	12.0	< 0.1	< 0.35				
UTP A 384	Solid wire, copper alloy, Cu 6560	Si	Mn	Cu	Sn	Fe			
		3.0	1.0	Bal.	< 0.2	< 0.3			
UTP A 387	Solid wire, copper alloy, Cu 7158	C	Mn	Ni	Ti	Cu	Fe		
		< 0.05	0.8	30.0	< 0.5	Bal.	0.6		
UTP A 3422	Solid wire, copper alloy, Cu 6327	Mn	Ni	Cu	Al	Fe			
		1.8	2.5	Bal.	8.5	1.5			
UTP A 3444	Solid wire, copper alloy, Cu 6328	Mn	Ni	Cu	Al	Fe			
		1.0	4.5	Bal.	9.0	3.5			

5.20.3 Special applications – Joining & Repair – Cast iron

Product name	Short description	Chemical composition (typical values) in %							
UTP A 8051 Ti	Solid wire, nickel alloy designed for cold welding of cast iron and dissimilar joints with steels.	C	Mn	Ni	Ti	Fe			
		0.1	3.5	55.0	0.5	Bal.			

	AWS	EN/ISO	Approvals	JOIN!online
	A5.7	**24373**		
	ER CuAl-A 1	S Cu 6100 (CuAl7)		
	A5.7	**24373**		
	ER CuMnNiAl	S Cu 6338 (CuMn13Al8Fe3Ni2)		
	A5.7	**24373**		
	ER Cu	S Cu 1897 (CuAg1)		
		24373		
		S Cu 5410 (CuSn12P)		
	A5.7	**24373**		
	ERCuSi-A	S Cu 6560 (CuSi3Mn1)		
	A5.7	**24373**	TÜV (01624)	
	ER CuNi	S Cu 7158 (CuNi30Mn1FeTi)		
		24373		
		S Cu 6327 (CuAl8Ni2Fe2Mn2)		
	A5.7	**24373**		
	ERCuNiAl	S Cu 6328 (CuAl9Ni5Fe3Mn2)		

	AWS	EN/ISO	Approvals	JOIN!online
		1071		
		S C NiFe-2		

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5.21 FCAW-G – Gas-shielded flux-cored wires

5.21.1 Special applications – Joining & Repair – Nickel alloys

Product name	Short description	Chemical composition (typical values) in %					
FOXcore 625-T1	Flux-cored wire, high-alloyed, nickel-base, ENiCrMo3 type, for welding of nickel-base alloys with high molybdenum content, superaustenitic stainless steels, clad pipes, optimized for positional welding of pipes.	C	Si	Mn	Cr	Ni	Mo
		0.02	0.5	0.3	20.7	Bal.	8.5
FOXcore 625-T1 PF	Flux-cored wire, high-alloyed, nickel-base, ENiCrMo3 type, for welding of nickel-base alloys with high molybdenum content, superaustenitic stainless steels, 9% Ni-steels for cryogenic applications, optimized for vertical up welding in PF / 3F / 3G position	C	Si	Mn	Ni	Cr	Mo
		0.05	0.4	0.4	Bal.	21.0	8.5
FOXcore Nicro 82-T0	Flux-cored wire, high-alloyed, nickel-base, ENiCr3 / 6082 type, for welding of many creep-resistant steels and nickel-base alloys, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr	Nb
		0.03	0.4	3.2	Bal.	19.5	2.5
FOXcore Nicro 83-T0	Flux-cored wire, high-alloyed, nickel-base, ENiCr3 / 6083 type, or welding of many creep-resistant steels and nickel-base alloys, flat and horizontal positions, mix shielding gas	C	Si	Mn	Ni	Cr	Nb
		0.03	0.3	5.5	Bal.	19.7	2.4

5.21.2 Special applications – Joining & Repair – Cast iron

Product name	Short description	Chemical composition (typical values) in %					
UTP FNM4-G	Gas shielded metal cored wire designed for cold welding of cast iron parts	C	Si	Mn	Ni	Fe	
		0.7	0.6	1.7	Bal.	44.0	

5.21.3 Special applications – Joining & Repair – Multi-purpose

Product name	Short description	Chemical composition (typical values) in %					
UTP 402-G	Gas shielded metal cored wire, recommended for build-up, crack repair and buffer layer prior to hardfacing	C	Ni	Cr	Mn	Fe	
		0.1	7.8	17.1	6.6	Bal.	

			AWS	EN/ISO	Shielding gas	Approvals	JOIN!online
	Nb	**Fe**	**A5.34 / SFA-5.34**	**12153**	M21, C1	TÜV (10991), ABS, BV, DNV	
	3.3	< 1.0	ENiCrMo3T1-4 ENiGT1-1	T Ni 6625 P M21 2 T Z Ni6625 P C1 2			
	Nb	**Fe**	**A5.34 / SFA-5.34**	**12153**	M21		
	3.3	< 1.0	ENiCrMo3T1-4	T Ni 6625 P M21 2			
	Fe		**A5.34 / SFA-5.34**	**12153**	M21	TÜV (10298)	
	< 2.5		ENiCr3T0-4	T Ni 6082 R M21 3			
	Fe		**A5.34 / SFA-5.34**	**12153**	M21		
	< 2.0		ENiCrMo3T1-4	T Ni 6625 P M21 2			

	EN/ISO	Hardness	Shielding gas	Approvals	JOIN!online
	14700	160 HB	M13, I1, M21		
	T C NiFe-2				

	EN/ISO	Hardness	Shielding gas	Approvals	JOIN!online
	14700	150 HB	M13, M12		
	T Z Fe10				

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5.22 FCAW-S – Self-shielded flux-cored wires

5.22.1 Special applications – Joining & Repair – Multi-purpose

Product name	Short description	Chemical composition (typical values) in %					
UTP 402-O	Self-shielded metal cored wire, recommended for build-up, crack repair and buffer layer prior to hardfacing	C	Si	Mn	Ni	Cr	Fe
		0.09	0.9	6.0	7.8	18.0	Bal.
UTP ROBOTIC RAIL 30 NG	Self-shielded seamless flux cored wire especially developed for rail joint welding applications. It is also suitable for welding of low-alloyed steel constructions where impact properties are not required.	C	Si	Mn	Al		
		0.23	0.35	0.45	1.4		

5.22.2 Special applications – Joining & Repair – Gouging

Product name		Short description	Chemical composition (typical values) in %					
New	Old							
UTP Cutarc-O	SK CutArc	Special cored wire developed for gouging applications in vertical down position						

	AWS	EN/ISO	Hardness	Approvals	JOIN!online
		14700	160 HB		
		T Z Fe10			
	A5.20 / SFA-5.20	**EN 17632-A**		CE	
	E70T-4	T42 Z W NO 3			

	AWS	EN/ISO	Hardness	Approvals	JOIN!online

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5.23 Metal powders

5.23.1 Flame-spraying powders for simultaneous melting

Product name	Short description	Grain size range	Chemical composition (typical values) in %					
SIMmelt™ NiBas20G	Repairs of glass moulds in general, allowing - thanks to its moderate hardness - an excellent machinability	-106 µm + 20 µm	C	Si	Ni	Cr	Cu	B
			0.03	2.0	Bal.	0.2	5.0	0.6
SIMmelt™ NiBas30G	Protection and repairing of glass moulds; NiCrBSi with addition of fluxing elements	-106 µm + 20 µm	C	Si	Ni	Cr	Mo	Fe
			0.1	2.5	Bal.	2.7	1.5	0.2
SIMmelt™ NiBas40	Good resistance to corrosion and wear even at high operating temperatures; drawing dies, forging dies, tools in the plastics industry, ejector pins	- 106 µm + 20 µm	C	Si	Ni	Cr	B	Fe
			0.25	3.5	Bal.	7.5	1.8	2.5
SIMmelt™ NiBas60	Good resistance to corrosion and wear even at high operating temperatures; pump rings, friction bearing surfaces, knife edges, press moulds	– 106 µm + 20 µm	C	Si	Ni	Cr	Fe	B
			0.75	4.5	Bal.	15.0	3.5	3.2
SIMmelt™ NiBasW35	High level of protection against abrasive wear; slicing machine blades, conveyor chains, kneader parts	– 106 µm + 20 µm	NiCrBSi Matrix					
			65 %					
SIMmelt™ NiBasW55	Highest abrasion resistance; mixer-settler parts and kneaders in the ceramics industry, die drawing tools, chopping blades, scrapers	– 106 µm + 20 µm	NiCrCoFeBSii Matrix					
			45 %					
SIMmelt™ NiBasW60	Highest abrasion resistance; well suitable for automated spraying processes; separator screws, mixing shovels	– 150 µm + 20 µm	NiCrCoFeBSi Matrix					
			40 %					

5.23.2 Flame-spraying powders for subsequent melting

Product name	Short description	Grain size range	Chemical composition (typical values) in %					
SUBmelt™ NiBasW35	High abrasion resistance; stirrers, mixer blades, mould edges, extruder screws	-125 µm + 45 µm	NiCrBSi Matrix					
			65%					
SUBmelt™ NiBasW50	For stirrer, mixing and fan blades, conveyer screw edges and parts subjected to abrasive wear	-125 µm + 45 µm	NiCrBSi Matrix					
			50%					
SUBmelt™ NiBas60	Highest abrasion resistance; stirrer, mixing shovels, screw shafts,for automatic spray processes	-125 µm + 45 µm	C	Si	Cr	B	Fe	
			0.75	4.4	15.0	3.2	3.5	

			EN	EN/ISO	Coating hardness	JOIN!online
Fe	**Others**				~ 20 HRC	+
0.2	**1.8**					
Cu	**B**	**Others**	**14700**	**14232-1**	~ 30 HRC	+
5.0	0.9	2.1	P Z Ni2	Ni-SF30 - 106/20		
			14700	**14232-1**	40 HRC	🛒
			P Z Ni3	Ni-SF40 - 106/20		
			14700	**14232-1**	60 HRC	🛒
			P Z Ni3	Ni-SF60 - 106/20		
Tungsten carbide			**14700**	**14232-1**	Matrix 60 HRC	🛒
35 %			Z P Ni20	WSC / Ni-SF - 106/20		
Tungsten carbide			**14700**	**14232-1**	Matrix 60 HRC	🛒
55 %			Z P Ni20	WSC / Ni-SF - 106/20		
Tungsten carbide			**14700**	**14232-1**	Matrix 60 HRC	🛒
60%			P Z Ni20	WSC / Ni-SF - 106/20		

			EN	EN/ISO	Coating hardness	JOIN!online
Tungsten carbide			**14700**	**14232-2**	60 HRC	🛒
35%			Z P Ni20	WSC / Ni-SF - 125/45		
Tungsten carbide			**14700**	**14232-2**	Matrix 60 HRC	🛒
50%			Z P Ni20	WSC / Ni-SF - 125/45		
			14701	**14232-2**	Matrix 60 HRC up to 63 HRC	🛒
			P Z Ni3	Ni-SF60 - 125/45		

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5.23.3 Flame-spraying powders without melting (cold process)

Product name	Short description	Grain size range	Chemical composition (typical values) in %				
COLDmelt™ CuAl	Good sliding and emergency running properties; rollers, bearing journals, slideways	- 120 µm + 36 µm	Cu	Al			
			Bal.	10.0			
COLDmelt™ Base17	Bond coat, base powder for initial layer under further coats of wear resistant CrNi- and Cu-alloys	– 106 µm + 36 µm	Al	Ni			
			5.0	Bal.			
COLDmelt™ Zn	Active corrosion protection on steel under atmospheric stresses	– 125 µm	Zn				
			> 99.5				

5.23.4 Metal powders for PTA and laser surfacing – WEAR protection – Steels difficult to weld

Product name	Short description	Grain size range	Chemical composition (typical values) in %				
PLASweld™ Ledurit60	Highly wear-resistant, preferred for protection against mineral wear with low impact; feed screws, excavator teeth	-200 + 63 µm in 5 kg powder containers	C	Si	Mn	Cr	Fe
			4.1	0.5	0.8	32.0	Bal.
PLASweld™ FerroV1	Due to its high hardness the powder for laser surfacing is suitable for build-ups on machine parts and tools subject to abrasion, compression and impact	-125 + 45 µm in 5 kg powder containers	C	Si	Mn	Cr	Mo
			0.5	0.3	0.2	4.5	2.8
PLASweld™ FerroV15	Ferreous powder alloy for plsma arc surfacing with high Vanadium and Chromium content against a combination of wear and corrosion. Cutting tools, scraper	-180 + 63µm in 5 kg powder containers	C	Si	Mn	Cr	Mo
			4.4	1.2	1.1	13.1	1.1
PLASweld™ NiBasW60	The powder blend for plasma arc surfacing, specially nickel base matrix for highest abrasion stressess, for excavator parts, drilling tools, screws in the plastic industry and mining.	-180 +63 µm in 5 kg powder containers	C	Si	Ni	W	Fe
			2.2	1.3	37.5	Bal.	0.5
PLASweld™ NiBas776W40	NiCrMo-powder with addition of tungsten carbides for PTA welding and laser surfacingd, hardfacing weld overlays subject to corrosion and abrasive wear	-150 + 50 µm in 5 kg powder containers	C	Si	Mn	Ni	Cr
			1.6	0.4	0.7	Bal.	9.0
PLASweld™ NiBasW15S	Special wear resistant NiCrBSiW- powder for PTA welding and laser surfacing - tungsten is an alloying element, not added as tungsten carbide in a blend.	-150 + 50 µm in 5 kg powder containers	C	Si	Ni	Cr	W
			0.8	4.1	Bal.	15.0	15.5

5.23.5 Metal powders for PTA and laser surfacing – WEAR protection – Cobalt alloys

Product name	Short description	Grain size range	Chemical composition (typical values) in %				
PLASweld™ Celsit706	Cobalt-base alloy for plasma- transferred-arc (PTA) welding	-150 + 50 µm in 5 kg powder containers	C	Si	Ni	Cr	W
			1.0	1.0	2.0	29.0	4.0
PLASweld™ Celsit712	Cobalt-base alloy for plasma- transferred-arc (PTA) welding	-150 + 50 µm in 5 kg powder containers	C	Si	Ni	Cr	W
			1.5	1.5	1.5	30.0	9.0
PLASweld™ Celsit721	Cobalt-base alloy for plasma- transferred-arc (PTA) welding	-150 + 50 µm in 5 kg powder containers	C	Si	Ni	Cr	Mo
			0.3	1.5	3.0	28.0	5.0

	EN/ISO	Coating hardness	JOIN!online
	14232-1	130 HB	
	CuAl 90 10 - 120/36		
	14232-1	appr. 150 – 190 HB	
	NiAl 95 5 - 106/36		
	14232-1	23 HB	
	Zn - 125		

				EN	Coating hardness	JOIN!online
				14700	57 HRC	
				P Fe14		
	W	**Fe**	**Others**		50 - 60 HRC	
	2.1	**Bal.**	< 0.5			
	V				58-64 HRC	
	15.2					
	B			**14700**	approx. 55 HRC	
	1.3			Z P Ni20		
	Mo	**V**	**Fe**	**14700**	Matrix approx. 510HV0,5	
	10.0	**0.3**	1.8	Z P Ni20		
	Fe				approx. 60 HRC	
	4.0					

			EN	Coating hardness	JOIN!online
	Co		**14700**	approx. 41 HRC	
	Bal.		P Z Co2		
	Co	**Others**	**14700**	approx. 48 HRC	
	Bal.	< 1.0	P Z Co3		
	Co	**Others**	**14700**	approx. 32 HRC	
	Bal.	< 1.0	P Z Co1		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

5.23.6 Metal powders for PTA and laser surfacing – WEAR protection – Tool steels

Product name	Short description	Grain size range	Chemical composition (typical values) in %			
PLASweld™ Ferro55	Ferreous based powder for laser and plasma arc surfacing, combining high strength, toughness and temperature resistance up to 550°C. Applicable on hot and cold work steels.	-125 + 45 µm in 5 kg powder containers -90 + 45 µm in 5 kg powder containers -150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			0.35	0.3	1.1	
PLASweld™ Ferro45	Ferreous based powder for laser and plasma arc surfacing, combining high strength, toughness and temperature resistance up to 550°C. Applicable on hot and cold work steels.	-150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			0.25	0.3	0.8	
PLASweld™ Ferro39	Ferreous based powder for laser and plasma arc surfacing, combining high strength, toughness and temperature resistance up to 550°C. Applicable on hot and cold work steels.	-150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			0.14	0.3	0.8	
PLASweld™ Ferro44	Ferreous powder for laser surfacing was especially developed for tough and crack resistant build-ups on high-strength nodular iron.	-125 + 38 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			0.2	0.5	0.3	
PLASweld™ Ferro702	Powder for laser and plasma arc surfacing, used for repair, maintenance and production of highly stressed cold and hot working tools, such as hot cutting tools and Al-die cast moulds.	-150 + 50 µm in 5 kg powder containers	**C**	**Ni**	**Mo**	
			0.03	18.0	4.8	

5.23.7 PTA & laser powders for hardfacing – Cladding

Product name	Short description	Grain size range	Chemical composition (typical values) in %			
PLASweld™ NiBas068HH	Corrosion resistant NiCrFe-powder for laser and plasma arc surfacing. Buffer layer preferred for stellite qualities, corrosion-resistant; pressure vessel construction, petrochemical industry	-150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			0.1	0.5	3.0	
PLASweld™ NiBas6222Mo	Highly corrosion-resistant NiCrMo- powder for PTA urfacing, similar corrosion and temperature resistant alloys and for surfacing on mild steels.	-150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Ni**	
			0.05	0.4	Bal.	
PLASweld™ NiBas718	Heat resistant NiCrFeNbTiAlMo-powder for PTA welding and laser surfacing	-150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			≤ 0.08	≤ 0.35	≤ 0.35	
PLASweld™ Stainless18	Gas-atomized metallic powder of the type 316 L designed for laser and plasma arc surfacing. It shows good corrosion resistance.	-150 + 50 µm in 5 kg powder containers	**C**	**Si**	**Mn**	
			< 0.03	0.8	0.1	

			EN	Coating hardness	JOIN!online
Cr	**Mo**	**Fe**	**14700**	53 - 58 HRC	
7.0	2.2	Bal.	P Z Fe8		
Cr	**Mo**	**Fe**	**14700**	42 - 46 HRC	
5.0	4.0	Bal.	P Z Fe3		
Cr	**Mo**	**Fe**	**14700**	38 - 42 HRC	
6.5	3.5	Bal.	P Z Fe3		
Cr	**Mo**	**Co**	**14700**	44 HRC	
15.0	2.5	15.0	P Z Fe3		
Ti	**Co**	**Fe**	**14700**	32 - 37 HRC	
1.0	9.5	Bal.	P Z Fe5		

							EN	Coating hardness	JOIN!online
Ni	**Cr**	**Nb**						180 HV	
Bal.	15.0	2.5							
Cr	**Mo**	**Nb**	**Fe**						
21.5	9.0	3.4	< 1%						
Ni	**Cr**	**Mo**	**Ti**	**Co**	**Al**	**Fe**		approx. 250 HV	
Bal.	19.0	3.0	0.9	≤ 1.0	0.5	18.0			
Ni	**Cr**	**Mo**					**14700**	160 - 200 HV	
12.5	17.0	2.5					P Z Fe12		

Further product information available in our webshop. For shopping possibilities contact our local sales team.

5.24 Arc-spraying cored-wires

5.24.1 Cladding

Product name		Short description	Chemical composition (typical values) in %					
Old	New							
Wearspray NiCrAlY-M	SK NiCrAlY-M	Cored wire for arc spraying, designed to resist against oxidation and corrosion in high temperature gas environment. Excellent bond coating behaviour.	C	Si	Cr	Ni	Al	Y
			0.02	0.4	20.0	Bal.	10.5	1.0
Wearspray NiMoAl-M	SK 825-M	Ni-base cored wire for arc spraying with addition of Molybdenum and Aluminium, high tensile bondcoat	Ni	Mo	Al			
			Bal.	5.0	6.5			
Wearspray 828-M	SK 828-M	Unique self-bonding wire especially developed for arc spraying. No prior bond coat layer needed. The coating is dens with extremely low coefficient of friction making it a suitable build up alloy for bearing journal and seats, pump plungers, bull blocks, pumps	Cr	Mo	Fe	Ni		
			8.1	5.5	5.5	Bal.		

5.24.2 WEAR protection

Product name		Short description	Chemical composition (typical values) in %					
Old	New							
Wearspray 235-M	SK 235 M	Cored wire developed for arc spraying. This material produces a hard, abrasive and corrosion resistant coating for high service temperatures. Suitable for high wear applications, anti-skid surfacing as well as corrosive resistant medias.	C	Mn	Si	Cr	B	Fe
			0.06	1.8	1.7	29.0	3.4	Bal.
Wearspray 420-M	SK 420-M	Chrome steel cored wire made exclusively for arc spraying to ensure a good corrosion and oxidation resistance. Hard coatings with good oxidation and corrosion resistances.	C	Mn	Si	Cr	Fe	
			0.4	0.5	0.4	14.0	Bal.	
Wearspray XD NiW30-MF	SK 900-MF	Ni-base cored wire for arc spraying with addition of Boron, Silicon and Tungsten carbides especially developed for spraying with subsequent fusion.	NiCrBSi matrix			Tungsten Carbide		
			70 %			30 %		

	EN/ISO	Hardness	Approvals	JOIN!online
	14919	380 HV 0.3		+
	~ 6.8-1.6-4			
				+
				+

	EN/ISO	Hardness	Approvals	JOIN!online
		900 HV 0.3		+
				+
				🛒

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6 APPENDIX

6.1 Welding processes

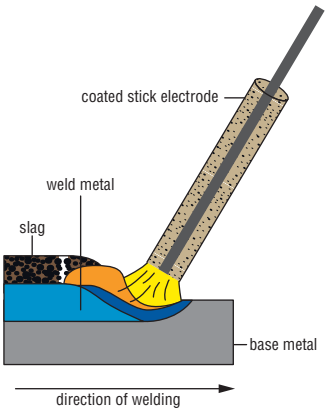
6.1.1 Covered electrodes – Description of the SMAW process

SMAW = Shielded Metal Arc Welding

Shielded metal arc welding is one of the oldest and most versatile welding methods and is considered to be both simple and reliable.

In this technique an electric arc is struck between a covered electrode and the workpiece. The electrode acts both as the carrier of electric current and as the welding consumable that will be melted. The electrode is melted in the high temperature of the arc and transfers to the weld pool in the form of drops. As this happens gases that stabilise the arc and shield the weld pool from oxidation and slag that floats on the weld pool as protective layer are formed.

This fulfils a number of functions: it protects both against the influence of the surrounding atmosphere (primarily oxidation) binds contamination and reduces stresses by slowing the rate at which the weld pool cools down. A wide range of different electrodes for shielded metal arc welding are available. Their alloying elements allow the strength and toughness of the weld seam to be accurately controlled. It is mainly used in steel construction and pipeline construction as well as for work in the open air and on assembly jobs since the necessary equipment is compact and can easily be transported.



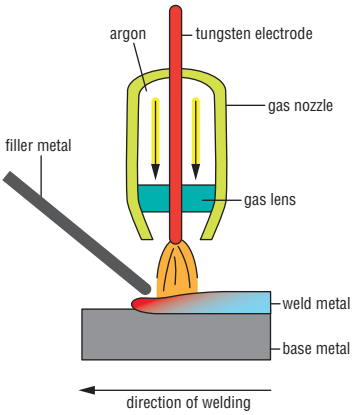
6.1.2 TIG rods – Description of the GTAW process

GTAW = Gas Tungsten Arc Welding / TIG = Tungsten-Inert-Gas

In TIG welding an electric arc is struck between a tungsten electrode which does not melt away and the workpiece (contact or high-frequency ignition).

If a welding consumable is needed it is supplied as a cold wire and is melted in the arc in front of the molten pool. The electrode the arc and the molten pool are protected from the effects of the atmosphere by an inert shielding gas – argon is usually used or more rarely the relatively expensive helium or a mixture of gases. The welding equipment consists of a source of electrical current (DC or AC) and a welding torch connected through a hose assembly. This assembly contains the cable for the welding current the supply of shielding gas the control line and in larger equipment a feed and return line for cooling water.

The decoupling of the supply of electricity from the welding consumables which is typical for TIG welding allows highly individual adjustment of the parameters so leading to very clean high-quality welded joints for root passes and position welding. There is hardly any splatter and only a little welding fume in addition to which lack of fusion undercuts and pores are easily avoided. TIG welding is therefore used wherever weld seams of particularly high quality are needed such as in the construction of pipelines and apparatus power station building aerospace engineering and in the chemical and food industries. The TIG technique can be applied manually or mechanically (whether semi or fully automatic) and can be used to process any metal that is suitable for welding.



6.1.3 Solid wires – Description of the GMAW process

GMAW = Gas Metal Arc Welding

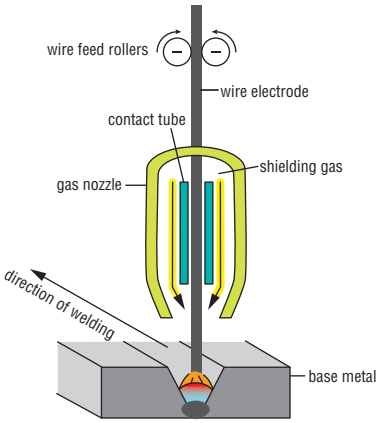
Metal shielding gas welding is an economic welding procedure which is well-suited to uniform welding sequences.

The weld metal demonstrates good properties and the method features high productivity whether applied manually or automatically.

The arc burns between the welding wire and the workpiece in gas shielded metal arc welding. The solid wire is automatically fed through the centre of the welding torch. The shielding gas is also passed through the welding torch and encloses the weld pool during the welding process. The weld seam is therefore shielded from the surroundings. The gases used in MAG welding are active. Carbon dioxide or a gas mixture is used. In practice MAG welding under a mixture of gases has prevailed as it has a lower tendency to spatter and a higher deposition rate than welding using 100 % carbon dioxide.

In MIG welding inert gases such as argon helium and their mixtures are used. These shielding gases do not react with either the base materials or the welding consumables.

The MSG method can be used with a wide range of materials welding position and degrees of mechanisation. It permits welding with a manually held torch as well as fully automated robot methods. The deposition rate is very high and productivity is high too.



a. 3Dprint solid wires for WAAM

With the manufacturing of wires which are tailor-made to its specific purpose voestalpine Böhler Welding is creating the basis for innovative Wire Arc Additive Manufacturing.

The metallurgical and application know-how of its materials specialists makes the company a central element in this technological revolution.

6.1.4 Gas-shielded flux-cored wires – Description of the FCAW process

FCAW = Flux-cored Arc Welding

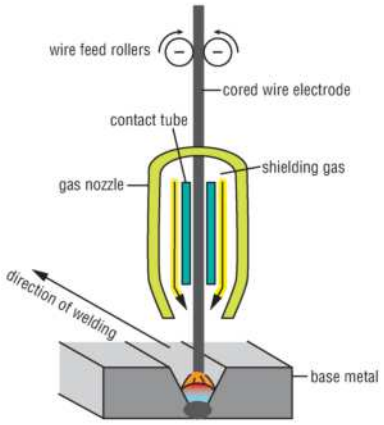
Flux-cored arc welding is a flexible method that offers high depositions rates good weldability and excellent weld appearance.

FCAW is a semiautomatic or automatic arc welding process commonly used to join or surfacing steel base materials. FCAW is recommend for welding thicker sections (> 5 mm). The high deposition rate also makes it suitable for overlay welding of mild and low-alloy steel components. The filler metal is a tubular wire filled with alloying elements that provide beneficial welding characteristics. When such filling is composed by metallic powders the wire is called metal cored; when is composed by mineral oxides raw materials, the wire is called flux cored (Rutile or Basic).

Flux Cored Arc Welding is closely related to Gas Metal-Arc Welding (GMAW): the cored wire is automatically fed through the center of the gun using the same equipment. The shielding gas is supplied through the gun and protects the weld pool from oxidation during welding. The flux inside the wire will protect the weld from the atmosphere since it forms a slag which covers the weld. The shielding gas that cover the welding arc area could be composed by different gases mixture ass Argon/CO_2 or pure CO_2.

Argon/CO_2 improve the arc stability during welding with fine droplet metal transfer. Pure CO_2 increase the the size of the metal transfer droplet with a more unstable arc but increase the performance in term of base metal penetration and it is also a cheaper shielding gas.

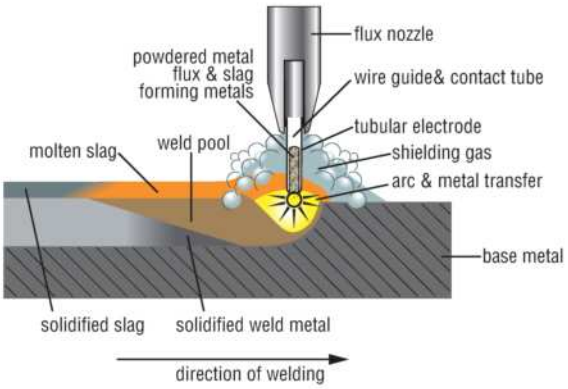
Flux Cored Arc Welding is a multi-positional process that make it suitable for many different applications and it is one of the most preferable and profitable welding process.



6.1.5 Self shielded flux-cored wires – Description of the FCAW-S process

FCAW-S = Self-shielded Flux cored wires

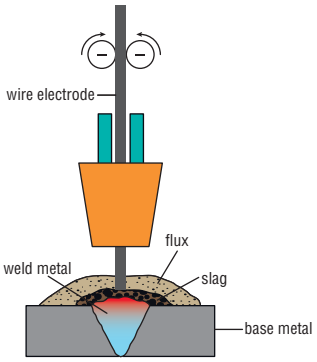
Easy to operate this welding process guarantees high deposition rates and a good recovery of elements across the arc. Open Arc welding allows the user to get a wide range of alloys and to customize these easily.



6.1.6 Submerged arc – Description of the SAW process

SAW = Submerged Arc Welding

Submerged arc welding is an arc welding process in which the arc burns between an electrode (wire or strip) and the workpiece. The special feature of this method is that the arc burns out of sight in a cavity filled with gases and vapours under a layer of coarse-grained mineral welding flux.



The welding flux melts in the arc forming a liquid slag that floats on the molten pool so protecting it from the effects of the atmosphere (like the shielding gas in gas shielded arc welding). The welding electrode whether wire or strip is supplied by an automatic feed system while the welding flux is supplied from a reservoir or through a compressed air feed system. The welding current flows via a contact tube to the electrode immediately above the welding area. This has several advantages including high current carrying capacity high deposition rate and a wide range of possible variations of the welding parameters. The flux coating moreover results in high thermal efficiency and submerged arc welding is therefore known as a high-efficiency process. Turning to detail there is a distinction in submerged arc welding between single-wire welding double-wire welding tandem welding and strip welding.

The composition of the weld metal can be influenced through the right selection of the electrode and flux combination since chemical reactions between the melt and the slag can control the burn-off and pick-up of alloying elements. The method generates very few emissions and creates spatter-free seams of high quality.

It is a fully automated welding procedure carried out for instance using welding gantries booms motorised axis systems or carriages most often for welding long seams in an industrial context. The method is often employed in shipbuilding container manufacture bridge building and steel construction. The method can be applied for joint welding and for build-up welding for instance for wear or corrosion protection layers.

a. Solid wires

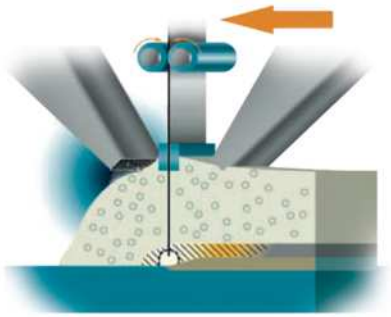
b. Flux-cored wires

c. Flux

6.1.7 Decription of the SASC / ESSC process

a. Submerged Arc Strip Cladding (SASC) process description

Submerged Ar c Strip Cladding (SASC) is a fusion process producing an electric arc between a strip electrode and the workpiece. Electric arc is covered by a blanket of granular flux. The arc is maintained in a cavity surrounded by molten flux, which refines the weld deposit and protects it from atmospheric contamination.

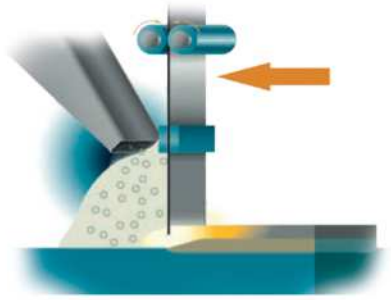


SASC Main benefits are:

- Arc flashes are virtually eliminated by flux blanket
- No spatter and fume make attractive from healthy & environmental standpoints
- Fully automatic operation requires minimal welder training
- High deposition rate
- Low cost per square meter of weld overlay
- ISO standard reference number for Submerged arc welding with strip electrode: ISO 4063 - 122

b. Electro Slag Strip Cladding (ESSC) process description

ElectroSlag Strip Cladding (ESSC) is a fusion process using heat generated into a layer of electroconductive slag producing coalescence which melts the strip electrode and the surface of the workpiece.



The electroconductive slag is maintained in a molten condition by Joule's effect produced by ohmic resistance to electric current driven by the strip electrode.

During the process, granular flux is added continuously to maintain an adequate slag covering over the molten weldpool. In operation with a constant potential power source, the strip electrode melts off while dipping only partly through the molten slag bath.

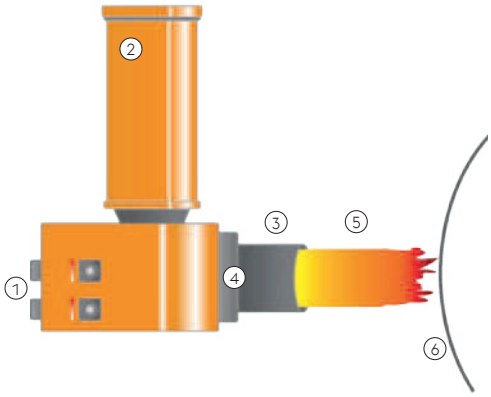
ESSC Main benefits, in addition to SASC, are:

- Very low penetration and dilution down to 8% typical.
- Single layer weld overlay with dilution compensated strip electrodes or/and granulated fluxes
- Highest deposition rate up to 1.5m^2 per hour with 90mm wide strip electrode
- High productivity with cladding speed up to 450mm per minute
- Low flux consumption, fused flux to melted strip electrode ratio down to 0.5
- ISO standard reference number for Electroslag welding with strip electrode: ISO 4063 – 721

6.1.8 Metal powders – Description of the thermal spraying process

Thermal spraying process

① Acetylene / Oxygen
② Powder container
③ Burner nozzle
④ Conveying gas / Powder
⑤ Acetylene / Oxygen – Flame and spray particles
⑥ Workpiece



In powder flame spraying the spray material in powder form is melted with an oxy-fuel gas flame accelerated towards a component by the combustion gases and sprayed on to the surface of the component. Metallic oxide ceramic carbide and plastic powders can be processed using spray guns specifically designed for those materials.

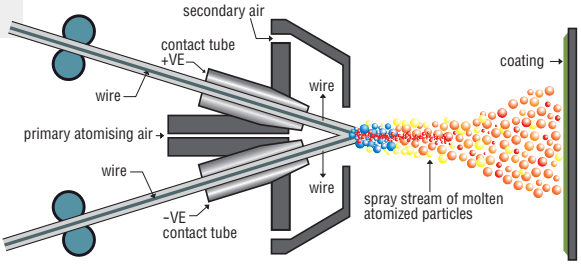
Spray guns that frequently take the form of manual torches preferably using acetylene as a fuel gas because of its high flame temperature are chosen for metallic alloys based on nickel iron or cobalt. The powder particles which are partially melted by the flame deform on impact with the surface of the component and are deposited there to form a spray coating with a lamellar structure. The main areas of application for thermal coatings are corrosion protection and wear protection.

6.1.9 Arc spraying cored wires – Description of the arc spraying with flux-cored wires process

Arc spraying cored wires

Arc Spraying is the highest productivity thermal spraying process. A DC electric arc is struck between two continuous consumable wire electrodes that form the spray material.

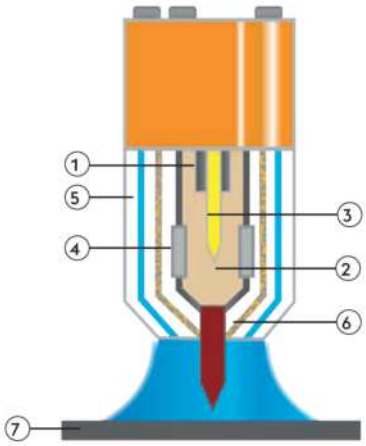
Compressed gas [usually air] atomizes the molten spray material into fine droplets and propels them towards the substrate. The process is simple to operate and can be used either manually or in an automated manner.



6.1.10 Plasma transferred arc surfacing (PTA)

Plasma transferred arc surfacing (PTA)

① Cathode holding device
② Plasma gas
③ Cathode
④ Water cooling
⑤ Shielding gas
⑥ Feeding gas and powder
⑦ Workpiece



In contrast to the spraying processes, this method is a welding process and so involves metallurgical bonding of the applied material to the base material.

However, if the parameters are set optimally, the degree to which it blends with the base material can be reduced to a minimum. The PTA process is employed primarily for surfacing of wear resistant and corrosion resistant coatings on to a base material. The process is characterized by the use of two separately controllable electric arcs. One of these is the (non-transferred) pilot arc; this arc is formed between the non-melting (tungsten) electrode and the (copper) plasma nozzle. It accelerates the plasma gas and enables ignition of the (transferred) main arc. This arc burns with a high energy density between the electrode and the workpiece. With the aid of the electric arc, both the base material and the metal powder that serves as the welding consumable are fused together, which then gives rise to the deposited protective coating. Ar, H2, He, or mixtures of gas are employed as a processing gas. This serves, firstly, as a plasma gas and, secondly, as a shielding gas and as a carrier gas for the powder. Because of its high degree of automation, the PTA process is clearly most suitable for series parts and offers advantages here with regard to:

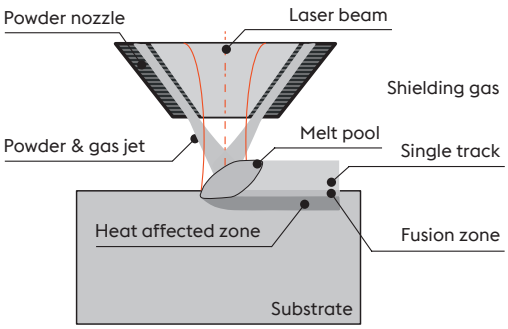
- High reproducibility
- Low degree of dilution with base material
- Small concentrated heat-affected zone
- High surfacing rates possible
- Alloy multiplicity in powder form
- Material combinations with hard substances

UTP offers these PTA powders as nickel-based, cobalt-based and iron-based alloys. The powders are designated PLASweld™ in keeping with the process for which they are intended. The grain sizes should be chosen according to the type of system; powder grain sizes between 150 and 210 µm are selected for the standard range of PTA.

6.1.11 Laser powder surfacing

Laser powder surfacing

Another method of using metal powder as a welding consumable is provided by laser powder surfacing. Here, a laser serves as the source of heat for partially melting the surface of the workpiece and fusing the welding consumable in powder form. The high-energy focus of the laser allows precisely targeted surfacing, which makes it possible to provide wear protection at specific places without negatively affecting (e.g. through a high heat input) the properties of the rest of the component. Because the coating thicknesses are usually small and the processing times short for laser powder surfacing, PLASweld™ powder of a finer grain size, typically 45-106 µm, can be used here.



6.2 Portfolio packaging

6.2.1 Wires and Rods

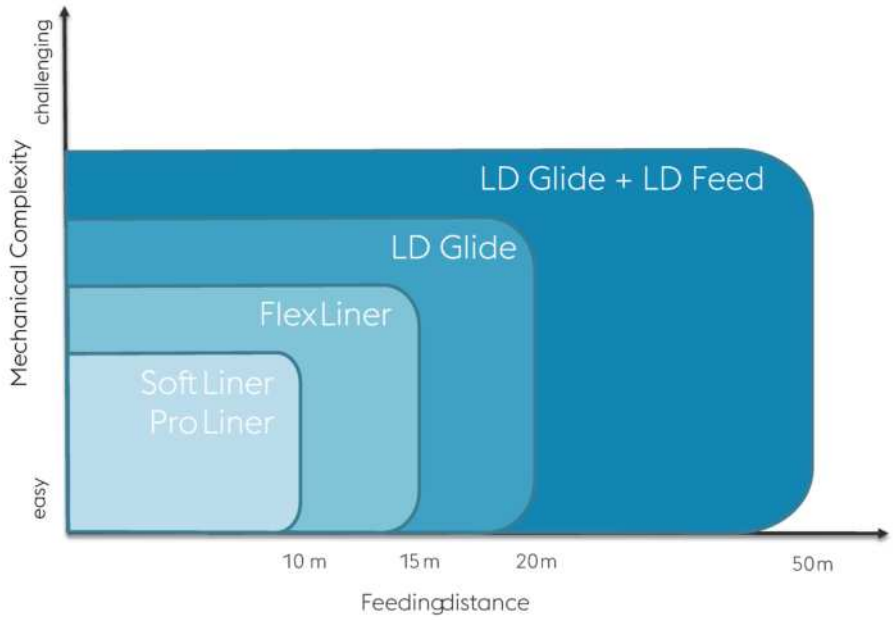
Drums

Description	Dimension	Drum	Drum with hood	Hood
Round drums				
BASEdrum 250	Ø 520 x 780 mm Ø 520 x 1080 mm with hood			 Art.No.: 25254
CLIMAdrum 250	Ø 520 x 780 mm Ø 520 x 1080 mm with hood			
CLIMAdrum 350	Ø 580 x 860 mm Ø 580 x 1160 mm with hood			
MEGAdrum 250 / 400 / 500	Ø 650 x 940 mm			

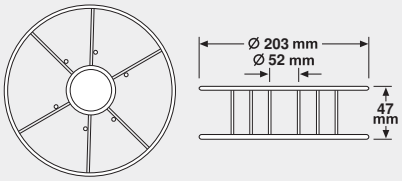
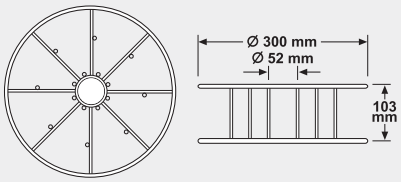
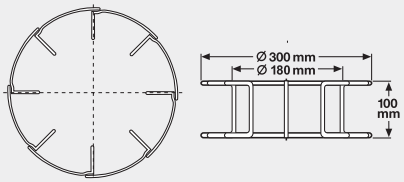
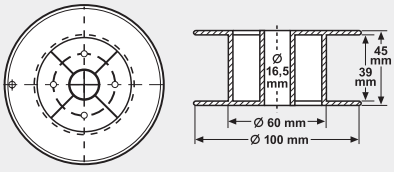
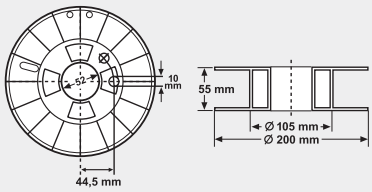
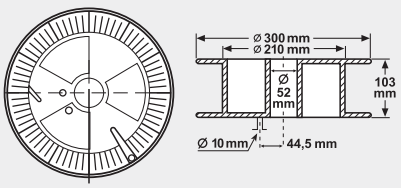
Description	Dimension	Drum	Drum with hood		Hoods
Octagonal drums					
ECOdrum 100	520 x 475 mm 520 x 775 mm with hood				 Art.No.: 25254
ECOdrum 250	520 x 830 mm 520 x 1165 mm with hood				 Art.No.: 63718
ECOdrum 350	600 x 860 mm 600 x 1160 mm with hood				 Art.No.: 25254
ECOdrum 450	600 x 980 mm 600 x 1280 mm with hood				 Art.No.: 30732
Square drums					
SQUAREdrum 300	550 x 550 x 1080 mm 550 x 550 x 1185 mm with hood				Art.No.: 64893
SQUAREdrum 550	720 x 720 x 1080 mm 720 x 720 x 1140 mm with hood				 Art.No.: 64894

Drum Accessories

BÖHLER Lift 250	Trolley universal	Hood
		
ProLiner	**Wire straightener**	**LD Feed**
		
SoftLiner	**LD Glide**	**Installation guide**
		



Spools

Description		Dimension	Spool	Packaging
Basket Spools (acc. EN ISO 544)				
BS200	Basket spool BS200			 3 spools / box
BS300	Basket spool BS300			 1 spool / box
B300	Basket rim B300			 1 spool / box
	Adapter B300 spool			
Plastic spools (acc. EN ISO 544)				
S100	Plastic spool S100			10 spools / box
S200	Plastic spool S200			 3 spools / box
S300	Plastic spool S300			 1 spool / box

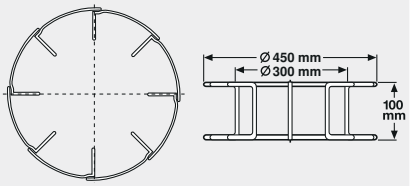
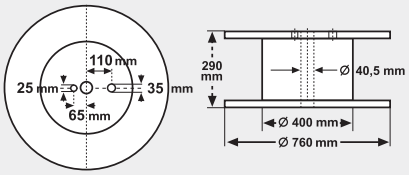
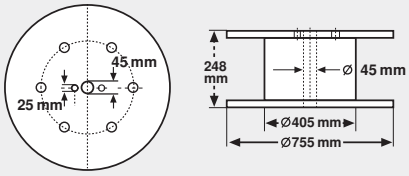
Rods

Description	Dimension	Tube	Packaging
Tubes / Carton	Tube: Radius: 40 mm Länge: 1005 mm Carton: 183 x 46 x 1020 mm		 4 tubes / box

SAW drums

Description	Dimension	Drum
SAWdrum	Ø 570 x 970 mm	

Spools

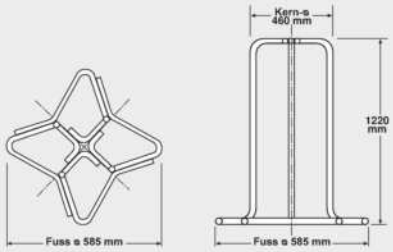
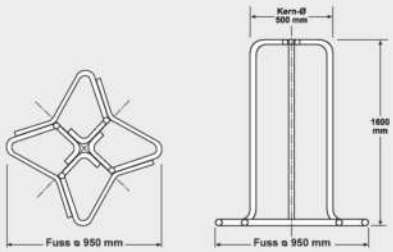
Description	Dimension	Spool	Packaging
Basket rim B415			 1 spool / box
Large spools for SAW / MIG / TIG			
Metal spool S760S			
Wooden spool S760W			

Strip electrodes on coils

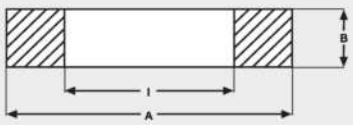
Width	Thickness	Weight	inner Diameter	outer Diameter	Number of coils per pallets 1100x1100	
30 mm	0.5 mm	25 - 30 kg	300 mm	550 mm	32	
60 mm	0.5 mm	50 - 60 kg			16	
90 mm	0.5 mm	75 - 90 kg			12	

Tailor strip electrode sizes and coil weights are available on demand

Spiders

Description	Dimension	Spool / Packaging
BASEspider	 max. 400kg	
MEGAspider	 max. 1000 kg	

Coils

Description	Dimension	Spool / Packaging
Coil C760	 Weight = 100 kg AA* / A = 770 mm / I = 570 mm / B = 100 mm *auf Anfrage	
Coil	Cardboard tube: 1150 x 500 mm	

6.2.2 Flux

Flux – DRY SYSTEM

Description	Packaging	Pallet
DRY SYSTEM bag 25 kg		EUP: 24 bags / pallet CP1BOX: 40 bags / pallet
PAPER bag 25 kg		for UTP WEAR protection SAW fluxes

BIG BAGs

Description	Dimension	Packaging
DRY SYSTEM BIGBAG 500 kg	85 cm x 85 cm x 70 cm	
DRY SYSTEM BIGBAG 1000 kg	85 cm x 85 cm x 125 cm	

Buckets / Drums

Description	Packaging
Steel bucket 25kg with lid	
Bucket 30 kg	
Steel barrel 200 kg	

6.2.3 Stick electrodes

Description	Packaging	Outer packaging
DRY SYSTEM 15 **DRY SYSTEM 20** **DRY SYSTEM 30**	 ~ 0,8 - 2,5 kg per box	 DRY SYSTEM 15: 13 / box DRY SYSTEM 20: 12 / box DRY SYSTEM 30: 8 / box
Tin 99	 ~ 9 kg per tin	 2 tins / box
Tin 73	 ~ 4,5 kg per tin	 3 tins / box
Box	 ~4,5 kg per box	 4 boxes / outer box
PocketBox 20 **PocketBox 30**	 1,0 / 2,0 kg per box	 12/8 boxes / outer box

6.3 Handling and storage recommendations

General recommendations

Böhler Welding filler and cladding materials and fluxes will keep their promised performance and properties when being stored properly under the described conditions. For storage conditions or periods deviating from recommended, a visual control and a welding test can verify the functionality. Depending on the type and individual properties of the material longer storage periods can be accepted. The start date of the storage period is the date where the consumables arrive at the ordering company. The storage management should follow the first in first out principle to avoid over-aging.

Basic guide lines

- Welding consumables should be kept in their undamaged original packaging.
- The storage environment must be dry, clean, and free of dust.
- No direct exposure to sunlight.
- No direct contact of the packaging with walls and floor.
- Welding consumables must be stored frost free.
- Temperature drops below the dew point should be avoided.

Recommended storage conditions

Temperature	Relativ humidity
5-15 °C	< 50 % RH
18-25 °C	< 60 % RH
25-35 °C	< 40 % RH
> 35 °C	< 30 % RH

These recommendations do not release the user from his duty to convince himself of the proper condition of the welding consumables before use.

Covered electrodes

Quality packaging
Depending on the type of electrode and the application, stick electrodes need to be protected against moisture pick up from the atmosphere. The electrodes need to be stored in a dry room in their undamaged original packaging.

Covered electrodes can be stored in their undamaged and unopened original packaging for 2 years following the recommended storage conditions above. The preferred condition is: 18 - 25 °C at < 60 % RH.

Covered electrodes in opened, broken or damaged packaging must be stored in a separate, heated room at higher temperatures. The re-drying time and temperature before use depends on type, kind of packaging and application. Individual information is provided on the electrode package.

Stick electrodes where no re-drying recommendation is given can be dried at 100 - 120 °C / 1 h.
Cellulosic electrodes must not be re-dried.
Electrodes exposed directly to water, oil or grease must not be used.

General recommendations for re-drying of stick electrodes:

Classification EN ISO	Application	Type	Re-drying	Temperature (°C)	Time (h)
2560	Non and low alloyed	A, RA, C, RC, R, RR, RB B	no yes	– 250-350	– 2-10
18275	High tensile steel	B	yes	300-350	2-10
3580	Creep resistant steel	R B	no yes	– 300-350	– 2-10
3581	Stainless steel (soft-) martensitic and heat resistant ferritic steel	R B B, R	yes no yes	250-300 – 300-350	2-10 – 2-10
14172	Ni and Ni-alloys	R, B	yes	250-300	2-10

Deviations from these recommendations are possible and provided on the individual product packaging.

In case of hydrogen content in weld metal of < 5 ml / 100 g weld deposit, re-drying at 350 °C / 2 h is necessary.

Before re-drying, the electrodes should be removed from the packages with the appropriate care and laid in the preheated (80° - 100° C) baking oven. The stacked height of the electrodes in the oven should not exceed 50 mm.

The electrodes should stay for at least 2 h in the oven after reaching the required re-drying temperature. Before taking the electrodes out let them cool down in the opened oven to 70° - 90 °C. After re-drying they can be kept in a drying cabinet at 120° - 200°C up to four weeks or in a quiver at 100° - 200°C for up to 8 hours.

DRY SYSTEM premium packaging – Ready-to-use covered electrodes

From the advanced Böhler Welding metal Can or the premium DRY SYSTEM vacuum pack, covered electrodes can be welded without re-drying. Using our special moisture resistant coated electrodes is possible up to 9 hours after opening. See detailed information on the label. DRY SYSTEM offers different packaging sizes matching the average consumption of one shift. Unused electrodes can be stored and re-dried as described before. DRY SYSTEM offers simple and save handling of covered electrodes under workshop and construction site conditions. Dry and optimal conditioned electrodes are available at all time.

Covered electrodes from the Böhler Welding DRY SYSTEM premium vacuum pack or the advanced metal Can have a nearly unlimited shelf live as long as the packs are neither opened nor damaged.

Flux for joining and cladding

Fluxes for joining and cladding can be stored in their undamaged and unopened original packaging for 2 years following the recommended storage conditions above. The preferred condition is: 18 - 25 °C at < 60 % RH.

Flux from damaged packs must be used or repacked immediately.

Basic fluxes need to be re-dried before use to avoid the risk of cold cracking when coming in standard packaging (Plastic bag, paper bag with plastic liner, standard Big Bag).

Re-drying of agglomerated fluxes is generally done at 300 - 350 °C for 2 - 4 hours or for FB types for two hours at 350 - 450 °C to ensure the H4 resp. H5 classification.

General recommendations for re-drying of agglomerated fluxes:

Typ	Re-drying	Temperature (°C)	Time (h)
FB	Y	300-350 (450)	2-10
AB	Y	300-350	2-10
AR	Y	150-200	2-10

Detailled re-drying recommendations are displayed on the product packaging.

The construction of the re-drying oven should avoid local over heating by means of a dry blend screw and ensure good ventilation. When applying static drying the height of the flux is restricted to 50 mm. The flux may be re-dried several times; we recommend a maximum cumulative holding time within a temperature range of 300 - 350 °C of approximately 10 hours. After re-drying, unused flux can be stored up to 30 days at a temperature of about 150 °C.

When working at higher temperatures > 30 °C and rel. humidity > 80 % it is recommended to maintain the flux at a temperature of 110 - 150 °C.

In a well-designed flux re-circulation system characterized by low flux travel speeds, no sharp bends and minimized flux travel distances, the flux can be re-circulated several times without damaging the agglomerate. A central flux hopper should be re-filled with fresh or re-dried flux when approximately 50 % of the contend is consumed.

Fine particles or dust formed during re-circulation should be limited to 5 % with a grain size of < 200 µm by using dust filters.

The re-circulated flux must be kept free of all foreign particles such as welding slag, rust, plate scale or grinding dust.

The compressed air used in any sucking or re-circulation system shall be clean and dry. Devices such as a frost condensation driers and oil traps should be used.

DRY SYSTEM premium packaging – Ready-to-use fluxes

Flux from the advanced Böhler Welding metal bucket or the premium DRY SYSTEM Bag or BigBag can be used right away without re-drying. The particular characteristic of the DRY SYSTEM packaging reliably prevents moisture pick up of the flux during transport and storage.

Böhler Welding flux for joining and cladding in unopened and an undamaged metal bucket, DRY SYSTEM Bag or DRY SYSTEM BigBag can be stored for longer periods than two years.

Cored wires

Flux cored wires can be stored in their undamaged and unopened original packaging for 2 years following the recommended storage conditions above, independent of the type as seamless or folded cored wire. The preferred condition is: 18 - 25 °C at < 60 % RH.

At storage temperatures below 10 °C there is a risk of condense forming on the wire surface when being opened and unpacked in a warmer environment. This can lead to porosity and gas marks at the beginning of the weldment. Acclimatized wires and rods should be used, only. After finishing welding broken spools should be removed from the welding machine and stored in the original packaging at a dry place.

Redrying of cored wires is not necessary and is not recommended in general.

Solid wires and rods

Solid wires and rods can be stored in their undamaged and unopened original packaging for 2 years following the recommended storage conditions above. The preferred condition is: 18 - 25 °C at < 60 % RH. For stainless steel products longer storage times do normally not lead to restrictions in their properties.

At storage temperatures below 10 °C there is a risk of condense forming on the wire surface when being opened and unpacked in heated environment. This can lead to porosity and gas marks at the beginning of the weldment. Acclimatized wires and rods should be used, only. After finishing welding broken spools should be removed from the welding machine and stored in the original packaging at a dry place.

Aluminium wires and rods

During transport and storage of aluminum alloys conditions leading to condensation of air humidity on the surface must be avoided to minimize the risk of hydrogen diffusing into the oxide skin as main source for porosity during welding.

Prior to welding aluminium welding consumables should be stored in their unopened original packaging in the welding area for 24 hours before use to enable a temperature relieve and avoid condensation.

Aluminium welding wires must be stored in a dry room with constant temperature in their unopened and undamaged original packaging. High humidity, air flow and quick temperature changes must be avoided.

Aluminium wires and rods can be stored up to two years under these conditions if the original packaging is unopened and not damaged.

Opened material is to be stored in the re-closed original packaging and must be kept away from each kind of contamination, contact with other metals, temperature and humidity changes. Under these conditions the material can be stored up to one year.

6.4 Welding consumables standards according to European standards

In order to maintain an overview of the various welding consumables, they are summarized in standards. The following pages provide a clear description of how the EN ISO standard is structured, can be read and to be understood. For easy understanding, the system is explained by giving examples.

6.4.1 Summary of EN / EN ISO standards for welding consumables

Standard	Title of the standard
EN ISO 636	Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels.
EN ISO 2560	Covered electrodes for manual metal arc welding of non-alloy and fine grain steels.
EN ISO 3580	Covered electrodes for manual metal arc welding of creep-resisting steels.
EN ISO 3581	Covered electrodes for manual metal arc welding of stainless and heat-resisting steels.
EN ISO 1071	Welding consumables - Covered electrodes, wires, rods and tubular cored electrodes for fusion welding of cast iron - Classification
EN ISO 12153	Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of nickel and nickel alloys.
EN 12536	Rods for gas welding of non alloy and creep-resisting steels.
EN ISO 14171	Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels.
EN ISO 14172	Covered electrodes for manual metal arc welding of nickel and nickel alloys.
EN ISO 14174	Fluxes for submerged arc welding and electroslag welding.
EN ISO 14175	Gases and gas mixtures for fusion welding and allied processes
EN ISO 14341	Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels.
EN ISO 14343	Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels.
EN 14700	Welding consumables - Welding consumables for hardfacing
EN ISO 16834	Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels.
EN ISO 17632	Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels.
EN ISO 17633	Tubular cored electrodes and rods for gas shielded and non-gas shielded metal arc welding of stainless and heat-resisting steels.
EN ISO 17634	Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels.
EN ISO 17777	Covered electrodes for manual metal arc welding of copper and copper alloys - Classification
EN ISO 18274	Solid wire electrodes, solid strip electrodes, solid wires and solid rods for fusion welding of nickel and nickel alloys.
EN ISO 18275	Covered electrodes for manual metal arc welding of high-strength steels.
EN ISO 18276	Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high-strength steels.
EN ISO 21952	Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels.
EN ISO 24034	Solid wire electrodes, solid wires and rods for fusion welding of titanium and titanium alloys.
EN ISO 24373	Solid wires and rods for fusion welding of copper and copper alloys.
EN ISO 24598	Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of creep-resisting steels.
EN ISO 26304	Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels.

6.4.2 Abbreviations for welding consumables classification A in EN ISO standards

Abbreviation	Description	EN ISO standards concerned
Abbreviation for welding process / product		
A	Agglomerated flux	14174
B	Solid strip electrodes	14343, 18274, 24373
C	Sintered strip electrodes	14700
E	Manual metal arc welding	2560,3580,3581,14172,18275, 1071, 14700, 17777
ES	Electroslag process	14174
G	Gas shielded metal arc welding with solid wire electrodes	14341, 14343, 21952, 16834
W	Tungsten inert gas welding	636, 14343, 16834, 21952, 14700
T	Gas shielded metal arc welding with flux cored wires	12153, 17632, 17633, 17634, 18276, 1071, 14700
S (S/T)	Submerged arc welding (solid/flux cored wire)	14171, 14343, 24598, 26304
O	Gas welding	12536
P	Plasma welding	14341
S	Solid wire	14343, 18274, 1071, 14700
Abbreviation for stress-relieved condition		
T	Mechanical properties after annealing	16834, 18275
P	560-600°C / 1h / furnace up to 300°C / air	26304
	Mechanical properties in the welded condition	all
Abbreviation for shielding gases		
M	Shielding gas EN ISO 14175-M2, but without helium	17632, 17634, 18276
C	Shielding gas EN ISO 14175-C1, carbon dioxide	
e.g. M21	The abbreviation for the shielding gas must be accordance with EN ISO 14175	12153, 14341, 16834, 17633
Z	No shielding gas specified	14341, 16834, 17633
N	No shielding gas	17632, 18276
NO	No shielding gas	12153, 17633
Abbreviation for covering type		
A	acid covering	2560
C	cellulosic covering	
R	rutile covering	2560, 3580, 3581
RR	rutile thick covering	2560
RC	rutile-cellulosic covering	
RA	rutile-acid covering	
RB	rutile-basic covering	
B	basic covering	2560, 3580, 3581, 18275

Abbreviation for flux type				
AB	aluminate basic	CS	calcium-silicate	14174, 14171, 18274, 26304, 24598
AS	aluminate-silicate	FB	fluoride basic	
AF	aluminate-fluoride basic	MS	manganese-silicate	
AR	aluminate-rutile	RS	rutile-silicate	
BA	basic-aluminate	ZS	zirconium-silicate	
CG	calcium-magnesium	Z	any other composition	

6.5 Certificates of Conformity and other certificates

General notes

If wanted, factory certificates or acceptance test certificates according to EN 10204 can be prepared for each delivery. Test Reports according to AWS A5.01 can also be supplied. Whatever the type of certification, it must always be requested at the time of order. It is essential that the extent of testing is stated for EN 10204-3.1 acceptance test certificates and for Test Reports. The subsequent preparation of a 3.1 Certificate or a Test Report with a testing scope that differs from schedules F and H is always associated with increased administration and increased costs. If a production series has already been entirely processed, it is not possible to prepare retrospective certificates.

Factory certificates according to EN 10204-2.2

With this certificate the manufacturer confirms that the delivered products correlate with the requirements of the order, including results of different not specified tests.

Acceptance test certificates according to EN 10204-3.1 and 3.2

3.1 or 3.2 acceptance tests certificates are also prepared if required. For this purpose, tests must be carried out on the delivery or on the manufacturing unit associated with the delivery. Since this involves certification of a delivery-specific test according to the requirements of the customer, it is essential that the extent of testing is made known at the time of the order, or at the initial enquiry stage. The resulting costs will be charged according to expenditure.

Test reports according to AWS A5.01

If certification of conformity of the product with the AWS (American Welding Society) is required for a customer project, a Test Report should be requested. The Test Report contains, as standard, a confirmation of conformity for correspondence with the applicable AWS standard, or with the reference to this AWS standard contained in ASME II, Part C. If no further elements are specified by the customer, the Test Report corresponds to “Schedule F” of the AWS A5.01. The content of this Test Report is comparable to that of a “2.2” factory certificate.

The necessary testing scope must be made known at the time of order for all other schedules. In this case, charging will be according to expenditure.

6.6 Classification of shielding gases according to EN ISO 14175

Symbol		Components in volume percent (nominal)					
Main group	Sub group	oxidising		inert		reducing	inert
		CO_2	O2	Ar	He	H_2	N_2
I	1			100			
	2				100		
	3			Residue	0,5 ≤He≤ 95		
M1	1	0,5 ≤CO_2 ≤ 5		Residue*		0,5 ≤ H_2 ≤ 5	
	2	0,5 ≤CO_2 ≤ 5		Residue*			
	3		0,5 ≤ O2 ≤ 3	Residue*			
	4	0,5 ≤CO_2 ≤ 5	0,5 ≤ O2 ≤ 3	Residue*			
M2	0	5 ≤CO_2 ≤ 15		Residue*			
	1	15 ≤CO_2 ≤ 25		Residue*			
	2		3 ≤ O2 ≤ 10	Residue*			
	3	0,5 ≤CO_2 ≤ 5	3 ≤ O2 ≤ 10	Residue*			
	4	5 ≤CO_2 ≤ 15	0,5 ≤ O2 ≤ 3	Residue*			
	5	5 ≤CO_2 ≤ 15	3 ≤ O2 ≤ 10	Residue*			
	6	15 ≤CO_2 ≤ 25	0,5 ≤ O2 ≤ 3	Residue*			
	7	15 ≤CO_2 ≤ 25	3 ≤ O2 ≤ 10	Residue*			
M3	1	25 ≤CO_2 ≤ 50		Residue*			
	2		10 ≤ O2 ≤ 15	Residue*			
	3	25 ≤CO_2 ≤ 50	2 ≤ O2 ≤ 10	Residue*			
	4	5 ≤CO_2 ≤ 25	10 ≤ O2 ≤ 15	Residue*			
	5	25 ≤CO_2 ≤ 50	10 ≤ O2 ≤ 15	Residue*			
C	1	100					
	2	Rest	0,5 ≤ O2≤ 30				
R	1			Residue*		0,5 ≤ H_2 ≤ 5	
	2			Residue*		15 ≤ H_2 ≤ 50	
N	1						100
	2			Residue*			0,5 ≤ N_2 ≤ 5
	3			Residue*			5 ≤ N_2 ≤ 50
	4			Residue*		0,5 ≤ H_2 ≤ 10	0,5 ≤ N_2 ≤ 5
	5					0,5 ≤ H_2 ≤ 50	Residue*
O	1		100				
Z	Mixed gases with components that are not listed in the table or mixed gases with a composition outside the specifi ed ranges**						

* Argon may be partially or completely replaced by helium.
** Two mixed gases with the same Z classifi cation must not be exchanged for each other.

6.7 Code numbers for the yield strength, strength and elongation of the weld metal

Code number	ReL [MPa]	Rm [MPa]	A5 [%]	EN ISO standards concerned
Code number for the yield strength, strength and elongation of the weld metal				
35	355	440-570	22	636, 2560, 14341, 14171, 17632
38	380	470-600	20	
42	420	500-640	20	
46	460	530-680	20	
50	500	560-720	18	
55	550	610-780	18	16834, 18275, 18276, 26304
62	620	690-890	18	
69	690	760-960	17	
79	790	880-1080	16	
89	890	980-1180	15	

Identifier	Description	EN ISO standards concerned
Identifier for welding positions		
1	All positions	2560, 3580, 3581, 12153, 18275, 17632, 17633, 17634, 18276
2	All positions except for vertical down	
3	Butt weld in flat position, fillet weld in flat and horizontal positions	
4	Butt weld in flat position, fillet weld in flat position	
5	Vertical down position, and positions as in code number 3	

Code number	Temperature [°C] for impact energy > 47 J (one sample may be lower, but > 32 J)	EN ISO standards concerned
Identifier for impact energy		
Z	No requirement	636, 2560, 14341, 14171, 16384, 18275, 18276, 26304
A	+20	
0	0	
2	-20	
3	-30	
4	-40	
5	-50	
6	-60	
7	-70	14171, 18275, 18276
8	-80	
10	-100	14171

Code number	Yield [%]	Type of current	EN ISO standards concerned
Code number for yield and type of current			
1	≤ 105	Alternating and direct current	2560, 3580, 3581, 18275
2	≤ 105	Direct current	
3	>105≤ 125	Alternating and direct current	
4	>105≤ 125	Direct current	
5	>125≤ 160	Alternating and direct current	2560, 3581, 18275
6	>125≤ 160	Direct current	
7	>160	Alternating and direct current	
8	>160	Direct current	

Code number	Yield strength of the weld metal [MPa]	Tensile strength of the weld metal [MPa]	EN ISO standards concerned
Code number for yield strength and strength with single-run/two-run welding			
2T	275	370	14171
3T	355	470	14171, 17632
4T	420	520	
5T	500	600	

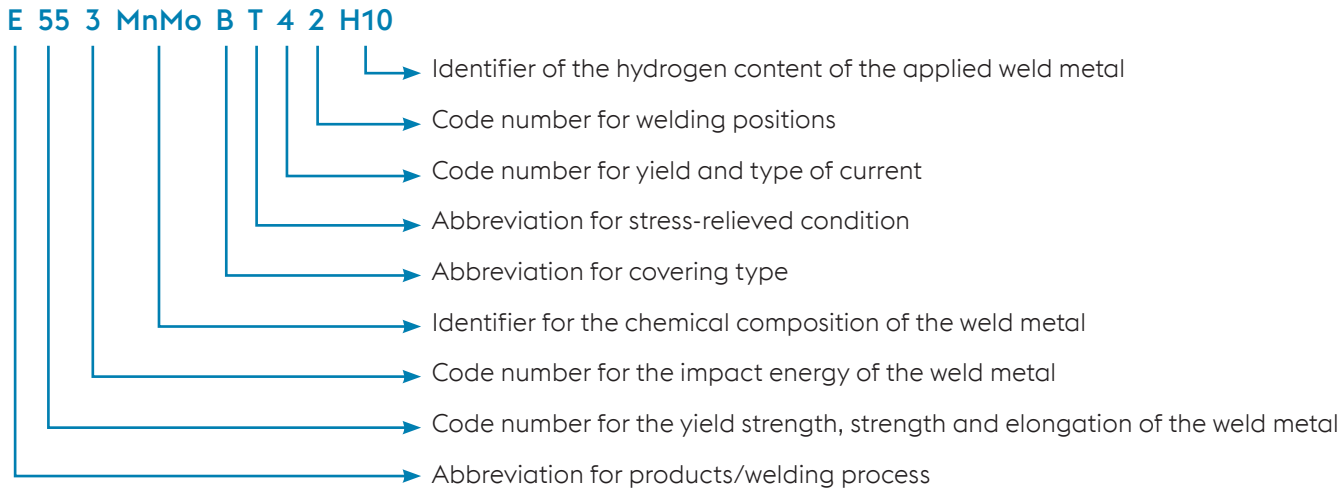
Code number	Maximum hydrogen content [ml/100g weld metal]	EN ISO standards concerned
Code number of hydrogen content in the weld-metal		
H5	5	2560, 3580, 14171, 17632, 17634, 18275, 18276, 26304
H10	10	
H15	15	

Code number	Type and properties	EN ISO standards concerned
Code number for the type of core		
R	Rutile, slowly solidifying slag, shielding gas required	12153, 17632, 17633, 17634, 18276
P	Rutile, fast solidifying slag, shielding gas required	
B	Basic, shielding gas required	
M	Metal powder, shielding gas required	
V	Rutile or basic/fluoride, shielding gas not required	17632
W	Basic/fluoride, slowly solidifying slag, shielding gas not required	
Y	Basic/fluoride, fast solidifying slag, shielding gas not required	
Z	Other types	12153, 17632, 17633, 17634, 18276
U	Without shielding gas, self-shielding	12153, 17633

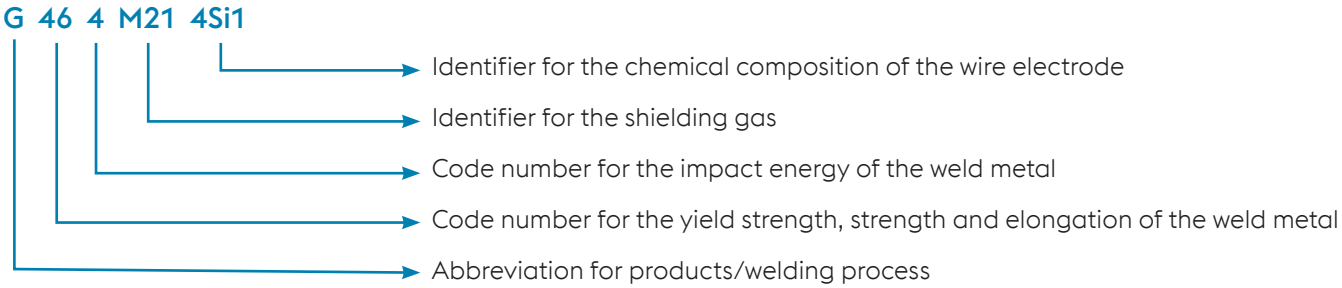
A list of the abbreviations for the chemical composition has been omitted from this manual.

6.8 Classification system according to EN ISO

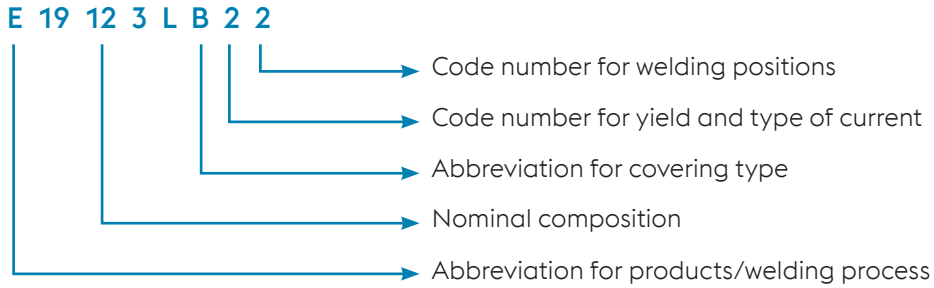
Classification system according to EN ISO 18275-A using a FOX EV 70 Mo as an example



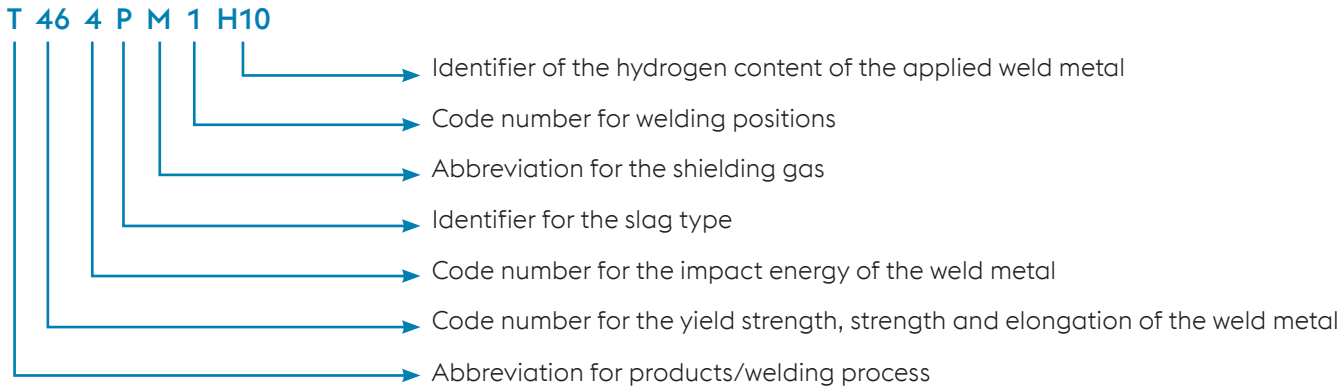
Abbreviation for products/welding process Classification system according to EN ISO 14341-A taking an EMK 8 as an example



Classification system according to EN ISO 3581-A using a FOX EAS 4 M as an example



Abbreviation for products/welding pocess Classification system according to EN ISO 17632-A taking a Böhler Q 71 RC as an example



6.9 Hardness conversion table

R_m = Tensile strength (MPa) / **HV** = Vickers hardness / **HB** = Brinell hardness / **HRC** = Rockwell hardness

R_m	HV	HB	HRC
200	63	60	–
210	65	62	–
220	69	66	–
225	70	67	–
230	72	68	–
240	75	71	–
250	79	75	–
255	80	76	–
260	82	78	–
270	85	81	–
280	88	84	–
285	90	86	–
290	91	87	–
300	94	89	–
305	95	90	–
310	97	92	–
320	100	95	–
330	103	98	–
335	105	100	–
340	107	102	–
350	110	105	–
360	113	107	–
370	115	109	–
380	119	113	–
385	120	114	–
390	122	116	–
400	125	119	–
410	128	122	–
415	130	124	–
420	132	125	–
430	135	128	–
440	138	131	–
450	140	133	–
460	143	136	–
465	145	138	–
470	147	140	–
480	150	143	–
490	153	145	–
495	155	147	–
500	157	149	–
545	170	162	–
550	172	163	–
560	175	166	–
570	178	169	–
575	180	171	–
580	181	172	–
590	184	175	–
595	185	176	–
600	187	178	–
610	190	181	–
620	193	184	–
625	195	185	–
630	197	187	–
640	200	190	–
650	203	193	–
660	205	195	–
670	208	198	–
675	210	199	–
680	212	201	–
690	215	204	–
700	219	208	–
705	220	209	–
710	222	211	–
720	225	214	–
730	228	216	–
740	230	219	–
750	233	221	–
755	235	223	–
760	237	225	–
770	240	228	–
780	243	231	21
785	245	233	
790	247	235	
800	250	238	22
810	253	240	
820	255	242	23
830	258	245	
835	260	247	24
840	262	249	
850	265	252	
890	278	264	
900	280	266	27
910	283	269	
915	285	271	
920	287	273	28
930	290	276	
940	293	278	29
950	295	280	
960	299	284	
965	300	285	
970	302	287	30
980	305	290	
990	308	293	
995	310	295	31
1000	311	296	
1010	314	299	
1020	317	301	32
1030	320	304	
1040	323	307	
1050	327	311	33
1060	330	314	
1070	333	316	
1080	336	319	34
1090	339	322	
1095	340	323	
1100	342	325	
1110	345	328	35
1120	349	332	
1125	350	333	
1130	352	334	
1140	355	337	36
1150	358	340	
1155	360	342	
1160	361	343	
1170	364	346	37
1180	367	349	
1190	370	352	
1200	373	354	38
1210	376	357	
1220	380	361	

Caution: Because of their approximate nature, conversion tables must be regarded as only an estimate of comparative values. It is recommended that hardness conversions be applied primarily to values such as specification limits, which are established by agreement or mandate, and that the conversion of test data be avoided whenever possible.

R_m	HV	HB	HRC
510	160	152	–
520	163	155	–
530	165	157	–
540	168	160	–
1260	392	372	40
1270	394	374	
1280	397	377	
1290	400	380	
1300	403	383	41
1310	407	387	
1320	410	390	
1330	413	393	42
1340	417	396	
1350	420	399	
1360	423	402	43
1370	426	405	
1380	430	409	
1390	431	410	
1400	434	413	44
1410	437	415	
1420	440	418	
1430	443	421	45
1440	446	424	
1450	449	427	
1455	450	428	
1460	452	429	
1470	455	432	
1480	458	435	46
1485	460	437	
1490	461	438	
1500	464	441	
1510	467	444	
1520	470	447	
1530	473	449	47
1540	476	452	
1550	479	455	
1555	480	456	
1560	481		
1570	484		48
1580	486		
1590	489		
1595	490		
1600	491		
1610	494		

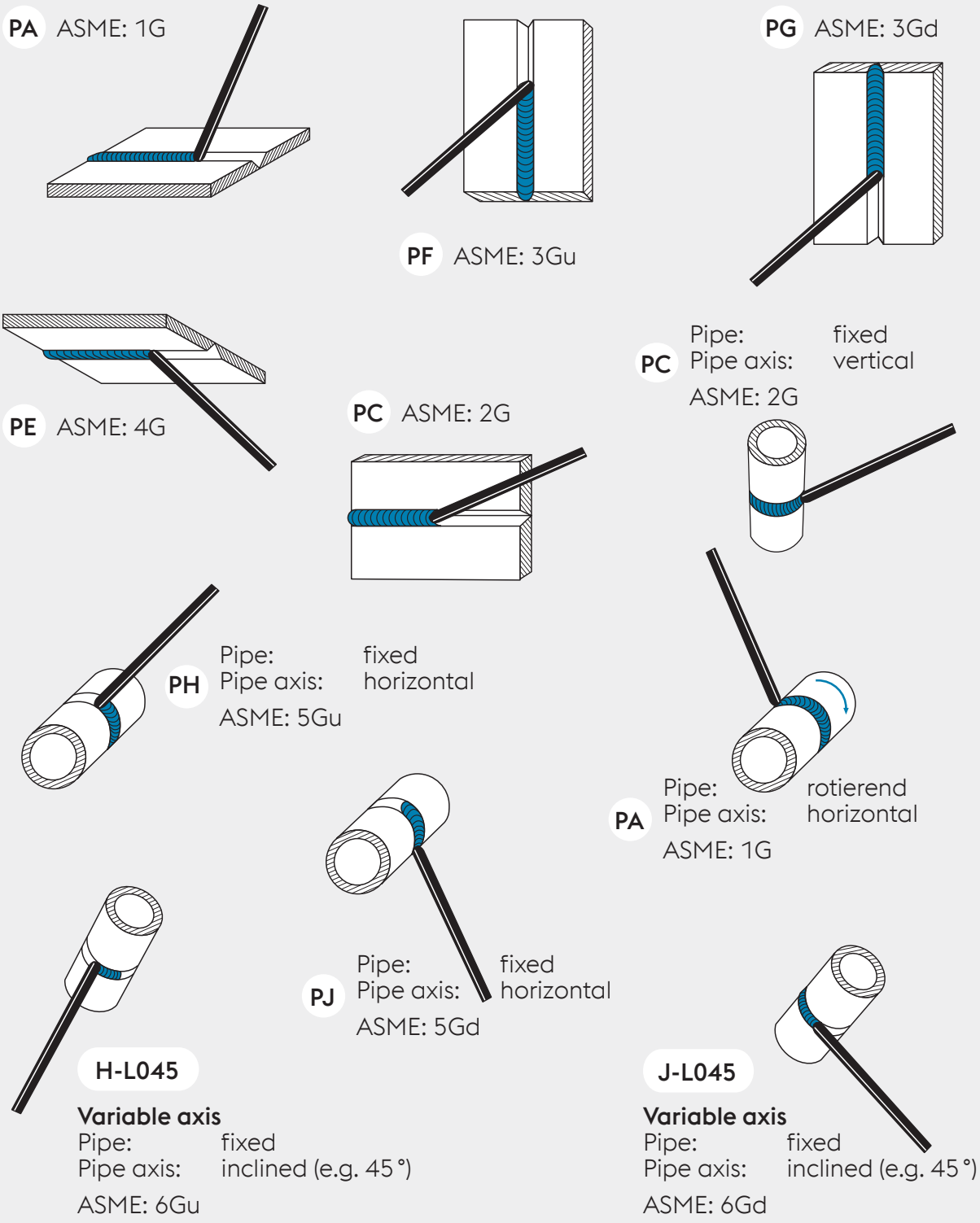
R_m	HV	HB	HRC
860	268	255	25
865	270	257	
870	272	258	26
880	275	261	
1620	497		49
1630	500		
1640	503		
1650	506		
1660	509		
1665	510		
1670	511		
1680	514		50
1690	517		
1700	520		
1710	522		
1720	525		
1730	527		51
1740	530		
1750	533		
1760	536		
1770	539		
1775	540		
1780	541		
1790	544		52
1800	547		
1810	550		
1820	553		
1830	556		
1840	559		
1845	560		53
1850	561		
1860	564		
1870	567		
1880	570		
1890	572		
1900	575		
1910	578		54
1920	580		
1930	583		
1940	586		
1950	589		
1955	590		
1960	591		
1970	594		

R_m	HV	HB	HRC
1230	382	363	39
1240	385	366	
1250	388	369	
1255	390	371	
1980	596		55
1990	599		
1995	600		
2000	602		
2010	605		
2020	607		
2030	610		
2040	613		
2050	615		56
2060	618		
2070	620		
2080	623		
2090	626		
2100	629		
2105	630		
2110	631		
2120	634		
2130	636		
2140	639		57
2145	640		
2150	641		
2160	644		
2170	647		
2180	650		
2190	653		
2200	655		58
	675		59
	698		60
	720		61
	745		62
	773		63
	800		64
	829		65
	864		66
	900		67
	940		68

6.10 Welding positions according to EN ISO 6947 & ASME code

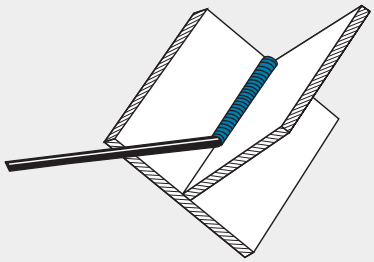
Section IX (QW 460) / AWS A3.0

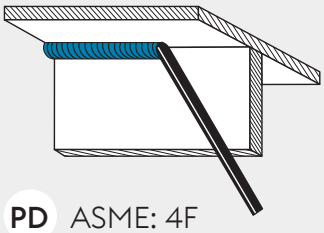
Butt welds



Fillets welds

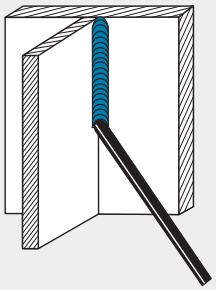
PA ASME: 1F

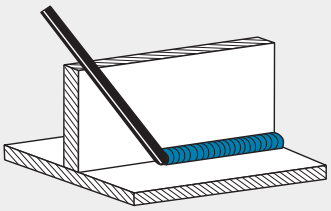




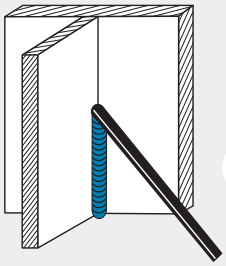
PD ASME: 4F

PG ASME: 3Fd

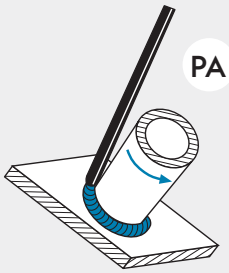




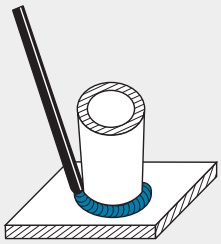
PB ASME: 2F



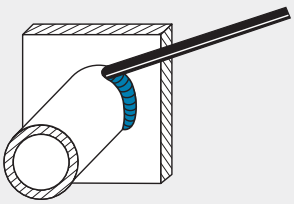
PF ASME: 3Fu



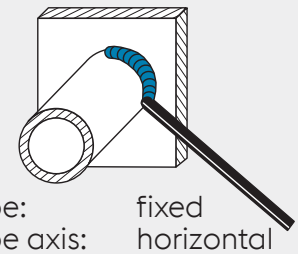
PA Pipe: rotated
Pipe axis: inclined
ASME: 1FR



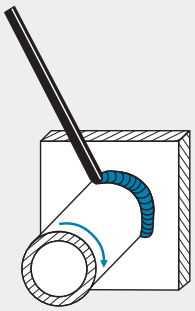
PB Pipe: fixed
Pipe axis: vertical
ASME: 2F



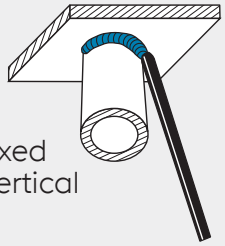
PH Pipe: fixed
Pipe axis: horizontal
ASME: 5Fu



PJ Pipe: fixed
Pipe axis: horizontal
ASME: 4Fd

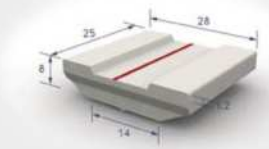
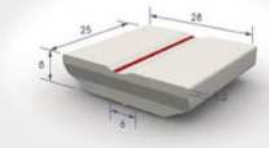
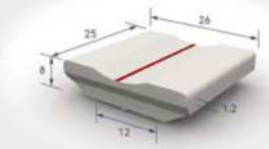
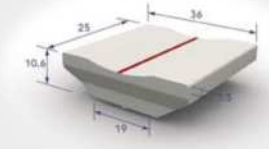


PB Pipe: rotated
Pipe axis: horizontal
ASME: 2FR



PD Pipe: fixed
Pipe axis: vertical
ASME: 4F

6.11 Ceramic backings

Type	Dimensions	Description	
CERAshape T14		Ceramic with trapezoidal groove for butt welds and V-welds; attached with self-adhesive aluminum strip	
CERAshape H6		Ceramic with trapezoidal groove for butt welds and V-welds; attached with self-adhesive aluminum strip	
CERAshape H12		Ceramic with trapezoidal groove for butt welds and V-welds; attached with self-adhesive aluminum strip	
CERAshape H19		Ceramic with trapezoidal groove for butt welds and V-welds; attached with self-adhesive aluminum strip	
CERAshape S7		Ceramic with cylindrical shape for X-welds and fillet welds; attached with self-adhesive aluminum strip	
CERAshape S10		Ceramic with cylindrical shape for X-welds and fillet welds; attached with self-adhesive aluminum strip	
CERAshape S12		Ceramic with cylindrical shape for X-welds and fillet welds; attached with self-adhesive aluminum strip	
CERAshape S15		Ceramic with cylindrical shape for X-welds and fillet welds; attached with self-adhesive aluminum strip	
CERAshape S20		Ceramic with cylindrical shape for X-welds and fillet welds; attached with self-adhesive aluminum strip	

This information is an aid for practitioners. It provides a simplified version of fundamental technical facts and does not claim to be complete.
A guarantee of the suitability for a specific application requires an express written agreement in each case.

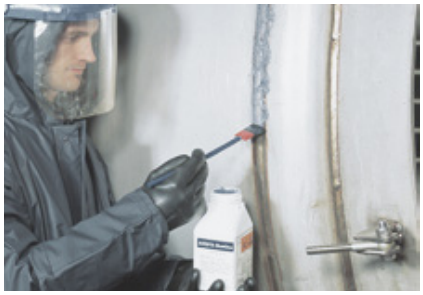
	Length	Part-No.	Packaging Unit
	600 mm	86890	40 Piece / Box 24 m / Box
	600 mm	86903	40 Piece / Box 24 m / Box
	600 mm	86907	40 Piece / Box 24 m / Box
	600 mm	86915	20 Piece / Box 12 m / Box
	600 mm	86917	80 Piece / Box 48 m / Box
	600 mm	86918	60 Piece / Box 36 m / Box
	600 mm	86919	48 Piece / Box 28.8 m / Box
	600 mm	86920	40 Piece / Box 24 m / Box
	600 mm	86921	24 Piece / Box 14.4 m / Box

6.12 Finishing chemicals

Böhler Welding is a leading producer of superior pickling products for stainless steels and special alloys. We offer a wide range of finishing chemicals like pickling gels, pastes, sprays, liquids and cleaning agents. We help you restore stainless steel. Stainless steel retains its beautiful finish thanks to a protective layer that forms on the surface.
Our products help customers around the word in their daily work of creating a superior stainless steel surface.
Pickling of stainless steel is the technically superior method to obtain the best corrosion resistance. Our pickling pastes and sprays are highly effective and can be used in thinner coats than many other pickling products.

Unique products for all steps in the post-weld and surface treatment of stainless steel

1. Pre-Cleaning:
Avesta Cleaner 401, a heavy-duty stainless steel cleaner, suitable for pre-cleaning of oil and grease before pickling. The Cleaner 401 could also be used for maintenance cleaning together with Passivator 630 to restore and brighten stainless steel surfaces and remove surface rust.



2.1 Brush Pickling:
Avesta BlueOne Pickling Paste 130, a unique, safer-to-use pickling paste. This low-fuming pickling paste reduces toxic nitric fumes, resulting from pickling, by 80% . Suitable for brush pickling of welds and smaller surfaces in standard stainless steel grades such as 304 and 316. For tougher heavy-duty applications like Duplex and SMO and pickling at lower temperatures the Avesta RedOne Pickling Paste 140 can be an alternative.

2.2 Spray Pickling:
Avesta RedOne Pickling Spray 240, a unique, safer-to-use pickling spray with an up to 50% reduction of the toxic nitric fumes emitted during pickling. Suitable for spray pickling of larger surfaces in standard stainless steel grades such as 304 and 316. For tougher heavy-duty applications like Duplex and SMO and pickling at lower temperatures, the Avesta Duplex Pickling Spray 250 can be an alternative.

2.3 Bath Pickling:
Avesta Pickling Bath 302, a concentrate to be diluted with water depending on stainless steel grade. Recommended for immersion pickling of objects and circulation pickling of pipe systems.

3.1 Passivation:

Avesta FinishOne Passivator 630, an outstanding, safer-to-use, acid-free passivator. Helps remove free iron from the surface and regenerate the protective passive layer thus speeding up the passivation process.

4. Neutralization:

Avesta Neutraliser 502, for simple neutralization of acid rinse water. Following the pickling process, the rinse water is strongly acidic and contains dissolved heavy metal. For environmental reasons, this water should be treated before discharge.

5. Worker Safety:

A First Aid kit containing **Avesta First Aid Spray 910** (only available in Europe) and / or calcium gluconate gel for immediate rinsing / treatment of acid splashes caused by pickling products should be easy available.

click here

TERRA & URANOS – THE NEW REFERENCE IN WELDING MACHINES.

As a provider of welding solutions, we offer a unique portfolio of high-quality welding consumables, application services, accessories and welding equipment. With the Terra & Uranos ranges, we are setting new standards in all standard and special welding processes. The combination of welding filler metal and power source, which is unique in the industry and based on our application know-how, takes precision to a new dimension.

This allows you to obtain TOP CLASS welded joints that you will be proud of. This is what we stand for – with up to 5 years warranty on all Terra & Uranos welding equipment.

6.13.1 URANOS – FOR THE HIGHEST DEMANDS

Efficiency & technological excellence

URANOS welding equipment from Böhler Welding cover the highest technological needs.

Uranos perform the most advanced processes :
MIG/MAG, pulsed MIG/MAG, TIG AC/DC and MMA. They are equipped with high-tech power sources and accessories and could be connected and interfaced with robots.

What URANOS welding equipment are all about:

- Large (3.5") digital user-friendly interface
- greenWave® technology guarantees high energy-efficiency
- MultiProcess inverters welding MMA, MIG/MAG and TIG DC HF
- Ready for automatic and robot welding application
- The power sources could be networked thanks to Weld@Net® Böhler Welding software

more information

6.13.2 TERRA – FOR STANDARD WELDING TASKS

Robust and user-friendly

TERRA welding equipment from Böhler Welding are available for MMA welding, TIG DC and MIG/MAG processes. The compact and robust design of the machines allows them to be used in a wide variety of working environments, even in confined spaces.

TERRA welding equipment from Böhler Welding thrive under heavy use and guarantee durable connections.

What TERRA welding equipment are all about:

- Simple operation for the welder
- Low weight
- Ideal for steel and stainless steel
- Flexibly deployable
- Suitable for use on construction sites and fabrication shops

6.14 PPE – Personal Protective Equipment

YOUR SAFETY. OUR PASSION.

As a passionate developer of innovative products, we are the ideal partner and solution provider for safe welding. We put the welder's daily challenges and highest expectations into the centre of our activities. This creates trust into our products and guarantees effective protection, outstanding quality and excellent comfort in accomplishing the welder's tasks.

more information

WELDING HELMETS

BÖHLER Guardian helmets are designed for a wide range of welding and grinding applications. In the focus of product development is the welders' expectation for high quality, comfortable and durable products. This means lightweight products down to 480 grams with a robust headgear covered by soft sweatbands and highest ADF clarity with true colour technology. Your safety is our passion and drives our R&D department to provide innovative products to our costumers.

WELDING RESPIRATORY SYSTEMS

BÖHLER Air is our Powered Air-Purifying Respiratory (PAPR)-System that provides the welder with the best protection against particles and fumes related to welding and grinding applications. It supplies the welder with a constant airflow. The system is equipped with an audio, visual and vibration alarm to inform the user about low battery as well as filters needed to be changed. BÖHLER Air is tested and certified according to EN12941 with the highest protection class TH3.

WELDING GLOVES

“Nothing is closer to the welder than the welding gloves. They must be protective on the outside and comfortable on the inside.” Our BÖHLER welding gloves are designed to meet these expectations by selecting high quality leather suppliers, a controlled eco-friendly production process and our intention for a perfect fit.

EYEWEAR

All of our BÖHLER Eyewear models are designed for the use in industrial environments with a variety of glasses certified according to EN 166 F.

6.15 ESSC – SASC Equipments designed by UTP

6.15.1 Cladding nozzle 30 ES2-75 for limited access applications

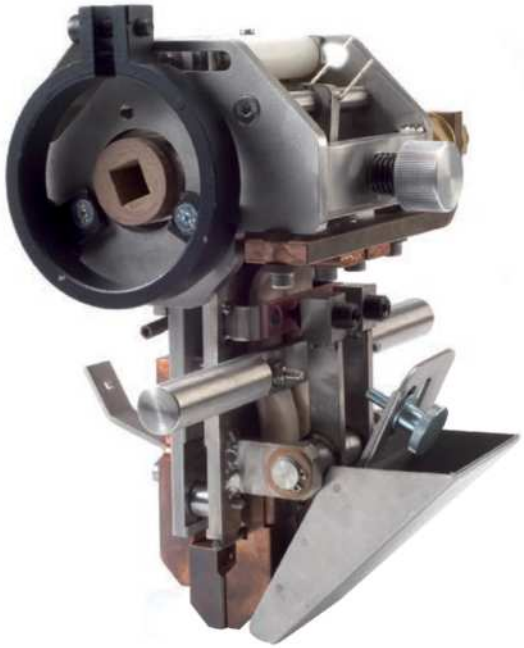
Electroslag and submerged arc strip cladding nozzle designed for small pipes internal cladding

Characteristics	
Allowed SOUDOTAPE size (mm)	15 - 20 - 30
Pipe internal diameter (mm)	
Longitudinal cladding	220
Circular cladding	300
Easy to install on all power sources	
ESAB / LINCOLN ELECTRIC / MILLER	

6.15.2 Cladding nozzle 60 ES3-207 for general purpose

Electroslag and submerged arc strip cladding nozzle designed for general purpose weld overlay

Characteristics	
allowed SOUDOTAPE size (mm)	30 - 60
Pipe internal diameter (mm)	
Longitudinal cladding	380
Circular cladding	550
UTP nozzle 60 ES3 - 207 ready to ESSC process	
Select the configuration between ESAB / LINCOLN ELECTRIC / MILLER	
Add adaptation to SASC process	
Art. No	36558



6.15.3 Cladding nozzle 125 ES3-300 for heavy duty up to 125mm strip electrodes

Electroslag and submerged arc strip cladding nozzle designed for heavy duty weld overlay with strip electrode up to 125mm and current capacity higher than 2500A

Characteristics	
Allowed SOUDOTAPE size (mm)	15 to 125
Pipe internal diameter (mm)	
Longitudinal cladding	550
Circular cladding	700
Easy to install on all power sources	
ESAB / LINCOLN ELECTRIC / MILLER	

6.15.4 UTP magnetic steering device for high productivity applications

- ESSC process is characterized by high productivity.
- UTP magnetic steering device is recommended for all stainless-steel alloys and nickel base when strip electrode size is over 60mm.
- UTP magnetic steering device is efficient to control consistency of bead overlap, bead shape and improve surface appearance.
- Available with 110V and 220V configuration

6.16 weldTECH – Perfect welding results

MORE SERVICE CREATES ADDED VALUE

Böhler welding offers its customers more than just outstanding welding filler metal products. After all, in practice, all that matters is a perfect welding result and efficient processes. We guarantee this with our industry-leading Application Services.

LASTING CONNECTIONS

With our individual expert support, we are the partner who reliably and permanently stands by your side – from consulting to process optimisation to the welded product and beyond.

PERSONAL, STRAIGHTFORWARD CONTACT

Simply contact the known contact person or
send an e-mail to:
application.services@voestalpine.com

WITH OUR APPLICATION SERVICES WE OFFER

- Product and application consulting
- Efficiency consulting and process optimisation
- Trainings and seminars
- Support in the qualification of welding procedures (e.g. EN ISO 15617-7)
- Prototype production (process development)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