

Distributor Product Portfolio Asia Pacific



voestalpine Böhler Welding Asia Pacific Pte Ltd
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voestalpine Böhler Welding

Metallurgical Expertise for Best Welding Results

voestalpine Böhler Welding is a leading manufacturer and worldwide supplier of filler metals for industrial welding and brazing applications. With more than 100 years of experience, the enterprise has decisively influenced the development of welding technology, setting the benchmark with its innovative solutions. The solidity is also reflected in the confidence of our employees who, as owners of the enterprise, hold a good portion of the shares.

As a part of the voestalpine Group, Austria's largest steel manufacturer and one of the world's leading suppliers of specialized steel products, we are a part of a global network of metallurgy experts.

Our customers benefit from:

- Comprehensive welding and steel know-how under one roof
- Coordinated complete solutions comprised of steel and welding filler metals
- A partner offering maximum economic stability and technological expertise

Welding Solutions for demanding industries

We focus on industries with high technological standards and deliver products tailored to industry-specific requirements. In the development and optimization of filler materials, we collaborate closely with customers, manufacturers, and research institutes.

Whether destined for use in challenging scenarios or in standard applications – our high quality filler materials are ideally suited for all applications in the following industry sectors:

- Oil and Gas
- Pipeline
- Chemical
- Power Generation
- Transportation & Automotive
- Maintenance & Repair
- Brazing Industries



Certificates of conformity and other certificates

Material test certificates according to EN 10204

Increasingly, certificates attesting the characteristics and property values of the welding filler metals are required by customers or inspection authorities within the framework of the acceptance testing of weldments.

A few explanatory notes are given below with the request that they be kept in mind when making enquiries or ordering.

The EN standard 10204 is taken as a basis to determine the schedule of such certificates in the case of enquiries and orders. EN 10204 defines who is responsible for testing and authorised to sign, and whether the certificates must contain details concerning general typical values or specific test results relating to the particular delivery in question.

We would like to emphasise strongly that the EN standard 10 204 does not contain the following details and that these must be specified by the customer when ordering:

- Scope of testing: e.g. type and number of tests, individual elements in case of chemical analyses
- Consumables: e.g. type of shielding gas, etc.
- Test parameters: e.g. postweld heat treatment of the test piece, test temperature
- Requirements: e.g. minimum values for yield strength, tensile strength, elongation, impact values, chemical composition tolerances
- Inspection society: e.g. ABS, BV, BKI, TÜV, DNV-GL, LR

3.1 and 3.2 certificates in accordance to EN 10204 are fee-based.

Standard certificates issued for filler metals (in excerpts)		
Type of certificate	Confirmation of certificate by	Content of the certificate
Test report 2.2	Manufacturer	Non specific values, based on continuous production records
Inspection certificate 3.1	The manufacturer's authorised representative independent of the manufacturing department	Specific test results determined from the consignment Inspection certificate
Inspection certificate 3.2	The manufacturer's authorised representative independent of the manufacturing department and the purchaser's authorised representative or inspector designated by the official regulations	Specific test results determined from the consignment or representative lot of this consignment

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.

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AWS A5.23: *F11A10-EC-F5 / **F11P6-EC-F5	EN ISO 26304-A: S 69 6 FB TZ H5	BÖHLER Subarc T85 + *UV 421 TT / **UV C 418 TT	SAW wire/flux combinations, low and medium-alloyed	29
AWS A5.23: *F11A10-EF5-F5-H4 / **F11A8-EG-F6	EN ISO 14174: SA FB 1 65 DC H4 SA FB 1 55 AC H5	Union S 3 NiMoCr + *UV 422 TT-LH / **UV C 418 TT	SAW wire/flux combinations, low and medium-alloyed	28
AWS A5.23: F8A10-ENi1-Ni1 / F8P10-ENi1-Ni1	EN ISO 14174: SA FB 1 55 AC H5	Union S 2 NiMo 1 + UV 418 TT / UV C 418 TT	SAW wire/flux combinations, low and medium-alloyed	28
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	EN ISO 14174: SA AR 1 76 AC H5	UV C 305	SAW flux, unalloyed	21
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	EN ISO 14174: SA FB 1 55 AC H5	UV 418 TT	SAW flux, unalloyed	21
	EN ISO 14174: SA FB 1 55 AC H5	UV 421 TT	SAW flux/low and medium-alloyed	30
	EN ISO 14174: SA FB 1 65 AC	UV C 420 TTR-W	SAW flux/low and medium-alloyed	30
	EN ISO 14174: SA FB 1 65 DC	UV 420 TTR-C	SAW flux/low and medium-alloyed	30
	EN ISO 14174: SA FB 1 65 DC / SA FB 1 65 AC	UV 420 TTR / UV 420 TTR-W	SAW flux/low and medium-alloyed	30
	EN ISO 14174: SA FB 1 65 DC / SA FB 1 65 DC H5	UV 420 TT / UV 420 TT-LH	SAW flux/low and medium-alloyed	30

AWS CLASSIFICATION	EN CLASSIFICATION	PRODUCT NAME	SPECIFICATION	PAGE
	EN ISO 14174: SA FB 1 65 DC H4	UV 422 TT-LH	SAW flux/low and medium-alloyed	30
	EN ISO 14174: SA FB 55 DC H5	Marathon 543	SAW flux/low and medium-alloyed	30
	EN ISO 14174: SA FB 2 DC	Avesta C 807	SAW flux, stainless	36
	EN ISO 14343-A: G Z 18 L Nb	BÖHLER GMA 430L Nb	Solid GMAW wire, stainless steel	34
	EN ISO 14343: SA FB 2	Marathon 431	SAW flux, stainless	36
	EN ISO 14174: SA FB 1 55 AC H5	UV C 419 TT-W	SAW flux/low and medium-alloyed	30
		Avesta Pickling Paste 101	Pickling & Passivation	41
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		Avesta BlueOne Pickling Paste 130	Pickling & Passivation	41
		Avesta RedOne Pickling Paste 140	Pickling & Passivation	41
		Avesta Pickling Spray 204	Pickling & Passivation	41
		Avesta RedOne Pickling Spray 240	Pickling & Passivation	41
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		Avesta Cleaner 401	Pickling & Passivation	41
		Avesta Neutraliser 502	Pickling & Passivation	41
		Avesta Passivator 601	Pickling & Passivation	41
		Avesta FinishOne Passivator 630	Pickling & Passivation	41
		Avesta Moly Drop 960	Pickling & Passivation	41
		Avesta Spray Pump	Pickling & Passivation	41

All contents are correct at the time of print. Please refer to Product Datasheets for the latest product information.

Covered electrodes, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER FOX S EV 50 AWS A 5.1: E7018 H4R	C: 0.08 Si: 0.50 Mn: 1.40 P: 0.009 S: 0.01	R _e : 490 MPa R _m : 560 MPa A: 30% CVN impact: +20 °C: 160 J -40 °C: 55 J	2.50 x 350 3.25 x 350/450 4.00 x 350/400/450 5.00 x 450	ABS, LR, DNV-GL, BKI, CE	Basic covered electrode with excellent strength and toughness down to -40 °C. Metal recovery approx. 115%. Diffusible hydrogen level H4. Crack free weld metal when welding high carbon steels.
BÖHLER FOX S EV 50-1 AWS A 5.1: E7018-1H4R	C: 0.08 Si: 0.50 Mn: 1.40 Cr: < 0.05 Mo: < 0.05 Ni: < 0.05 P: 0.009 S: 0.01	R _e : 490 MPa R _m : 560 MPa A: 30% CVN impact: +20 °C: 190 J -50 °C: 90 J PWHT: 620 °C/2 hrs R _e : 440 MPa R _m : 530 MPa A: 35% CVN impact: +20 °C: 220 J -50 °C: 120 J	2.50 x 350 3.25 x 350/450 4.00 x 450 5.00 x 450	ABS, LR, DNV-GL, BKI, CE	Basic covered electrode with excellent strength and toughness properties down to -50 °C. Metal recovery approx. 115%. Diffusible hydrogen level H4. CTOD tested at -10 °C. Crack-free weld metal when welding high-carbon steels. Suitable for use in tank construction, boiler and pressure vessel manufacturer, apparatus engineering, vehicle manufacture, offshore application and ship building. Suitable for welding steels with low purity and high carbon content.
BÖHLER FOX S EV 47 AWS A 5.1: E7016 H4R	C: 0.07 Si: 0.40 Mn: 0.90	R _e : 460 MPa R _m : 545 MPa A: 34% CVN impact: +20 °C: 190 J -46 °C: 90 J -50 °C: ≥ 47 J	2.50 x 350 3.25 x 350/450 4.00 x 450 5.00 x 450	ABS, DNV-GL, CE	Basic electrode for high-quality welds. Good weldability in all positions except vertical-down. Metal recovery about 110%. Low hydrogen content (HD < 4ml/100 g weld metal as per AWS). Weld metal is extremely ductile, crack resistant and ageing resistant, thus especially suited for rigid weldments with heavy seam cross sections.
BÖHLER FOX S EV Pipe-1 AWS A 5.1: E7016-1H4R	C: 0.06 Si: 0.60 Mn: 0.90	R _e : 480 MPa R _m : 570 MPa A: 30% CVN impact: -40 °C: 60 J -46 °C: 50 J	2.50 x 350 3.25 x 350/450 4.00 x 350	ABS, CE	Basic electrode with some additions of rutile and silicates. Weld metal toughness is available down to -46 °C. Very low-hydrogen content (HD < 4ml/100 g weld metal as per AWS). Considerable time savings against AWS E7018 type electrodes when welding root passes due to increased travel speeds.
BÖHLER FOX S 6013 AWS A 5.1: E6013	C: 0.06 Si: 0.30 Mn: 0.40	R _e : 430 MPa R _m : 520 MPa A: 23% CVN impact: ±0 °C: 50 J	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 450	ABS, BKI	Rutile-cellulosic coated electrode engineered for easy operating in all positions including vertical down. Excellent welding properties in AC polarity, good striking and restriking characteristic, sound penetration, flat beads. Popular for general steel construction.
BÖHLER FOX S OHV AWS A 5.1: E6013	C: 0.08 Si: 0.40 Mn: 0.45	R _e : 477 MPa R _m : 550 MPa A: 20% CVN impact: +20 °C: 55 J ±0 °C: 50 J	2.50 x 350 3.25 x 350/450 4.00 x 350/450 5.00 x 450	ABS, BKI	Rutile-cellulosic electrode with good weldability in all positions including vertical-down. Most popular E6013 type, suitable for small transformers with low OCV. Very good operating characteristics. The slag covering and its removability are good. Flexible coating, good for tack welding. Versatile applications in structural welding, automotive fabrication, boiler and tank welding, and in shipbuilding. Also suitable for galvanized components.
BÖHLER FOX CEL + AWS A 5.1: E6010	C: 0.17 Si: 0.15 Mn: 0.6	R _e : 430 MPa R _m : 520 MPa A: 26% CVN impact: +20 °C: 105 J ±0 °C: 95 J -20 °C: 60 J (≥ 47) -30 °C: 50 J (≥ 27)	2.50 x 300 3.20 x 350 4.00 x 350	CE	Cellulose electrode for vertical-down welding of large diameter pipelines. Especially recommended for root pass welding on D.C. positive polarity in the vertical down and vertical up welding positions. Apart from its good welding and gap bridging characteristics Böhler FOX CEL+ provides a powerful arc that deposits well penetrated, smooth root passes with high travel speeds as well as high safety against the formation of piping or hollow bead and undercut. BÖHLER FOX CEL+ can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84).
BÖHLER FOX CEL 70-P AWS A 5.5: E7010-P1	C: 0.15 Si: 0.10 Mn: 0.45 Ni: 0.17	R _e : 460 MPa R _m : 560 MPa A: 23% CVN impact: 23 (≥ 22) +20 °C: 100 J -20 °C: 80 J -30 °C: 65 J (≥ 47)	3.20 x 350 4.00 x 350 4.80 x 350 5.00 x 350	TÜV, CE	Cellulose electrode for vertical-down welding of high strength large diameter pipelines. Especially recommended for hot passes, filler and cover layers. Highly economical compared with conventional vertical-up welding. The BÖHLER FOX CEL 70-P provides a more intensive arc and a more fluid weld metal as compared to the well-known BÖHLER FOX CEL 75. BÖHLER FOX CEL 70-P can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84).
BÖHLER FOX CEL 80-P AWS A 5.5: E8010-P1/E8010-G	C: 0.15 Si: 0.15 Mn: 0.70 Ni: 0.80	R _e : 490 MPa R _m : 580 MPa A: 23% CVN impact: +20 °C: 90 J -20 °C: 80 J -30 °C: 60 J (≥ 47)	3.20 x 350 4.00 x 350 4.80 x 350 5.00 x 350	TÜV, CE	Cellulose electrode for vertical-down welding of high strength, large diameter pipelines. Especially recommended for hot pass, filler and cover layers. BÖHLER FOX CEL 80-P can also be used in sour gas applications (HIC-Test acc. to NACE TM-02-84)

Covered electrodes, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER FOX CEL 90 AWS A5.5: E9010-P1/E9010-G	C: 0.17 Si: 0.15 Mn: 0.9 Ni: 0.80	R _m : 560 MPa R _m : 650 MPa A: 21% CVN impact: +20 °C: 100 J ± 0 °C: 90 J -30 °C: 65 J (≥ 47)	4.00 x 350 5.00 x 350	TÜV, CE	Cellulose-coated electrode for vertical-down welding of high strength large diameter pipelines. Especially recommended for hot passes, filler and cover layers. The electrode allows good weld pool visibility, and easy manipulation, as well as high safety margins against porosity and slag inclusions. BÖHLER FOX CEL 90 can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84).
BÖHLER FOX BVD 85 AWS A5.5: E8045-P2/E8018-G	C: 0.05 Si: 0.40 Mn: 1.1 Ni: 0.90	R _m : 500 MPa R _m : 560 MPa A: 27% CVN impact: +20 °C: 170 J -50 °C: 65 J (≥ 47)	3.20 x 350 4.00 x 350 4.50 x 350	TÜV, CE	Basic electrodes for vertical-down welds of large diameter pipelines and for structural work. Suitable for filler and cover pass welding in pipeline construction. Deposition rate is 80 – 100% higher than for vertical up welding. The weld deposit of BÖHLER FOX BVD 85 shows an ideal combination between high strength and cryogenic toughness down to -50 °C (-58 °F). BÖHLER Fox BVD 85 can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84).



Flux and metal-cored wires, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER Ti 71-T1C AWS A5.20: E71T-1C AWS A5.36: E71T1-C1A0-CS1-H8	C: < 0.12 Si: < 0.90 Mn: < 1.75 P: < 0.03 S: < 0.03	Shielding gas: CO ₂ R _e : ≥ 400 MPa R _m : 490 – 660 MPa A: ≥ 22% CVN impact: -20 °C: ≥ 27 J	1.20 1.60	ABS, DNV, LR	BÖHLER Ti 71-T1C is a rutile flux cored wire with fast freezing slag. Excellent welding characteristics in all positions. Very good mechanical properties, easy slag removability, low spatter level, smooth and well shaped beads. Applicable in out-of-position welding, with higher productivity and less time for postweld cleaning. Suitable for butt and fillet welding of hulls, storage tanks, mechanical and constructional steel structure and bridge.
BÖHLER Ti 71-T1M AWS A5.20: E71T-1M AWS A5.36: E71T1-M21A0-CS1-H8	C: < 0.12 Si: < 0.90 Mn: < 1.75 P: < 0.03 S: < 0.03	Shielding gas: Ar + 15 – 25% CO ₂ R _e : ≥ 390 MPa R _m : 490 – 670 MPa A: ≥ 22% CVN impact: -20 °C: ≥ 27 J	1.20 1.60	-	BÖHLER Ti 71-T1M is a rutile flux cored wire with fast freezing slag. Excellent welding characteristics in all positions. Very good mechanical properties, easy slag removability, low spatter level, smooth and well shaped beads. Applicable in out-of-position welding, with higher productivity and less time for postweld cleaning. Suitable for butt and fillet welding of hulls, storage tanks, mechanical and constructional steel structure and bridge.
BÖHLER Ti 71-T9C AWS A5.20: E71T-9C-J AWS A5.36: E71T1-C1A4-CS1-H4	C: < 0.12 Si: < 0.90 Mn: < 1.75 Ni: < 0.50 P: < 0.03 S: < 0.03	Shielding gas: CO ₂ R _e : 420 MPa R _m : 490 – 670 MPa A: 22% CVN impact: -40 °C: 100 J	1.20 1.60	ABS, DNV	BÖHLER Ti 71-T9C is a rutile flux cored wire designed for all-position welding with excellent CVN impact properties in as welded condition at -40 °C. Excellent welding characteristics in all positions. Very good mechanical properties, easy slag removability, low spatter level, smooth and good weld beads with X-ray-quality. Applicable in out-of-position welding, with higher productivity and less time for postweld cleaning. Applicable for single pass & multi passes weld. Suitable for Butt, fillet welding of 490N/mm ² class high strength steel and low temperature steel of structure such as ships, bridges, buildings and storage tanks etc.

Seamless flux and metal-cored wires, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER Ti 52 T-FD (CO₂) AWS A5.36: E71T1-C1A2-CS1-H4	C: 0.065 Si: 0.45 Mn: 1.30	Shielding gas: C1 R _e : 520 MPa (≥ 460) R _m : 580 MPa (550 – 660) A: 25% (≥ 20) CVN impact: +20 °C: 100 J -20 °C: 95 J -30 °C: 70 J (≥ 47)	1.00 1.20 1.40 1.60	TÜV, DB, DNV GL, ABS, LR, BV, RINA, RS, CE	Seamless rutile flux cored wire for single- or multilayer welding of Carbon, Carbon-Manganese steels and similar types of steels including fine grain steels with pure CO ₂ shielding gas. Main features: excellent weldability in all positions especially vertical upward position, also with high parameters (300 A), very low spatter losses, fast freezing, easy to remove slag and smooth and bright bead. This wire is especially suitable for ship building where excellent performance and welding speed are needed.
BÖHLER Ti 52 T-FD SR (CO₂) AWS A5.36: E71T12-C1AP4-CS2-H4	C: 0.04 Si: 0.40 Mn: 1.30 Ni: 0.40	Shielding gas: CO ₂ R _e : 500 MPa (≥ 420) R _m : 570 MPa (500 – 640) A: 24% (≥ 20) CVN impact: -40 °C: 110 J (≥ 47) -60 °C: 60 J PWHT: 620 °C / 13 hrs R _e : 460 MPa (≥ 420) R _m : 550 MPa (500 – 640) A: 29% (≥ 20) CVN impact: -40 °C: 95 J (≥ 47) -60 °C: 60 J	1.00 1.20 1.40 1.60	ABS, DNV-GL, BV, LR, CE	Seamless rutile flux cored wire for single- or multilayer welding of Carbon, Carbon-Manganese steels and similar types of steels including fine grain steels with pure CO ₂ shielding gas. Main features: excellent weldability in all positions and excellent toughness at low temperatures in as welded conditions and after post weld heat treatments. This wire is especially suitable for ship building, pressure vessels, bridge construction, and earthmoving equipment. The seamless technology guarantees constant low diffusible Hydrogen in all situations of humidity and environment. CTOD tested at -10 °C (14 °F)
BÖHLER HL 51 T-MC AWS A5.36: E70T15-M21A8-CS1-H4 E70T15-C1A6-CS1-H4	M21 C: 0.06 Si: 0.80 Mn: 1.6 C1 C: 0.05 Si: 0.60 Mn: 1.50	Shielding gas: M21 R _e : 500 MPa (≥ 460) R _m : 600 MPa (550 – 660) A: 29% (≥ 20) CVN impact: -40 °C: 90 J -60 °C: 60 J (≥ 47) Shielding gas: C1 R _e : 460 MPa (≥ 420) R _m : 560 MPa (500 – 640) A: 30% (≥ 20) CVN impact: -40 °C: 80 J -50 °C: 60 J (≥ 47)	1.00 1.20 1.40 1.60	TÜV, DB, DNV-GL, ABS, LR, BV, RINA, CWB, CE	Seamless metal cored wire for single- or multilayer welding of Carbon, Carbon-Manganese and similar types of steels, including fine grain steels with Argon-CO ₂ or pure CO ₂ shielding gas. Features include: high yield, good weldability, excellent bead appearance, very low spatter losses and exceptional mechanical properties at low temperatures (-60 °C) in as welded conditions as well with post weld heat treatment. This wire is especially suitable for automated-robotized applications and for root pass welding for piping and butt-joints. This wire is CTOD-tested.

Solid GMAW wires, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER SG 2 AWS A5.18: ER70S-6	C: 0.07 Si: 0.85 Mn: 1.50	Shielding gas: M21 R _y : ≥ 420 MPa R _m : 500 – 640 MPa A: ≥ 20% CVN impact: -30 °C: ≥ 47 J Shielding gas: CO ₂ R _y : ≥ 420 MPa R _m : 500 – 640 MPa A: ≥ 20% CVN impact: -30 °C: ≥ 47 J	0.80 1.00 1.20 1.60	TÜV, DB, CE, DNV-GL	Copper-coated solid wire or welding rods suited for universal application in boiler and vessel fabrication and in structural steel engineering. Largely spatter-free metal transfer both when using gas mixtures and carbon dioxide. Thanks to its high current carrying capacity this filler metal is also optimally suited for welding thick-walled sheet and plate structures.
BÖHLER SG 3 AWS A5.18: ER70S-6	C: 0.09 Si: 0.95 Mn: 1.70	Shielding gas: M21 R _y : 480 MPa (≥ 460) R _m : 530 – 680 MPa A: 26% (≥ 20) CVN impact: -40 °C: 50 J (≥ 47) Shielding gas: CO ₂ R _y : 470 MPa (≥ 460) R _m : 530 – 680 MPa A: 27% (≥ 20) CVN impact: -20 °C: 60 J (≥ 47)	0.80 0.90 1.00 1.20 1.60	TÜV, DB, ABS, CWB, DNV-GL, CE	Copper-coated solid wire with universal application in boiler and vessel fabrication and in structural steel engineering. Largely spatter-free metal transfer both when using gas mixtures and carbon dioxide. Thanks to its high current carrying capacity this filler metal is also optimally suited for welding thick-walled sheet and plate structures.

GTAW rods, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER S ER70S-2 AWS A5.18: ER70S-2	C: 0.05 Si: 0.50 Mn: 1.2	Shielding gas: Argon R _y : 420 MPa R _m : 520 MPa A: 24% CVN impact: +20 °C: 150 J -30 °C: 100 J -40 °C: 70 J	1.60 2.00 2.40 3.20	-	BÖHLER S ER70S-2 is a copper coated GTAW rod containing Al, Ti and Zr as string deoxidants in addition to Mn and Si and is often referred to as triple deoxidised. This has advantages when rimming or semi-killed mild steels are welded or where joint operations are rusty or contaminated.
BÖHLER S EMK 6 AWS A5.18: ER70S-6	C: 0.07 Si: 0.85 Mn: 1.48 P: ≤ 0.020 S: ≤ 0.015	Shielding gas: Argon R _y : 430 MPa R _m : 550 MPa A: 40% CVN impact: -40 °C: 100 J -50 °C: 90 J PWHT: 620°C/2hrs R _y : 400 MPa R _m : 510 MPa A: 28% CVN impact: -40 °C: 110 J -50 °C: 100 J	1.60 2.00 2.40 3.20	ABS	A copper coated, manganese-silicon alloyed GTAW wire for all general engineering and structural steels fabrication with minimum yield strength of 400 MPa. High levels of silicon and manganese for use on slightly contaminated base materials. The additional deoxidizers also provide better wetting, giving a flatter bead shape and the capability of faster travel speeds. The welding rod is suitable for joint welding in the construction of small diameter pipe and tubing, process piping, boilers, containers and offshore structures.
BÖHLER EML 5 AWS A5.18: ER70S-3	C: 0.10 Si: 0.60 Mn: 1.20	R _y : 520 MPa (≥ 460) R _m : 620 MPa (530 – 680) A: 26% (≥ 23) CVN impact: +20 °C: 220 J -20 °C: 200 J -50 °C: 90 J (≥ 47) PWHT: 600 °C / 2 hrs R _y : 480 MPa (≥ 460) R _m : 580 MPa (530 – 680) A: 28% (≥ 23) CVN impact: +20 °C: 200 J -20 °C: 210 J	1.60 2.00 2.40 3.00	TÜV, DB, Statoil, CE	The GTAW welding rod is suitable for thin-walled plate and pipe as well as root pass welds. The low Si content makes this welding rod especially suitable for joint welds that are subjected to enamelling or galvanising. BÖHLER EML 5 can be used in sour gas applications (HIC-Test acc. NACE TM-02-84) as well.

SAW wire/flux combinations, unalloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
Union S EM12K / UV C 305 AWS A5.17: EM12K AWS A5.17: F7AZ-EM12K EN ISO 14171-A: S 42 Z AR S2Si EN ISO 14174: SA AR 1 76 AC H5	C: 0.05 Si: 0.6 Mn: 1.2 P: ≤ 0.03 S: ≤ 0.01	R _e : 450 MPa (≥ 420) R _m : 530 MPa (≥ 530) A: 31% (≥ 24) CVN impact: +20 °C: 70 J ± 0 °C: 40 J	1.60 2.00 2.40 3.20	-	It is a wire-flux combination for submerged-arc welding of unalloyed steel grades. It is used in general purpose applications in structural steel and pipe. It can be used for single- and multi-wire welding with high welding speed using the two-run technique as well as for fillet welding. The flux is donating Mn and Si to the weld pool (desoxidation) and therefore it is less sensitive for porosity issues due to dirt and rust on the plate. Most suitable for single run or 2-run procedures. Wall thickness < 10 mm. For higher wall thickness UV C 401 or UV C 418 TT to be preferred. Very good slag detachability and nice bead appearance.
Union S EM12K / UV C 401 AWS A5.17: EM12K AWS A5.17: F7A5-EM12K / F7P5-EM12K EN ISO 14171-A: S 42 4 AB S2Si EN ISO 14174: SA AB 1 67 AC H5	C: 0.06 Si: 0.45 Mn: 1.4 P: ≤ 0.02 S: ≤ 0.005	R _e : 430 MPa R _m : 520 MPa A: 36 % CVN impact: +20 °C: 80 J -40 °C: 60 J	1.60 2.00 2.40 3.20 4.00	-	It is a wire flux combination for joining and surfacing applications with general-purpose structural steels, boiler and pipe steels. It is suitable for single and multi-pass welding. Good slag removability by butt and fillet welding. General and fine grained structural steels, shipbuilding steels, pipe steels up to 420 MPa minimum yield strength.
Union S EM12K / UV C 418 TT AWS A5.17: EM12K AWS A5.17: F7A8-EM12K / F6P8-EM12K EN ISO 14171-A: S 42 6 FB S2Si EN ISO 14174: SA FB 1 55 AC H5	C: 0.08 Si: 0.30 Mn: 1.12 P: ≤ 0.015 S: ≤ 0.015	R _e : ≥ 420 MPa R _m : ≥ 510 MPa A: ≥ 30 % CVN impact: -40 °C: 95 J -60 °C: 82 J	2.40 3.20 4.00	ABS	It is a wire flux combination universally applicable in shipbuilding, steel construction and in the fabrication of boilers and containers up to 420 MPa. A nice bead appearance and good wetting properties, together with good slag detachability and low hydrogen content in the weld metal (≤ 5 ml/100 g) characterize this wire/flux combination. It is particularly suitable for multi-pass welding of thick plates. Very good impact toughness of weld metal at low temperatures.
Union S EH12K / UV C 418 TT AWS A5.17: EH12K AWS A5.17: F7A8-EH12K / F7P8-EH12K EN ISO 14171-A: S 46 6 FB S3Si	C: 0.08 Si: 0.40 Mn: 1.65 P: ≤ 0.011 S: ≤ 0.004	R _e : ≥ 460 MPa R _m : ≥ 520 MPa A: ≥ 30 % CVN impact: -40 °C: 125 J -60 °C: 95 J	2.40 3.20 4.00	ABS	It is a wire flux combination universally applicable in shipbuilding, steel construction and in the fabrication of boilers and containers up to 460 MPa yield strength. A nice bead appearance and good wetting properties, together with good slag detachability and low hydrogen content in the weld metal (≤ 5 ml/100 g) characterize this wire/flux combination. Very good toughness of weld metal down to -60°C.
Union S EH 14 / UV C 418 TT AWS A5.17: EH14 AWS A5.17: F7A4-EH14 EN ISO 14171-A: S 38 4 FB S4	C: 0.10 Si: 0.15 Mn: 1.90 P: 0.02 S: 0.01	R _e : 420 MPa R _m : 500 MPa A: 33 % CVN impact: -40 °C: 150 J	1,60 2,00 2,40 3,20 4,00	-	It is a wire flux combination universally applicable in shipbuilding, steel construction and in the fabrication of boilers and containers. A good seam appearance and good wetting properties, together with good slag detachability and low hydrogen content in the weld metal (≤ 5 ml/100 g) characterize this wire/flux combination. It is particularly suitable for multi-pass welding of thick plates. Very good slag detachability also for narrow gap welding.
BÖHLER Subarc T55 HP + UV C 418 TT / UV 418 TT AWS A5.17: F7A8-EC1 / F7P8-EC1 EN ISO 14171-A: S 46 6 FB T3 H5	C: 0.07 Si: 0.3 Mn: 1.60	R _e : 470 MPa (≥460) R _m : 575 MPa (530 - 680) A: 29 % (≥22) CVN impact: -40 °C: 150 J -60 °C: 90 J (≥47)	2.40 3.20 4.00	ABS	It is a wire-flux combination for submerged arc welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 460 MPa. The weld metal demonstrates very good toughness properties at low temperatures, which gives the fabricator the possibility to weld with high heat-input at high welding speed resulting in very high productivity: e.g: single wire 4,0 mm, 900 Amps (~20 kg/hour) with a good bead appearance, nice fusion and good slag detachability. The combination can be used for joining applications in unlimited thickness, with DC+ or AC current, which allows Tandem process (~ 30 kg/hour) with 2 wires (3,2 or 4,0 mm).

Note: Flux and wire combination can be change according to technical requirement

SAW flux, unalloyed

Product Name Classification	Flux type	Main constituents: %	Grain size EN ISO 14174	Characteristics and applications
UV C 305 EN ISO 14174: SA AR 1 76 AC H5	aluminate-rutile	SiO ₂ + TiO ₂ : 24 Al ₂ O ₃ + MnO: 50 CaF ₂ + CaO + MgO: 14	4 – 14	UV C 305 is an agglomerated flux designed for joining applications on general-purpose structural and pipe steels. Suitable for use on DC and AC. For single- and multi-wire welding with high welding speed using the two-run technique as well as for fillet welding. Very good slag removal.
UV C 401 EN ISO 14174: SA AB 1 67 AC H5	aluminate-basic	SiO ₂ + TiO ₂ : 20 CaO + MgO: 30 Al ₂ O ₃ + MnO: 28 CaF ₂ : 16	3 – 20	UV C 401 is an agglomerated aluminate-basic flux, designed for joining and surfacing applications with general-purpose structural steels, fine grained structural steels, boiler and pipe steels. The flux is characterized by its low silicon and moderate manganese pickup. It can be used on DC and AC
UV C 418 TT EN ISO 14174: SA FB 1 55 AC H5	fluoride - basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 38 Al ₂ O ₃ + MnO: 20 CaF ₂ : 25	3 – 20	UV C 418 TT is an agglomerated fluoride-basic flux for joining and surfacing and applications with dissimilar steels. Mainly for high strength and cryogenic fine grained structural steels. This flux is suited for many SAW wires on AC and DC current. Also suited for tandem and multiwire systems.
UV 418 TT EN ISO 14174: SA FB 1 55 AC H5	fluoride - basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 38 Al ₂ O ₃ + MnO: 20 CaF ₂ : 25	3 – 20	UV 418 TT is an agglomerated fluoride-basic flux from Europe for joining and surfacing and applications with dissimilar steels. Mainly for high strength and cryogenic fine grained structural steels. This flux is suited for many SAW wires on AC and DC current. Also suited for tandem and multiwire systems.

Covered electrodes, low- and medium alloyed creep resistant

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER FOX DMO Kb AWS A5.5: E7018-A1H4	C: 0.08 Si: 0.40 Mn: 0.80 Mo: 0.50	R _{pe,2} : 490 MPa (≥ 460) R _m : 590 MPa (530 - 680) A: 24% (≥ 22) CVN impact: +20 °C: 170 J -50 °C: 60 J (≥ 47) PWHT: 620 °C/15 hrs R _{pe,2} : 480 MPa (≥ 460) R _m : 580 MPa (530 - 680) A: 27% (≥ 22) CVN impact: +20 °C: 170 J (≥ 47) -50 °C: 75 J (≥ 47)	2.50 x 250/350 3.20 x 350 4.00 x 350/450 5.00 x 450	TÜV, DB, KTA, ABS, DNV GL, CE	Basic low-hydrogen electrode for 0.5% Mo-alloyed boiler, plates, and tube steels. Approved for long term exposure up to +550 °C service temperature. For high quality welds of long term stressed components with reliable mechanical properties under high and low temperature conditions. Crack resistant, tough and ageing resistant. Very low hydrogen content (acc. to AWS class HD < 4 ml/100 g). Metal recovery approx. 115%.
BÖHLER FOX DCMS Kb AWS A5.5: E8018-B2H4	C: 0.08 Si: 0.25 Mn: 0.80 Cr: 1.10 Mo: 0.50	Annealed: 680 °C/2hrs R _{pe,2} : 480 MPa (≥ 460) R _m : 580 MPa (≥ 550) A: 23% (≥ 20) CVN impact: +20 °C: 160 J (≥ 47)	2.50 x 250/350 3.20 x 350 4.00 x 350/450 5.00 x 450	TÜV, DB, ABS, DNV GL, LTSS, SEPROZ, CE, NAKS	Basic low hydrogen electrode for 1% Cr 0.5% Mo alloyed boiler, plate and tube steels. Approved for long term exposure up to +570 °C service temperature. Fully alloyed core wire which will provide reliable creep rupture properties for the whole service life of a boiler plant. High ductility and crack resistance. The weld metal deposit is heat treatable. Very low hydrogen content (acc. AWS class HD < 4ml/100g). Metal recovery approx. 115%. Suitable for step cooling application. Bruscato ≤ 15 ppm. Post weld tempering at 660-700 °C for at least half an hour followed by cooling down in furnace to 300 °C and still air.
BÖHLER FOX CM 2 Kb AWS A5.5: E9018-B3H4R	C: 0.08 Si: 0.30 Mn: 0.70 Cr: 2.20 Mo: 1.00	Annealed: 720 °C/1hrs R _{pe,2} : 580 MPa (≥ 400) R _m : 680 MPa (≥ 500) A: 19% (≥ 18) CVN impact: +20 °C: 150 J (≥ 47) Annealed: 720 °C/2hrs R _{pe,2} : 530 MPa (≥ 400) R _m : 630 MPa (≥ 500) A: 20% (≥ 18) CVN impact: +20 °C: 180 J (≥ 47)	2.50 x 250 3.00 x 350 4.00 x 350/450 5.00 x 450	TÜV, DB, ABS, DNV GL, CE, NAKS	Basic covered stick electrode for welding 2.25% Cr 1% Mo alloyed steels. Approved in long-term condition up to +600 °C service temperature. Applicable for welds in refineries, boiler construction, and thermal power plants. Core wire alloyed electrode which will provide reliable creep rupture properties. Crack resistant and ductile deposit, high creep rupture strength, low hydrogen content (acc. AWS condition HD < 4 ml/100 g). Good weldability in all positions except vertical down. Deposit is nitride-able and heat treatable. Metal recovery approx. 110%.
BÖHLER FOX CM 5 Kb AWS A5.5: E8018-B6H4R	C: 0.08 Si: 0.30 Mn: 0.8 Cr: 5.00 Mo: 0.60	Annealed: 730 °C/2hrs R _{pe,2} : 520 MPa (≥ 460) R _m : 620 MPa (≥ 590) A: 21% (≥ 17) CVN impact: +20 °C: > 90 J (≥ 47)	2.50 x 250 3.20 x 350 4.00 x 350	TÜV, LTSS, SEPROZ, CE	Basic core wire alloyed electrode for creep resistant steels and steels for hot hydrogen service. Preferably used for X12CrMo5 (5 Cr 0.5 Mo) steels. Approved for long term exposure up to +650 °C service temperature. High crack resistance, very low hydrogen content (acc. AWS class HD < 4 ml/100 g). Good weldability in all positions except vertical down. The deposit is heat treatable. Metal recovery approx. 115%.
BÖHLER FOX C 9 MV AWS A5.5: E9015-B91H4	C: 0.10 Si: 0.20 Mn: 0.6 Cr: 8.50 Ni: 0.50 Mo: 0.90 Nb: 0.05 V: 0.20 N: 0.04	PWHT: annealed 760 °C/2h R _{pe,2} : 580 MPa (≥ 530) R _m : 710 MPa (≥ 620) A: 19% (≥ 17) CVN impact: +20 °C: 75 J (≥ 47)	2.50 x 250 3.20 x 350 4.00 x 350 5.00 x 450	TÜV, CE	The basic coated CrMoVNB core wire alloyed electrode is specially designed for welding of creep resistant tempered martensitic 9% Cr steels used for turbine and boiler fabrication in thermal power plants as well as in the chemical industry. Approved for long-term use at service temperatures up to 650 °C. BÖHLER FOX C 9 MV provides good welding characteristics in all positions except vertical down, a stable arc, low spattering, good slag detachability and excellent striking and re-striking properties. The chemical composition is optimized in order to provide a high creep resistant and ductile weld metal and is characterized by low hydrogen content and low level of trace elements.

Covered electrodes, low- and medium alloyed high strength

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER FOX EV 60 AWS A5.5: E8018-C3H4R	C: 0.07 Si: 0.40 Mn: 1.15 Ni: 0.90	R _{0.2} : 510 MPa (≥ 460) R _m : 600 MPa (550 - 740) A: 27% (≥ 20) CVN impact: +20 °C: 200 J -60 °C: 120 J (≥ 47) PWHT: 580°C/2hrs R _{0.2} : 470 MPa R _m : 580 MPa A: 27% CVN impact: +20 °C: 180 J	2.50 x 350 3.20 x 350 4.00 x 350/450 5.00 x 450	TÜV, DNV GL, RMR, CRS, VG 95132, CE, ABS	Basic Ni- alloyed electrode with excellent mechanical properties, particularly high toughness and crack resistance. For higher strength fine- grained constructional steels. Suitable for service temperatures at -60 °C to +350 °C. Very good impact strength in aged condition. Metal recovery about 115%. Good weldability in all positions except vertical-down. Very low hydrogen content (acc. AWS condition HD < 4 ml/100 g weld metal). CTOD tested at -40 °C. Test values for SSC-test are available.
BÖHLER FOX EV 65 AWS A5.5: E8018-GH4R/ E8018-D1H4R (mod.)	C: 0.06 Si: 0.30 Mn: 1.20 Ni: 0.80 Mo: 0.35	R _{0.2} : 590 MPa (≥ 550) Rm: 650 MPa (620 – 780) A: 25% (≥ 18) CVN impact: +20 °C: 190 J -60 °C: 90 J (≥ 47)	2.50 x 350 3.20 x 350 4.00 x 350/450 4.80 x 450 5.00 x 450	TÜV, CE NAKS, VG 95132, BV, RMR, ABS	Basic electrode with high ductility and crack resistance, for high-strength fine- grained steels. Ductile down to -60 °C. Resistant to ageing. Easy to handle in all positions, except vertical- down. Very low hydrogen content (acc. to AWS condition HD <4 ml/ 100 g weld metal). BÖHLER FOX EV 65 can be used in sour gas applications (HIC-Test acc. NACE TM-02-84).
BÖHLER FOX EV 70 AWS A5.5: E9018-GH4R / E9018-D1H4R (mod.)	C: 0.04 Si: 0.30 Mn: 1.20 Ni: 0.90 Mo: 0.40	R _{0.2} : 650 MPa (≥ 550) R _m : 700 MPa (620 – 780) A: 24% (≥ 18) CVN impact: +20 °C: 160 J -60 °C: 70 J (≥ 47)	2.50 x 350 3.20 x 350 4.00 x 450 5.00 x 450	TÜV, SEPROZ, CE	Basic Mo-Ni alloyed electrode exhibiting high ductility and crack resistant for applications on high-strength fine-grained steels. Suitable for service temperatures between -60 °C and +350 °C. Metal recovery approx. 115%. Easy to handle in all positions except vertical-down. Very low hydrogen content (acc. AWS condition HD < 4 ml/100 g weld metal). Preheat and interpass temperatures, as well as post weld heat treatment as required by the base metal.
BÖHLER FOX S 1 Ni AWS A5.5: E7018-GH4R	C: 0.08 Si: 0.50 Mn: 1.20 Ni: 0.90 P: 0.01 S: 0.01	R _{0.2} : 460 MPa R _m : 560 MPa A: 30% CVN impact: -46 °C: 110 J -50 °C: 100 J -60 °C: 90 J	2.50 x 350 3.25 x 450 4.00 x 450	ABS	Basic coated electrode producing tough and crack free welded joints. All position electrodes for offshore and Nickel content around 1%. Excellent mechanical properties (CVN impact down to -60 °C). Extremely low hydrogen content and also available in vacuum sealed Dry-System®: HDM< 4ml/100 g. Very good mechanical properties suitable for demanding applications, such as offshore.
BÖHLER FOX NiCuCr AWS A5.5: E8018-W2H4R	C: 0.05 Si: 0.40 Mn: 0.70 Cr: 0.60 Cu: 0.45 Ni: 0.60	R _{0.2} : 520 MPa (≥ 460) R _m : 570 MPa (≥ 530 – 680) A: 27% (≥ 20) CVN impact: +20 °C: 200 J -40 °C: 130 J (≥ 70) PWHT: 580°C/2 hrs R _{0.2} : 500 MPa R _m : 550 MPa A: 27% +20 °C: 190 J	2.50 x 350 3.20 x 350 4.00 x 450	RMR, CE	NiCuCr alloyed basic electrode for welding weathering resistant constructional steels. Excellent mechanical properties and high crack resistance even when subjected to restraint. Metal recovery approx. 115%. Easy welding in all positions except vertical-down. Very low hydrogen contents (acc. AWS condition HD < 4 ml/100 g weld metal).
Thermanit NiMo 100 AWS A5.5: E10018-D2	C: 0.1 Si: 0.3 Mn: 1.9 Mo: 0.4 Ni: 0.9	R _{0.2} : 600 MPa R _m : 690 MPa A: 18% CVN impact: +20 °C: 100 J -20 °C: 50 J -40 °C: 47 J	3.20 x 350 4.00 x 450 5.00 x 450	-	Basic covered MnNiMo alloyed electrode. Very low H ₂ -content ≤ 5 ml/100 g; extremely high resistance to cracking and high toughness at temperatures as low as -40 °C (-40 °F). For creep resistant steels and cast steel grades, valves and oil tools according to sour gas specification; postweld heat treatment: stress relieving according to parent metal.
BÖHLER FOX S 2.5Ni AWS A5.5: E8018-C1H4R	C: 0.05 Si: 0.30 Mn: 0.80 Ni: 2.40	R _{0.2} : 500 MPa R _m : 580 MPa A: 32% CVN impact: -60 °C: 110 J -80 °C: 80 J PWHT: 620°C/1 hrs R _{0.2} : 490 MPa R _m : 570 MPa A: 32% CVN impact: -60 °C: 120 J -80 °C: 100 J	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	-	Ni-alloy, basic coated stick electrode for unalloyed and Ni-alloy fine-grained structural steels. Tough, crack resistant weld metal. The weld metal is cryogenic down to -80 °C. Ideal weldability in all position except for vertical down. Very low hydrogen content (under AWS condition HD < 4 ml/100 g).

Flux and metal-cored wires, low- and medium alloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER DMO Ti-FD AWS A5.36: E81T1-M21PY-A1H8	C: 0.04 Si: 0.25 Mn: 0.75 Mo: 0.50	Shielding gas: M21 R _{m0.2} : 540 MPa (≥ 470) R _m : 600 MPa (550 – 690) A: 23% (≥ 22) CVN impact: +20 °C: 120 J (≥ 47) Annealed: 620 °C/1 hr R _{m0.2} : 510 MPa (≥ 470) R _m : 570 MPa (550 – 690) A: 23% (≥ 22) CVN impact: +20 °C: 140 J (≥ 47)	1.20	TÜV, CE	Rutile flux-cored wire which provides easy all-position weldability, primarily designed for the welding of 0.5% Mo alloyed base metals, that are used for the fabrication of vessels, high-pressure storage tanks, pipe systems as well as for structural steel applications. Due to the fast freezing slag system this flux-cored wire provides excellent positional welding characteristics and allows fast travel speeds to be used. It can be operated in spray arc mode in all positions and offers a controllable spatter free arc. Easy slag detachability with smooth, good profile, clean weld beads are further features of this wire.
BÖHLER DCMS Ti-FD AWS A5.36 E81T1-M21PY-B2H8	C: 0.06 Si: 0.22 Mn: 0.75 Cr: 1.20 Mo: 0.47	Shielding gas: M21 PWHT: annealed 690 °C/1h R _{m0.2} : ≥ 460 MPa R _m : 550 – 740 MPa A: ≥ 20% CVN impact: +20 °C: ≥ 47	1.20	TÜV, CE	The welding consumable Bohler DCMS Ti-FD is a low alloyed, flux-cored wire with rutile filling, primarily designed for welding of 1% Cr and 0.5% Mo alloyed creep-resistant base metals, that are used for the fabrication of high-pressure vessels and pipe systems. Due to the fast freezing slag system this flux-cored wire provides excellent positional welding characteristics and allows fast travel speeds to be used. This flux cored wire is for welding with normal power sources on DCRP under Mixture gas (82% Ar + 18% CO ₂).
BÖHLER CM 2 Ti-FD AWS A5.36 E91T1-M21PY-B3H8	C: 0.08 Si: 0.25 Mn: 0.80 Cr: 2.25 Mo: 1.10	Shielding gas: M21 PWHT: annealed 720 °C/2h R _{m0.2} : 600 MPa (≥ 540) R _m : 700 MPa (620 – 760) A: 19% (≥ 18) CVN impact: +20 °C: 70 J (≥ 47)	1.20	TÜV, CE	The welding consumable BÖHLER CM 2 Ti-FD is a low alloyed, flux-cored wire with rutile filling, primarily designed for the welding of 2.25% Cr and 1% Mo alloyed creep-resistant base metals (e.g. 10CrMo9-10), that are used for the fabrication of high-pressure vessels and pipe systems. Due to the fast freezing slag system this flux-cored wire provides excellent positional welding characteristics and allows fast travel speeds to be used.
BÖHLER C 9 MV Ti-FD AWS A5.36 E91T1-M21PY-B91	C: 0.10 Si: 0.20 Mn: 0.70 Cr: 9.00 Ni: 0.20 Mo: 1.00 V: 0.20 Nb: 0.04 N: 0.04	Shielding gas: M21 PWHT: annealed 760 °C/2h R _{m0.2} : 580 MPa (≥ 565) R _m : 720 MPa (690 – 830) A: 18% (≥ 14) CVN impact: +20 °C: 60 J (≥ 32) PWHT: annealed 760 °C/4h R _{m0.2} : 590 MPa (≥ 565) R _m : 730 MPa (690 – 830) A: 18% (≥ 14) CVN impact: +20 °C: 40 J (≥ 32)	1.20	TÜV	BOHLER C 9 MV Ti-FD is a rutile- basic flux cored wire for the welding of creep resistant, tempered 9 – 12% chromium steels in turbine-, boiler- and pipework construction as well as in the foundry industry. The wire is especially designed for the ASTM steels T91/P91. The flux cored wire is designed for out of position welding technology. The chemistry of the product is according to LOW NICKEL content requirements, meaning (Ni + Mn) < 1wt. %

Seamless flux and metal-cored wires, low- and medium alloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER Ti 60 T-FD (CO₂) AWS A5.36: E81T1-C1A4-Ni1-H4	C: 0.07 Si: 0.35 Mn: 1.10 Ni: 0.85	Shielding gas 100% CO ₂ R _m : 550 MPa (≥ 470) R _m : 620 MPa (550 – 680) A: 24% (≥ 20) CVN impact: -20 °C: 110 J -40 °C: 80 J (≥ 47)	1.00 1.20 1.40 1.60	LR, ABS	Seamless rutile, Nickel alloyed, flux cored wire for single- or multilayer welding of Carbon, Carbon-Manganese steels and high strength steels with pure CO ₂ shielding gas. Main features: excellent weldability in all positions, excellent bead appearance, very low spatter losses and fast freezing and easy to remove slag. The exceptional mechanical properties of this wire even at low temperatures make it especially suitable for offshore applications.
BÖHLER Ti 60 K2 T-FD (CO₂) AWS A5.36: E81T1-C1A8-K2-H4	C: 0.07 Si: 0.30 Mn: 1.20 Ni: 1.50	Shielding gas: C1 R _m : 580 MPa (≥ 500) R _m : 650 MPa (560 – 690) A: 22% (≥ 18) CVN impact: -60 °C: 75 J (≥ 47)	1.20 1.40 1.60	-	High performance seamless rutile flux cored wire, for the welding of medium alloyed steel and for low temperature applications with pure CO ₂ shielding gas. Main features: excellent weldability in all positions, fast freezing and easily removable slag, no spatter at low parameters. The good mechanical properties of this wire even at low temperature (-60 °C) as well as the low content of diffusible hydrogen make it especially suitable for offshore applications.
BÖHLER alform® 700-MC AWS A5.36: E110T15-M21A8-K4-H4	C: 0.07 Si: 0.70 Mn: 1.60 Cr: 0.35 Ni: 2.00 Mo: 0.30	Shielding gas: M21 R _m : 770 MPa (≥ 690) R _m : 830 MPa (770 – 900) A: 19% (≥ 17) CVN impact: -40 °C: 130 J -60 °C: 85 J (≥ 47)	1.00 1.20 1.60	TÜV, DB, GL, CE	The BÖHLER alform® 700-MC metal cored wire manufactured with seamless laser technology, is developed for shielded arc welding of thermo mechanically produced fine grained structural steels. Due to the manufacturing technology, this metal cored wire ensures low diffusible hydrogen content of < 2 ml/100g weld metal. This metal cored wire is designed for welding under mixture gas (Ar + CO ₂) in PA and PB-position. Good results were also achieved after using alternative gases, 8 – 10% CO ₂ + Ar and different welding positions (PG). This filler material is used for high strength steel constructions, crane and vehicle manufacturing, for ship building, offshore applications and also for penstocks.
BÖHLER HL 75 T-MC AWS A5.36: E101T15-M21A4-G-H4	C: 0.10 Si: 0.50 Mn: 1.80 Ni: 0.90 Mo: 0.55	Shielding gas: M21 R _m : 780 MPa (≥ 620) R _m : 820 MPa (700 – 830) A: 20% (≥ 17) CVN impact: -40 °C: 70 J (≥ 47) PWHT: annealed 650 °C/4h R _m : 670 MPa (≥ 620) R _m : 750 MPa (700-830) A: 22% (≥ 17) CVN impact: -40 °C: 60 J (≥ 47)	1.20	ABS, DNV GL	Seamless, nickel-molybdenum alloyed, metal cored wire for single- or multilayer welding of high strength steels with pure Argon or Ar-CO ₂ shielding gas. This wire is especially suitable for pipe welding of special base material like ASTM A519 Gr. 4130; it meets the NACE requirements. Features include: high yield, good weldability, excellent bead appearance, low spatter losses and exceptional mechanical properties at low temperatures.
BÖHLER Ti 70 Pipe T-FD AWS A5.36: E91T1-M21A6-K2-H4	C: 0.05 Si: 0.30 Mn: 1.60 Ni: 1.00	Shielding gas: M21 R _m : 620 MPa (≥ 550) R _m : 680 MPa (640 – 760) A: 22% (≥ 18) CVN impact: -40 °C: 90 J -50 °C: 80 J (≥ 47)	1.00 1.20 1.40 1.60	TÜV, CE	Seamless rutile, Nickel-Manganese alloyed, flux cored wire for single- or multilayer welding of carbon, carbon-manganese steels and high strength steels with Ar-CO ₂ shielding gas. Main features: excellent weldability in all positions, excellent bead appearance, very low spatter losses, fast freezing and easy to remove slag. The exceptional mechanical properties of this wire even at low temperatures as well as the low content of diffusible hydrogen make it especially suitable for pipeline applications.
BÖHLER Ti 80 T-FD AWS A5.36: E111T1-M21A8-GH4	C: 0.07 Si: 0.40 Mn: 1.70 Ni: 2.00 Mo: 0.15	Shielding gas: M21 R _m : 770 MPa (≥ 690) R _m : 800 MPa (770 – 900) A: 19% (≥ 17) CVN impact: -40 °C: 75 J -60 °C: 60 J (≥ 47)	1.00 1.20 1.40 1.60	DNV GL, ABS, LR, BV, CE	Seamless rutile, Nickel-Molybdenum alloyed, flux cored wire for single- or multilayer welding of high strength steels to be used with Argon-CO ₂ shielding gas. This core wire with its easy to remove and fast freezing slag shows excellent weldability in all positions, excellent bead appearance and very low spatter losses. The low diffusible hydrogen content of the pure weld metal (2 – 3 ml/100g) and the outstanding mechanical properties at low temperatures (-60 °C) make this wire perfect suitable for offshore applications and crane fabrication.
BÖHLER alform® 900-MC AWS A5.28: E120C-GH4	C: 0.06 Si: 0.70 Mn: 1.90 Cr: 0.60 Ni: 2.10 Mo: 0.50	Shielding gas: M21 R _m : 950 MPa (≥ 890) R _m : 1010 MPa (940 – 1180) A: 16% (≥ 15) CVN impact: +20 °C: 80 J -40 °C: ≥ 47	1.20	TÜV, CE, DB	The alform® 900-MC metal cored wire is developed for shielded arc welding of thermo mechanically produced fine grained structural steels. Due to the technology metal cored wire ensures low diffusible hydrogen content of < 3 ml/100g. This metal cored wire is designed for welding under mixture gas (Ar + CO ₂) in PA and PB-position. Good results were also achieved after using alternative gases CO ₂ 8 – 10% CO ₂ + Ar and different welding positions (PG). This filler material is used for high strength steel constructions, crane and vehicle manufacturing, for ship building, offshore applications and also for penstocks.

Solid GMAW wire, low- and medium-alloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UNION NiMoCr AWS A5.28: ER100S-G	C: 0.08 Si: 0.60 Mn: 1.70 Cr: 0.20 Mo: 0.50 Ni: 1.50	Shielding gas: C1 R _m : 680 MPa R _m : 740 MPa A: 18% CVN impact: +20 °C: 80 J -40 °C: 47 J Shielding gas: M21 R _m : 720 MPa R _m : 780 MPa A: 16% CVN impact: +20 °C: 100 J -60 °C: 47 J	0.80 1.00 1.20	TÜV, DB, ABS, BV, DNV GL, LR, CE, VG 95132-1	Low-alloyed solid wire electrode for shielded arc welding of quenched and tempered and thermomechanically treated fine grained structural steels; for joint welding of wear resistant steels. For use with CO ₂ and gas mixture. Outstanding toughness of the weld metal at low temperatures. For use in crane and vehicle manufacturing.
BÖHLER alform® 700-IG AWS A5.28: ER110S-G	C: 0.09 Si: 0.70 Mn: 1.70 Cr: 0.30 Ni: 1.85 Mo: 0.60	Shielding gas: M21 R _m : ≥ 790 MPa R _m : 880 – 1080 MPa A: ≥ 16% CVN impact: +20 °C: ≥ 90 J -50 °C: ≥ 47 J	1.00 1.20	NAKS	Medium alloy solid wire electrode for shielded arc welding of quenched and tempered fine grained structural steels. Outstanding tough weld metal at low temperature when deposited with gas mixture. Good deformability; outstanding mechanical properties even at higher electric heat input per unit length of weld. Good resistance to cold cracking due to high purity of the wire surface. For use in crane and vehicle manufacturing.
BÖHLER alform® 900-IG AWS A5.28: ER120S-G	C: 0.10 Si: 0.80 Mn: 1.80 Cr: 0.35 Ni: 2.30 Mo: 0.60	Shielding gas: M21 R _m : ≥ 890 MPa R _m : 940 – 1180 MPa A: ≥ 15% CVN impact: -60 °C: ≥ 47 J	1.00 1.20	-	Medium alloy solid wire electrode for shielded arc welding of quenched and tempered fine grained structural steels. Outstanding tough weld metal at low temperature when deposited with gas mixture. Good resistance to cold cracking due to high purity of the wire surface. For use in crane and vehicle manufacturing.

GTAW rods, low- and medium alloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER DMO-IG AWS A5.28: ER70S-A1/ ER80S-G	C: 0.10 Si: 0.60 Mn: 1.10 Mo: 0.50	Shielding gas: M21 R _{m0.2} : 530 MPa (≥ 460) R _m : 650 MPa (550 – 740) A: 26% (≥ 22) CVN impact: +20 °C: 200 J -30 °C: 80 J (≥ 47) Annealed: 620°C/1hr R _m : 480 MPa R _m : 570 MPa A: 27% CVN impact: +20 °C: 230 J	1.60 2.00 2.40 3.00 3.20	TÜV, KTA, DB, BV, DNV GL, CRS, CE, NAKS	Copper coated GTAW rod for welding in boiler, pressure vessel, pipeline, and crane constructions as well as in structural steel engineering. Very tough deposit of high crack resistant, non-ageing. Recommended for the temperature range from -30 °C to +500 °C. Good copper bonding with low total copper content. Very good welding and flow characteristics.
UNION ER80S-B2 AWS A5.28: ER80S-B2	C: 0.10 Si: 0.55 Mn: 0.60 Cr: 1.30 Mo: 0.50	Shielding gas 100% Argon PWHT: annealed 620 °C/1h R _{m0.2} : 470 MPa R _m : 550 MPa A: 19% CVN impact: +20 °C: 90 J	1.60 2.00 2.40 3.00 3.20	-	GTAW rod for 1% Cr 0.5% Mo alloyed boiler, plate and tube steels as well as in oil refineries. Preferably used for base metal 10CrMo9-10 (ASTM A335 P22). Approved in long-term condition up to +600 °C service temperature. Very good operating characteristics.
UNION ER90S-B3 AWS A5.28: ER90S-B3	C: 0.09 Si: 0.55 Mn: 0.60 Cr: 2.55 Mo: 1.05	Shielding gas 100% Argon PWHT: annealed 690°C/1h R _{m0.2} : 540 MPa R _m : 620 MPa A: 20% CVN impact: +20 °C: 80 J (≥ 47)	1.60 2.00 2.40 3.00 3.20	-	GTAW rod for 2.25% Cr 1% Mo alloyed boiler, plate and tube steels as well as in oil refineries. Preferably used for base metal 10CrMo9-10 (ASTM A335 P22). Approved in long-term condition up to +600 °C service temperature. Also for similarly alloyed quenched and tempered steels as well as case hardening steels. The weld metal meets all prerequisites for reliable long term creep properties without embrittlement due to very low content of trace elements.
BÖHLER CM 5-IG AWS A5.28: ER80S-B6	C: 0.08 Si: 0.40 Mn: 0.50 Cr: 5.60 Mo: 0.60	R _{m0.2} : 500 MPa (≥ 470) R _m : 620 MPa (≥ 590) A: 20% (≥ 17) CVN impact: +20 °C: 200 J (≥ 47)	1.60 2.00 2.40 3.00	TÜV, SEPROZ, CE	GTAW rod for 5% Cr 0.5% Mo steels and steels for hot hydrogen service, particularly for application in oil refineries and the base metals X12CrMo5/P5. Approved in long-term condition up to +650 °C service temperature.
BÖHLER C 9 MV-IG AWS A5.28: ER90S-B9	C: 0.11 Si: 0.30 Mn: 0.50 Cr: 9.00 Ni: 0.50 Mo: 0.90 V: 0.20 Nb: 0.06	R _{m0.2} : 640 MPa (≥ 415) R _m : 760 MPa (≥ 620) A: 19% (≥ 17) CVN impact: +20 °C: 150 J (≥ 47)	2.00 2.40	TÜV, CE, NAKS	GTAW rod for high temperature, creep resistant martensitic 9 – 12% chromium steels in turbine and boiler fabrication and in the chemical industry. Especially designed for the ASTM steels T91/P91. Approved in long-term condition up to +650 °C service temperature.

SAW wire/flux combinations, low and medium-alloyed

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
Union S 2 Mo + UV 420 TT/ UV C 419 TTR-W AWS A 5.23: F8A4-EA2-A2 EN ISO 14171: SA FB 1 65 DC	C: 0.07 Si: 0.25 Mn: 1.05 Mo: 0.45	R _{0.2} : 470 MPa R _m : 550 MPa A: 25% CVN impact: +20 °C: 140 J PWHT: 580 °C/5 hrs R _{0.2} : 470 MPa R _m : 550 MPa A: 26% CVN impact: +20 °C: 120 J	2.00 2.50 3.00 4.00	TÜV, CE	It is an agglomerated flux of fluoride basic type characterised by the neutral metallurgical behaviour. In combination with Union S 2 Mo wire electrodes, the weld metal exhibits good toughness properties. For joining and surfacing applications with general purpose structural steels, fine grained structural steels and creep resistant steels. It is suited for single wire and tandem welding.
Union S 2 CrMo + *UV C 419 TT-W/ **UV 420 TTR-W or UV C 420 TTR-W AWS A 5.23: *F8P2-EB2R-B2/ **F8P4-EB2R-B2R Flux: EN ISO 14174: SA FB 1 65 DC	C: 0.08 Si: 0.20 Mn: 1.00 Cr: 1.10 Mo: 0.45	Heat treatment: 690 °C/2 hrs R _{0.2} : 470 MPa R _m : 550 MPa A: ≥ 20% CVN impact: +20 °C: 130 J -20 °C: 100 J -30 °C: 80 J	2.00 2.50 3.00 4.00	TÜV, CE	It is an agglomerated fluoride-basic flux with high basicity and neutral metallurgical behavior. It is characterized by a high degree of purity. The low P-pickup of 0.004% max. makes it particularly suitable for use in reactor construction as well as for welding of hydrocrackers. When the combination Union S 2 CrMo - UV C 419 TT-W/UV 420 TTR-W is used for SAW of high-temperature resistant steels of the type 1% Cr - 0.5% Mo, it is possible to meet the most stringent toughness requirements at low/ subzero temperatures, even after step-cooling treatment. UV C 419 TT-W is suitable for single wire welding with direct current (DC) only while UV 420 TTR-W provides good weldability for single wire with alternating current (AC). Thereby it is possible to achieve higher toughness level than with the flux UV C 419 TT-W (DC-welding). UV 420 TTR-W is also applicable when using the tandem process with DC and AC or AC and AC.
Union S 1 CrMo 2 + **UV 420 TTR-W or UV C 420 TTR-W/UV C 419 TT-W AWS A 5.23: F9P2-EB3R-B3R Flux: EN ISO 14174: SA FB 1 65 AC **Depending on numbers of PWHT cycle	C: 0.07 Si: 0.20 Mn: 0.75 Cr: 2.30 Mo: 1.00 X: < 12.00	Heat treatment: 650 °C/10 hrs R _{0.2} : > 550 MPa R _m : > 680 MPa A: > 16% CVN impact: +20 °C: > 130 J -40 °C: > 27 J	2.00 2.50 3.00 4.00	TÜV	It is a wire-flux combination for submerged-arc welding of creep resistant steel grades with 2¼% Cr - 1% Mo. To prevent long term temper-embrittlement the weld metal is characterized by a high degree of purity, and meets the most stringent toughness requirements at low/subzero temperatures, also after step-cool heat treatment. The very good welding behavior on AC and DC+ make it possible to weld with single wire (DC+ or AC) and tandem (DC+/AC or AC/AC) in narrow gap joint configurations without limitation in thickness. Highest toughness levels are achieved using AC current.
Union S 2 NiMo 1 + UV 418 TT/UV C 418 TT AWS A5.23: F8A10-ENi1-Ni1 / F8P10-ENi1-Ni1 Flux: EN ISO 14174: SA FB 1 55 AC H5	C: 0.06 Si: 0.20 Mn: 1.10 Ni: 0.90 Mo: 0.25 P: ≤ 0.010 S: ≤ 0.010	R _{0.2} : 500 MPa R _m : 570 MPa A: 25% CVN impact: +20 °C: 180 J -40 °C: 120 J -60 °C: 70 J Heat treatment: 621 °C/1 hr R _{0.2} : 470 MPa R _m : 550 MPa A: 25% CVN impact: +20 °C: 180 J -40 °C: 140 J -60 °C: 80 J	2.50 3.20 4.00	-	UV 418 TT is an agglomerated fluoride-basic flux with high basicity and neutral metallurgical behavior. It is suitable for single (AC or DC) and tandem (DC and AC or AC and AC) welding. Very good slag detachability also for narrow gap welding. Flux can especially be used for multi-pass butt welding of medium and high tensile steels. Very good impact toughness of weld metal at low temperatures. Weld metal hydrogen content acc. to EN ISO 3690: HD max. 5 ml/100 g
Union S 3 NiMo 1 + *UV 420 TTR-C **UV C 418 TT AWS A 5.23: *F10A6-EF3-F3/F9P6-EF3-F3 **F9A8-EF3-F3 Flux: EN ISO 14171: SA FB 1 65 DC SA FB 1 55 AC	C: 0.08 Si: 0.25 Mn: 1.70 Ni: 0.90 Mo: 0.55	R _{0.2} : > 560 MPa R _m : > 680 MPa A: > 22% CVN impact: +20 °C: > 140 J -60 °C: > 47 J Heat treatment: 600 °C/2hrs R _{0.2} : > 560 MPa R _m : > 680 MPa A: > 22% CVN impact: +20 °C: > 140 J -60 °C: > 47 J	2.00 2.50 3.00 4.00	TÜV	It is a wire flux combination for submerged arc welding of unalloyed and low alloyed steel grades. UV 420 TTR-C is an agglomerated fluoride-basic flux with high basicity with a neutral metallurgical behavior and is characterised by a high degree of purity. The wire/flux combination is extensively used for the manufacturing of nuclear pressure vessels and also used in oil and gas industry for the welding of high strength low alloy steel where good strength and toughness properties are required with controlled hardness levels. Excellent weldability, good slag detachability and side wall fusion and a nice bead appearance. It is mostly applied in single wire technique on DC+ polarity.
Union S 3 NiMoCr + *UV 422 TT-LH **UV C 418 TT AWS A 5.23: *F11A10-EF5-F5-H4 **F11A8-EG-F6 Flux: EN ISO 14174: SA FB 1 65 DC H4 SA FB 1 55 AC H5	C: 0.07 Si: 0.35 Mn: 1.65 Cr: 0.35 Ni: 2.00 Mo: 0.57 P: ≤ 0.015 S: ≤ 0.012	R _{0.2} : 780 MPa R _m : 835 MPa A: 19% CVN impact: +20 °C: 125 J -40 °C: 105 J -60 °C: 100 J -80 °C: 80 J	2.50 3.00 4.00	-	It is a wire-flux combination for submerged arc welding of high strength steel grades. This combination is recommended for overmatching strength requirements in S690 applications, combined with the highest requirements to charpy toughness. Very low amount of diffusible hydrogen (ISO 3690). Applications in the off shore construction (jack up rigs), heavy cranes, and pressure pipes in pumped-storage hydropower plants and other high strength applications.

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER Subarc T85 + UV 421 TT/UV C 418 TT AWS A5.23: F11A10-EC-F5/ F11P6-EC-F5 EN ISO 26304-A: S 69 6 FB TZ H5	C: 0.06 Si: 0.30 Mn: 1.70 Cr: 0.50 Ni: 2.50 Mo: 0.50	R _m : 790 MPa (≥ 690) R _{p0.2} : 850 MPa (830 – 900) A: 20% (≥ 17) CVN impact: +20 °C: 140 J -60 °C: 85 J (≥ 69) Heat treatment: stress relieved 580 °C/2h R _{p0.2} : 750 MPa (≥ 690) R _m : 830 MPa (790 – 900) A: 20% (≥ 17) CVN impact: +20 °C: 140 J -60 °C: 85 J (≥ 27)	2.40 3.20 4.00	ABS, DNV GL, LRS, CE	Basic flux cored wire-flux combination for joint welding of high-strength, quenched and tempered fine grained structural steels up to MSYS = 690 MPa. The flux UV 421 TT has a high basicity index and has been designed to be applied in unlimited maximum thickness for a low level of diffusible hydrogen (to decrease the risk of cold cracking). The flux features a neutral metallurgical behavior. The weld metal demonstrates good toughness properties at low temperatures (-60 °C), a fine bead appearance and good wetting properties, together with good slag detachability and low hydrogen content in the weld metal (≤ 5 ml/100g acc. ISO 3690) characterize this wire/flux combination. The seamless coppered wire is not sensitive to moisture pick up, has a good resistance to deformation (wire feed rollers) and is very easy to straighten to ensure the best current transfer with low contact tip consumption.
Thermanit MTS 3 + Marathon 543 AWS A5.23: EB91 AWS A5.23: F9PZ-EB91-B91 Flux: EN 14174: SA FB 1 55 DC	C: 0.09 Si: 0.22 Mn: 0.70 Cr: 8.90 Ni: 0.40 Mo: 0.95 V: 0.18 Nb: 0.05 N: 0.04	PWHT: 760 °C/4h R _{p0.2} : 540 MPa R _m : 700 MPa A: 18% CVN impact: +20 °C: ≥ 47 J	2.50 3.00 3.20	TÜV, CE	Thermanit MTS 3 is a matching filler metal for welding high temperature and creep resistance 9% chromium steel like T(P)91. Marathon 543 is an agglomerated welding flux of the fluoride basic type with high basicity.

Note: Flux and wire combination can be change according to technical requirement

SAW flux / low and medium-alloyed

Product Name Classification	Flux Type	Main constituents: %	Grain size EN ISO 14174	Characteristics and applications
UV C 419 TT-W EN ISO 14174: SA FB 1 55 AC H5	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 35 Al ₂ O ₃ + MnO: 21 CaF ₂ : 26	3 – 20	UV C 419 TT-W is an agglomerated fluoride-basic flux for submerged arc welding of unalloyed and low alloyed steel grades. The basic flux has a neutral metallurgical behaviour regarding Mn and Si, and is mainly recommended for multi-run procedures for relative great wall thickness. Nice flat bead appearance with very good slag detachability, especially in narrow gap applications. Metallurgically, the flux has been optimised to provide excellent mechanical properties as well after extended PWHT-duration as well as in as welded condition. The flux generates a low amount of diffusible hydrogen content HD < 5 ml/100 gr according to ISO 3690 in the weld metal.
UV 420 TT/UV 420 TT-LH EN ISO 14174: SA FB 1 65 DC / SA FB 1 65 DC H5	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 35 Al ₂ O ₃ + MnO: 21 CaF ₂ : 26	3 – 25	UV 420 TT/UV 420 TT-LH is an agglomerated flux of fluoride basic type characterised by the neutral metallurgical behaviour. In combination with suitable wire electrodes, the weld metal exhibits good toughness properties at low temperatures. For joining and surfacing applications with general purpose structural steels, fine grained structural steels and creep resistant steels. It is suited for single wire and tandem welding.
UV 420 TTR/UV 420 TTR-W EN ISO 14174: SA FB 1 65 DC / SA FB 1 65 AC	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 35 Al ₂ O ₃ + MnO: 21 CaF ₂ : 26	3 – 20	UV 420 TTR is an agglomerated fluoride-basic flux, mainly for joining and surfacing applications with creep resistant steels. It displays neutral metallurgical behaviour and is characterised by a high degree of purity. It is particularly suitable for welding hydrocrackers because of the low P pick-up of 0.004% max. UV 420 TTR-W permits sound welding on AC, by this achieving a higher level of toughness when welding with CrMo-alloyed SAW wires.
UV 420 TTR-C EN ISO 14174: SA FB 1 65 DC	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 35 Al ₂ O ₃ + MnO: 21 CaF ₂ : 26	3 – 20	UV 420 TTR-C is an agglomerated fluoride-basic welding flux with high basicity. UV 420 TTR-C is applied in high strength and creep resistant applications that need PWHT at relative high temperatures (e.g. 632 – 660 °C) for long duration (e.g. 6 – 26 hrs). Also suited for weldments that will be exposed to a normalising heat treatment (N+AVQ +A). The flux has Carbon support as special feature. Depending on the Carbon content in the wire, it results in either a reduced loss or a small increase of Carbon. Compared to UV 420 TTR the Carbon content in the weld metal is about 0.02 – 0.04% higher.
UV C 420 TTR-W EN ISO 14174: SA FB 1 65 AC	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 14 CaO + MgO: 34 Al ₂ O ₃ + MnO: 21 CaF ₂ : 27	3 – 20	UV C 420 TTR-W is an agglomerated fluoride-basic flux for Submerged Arc Welding of un- and low alloyed steel grades. It is characterized by its neutral metallurgical behaviour and has been designed mainly for multi-pass welding. During welding the flux shows very nice operative characteristics on both AC and DC+, and is suitable for Tandem process. Also very good slag detachability in narrow gap weld preparations.
UV 421 TT EN ISO 14174: SA FB 1 55 AC H5	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 15 CaO + MgO: 38 Al ₂ O ₃ + MnO: 20 CaF ₂ : 25	3 – 20	UV 421 TT is a neutral flux for joining and surfacing of high strength fine grained structural steels. The silicon and manganese pickups and burn-off rates are neutral because of its metallurgical behaviour. The cryogenic toughness of the weld metal is very good. It can be welded with nearly every wire electrode. The flux can be used for tandem and multi wire welding with DC and AC. Very good slag detachability.
UV 422 TT-LH EN ISO 14174: SA FB 1 65 DC H4	Agglomerated fluoride basic	SiO ₂ + TiO ₂ : 18 CaO + MgO: 42 Al ₂ O ₃ + MnO: 19 CaF ₂ : 19	3 – 20	UV 422 TT-LH is an agglomerated fluoride-basic flux for submerged arc welding of non-alloyed and low alloyed steel grades. The flux has good welding behaviour and can be used in single and multiwire applications with solid and flux-cored SA-wires. The flux has been optimised for the highest strength levels (700 till 1100 MPa) with high toughness requirements. The flux generates a very low amount of diffusible hydrogen content HD < 4 ml/100 g acc to ISO 3690 in the weld metal (DC+). Also during welding activities the flux shows a very low tendency concerning moisture pick-up and consequently a rapid increase of diffusible hydrogen in the weld metal is avoided. Applications in high tensile strength constructions (S500-S1100) in off-shore industry and heavy lifting equipment and hydro-power.
Marathon 543 EN ISO 14174: SA FB 55 DC H5	Agglomerated fluoride basic	SiO ₂ + Al ₂ O ₃ : 35 CaF ₂ + CaO + MgO: 60	3 – 20	Marathon 543 is an agglomerated fluoride-basic flux with a high basicity. For joining and surfacing applications of creep resistant CrMo steels such as e.g. 12CrMo 19-5, P 91/T 91, X10CrMoVNb9-1, X20CrMoWV12-1. In combination with SAW wire Thermanit MTS 616 the flux is suited for welding steels of type P 92 and X11Cr-MoWVNb9-1-1, E 911.

Covered electrodes, stainless

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER FOX S 308L-16 AWS A5.4: E308L-16	C: 0.02 Si: 0.80 Mn: 0.70 Cr: 19.50 Ni: 9.80	R _{m0.2} : 430 MPa R _m : 560 MPa A: 45% CVN impact: +20 °C: 70 J -120 °C: 32 J	2.50 x 300 3.25 x 350 4.00 x 350 5.00 x 350	ABS	Rutile electrode noted for its superior welding characteristics and metallurgy. Bohler Fox S 308L-16 is a Cr-Ni electrode for all position welding of ASTM 304 type stainless steels. Very good corrosion resistance under fairly severe conditions, eg: in oxidation acids and cold or dilute reducing acids.
BÖHLER FOX S 316L-16 AWS A5.4: E316L-16	C: 0.03 Si: 0.80 Mn: 0.60 Cr: 18.80 Ni: 12.50 Mo: 2.20	R _{m0.2} : 430 MPa R _m : 575 MPa A: 35% CVN impact: +20 °C: 70 J -46 °C: 45 J	2.50 x 300 3.25 x 350 4.00 x 350 5.00 x 350	ABS	Low carbon, core wire alloyed, austenitic stick electrode with rutile coating. For application in all branches of industry where same-type steels, including higher carbon-steels and ferritic 13% chrome steels are welded. Special fine welding properties, excellent welding with AC power and a high resistance to hot cracking in the weld metal are features of this product. Resists intergranular corrosion up to +400 °C.
BÖHLER FOX S 309L-16 AWS A5.4: E309L-16	C: 0.02 Si: 0.80 Mn: 0.70 Cr: 23.00 Ni: 13.00	R _{m0.2} : 450 MPa R _m : 570 MPa A: 40% CVN impact: +20 °C: 55 J -46 °C: 40 J	2.50 x 300 3.25 x 350 4.00 x 350 5.00 x 350	ABS	Bohler Fox S 309L-16 is a high alloyed low carbon electrode designed for welding dissimilar joints between stainless and mid or low-alloy steels. The electrode is well suited as a buffer layer when overlay welding on mild steels, providing an 18 Cr 8 Ni deposit from the very first layer. Its can also be used for welding some high temperatures steels, such as 1.4833/ASTM 309S.
AVESTA 308L/MVR AWS A5.4: E308L-17	C: 0.02 Si: 0.80 Mn: 0.60 Cr: 19.50 Ni: 10.00	R _{m0.2} : 425 MPa R _m : 580 MPa A: 44% CVN impact: +20 °C: 60 J -196 °C: 36 J	2.50 x 350 3.25 x 350 4.00 x 450 5.0 x 450	ABS, DNV-GL, CWB, CE	Is a Cr-Ni electrode for all position of ASTM 304 and 304L stainless steels. Weld metal features a good resistance against intergranular corrosion (IGC ASTM A262 Practice E).
AVESTA 309L AWS A5.4: E309L-17	C: 0.023 Si: 0.74 Mn: 0.74 Cr: 23.60 Ni: 13.30	R _{m0.2} : 445 MPa R _m : 565 MPa A: 41% CVN impact: +20 °C: 59 J -120 °C: 46 J	2.50 x 300 3.25 x 350 4.00 x 450 5.00 x 450	ABS, DNV-GL, CWB, CE	Highly alloyed low carbon electrode designed for dissimilar welding between stainless and mild or low alloy steels. The electrode is also well suited as a buffer layer when performing overlay welding on mild steels, providing an 18 Cr 8 Ni deposit from the very first layer.
AVESTA 310 AC/DC AWS A5.4: E310-17	C: 0.12 Si: 0.50 Mn: 2.20 Cr: 27.00 Ni: 21.00	R _{m0.2} : 460 MPa R _m : 630 MPa A: 37% CVN impact: +20 °C: 90 J -196 °C: 42 J	2.50 x 300 3.25 x 350 4.00 x 450	-	Avesta 310 is a 25Cr-20Ni electrode for welding to ASTM 310S and related types of high temperature stainless steels. 310 has a fully austenitic structure, which makes it somewhat more sensitive to hot cracking than 309L. Welding should be performed taking great care about low heat input and interpass temperature.
AVESTA P5 AWS A5.4: E309MoL-17	C: 0.020 Si: 0.80 Mn: 0.80 Cr: 22.50 Ni: 13.50 Mo: 2.50	R _{m0.2} : 490 MPa R _m : 640 MPa A: 32% CVN impact: +20 °C: 30 J	2.00 x 300 2.50 x 300 3.25 x 350 4.00 x 450 5.00 x 450	ABS, DNV-GL, CWB, CE	Avesta P5 is highly alloyed low carbon containing stainless steel electrode corresponding to spec. AWS 5.4, class E309MoL-17. The electrode is designed for dissimilar welding between Mo-Alloyed stainless with mild or low alloy steels. It can also be used for overlay welding, providing a 18 Cr 8 Ni 2 Mo deposit from the very first layer.
AVESTA 347-16 AWS A5.4: E347-16	C: 0.03 Si: 0.80 Mn: 0.50 Cr: 19.00 Ni: 10.00 Nb: 0.25	R _{m0.2} : 431 MPa R _m : 598 MPa A: 46% CVN impact: +20 °C: 55 J -40 °C: 45 J	2.50 x 300 3.25 x 350 4.00 x 350	-	The electrode is rutile type and intended for high temperature service or applications. For welding of Ti-stabilized steels such as ASTM 321 and 347 that are exposed to service temperature exceeding +400 °C. Also used for the second layer (first layer 309L type) when cladding mild steel.
AVESTA 2205 3D AWS A5.4: E2209-17	C: 0.025 Si: 0.87 Mn: 0.63 Cr: 22.94 Ni: 9.57 Mo: 2.89 N: 0.15	R _{m0.2} : 685 MPa R _m : 850 MPa A: 26% CVN impact: +20 °C: 38 J -40 °C: 31 J	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	ABS	Cr, Ni Mo alloyed duplex electrode for welding duplex steel such as 2205. For light to moderate thickness material, welding should be carried out as for ordinary austenitic stainless steel. However the somewhat lower penetration and fluidity of the weld should be considered.
AVESTA 2205 basic AWS A5.4: E2209-15	C: 0.03 Si: 0.60 Mn: 1.20 Cr: 23.10 Ni: 8.90 Mo: 3.00 N: 0.16 PREN > 35	R _{m0.2} : 620 MPa R _m : 820 MPa A: 26% CVN impact: +20 °C: 90 J -40 °C: 70 J	2.50 x 300 3.20 x 350 4.00 x 350	-	Primarily designed for welding 22Cr duplex stainless steels used in offshore, shipyards, chemical, tankers, chemical/petrochemical, pulp & paper, etc. Avesta 2205 basic provides somewhat better impact properties than the 2205 AC/DC type and better welding properties in flat/horizontal position. The weld metal has very good resistance to pitting and stress corrosion cracking in chloride containing environments.
Avesta 2507/P100-HF AWS A5.4: E2594-15	C: 0.03 Si: 0.45 Mn: 1.30 Cr: 25.60 Ni: 8.80 Mo: 4.10 N: 0.23 PREN: > 42	R _{m0.2} : 730 MPa R _m : 880 MPa A: 25% CVN impact: +20 °C: 64 J -50 °C: 42 J Hardness HB: 250	4.00 x 350 5.00 x 350	CE	Rutile-basic super duplex stick electrode especially designed for welding super duplex steel castings. Tailored to offer weld metal ferrite levels of 35 – 50% after post-weld heat treatment, Avesta 2507/P100-HF can successfully be used for repair welding of castings or be used as a substitute for standard electrodes, whose chemistry cannot give acceptable ferrite levels after heat treatment. Developed to satisfy severe requirements, such as those in Norsok M-601 and similar standards. Meets the corrosion test requirements per ASTM G48 Methods A and E (50 °C) in both as-welded condition and after post-weld heat treatment (annealing at 1100 – 1150 °C, followed by short air cooling and quenching).

Flux and metal-cored wires, stainless

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER EAS 2 AG-FD AWS A5.22: E308LT0-4(1)	C: 0.03 Si: 0.70 Mn: 1.50 Cr: 19.50 Ni: 10.50	Shielding gas: M21, C1 R _{m0.2} : 380 MPa R _m : 560 MPa A: 40% CVN impact: +20 °C: > 47 J -120 °C: > 32 J	1.20 1.60	-	Rutile strip alloyed flux cored welding wire of type T 19 9 L R/ E308LT0 for GMAW of stainless steels like 1.4306/304L. This product achieves high productivity and is easy to operate providing excellent operating characteristics, self releasing slag, almost no spatter formation and temper discoloration, smooth weld finish and safe penetration. Increased travel speeds as well as little demand for cleaning and pickling provide considerable savings in time and money. Suitable for service temperatures from -120 °C to +350 °C. BÖHLER EAS 2 AG-FD ø 1.2 mm can be used for wall thicknesses from 3 mm upwards. Wire ø 1.2 mm and ø 1.6 mm are recommended mainly for downhand and horizontal welding positions as well as in position PC/2G. FN 4 – 8 (calculated WRC92, 100% CO ₂).
BÖHLER EAS 4 M AG-FD AWS A5.22: E316LT0-4(1)	C: 0.03 Si: 0.70 Mn: 1.50 Cr: 18.80 Ni: 12.00 Mo: 2.70	Shielding gas: M21, C1 R _{m0.2} : 400 MPa R _m : 560 MPa A: 38% CVN impact: +20 °C: > 47 J -120 °C: > 32 J	1.20 1.60	-	Rutile flux cored welding wire of type T 19 12 3 L R/E316LT0 for GMAW of stainless steels like 1.4435/316L. This product achieves high productivity and is easy to operate providing excellent operating characteristics, self releasing slag, almost no spatter formation and temper discoloration, smooth weld finish and safe penetration. Increased travel speeds as well as little demand for cleaning and pickling provide considerable savings in time and money. Suitable for service temperatures of -120 °C to +400 °C. Resists intergranular corrosion up to +400 °C. BÖHLER EAS 4 M AG-FD ø 1.2 mm can be used for wall thicknesses from 3 mm and up. Wire ø 1.2 mm and ø 1.6 mm are recommended mainly for downhand and horizontal welding positions, horizontal/vertical position as well as in position PC/2G. FN 4 – 8 (calculated WRC92, 100% CO ₂).
BÖHLER CN 23/12 AG-FD AWS A5.22: E309LT0-4(1)	C: 0.03 Si: 0.75 Mn: 1.40 Cr: 22.80 Ni: 12.40	Shielding gas: M21, C1 R _{m0.2} : 400 MPa R _m : 540 MPa A: 35% CVN impact: +20 °C: > 47 J -60 °C: > 32 J	1.20 1.60	-	Rutile flux-cored welding wire for GMAW of dissimilar joints of Cr- and CrNi(Mo)-steels and non- or low-alloy steels, as well as weld cladding of un- or low alloyed base metals preferably in flat or horizontal position. This product achieves high productivity and is easy to operate achieving excellent welding characteristics, self releasing slag, almost no spatter formation and temper discoloration, smooth weld finish and safe penetration. Beside the major savings in time and cost BÖHLER offers a high production quality level together with lowest probabilities for welding errors. Increased travel speeds as well as little demand for cleaning and pickling provide considerable savings in time and money. Suitable for service temperatures of -60 °C to +300 °C. Wires with ø 1.2 mm can be used for wall thicknesses from 3 mm and up. Wire ø 1.2 mm and ø 1.6 mm are recommended mainly for downhand and horizontal welding positions. FN 11 – 15 (calculated WRC92, 100% CO ₂).
BÖHLER EAS 2 PW-FD AWS A5.22: E308LT1-4(1)	C: 0.03 Si: 0.70 Mn: 1.50 Cr: 19.80 Ni: 10.50	R _{m0.2} : 380 MPa R _m : 535 MPa A: 39% CVN impact: +20 °C: 70 J -196 °C: 38 J	0.90 1.20 1.60	TÜV, DB, DNV GL, CE	Rutile strip-alloyed flux-cored wire of T 19 9 L P/308LT1 type for welding of stainless steels such as EN 1.4306/AISI 304L. The fast freezing slag offers excellent weldability and slag control in all positions. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. Increased travel speeds as well as self-releasing slag with little demand for cleaning and pickling provide considerable savings in time and money. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Suitable for service temperatures from -196 °C to +350 °C.
BÖHLER EAS 4 PW-FD AWS A5.22: E316LT1-4(1)	C: 0.03 Si: 0.70 Mn: 1.50 Cr: 19.00 Ni: 12.00 Mo: 2.70	R _{m0.2} : 430 MPa R _m : 560 MPa A: 34% CVN impact: +20 °C: 65 J -120 °C: 40 J	0.90 1.20 1.6	TÜV, DB, LR, CE DNV GL	Rutile flux-cored wire of T 19 12 3 L P/E316LT1 type for welding of stainless steels such as EN 1.4435/AISI 316L. The fast freezing slag offers excellent weldability and slag control in all positions. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. Increased travel speeds as well as self-releasing slag with little demand for cleaning and pickling provide considerable savings in time and money. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Suitable for service temperatures from -120 °C to +400 °C. Resists intergranular corrosion up to +400 °C.

Flux and metal-cored wires, stainless

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER CN 23/12 PW-FD AWS A5.22: E309LT1-4(1)	C: 0.03 Si: 0.70 Mn: 1.40 Cr: 23.00 Ni: 12.50	R _{m0.2} : 420 MPa R _m : 540 MPa A: 36% CVN impact: +20 °C: 65 J -60 °C: 50 J	0.90 1.20 1.60	TÜV, DB, LR, RINA BV, CE, DNV GL	Rutile flux-cored wire of T 23 12 L P/E309LT1 type for welding of dissimilar joints of Cr and CrNi(Mo) steels and unalloyed or low-alloyed steels, as well as weld cladding of unalloyed or low-alloyed base metals. Ferrite measured with Fischer Feritescope 14 – 22 FN. The fast freezing slag offers excellent weldability and slag control in all positions. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. Increased travel speeds as well as self-releasing slag with little demand for cleaning and pickling provide considerable savings in time and money. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Suitable for service temperatures from -60 °C to +300 °C.
BÖHLER CN 23/12 Mo PW-FD AWS A5.22: E309LMoT1-4/1	C: 0.03 Si: 0.7 Mn: 1.4 Cr: 23.0 Ni: 12.5 Mo: 2.7 FN: 23-36	Shielding gas: Ar + 18% CO ₂ R _{m0.2} : 540 MPa (≥ 350) R _m : 705 MPa (≥ 550) A: 28% (≥ 25) CVN impact: +20 °C: 65 J -20 °C: 44 J (≥ 32)	0.90 1.20	TÜV, BV, LR, DNV GL, CWB, CE	Austenitic stainless steel CrNiMo rutile flux-cored wire of T 23 12 2 L P / E309LMoT1 type. The corrosion resistance is superior to E316L type fillers. Primarily designed for welding dissimilar joints between stainless steels and low-alloyed steels. It can also be used for overlay welding, providing an 18Cr-8Ni-2Mo deposit from the very first layer and for joining of various steels. The fast freezing slag offers excellent weldability and slag control in all positions. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. Increased travel speeds as well as self-releasing slag with little demand for cleaning and pickling provide considerable savings in time and money. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Provides high resistance to hot cracking even at high dilution. Alloying with molybdenum increases the corrosion resistance and weld metal strength. Suitable for service temperatures from -60 °C to 300 °C.
Avesta FCW 2205-PW AWS A5.22: E2209T1-4/1	C: 0.029 Si: 0.70 Mn: 1.00 Cr: 23.00 Ni: 9.10 Mo: 3.20 N: 0.13 FN: 45 – 65 PREN: > 35	Shielding gas: Ar + 18% CO ₂ R _{m0.2} : 600 MPa (≥ 450) R _m : 800 MPa (≥ 690) A: 27% (≥ 20) CVN impact: +20 °C: 58 J -46 °C: 45 J Hardness HB: 240	1.20	TÜV, BV, CWB, DNV GL, LR, RINA, ABS, CE	Primarily designed for welding 22Cr duplex stainless steels used in offshore, shipyards, chemical tankers, chemical/petrochemical, pulp & paper, etc. Avesta FCW 2205-PW has a stronger arc and a faster slag compared to the 2D type. It is designed for all round welding and can be used in all positions without changing the parameter settings. Very good resistance to pitting and stress corrosion cracking in chloride containing environments. Meets the corrosion test requirements per ASTM G48 Methods A, B and E (25 °C). Over-alloyed in nickel to promote austenite formation. Duplex alloys have good weldability, but the welding procedure should be adapted to the base material considering fluidity, joint design, heat input, etc.
Avesta FCW 2507/P100-PW AWS A5.22: E2594T1-4/1	C: 0.03 Si: 0.70 Mn: 0.90 Cr: 25.30 Ni: 9.80 Mo: 3.70 N: 0.230 PREN > 41	R _{m0.2} : 690 MPa R _m : 890 MPa A: 27% CVN impact: +20 °C: ≥ 60 J -40 °C: ≥ 38 J Hardness HB: 260	1.20	CE	Rutile flux-cored wire of 25 9 4 N L P/E2594T1 type designed for welding ferritic-austenitic super duplex steel and equivalent steel grades. Super duplex steels are particularly popular for desalination, pulp & paper, flue gas desulphurization and sea water systems. Meet the corrosion test requirements per ASTM G48 Methods A, B and E (40 °C). Over-alloyed in nickel to promote austenite formation. Designed for all-round welding and can be used in all positions without changing the parameter settings. The weldability is excellent in the vertical-up and overhead welding positions. The operating temperature range is -40 °C to +220 °C. Duplex alloys have good weldability, but the welding procedure should be adapted to the base material considering fluidity, joint design, heat input, etc.

Solid GMAW wires, stainless

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER GMA 308LSi AWS A5.9: ER308LSi	C: 0.02 Si: 0.85 Mn: 1.90 Cr: 20.00 Ni: 10.10 P: 0.015 S: 0.015	R _m : 430 MPa R _{0.2} : 580 MPa A: 41% CVN impact: +20 °C: 110 J	0.80 0.90 1.00 1.20	CE, DB	GMAW solid wire of type G 19 9 L Si/ER308LSi designed for first class welding, good wetting and feeding characteristics and excellent weld metal CVN values down to -196 °C. Resistance to intergranular corrosion up to +350 °C
BÖHLER GMA 309LSi AWS A5.9: ER309LSi	C: 0.02 Si: 0.85 Mn: 2.10 Cr: 23.50 Ni: 13.60 P: 0.015 S: 0.015	R _m : 450 MPa R _{0.2} : 685 MPa A: 36% CVN impact: +20 °C: 130 J	0.80 0.90 1.00 1.20	CE, DB	GMAW solid wire of type G 23 12 L Si/ER309LSi. This is a standard alloy for welding dissimilar joints with average ferrite content 16 FN. It is designed for very good welding and wetting characteristics as well as good safety after dilution when welding dissimilar joints. Suitable for service temperatures between -80 °C and +300 °C.
BÖHLER GMA 316LSi AWS A5.9: ER316LSi	C: 0.02 Si: 0.80 Mn: 1.70 Cr: 18.40 Ni: 12.40 Mo: 2.30 P: 0.015 S: 0.015	R _m : 440 MPa R _{0.2} : 580 MPa A: 38% CVN impact: +20 °C: 100 J -120 °C: 65 J	0.80 0.90 1.00 1.20	CE	GMAW solid wire of type G 19 12 3 L/ER316L designed for first class welding, good wetting and feeding characteristics as well as reliable corrosion resistance up to +400 °C. Low temperature service down to -196 °C.
BÖHLER GMA 347 AWS A5.9: ER347	C: 0.04 Si: 0.55 Mn: 1.30 Cr: 19.40 Ni: 9.70 Nb: 0.50 P: 0.015 S: 0.015	R _m : 460 MPa R _{0.2} : 630 MPa A: 40% CVN impact: +20 °C: 110 J -20 °C: ≥ 32 J	0.80 1.00 1.20 1.60	CE	GMAW solid wire of type G 19 9 Nb/ER347 designed for first class welding, good wetting and feeding characteristics as well as reliable corrosion resistance up to +400 °C. Low temperature service down to -196 °C.
BÖHLER GMA 430L Nb EN ISO 14343-A: G Z 18 L Nb	C: 0.012 Si: 0.38 Mn: 0.50 Cr: 18.50 Nb: 0.35 Cu: 0.04	Brinell Hardness: Untreated: 150 HB Annealed: 130 HB	0.90 1.00 1.20	CE	Special wire electrode for catalytic converters and silencers, exhaust mufflers, pipe junctions and intake manifolds made of same-type or similar-type materials. Resistance scaling up to +900 °C. Outstanding sliding and feeding characteristics. Very good welding and flow behavior.
BÖHLER GMA 410NiMo AWS A5.9: ER410NiMo	C: 0.02 Si: 0.45 Mn: 0.50 Cr: 12.40 Ni: 4.70 Nb: 0.50 P: 0.010 S: 0.010	R _m : 890 MPa R _{0.2} : 960 MPa A: 17% CVN impact: +20 °C: 80 J -20 °C: ≥ 32 J	1.00 1.20 1.60	CE	GMAW solid wire of type W 13 4 designed for numerous applications. For the fabrication and repair welding of hydro turbine components made of soft martensitic 13% Cr 4% Ni alloyed steels and cast steels. Very good welding characteristics, high resistance to cracking.

GTAW rods, stainless

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
BÖHLER S EAS 2-IG AWS A5.9: ER308L	C: 0.02 Si: 0.45 Mn: 2.00 Cr: 19.80 Ni: 10.00 Mo: 0.04	R _m : 385 MPa R _{0.2} : 575 MPa A: 40% CVN impact: +20 °C: 150 J -196 °C: 58 J	1.60 2.00 2.40 3.20	ABS	Good welding and wetting characteristics as well as corrosion resistance up to +350 °C.
BÖHLER S CN 23/12-IG AWS A5.9: ER309L	C: 0.02 Si: 0.40 Mn: 1.80 Cr: 23.00 Ni: 13.60	R _m : 450 MPa R _{0.2} : 590 MPa A: 38% CVN impact: +20 °C: 200 J -40 °C: 120 J	1.60 2.00 2.40 3.20	ABS	This is a standard alloy for welding dissimilar joints and designed for very good welding and wetting characteristics as well as good safety after dilution when welding dissimilar joints.
BOHLER S EAS 4 M-IG AWS A5.9: ER316L	C: 0.023 Si: 0.40 Mn: 1.67 Cr: 18.00 Ni: 11.00 Mo: 2.30	R _m : 460 MPa R _{0.2} : 605 MPa A: 32% CVN impact: +20 °C: 175 J -196 °C: 75 J	1.60 2.00 2.40 3.20	ABS	Is engineered to create a weld deposit of high purity, superior hot cracking and corrosion resistant.
BÖHLER SAS 2-IG AWS A5.9: ER347	C: 0.05 Si: 0.50 Mn: 1.80 Cr: 19.60 Ni: 9.50	R _m : 490 MPa R _{0.2} : 660 MPa A: 35% CVN impact: +20 °C: 140 J -196 °C: ≥ 32 J	1.60 2.00 2.40 3.00	TÜV, DNV GL, LTSS, NAKS, CE, SEPROZ	GTAW rod of type W 19 9 Nb/ER 347 engineered to a very precise analysis to create a weld deposit of high purity, superior hot cracking and corrosion resistance. CVN toughness down to -196 °C, resistant to intergranular corrosion up to +400 °C.
BOHLER S CN 22/9 N-IG AWS A5.9: ER2209	C: ≤ 0.015 Si: 0.48 Mn: 1.67 Cr: 22.86 Ni: 8.70 Mo: 3.00 N: 0.18 PREN ≥ 35	R _m : 610 MPa R _{0.2} : 780 MPa A: 36% CVN impact: +20 °C: 243 J -40 °C: 238 J	1.60 2.00 2.40	ABS	Is primarily designed for welding the duplex grade and similar grades but can also be used for welding SAF 2304 type of steels. Provides a ferritic-austenitic weldment that combines many of the good properties of both ferritic and austenitic stainless steel. Welding without filler metal (i.e. TIG dressing) is not allowed since the ferrite content will increase.
Avesta 2507/P100 AWS A5.9: ER2594	C: 0.02 Si: 0.35 Mn: 0.40 Cr: 25.00 Ni: 9.50 Mo: 4.00 N: 0.250 PREN ≥ 40	R _m : 660 MPa R _{0.2} : 860 MPa A: 28% CVN impact: +20 °C: 190 J -40 °C: 170 J	1.60 2.00 2.40 3.20	TÜV, CE	Avesta 2507/P100 is intended for welding super duplex alloys such as SAF 2507, ASTM S32760, S32550 and S31260. It can also be used for welding duplex type 2205 if extra high corrosion resistance is required, e.g. in root runs in tubes. Avesta 2507/P100 provides a ferritic-austenitic weldment that combines many of the good properties of both ferritic and austenitic steels. Welding without filler metal (i.e. TIG-dressing) is not allowed since the ferrite content will increase drastically and both mechanical and corrosion properties will be negatively affected. Structure: Austenite with 45 – 55% ferrite. Scaling temperature: Approx. 850 °C (air) Excellent resistance to pitting and stress corrosion cracking in chloride containing environments. Pitting resistance is in accordance with ASTM G48-A, better than 40 °C.

SAW wire/flux combinations, stainless

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
AVESTA S 308L S + Marathon 431/ AVESTA C 807 Wire: AWS A5.9: ER308L Flux: EN ISO 14174: SA FB 2 64 DC	C: 0.02 Si: 0.60 Mn: 1.20 Cr: 19.50 Ni: 9.50	R _{m0.2} : > 380 MPa R _m : > 550 MPa A: > 35% CVN impact: +20 °C: 90 J -196 °C: 35 J	2.00 2.40 3.20 4.00	-	It is a wire-flux combination for submerged arc welding of stainless steels grade like 1.4301/ASTM 304. The wire can also be used for welding titanium and niobium stabilised steels such as ASTM 321 and ASTM 347 in cases where the construction will be used at temperatures not exceeding 400 °C.
AVESTA S 316L S + Marathon 431/ AVESTA C 807 Wire: AWS A5.9: ER316L Flux: EN ISO 14174: SA FB 2 64 DC	C: 0.02 Si: 0.60 Mn: 1.20 Cr: 18.00 Ni: 11.60 Mo: 2.30	R _{m0.2} : > 380 MPa R _m : > 540 MPa A: > 35% CVN impact: +20 °C: 90 J -196 °C: 30 J	2.00 2.40 3.20 4.00	-	It is a wire-flux combination for submerged arc welding of austenitic stainless steel type 17 Cr 12 Ni 2.5 Mo or similar where high resistance to general and intercrystalline corrosion is required. The filler metal is also suitable for welding titanium and niobium stabilised steel such as ASTM 316Ti in cases where the construction will be used at temperatures not exceeding 400 °C.
AVESTA S 309L S + Marathon 431/ AVESTA C 807 Wire: AWS A5.9: ER309L Flux: EN ISO 14174: SA FB 2 DC	C: 0.015 Si: 0.60 Mn: 1.30 Cr: 23.50 Ni: 13.20	R _{m0.2} : > 380 MPa R _m : > 600 MPa A: > 25% CVN impact: +20 °C: > 100 J	2.00 2.40 3.20 4.00	-	It is a wire-flux combination for submerged arc welding. This is a standard combination for welding dissimilar joints, and the first layer in weld overlay (wire cladding). The average ferrite content is 16 FN. Suitable for service temperatures up to +300 °C.
Thermanit H 347 + Marathon 431 AWS A5.9: ER347 Flux: EN ISO 14174: SA FB 2 DC	C: 0.038 Si: 0.60 Mn: 1.30 Cr: 19.00 Ni: 9.50 Nb: 0.55	R _{m0.2} : > 380 MPa R _m : > 550 MPa A: > 30% CVN impact: +20 °C: > 65 J -120 °C: > 40 J	2.40 3.20 4.00	TÜV, CE	It is a wire-flux combination for submerged arc welding of stainless steel grades like 1.4541/347. Marathon 431 is an agglomerated basic flux that ensures good welding properties with nice bead appearance and good slag detachability.
Thermanit 22/09 + Marathon 431/ Avesta C 805-D AWS A5.23: ER2209 Flux: EN ISO 14174: SA FB 2 DC	C: 0.02 Si: 0.50 Mn: 1.40 Cr: 22.20 Ni: 8.30 Mo: 3.10 N: 0.14	R _{m0.2} : > 450 MPa R _m : > 690 MPa A: > 20% CVN impact: +20 °C: > 80 J -40 °C: > 40 J	2.40 3.00 3.20	TÜV, CE, ABS, DNV-GL, LR	It is a wire-flux combination for submerged arc welding for welding duplex steel grades like 1.4462/S31803 used in offshore, shipyards, chemical tankers, chemical/petrochemical, pulp & paper, etc. Very good resistance to pitting and stress corrosion cracking in chloride containing environments. Over-alloyed in nickel to promote austenite formation. Suitable for service temperatures from -40 °C to +250 °C. Marathon 431 is an agglomerated basic flux that ensures good welding properties with nice bead appearance and good slag detachability.
Avesta 2507/P100 CuW + Avesta 805 AWS A5.9: ER2594 Flux: EN ISO 14174: SA AF 2 Cr DC	C: 0.015 Si: 0.55 Mn: 0.70 Cr: 26.20 Ni: 9.50 Mo: 3.80 N: 0.22 Cu: 0.50 W: 0.60	R _{m0.2} : 700 MPa R _m : 890 MPa A: 23% CVN impact: -46 °C: 70 J (> 45)	2.40 3.20	-	It is a wire/flux combination for submerged arc welding of super duplex stainless steel grades like SAF 2507, ASTM S32760, S32550 and S31260. The weld metal shows excellent resistance to pitting- and crevice corrosion in chlorine containing media as well as to stress corrosion cracking especially in H ₂ S containing media. Suitable for service temperatures from -40 °C to +220 °C.

Note: Flux and wire combination can be change according to technical requirement

SAW flux, stainless

Product Name Classification	Flux Type	Main constutents: %	Grain size EN ISO 14174	Characteristics and applications
Avesta 805 EN 760: SA AF 2 Cr DC	Agglomerated fluoride-basic	SiO ₂ : 10 Al ₂ O ₃ : 36 CaF ₂ : 48 Cr: 2.5	4 – 14	It is a basic, slightly chromium-compensated agglomerated flux. It is primarily desinged for welding with high-alloyed stainless fillers such as Avesta P12, 904L and 2205. Standard Cr-Ni and Cr-Ni-Mo fillers can also be welded with excellent results.
Avesta C 805 D EN ISO 14174: SA AF 2 56 55 Mo DC	Agglomerated fluoride-basic	SiO ₂ : 10 Al ₂ O ₃ : 40 CaF ₂ : 50	3 – 16	It is an agglomerated basic type welding flux. Specially designed for joining duplex stainless steels but can also be used for austenitic stainless wires types 308L, 316L and 309L for applications where high impact strength values and high corrosion resistance is required. The flux is alloyed with Cr and Mo which will improve the corrosion resistance. This make it well suitable for surfacing. The alloy addition will cause a slight increase of the ferrites content (typically 2 – 3% units) compared to the wire.
Marathon 431 EN ISO 14343: SA FB 2	Agglomerated fluoride-basic	SiO ₂ : 10 Al ₂ O ₃ : 38 CaF ₂ : 50	4 – 14	It is an agglomerated basic welding flux for welding stainless high alloyed CrNi(Mo) steels. The weld seams are smooth and finely rippled without any slag residues. Besides the good slag detachability the flux also provides good fillet weld properties. The weld metals show high degree of purity and good mechanical properties.
Avesta C 807 EN ISO 14174: SA FB 2 DC	Agglomerated fluoride-basic	SiO ₂ : 10 Al ₂ O ₃ : 38 CaF ₂ : 50	4 – 16	It is an agglomerated basic welding flux for welding stainless high alloyed CrNi(Mo) steels. Besides the good slag detachability, the flux also provides good fillet weld properties. The weld metal show high degree of purity and good mechanical properties.

Covered electrodes, nickel-base

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP 7015 AWS A5.11: ENiCrFe-3	C: 0.025 Si: 0.40 Mn: 6.00 Cr: 16.00 Ni: Balance Nb: 2.20 Fe: 6.00	R _m : 400 MPa R _m : 670 MPa A: 40% CVN impact: +20 °C: 120 J -196 °C: 80 J	2.50 x 300 3.20 x 300 4.00 x 350 5.00 x 400	TÜV, DNV GL, KTA	UTP 7015 is employed for joining and surfacing of nickel-base materials. UTP 7015 is also recommended for welding different materials, such as austenitic to ferritic steels, as well as for weld claddings on unalloyed and low-alloyed steels, e.g. for reactor construction. Weldable in all positions, except vertical down. Stable arc, good slag removability. The seam is finely rippled and notch-free. The weld deposit has a fully austenitic structure and is high temperature resistant. Not prone to embrittlement either at high or low temperatures. The preheating must be matched to the parent metal. Any thermal post-treatments can be applied without regard for the weld metal.
UTP 6222 Mo AWS A5.11: ENiCrMo-3	C: 0.023 Si: 0.40 Mn: 0.60 Cr: 22.00 Mo: 9.00 Ni: Balance Nb: 3.30 Fe: < 1.00	R _m : > 450 MPa R _m : > 760 MPa A: 30% CVN impact: +20 °C: 75 J -196 °C: 45 J	2.50 x 250 3.20 x 300 4.00 x 350 5.00 x 400	TÜV, DNV GL, ABS, BV	UTP 6222 Mo is particularly suited for joining and surfacing on nickel alloys, austenitic steels, low temperature nickel steels, austenitic-ferritic-joints and claddings of the same or similar nature, like 2.4856 (NiCr22Mo 9 Nb), 1.4876 (X30 NiCrAlTi 32 20), 1.4529 (X2 NiCrMoCu 25 20 5). The weld metal is heat resistant and suitable for operating temperatures up to 1000 °C. It must be noted that a slight decrease in ductility will occur if prolonged heat treatment is given within the temperature range 600 – 800 °C. Scale-resisting in low-sulphur atmosphere up to 1100 °C. High creep strength.
UTP 6170 Co AWS A5.11: ENiCrCoMo-1 (mod.)	C: 0.06 Si: 0.70 Mn: 0.10 Cr: 21.00 Mo: 9.00 Ni: Balance Co: 11.00 Al: 0.70 Ti: 0.30 Fe: 1.00	R _m : > 450 MPa R _m : > 700 MPa A: > 35% CVN impact: +20 °C: 80 J	2.50 x 300 3.20 x 300 4.00 x 350 5.00 x 400	TÜV, DNV GL, KTA	UTP 6170 Co is suitable for joining high-temperature and similar nickel-base alloys, heat resistant austenitic and cast alloys, such as 2.4663 (NiCr23Co12Mo), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrAlTi 32 21), 1.4859 (GX10 NiCrSiNb 32 20). The weld metal is resistant to hot-cracking and is used for service temperatures up to 1100 °C. Scale-resistance up to 1100 °C in oxidizing and carburized atmospheres, e.g. gas turbines, ethylene production plants. UTP 6170 Co can be welded in all positions except vertical-down. It has a stable arc. The seam is finely rippled and notch-free. Easy slag removal. Preheating temperature should be adjusted to the base material. Post weld heat treatments can be applied independently of the weld metal.
Thermanit Nicro 182 AWS A5.15: ENiCrFe-3	C: 0.025 Si: 0.40 Mn: 6.00 Cr: 16.00 Ni: Balance Nb: 2.20 Fe: 6.00	R _m : 400 MPa (≥ 360) R _m : 670 MPa (≥ 600) A: 40% (≥ 30) CVN impact: +20 °C: 120 J (≥ 90) -196 °C: 80 J (≥ 32)	2.50 x 300 3.20 x 300 4.00 x 350 5.00 x 400	TÜV, CE	Basic electrode, core-wire-alloyed for high grade welding of nickel-base alloys, creep resistant steels, heat resisting and cryogenic materials, dissimilar joints and low-alloyed steels with difficult welding behaviour. Ferritic-austenitic joints for service temperatures above +300 °C or applications where post weld heat treatment is required. Suitable for pressure vessels from -196 °C up to +650 °C. Scaling resistance up to +1200 °C (S-free atmosphere). Insusceptible to embrittlement, highly resistant to hot cracking, high resistance to porosity, thermal shock resistant, stainless, fully austenitic. Excellent welding characteristics in all welding positions, except vertical down, easy slag removal.

Flux and metal-cored wires, nickel-base

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP AF 6222 MoPW AWS A5.34: ENiCrMo3 T1-4	C: 0.03 Si: 0.40 Mn: 0.40 P: 0.01 S: 0.01 Cr: 21.50 Mo: 9.00 Ni: Balance Nb: 3.50 Fe: 0.50	R _m : 490 MPa R _m : 750 MPa A: 30% CVN impact: +20 °C: 70 J -196 °C: 60 J	1.2	TÜV	The nickel-base-flux-cored wire (NiCrMo) UTP AF 6222 MoPW is suitable for joining and surfacing on nickel-base materials of the same nature and on C- and CrNi-steels as well as for cladding on C-steels, furthermore in high temperature applications. UTP AF 6222 MoPW distinguishes by a hot cracking resistant and tough weld metal. It is suitable for operating temperatures up to 500 °C and above 800 °C. It must be noted that a slight decrease in ductility will occur if prolonged heat treatment is given within the temperature range 550 – 800 °C. UTP AF 6222 MoPW provides excellent positional welding. It has excellent welding properties with a regular and fine drop transfer. The weld seam is finely rippled and the transition from weld to base materials is regular and notch-free. The wide parameter range enables an application on different wall thicknesses.
BÖHLER NIBAS 70/20-FD AWS A5.34: ENiCr3T0-4	C: 0.03 Si: 0.40 Mn: 3.20 Cr: 19.50 Ni: Balance Nb: 2.50 Fe: ≤ 2.50	R _m : 385 MPa R _m : 650 MPa A: 39% CVN impact: +20 °C: 130 J -196 °C: 120 J	1.2 1.6	TÜV, CE	Fully austenitic rutile flux-cored wire of Ni 6082 R/ENiCr3T0 type for welding a variety of creep-resistant steels and nickel-based alloys. Well-suited for dissimilar welding of stainless and nickel alloys to mild steels and some copper alloys. Can also be used as a buffer layer in many difficult-to-weld applications, where the high nickel content will minimize the carbon diffusion from the mild steel into the stainless material. The austenitic structure is very stable and the risk of solidification cracking is low. Suitable for pressure vessel fabrication in the service temperature range -196 °C to +550 °C, otherwise resistant to scaling up to +1200 °C (in S-free atmosphere). Especially designed for flat and horizontal welding positions.

Solid GMAW wires, nickel-base

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP A 6222 Mo-3/ UTP A 6222 Mo AWS A5.14: ER NiCrMo-3	C: ≤ 0.02 Si: ≤ 0.20 Cr: 22.00 Mo: 9.00 Nb: 3.50 Fe: < 1.00 Ni: Balance	R _{m0.2} : > 460 MPa R _m : > 740 MPa A: > 30% CVN impact: +20 °C: 100 J -196 °C: 85 J	0.80 1.00 1.20 1.60	TÜV, DNV GL, ABS	It has a high nickel content and is suitable for welding high-strength and high corrosion resistant nickel-base alloys. It can be used for joining ferritic steel to austenitic steel as well as for surfacing on steel. It is also possible to weld 9% nickel steels using this wire due to its high yield strength. The special features of the weld metal of UTP A 6222 Mo include a good creep rupture strength, corrosion resistance, resistance to stress and hot cracking. It is highly resistant and tough even at working temperatures up to 1100 °C. It has an extremely good fatigue resistance due to the alloying elements Mo and Nb in the NiCr-matrix. The weld metal is highly resistant to oxidation and is almost immune to stress corrosion cracking. It resists intergranular penetration without having been heat-treated.

GTAW rods, nickel-base

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP A 068 HH AWS A5.14: ER NiCr-3	C: < 0.02 Si: < 0.20 Mn: 3.00 Cr: 20.00 Ni: Balance Nb: 2.70 Fe: 0.80	R _{m0.2} : > 380 MPa R _m : > 640 MPa A: > 35% CVN impact: +20 °C: 160 J -196 °C: 80 J	1.60 2.00 2.40 3.20	TÜV, KTA, ABS, DNV GL	UTP A 068 HH is predominantly used for joining identical or similar high heat resistant Ni-base alloys, heat resistant austenites, and for joining heat resistant austenitic-ferritic materials. Also used for joinings of high C content 25/35 CrNi cast steel to 1.4859 or 1.4876 for petrochemical installations with service temperatures up to 900 °C. The welding deposit is hot cracking resistant and does not tend to embrittlement.
UTP A 6222 MO AWS A5.14: ER NiCrMo-3	C: < 0.02 Si: < 0.20 Cr: 22.00 Mo: 9.00 Ni: Balance Nb: 3.50 Fe: 1.00	R _{m0.2} : > 460 MPa R _m : > 740 MPa A: > 30% CVN impact: +20 °C: 100 J -196 °C: 85 J	1.60 2.00 2.40 3.20	TÜV, DNV GL, ABS	UTP A 6222 Mo has a high nickel content and is suitable for welding high-strength and high corrosion resistant nickel-base alloys. It can be used for joining ferritic steel to austenitic steel as well as for surfacing on steel. It is also possible to weld 9% nickel steels using this wire due to its high yield strength. Its wide range of uses is of particular significance in aviation, chemical industry and in applications involving seawater. The special features of the weld metal of UTP A 6222 Mo include a good creep rupture strength, corrosion resistance, resistance to stress and hot cracking. It is highly resistant and tough even at working temperatures up to 1100 °C. It has an extremely good fatigue resistance due to the alloying elements Mo and Nb in the NiCr-matrix. The weld metal is highly resistant to oxidation and is almost immune to stress corrosion cracking. It resists intergranular penetration without having been heat-treated.
UTP A 6170 CO AWS A5.14: ERNiCrCoMo-1	C: 0.06 Si: < 0.30 Cr: 22.00 Mo: 8.50 Ni: Balance Co: 11.50 Ti: 0.40 Al: 1.00 Fe: 1.00	R _{m0.2} : > 450 MPa R _m : > 750 MPa A: > 30% CVN impact: +20 °C: > 120 J	1.60 2.00 2.40 3.20	TÜV	UTP A 6170 Co is particularly used for joining heat-resistant and creep-resistant nickel-base alloys of identical and similar nature, high-temperature austenitic and cast alloys. The weld metal is resistant to hot-cracking. It is used for operating temperatures up to 1100 °C. Scale-resistant at temperatures up to 1100 °C in oxidizing resp. carburizing atmospheres, e.g. gas turbines, ethylene production plants.
UTP A 759 AWS A5.14: ERNiCrMo-13	C: < 0.01 Si: 0.10 Cr: 22.50 Mo: 15.50 Ni: Balance Fe: < 1.00	R _{m0.2} : > 450 MPa R _m : > 720 MPa A: > 35% CVN impact: +20 °C: > 100 J	1.60 2.00 2.40 3.20	TÜV, DNV GL	UTP A 759 is suitable for welding components in plants for chemical processes with highly corrosive media. For joining materials of the same or similar natures and these materials with low alloyed steels such as for surfacing on low alloyed steels. Good corrosion resistance against acetic acid and acetic hydride, hot contaminated sulphuric and phosphoric acids and other contaminated oxidising mineral acids. Intermetallic precipitation will be largely avoided.
UTP A 4221 AWS A5.14: ERNiFeCr-1	C: 0.01 Si: 0.25 Mn: 0.80 Cr: 20.50 Ni: 41.00 Mo: 3.10 Cu: 1.80 Fe: Balance	R _{m0.2} : 360 MPa R _m : > 550 MPa A: > 30% CVN impact: +20 °C: > 100 J	2.40	-	UTP A 4221 is suitable for joining and surfacing of alloys of similar nature, furthermore for welding of CrNi-MoCu-alloyed austenitic steels used for high quality tank and apparatus construction in the chemical industry, corrosion resistance in media of sulphuric and phosphoric acid. UTP A 4221 is specially designed for welding alloy 825 (2.4858, UNS N08825). Fully austenitic weld metal with high resistance against stress corrosion cracking and pitting in media containing chloride ions. Good corrosion resistance against reducing acids due to the combination of Ni, Mo and Cu. Sufficient resistance against oxidizing acids. The weld metal is corrosion resistant in sea water.

SAW wire/flux combinations, nickel-base

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP UP 6222 Mo + Record NiCrW/ Record NiCrW-412 AWS A5.14: ER NiCr-3 EN ISO 18274: S Ni 6082 (NiCr20Mn3Nb)	C: < 0.02 Si: < 0.20 Cr: 21.00 Mo: 9.00 Ni: Balance Nb: 3.30 Fe: 1.00	R _{m0.2} : 460 MPa R _m : 725 MPa A: 40% CVN impact: +20 °C: 80 J -196 °C: 65 J	1.60 2.00 2.40 3.20	-	UTP UP 6222 Mo is applied for joint welding of base materials with the same or with a similar composition, e.g. Alloy 625 (UNS N06625) or NiCr22Mo9Nb, Material-No. 2.4856 or mixed combinations with stainless steels and carbon steels. Furthermore the wire is used for cold-tough Ni-steels, e.g. X8Ni9 for LNG projects. UTP UP 6222 Mo is also applied on alloyed or unalloyed steels for cladding of corrosion resistant plants.
Thermanit Nicro 82 + Marathon 444 AWS A5.14: ER NiCr-3 Flux: EN ISO 14174 : SA FB 2 AC	C: 0.012 Si: 0.25 Cr: 20.20 Mn: 3.00 Ni: Balance Nb: 2.40 Fe: < 2.00	R _{m0.2} : 380 MPa R _m : 580 MPa A: 35% CVN impact: +20 °C: 110 J	1.60 2.40	TÜV, DNV GL	Austenite ferrite joints, joints of stainless, heat resistant, creep resistant and cryogenic steels. The weld metals show excellent mechanical properties with high hot cracking resistance. It is applicable for chemical apparatus construction on high temperature metals as well as in low temperature sections down to -196 °C.

SAW flux, nickel-base

Product Name Classification	General Characteristics	Characteristics and applications
Record NiCrW-412 DIN EN ISO 14174: SA AB 2	Current: DC (+/-) and AC – 800A max. Basicity index: 2.1 Grain size: 0.40 – 1.40 mm Apparent density: 1.0 Consumption: 1 (kg flux/kg wire) Redrying: 1 – 2h at 350 +/- 50 °C	Record NiCrW 412 basic agglomerated flux for SAW of Ni-alloys in joining and overlay applications. Also suitable for cryogenic applications.
Record NiCrW DIN EN ISO 14174: SA FB 2	Current: DC (+/-) and AC – 800A max. Basicity index: 4.5 Grain size: 0.40 – 1.40 mm Apparent density: 1.0 Consumption: 1 (kg flux/kg wire) Redrying: 1 – 2h at 350 +/- 50 °C	Record NiCrW is a high basic agglomerated flux designed for welding and cladding of NiCr(Mo) alloys. It has a high resistance against hot cracking thanks to its low silicon pick-up.
Marathon 444 DIN EN ISO 14174: SA FB 2 AC	Current: DC (+/-) and AC – 900A max. Basicity index: 2.9 Grain size: 0.30 – 1.60 mm Apparent density: 1.0 Consumption: 1.0 (kg flux/kg wire) Redrying: 2hrs min. at 300 – 350 °C	Marathon 444 is a highly basic agglomerated welding flux, designed for welding and cladding of NiCr(Mo) alloys. Highly resistant against hot cracking thanks to its low level of Si pick up.

GMAW wires, Aluminium

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
Union AlMg 5 AWS A5.10: ER5356 EN ISO 18273: AlMg5Cr(A)	Al: Balance Mn: 0.05 – 0.20 Cr: 0.05 – 0.20 Mg: 4.50 – 5.50 Ti: 0.06 – 0.20 Fe: < 0.40 Si: < 0.25 Zn: < 0.10 Cu: < 0.10	R _e : 110 MPa R _m : 240 MPa A: 17%	1.00 1.20 1.60	TÜV, DB, DNV-GL, LR	Solid wire for AlMg alloys containing up to 5% Mg. Seawater resistant weld metal. Good colour matching with base metal after anodizing. Thorough cleaning of the workpiece bevels is necessary. Thicker plate materials require preheating to 150 °C (302 °F).
Union AlMg 4.5 Mn AWS A5.10: ER5183 EN ISO 18273-A: AlMg4.5Mn0.7(A)	Al: Balance Mg: 0.50 – 1.00 Cr: 0.05 – 0.25 Mg: 4.30 – 5.20 Ti: < 0.15 Si: < 0.40 Zn: < 0.25 Cu: < 0.10	R _e : 125 MPa R _m : 275 MPa A: 17%	1.00 1.20 1.60	TÜV, DB, DNV-GL, LR, BV	Solid wire for AlMg alloys. Seawater resistant weld metal. Thorough cleaning of the workpiece bevels is necessary. Thicker plate materials require preheating to 150 °C (302 °F).
Union AlSi 5 AWS A5.10: ER4043 EN ISO 18273-A: AlSi5(A)	Al: Balance Si: 4.50 – 6.00 Fe: < 0.60 Cu: < 0.30 Mg: < 0.20 Ti: < 0.15 Mn: < 0.15 Zn: < 0.10	R _e : 40 MPa R _m : 120 MPa A: 8%	1.00 1.20 1.60	DB	Solid wires for GMAW welding of aluminium alloys. The weld metal is not suitable for anodizing for decorative purposes. Very fluid weld pool. Thicker plate materials and castings require preheating to 150 – 200 °C (302 – 392 °F). Do not use for welding hardenable alloys in high stressed zones.

GTAW rods, Aluminium

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
Union AlMg 5 AWS A5.10: ER5356 EN ISO 18273: AlMg5Cr(A)	Al: Balance Mn: 0.05 – 0.20 Cr: 0.05 – 0.20 Mg: 4.50 – 5.50 Ti: 0.06 – 0.20 Fe: < 0.40 Si: < 0.25 Zn: < 0.10 Cu: < 0.10	R _e : 110 MPa R _m : 240 MPa A: 17%	1.60 2.00 2.40 3.20 4.00 5.00	TÜV, DB	TIG welding rod for AlMg alloys containing up to 5% Mg. Seawater resistant weld metal. Good colour matching with base metal after anodizing. Thorough cleaning of the workpiece bevels is necessary. Thicker plate materials require preheating to 150 °C (302 °F).
Union AlMg 4.5 Mn AWS A5.10: ER5183 EN ISO 18273-A: AlMg4.5Mn0.7(A)	Al: Balance Mg: 0.50 – 1.00 Cr: 0.05 – 0.25 Mg: 4.30 – 5.20 Ti: < 0.15 Si: < 0.40 Zn: < 0.25 Cu: < 0.10	R _e : 125 MPa R _m : 275 MPa A: 17%	1.60 2.00 2.40 3.20 4.00	TÜV, DB, WWEB	TIG welding rod for AlMg alloys. Seawater resistant weld metal. Thorough cleaning of the workpiece bevels is necessary. Thicker plate materials require preheating to 150 °C (302 °F).
Union AlSi 5 AWS A5.10: ER4043 EN ISO 18273-A: AlSi5(A)	Al: Balance Si: 4.50 – 6.00 Fe: < 0.60 Cu: < 0.30 Mg: < 0.20 Ti: < 0.15 Mn: < 0.15 Zn: < 0.10	R _e : 40 MPa R _m : 120 MPa A: 8%	1.60 2.00 2.40 3.20 4.00	DB	TIG welding rod of aluminium alloys. The weld metal is not suitable for anodizing for decorative purposes. Very fluid weld pool. Thicker plate materials and castings require preheating to 150 – 200 °C (302 – 392 °F). Do not use for welding hardenable alloys in high stressed zones.

Pickling & Passivation

Product Name	Product Type	Characteristics and applications
Avesta Pickling Paste 101	Paste	A universal pickling paste with good adhesion properties, suitable for difficult surfaces such as "overhead" pickling.
Avesta Pickling Gel 122	Gel	A universal pickling gel, with a more free-flowing consistency that facilitates the application and gives a high coverage. Suitable for use and storage in warmer climates.
Avesta BlueOne Pickling Paste 130	Paste	A unique world patented safer-to-use pickling paste. This low-fuming pickling paste reduces toxic nitric fumes by 80%. Suitable for pickling of standard stainless steel grades such as 304 and 316.
Avesta RedOne Pickling Paste 140	Paste	A powerful world patented safer-to-use pickling paste. This low-fuming pickling paste reduces toxic nitric fumes by 50%. Suitable for pickling of heavy-duty applications such as high-alloyed stainless steel grades like duplex and SMO, and for pickling at lower temperatures.
Avesta Pickling Spray 204	Spray	A powerful pickling spray for heavy-duty applications such as high-alloyed stainless steel grades like duplex and SMO, and pickling at lower temperatures.
Avesta RedOne Pickling Spray 240	Spray	A unique, safer-to-use pickling spray. This low-fuming pickling spray reduces toxic nitric fumes by 50%. Suitable for pickling of standard stainless steel grades such as 304 and 316.
Avesta Pickling Bath 302	Liquid	A concentrated pickling bath which should be diluted with water depending on the stainless steel grade. Suitable for immersion pickling of objects or circulation pickling of pipe systems.
Avesta Cleaner 401	Spray	A heavy-duty stainless steel cleaner. Suitable for pre-cleaning and degreasing of stainless steel surfaces before pickling. Could also be used for maintenance cleaning to restore and brighten stainless steel surfaces and remove surface rust. The Cleaner 401 can be used for maintenance cleaning and surface restoration together with Passivator 630 to further improve the cleaning effect.
Avesta Neutraliser 502	Liquid	For simple neutralization of acidic rinse water resulting from pickling. This rinse water is acidic and contains dissolved metals including chromium and nickel. For environmental reason this water should be treated before discharge.
Avesta Passivator 601	Spray	A traditional nitric acid based well-proven passivator. The passivator can be used after mechanical cleaning of stainless steel surfaces to remove remaining grinding dust and iron particles. It can also be used after pickling to accelerate the rebuilding of the protective layer of chromium oxide.
Avesta FinishOne Passivator 630	Spray	An acid-free passivator, which creates no hazardous waste. The passivator can be used after mechanical cleaning of stainless steel surfaces to remove remaining grinding dust and iron particles. It can also be used after pickling to accelerate the rebuilding of the protective layer of chromium oxide.
Avesta Moly Drop 960	Liquid	Easy identifying of stainless steel grades. The Moly-Drop test helps to differentiate 304 (EN 1.4301) grade stainless steel from 316 grade (EN 1.4436).
Avesta Spray Pump	Pump	A customized pump system for Finishing Chemicals. The pump is specially designed for the demanding spraying of cleaning solutions.

Cladding, Covered electrodes

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP 6222 Mo AWS A5.11: ENiCrMo-3	C: 0.03 Si: 0.40 Mn: 0.60 Cr: 22.00 Mo: 9.00 Ni: Balance Nb: 3.30 Fe: < 1.00	R _m : > 450 MPa R _m : > 760 MPa A: > 30% CVN impact: -196 °C: 45 J	2.50 x 250 3.20 x 300 4.00 x 350 5.00 x 400	TÜV, DNV GL, ABS, BV	UTP 6222 Mo is particularly suited for joining and surfacing on nickel alloys, austenitic steels, low temperature nickel steels, austenitic ferritic-joints and claddings of the same or similar nature, like 2.4856 (NiCr22Mo 9 Nb), 1.4876 (X30 NiCrAlTi 32 20), 1.4529 (X2 NiCrMoCu 25 20 5). The weld metal is heat resistant and suitable for operating temperatures up to 1000 °C. It must be noted that a slight decrease in ductility will occur if prolonged heat treatment is given within the temperature range 600 – 800 °C. Scale-resisting in low-sulphur atmosphere up to 1,100 °C. High creep strength.
UTP 068 HH AWS A5.11: E NiCrFe-3 (mod.)	C: 0.025 Si: 0.40 Mn: 5.00 Cr: 19.00 Mo: 1.50 Nb: 2.20 Ni: Balance Fe: 3.00	R _m : > 420 MPa R _m : 680 MPa A: 40% CVN impact: -196 °C: 80 J 15 h 650 °C/air -196 °C : 70 J	2.00 x 250 2.50 x 300 3.20 x 300 4.00 x 350 5.00 x 400	TÜV, KTA, ABS, BV, DNV-GL	UTP 068 HH is predominantly used for joining identical or similar heat-resistant Ni-base alloys, heat-resistant austenites. Specially used for joining of high carbon containing 25/35 CrNi cast steel to 1.4859 or 1.4876 for petrochemical installations with working temperatures up to 900 °C. Furthermore UTP 068 HH can be used for repair welding of hardly weldable steels such as heat-treatable steels or tool steels. Additionally mixed joints of austenitic and ferritic materials with elevated service temperatures can be welded. The welding deposit of UTP 068 HH is hot-crack-ing-resistant, does not tend to embrittlement and is scale-resist-ant at high temperatures.
UTP 8 FN AWS A5.15: E NiFe-CI	C: < 2.00 Si: < 2.50 Mn: < 4.00 Ni: 45.00 – 60.00 Fe: Balance S: < 0.03 Cu: < 2.50 Al: < 1.00	R _m : > 320 MPa Hardness HB: > 190	2.00 x 250 3.20 x 300 4.00 x 400	-	It is suitable for surfacing of all commercial cast iron grades, as well as to join the iron casting to steel. Particularly suitable for welding of nodular cast iron. Can also be applied in welding combined with UTP 8.
UTP 83 FN AWS A5.15: E NiFe-CI	C: 1.30 Ni: 52.00 Fe: Balance	Hardness HB: 190	2.50 x 300 3.20 x 350 4.00 x 350	-	UTP 83 FN is suitable for surfacing and joining of all commercial cast iron grades, such as lamellar grey cast iron and nodular cast iron, malleable cast iron and for joining these materials to steel or cast steel. This stick electrode is particularly used where a high deposition rate is needed. UTP 83 FN has an excellent melting performance and the easily controllable transfer provides a spatter-free deposit of perfect appearance. The weld deposit is easily machinable with cutting tools, tough and crack-resistant.
UTP 85 FN AWS A5.15: E NiFe-CI	C: 1.20 Ni: 54.00 Fe: Balance	R _m : approx. 320 MPa Hardness HB: approx. 200	2.5 x 300 3.2 x 350 4.0 x 350 5.0 x 400	-	UTP 85 FN is suitable for surfacing and joining of all grades of cast iron, particularly nodular cast iron (GGG 38-60) and for joining these materials with steel and cast steel. UTP 85 FN has excellent welding properties and a smooth, regular flow, a high deposition rate and a finely rippled bead appearance. Very economic for construction and production welding on nodular cast iron parts. High current carrying capacity thanks to a bimetallic core wire.
UTP 86 FN AWS A5.15: E NiFe-CI	C: 1.20 Ni: Balance Fe: 45.00	R _m : approx. 340 MPa Hardness HB: approx. 220	2.50 x 300 3.20 x 350 4.00 x 350	DB	It is suitable for joining and surfacing of lamellar grey cast iron EN GJL 100 – EN GJL 400, nodular cast iron (spheroidal cast iron) EN GJS 400 – EN GJS 700 and malleable cast iron grades EN GJMB 350 – EN GJMB 650 as well as for joining these materials with each other or with steel and cast steel. Universally applicable for repair, construction and production welding. It has excellent buttering characteristics on cast iron. The stick electrode has a stable arc and produces a flat seam structure without undercutting. Due to the bimetallic core wire, the current carrying capacity and the deposition rate are excellent. The bead appearance is smooth. The weld deposit is highly crack resistant and easily machinable with cutting tools.
UTP 80 M AWS A5.11 : E NiCu-7	C: < 0.05 Si: 0.70 Mn: 3.00 Cu: 29.00 Ti: 0.70 Al: 0.30 Fe: 1.00 Ni: Balance	R _m : > 300 MPa R _m : > 480 MPa A: > 30% CVN impact: +20 °C: > 80 J	2.50 x 300 3.20 x 350 4.00 x 350 5.00 x 400	TÜV, ABS, DNV GL	UTP 80 M is suitable for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. Particularly suited for the following materials: 2.4360 NiCu30Fe, 2.4375 NiCu30Al. UTP 80 M is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP 6170 Co AWS A5.11: ENiCrCoMo-1 (mod.)	C: 0.06 Si: 0.70 Mn: 0.10 Cr: 21.00 Mo: 9.00 Ni: Balance Co: 11.00 Fe: 1.00 Al: 0.70 Ti: 0.30	$R_{m,0.2}$: > 450 MPa $R_{m,0.2}$: > 700 MPa A: > 35% CVN impact: +20 °C: > 80 J	2.50 x 250 3.20 x 300 4.00 x 350	TÜV	UTP 6170 Co is suitable for joining high temperature and similar nickel-base alloys, heat resistant austenitic and cast alloys, such as 2.4663 (NiCr23Co12Mo), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrAlTi 32 21), 1.4859 (GX10 NiCrSiNb 32 20). The weld metal is resistant to hot-cracking and is used for service temperatures up to 1,100 °C. Scale-resistance up to 1,100 °C in oxidizing and carburized atmospheres, e.g. gas turbines, ethylene production plants. UTP 6170 Co can be welded in all positions except vertical-down. It has a stable arc. The seam is finely rippled and notch-free. Easy slag removal. Preheating temperature should be adjusted to the base material. Post weld heat treatments can be applied independently of the weld metal.
UTP CELSIT 706 AWS A5.13: E CoCr-A	C: 1.10 Cr: 27.50 W: 4.50 Co: Balance	Hardness of the pure weld deposit 40 – 42 HRC Hardness at 500 °C approx. 30 HRC Hardness at 700 °C approx. 160 HB	3.20 x 350 4.00 x 350 5.00 x 350	-	UTP CELSIT 706 is used for hardfacing on parts subject to a combination of erosion, corrosion, cavitation, impact, pressure, abrasion and high temperatures up to 900 °C, such as tight surfaces on fittings, valve seats and cones for combustion engines, gliding surfaces metal-metal, highly stressed hot working tools without thermal shock, milling mixers and drilling tools. Excellent gliding characteristics, easy polishability, good toughness, non magnetic. Machining by grinding or with tungsten carbide cutting tools. UTP CELSIT 706 has excellent welding properties and a homogenous, finely rippled seam due to spray arc. Very easy slag removal.
UTP 80 Ni AWS A5.11 : E Ni-1	C: < 0.02 Si: 0.80 Mn: 0.25 Ti: 2.00 Al: 0.20 Fe: 0.10 Ni: Balance	$R_{m,0.2}$: > 300 MPa $R_{m,0.2}$: > 450 MPa A: > 30% CVN impact: +20 °C: > 160 J	2.50 x 300 3.20 x 300 4.00 x 350	TÜV	UTP 80 Ni is suited for joining and surfacing on commercial pure nickel grades, including LC nickel, nickel alloys and nickel-clad steels. These materials are employed primarily in the construction of pressure vessels and apparatus in the chemical industry the food industry and for power generation, where good behaviour under corrosion and temperature is demanded.



Maintenance and Repair

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP S FeNi AWS A5.15: Est	C: < 0.10 Si: 0.50 Mn: 1.00 Cr: 4.50 Ni: 13.00 Fe: Balance	Hardness: HRC: 25 – 35 Hardness: HB: 300 – 350	2.50 x 350 3.25 x 350 4.00 x 450 5.00 x 450	-	Basic low hydrogen steel electrode alloyed with Nickel for build-up & repair of grey cast iron. Provides crack-proof buffer layers under top coat alloys. Weld deposit resists scaling and cracks.
UTP S 613 Kb AWS A5.1: E7018-1 H4R	C: 0.04 Si: 0.50 Mn: 0.80 Fe: Balance	R _{m0.2} : > 420 MPa R _m : > 510 MPa A: > 25% CVN impact: -30 °C: > 35 J	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	-	UTP S 613 Kb is a basic-coated stick electrode for joining on structural steels. Typical usage can be of repairs of structural cracks of excavators, kiln, pulverizing mill, crusher and blast furnace structure. This electrode has special moisture resistant coating. UTP S 613 Kb has a good weldability and stable arc. The weld metal is resistant to ageing, crack resistant and is little affected by steel impurities.
UTP S 63 AWS A5.1: E307-16	C: 0.10 Si: 0.80 Mn: 5.00 Cr: 19.00 Ni: 8.50 Fe: Balance	R _{m0.2} : > 350 MPa R _m : > 600 MPa A: > 40% CVN impact: +20 °C: 60 J	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 450	-	Non alloy structural and heat treatable steels can be welded, also in combination with austenitic CrNi steels. Universally applicable for surfacing of work pieces exposed to impact, pressure and rolling wear. Such as curved rails, crusher parts, and excavator teeth. Provides crack-proof buffer layers under hard alloys. Weld deposit resist to scaling, rust and cracks, work hardened.
UTP S 65 AP AWS A5.4: E312-16 (mod.)	C: 0.10 Si: 1.20 Mn: 1.00 Cr: 30.00 Ni: 9.50 Fe: Balance	R _{m0.2} : > 640 MPa R _m : > 820 MPa A: 25%	2.50 x 350 3.25 x 350 4.00 x 350 5.00 x 350	-	Outstanding weldability, even at low amperage and with AC power. Stable arc, spatter free and excellent slag removal. The finely rippled seam has a homogeneous structure and crack – free seam. Ideal for repair & build-up of carbon steels, alloy steels & unknown steels such as gears, cams, shafts, hot cuts, hot trim plates and dies. All-purpose application for hard manganese steels, tool steels, spring steels, high speed steels as well as dissimilar metal joints. Machinable deposits Hardness of the pure weld deposit: Approx. 250 HB
UTP S DUR 350 AWS A5.13: E Fe 1	C: 0.16 Si: 1.10 Mn: 1.40 Cr: 1.90 Fe: bal.	Hardness of the pure weld deposit approx. 380 HB 1 layer on steel with C = 0.5% approx. 420 HB	3.25 x 350 4.00 x 450 5.00 x 450	-	Good abrasion resistance and multi-layer build up ability. Particularly suited for wear resistant surfacing on Mn-Cr-V alloyed parts, such as frogs, track rollers, chain support rolls, sprocket wheels, guide rolls etc. Weld metal is machinable with tungsten carbide tools.
UTP S BMC AWS A5.1: E6013	C: 0.70 Si: 0.70 Mn: 15.00 Cr: 12.00 Fe: Balance	Hardness of the pure weld deposit approx. 260 HB After work hardened 48 – 53 HRC	3.25 x 350 4.00 x 450 5.00 x 450	-	Suitable for build-up and claddings on part subject to highest pressure and shock in combination with abrasion. Surfacing can be made on ferritic steel as well as austenitic hard Mn-steel and joints on hard Mn-steel can be welded. Main application are in the mining, cement, crushing plant, steel works, thermal power plant where working parts are regenerated, such as breaker jaws, frogs, cross pieces, paving breakers, crusher hammer & rotors, railway points & crossing, etc. Rapid work hardening and high toughness.
UTP S DUR 250 EN 14700: E Fe1	C: 0.15 Si: 1.10 Mn: 1.20 Cr: 0.80 Fe: Balance	Hardness of the pure weld deposit approx. 270 HB 1 layer on steel with C = 0.5% approx. 320 HB	3.25 x 450 4.00 x 450 5.00 x 450	-	UTP S DUR 250 is used for surfacing on parts, where a tough and easily machinable deposit is required, such as rails, gear wheels, shafts, crane wheels, track roller and other parts on farming and building machineries. Also suitable as cushion and filler layer on non-alloyed and low-alloyed steels and cast steels. UTP S DUR 250 has a very good resistance against compression and rolling strain. The weld metal is easily machinable.
UTP S 718 S EN 14700: E Fe14	C: 3.50 Si: 1.20 Mn: 2.50 Cr: 28.00 Fe: Balance	Hardness of the pure weld deposit approx. 60 HRC	3.25 x 350 4.00 x 450 5.00 x 450	-	This electrode is designed especially to roughen the sugar milling rolls by applying a hard coating in the form of small globules on the surface of the teeth of the mass thus dramatically reducing the sugarcane slippage. This electrode has a specially designed flux as characterized by a rapid ignition and re-ignition, needed to cross the discontinuities caused by grooving of the masses. Its hard coat globules deposit, have the right size for a good drag of the sugarcane, without having to open the combs.
UTP S DUR 600 EN 14700: E Fe8	C: 0.50 Si: 2.30 Mn: 0.40 Cr: 9.00 Fe: Balance	Hardness of the pure weld deposit 56 – 58 HRC After soft-annealing 780 – 820 °C/oven approx. 25 HRC After hardening 1000 – 1050 °C/oil approx. 60 HRC 1 layer on high Mn-steel approx. 22 HRC 2 layers on high Mn-steel approx. 40 HRC	2.50 x 300 3.20 x 350 4.00 x 450 5.00 x 450	DB	UTP DUR 600 is universally applicable for cladding on parts of steel, cast steel and high Mn-steel, subject simultaneously to abrasion, impact and compression. Typical application fields are the earth moving and stone treatment industry, e.g. excavator teeth, bucket knives, crusher jaws and cones, mill hammers etc., but also for cutting edges on cold cutting tools.
UTP S DUR 650 KB EN 14700: E Fe8	C: 0.80 Si: 0.60 Mn: 0.30 Cr: 7.00 Mo: 0.50 V: 0.70 Fe: Balance	Hardness of the pure weld deposit 58 – 60 HRC 1 layer on high Mn-steel approx. 24 HRC 2 layers on high Mn-steel approx. 45 HRC	3.20 x 450 4.00 x 450 5.00 x 450	-	UTP DUR 650 Kb is suitable for cladding structural parts subject to abrasion combined with impact. The main applications are tools in the earth moving industry and crushing plants as well as cold and hot working tools. The deposit is only machinable by grinding. UTP DUR 650 Kb is a martensitic alloy. The stick electrode is suited in impact and pressure stress situations. Machining of the weld metal only by grinding.

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
UTP S Ledurit 61 AWS A5.13: E FeCr-A1 EN 14700: E Fe14	C: 2.60 Si: 1.30 Cr: 32.00 Fe: Balance	Hardness of the pure weld deposit approx. 60 HRC 1 layer on steel with C = 0,15% approx. 55 HRC 1 layer on high Mn-steel approx. 52 HRC	2.50 x 350 3.20 x 350 4.00 x 450 5.00 x 450	-	It is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact, such as conveyor screws, scraper blades, digging teeth, mixer wings, sand pumps. Also as a final layer on crusher jaws. UTP S LEDURIT 61 has excellent welding characteristics and a very easy slag removal. For most applications the homogeneous and finely rippled seam surface does not require any finishing by grinding.
UTP LEDURIT 65 En 14700: E Fe16	C: 4.50 Si: 23.50 Mo: 6.50 Nb: 5.50 V: 1.50 W: 2.20 Fe: Balance	Hardness of the pure weld deposit approx. 65 HRC 1 layer on steel with C = 0,15% approx. 58 HRC 1 layer on high Mn-steel approx. 55 HRC	3.20 x 350 4.00 x 450 5.00 x 450	-	UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C. The extremely high abrasion resistance is reached by the very high content of special carbides (Mo, V, W, Nb). Main application fields are surfacings on earth moving equipment, working parts in the cement and brick industry as well as in steel mills for radial breakers and revolving-bar screens of sintering plants. UTP LEDURIT 65 has an even droplet transfer in the spray arc. The smooth welding bead is without slag covering. In general there is no need for any finishing by grinding. Recovery approx. 265%.
UTP S 813 AWS A5.15: Est	C: < 0.10 Si: 0.50 Mn: 1.00 Cr: 4.50 Ni: 13.00 Fe: Balance	Hardness of the pure weld deposit approx. 25 – 35 HRC	2.50 x 350 3.20 x 350 4.00 x 450 5.00 x 450	-	Basic low hydrogen steel electrode alloyed with Nickel for build-up of grey cast iron. The application is for buffer layer of cast iron before hard facing.
UTP A 8051 Ti EN ISO 1071: S C NiFe-2	C: 0.10 Mn: 3.50 Ni: 55.00 Ti: 0.50 Fe: Balance	R _{m,2'} > 300 MPa R _{m,2'} > 500 MPa A: > 25% Hardness HB: approx. 200	0.80 1.00 1.20	-	UTP A 8051 Ti is particularly suited for MIG/MAG welding of ferritic and austenitic nodular cast iron as well as for joining it with unalloyed and high-alloyed steels, copper and nickel alloys. Build-up layers on grey cast iron qualities are also possible. Special applications are construction welding of ductile centrifugal casting tubes, such as joggles and flange joints, fittings, pumps. The deposit is tough, crack resistant and easily machinable with cutting tools.
LOTUS-90 Low Heat Input Cutting Electrode	-	Not applicable	3.15 x 350 4.00 x 350 5.00 x 350	-	Gouging aluminium, cast irons, other metals, bevelling cracks, removing unwanted metal and unwanted sections, old rivets etc. -No oxygen, other gas or special electrode holder required -Exothermic coating concentrates arc force -Further finishing not necessary -Oxide free 'U' groove
UTP Vanadium 500 Standard: Special Development	-	Hardness of the weld deposit on casting iron: 60 – 65 HRC	4.00 x 450 5.00 x 450	-	The UTP VANADIUM 500 is a stick electrode for arcing on sugar mill rolls in the sugar cane industry. A soft transfer with exact sizes of the drops improves the grinding of sugar cane. A special Chrome/Vanadium alloy offers excellent resistance against abrasion. It works with amperages lower than the conventional ones.
UTP AF Vanadium 500 Standard: Special Development	-	Hardness of the weld deposit on casting iron: 60 – 65 HRC	2.00 2.40 2.80 3.20	-	Open-Arc flux cored wire for manual or fully automatic on-site „arcing“ of sugar mill rolls in view of enhancing the gripping surfaces excessive wear taking place on the rolls during crushing. Special Chromium/Vanadium alloy and homogeneous droplet transfer.
UTP Vanadium SG Standard: Special Development	-	Hardness of the weld deposit on casting iron: 66 HRC 1 layer on C-Steel approx. 60 HRC	4.00 x 450 5.00 x 450 6.00 x 450	-	The UTP VANADIUM SG is a new high alloy extruded hard surfacing electrode with high level of primary chromium carbides resistant to wet abrasion. The UTP VANADIUM SG improves the efficiency and extends the life of mill rolls by increasing the gripping action and providing wear abrasion resistance. The special covering of this electrode produces an aggressive arc type „spray“ of high penetration. Due to the arc spray, the arcing could be done during grinding operation.

Solid wires / rods for brazing

Product Name Classification	Chemical composition (%) Typical values	Mechanical properties Typical values	Ø x L (mm)	Approvals	Characteristics and applications
FONTARGEN A 200 SM AWS A 5.7: ER Cu ISO 24373: S Cu 1898 (CuSn1)	Sn: 0.80 Mn: 0.30 Si: 0.30 Cu: Balance	Melting range: 1020 – 1050 °C R _e : 120 MPa R _m : 200 – 240 MPa A: 30% CVN impact: +20 °C: 75 J Hardness: 50 – 60 HB	0.80 1.00 1.20 1.60	-	Joint and build-up welding on oxygen-free copper and copper alloys of material numbers: 2.0040, 2.0060, 2.0070, 2.0080, 2.0090, 2.0100, 2.0120, 2.0150, 2.0170, 2.1202, 2.1322, 2.1325, 2.1491. Suitable for out-of position welding. Clean base materials in the welding spheres and preheat if over 3 mm (per mm of plate thickness approx. 100 °C, but not more than 600 °C). Suitable for welding of galvanised steel (MIG-brazing).
FONTARGEN A 210 AWS A 5.8: RB Cu Zn – A EN ISO 3677 : B-Cu 60 Zn (Si) – 875/895	Cu: 60.00 Si: 0.30 Sn: < 0.20 Zn: Balance	Melting range: 875 – 895 °C R _e : > 350 MPa A: > 35% Hardness: 110 HB	2.00 2.50 3.00 4.00	-	Brazing alloy with good flowing properties, hardly sensitive to over heating. Suitable for gap brazing and coating of steel, cast iron, malleable cast iron, nickel and nickel alloys, as well as copper and copper alloys with a solidus > 900 °C.
FONTARGEN A 3005 AWS A 5.8: BC uP-3 EN ISO 3677: B-Cu89PAg-645/815	Ag: 5.00 Cu: 89.00 P: 6.00	Melting range: 645 – 815 °C R _e : 250 MPa A: 8%	1.50 2.00 3.00	-	Copper-phosphorus alloy with low silver content, good flowing properties and high ductility. Suitable for gap brazing of copper and copper alloys. Joint brazing at working temperatures between -60 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.
FONTARGEN A 3015 AWS A 5.8: BC uP-5 EN ISO 3677: B-Cu80AgP-645/800	Ag: 15.00 Cu: 80.00 P: 5.00	Melting range: 645 – 800 °C R _e : 250 MPa A: 10%	2.00 3.00	-	Thin fluid copper-phosphorus alloy with high silver content and high ductility, even at low temperatures. Suitable for gap brazing of copper and copper alloys. Recommended for joints with strong thermal load and vibrations. Joint brazing at working temperatures between -70 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.
FONTARGEN A 320 AWS A 5.8: BAg-36 EN ISO 3677: B-Ag45CuZnSn-640/680	Ag: 45.00 Cu: 27.00 Zn: 25.50 Sn: 2.50 Si: 0.15	Melting range: 640 – 680 °C R _e : 350 – 430 MPa A: 12%	2.00 2.50 3.00 4.00	DVGW, GW 2, VG 81245	Cadmium free brazing alloy for gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Approval: Marine code VG 81245, section 3. Also suitable for copper pipe installation according to DVGW work certificate GW 2. The silicon contained in the solder can reduce the mechanical property values of welded carbon steels. Joint-brazing at working temperatures of max 200 °C.
FONTARGEN A 340 AWS A 5.8: BAg-140 EN ISO 3677: B-Ag40CuZnSn-650/710	Ag: 40.00 Cu: 30.00 Zn: 28.00 Sn: 2.00 Si: 0.15	Melting range: 650 – 710 °C R _e : 350 – 430 MPa A: 20%	1.50 2.00 3.00	VG 81245	Silver alloy, cadmium free, insensitive to overheating. Gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys and carbides. Seawater resistant, according to marine standard VG 81245, part 3. Silicon can reduce the mechanical properties of carbon steel. Joint-brazing at working temperatures of max. 200 °C.
FONTARGEN A 2115/8 M AWS A 5.7: ERCuAl-A1 EN ISO 24373: S Cu 6100 (CuAl7)	Al: 8.00 Ni: 0.50 Mn: 0.20 Fe: 0.20 Cu: Balance	Melting range: 1030 – 1040 °C R _e : 380 – 450 MPa A: 45%	0.80 1.00 1.20	-	MIG-brazing of aluminium plated and uncoated steel plates. Applications: Auto body, magnetic solenoids, air conditioning and container building. The corrosion resistance galvanized steel plates remain unaffected. Little deformation of thin steel sheets. Suitable for joining of aluminium-bronze, high-strength brass and steel. Range of applications: Car body, ship building, heating and cooling as well as container building.

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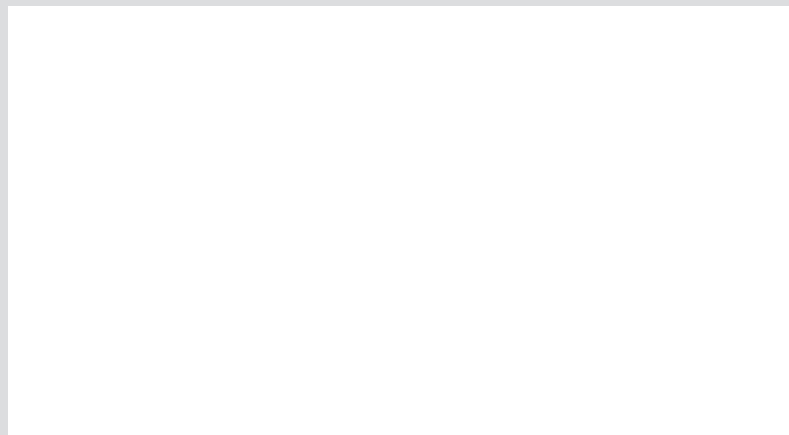
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