böhler welding
by voestalpine

Lasting Connections

WELDING CONSUMABLES FOR JOINT WELDING

voestalpine Bohler Welding India
www.voestalpine.com/welding

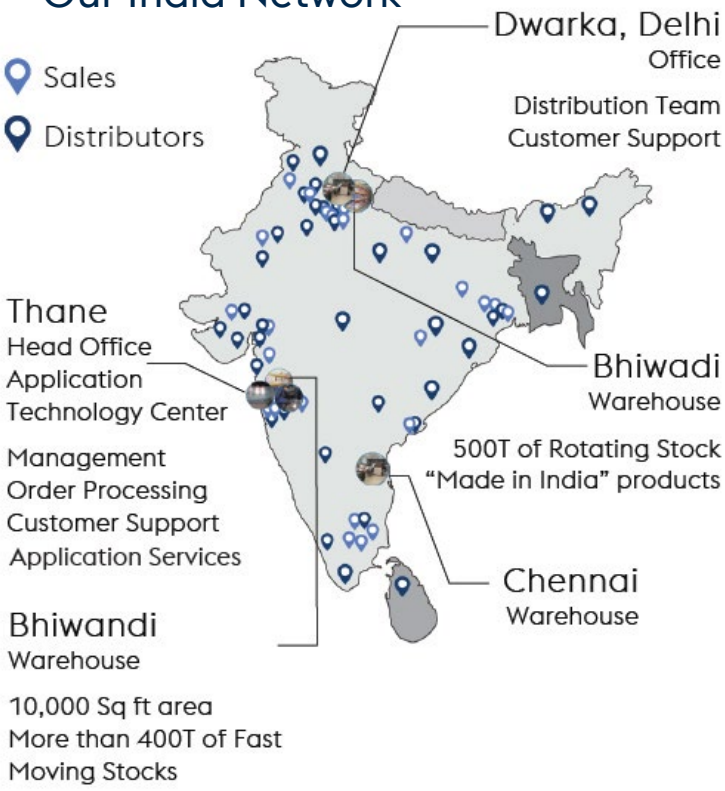
voestalpine
ONE STEP AHEAD.

voestalpine Bohler Welding India

voestalpine Bohler Welding India Pvt. Ltd., is a fully owned subsidiary of voestalpine Bohler Welding GmbH for the region covering India, Sri Lanka, Nepal and Bangladesh. voestalpine Bohler Welding is associated with Indian market for past 40 years providing solutions for all welding jobs, services to all industries.

The sales company in India started in 2006, with its Head Office based out of Thane (near Mumbai) and Sales personnel spread across the Nation. In the last 20 years voestalpine Bohler Welding has spread its wings across industries and has an established distribution network to service the customers need.

Our India Network



We provide expertise and know-how for the brands:

» Bohler Welding
» UTP Maintenance
» Fontargen Brazing

With the acquisition in India in 2013, the company now has its own production facility based out of Bhiwadi, Rajasthan. Production facility in Bhiwadi focuses on supplying the Unalloyed, Medium alloyed and High alloyed stick electrodes. In past few years, investments have been put in improving the Quality standards, R&D and in New Product Development. With the inclusion of the World Class Flux Cored line, the company is also focussing on producing Unalloyed and hardfacing Flux Cored wires in India. With this facility, voestalpine Bohler Welding India is the first company in India to have European Technology based Flux cored line.

Our voestalpine Bohler Welding Application Technology Centre at Thane supports customers with specialised training programmes, local application support, product demonstrations and trials.


böhler welding
by voestalpine
böhler
böhler welding
böhler welding
DEERSOft®

Lasting Connections

As a globally active supplier in the field of joint welding, Bohler Welding offers its customers the best solutions and products. With the support of a worldwide network of industrial segment managers and application engineers, local experts can guarantee the optimum solutions. With over 100 years of experience, Bohler Welding has actively shaped the history of welding technology and will continue to do so in the future.

Our clients benefit from a partner with

- the highest expertise in joining, rendering the best application support globally available
- specialized and best in class product solutions for their local and global challenges
- an absolute focus on customer needs and their success
- a worldwide presence through factories, offices and distributors

Content

For high demanding industries

Automotive
Welding consumables of Bohler Welding are used in numerous demanding areas of the automobile industry, e.g. in auto body construction, production of axles and in the manufacture of exhaust systems. Our new generation of metal cored wires has already been successfully applied by notable branch leaders and enables the highest process reliability while at the same time minimising scrap rates and rectification costs.

Chemical and petrochemical processing industry
Top quality high-alloyed welding consumables made by Bohler Welding are available for plant construction. Decades of first hand experience in development, manufacture and applications provides users with the assurance of the highest metallurgical standards, consistently high product quality and excellent welding characteristics. Reliable resistance to corrosion and ageing ensures safe and enduring operation of the plants.

Pipeline
The laying of pipelines through varying climatic zones and terrain demands a high level of engineering ingenuity. Bohler Welding faces this task in close collaboration with the leading pipelaying companies and offers a unique product portfolio for the pipeline industry. The toughness of the weld metal, which is decisive for safety, is of primary concern. Over 100,000 km of pipeline successfully laid worldwide with welding consumables made by Bohler Welding confirm the trust placed in our products.

Steel construction and special designs
For metallurgically demanding structures in bridges and steel construction as well as in the field of fine grained steels for crane and vehicle manufacture, the proven quality of Bohler Welding is a key to reducing manufacturing costs and ensuring structural safety. The excellent welding characteristics are valued by welders all over the world.

Thermal power
The demands for higher efficiency with improved economy and a simultaneously reduced environmental impact continually spurs the development of new materials for thermal power plants. Bohler Welding develops these high temperature and creep resistant filler metals working closely with leading steel producers and power station operators worldwide.

Hydropower
For the construction of Francis, Kaplan and Pelton turbines, Bohler Welding offers high quality, specialised welding consumables, which are optimally suited for type 316L stainless steel as well as for 13%Cr-4%Ni alloys. For the associated pressure pipelines we also offer a wide product range which meets the strictest safety requirements while also ensuring excellent mechanical properties.

Covered electrodes, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX N 6013 AWS A5.1: E6013 EN ISO 2560 - A: E 42 0 RC 11	C: 0.06 Si: 0.30 Mn: 0.45 P: 0.025 S: 0.020	Heat treatment: As welded UTS: 520 MPa YS: 440 MPa El: 25% CVN Impact: 0°C: 55J	2.50 x 350 3.20 x 350 4.00 x 350/450 5.00 x 350/450	ABS, BIS, IRS, IBR	Excellent weldability in all position thus ease of manipulation & high welder appeal. The deposited weld metal is of radiographic quality. Excellent re-striking and arc stability characteristics and usable on low OCV transformers (OCV~45V). Good fluidity & excellent passage through joints thus helps easy & controlled flow of weld metal including bad fit-up joints & tack welding. Typical applications are storage tanks, boiler tubes, railway wagons, ships, trawlers, dredgers, machinery construction, bridges & sheet metal works.
BOHLER FOX N 63X AWS A5.1 E 6013	C: 0.07 Si: 0.30 Mn: 0.45 P: 0.025 S: 0.020	Heat treatment: As welded UTS: 510 MPa YS: 440 MPa El: 23% CVN Impact: 0°C: 50J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	BIS, IBR, IRS	It is a medium coated rutile type electrode for all position welding. Smooth & stable arc with low spatter, easy slag removal and fine rippled bead are special characteristics. Weld deposit has good chemical and mechanical properties with radiography quality. Welding of structural steels, truck bodies, dies, steel furniture, maintainace work & genaral fabrication of steel are the applications of this product.
MARUTI FS AWS A5.1: E6012	C: 0.08 Si: 0.30 Mn: 0.40 P: 0.025 S: 0.025	Heat treatment: As welded UTS: 510 MPa YS: 430 MPa El: 23% CVN Impact: 0°C: 50J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	-	A medium coated, all position electrode for jobs of structural importance. The electrode operates with quiet arc and deposits a smooth bead with fine ripples. It gives medium penetration, least spatter and easy slag removal. It is easy to operate in all positions including vertical down. Suitable for general purpose mild steel welding, steel structures, tanks, railway wagons, storage tanks etc.
MARUTI - A1 AWS A5.1: E6013	C: 0.08 Si: 0.30 Mn: 0.40 P: 0.025 S: 0.025	Heat treatment: As welded UTS: 510 MPa YS: 430 MPa El: 23% CVN Impact: 0°C: 50J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	BIS	A medium coated all position mild steel rutile coated electrode. It gives normal penetration, finely rippled bead and easy slag removal. Suitable for structures, building construction, vessels, tanks, pipeline and railway wagons etc.
MARUTI - 44 AWS A5.1: E6013 EN ISO 2560 A: E 38 A RC 11	C: 0.07 Si: 0.25 Mn: 0.45 P: 0.025 S: 0.025	Heat treatment: As welded UTS: 520 MPa YS: 450 MPa El: 24% CVN Impact: 0°C: 56J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	BIS, IBR	A medium heavy coated rutile type electrode, specially designed for radiographic quality welds. Low spatter, easy slag removal, adequate penetration and smooth bead are its special features. Suitable for welding rail coaches, wagons, storage tanks, pipeline, pressure vessel and heavy structure etc.
MARUTI - 66 AWS A5.1: E6013 EN ISO 2560 - A: E 38 A RC 11	C: 0.07 Si: 0.25 Mn: 0.45 P: 0.025 S: 0.022	Heat treatment: As welded UTS: 530 MPa YS: 450 MPa El: 24% CVN Impact: 0°C: 58J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	BIS, IBR	A heavy coated rutile type electrode for achieving welds of superior finish and radiographic quality. It gives low spatter and excellent self lifting slag, striking and re-striking are excellent. Suitable for wagon building, locomotive fabrication, auto component, pipelines and steel furniture. Also suitable for thin steel due to its fine droplet transfer etc.

Covered electrodes, unalloyed

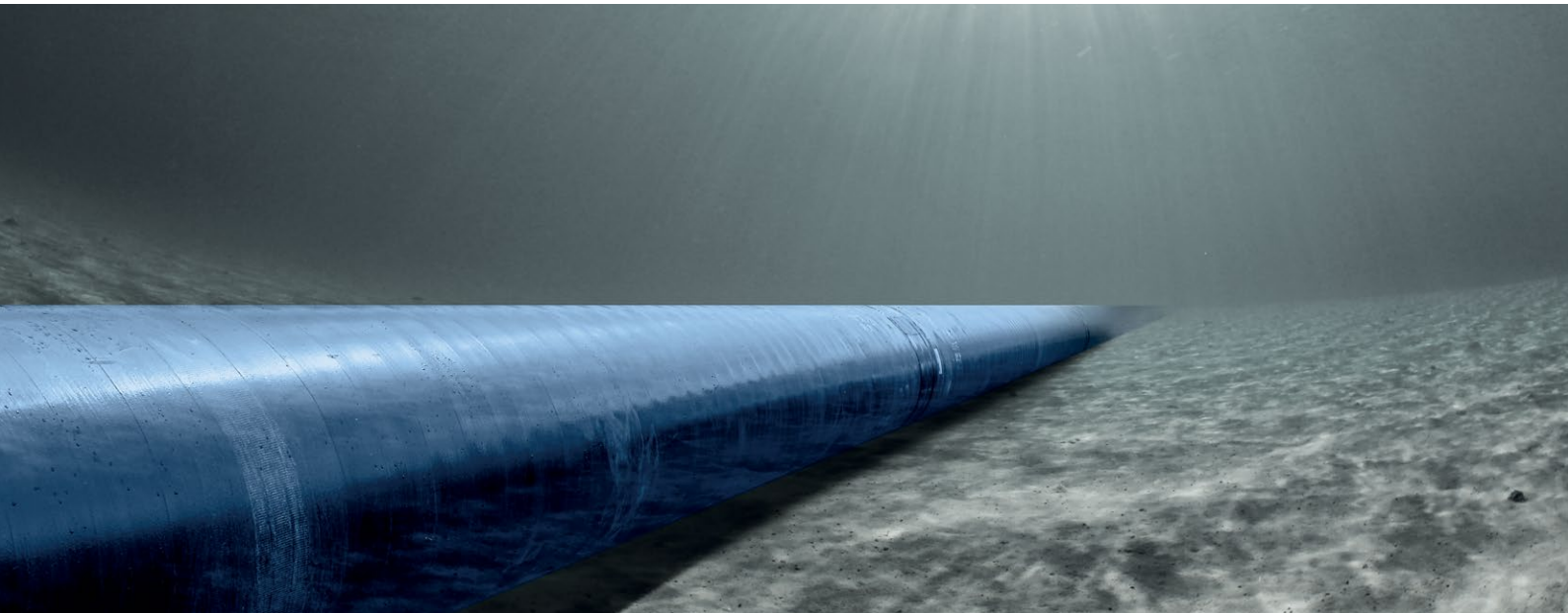
Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
MARUTI - XL AWS A5.1: E6013 EN ISO 2560 A: E 38 A RC 11	C: 0.06 Si: 0.25 Mn: 0.45 P: 0.025 S: 0.022	Heat treatment: As welded UTS: 520 MPa YS: 440 MPa El: 24% CVN Impact: 0°C: 56J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	BIS	A rutile type medium coated electrode, gives smooth arc with low spatter, slag comes off easily and gives shining bead of smooth profile & radiographic quality. Suitable for welding rail coaches, wagons, storage tanks, pipeline, pressure vessel and heavy structure etc.
MARUTI 63X-AP(SPL) AWS A5.1: E6013 EN ISO 2560 A: E 38 A RC 11	C: 0.05 Si: 0.30 Mn: 0.50 P: 0.020 S: 0.015	Heat treatment: As welded UTS: 520 MPa YS: 445 MPa El: 24% CVN Impact: 0°C: 56J	2.50 x 350 3.15 x 350/450 4.00 x 350/450 5.00 x 450	-	It is a Medium rutile coated electrode for unalloyed steels. Excellent welding characteristic in vertical down position. Good current capacity hence no red hot tendency. Very good slag removal. Strong arc force helps to achieve good penetration. Exceptionally good for transformer manufacturing fabrication.
ULTRA 7016 AWS A5.1: E7016	C: 0.06 Si: 1.30 Mn: 0.50 P: 0.025 S: 0.020	Heat treatment: As welded UTS: 540 MPa YS: 470 MPa El: 28% CVN Impact: -30°C: 80J	2.50 x 350 3.15 x 450 4.00 x 450 5.00 x 450	RDSO Class A3-B1	Ultra 7016 is a basic coated low hydrogen electrode for welding of medium and high tensile structural steel and depositing buffer layer before hard surfacing. Yields sound radiographic welds having excellent mechanical properties. Suitable for railway coaches, ships, oil tanks, heavy duty structure, earth moving machinery and also joining mild steel to cast iron etc. Also suitable for buffer layers on CI.
ULTRA 7018 AWS A5.1: E7018 EN ISO 2560 A: E 42 5 B 4 2 H5	C: 0.05 Si: 0.40 Mn: 1.20 P: 0.025 S: 0.015 Cr: 0.02 Mo: 0.003 Ni: 0.015	Heat treatment: As welded UTS: 550 MPa YS: 460 MPa El: 30% CVN Impact: -30°C: 90J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	BIS, CIB, BHEL,	Ultra 7018 is a basic coated electrode with very good welding characteristics, including out of position work. With weld metal recovery about 110%, thus higher productivity. Weld of consistent radiographic quality is achieved along with extremely good slag detachability thus greater weld appeal.
BOHLER FOX N EV 48 AWS A5.1: E7018 EN ISO 2560 - A: E 42 3 B 3 2 H5	C: 0.05 Si: 0.40 Mn: 1.20 P: 0.025 S: 0.020 Cr: 0.02 Mo: 0.003 Ni: 0.015	Heat treatment: As welded UTS: 550 MPa YS: 460 MPa El: 28% CVN Impact: -30°C: 100J Heat treatment: 610°C / 12h UTS: 530 MPa YS: 432 MPa El: 30% CVN Impact: -30°C: 110J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	IBR, LRS, IRS, BV, ABS	Basic covered electrode with very good welding characteristics, including out of position work. High impact properties at -30°C, thus produces tougher weld. Weld metal recovery about 115%, thus higher productivity. Extremely good slag detachability, thus greater weld appeal. Low spatter and finely rippled bead with regular profile reduces machining work. Weld of consistent radiographic quality is achieved.

Covered electrodes, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX N EV 48-1 AWS A5.1: E7018-1 EN ISO 2560 - A: E 42 5 B 3 2 H5	C: 0.045 Si: 0.45 Mn: 1.3 P: 0.024 S: 0.015 Cr: 0.02 Mo: 0.003 Ni: 0.015	Heat treatment: As welded UTS: 562 MPa YS: 465 MPa El: 28% CVN Impact: -45°C: 90J Heat treatment: 610°C / 12h UTS: 536 MPa YS: 436 MPa El: 30% CVN Impact: -45°C: 62J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	IBR, LRS, IRS, ABS	Basic coated electrode with excellent welding characteristic and positional welding. Tough weld with high impact strength at -45°C. Weld metal recovery about 115%, thus higher productivity. Extremely good slag detachability thus greater welder comfort. Low spatter and finely rippled bead with regular profile reduces dressing work. Weld of consistent radiographic quality is achieved.
BOHLER FOX N EV 50 AWS A5.1: E7018 H4R EN ISO 2560 - A: E 42 3B 42 H5	C: 0.08 Si: 0.5 Mn: 1.25 P: 0.020 S: 0.015 Cr: 0.015 Mo: 0.002 Ni: 0.012	Heat treatment: As welded UTS: 575 MPa YS: 470 MPa El: 28% CVN Impact: -30°C: 100J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	IBR, LRS, ABS	Basic covered electrode with very good welding characteristics including out of position work. Excellent impact properties down to - 30°C. Diffusible Hydrogen level < 4ml /100 gm. Weld metal recovery about 115%. Crack free weld metal when welding high carbon steels. Suitable for use in tank construction, boiler & pressure vessel manufacturing, vehicle manufacturing, offshore applications and ship building.
BOHLER FOX N EV 50-1 AWS A5.1: E7018-1 H4R EN ISO 2560 - A: E 42 5B 4 2 H5	C: 0.07 Si: 0.5 Mn: 1.3 P: 0.020 S: 0.015 Cr: 0.015 Mo: 0.002 Ni: 0.012	Heat treatment: As welded UTS: 575 MPa YS: 480 MPa El: 28% CVN Impact: -45°C: 80J	2.50 x 350 3.15 x 350/450 4.00 x 450 5.00 x 450	IBR, LRS, ABS	Basic covered electrode with very good welding characteristics including out of position work. Good impact properties down to -45°C. Diffusible Hydrogen level < 4ml /100 gm. Weld metal recovery about 115%. Crack free weld metal when welding high carbon steels. Suitable for use in tank construction, boiler & pressure vessel manufacturing, vehicle manufacturing, offshore applications and ship building.
BOHLER FOX CEL + AWS A5.1: E6010 EN ISO 2560-A: E 38 2 C 2 1	C: 0.17 Si: 0.15 Mn: 0.6	Heat treatment: As welded UTS: 520 MPa (470 - 600) YS: 430 MPa (≥380) El: 26% (≥ 22) CVN Impact: +20°C: 105J -20°C: 60J (≥ 47) -30°C: 50J (≥ 27)	2.5 x 300 3.2 x 350 4.0 x 350	TÜV (19380.), 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, BOHLER 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. BOHLER FOX CEL+ can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84). Test values of SSC-test are available too.

Covered electrodes, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX CEL 70-P AWS A5.5: E7010-P1 EN ISO 2560-A: E 42 3 C 25	C: 0.15 Si: 0.1 Mn: 0.45 Ni: 0.17	Heat treatment: As welded UTS: 560 MPa (500 – 640) YS: 460 MPa (≥ 420) El: 23% (≥ 22) CVN Impact: +20°C: 100J -20°C: 80J -30°C: 65J (≥ 47)	3.2 x 350 4.0 x 350 4.8 × 350 5.0 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. BOHLER FOX CEL 70-P provides an intense arc and a fluid weld metal. It can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84). Test values of SSC-test are available too.
BOHLER FOX CEL 80-P AWS A5.5: E8010-P1/E8010-G EN ISO 2560-A: E 46 3 1Ni C 2 5	C: 0.15 Si: 0.15 Mn: 0.7 Ni: 0.8	Heat treatment: As welded UTS: 580 MPa (550 – 680) YS: 490 MPa (≥460) El: 23% (≥20) CVN Impact: +20°C: 90J -20°C: 80J -30°C: 60J (≥ 47)	3.2 x 350 4.0 x 350 4.8 × 350 5.0 x 350	TÜV, CE	Cellulose electrode for vertical down welding of high strength, large diameter pipelines. Highly economical compared with conventional vertical up welding. Especially recommended for hot pass, filler and cover layers. The BOHLER FOX CEL 80-P provides a more intensive arc and a more fluid weld metal as compared to the well known BOHLER FOX CEL 85. BOHLER FOX CEL 80-P can also be used in sour gas applications (HIC-Test acc. to NACE TM-02-84). Test values for SSC-test are available too.
BOHLER FOX BVD 85 AWS A5.5: E8045-P2H4R / E8018-GH4R EN ISO 2560-A: E 46 5 1Ni B 4 5 H5	C: 0.05 Si: 0.4 Mn: 1.1 Ni: 0.9	Heat treatment: As welded UTS: 560 MPa (550 – 680) YS: 500 MPa (≥460) El: 27% (≥20) CVN Impact: +20°C: 170J -30°C: 120J -40°C: 100J -50°C: 65J (≥ 47)	3.2 x 350 4.0 x 350 4.5 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. Deposit is extremely crack resistant, and features high toughness and a very low hydrogen content. Special design and development work has enabled this electrode to provide exceptional striking characteristics and the avoidance of start porosity. Due to this and the good welding characteristics this special basic electrode offers easy handling even under field conditions. Bohler Fox BVD 85 can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84). Test values for SSC-test are available too.



Covered electrodes, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX N DMO Kb AWS A5.5: E7018-A1 H4R EN ISO 3580-A: E Mo B 4 2 H5	C: 0.06 Si: 0.35 Mn: 0.60 S: 0.010 P: 0.015 Cr: 0.04 Mo: 0.50	Heat treatment: 620°C, 1h UTS: 580 MPa YS: 475 MPa El: 24% CVN Impact: +25°C: 180J	2.50 x 350 3.15 x 450 4.00 x 450 5.00 x 450	IBR	Basic coated electrode for high quality welded joints of 0.5% Mo alloyed boiler, plate and tube steels. Suitable in long term condition up to + 500°C service temperature. Crack resistant, ductile deposit and high creep rupture strength. Diffusible H2 content less than 4ml/100gm. Self lifting slag, flat and shiny bead. Excellent arc force helps to achieve radiographic quality weld deposit. Deposition Efficiency 115%.
BOHLER FOX N DCMS Kb AWS A5.5: E8018-B2 H4R EN ISO 3580 - A: E Cr Mo 1B 42 H5	C: 0.070 Si: 0.40 Mn: 0.60 S: 0.010 P: 0.015 Cr: 1.30 Mo: 0.50 As: <0.005 Sb: <0.005 Sn: <0.005	Heat treatment: 690°C, 1h UTS: 605 MPa YS: 510 MPa El: 23% CVN Impact: +25°C: 150J	2.50 x 350 3.15 x 450 4.00 x 450 5.00 x 450	IBR	Basic coated electrode for 1.25% Cr, 0.5% Mo alloyed boiler, plate, and tube steels. Suitable in long-term condition up to +570 °C service temperature. Reliable creep ruptures properties for the whole service life of a boiler plant. High toughness, crack resistant, weld metal can be quenched and tempered. Penetrating arc and excellent in positional welding. Diffusible Hydrogen content < 4ml/100 gm. Deposition efficiency 115%.
PHOENIX CHROMO 1 AWS A5.5: E8018-B2 EN ISO 3580-A: E CrMo1 B 4 2 H5	C: 0.06 Si: 0.25 Mn: 0.85 Cr: 1.20 Mo: 0.50 P: < 0.012 As: < 0.010 Sb: < 0.005 Sn: < 0.005	Heat treatment: 690°C / 10h UTS: 550 MPa YS: 460 MPa El: 22% CVN Impact: +20°C: 120J -20°C: 100J -40°C: 60J	2.5 x 350 3.2 x 350/450 4.0 x 350/450 5.0 x 450	TÜV, CE	Basic covered CrMo alloyed electrode. Cryogenic, suitable for quenching and tempering; resistant to caustic cracking; creep resistant in short time range up to 500°C (932°F) and in long time range up to 570 °C (1058°F). Electrode for heavy duty steam boiler and superheater tube fabrication; for quenched and tempered steels.
BOHLER FOX N CM 2 Kb AWS A5.5: E9018 - B3 H4R EN ISO 3580 - A: E CrMo2 B 4 2 H5	C: 0.075 Si: 0.45 Mn: 0.65 S: 0.010 P: 0.015 Cr: 2.30 Mo: 1.0 As: <0.006 Sb: <0.006 Sn: <0.006	Heat treatment: 690°C, 1h UTS: 660 MPa YS: 560 MPa El: 20% CVN Impact: +25°C: 175J	2.50 x 350 3.15 x 450 4.00 x 450 5.00 x 450	IBR	Basic coated electrode for 2.25% Cr, 1%Mo alloyed boiler, plate and tube steels. Suitable in long term condition up to +600°C service temperature. Crack resistant, tough weld and high creep rupture strength. Diffusible H2 content less than 4ml/100gm. Self lifting slag, flat and shiny bead. Excellent arc force helps to achieve radiographic quality weld deposit. Deposition efficiency 115%.
PHOENIX SH CHROMO 2 KS AWS A5.5: E9015-B3 H4 EN ISO 3580-A: E CrMo2 B 4 2 H5	C: 0.07 Si: 0.22 Mn: 0.75 S: ≤ 0.010 P: ≤ 0.012 Cr: 2.20 Mo: 0.90 As: ≤ 0.010 Sb: ≤ 0.005 Sn: ≤ 0.005	Heat treatment: 690°C, 1h UTS: 660 MPa (≥ 620) YS: 540 MPa (≥ 530) El: 21 %(≥18) CVN impact: +20°C: 180J (≥47)	2.50 x 250 3.20 x 350 3.20 x 450 4.00 x 350 4.00 x 450 5.00 x 450	TÜV, CE	The 2,25Cr-1Mo type weld metal exhibits a bainitic microstructure with favorable mechanical properties in tempered and quenched condition. The range of application covers joint welding of similar alloyed creep resistant steel and steel casting in thermal power and chemical industry. Approved for application under creep condition at design temperatures up to 600°C. Due to the low content of residual and tramp elements the weld metal offers a Bruscato factor < 12 ppm. Thus, being resistant to temper embrittlement and complies with the requirements on step-cooling testing. The basic coating guarantees low level of diffusible hydrogen in the weld metal.

Covered electrodes, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX CrMo 2V AWS A5.5: E9015-G EN ISO 3580-A: E Z CrMo2V B 4 2 H5	C : 0.09 Si : 0.25 Mn : 0.75 Cr : 2.5 Mo : 1.0 V : 0.25 Nb : 0.01	Heat treatment: 705°C, 8h UTS : 660 MPa (585-760) YS: 550 MPa (415-620) El: 19% (18) CVN impact: +20°C: 140J -20°C: 100J -30°C: 70J (54) -40°C: 55J	3.2 × 450 4.0 × 450 5.0 × 450	VdTÜV (10230)	BOHLER FOX CrMo 2V is a core wire alloyed electrode with basic coating for welding of 2.25Cr-1Mo-0.25V steels. The weld metal exhibits a bainitic microstructure with favorable mechanical properties in tempered condition. The range of application covers joint welding of similar alloyed creep resistant steel for the fabrication of thick walled pressure vessel in the petrochemical industry. Approved for application under creep condition at design temperatures up to 550 °C. Impact energy is excellent down to temperatures <-30 °C. Being resistant to temper embrittlement and complies with the requirements on step-cooling testing. The optimized coating results in minimal moisture pick up and guarantees low level of diffusible hydrogen in the weld metal.
BOHLER FOX CM 5 Kb AWS A5.5: E8018-B6H4R EN ISO 3580-A: ECrMo5 B 4 2 H5	C: 0.08 Si: 0.3 Mn: 0.8 Cr: 5.0 Mo: 0.6	Heat treatment: 730°C/2h UTS: 620 MPa (≥550) YS: 520 MPa (≥460) El: 21% (≥ 17) CVN Impact: +20°C: + 130J (≥47)	2.5 x 250 3.2 x 350 4.0 x 350	TÜV, CE	BÖHLER FOX CM 5 kb is a covered electrode with basic coating for shielded metal arc welding. The 5Cr-0.6Mo type weld metal exhibits a martensitic-bainitic microstructure with favorable mechanical properties in tempered and quenched condition. The range of application covers joint welding of similar alloyed creep resistant steel and steel casting in thermal power and chemical industry. Approved for long-term service under creep condition up to 650 °C. The basic coating guarantees low level of diffusible hydrogen in the weld metal and a metal recovery of approximately 115%.
BOHLER FOX CM 9 Kb AWS A5.5: E8018-B8 H4 EN ISO 3580-A: E CrMo9 B 4 2 H5	C : 0.08 Si : 0.25 Mn : 0.65 Cr : 9.0 Mo : 1.0	Heat treatment: 760°C/2h UTS: 715 MPa (≥620) YS: 580 MPa (≥ 530) El: 25% (≥18) CVN impact: +20°C: 80J (≥34)	2.5 × 250 3.2 × 350 4.0 × 350 5.0 × 450	TÜV, CE	BOHLER FOX CM 9 Kb is a core wire alloyed covered electrode with basic coating for shielded metal arc welding. The 9Cr-1Mo type weld metal exhibits a fully tempered martensitic microstructure with favorable mechanical properties in post weld heat treated condition. The range of application covers joint welding of similar alloyed creep resisting steels tube, pipe, plate and forgings used in the thermal power and petrochemical industry. BÖHLER FOX CM 9 Kb is aproved for long-term service up to 600 °C. Its basic coating guarantees low level of diffusible hydrogen in the weld metal and metal recovery of approximately 115 %.
THERMANIT CHROMO 9 V AWS A5.5: E9015-B91 H4 EN ISO 3580-A: E CrMo9 1 B 4 2 H5	C: 0.1 Si: 0.2 Mn: 0.6 Cr: 8.5 Mo: 0.9 Ni: 0.5 V: 0.2 Nb: 0.05 N: 0.04	Heat treatment: 760°C/2h UTS: 730 MPa (≥620) YS: 600 MPa (≥ 530) El: 19% (≥ 17) CVN impact: +20°C: 80J (≥ 47)	2.5 x 250 3.2 x 350 4.0 x 350 5.0 x 450	TÜV, CE	Thermanit Chromo 9 V is a covered electrode with basic coating for shielded metal arc welding. The 9Cr-1Mo-VNb type weld metal exhibits a fully tempered martensitic microstructure with favorable mechanical properties in post weld heat treated condition. The range of application covers joint welding of similar alloyed creep strength enhanced ferritic steels like ASTM grade 91 tube, pipe, plate, forgings and castings, used in the thermal power and petrochemical industry. Thermanit Chromo 9 V is approved for long-term service at temperatures up to 650 °C. The covering concept of Thermanit Chromo 9 V ensures easy handling, designed for welding under difficult conditions in combination with low level of diffusible hydrogen.

Covered electrodes, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
THERMANIT CHROMO 9 V MOD AWS A5.5: E9015-B91 H4 EN ISO 3580-A: EZ CrMo91 B 4 2 H5	C: 0.10 Si: 0.2 Mn: 0.8 Cr: 9.0 Mo: 1.1 Ni: 0.1 V: 0.2 Nb: 0.05 N: 0.04	Heat treatment: 760°C/2h UTS: 730 MPa (≥ 620) YS: 595 MPa (≥ 530) El: 19% (≥ 17)CVN impact: +20°C: 80J (≥ 47)	2.5 x 250 3.2 x 350 4.0 x 350 5.0 x 450	CE	Thermanit Chromo 9 V Mod is a basic coated stick electrode. The 9Cr-1Mo-VNb type weld metal exhibits a fully tempered martensitic microstructure with favorable mechanical properties in post weld heat treated condition. The range of application covers joint welding of similar alloyed creep strength enhanced ferritic steels like ASTM grade 91 tube, pipe, plate, forgings and castings, used in the thermal power and petrochemical industry. The chemical composition is optimized in order to provide a high creep resistant and ductile weld metal after post weld heat treatment along with low level of trace elements. The covering concept of Thermanit Chromo 9 V Mod ensures easy handling, designed for welding under diffi cult conditions in combination with low level of diffusible hydrogen.
BOHLER FOX C 9 MV AWS A5.5: E9015-B91H4 EN ISO 3580-A: E CrMo 9 1 B 4 2 H5	C: 0.10 Si: 0.2 Mn: 0.6 Cr: 8.5 Ni: 0.5 Mo: 0.9 Nb: 0.05 V: 0.2 N: 0.04	Heat treatment: 760°C / 2h UTS : 710 MPa (≥ 620) YS: 580 MPa (≥ 530) El: 19% (≥ 17) CVN Impact: +20°C: 70J (≥ 47)	2.50 x 250 3.20 x 350 4.00 x 350 5.00 x 450	TÜV, CE	The 9Cr-1Mo-VNb type weld metal exhibits a fully tempered martensitic microstructure with favorable mechanical properties in post weld heat treated condition. The range of application covers joint welding of similar alloyed creep strength enhanced ferritic steels like ASTM grade 91 tube, pipe, plate, forgings and castings, used in the thermal power and petrochemical industry. Approved for long-term service at temperatures up to 650 °C. The chemical composition is optimized in order to provide a high creep resistant and ductile weld metal after post weld heat treatment along with low level of trace elements. Thanks to the restricted Mn+Ni content of less than 1.2 wt. % the A C1 temperature is certainly above 780 °C.
THERMANIT MTS 616 AWS A5.5: E9015-B92 H4 EN ISO 3580-A: E Z CrMoWVNb9 0, 5 2 B 4 2 H5	C: 0.11 Si: 0.2 Mn: 0.6 Cr: 8.8 Mo: 0.5 Ni: 0.6 V: 0.2 W: 1.7 Nb: 0.04 N: 0.04	Heat Treatment: 760°C/2h UTS: 730 MPa (≥ 620) YS: 590 MPa (≥530) El: 19% (≥17) CVN impact: +20°C: 50J (≥41)	2.5 x 300 3.2 x 350 4.0 x 350 5.0 × 450	TÜV, IBR, CE	The basic coated core wire alloyed electrode is specially designed for welding of creep resistant tempered martensitic 9 % Cr steels. The electrode is used for the fabrication of turbine and boiler components in thermal power plants. It features 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.
BOHLER FOX EV 64 (PHOENIX SH SCHWARZ 3 K NI) AWS A5.5: E9018-G EN ISO 2560-A: E 50 4 Z1NiMo B 4 2 H5	C: 0.06 Si: 0.30 Mn: 1.4 P: ≤ 0.01 S: ≤ 0.01 Mo: 0.5 Ni: 0.95 Cu: ≤ 0.08	Heat treatment: As welded UTS: 620 MPa YS: 540 MPa (≥ 530) El: 20% (≥18) CVN Impact: +20°C: 140J -40°C: 60J (≥ 47)	2.5 x 350 3.2 x 350 4.0 x 350 5.0 x 450	TÜV, KTA, CE	Basic coated NiMo alloyed electrode with a weld metal of special metallurgical purity for nuclear reactor construction. Very low hydrogen content < 5 ml/100 g; NDT-tested. Used preferably for the welding of steels in the construction of nuclear reactors, boiler and pressure vessels; for fine grained structural steels up to S500Q.

Covered electrodes, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX 2.5 Ni AWS A5.5: E8018-C1H4R EN ISO 2560-A: E 46 8 2Ni B 4 2 H5	C: 0.04 Si: 0.3 Mn: 0.8 Ni: 2.4	Heat treatment: As welded UTS: 570 MPa (≥ 530 – 680) YS: 490 MPa (≥ 460) El: 30% (≥ 20) CVN Impact: +20°C: 180J -80°C: 110J (≥ 47)	2.5 x 350 3.2 x 350 4.0 x 450 5.0 x 450	TÜV, DB, ABS, BV, DNV, LR, WIWEB, CE	Basic Ni alloyed electrode for unalloyed and Ni alloyed fine grained construction steels. Tough, crack resistant weld deposit. Low temperature toughness to -80°C. Good weldability in all position except vertical down. Very low hydrogen content (acc. AWS condition HD < 4ml/100g weld metal) with a moisture resistant coating.
BOHLER FOX EV 60 AWS A5.5: E8018-C3H4R EN ISO 2560-A: E 46 6 1Ni B 42 H5	C: 0.07 Si: 0.4 Mn: 1.15 Ni: 0.9	Heat treatment: As welded UTS: 600 MPa (550 – 680) YS: 510 MPa (≥ 460) El: 29% (≥ 20) CVN Impact: +20°C: 200J -60°C: 120J (≥47)	2.5 x 350 3.2 x 350 4.0 x 350/450 5.0 x 450	TÜV, DNV, RMR, VG 95132, ABS, CE	Basic coated, 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 %. Easy weldability in all positions except vertical down. Very low hydrogen content (acc. AWS condition HD < 4 ml/100 g weld metal) with a moisture resistant coating.
BOHLER FOX EV 65 AWS A5.5: E8018-G H4R / E8018-D1 H4R (mod.) EN ISO 18275-A: E 55 6 1NiMo B 4 2 H5	C: 0.06 Si: 0.3 Mn: 1.2 Ni: 0.8 Mo: 0.35	Heat treatment: As welded UTS: 650 MPa (610 – 780) YS: 590 Mpa (≥ 550) El: 25% (≥ 18) CVN Impact: +20°C: 190J -60°C: 90J (≥47)	2.5 × 350 3.2 × 350 4.0 × 350/450 4.8 × 450 5.0 × 450	TÜV, NAKS, VG 95132, BV, RMRS, ABS, CE	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). BOHLER FOX EV 65 can be used in sour gas applications (HIC Test acc. NACE TM-02-84). Test values for SSC test are available on request.
BOHLER FOX EV 70 AWS A5.5: E9018-GH4R / E9018-D1H4R (mod.) EN ISO 18275-A: E 55 6 1NiMo B 4 2 H5	C: 0.04 Si: 0.3 Mn: 1.2 Ni: 0.9 Mo: 0.4	Heat treatment: As welded UTS: 670 MPa (≥620 – 780) YS: 590 MPa (≥ 550) El: 24% (≥18) CVN Impact: +20°C: 160J -60°C: 70J (≥ 47)	2.5 x 350 3.2 x 350 4.0 x 450 5.0 x 450	TÜV, CE	Basic coated, Mo-Ni alloyed electrode exhibiting high ductility and crack resistance 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 class HD < 4 ml/100 g weld metal) with moisture resistant coating.
BOHLER FOX N EV85-G AWS A5.5: E 11018-G H4R EN ISO 18275-A: E 69 6 Mn2NiCrMo B 4 2 H5	C: 0.05 Si: 0.20 Mn: 1.40 S: 0.010 P: 0.020 Cr: 0.30 Ni: 1.65 Mo: 0.35	Heat treatment: As welded UTS : 820 MPa YS: 710 MPa El: ≥18% CVN Impact: -51°C: 55J	2.50 x 350 3.15 x 450 4.00 x 450 5.00 x 450	-	Bohler Fox N EV85-G basic coated low hydrogen type electrode specially designed for use in high strength applications and formulated to resist cracking under conditions of high humidity and restraints. Weld deposit is of radigraphic quality and sound mechanical properties. Suitable for penstocks, earth moving equipment and other heavy steel fabrications made from Q & T high tensile steels etc. Very low hydrohen content (HD ~ 4ml /100 gm of weld metal)

Covered electrodes, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
SUPERALOY - 1A AWS A5.4: E308 -16	C: 0.05 Si: 0.45 Mn: 1.20 S: 0.015 P: 0.035 Cr: 18.70 Mo: 0.1 Ni: 9.1	UTS: 580 MPa El: 34%	2.50 x 350 3.15 x 350 4.00 x 350	-	Low carbon 19/9 type stainless steel electrode with properties like oxidation and corrosion resisatnce, resiatnace to hot cracking. Electrode gives smooth arc, less spatter and self peeling slag. Suitable for joining AISI 301, 302, 304 and 308 having 18 Cr/ 8 Ni. Welding of hospital apparatus, househols articles, equipments used in petrochemical, chemical and fertilizer industries etc.
SUPERALOY - 38 AWS A5.4: E308L-16	C: 0.03 Si: 0.85 Mn: 0.60 P: 0.030 S: 0.015 Cr: 18.60 Mo: 0.10 Ni: 8.10	UTS: 570 MPa El: 38%	2.50 x 350 3.15 x 350 4.00 x 450 5.00 x 450	-	Low carbon 19/9 rutile coated stainless steel electrode. Best suitable electrodes for furniture manufacturing. The electrode gives smooth arc, fine bead apperance and shiny finish. Suitable for joining AISI 301, 302, 304L and 308L and welding of utensiles, dairy machieries, equipments used in petrochemicals, chemical and fertilizer industries etc. This electrode has excellent re-striking at low OCV and low current in AC and DC
BOHLER FOX N EAS 2-16 AWS A5.4: E308L-16 EN ISO 3581 A: E 19 9 L R	C: 0.020 Si: 0.70 Mn: 0.60 P: 0.030 S: 0.020 Cr: 19.0 Ni: 10.0 FN: 3 - 8 (WRC-92)	UTS: 600 MPa El: 40%	2.50 x 350 3.15 x 350 4.00 x 350 5.00 x 350	IBR, ABS	Low carbon, austenitic stainless steel 19/9 Cr-Ni type stick electrode with rutile coating. Designed to produce first class weld deposits with reliable CVN toughness values giving 100% radiography quality welds with very good root pass and positional welding characteristics. Excellent welding properties with DC power and high resistance to hot cracking in the weld metal with good resistance to intergranular corrosion.
SUPERALOY - 2A AWS A5.4: E316 -16	C: 0.06 Si: 0.40 Mn: 0.90 P: 0.045 S: 0.020 Cr: 18.25 Mo: 2.20 Ni: 11.50 FN: 3 - 8 (WRC-92)	UTS: 560 MPa El: 35%	2.50 x 350 3.15 x 350 4.00 x 450 5.00 x 450	-	An 18 Cr /12 Ni /2.3 Mo stainless steel electrode with resistance to corrosion, cracking and heat. The weld metal has excellent creep resistant strength, welds are to chemical corrosions. The bead is finely rippled. Suitable to weld 18/8/ Mo steels such as 316 type, fabrication of stainless steel tanks used in textiles, chemical, pulp and paper industries. Corrosion resistance application such as tanks fabrication for storage of phosphoric acid, acetic acid and suplhuric acids etc.
BOHLER FOX N EAS 4M - 16 AWS A5.4: E316L-16 EN ISO 3581-A: E 19 12 3 L R	C: 0.020 Si: 0.70 Mn: 0.60 S: 0.020 P: 0.030 Ni: 12.60 Cr: 18.70 Mo: 2.30 FN: 3 - 8 (WRC-92)	UTS: 575 MPa El: 35%	2.50 x 350 3.15 x 350 4.00 x 350 5.00 x 350	IBR, ABS	A Low Carbon, Cr-Ni-Mo stainless steel electrode with rutile coating for welding of ASTM 316 & 316L stainless steel. Weld metal features a good resistance against intergranular corrosion. Passes the test as per ASTM A262 IGC Practice E. Designed to produce first class weld deposits with reliable CVN toughness values and 100% radiography quality welds with very good root pass and positional welding characteristics with self releasing slag. Good gap bridging ability, easy weld pool and slag control as well as easy slag removal even in narrow preparations resulting in clean bead surfaces and minimum post weld cleaning.

Covered electrodes, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX N CN 23/12 - 16 AWS A5.4: E309L-16 EN ISO 3581-A: E 23 12 L R	C: 0.020 Si: 0.80 Mn: 0.65 P: 0.030 S: 0.020 Cr: 23.0 Ni: 12.9 FN: 10 - 14 (WRC-92)	UTS: 575 MPa El: 35%	2.50 x 350 3.15 x 350 4.00 x 350 5.00 x 350	IBR, ABS	A Low Carbon, highly alloyed stainless steel stick electrodes with rutile coating. The electrode is designed for dissimilar welding between stainless and mild or low alloy steels. The electrode is well suited as a buffer layer when performing overlay welding on mild steels, providing an 18Cr 8 Ni deposit from the very first layer. High crack resistance is achieved through the increased ferrite content in the weld metal. Designed to produce first class weld deposits with 100% radiography quality welds with very good positional welding characteristics with self releasing slag. Excellent welding properties with DC power and high resistance to hot cracking in the weld metal. Scaling temperature – Approx. 850°C (air).
SUPERALOY - CW AWS A5.4: E310 -16	C: 0.12 Si: 0.40 Mn: 1.10 P: 0.025 S: 0.015 Cr: 27.0 Ni: 21.0	UTS: 620 MPa El: 35%	2.50 x 350 3.15 x 350 4.00 x 350 5.00 x 350	-	An all position electrode to deposit 25 Cr/20 Ni. The electrode is specially designed for oxidation and scaling resisatnce at elevated temprature at 1200°C with excellent weld metal finish, low spatter and easily removable slag. Suitable for AISI 310 grade steel, clad steel, high temperature furnace parts, gas turbine cumbustion chamber, harneable steel and disimilar steels.
BOHLER FOX N SAS 2-16 AWS A5.4: E347-16 EN ISO 3581-A: E 19 9 Nb R	C: 0.035 Si: 0.70 Mn: 0.60 P: 0.025 S: 0.020 Ni: 9.50 Cr: 19.70 Nb: 0.35 FN: 3 - 8 (WRC-92)	UTS: 620 MPa El: 34%	2.50 x 350 3.15 x 350 4.00 x 350 5.00 x 350	-	Stabilized, austenitic stick electrode with rutile coating. Excellent welding characteristic with easy slag removal and finely rippled bead, high resistance to hot cracking with resists intergranular corrosion up to +400°C. Excellent strength after PWHT (~ 690°C for 30 hrs.). Suitable where same type steels and ferritic 13% chrome steels are welded.
BOHLER FOX N CN 23/12 Mo - 16 AWS A5.4: E309LMo -16 EN ISO 3581-A: E 23 12 2 L R	C: 0.020 Si: 0.80 Mn: 0.70 P: 0.025 S: 0.020 Ni: 13.0 Cr: 23.0 Mo: 2.50 FN: 16 - 20 (WRC-92)	UTS: 720 MPa El: 32%	2.50 x 350 3.15 x 350 4.00 x 350 5.00 x 350	ABS	Low Carbon, austenitic stainless steel stick electrodes with rutile coating. The electrode is designed for dissimilar welding between stainless and mild or low alloy steels. The electrode is well suited as a buffer layer when performing overlay welding on mild steels, providing an 18Cr 8 Ni deposit from the very first layer. High crack resistance with austenite – ferrite joints and weld cladding achieved by increased FN (~ 20). Designed to produce first class weld deposits with 100% radiography quality welds with very good positional welding characteristics with self releasing slag. Excellent welding properties with DC power and high resistance to hot cracking in the weld metal.

Covered electrodes, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX A 7 (Thermanit X) AWS A5.4: E307-15 (mod.) EN ISO 3581-A: E 18 8 Mn B 2 2	C: 0.09 Si: 0.7 Mn: 6.5 Cr: 18.6 Ni: 8.8	UTS: 640 MPa (≥500) YS: 460 MPa (≥350) El: 39% (≥25) CVN Impact: +20°C: 90J	2.50 x 300 3.20 x 350 4.00 x 350 5.00 x 450 6.00 × 450	TÜV, DB, DNV, CE	Basic coated, core wire alloyed austenitic electrode of E 18 8 Mn B / E307-15 type for welding and cladding in all positions except vertical down. Versatile electrode for numerous applications – welding of "hard-to-weld" steels, dissimilar welding as well as repair and maintenance. For tough buffer and intermediate layers for cladding of rails and switches, valve seats and in hydropower plants. The weld metal offers exceptionally high ductility and elongation together with outstanding crack resistance. Good resistance to embrittlement when operating at service temperatures from –100°C up to 650°C.
AVESTA 308L/MVR AWS A5.4: E308L-17 EN ISO 3581-A: E 19 9 L R 3 2	C: 0.025 Si: 0.7 Mn: 0.7 Cr: 19.7 Ni: 10.0	UTS: 570 MPa (≥510) YS: 420 MPa (≥ 320) El: 45% (≥ 25) CVN Impact: +20°C: 70J –120°C: 40J –196°C: 34J (≥ 32)	1.5 x 250 2.0 x 300 2.5 x 350 3.2 x 350 4.0 x 450 5.0 x 450	TUV, DB, DNV, CE	Rutile coated, core wire alloyed electrode of E 19 9 L R / E308L-17 type for all position welding of 1.4301, 1.4307 / 304L stainless steels. Resulting weld microstructure is austenite with 5 – 10% ferrite. Very good corrosion resistance under fairly severe conditions, e.g. in oxidizing acids and cold or dilute reducing acids. Max. service temperature 350°C.
AVESTA 316L/SKR AWS A5.4: E316L-17 EN ISO 3581-A: E 19 12 3 L R 3 2	C: 0.02 Ni: 12.0 Si: 0.8 Mn: 0.7 Cr: 18.0 Mo: 2.8	UTS: 580 MPa (≥510) YS: 460 MPa (≥320) El: 40% (≥25) CVN Impact: +20°C: 65J -120°C: 50J (≥32)	1.5 × 250 2.0 x 300 2.5 x 350 3.2 x 350 4.0 x 450 5.0 x 450	TÜV, DB, DNV, CE	Rutile coated low carbon, core wire alloyed electrode of E 19 12 3 L R / E316L-17 type for welding 1.4404 and 1.4436 / 316L type stainless steels in all positions. The weld metal offers a good resistance to general corrosion, pitting and intercrystalline corrosion in chloride-containing environments e.g. for applications in dilute hot acids. Resulting weld microstructure is austenite with 5 – 10% ferrite. Max. service temperature 400°C.
AVESTA 310 AWS A5.4: E310-17 EN ISO 3581-A: E 25 20 R	C: 0.11 Si: 0.7 Mn: 2.0 Cr: 26.0 Ni: 21.4	UTS: 560 MPa (≥550) YS: 420 MPa (≥350) El: 25% (≥20) CVN Impact: +20°C: 65J -196°C: 45J	2.50 x 300 3.20 x 350 4.00 x 350	-	AVESTA 310 is designed for welding of high temperature stainless steel 1.4845 / ASTM 310S and similar types. To minimise the risk of hot cracking when welding fully austenitic steels like that heat input and interpass temperature must be low and there must be as little dilution as possible from the parent metal. Primary intended for high temperature applications.
BOHLER FOX SAS 4-A AWS A5.4: E318-17 EN ISO 3581-A: E 19 12 3 Nb R 3 2	C: 0.03 Si: 0.8 Mn: 0.8 Cr: 19.0 Ni: 12.0 Mo: 2.7 Nb: 0.31	UTS: 620 MPa (≥550) YS: 460 MPa (≥350) El: 35% (≥25) CVN Impact: +20°C: 60J -90°C: 50J (≥32)	2.0 × 300 2.5 × 350 3.2 × 350 4.0 × 350 5.0 × 450	TÜV, DB, CE	Rutile coated, cored wire alloyed stabilized electrode of E 19 12 3 Nb R / E318-17 type. Mainly for welding titanium and niobium-stabilized 1.4571 / 316Ti and 1.4580 / 316Cb austenitic stainless steel grades. Designed for first class weld seams and easy handling on AC or DC. High current carrying capacity with minimum spatter formation. Self-releasing slag, smooth and clean weld profile. Safety against formation of porosity due to moisture resistant coating. The corrosion resistance corresponds to that of 316Ti with good resistance to general and pitting corrosion. Max. service temperature 400°C.

Covered electrodes, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX EAS 4 M AWS A5.4: E316L-15 EN ISO 3581-A: E 19 12 3 L B 2 2	C: 0.03 Si: 0.4 Mn: 1.2 Cr: 18.8 Ni: 11.8 Mo: 2.7	UTS: 590 MPa (≥510) YS: 450 MPa (≥320) El: 42% (≥25) CVN Impact: +20°C: 130J -120°C: 62J -196°C: 38J (≥32)	2.5 x 300 3.2 x 350 4.0 x 350 5.0 x 450	TÜV, DNV CE	Basic electrode, core wire alloyed electrode of E 19 12 3 L B / E316L-15 type. Primarily used for 1.4404 and 1.4435 / 316L austenitic steel grades. Reliable toughness values down to –196°C. Good gap bridging ability and excellent X-ray safety. Good welding characteristics in all positions except vertical-down with easy weld pool and slag control. Easy slag removal even in narrow joint preparations result in clean bead surfaces with minimum post weld cleaning. Max. service temperature 400°C.
BOHLER FOX EAS 2 AWS A5.4: E308L-15 EN ISO 3581-A: E 19 9 L B 2 2	C: 0.03 Si: 0.4 Mn: 1.3 Cr: 19.8 Ni: 9.6 FN: 4 – 10	UTS: 575 MPa (≥520) YS: 420 MPa (≥320) El: 40% (≥30) CVN Impact: +20°C: 110J -196°C: 46J (≥34)	2.5 x 300 3.2 x 350 4.0 x 350 5.0 x 450	TÜV, DB, CE	Basic coated, cored wire alloyed electrode of E 19 9 L B / E308L-15 type. Primarily used for 1.4306 / 304L and 304LN steel grades. Designed to produce first class weld deposits with reliable CVN impact toughness values down to –196°C. Good gap bridging ability, very good root pass and excellent X-ray safety. Good welding characteristics in all positions except vertical-down with easy weld pool and slag control. Easy slag removal even in narrow preparations result in clean bead surfaces with minimum post-weld cleaning. Ideal electrode for welding on site. Max. service temperature 350°C. Also available as a special low ferrite version, BÖHLER FOX EAS 2 (LF).
BOHLER FOX CN 13/4 AWS A5.4: E410NiMo-15 EN ISO 3581-A: E 13 4 B 6 2	C: 0.035 Si: 0.3 Mn: 0.5 Cr: 12.2 Ni: 4.5 Mo: 0.5	Heat treatment: 600°C / 2h UTS: 910 MPa (≥ 760) YS: 680 MPa (≥ 500) El: 17% (≥ 15) CVN Impact: +20°C: 66J -20°C: 55J -60°C: 50J	2.5 x 350 3.2 x 450 4.0 x 450 5.0 x 450	TÜV, CE	Basic coated, low-hydrogen electrode of E 13 4 B / E410NiMo-15 type for welding soft-martensitic and martensitic-ferritic rolled, forged, and cast steels. Mainly used in the construction of hydro turbines and compressors. Corrosion resistance similar to matching 13Cr(Ni)- steels. Thanks to an optimum balance of alloying components, the weld deposit yields very good ductility, toughness and cracking resistance despite the high strength. Excellent operating characteristics with easy slag removal, smooth bead appearance and low hydrogen content in the weld metal (HD < 5 ml/100 g). The Ø 2.5 and 3.2 mm electrodes can be used for welding in all positions apart from vertical down. Higher recovery rate and better re-striking properties than BÖHLER FOX CN 13/4 SUPRA.

Covered electrodes, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER FOX CN 17/4 PH AWS A5.4: E630-15 (mod.) EN ISO 3581-A: E Z 17 4 Cu B 4 3 H5	C: 0.03 Si: 0.3 Mn: 0.6 Cr: 16.0 Ni: 5.1 Mo: 0.4 Cu: 3.2 Nb: 0.2	Heat treatment : Solution annealed, 1040°C / 0.5h / Air / 620°C / 4 h / Air UTS: 880 MPa YS: 550 MPa El: 18% CVN Impact: +20°C: 69 - 75J -50°C: 55J	2.5 x 300 3.2 x 350 4.0 x 350 5.0 x 450	CE	Basic coated electrode of E Z 17 4 Cu B / E630-15 (mod.) type with high strength for welding of similar precipitation hardening rolled, forged and cast CrNiCu-steels. Popular for components in the paper industry, rotors of compressors, fan blades, press plates in the plastic processing industry and in the aerospace industry. The electrode shows very good arc stability and weld puddle control as well as slag detachability and seam cleanness. Hydrogen content in weld deposit < 5 ml/100 g. Suitable for welding in all positions except vertical down. With the use of proper PWHT (solution annealing + precipitation hardening), impact values down to –50°C are achievable.
AVESTA 904L AWS A5.4: E385-17 EN ISO 3581-A: E 20 25 5 Cu N L R 3 2	C: 0.02 Si: 0.7 Mn: 1.2 Cr: 20.5 Ni: 25 Mo: 4.5 Cu: 1.5	UTS: 620 MPa (≥510) YS: 430 MPa (≥320) El: 35% (≥25) CVN Impact: +20°C: 70J -60°C: 60J -196°C: 45J (≥32)	2.5 x 350 3.2 x 350 4.0 x 400 5.0 x 400	TÜV, DB, CE	Rutile coated fully austenitic electrode of E 20 25 5 Cu N L R / E385-17 type designed for welding 1.4539 / 904L type steels. It can also be used for welding 1.4404 / 316L components where a ferrite free weld is required, e.g. in cryogenic or non-magnetic applications. The weld metal has very good impact toughness at low temperatures. Very good resistance to general corrosion in non-oxidizing environments such as sulfuric acid and phosphoric acid and to pitting and crevice corrosion in chloride containing solutions. Meets the corrosion test requirements as per ASTM G48 Methods A, B and E (40°C). Scaling temperature approximately 1000°C in air.
AVESTA 2205 AWS A5.4: E2209-17 EN ISO 3581-A: E 22 9 3 N L R	C: 0.02 Si: 0.8 Mn: 0.7 Cr: 22.6 Ni: 9.4 Mo: 3.0 N: 0.16	UTS: 810 MPa (≥690) YS: 620 MPa (≥450) El: 25% (≥20) CVN Impact: +20°C: 45J -40°C: 40J (≥32)	2.5 x 350 3.2 x 350 4.0 x 450 5.0 x 450	TÜV, DB, Certified by CWB to CSA W48, CE	Rutile coated electrode of E 22 9 3 N L R / E2209-17 type. Primarily designed for welding 22Cr duplex stainless steels such as 1.4462 / UNS 31803 used in offshore, shipyards, chemical tankers, chemical/petrochemical, pulp & paper, etc. Good weldability in all welding positions. Very good resistance to pitting and stress corrosion cracking in chloride containing environments. Good wettability and slag detachability result in smooth and clean welds.
BOHLER FOX CN 22/9 N-B AWS A5.4: E2209-15 EN ISO 3581-A: E 22 9 3 N L B 2 2	C: 0.03 Si: 0.3 Mn: 1.1 Cr: 22.6 Ni: 8.8 Mo: 3.1 N: 0.16	UTS: 830 MPa (≥ 690) YS: 630 MPa (≥450) El: 30% (≥20) CVN Impact: +20°C: 100J -50°C: 65J (≥32)	2.5 x 350 3.2 x 350 4.0 x 350 5.0 × 450	TÜV, CE	Basic coated, core wire alloyed electrode of E 22 9 3 N L B / E2209-15 type for welding of duplex stainless steels such as 1.4462 / UNS S31803 and S32205. Specially designed for the joining of thick-walled sections (e.g. > 20 mm) and rigid constructions as well as for applications where extra low service temperature requirements exist (down to -50°C). The weld metal meets the corrosion test requirements per ASTM G48 Methods A, B and E (25°C) and shows high resistance to stress corrosion cracking. The electrode provides user-friendly operating characteristics in all positions except vertical down with good slag removability and weld bead appearance. Additionally the filler metals offer high safety against formation of porosity. Ferrite measured with FeritScope FMP30 34 – 36 FN. Suitable for service temperatures from –50°C to 250°C.

Covered electrodes, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
AVESTA 2507/P100 rutile AWS A5.4: E2594-16 EN ISO 3581-A: E 25 9 4 N L R 4 2	C: 0.03 Si: 0.4 Mn: 1.0 Cr: 24.8 Ni: 9.3 Mo: 3.7 N: 0.23 PREN: ≥40 FN: 45 (WRC-92)	UTS: 910 MPa (≥760) YS: 720 MPa (≥550) El: 30% (≥18) CVN Impact: +20°C: 105J –50°C: 50J (≥ 32)	2.5 x 300 3.2 x 350 4.0 x 350	CE	Designed for welding of superduplex steel and equivalent steel grades such as 1.4410 / UNS S32750, 1.4507 / UNS S32550 and 1.4501 / UNS S32760, used in desalination, pulp & paper, flue gas desulfurization and seawater systems. Developed to fulfill severe requirements stated in NORSOK M-601 and similar standards. Properties of the weld metal match those of the parent metal, offering high tensile strength and toughness as well as an excellent resistance to stress corrosion cracking and localized corrosion in chloride containing environments. Meets the corrosion test requirements for ASTM G48 Methods A, B and E (40°C) in both as-welded condition and after post-weld heat treatment. The operating temperature range is –50°C to 220°C.
BOHLER FOX CN 25/9 CuT AWS A5.4: E2595-15 EN ISO 3581-A: E 25 9 4 N L B 2 2	C: 0.03 Si: 0.5 Mn: 1.0 Cr: 25.0 Mo: 3.7 Ni: 9.5 N: 0.22 Cu: 0.7 W: 0.7	UTS: 850 MPa (≥ 760) YS: 650 MPa (≥550) El: 28% (≥18) CVN Impact: +20°C: 80J -50°C: 40J (≥32)	2.5 x 300 3.2 x 350 4.0 x 350	CE	Basic electrode of E 25 9 4 N L B / E2595-15 type, for welding of ferritic-austenitic superduplex steels. By virtue of specific alloy composition the deposit has, in addition to high tensile strength and toughness, also excellent resistance to stress corrosion cracking and pitting corrosion. The operating temperature range is –50°C up to 250°C. Well suited for the conditions in the offshore field.
AVESTA 253 MA EN ISO 3581-A: E 21 10 N R	C: 0.08 Si: 1.50 Mn: 0.70 Cr: 22.00 Ni: 10.50 N: 0.18	UTS: 725 MPa (≥550) YS: 535 MPa (≥350) El: 35% (≥30) CVN Impact: +20°C: 60J	2.0 x 300 2.5 x 350 3.2 x 350 4.0 x 400 5.0 x 400	CE	Rutile coated electrode of E 21 10 N R type. Designed for welding the high temperature stainless steel 253 MA® (1.4835 / UNS S30815), used for furnaces, combustion chambers and burners. Both the steel and filler metal offer excellent resistance to oxidation up to 1100°C. Balanced chemical composition to result in a ferrite content of max. 6 FN to give a crack resistant weld metal. Excellent resistance to high temperature corrosion. Not intended for applications exposed to wet corrosion.

Covered electrodes, nickel-base

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
THERMANIT NICRO 182 AWS A5.11: ENiCrFe-3 EN ISO 14172: E Ni 6182 (NiCr15Fe6Mn)	C: 0.025 Si: 0.4 Mn: 6.0 Cr: 16.0 Ni: bal. Nb: 2.2 Fe: 6.0	UTS: 650 MPa (≥ 550) YS: 420 MPa (≥360) El: 40% (≥27) CVN Impact: +20°C: 120J -196°C: 110J	2.5 x 300 3.2 x 300 4.0 x 350 5.0 x 400	TÜV (02073), TÜV (KTA 1408.1) (08128.00)	Basic coated nickel-base electrode of E Ni 6182 / ENiCrFe-3 type for welding of nickel-base alloys, creep resistant steels, heat resisting and cryogenic materials, dissimilar joints and low-alloyed steels with limited weldability. Dissimilar joining for service temperatures above 300 °C or applications where post-weld heat treatment is required. Well-suited for dissimilar welding of stainless and nickel alloys to mild steels. 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. Scaling resistant up to 950 °C and creep resistant up to 800 °C. Good toughness down to –196 °C. Resistant to embrittlement, hot cracking and thermal shock.
THERMANIT NICRO 82 AWS A5.11: ENiCrFe-3 (mod.) EN ISO 14172: E Ni 6082 (NiCr20Mn3Nb)	C: 0.025 Si: < 0.4 Mn: 5.0 Cr: 19.0 Mo: 1.5 Ni: bal. Nb: 2.2 Fe: 3.0	UTS: 680 MPa (≥600) YS: 440 MPa (≥360) El: 40% (≥22) CVN Impact: +20°C: 120J -196°C: 100J	2.5 x 300 3.2 x 300 4.0 x 350 5.0 x 400	TÜV, DNV CE	Stainless, heat-resistant, creep resistant, low temperatures toughness down to –269 °C, well suited for austenite-ferrite joints. Even with heat treatments above 300 °C, there are no embrittling Cr carbide zones in the ferrite / weld metal transition. Good for joining and surfacing on heat-resistant Cr and CrNi steels and nickel alloys. Temperature limits: 550 °C in S-containing atmospheres, max. 900 °C for fully loaded seams. Resistant to scaling up to 1000 °C. Well suited for mixed connections of stainless and nickel alloys to unalloyed steels.
THERMANIT 625 AWS A5.11: ENiCrMo-3 EN ISO 14172: E Ni 6625 (NiCr22Mo9Nb)	C: 0.03 Si: 0.4 Mn: 0.6 Cr: 22.0 Mo: 9.0 Ni: bal. Nb: 3.3 Fe: < 1.0	UTS: 790 MPa (≥760) YS: 520 MPa (≥420) El: 42% (≥27) CVN Impact: +20°C: 81J -196°C: 62J (≥32)	2.5 x 300 3.2 x 350 4.0 x 350 5.0 x 400	TÜV, DNV, CE	Basic coated nickel-base electrode of E Ni 6625 / ENiCrMo-3 type for welding the nickel-base alloys 625 and 825 as well as CrNiMo-steels with high molybdenum content (e.g. 6% Mo-steels). Also recommended for high temperature and creep resistant steels, heat resistant and cryogenic materials, dissimilar joints and low-alloyed problem steels. Suitable in pressure vessel fabrication for –196°C to 550°C, otherwise for service temperatures up to 1000°C. Resistant to scaling up to 1100°C (in sulfur-free atmosphere). Due to the weld metal embrittlement at 600 – 800°C, this temperature range should be avoided. Highly resistant to hot cracking and thermal shock. Extremely resistant to stress corrosion cracking and pitting.

Flux cored wires, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
BOHLER N Ti 71-T1C AWS A5.20: E71T-1C AWS A5.36: E71T1-C1A2-CS1-H8 EN ISO 17632-A: T 42 2 PC1 H10	C: 0.04 Si: 0.40 Mn: 1.25 S: 0.03 max P: 0.03 max	Heat treatment: As welded Shielding gas: CO_2 UTS: 580 MPa YS: 520 MPa El: 27% CVN impact: -20°C: 110J Heat treatment: 620°C, 2h Shielding gas: CO_2 UTS: 570 MPa YS: 490 MPa El: 28% CVN impact: -20°C: 116J	1.2 1.6	IBR, ABS, DNV, LRS, IRS	BOHLER N 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 detachability, low spatter level, smooth and well shaped beads with X-ray quality. Applicable in out of position welding, with higher productivity and less time needed for postweld cleaning. Suitable for butt and fillet welding of hulls, storage tanks, mechanical and constructional steel structures and bridges.
BOHLER Q 71 RC (C1) AWS A5.20 E71T-1C-H8 EN ISO 17632 – A T 42 2 PC1 H10	C: 0.04 Si: 0.40 Mn: 1.25 S: 0.015 P: 0.020	Heat treatment: As welded UTS: 570 MPa YS: 490 MPa El: 27% CVN Impact: -20°C: 90J	1.20	IRS , ABS, IBR and CE (Under Process)	BOHLER Q 71 RC (C1) is Rutile flux cored wire specially designed for positional welding including out of position welding. Weldability characterized by fast freezing slag, less spatter, fine droplet transfer at low & high welding parameters enables easy slag removal; very less post weld cleaning operation produces X-Ray quality weld deposit. It gives excellent mechanical properties and is suitable for welding of hulls, storage tanks, bridges, water wall panels, structures and constructional steels.
BOHLER Ti 71-T1M AWS A5.36: E71T1-M21A0-CS1 EN ISO 17632-A: T42 2 P M 1 H10	C: Max. 0.12 Si: Max. 0.9 Mn: Max. 1.75 S: Max. 0.03 P: Max. 0.03	Heat treatment: As welded Shielding Gas: 75-80%Ar+bal CO_2 UTS: 490-670 MPa YS: ≥390 MPa El: ≥22% CVN Impact: -20°C: ≥27J	1.2 1.6	BV	BOHLER Ti 71-T1M is a rutile flux cored wire with fast freezing slag. Excellent welding characteristics in all positions with X-ray-quality. 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 needed for postweld cleaning. Suitable for butt and fillet welding of hulls, storage tanks, mechanical and constructional steel structures and bridges.
BOHLER Ti 71-T9C AWS A5.20: E71T-9C-J AWS A5.36: E71T1-C1A4-CS1-H4	C: Max. 0.12 Si: Max. 0.9 Mn: Max. 1.75 P: Max. 0.03 S: Max. 0.03 Ni: Max. 0.50	Heat treatment: As welded Shielding Gas: CO_2 UTS: 490 - 670 MPa YS: 420 MPa El: 22% CVN Impact: -40°C: 100J	1.2 1.6	ABS, DNV	BOHLER Ti 71-T9C is a rutile flux cored wire and designed for all position welding with excellent CVN impact proerties in as weldeded 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. 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 490 MPa class high strength steel and low temperature steel of structure such as ships, bridges, buildings and storage tanks etc.

Flux cored wires, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
BOHLER Pipeshield 81 T8-FD AWS A5.29: E81T8-G EN ISO 17632-A: T 46 3 Z Y NO 1 H10	C: 0.04 Si : 0.25 Mn : 1.6 Ni : 2.25 Al : 0.9	Heat treatment: As welded UTS: 620 MPa (550 – 690) YS: 520 MPa (≥470) El: 27% (≥19) CVN Impact: -30°C: 150J -40°C : 140J (≥27)	2.0	-	Bohler Pipeshield 81 T8-FD is a self-shielded flux-cored wire and is especially developed for semi- automatic vertical down welding of pipelines. It is also suitable for welding of low alloyed steel constructions. This wire offers a fast freezing, easy removable slag and excellent welding characteristics in all positions. Bohler Pipeshield 81 T8-FD is designed to offer both good mechanical properties and high impact toughness at low temperatures. The outstanding benefi ts are especially accessible in the vertical down position for (hot pass) filler and cap layers. Due to the fluoride-basic filling the interpass temperature can be arranged similar to that of basic electrodes, we recommend 80 – 200°C. Bohler self-shielded flux-cored wire provide an easy handling for the welder due to a very tolerant stick out length and loss tendency to porosity also when welding with a longer arc length as a result of higher voltage.
DIAMONDSPARK 54 MC AWS A5.18: E70C-6M H4 E70C-6C H4 EN ISO 17632-A: T 46 6 M M21 1 H5 T 42 5 M C1 1 H5	Shielding gas M21 C: 0.07 Si: 0.75 Mn: 1.40	Heat treatment: As welded Shielding Gas: M21 UTS: 600 MPa (550-660) YS: 500 MPa (≥460) El: 29% (≥20) CVN Impact: -40°C: 120J -60°C: 80J (≥47)	1.0 1.2 1,4 1.6	TÜV, DB, DNV, 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-CO2 or pure CO2 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 product can be used in sour gas applications. (HIC tested acc. to NACE TM-0284).
BOHLER Q 70 MC AWS A5.36: E71T15-M21A4-CS1-H4 E71T15-M20A4-CS1-H4 EN ISO 17632-A: T 46 3 M M21 1 H5	C: 0.07 Si: 0.7 Mn: 1.5	Heat treatment: As welded Shielding Gas: Ar + 5-25% CO_2 UTS: 590 MPa (550 - 660) YS: 490 MPa (≥460) El: 25% (≥22) CVN Impact: -30°C: 90J (≥47) -40°C: 47J (≥27)	1.2 1.4 1.6	TÜV, DB, DNV, LR, BV, ABS, CWB, CE	Metal-cored all positional high-efficiency wire for semi-automatic and fully automatic joint welding of unalloyed and fine-grained constructional steels and service temperatures from -40°C (≥ 27J) to +450°C when using mixed gas M20 and M21 according to EN ISO 14175. Steady spray arc-like droplet transfer with minimal spatter formation from 200 A (1,2 mm); good penetration; high resistance to porosity; good wetting behaviour; ideal for horizontal and flat fillet welds. Compared to solid wires 20% higher productivity can be achieved. This wire is designed for minimum oxide residues permit the welding of multi passes with minimum needs for inter-run cleaning.

Flux cored wires, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
FOXcore 308L-T0 DG AWS A5.22: E308LT0-4(1) EN ISO 17633-A: T 19 9 L R M21 (C1) 3	C: 0.03 Si: 0.7 Mn: 1.5 Cr: 19.5 Ni: 10.5 FN: 3-12 (WRC-92)	Heat treatment: As welded Shielding Gas: Ar + 18 % CO_2 UTS: 530 MPa (≥520) YS: 365 MPa (≥320) El: 42% (≥30) CVN Impact: +20°C: 57J -120°C: 39J (≥32)	1.2 1.6	TÜV, CWB, DB, ABS, CE	Rutile flux-cored wire of T 19 9 L R / E308LT0 type designed for welding 1.4307 / 304L type stainless steels with very good corrosion resistance under fairly severe conditions, e.g. in oxidizing acids and cold or dilute reducing acids. Also suitable for welding stainless steels that are stabilized with titanium or niobium, such as 1.4541 / 321, 1.4878 / 321H and 1.4550 / 347 in cases where the construction will be operating at temperatures below 400 °C. Provides excellent weldability in flat as well as horizontal-vertical position. Great slag detachability and almost no spatter formation. Optimized to result in a shiny weld metal surface; also when welding with 100% CO_2.
FOXcore 316L-T0 DG AWS A5.22: E316LT0-4(1) EN ISO 17633-A: T 19 12 3 L R M21 (C1) 3	C: 0.03 Si: 0.7 Mn: 1.3 Cr: 18.4 Ni: 12.1 Mo: 2.6 FN: 3-12 (WRC-92)	Heat treatment: As welded Shielding Gas: Argon + 15 – 25 % CO_2; 100 %CO_2 UTS: 550 MPa (≥510) YS: 390 MPa (≥320) El: 37% (≥30) CVN Impact: +20°C: 52J -20°C: 47J -120°C: 37J (≥32)	1.2 1.6	TÜV, CWB, DNV GL, ABS, CE	Rutile flux-cored wire of T 19 12 3 L R / E316LT0 type designed for welding 1.4404 / 316L type stainless steels with excellent resistance to general, pitting and intergranular corrosion in chloride containing environments and dilute hot acids. FOXcore 316L-T0 DG provides excellent weldability in flat as well as horizontal-vertical position. Great slag detachability and almost no spatter formation. Optimized to result in a shiny weld metal surface; also when welding with 100% CO_2.
FOXcore 309L-T0 DG AWS A5.22: E309LT0-4/1 EN ISO 17633-A: T 23 12 L R M21/C1 3	C: 0.03 Si: 0.7 Mn: 1.2 Cr: 23.1 Ni: 12.5 FN: 12-23 (WRC-92)	Heat treatment: As welded Shielding Gas: Ar + 18 % CO_2 UTS: 560 MPa (≥520) YS: 390 MPa (≥320) El: 35% (≥30) CVN Impact: +20°C: 49J -60°C: 48J (≥32)	1.6	TÜV, DB, CWB, DNV GL, LR, RINA, BV, CE	Rutile flux-cored wire of T 23 12 L R / E309T0 type. Primarily intended for surfacing low-alloyed steels and for dissimilar welds between mild steel and stainless steels. When used for overlay welding on mild steel a corrosion resistance equivalent to that of base metal 1.4301 / 304 is obtained already in the first layer. Provides excellent weld ability in flat as well as horizontal-vertical position. Ferrite measured with FeritScope MP30: 14 – 22 FN. Great slag detachability and almost no spatter formation. Optimized to result in a shiny weld metal surface; also when welding with 100% CO_2. Maximum service temperature 300 °C.
Avesta FC 308L-T1 AWS A5.22: E308LT1-1	C: 0.02 Si: 0.70 Mn: 1.30 Cr: 19.2 Ni: 10.2 Mo: 0.01 FN : 3-10 (WRC -92)	Heat treatment: As welded Shielding Gas: 100% CO_2 UTS: 570 MPa YS: 390 MPa El: 39% CVN Impact: - 20°C: 60J	1.2	ABS	Avesta FC 308L-T1 is designed for welding austenitic stainless steel type 19Cr 10Ni or similar. This filler metal is also suitable for welding titanium and niobium stabilised steels such as ASTM 321 and ASTM 347 in case where the construction will be operating at temperatures below 400°C. For higher temperatures a niobum stabilised consumable such as Avesta 347/MVNb is required. Avesta FC 308L-T1 provides the excellent usability with stable arc, less spattering, good bead appearance, better slag removal, and it is designed for all-round welding and can be used in all positions without changing parameter settings.

Flux cored wires, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
Avesta FC 316L-T1 AWS A5.22: E316LT1-1	C: 0.03 Si: 0.70 Mn: 1.30 Cr: 18.0 Ni: 12.2 Mo: 2.5 FN : 3-10 (WRC -92)	Heat treatment: As welded Shielding Gas: 100% CO_2 UTS : 560 MPa YS: 400 MPa El: 37% CVN Impact: -20°C: 60J	1.2	ABS	Avesta FC 316L-T1 is designed for welding austenitic stainless steel type 17Cr 12Ni 2.5Mo or similar. This filler metal is also suitable for welding titanium and niobium stabilised steels such as ASTM 316Ti in case where the construction will be operating at temperatures below 400°C. For higher temperatures a niobum stabilised consumable such as Avesta 347/MVNb is required. Avesta FC 316L-T1 provides the excellent usability with stable arc, less spattering, good bead appearance, better slag removal, and it is designed for all-round welding and can be used in all positions without changing parameter settings.
Avesta FC 309L-T1 AWS A5.22: E309LT1-1	C: 0.03 Si: 0.60 Mn: 1.50 Cr: 23.2 Ni: 12.8 Mo: 0.02 FN : 10-15 (WRC -92)	Heat treatment: As welded Shielding Gas: 100% CO_2 UTS: 550 MPa YS: 390 MPa El: 35% CVN Impact: -20°C: 50J	1.2	ABS	Avesta FC 309L-T1 is a high-alloy 23Cr 13Ni wire primarily intended for surfacing on low-alloy steels and for dissimilar welds between mild steel and stainless steels. It provides the excellent usability with stable arc, less spattering, good bead appearance, and better slag removal. Avesta FC 309L-T1 is designed for all-round welding and can be used in all positions without changing parameter settings.
FOXcore 347-T0 AWS A5.22: E 347T0-4(1) EN ISO 17633-A: T 19 9 Nb R M21 (C1) 3	C: 0.03 Si: 0.6 Mn: 1.4 Cr: 19.5 Ni: 10.6 Nb: 0.37 FN: 5-13 (WRC-92)	Heat treatment: As welded Shielding Gas: Ar + 18 % CO_2 UTS: 585 MPa (≥550) YS: 420 MPa (≥350) El: 40% (≥30) CVN Impact: +20°C: 65J -120°C: 35J (≥ 32)	1.2	TÜV, CE	Rutile flux-cored wire of T 19 9 Nb R / E347T0 type for welding of stainless steels such as 1.4546 / 347. Designed for single and multipass welding mainly in the flat and horizontal position and horizontal/vertical position. Good resistance to general corrosion. 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. Stabilized with niobium and suitable for service temperatures from –196°C to 400°C.
FOXcore 347-T1 AWS A5.22: E347T1-4(1) EN ISO 17633-A: T 19 9 Nb P M21 (C1) 1	C: 0.03 Si: 0.7 Mn: 1.4 Cr: 19.0 Ni: 10.4 Nb: 0.35 FN: 5-13 (WRC-92)	Heat treatment: As welded Shielding Gas: Ar + 18% CO_2 UTS: 600 MPa (≥550) YS: 450 MPa (≥350) El: 35% (≥30) CVN Impact: +20°C: 70J -120°C: 40J (≥ 32)	1.2	TÜV, CE, NAKS	Rutile flux-cored wire of T 19 9 Nb P / E347T1 type for welding of stainless steels such as 1.4546 / 347. Good resistance to general corrosion. 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. Stabilized with niobium and suitable for service temperatures from –120°C to 400°C.

TIG rods, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER N ER 70 S-2 AWS A5.18: ER70S-2	C: 0.05 Si: 0.50 Mn: 1.20 Ti: + Zr: + Al: +	Heat treatment: As welded UTS: ≥520 MPa YS: ≥420 MPa El: ≥23% CVN Impact: +20°C: ≥80J -30°C: ≥27J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER N ER 70 S-2 is a copper coated GTAW rod containing Al, Ti and Zr as strong deoxidants in addition to Mn and Si and is often referred to as triple deoxidized copper coated wire with very low impurity levels. This has advantages when rimming or semi-killed mild steels are welded or where joint preparations are rusty or contaminated. BOHLER N ER 70 S-2 is primarily used for single pass welding. For applications involving single and multipass GTAW and/ or low temperature toughness requirements down to –30°C we recommend our GTAW rod BOHLER N ER 70 S-2.

TIG rods, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER DMO-IG AWS A5.28: ER70S-A1 (ER80S-G) EN ISO 636-A / 21952-A: W W2Mo / W MoSi	C: 0.1 Si: 0.6 Mn: 1.1 Mo: 0.5	Heat treatment : 620°C / 1h UTS: 570 MPa YS: 480 MPa El: 27% CVN Impact: +20°C: 230J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.0 x 1000 3.2 x 1000	TÜV, DB, KTA, BV, DNV GL, CRS, CE, NAKS	GTAW rod for welding of low alloy and creep resistant steels. Application area includes boiler, pressure vessel, tanks, pipeline, and crane constructions as well as in structural steel engineering. Approved in long-term service up to 550 °C.
UNION I CrMo AWS A5.28: ER80S-G [ER80S-B2(mod.)] EN ISO 21952-A: W CrMo1Si	C: 0.10 Si: 0.60 Mn: 1.00 Cr: 1.10 Mo: 0.50	Heat treatment: 620°C / 1h UTS: 560 MPa YS: 450 MPa El: 22% CVN Impact: +20°C: 90J	2.0 x 1000 2.5 x 1000 3.2 x 1000	TÜV, DB, CE	Welding rod / wire for the welding with argon. Suitable for manufacturing creep resistant steels in boiler, tank, pipeline and nuclear reactor construction.
UNION I 1,2 Ni AWS A5.28: ER80S-G EN ISO 636-A: W 46 6 W3Ni1	C: 0.10 Si: 0.70 Mn: 1.40 Ni: 1.30	Heat treatment: As welded UTS: 600 MPa YS: 470 MPa El: 25% CVN Impact: +20°C: 150J -60°C: 47J	2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, DB, DNV, KTA 1408.1, CE	Ni-alloyed welding rod/wire. Good flow characteristics in out of position welding. Very good impact toughness of weld metal at low temperatures. Tested according to KTA 1408.

TIG rods, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER DCMS-IG AWS A5.28: ER80S-G, ER80S-B2 (mod.) EN ISO 21952-A: W CrMo1Si	C: 0.1 Si: 0.6 Mn: 1.0 Cr: 1.2 Mo: 0.5 P: ≤ 0.015 As: ≤ 0.010 Sb: ≤ 0.005 Sn: ≤ 0.006	Heat treatment: 680 °C / 1h UTS: 570 MPa (≥550) YS: 440 MPa (≥ 355) El: 25% (≥20) CVN Impact: +20 °C: 250J (≥47)	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.0 x 1000	TÜV, SEPROZ, CE, NAKS	GTAW rod for 1.25% Cr 0.5% Mo alloyed boiler, plate and tube steels as well as for the welding of quenched and tempered and case hardening steels. Preferably used for the steels 13CrMo4-5 or ASTM A335 P11/P12. Approved in long-term condition up to +570 °C service temperature. Suitable for step cooling applications. Bruscato ≤ 15 ppm. The deposit is noted for its good mechanical properties and good toughness. Further, good resistance to cracking, when attacked by caustic soda, and the fact that it is suitable for nitriding, quenching and tempering are additional features. The values of the creep rupture strength lay within the scatter band of the material 13CrMo4-5. Very good operating characteristics.
UNION ER80S-B2 AWS A5.28: ER80S-G, ER80S-B2 EN ISO 21952-A: W CrMo1	C: 0.10 Si: 0.55 Mn: 0.60 Cr: 1.30 Mo: 0.50	Heat treatment: 620 °C / 1h UTS: 550 MPa YS: 470 MPa El: 19% CVN Impact: +20 °C: 90J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.0 x 1000 3.2 x 1000	On request	GTAW rod for 1.25 % Mo alloyed boiler, plate and tube steels as well as in oil refineries. Approved in long-term service up to 600 °C / 1100 °F service temperature. Very good operating characteristics. *For step- cooling applications we can offer special products.
UNION I CrMo 910 AWS A5.28: ER90S-G [ER90S-B3(mod.)] EN ISO 21952-A: W CrMo2Si	C: 0.07 Si: 0.6 Mn: 1.0 Cr: 2.55 Mo: 1.0	Heat treatment: 620 °C / 1h UTS: 590 MPa YS: 470 MPa El: 20% CVN Impact: +20 °C: 80J	2.0 x 1000 2.5 x 1000 3.0 x 1000	TÜV, DB, CE	Low-alloyed welding rod / wire for the welding with argon. Suitable for manufacturing creep resistant steels in boiler, tank, pipeline and nuclear reactor construction.
BOHLER CM 2-IG AWS A5.28: ER90S-G, ER90S-B3 (mod.) EN ISO 21952-A: W CrMo2Si	C: 0.08 Si: 0.6 Mn: 0.9 Cr: 2.5 Mo: 1.0 P: ≤ 0.010 As: ≤ 0.010 Sb: ≤ 0.005 Sn: ≤ 0.006	Heat treatment: 720 °C / 2h UTS: 600 MPa (≥550) YS: 470 MPa (≥400) El: 23% (≥ 18) CVN Impact: +20°C: 190J (≥47)	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.0 x 1000	TÜV, SEPROZ, CE, NAKS	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. Very good operating characteristics. *For step cooling applications we can offer special products.
UNION ER90S-B3 AWS A5.28: ER90S-G, ER90S-B3 EN ISO 21952-A: W CrMo2	C: 0.09 Si: 0.55 Mn: 0.60 Cr: 2.55 Mo:1.05	Heat treatment: 690°C/ 1h UTS: 620 MPa (≥550) YS: 540 MPa (≥400) El: 20% (≥18) CVN Impact: +20°C: 80J (≥47)	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	On request	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. Very good operating characteristics. *For step cooling applications we can offer special products.

TIG rods, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER CM 5-IG AWS A5.28: ER80S-B6 EN ISO 21952-A: W CrMo5Si	C: 0.08 Si: 0.4 Mn: 0.5 Cr: 5.6 Mo: 0.6	Heat treatment: Annealed, 730°C / 2h UTS: 620 MPa (≥590) YS: 500 MPa (≥470) El: 20% (≥17) CVN Impact: +20°C: 200J (≥47)	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.0 x 1000	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.
BOHLER C 9 MV-IG AWS A5.28: ER90S-B9 EN ISO 21952-A: W CrMo91	C: 0.11 Si: 0.3 Mn: 0.5 Cr: 9.0 Ni: 0.5 Mo: 0.9 V: 0.2 Nb: 0.06	Heat treatment: Annealed, 760°C / 2h UTS: 760 MPa (≥620) YS: 640 MPa (≥415) El: 19% (≥17) CVN Impact: +20°C: 150J (≥47)	2.0 x 1000 2.4 x 1000	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.
THERMANIT MTS 3 AWS A5.28: ER90S-B9 EN ISO 21952-A: W CrMo91	C: 0.1 Si: 0.3 Mn: 0.5 Cr: 9.0 Mo: 1.0 Ni: 0.5 Nb: 0.06 V: 0.2	Heat treatment: 760°C / 2h UTS: 620 MPa YS: 530 MPa El: 17% CVN Impact: +20°C: 50J	2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, CE,	High temperature resistant, resistant to scaling up to 600°C. Suited for joining and surfacing applications with quenched and tempered 9% Cr steels, particularly for matching high temperature resistant parent metal like T91 / P91 according to ASTM.
BOHLER NiMo 1-IG AWS A5.28: ER90S-G EN ISO 16834-A: W Mn3Ni1Mo	C: 0.08 Si: 0.6 Mn: 1.8 Mo: 0.3 Ni: 0.9	Heat treatment: As welded UTS: 700 MPa (640-820) YS: 620 MPa (≥550) El: 23% (≥18) CVN Impact: +20°C: 140J -40°C: 110J -60°C: ≥47J	2.4 x 1000	-	GTAW rod for high strength quenched and tempered fine grained constructional steels. The rod is suited for joint welding in boiler, pressure vessel, pipeline, and crane construction as well as in structural steel engineering. Due to the precise addition of micro alloying elements NiMo 1-IG rod features excellent ductility and crack resistance in spite of its high strength. Good cryogenic impact energy down to -60°C, low hydrogen contents in the deposit are advantages of this rod.
THERMANIT MTS 616 AWS A5.28: ER90S-G [ER90S-B9(mod.)] EN ISO 21952-A: WZ CrMoWVNb 9 0,5 1,5	C: 0.1 Si: 0.25 Mn: 0.5 Cr: 8.5 Mo: 0.4 Ni: 0.5 W: 1.6 V: 0.2 Nb: 0.06 N: 0.04	Heat treatment: 760°C / ≥ 2h UTS: 720 MPa YS: 560 MPa El: 15% CVN Impact: +20°C: 41J	2.0 x 1000 2.4 x 1000	TÜV, CE	High temperature resistant. Suited for joining and surfacing applications with matching high temperature resistant parent metal P92 according to ASTM A 335.

TIG rods, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER TIG N 308L AWS A5.9: ER 308L EN ISO 14343-A: W 19 9 L	C: ≤0.02 Si: 0.40 Mn: 1.75 Ni: 9.5 Cr: 19.80 Mo: 0.16 FN: 3-11 (WRC-92)	UTS: ≥550 MPa YS: ≥400 MPa El: ≥35% CVN Impact: +20°C: ≥100J -196°C: ≥35J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER TIG N 308L designed for welding austenitic stainless steel type 19 Cr 10 Ni or similar. The wire is also suitable for welding titanium and niobium stabilized steels such as ASTM 321 and ASTM 347 in cases where the construction is used at temperatures not exceeding 400°C. GTAW rod of type W 19 9 L/ ER 308L designed for first class welding with good wetting characteristics and excellent CVN down to -196°C.
BOHLER TIG N 309L AWS A5.9: ER 309L EN ISO 14343-A: W 23 12 L	C: ≤0.02 Si: 0.32 Mn: 1.83 Ni: 12.37 Cr: 23.20 Mo: 0.13 FN: 10-14 (WRC-92)	UTS: ≥520 MPa YS: ≥320 MPa El: ≥30% CVN Impact: +20°C: ≥100J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER TIG N 309L is a high alloy 23 Cr 13 Ni wire primarily intended for surfacing low alloy steels and for dissimilar welding between mild steels and stainless steels, offering a ductile and crack resistant weldment. The chemical composition, when surfacing, is equivalent to that of ASTM 304 from the first run. The weld metal reduces inter granular corrosion where severe corrosion condition exist requiring high alloy weld metal.
BOHLER TIG N 316L AWS A5.9: ER316L EN ISO 14343-A: W 19 12 3 L	C: ≤0.02 Si: 0.37 Mn: 1.58 Ni: 11.50 Cr: 18.37 Mo: 2.65 FN: 4-10 (WRC-92)	UTS: ≥520 MPa YS: ≥400 MPa El: ≥30% CVN Impact: +20°C: ≥100J -196°C: ≥32J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER TIG N 316L rod of type W 19 12 3L / ER 316L 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. The filler metal is also suitable for welding titanium and niobium stabilised steels such as ASTM 316Ti in cases where the construction is used at temperatures not exceeding 400°C.
THERMANIT X AWS A5.9: ER307(mod.) EN ISO 14343-A: W 18 8 Mn	C: 0.08 Si: 0.8 Mn: 7.0 Cr: 19.0 Ni: 9.0	UTS: 620 MPa YS: 450 MPa El: 35% CVN Impact: +20°C: 100J	1.0 x 1000 1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, DB, DNV, CE	Stainless. Resistant to scaling up to 850°C (1562°F). No adequate resistance against sulphureous combustion gases at temperatures above 500°C (932°F). For joining and surfacing applications with heat resistant Cr-steels / cast steel grades and heat resistant austenitic steels / cast steel grades. Well suited for fabricating austenitic ferritic joints – max. application temperature 300°C (572°F). For joining unalloyed/low alloy or Cr-steels / cast steel grades to austenitic steels. Low heat input required in order to avoid brittle martensitic.

TIG rods, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
AVESTA P5 AWS A5.9: ER309LMo(mod.) EN ISO 14343: W 23 12 2 L	C: 0.02 Si: 0.35 Mn: 1.5 Cr: 21.5 Ni: 15.0 Mo: 2.7 FN: 8(WRC-92)	UTS: 640 MPa YS: 470 MPa El: 30% CVN Impact: +20°C: 140J -40°C: 90J	1.6 x 1000 2.4 x 1000	TUV, DB, DNV, CE	Avesta P5 is a Mo-alloyed wire, type 309LMo for dissimilar joints of un-alloyed and stainless steels and for cladding on low-alloyed steels. The all-weld metal ensures a high resistance against cracking and is also suitable for welding of high strength steels. Corrosion resistance: Comparable but slightly better than 316L Structure: Austenit with 5 – 10% Ferrit Scaling temperature: 950°C (air)
AVESTA 309L AWS A5.9: ER309L	C: 0.02 Si: 0.36 Mn: 1.80 Cr: 23.00 Ni: 13.50 FN: 10 - 14 (WRC-92)	UTS: 590 MPa YS: 450 MPa El: 39% CVN Impact: +20°C: 202J -60°C: 154J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	DNV	AVESTA 309L is a high alloy 23 Cr 13 Ni wire primarily intended for surfacing low alloy steels and for dissimilar welding between mild steels and stainless steels, offering a ductile and crack resistant weldment. The chemical composition when surfacing is equivalent to that of ASTM 304 from the first run. One or two layers of 309L are usually combined with final layer of 308L, 316L or 347.
THERMANIT 13/04 Si AWS A5.9: ER410NiMo (mod.) EN ISO 14343-A: W 13 4	C: 0.01 Si: 0.7 Mn: 0.7 Cr: 12.3 Mo: 0.5 Ni: 4.7	Heat treatment: As welded UTS: 1000 MPa YS: 915 MPa El: 15% CVN Impact: +20°C: 85J Heat treatment: 600°C/ 8h UTS: 830 MPa (≥750) YS: 750 MPa (≥500) El: 21% (≥15) CVN Impact: +20°C: 150J -60°C: ≥32J	2.0 x 1000 2.4 x 1000	TÜV, CE	Solid wire TIG rod of W 13 4 / ER410NiMo (mod.) type for joining and surfacing applications with matching 13Cr(Ni) and 13Cr-steels and cast steel grades. Soft-martensitic; suitable for quenching and tempering. High resistance to corrosion fatigue cracking. Corrosion resistance similar to matching 13Cr(Ni)-steels and cast steel grades.
THERMANIT H-347 AWS A5.9: ER347 EN ISO 14343-A: W 19 9 Nb	C: 0.05 Si: 0.5 Mn: 1.8 Cr: 19.5 Ni: 9.5 Nb: ≥ 12×C	UTS: 570 MPa YS: 400 MPa El: 30% CVN Impact: +20°C: 65J -196°C: 27J	1.0 x 1000 1.2 x 1000 1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000 4.0 x 1000	TÜV, DB, CE	Solid wire TIG rod of W 19 9 Nb / ER347 type for joining and surfacing application with matching and similar stabilized and non-stabilized austenitic CrNi(N)-steels and cast steel grades. Max. service temperature 400°C. Corrosion resistance similar to matching stabilized austenitic CrN-steels.

TIG rods, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
THERMANIT 22/09 AWS A5.9: ER2209 EN ISO 14343-A: W 22 9 3 N L	C: 0.02 Si: 0.4 Mn: 1.7 Cr: 22.5 Ni: 8.8 Mo: 3.2 N: 0.15	UTS: 800 MPa (≥550) YS: 600 MPa (≥ 450) El: 33% (≥ 20) CVN Impact: +20°C: 150J –40 °C: ≥ 47J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, ABS, DNV, GL, LR, CE	Duplex stainless steel; resistant to inter-crystalline corrosion. Good resistance to stress corrosion cracking in chlorine- and hydrogen sulphide-bearing environment. High Cr- and Mo-contents provide resistance to pitting corrosion. For joining and surfacing work with matching and similar austenitic steels / cast steel grades. Attention must be paid to embrittlement susceptibility of the parent metal. Service temperature: -40°C to 250°C (32°F to 482 °F).
THERMANIT 25/09 CuT AWS A5.9: ER2594 EN ISO 14343-A: W 25 9 4 N L	C: 0.02 Si: 0.3 Mn: 0.8 Cr: 25.3 Mo: 3.7 Ni: 9.5 N: 0.22 Cu: 0.6 W: 0.6	UTS: 750 MPa YS: 600 MPa El: 25% CVN Impact: +20°C: 80J -50°C: 50J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	Super duplex stainless steel; resistant to inter-crystalline corrosion. Very good resistance to pitting corrosion and stress corrosion cracking due to the high CrMo(N) content (pitting index ≥40). Well suited for conditions in offshore application, particularly for welding of super-martensitic stainless steels (13 % Cr); extra low hydrogen in the filler material available on request.
THERMANIT 21/33 So EN ISO 14343-A: WZ 21 33 Mn Nb	C: 0.12 Si: 0.20 Mn: 4.8 Cr: 21.5 Ni: 32.5 Nb: 1.2	UTS: 600 MPa YS: 400 MPa El: 17% CVN Impact: +20°C: 50J	2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, CE	Resistant to scaling up to 1050°C (1922°F). Good resistance to carburizing atmospheres. For joining and surfacing applications with matching / similar heat resistant steels / cast steel grades.
THERMANIT 25/35 R EN ISO 14343-A: W Z 25 35	C: 0.40 Si: 1.0 Mn: 1.7 Cr: 25.5 Ni: 35.5 Nb: 1.2	UTS: 650 MPa YS: 450 MPa El: 8%	2.0 x 1000 2.4 x 1000 3.2 x 1000	-	For joining and surfacing work with matching / similar heat resistant steels and cast steel grades. Typical alloy for welding of pyrolysis furnace tubes. The weld deposit is applicable in a low sulphur, carbon enriching atmosphere up to 1150° C.

TIG rods, nickel-base

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
THERMANIT NICRO 82 AWS A5.14: ERNiCr-3 EN ISO 18274: S Ni 6082 (NiCr20Mn3Nb)	C: 0.02 Si: 0.1 Mn: 3.0 Cr: 20.0 Ni: >67.0 Nb: 2.5 Fe: <2	UTS: 620 MPa YS: 400 MPa El: 35% CVN Impact: +20°C: 150J -269°C: 32J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, DB, DNV·GL, CE	Stainless; heat and high temperature resistant. Good toughness at subzero temperatures as low as –269°C (–452°F). Good for welding austenitic ferritic joints. No Cr carbide zone that becomes brittle in the ferrite weld deposit transition zone, even as a result of heat treatments above 300°C (572°F). Good for fabricating tough joints and surfacing with heat resistant Cr and CrNi steels and Ni-alloys.
THERMANIT 625 AWS A5.14: ERNiCrMo-3 EN ISO 18274: S Ni 6625 (NiCr22Mo9Nb)	C: 0.03 Si: 0.1 Mn: 0.1 Cr: 22.0 Mo: 9.0 Ni: Bal. Nb: 3.6 Fe: ≤0.5	UTS: 740 MPa YS: 460 MPa El: 35% CVN Impact: +20°C: 120J -196°C: 100J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, DB, DNV, CE	High resistance to corrosive environment. Resistant to stress corrosion cracking. Resistant to scaling up to 1000°C (1832°F). Temperature limit: 500°C (932°F) max. in sulphureous atmospheres. High temperature resistant up to 900°C (1652°F). Good toughness at subzero temperatures as low as –196°C (–321°F). For joining and surfacing work with matching / similar corrosion resistant materials as well as on matching and similar heat resistant, high temperature resistant steels and alloys. For joining and surfacing work on cryogenic austenitic CrNi(N) steels / cast steel grades and on cryogenic Ni-steels suitable for quenching and tempering.

TIG rods, Aluminium

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
UNION Al Si 5 AWS A5.10: ER4043 EN ISO 18273: S Al 4043A (AlSi5(A))	Al: bal. Si: 4.5 – 6.0 Fe: < 0.6 Cu: < 0.3 Mg: < 0.2 Mn: < 0.15 Zn: < 0.1	UTS: 130 MPa YS: 70 MPa El: 16%	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000 4.0 x 1000	DB, CE	Rod for GTAW of Al alloys containing up to 2% of alloying elements and for aluminium alloys containing up to 7% Si. The weld metal is not suitable for anodizing for decorative purposes. Very fluid weld pool. Not applicable for welding hardenable alloys is high stressed zones. Thorough cleaning of the workpiece bevels is necessary prior to welding.
UNION Al Si 12 AWS A5.10: ER4047 EN ISO 18273: S Al 4047A (AlSi12(A))	Al: bal. Si: 11.0 – 13.0 Fe: < 0.6 Cu: < 0.3 Mg: < 0.1 Mn: < 0.15 Zn: < 0.2	UTS: 130 MPa YS: 60 MPa El: 5%	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000 4.0 x 1000	-	Rod for GTAW of AlSi cast alloys containing 7-12% Si. The weld metal is not suitable for anodizing for decorative purposes. Very fluid weld pool. Good mechanical properties, excellent corrosion resistance and a low melting point ensure high quality welding results. Thorough cleaning of the workpiece bevels is necessary prior to welding.
UNION AlMg 4.5 Mn AWS A5.10: ER5183 EN ISO 18273-A: S Al 5183 (AlMg4.5Mn0.7(A))	Al: bal. Mn: 0.6 – 1.0 Cr: 0.05 – 0.25 Mg: 4.3 – 5.2 Ti: < 0.15	UTS: 275 MPa YS: 125 MPa El: 17%	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000 4.0 x 1000	TÜV, DB, CE	TIG-rod for welding of AlMg alloys. The weld metal is resistant against sea water. Base material should be cleaned near the seam. Pre-heating 150 °C for plates > 15 mm.
UNION AlMg 5 AWS A5.10: ER5356 EN ISO 18273-A: S Al 5356 (AlMg5Cr(A))	Al: bal. Mn: 0.05 – 0.2 Cr: 0.05 – 0.2 Mg: 4.5 – 5.5 Ti: 0.06 – 0.2 Fe: < 0.4 Zn: < 0.1	UTS: 240 MPa YS: 110 MPa El: 17%	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000 4.0 x 1000	TÜV, DB, CE	Rod for GTAW of AlMg alloys containing up to 5% Mg. Seawater resistant weld metal. Susceptible to stress corrosion cracking if exposed to service temperatures >65°C. Good colour matching with base metal after anodizing. Thorough cleaning of the workpiece bevels is necessary prior to welding.

Solid wire, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
BOHLER N ER 70 S-6 AWS A5.18: ER70S-6 EN ISO 14341-A: G42 4 M21 3Si1/G 42 4 C1 3Si1	C: 0.09 Si: 0.80 Mn: 1.49 P: 0.01 S: 0.01 Cr: 0.01 Mo: 0.01 Ni: 0.01	As welded: Shielding Gas: CO_2 UTS: 600 MPa YS: 510 MPa El: 28% CVN Impact: -30°C: >50J	0.8 1.0 1.2	-	Universally applicable copper coated wire electrode with a largely spatter free material transfer using CO_2. The wire electrode is suitable for joint welding in the construction of boilers, containers and building structures. This wire has been designed to provide X-ray quality porosity free welds. High tensile strength in as welded condition. High arc stability at high welding current amperage. Designed to feed ideally even at high wire feed rates. Suitable for robotic applications. It is a great choice for welding light to moderately scaled, oily or rusty plates due to the presence of balanced amount of de-oxidizers.
BOHLER SG 2 AWS A5.18: ER70S-6 EN ISO 14341-A: G 42 3 M21 3Si1/G 42 3 C1 3Si1	C: 0.08 Si: 0.85 Mn: 1.5	As welded: Shielding Gas: Ar + 15-25% CO_2 UTS : 575 MPa (500-640) YS: 450 MPa (≥420) El: 30% (≥22) CVN Impact: -30°C: 110J (≥47) Shielding Gas: 100% CO_2 UTS : 555 MPa (500-640) YS: 430 MPa (≥380) El: 29% (≥24) CVN Impact: -30°C: 90J (≥47)	0.8 0.9 1.0 1.2 1.6	TUV, DB, CE, ABS, CWB	Solid wire electrode for welding unalloyed and low alloy steels with CO_2 or gas mixture. Low spatter transfer in short and spray arc range. High arc stability also at high welding current amperage. Large application range; used in boiler and pipeline construction. Shipbuilding, vehicle manufacturing and structural engineering.
BOHLER EMK 8 NC AWS A5.18: ER70S-6 EN ISO 14341-A: G 46 4 M21 4Si1/G 46 4 C1 4Si1	C: 0.1 Si: 1.0 Mn: 1.7	As welded: Shielding Gas: CO_2 UTS: 620 MPa (530-680) YS: 480 MPa (≥460) El: 26% CVN Impact: +20°C: 150J –40°C: 80J (≥47)	1.0 1.2 1.6	TUV, DB, CE	Non coppered solid wire designed for extremely low spatter formation and excellent feeding properties at high wire feed rates. The non coppered welding wires of the EMK NC series are characterised by very good feeding properties at high wire feeding rates, by a very stable arc performance and significant lower oxide / silicate forming on the weld surface. This makes them especially suited for fully mechanised processes where the wire comes in BASEdrum or the environmental friendly ECOdrum bulk package.

Solid wire, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
UNION MoNi AWS A5.28: ER90S-G EN ISO 16834-A: G 62 5 M21 Mn3Ni1Mo	C: 0.10 Si: 0.65 Mn: 1.55 Mo: 0.40 Ni: 1.10	Heat treatment: As welded Shielding Gas: M21 UTS: 700 MPa YS: 620 MPa El: 18% CVN Impact: +20°C: 100J -50°C: 47J	0.8 1.0 1.2	TÜV, DB, DNV, GL, WIWEB, VG 95132-1, CE	Medium alloy solid wire electrode for shielded arc welding of quenched and tempered and thermomechanically treated fine grained structural steels; creep resistant structural steels with higher yield strength. Outstanding toughness values of the weld metal at low temperatures when deposited with CO_2 and gas mixture.
THERMANIT MTS 3 AWS A5.28: ER90S-B9 EN ISO 21952-A: G CrMo91	C: 0.1 Si: 0.3 Mn: 0.5 Cr: 9.0 Mo: 1.0 Ni: 0.5 Nb: 0.06 V: 0.2	Heat treatment: 760°C/2 h Shielding Gas: M12, (M13) UTS: 620 MPa YS: 520 MPa El: 16% CVN Impact: 50J	1.0 1.2	-	High temperature resistant, resistant to scaling up to 600°C. Suited for joining and surfacing applications with quenched and tempered 9 % Cr steels, particularly for matching high temperature resistant parent metal like T91 / P91 according to ASTM.

Solid wire, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
THERMANIT MTS 616 AWS A5.28: ER90S-G / ER90S-B9(mod.) EN ISO 21952-A: GZ CrMoWVNb 9 0.5 1.5	C: 0.1 Si: 0.25 Mn: 0.5 Cr: 8.5 Mo: 0.4 Ni: 0.5 W: 1.6 V: 0.2 Nb: 0.06 N: 0.04	Heat treatment: 760°C / ≥ 2h Shielding Gas: M12, (M13) UTS: 720 MPa YS: 560 MPa El: 15% CVN Impact: 41J	0.8 1.0 1.2 1.6	-	High temperature resistant. Suited for joining and surfacing applications with matching high temperature resistant parent metal P92 according to ASTM A 335.
UNION NiMoCr AWS A5.28: ER100S-G / [ER100S-1(mod.)] EN ISO 16834-A: G 69 6 M21 Mn4Ni1, 5CrMo	C: 0.08 Si: 0.60 Mn: 1.70 Cr: 0.20 Mo: 0.50 Ni: 1.50	Heat treatment: As welded Shielding Gas: M21 UTS: 780 MPa YS: 720 MPa El: 16% CVN Impact: +20°C: 100J -60°C: 47J	0.8 1.0 1.2	TÜV, DB, ABS, BV, DNV, GL, LR, VG 95132-1, CE	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 toughnesss of the weld metal at low temperatures. For use in crane and vehicle manufacturing.
BOHLER X 70-IG AWS A5.28: ER110S-G EN ISO 16834-A: G 69 5 M Mn3Ni1CrMo	C: 0.1 Si: 0.6 Mn: 1.6 Cr: 0.25 Ni: 1.3 Mo: 0.25 V: 0.1	Heat treatment: As welded Shielding Gas: Ar+15 – 25% CO_2 UTS : 900 MPa (770 – 940) YS: 800 MPa (≥690) El: 19% (≥17) CVN Impact: +20°C: 190J -50°C: ≥47J	0.8 1.0 1.2 1.6	TÜV (05547), DB 42.132.77), ABS, BV , DNV, LR (Suppl. List), CE	GMAW wire for the welding of high-strength, heat treated, fine-grained constructional steels with a minimum yield strength of 690 MPa. Due to the precise addition of micro-alloying elements X 70-IG wire features excellent ductility and crack resistance in spite of its high strength. Good cryogenic impact energy down to -50°C.

Solid wire, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
BOHLER FOX A 7 (THERMANIT X) AWS A5.9: ER307(mod.) EN ISO 14343-A: G 18 8 Mn	C: 0.08 Si: 0.8 Mn: 7.0 Cr: 19.0 Ni: 9.0	Shielding Gas: Ar + 2.5% CO_2 UTS: 600 MPa YS: 370 MPa El: 35% CVN Impact: +20°C: 100J	0.8 1.0 1.2 1.6	TÜV, DB, DNV-GL, VG 95132-1, CE	Solid wire of G 18 8 Mn / ER307 (mod.) type for joining and surfacing applications with heat resistant Cr-steels and heat resistant austenitic steels. Well-suited for fabricating dissimilar austenitic-ferritic joints for a max. application temperature of 300°C. For joining unalloyed / low-alloyed or Cr-steels to austenitic steels. Low heat input required in order to avoid brittle martensitic transition zones. Max. service temperature 850 °C.
BOHLER Q NG 308L-Si AWS A5.9: ER308LSi EN ISO 14343-A: G 19 9 L Si	C: ≤0.02 Si: 0.8 Mn: 1.7 Cr: 20.0 Ni: 10.2	Shielding Gas: Ar + 2.5% CO_2 UTS : 540 MPa (≥ 510) YS: 390 MPa (≥ 320) El: 38% (≥35) CVN Impact: +20°C: 110J (≥47) -196°C: >32J	0.8 1.0 1.2	-	GMAW solid wire of type G 19 9 L Si / ER308LSi designed for first class welding, wetting and feeding characteristics and excellent weld metal CVN values down to –196 °C. Resistance to intergranular corrosion up to +350 °C.
BOHLER Q NG 316L-Si AWS A5.9: ER316LSi EN ISO 14343-A: G 19 12 3 L Si	C: ≤0.02 Si: 0.9 Mn: 1.7 Cr: 18.5 Ni: 11.5 Mo: 2.7	Shielding Gas: Ar + 2.5% CO_2 UTS : 580 MPa (≥ 510) YS: 430 MPa (≥ 320) El: 38% (≥30) CVN Impact: +20°C: 120J (≥47) -196°C: 45J (>32)	0.8 1.0 1.2	-	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.

Solid wire, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
BOHLER Q NG 309L-Si AWS A5.9: ER309LSi EN ISO 14343-A: G 23 12 L Si	C: ≤ 0.03 Si: 0.9 Mn: 2.0 Cr: 24.0 Ni: 13.0	Shielding Gas: Ar + 2.5% CO_2 UTS : 550 MPa (≥ 510) YS: 400 MPa (≥ 320) El: 33% (≥ 30) CVN Impact: +20°C: 55J (≥ 47) -60°C: >32J	0.8 1.0 1.2	-	GMAW solid wire of type G 23 12 L Si / ER309LSi designed for first class welding, good wetting and feeding characteristics. For joining austenitic stainless steels and castings to unalloyed/ low-alloy steels/cast steel grades, stainless heat resistant Cr steels as well as depositing intermediate layers when welding cladded materials. Favorably high Cr and Ni contents, low C content. Application temperature max. 300°C (572 °F).
THERMANIT 22/09 AWS A5.9: ER2209 EN ISO 14343-A: G 22 9 3 N L	C: 0.025 Si: 0.5 Mn: 1.6 Cr: 23.0 Mo: 3.0 Ni: 9.0 N: 0.14	Shielding Gas: M12, M13 Ar + 20% He + 2% CO_2 UTS: 700 MPa YS: 510 MPa El: 25% CVN Impact: +20°C: 70J	0.8 1.0 1.2	TÜV, DB, GL, DNV, CE	Duplex stainless steel; resistant to intercrystalline corrosion and wet corrosion up to 250°C (482°F). Good resistance to stress corrosion cracking in chlorine- and hydrogen sulphide-bearing environment. High Cr- and Mo-contents provide resistance to pitting corrosion. For joining and surfacing work with matching and similar austenitc steels / cast steel grades. Attention must be paid to embrittlement susceptibility of the parent metal.

Solid wire, nickel-base

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
THERMANIT 625 AWS A5.14: ERNiCrMo-3 EN ISO 18274: S Ni 6625 (NiCr22Mo9Nb)	C: 0.03 Si: 0.25 Mn: 0.20 Cr: 22.0 Ni: Bal. Mo: 9.0 Nb: 3.6 Fe: <0.5	Shielding Gas: I1,M12 (ArHeC-30/0.5) UTS: 740 MPa YS: 460 MPa El: 30% CVN Impact: +20°C: 60J -196°C: 40J	0.8 1.0 1.2 1.6	TÜV, DB, CE	High resistance to corrosive environment. Resistant to stress corrosion cracking. Resistant to scaling up to 1000°C (1832 °F). Temperature limit: 500°C (932°F) max. in sulphureous atmospheres. High temperature resistant up to 900 °C (1652°F). Good toughness at subzero temperatures as low as –196°C (–321°F). For joining and surfacing work with matching / similar corrosion resistant materials as well as with matching and similar heat resistant, high temperature resistant steels and alloys. For joining and surfacing work on cryogenic austenitic CrNi(N) steels / cast steel grades and on cryogenic Ni steels suitable for quenching and tempering.
THERMANIT NICRO 82 AWS A5.14: ERNiCr-3 EN ISO 18274: S Ni 6082 (NiCr20Mn3Nb)	C: 0.02 Si: 0.2 Mn: 2.8 Cr: 19.5 Ni: >67 Nb: 2.5 Fe: <2.0	Shielding Gas: I1, Z (ArHeHC -30/2/~0, 1) UTS: 620 MPa YS: 380 MPa El: 35% CVN Impact: +20°C: 90J	0.8 1.0 1.2 1.6	TÜV, DNV GL, CE	Nickel alloy; heat and high temperature resistant. Good toughness at subzero temperatures as low as –269°C (–452°F). Good for welding austenitic ferritic joints. No Cr-carbide zone that become brittle in the ferrite weld deposit transition zone, even as a result of heat treatments above 300 °C (572°F). Good for fabricating tough joints and surfacing with heat resistant Cr and CrNi steels and Ni alloys.

Wire/flux combination, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
UNION S EM12K + UV C 418 TT-M AWS A5.17: F7A8-EM12K, F7P8-EM12K EN ISO 14171-A: S 42 6 FB S2Si	Wire C: 0.11 Si: 0.23 Mn: 1.0 P: 0.012 S: 0.004 Weld metal: C: 0.08 Si: 0.30 Mn: 1.09 P: 0.017 S: 0.005	Heat treatment: As welded UTS: 520 MPa (500-640) YS: 445 MPa (≥420) El: 30% (≥22) CVN Impact: -40°C: 170J (≥47) -60°C: 120J (≥47) Heat treatment: 620°C / 1h UTS: 500 MPa (485-640) YS: 425 MPa (≥400) El: 33% (≥22) CVN Impact: -40°C: 190J (≥47) -60°C: 150J (≥47)	1.6 2.0 2.4 3.2 4.0	-	Union S EM12K - UV C 418 TT-M is a wire flux combination universally applicable in shipbuilding, steel construction and in the fabrication of boilers and containers. 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 slag detachability also for narrow gap welding.
UNION S EH10K / UV C 418 TT-M AWS A5.17: F7A6-EH10K / F7P6-EH10K EN ISO14171-A: S 46 5 FB S3	Wire C: 0.08 Si: 0.05 Mn: 1.5 P: 0.01 S: 0.01 Weld metal C: 0.08 Si: 0.2 Mn: 1.6 P: 0.02 S: 0.01	Heat treatment: As welded UTS: 560 MPa (500-640) YS: 460 MPa (≥400) El: 30% (≥22) CVN Impact: -40°C: 150J (≥27) -60°C: 80J (≥27) Heat treatment: 620°C / 1h UTS: 520 MPa (500-640) YS: 420 MPa (≥400) El: 32% (≥22) CVN Impact: -40°C: 170J (≥27) -60°C: 100J (≥27)	1.6 2.0 2.4 3.2 4.0	-	Union S EH10K - UV C 418 TT-M 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.
UNION S EH14 + UV C 418 TT AWS A5.17: F7A4-EH14, F7P4-EH14 EN ISO14171-A: S 46 6 FB S4	Wire C: 0.10 Si: 0.05 Mn: 1.80 P: 0.019 S: 0.013 Cu: 0.05 Weld metal C: 0.08 Si: 0.18 Mn: 1.90 P: 0.018 S: 0.011 Cu: 0.05	Heat treatment: As welded UTS: 550 MPa (500-640) YS: 470 MPa (≥460) El: 30% (≥22) CVN Impact: -40°C: 150J (≥47) -60°C: 120J (≥47) Heat treatment: 620°C / 1h UTS: 500 MPa (480-660) YS: 405 MPa (≥400) El: 32% (≥22) CVN Impact: -40°C: 180J (≥47) -60°C: 140J (≥47)	1.6 2.0 2.4 3.2 4.0	-	Union S EH14 - UV C 418 TT 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.

Wire/flux combination, unalloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
UNION S EM12K + UV C 401 AWS A5.17: F7A5-EM12K, F7P5-EM12K EN ISO 14171-A: S 42 4 AB S2Si	Wire C: 0.09 Si: 0.25 Mn: 1.1 P: 0.02 S: 0.004 Weld metal C: 0.06 Si: 0.51 Mn: 1.47 P: 0.02 S: 0.005	Heat treatment: As welded UTS: 570 MPa YS: 470 MPa El: 33% CVN Impact: -40°C: 90J	1.6 2.0 2.4 3.2 4.0	ABS (4YM)	Union S EM12K - UV C 401 is a wire flux combination for joining and surfacing applications with general-purpose structural steels, boiler and pipe steels. The flux is characterized by low Silicon and moderate Manganese pick-up. The welding characteristics are good producing a smooth weld bead with excellent slag detachability.
UNION S EM12K + UV C 305 AWS A5.17: F7AZ-EM12K EN ISO 14171-A: S 42 Z AR S2Si	Wire C: 0.09 Si: 0.25 Mn: 1.1 P: 0.02 S: 0.004 Weld metal C: 0.05 Si: 0.6 Mn: 1.2 P: 0.03 S: 0.01	Heat treatment: As welded UTS: 530 MPa YS: 450 MPa El: 31% CVN Impact: +20°C: 70J 0°C: 40J	1.6 2.0 2.4 3.2	-	Union S EM12K - UV C 305 is a wire flux combination for joining applications with general purpose steels. It is particullary well suited for single wire or twin-arc fillet welding with small wire diameter (e.g. with 2.0 mm) with high welding speed. Wall thickness <10 mm. The flux is characterized by low silicon and moderate manganese pick up. The welding characteristics are good producing a smooth weld bead with excellent slag detachability.

Wire/flux combination, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
UNION S 2 Mo / UV 421 TT AWS A 5.23: F8A6-EA2-A2 EN ISO 14171-A: S 46 4 FB S2Mo	Wire C: 0.10 Si: 0.15 Mn: 1.0 Mo: 0.5 Weld metal: C: 0.07 Si: 0.25 Mn: 1.1 Mo: 0.5 P: ≤0.012 As: ≤0.01 Sb: ≤0.005 Sn: ≤0.005	Heat treatment: 620°C / 1h UTS: >550 MPa YS: >470 MPa El: >24% CVN Impact: +20°C: 140J -20°C: 100J -40°C: 47J	2.0 2.5 3.0 4.0	TÜV, DB, CE, LR	Wire/flux combination suited for fine grained constructional steels of increased strength, specially used in boiler, vessel and pipeline construction. The metallurgical behaviour of the flux UV 421 TT is neutral. The wire/flux combination produces very good low temperature impact properties down to -40°C. Excellent slag detachability, smooth beads and good wetting are further important features. The flux can be used for tandem and multi wire welding on DC and AC. For information regarding UV 421 TT see our detailed data sheet.

Wire/flux combination, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
UNION S 3 Mo / UV 418 TT AWS A5.23: F8A5-EA4-A4 / F8P6-EA4-A4 EN ISO 14171-A: S 46 4 FB S3Mo	Wire C: 0.10 Si: 0.15 Mn: 1.50 Mo: 0.50 Weld metal: C: 0.06 Si: 0.25 Mn: 1.35 Mo: 0.45	Heat treatment: 600°C x 2hr UTS: >550 MPa YS: >470 MPa El: >24% CVN Impact: +20°C: >140J -20°C: >80J -46°C: >47J -51°C: >27J	2.5 3.0 4.0	-	Union S 3 Mo - UV 418 TT is a wire flux combination for submerged arc welding of un and low alloyed steel grades. Very good slag detachability also for narrow gap welding. Flux can especially be used for multi-pass butt welding of medium tensile steels. Very good impact toughness of weld metal at low temperatures. UV 418 TT is an agglomerated fluoride-basic flux with high basicity and neutral metallurgical behaviour. For more information regarding this welding flux see our detailed data sheet.
UNION S 2 CrMo + UV 420 TTR / UV 420 TTR-W AWS A5.23: F8P2-EB2R-B2 EN ISO 24598-A: S S CrMo 1 FB	Wire C: 0.12 Si: 0.10 Mn: 0.80 Cr: 1.2 Mo: 0.5 Weld metal: C: 0.08 Si: 0.20 Mn: 1.00 Cr: 1.1 Mo: 0.45 P: ≤0.012 As: ≤0.01 Sb: ≤0.006 Sn: ≤0.008	Heat treatment: 690°C / 2h UTS: 550 MPa YS: 470 MPa El: ≥ 20% CVN impact: +20°C: 130J -20°C: 100J -30°C: 80J	2.0 2.5 3.0 4.0	TÜV, CE	UV 420 TTR / UV 420 TTR-W is an agglomerated fluoride basic flux with high basicity and neutral metallurgical behavior. It is characterized by a high degree of purity. The low 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 420 TTR / 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 420 TTR 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 420 TTR (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 AWS A 5.23: F9P2-EB3R-B3R EN ISO 24598-A: S S CrMo2 FB	Wire C: 0.10 Si: 0.10 Mn: 0.50 Cr: 2.4 Mo: 1.0 X: <10 All-weld metal C: 0.07 Si: 0.20 Mn: 0.75 Cr: 2.3 Mo: 1.0 X: <12	Heat treatment: 690°C / 10h UTS: 580 MPa (≥550) YS: 480 MPa (≥460) El: 22% (≥20) CVN impact: +20°C: ≥140J -20°C: ≥120J -30°C: ≥100J -40°C: ≥54J	2.0 2.5 3.0 4.0	TÜV	Union S 1 CrMo 2 – UV 420 TTR-W 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.

Wire/flux combination, low alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
UNION S 3 NiMoCr / UV 421 TT AWS A5.23: F11A8-EG-F6 EN ISO 26304-A: S 69 6 FB SZ3Ni2,5CrMo	Wire C: 0.14 Si: 0.10 Mn: 1.75 P: ≤0.012 S: ≤0.012 Cr: 0.35 Ni: 2.10 Mo: 0.60 Weld metal: C: 0.08 Si: 0.20 Mn: 1.60 P: ≤0.015 S: ≤0.012 Cr: 0.32 Ni: 2.00 Mo: 0.58	Heat treatment: As welded UTS: 770 MPa YS: 690 MPa El: 17% CVN Impact: +20°C: 120J -20°C: 80J -40°C: 60J -60°C: 47J	3.0 4.0	TÜV, DB, BV, WIWEB, LR, DNV GL, ABS, CE	Union S 3 NiMoCr – UV 421 TT is a wire – flux combination for Submerged Arc Welding of high strength steel grades. Very good slag detachability also for narrow gap welding. UV 421 TT is an agglomerated fluoride basic flux with high basicity and neutral metallurgical behavior.
THERMANIT MTS 3 / MARATHON 543 AWS A5.23: F9PZ-EB91-B91 EN ISO 24598-A: S S CrMo 91 FB	Wire C: 0.11 Si: 0.25 Mn: 0.50 Cr: 9.0 Ni: 0.45 Mo: 0.95 V: 0.20 Nb: 0.06 N: 0.04 Weld metal: C: 0.09 Si: 0.22 Mn: 0.70 Cr: 8.9 Ni: 0.45 Mo: 0.95 V: 0.18 Nb: 0.05 N: 0.04	Heat treatment: 760°C / 4h UTS: 705 MPa (≥ 620) YS: 565 MPa (≥ 540) El: 19% (≥ 17) CVN Impact: +20°C: 75J (≥ 47)	1.2 1.6 2.0 2.4 2.5 3.0 3.2	TÜV, CE	Thermanit MTS 3 – Marathon 543 is a wire flux combination for Submerged Arc Welding for welding high temperature and creep resistance 9% chromium steel like P91. Marathon 543 is an agglomerated welding flux of the fluoride basic type with high basicity. For more information regarding this welding flux see our detailed data sheet.
THERMANIT MTS 616 / MARATHON 543 AWS A5.23: F9PZ-EG-G EN ISO 24598-A: S S ZCrMoWVNb9 0.5 1.5 FB	Wire C: 0.11 Si: 0.15 Mn: 0.5 Cr: 8.8 Ni: 0.45 Mo: 0.45 W: 1.65 V: 0.2 Nb: 0.06 N: 0.04 Weld metal: C: 0.09 Si: 0.15 Mn: 0.7 Cr: 8.7 Ni: 0.40 Mo: 0.43 W:1.65 V: 0.18 Nb: 0.05 N: 0.04	Heat treatment: Annealed, 760°C / 4h UTS: ≥ 700 MPa YS: ≥ 560 MPa El: ≥ 18% CVN Impact: +20°C: ≥ 41J	1.2 1.6 2.0 2.5 3.0 3.2	TÜV, CE	Thermanit MTS 616 - Marathon 543 is a wire - flux combination for submerged arc welding of 9% Cr creep resistant steel, especially for P92 (NF616) acc. to ASTM A335. Approved in long-term condition up to +650°C service temperature. Marathon 543 is an agglomerated welding flux of the fluoride basic type with high basicity. For more information regarding Marathon 543 see our detailed data sheet.

Wire/flux combination, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
Thermanit JE-308L - Marathon 431 AWS A5.9: ER308L EN ISO 14343-A: S 19 9 L EN ISO 14174: SA FB 2 DC	Wire C: 0.015 Si: 0.45 Mn: 1.6 Cr: 20.0 Ni: 10.0 Weld metal C: 0.015 Si: 0.60 Mn: 1.3 Cr: 19.5 Ni: 9.8	UTS: ≥550 MPa YS: ≥320 MPa El: ≥30% CVN Impact: +20°C : ≥65J –196°C: 40J	1.6 2.4 3.2 4.0	TÜV (06114), CE	Thermanit JE-308L - Marathon 431 is a wire/flux combination for submerged arc welding of stainless steel grades such as 1.4306 / 304L. Solid SAW wire of S 19 9 L / ER308L type for joining and surfacing applications with matching and similar stabilized and unstabilized austenitic CrNi(N) and CrNiMo(N)-steels and cast steel grades. Max. service temperature 350°C. Corrosion resistance similar to matching low-carbon and stabilized austenitic 18Cr-8Ni(N)-steels and cast steel grades. Good toughness at subzero temperatures as low as –196°C. Marathon 431 is an agglomerated basic flux that ensures good welding properties with nice bead appearance and good slag detachability. For more information regarding this sub-arc welding flux, see the separate datasheet.
Thermanit GE-316L - Marathon 431 AWS A5.9: ER316L EN ISO 14343-A: S 19 12 3 L EN ISO 14174: S A FB 2 DC	Wire C: 0.01 Si: 0.45 Mn: 1.6 Cr: 18.5 Ni: 12.2 Mo: 2.7 Weld metal: C: 0.01 Si: 0.55 Mn: 1.2 Cr: 18.0 Ni: 12.2 Mo: 2.7	UTS: ≥550 MPa YS: ≥350 MPa El: ≥30% +20°C: ≥70J –120°C: ≥60J	2.0 2.4 3.2 4.0	TÜV(06113), CE	Thermanit GE-316L - Marathon 431 is a wire-flux-combination for welding of stainless steel grades such as 1.4435 / 316L. Solid SAW wire of S 19 12 3 L / ER316L type for joining and surfacing application with matching and similar unstabilized austenitic CrNi(N) and CrNiMo(N)-steels and cast steel grades. Corrosion resistance similar to matching low-carbon and stabilized austenitic CrNiMo-steels. Max. service temperature 400°C. Low temperature service down to –196°C. Marathon 431 is an agglomerated basic flux that ensures good welding properties with nice bead appearance and good slag detachability. For more information regarding this sub-arc welding flux, see the separate datasheet.

Wire/flux combination, nickel-base

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø (mm)	Approvals	Characteristics and Applications
THERMANIT NICRO 82 / MARATHON 104 SAW solid wire: AWS A5.14: ERNiCr-3 EN ISO 18274: S Ni 6082 (NiCr20Mn3Nb) SAW flux: EN ISO 14174: SA FB 2 AC	Wire C: 0.010 Si: 0.20 Mn: 3.2 Cr: 20.5 Ni: Rem. Nb: 2.6 Fe: < 2.0 Weld metal: C: 0.020 Si: 0.30 Mn: 3.0 Cr: 20.2 Ni: Rem. Nb: 2.4 Fe: < 2.0	UTS: >600 MPa YS: >380 MPa El: >35% CVN Impact: +20°C: >100J	2.4	-	Thermanit Nicro 82 / Marathon 104 is a wire flux combination for submerged arc welding. It can be applied for a large scope of base metals, like stainless and heat resistant steel grades, creep resistant and cryogenic steel grades. Also suitable for dissimilar welding (austenitic to ferritic). The weld metal shows excellent mechanical properties with high hot cracking resistance. It is mainly applied for components in chemical and in petrochemical plants. Marathon 104 is an agglomerated fluoride basic flux for submerged arc welding of stainless and heat resistant steel grades. The weld metal is characterized by high resistance to hot cracking and is recommended for the highest demanding applications.
THERMANIT 625 / MARATHON 444 SAW wire: AWS A5.14: ERNiCrMo-3 EN ISO 18274: S Ni 6625 (NiCr22Mo9Nb) SAW flux: EN ISO 14174: SA FB 2 AC	Wire C: 0.010 Si: 0.10 Mn: 0.1 Cr: 22.0 Mo: 9.0 Ni: Bal. Nb: 3.6 Fe: < 1.0 Weld metal: C: 0.012 Si: 0.16 Mn: 0.2 Cr: 21.8 Mo: 9.0 Ni: Bal. Nb: 3.2 Fe: < 1.0	UTS: ≥ 700 MPa YS: ≥ 420 MPa El: ≥ 40% CVN Impact: +20°C: ≥ 80J -196°C: ≥ 70J	1.6 2.0 2.4	TÜV, DNV GL	Thermanit 625 - Marathon 444 is a wire/flux combination for submerged arc welding. Solid wire of S Ni 6625 (NiCr22Mo9Nb) / ERNiCr-Mo-3 type for joining similar nickel-alloys and dissimilar joints between Ni-alloys with low-alloyed and stainless steels and surfacing on low-alloyed steels. Resistant to scaling up to 1000°C. Service temperature limit max. 500°C in sulfurous atmospheres, otherwise heat resistant up to 900°C. Resistant to stress corrosion cracking. Excellent resistance to general, pitting, crevice and intercrystalline corrosion in chloride containing environments. Good toughness down to –196°C. Creep rupture properties according to matching high temperature steels / alloys. Marathon 444 is an agglomerated fluoride basic welding flux with high basic slag characteristics without Cr-support. The weld metals show excellent mechanical properties with high hot cracking resistance.

SAW-flux for un and low alloyed wires

Brand Standard AWS Standard EN ISO	Main constituent: %				Grain size / density	Characteristics and Applications
UV 420 TTR / UV 420 TTR-W EN ISO 14174: SA FB 1 65 DC / SA FB 1 65 AC	SiO_2+TiO_2 15	CaO+MgO 35	Al_2O_3+MnO 21	CaF_2 26	Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	UV 420 TTR is an agglomerated flux of fluoride basic type. 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. When used in combination with electrodes Union S 2 CrMo and Union S 1 CrMo 2 it is possible to meet the most stringent toughness requirements at sub zero temperatures even after step cooling treatment. UV 420 TTR-W permits sound welding on AC, by this achieving a higher level of toughness when welding with CrMo alloyed sub arc wires.
UV 421 TT EN ISO 14174: SA FB 1 55 AC H5	SiO_2+TiO_2 15	CaO+MgO 38	Al_2O_3+MnO 20	CaF_2 25	Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	UV 421 TT is an agglomerated flux of fluoride basic type for joining and surfacing of high strength steels and cryogenic 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.
MARATHON 543 EN ISO 14174: S A FB 1 55 DC H5	CaF_2 21	SiO_2 8	CaF_2+CaO+MgO+MnO 62		Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	Marathon 543 is an agglomerated fluoride-basic special welding flux with high basicity suitable for multi-run welding high creep resistant 9%Cr-steels like grade P91/ T91, 1.4903 - X10CrMoVNb9-1, grade P92/T92, NF616 and 1.4905 - X11CrMoWVNb9-1-1. The metallurgical behaviour concerning Si and Mn is neutral. The flux produces well contoured and smooth welding beads with good slag release as well as appropriate weld metal ductility and impact behaviour after tempering. Marathon 543 is a hydrogen-controlled welding flux with hydrogen contents of maximum 5 ml / 100 gr weld deposit.
UV C 418 TT-M EN ISO 14174: SA FB 1 56 AC H5	SiO_2 + TiO_2 15	CaO + MgO 32	Al_2O_3 + MnO 20	CaF_2 28	Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	UV C 418 TT-M is an agglomerated flux of fluoride basic type for joining and surfacing applications. Mainly for high strength and cryogenic fine grained structural steels. Very good slag detachability. Excellent for narrow gap welding. The flux can be used for tandem and multi wire welding with DC+ and AC.
UV C 418 TT EN ISO 14174: SA FB 1 55 AC H5	SiO_2 + TiO_2 16	CaO + MgO 33	Al_2O_3 + MnO 20	CaF_2 27	Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	UV C 418 TT is an agglomerated flux of fluoride basic type for joining and surfacing applications. Mainly for high strength and cryogenic fine grained structural steels. It is characterized by its neutral metallurgical behaviour. Very good slag detachability. Excellent for narrow gap welding. The flux can be used for tandem and multi wire welding with DC+ and AC.
UV 310 P EN ISO 14174: S A AB 1 55 AC H5	SiO_2 + TiO_2 18	CaO + MgO 25	Al_2O_3 + MnO 35	CaF_2 17	Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	UV 310 P is an agglomerated aluminate-basic flux for submerged arc welding of unalloyed and low alloyed steel grades. The basic flux has a neutral metallurgical behaviour regarding to Mn and Si to avoid hard spots in the weld and is suitable for sour service applications.The flux has been optimised for the manufacture of pipes using the two-run technique and has a high current carrying capacity. Suitable for longitudinal pipe welding and spiral pipe welding with single wire, and especially multi-wire applications with 2-5 wires (DC+ / AC). Nice flat bead appearance with very good slag detachability. The flux generates a very low amount of diffusible hydrogen content HD <4 ml/100gr acc to ISO 3690 in the weld metal. 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. UV 310 P has a relative low sensitivity for possible negative effects of copper particles in the flux. UV 310 P has been designed to achieve best CTOD- and charpy toughness properties in two-run applications with wires like Union S 3 MoTiB, Union S 3 TiB (and Union S 2 Mo). Depending on wire selection and welding conditions the flux can be used for pipe steel grades acc. to API: Grade X 42 to X 80.

SAW-flux for un and low alloyed wires

Brand Standard AWS Standard EN ISO	Main constituent: %				Grain size / density	Characteristics and Applications
UV C 401 EN ISO 14174: SA AB 1 67 AC H5	$SiO_2 + TiO_2$ 19	CaO + MgO 31	Al_2O_3 + MnO 29	CaF_2 20	Grain size acc. EN ISO 14174: 3-20 (0.3-2.0mm)	UV C 401 is an agglomerated flux of aluminate basic type for joining and surfacing applications with general purpose structural steels, boiler and pipe steels. The flux is characterized by low Silicon and Moderate manganese pick up. The welding characteristics are good producing a smooth weld bead with excellent slag detachability.
UV C 305 EN ISO 14174: SA AR 1 76 AC H5	$SiO_2 + TiO_2$ 28	CaO + MgO 0	Al_2O_3 + MnO 55	CaF_2 10	Grain size acc. EN ISO 14174: 4-14 (0.4-1.4mm)	UV C 305 is an agglomerated flux of aluminate rutile type for joining applications with general purpose steels. The flux is characterized by low silicon and moderate manganese pick up. The welding characteristics are good producing a smooth weld bead with excellent slag detachability. The flux is particulary well suited for single wire or twin arc fillet welding with small wire diameter (1.6-2.4 mm) with high welding speed. Wall thickness <10 mm.

SAW-flux for high alloyed wires

Brand Standard AWS Standard EN ISO	Main constituent: %				Grain size / density	Characteristics and Applications
AVESTA C 807 EN ISO 14174: SA FB 2	$SiO_2 + TiO_2$ 10		Al_2O_3 38	CaF_2 50	Grain size acc. EN ISO 14174: 3-16 (0.3-1.6mm)	AVESTA C 807 is specially designed for joining stainless steels which is used for austenitic stainless wires type 308L, 316L and 309L for applications where high impact strength values and high corrosion resistance is required. It can also be used for cladding unalloyed or low alloy steel. Very good welding properties and easy slag removal.
AVESTA C 805-D EN ISO 14174: SA AF 2 56 55 Mo DC	$SiO_2 + TiO_2$ 10	CaO+MgO 0	Al_2O_3+MnO 40	CaF_2 50	Grain size acc. EN ISO 14174: 3-16 (0.3-1.6mm)	Avesta C 805-D is an agglomerated flux of aluminate fluoride basic type. Flux 805-D is specially designed for joining duplex stainless steels but can also be used for austenitic stainless wires type 308L, 316L and 309L for applications where high corrosion resistance is required. Very good welding properties and easy slag removal.
MARATHON 431 EN ISO 14174: SA FB 2 DC	CaF_2 52	SiO_2 8	CaF_2 +CaO+MgO+MnO 52		Grain size acc. EN ISO 14174: 3 – 16 (0.3 – 1.6 mm); 4 – 14 (0.4 – 1.4 mm)	Marathon 431 is a fluoride-basic agglomerated flux for submerged arc welding of stabilized and unstabilized standard CrNi(Mo) and duplex stainless steel grades. The flux can be applied in multi-pass and single pass welding procedures. For a nice welding performance combined with good mechanical properties. Thin fluid slag which is self-releasing after solidification. The weld seams become smooth and finely rippled without any slag residues. Marathon 431 provides a high degree of purity in the weld metal ensuring good mechanical properties with good corrosion resistance. The flux does not compensate chromium loss.

SAW-flux, nickel-base

Brand Standard AWS Standard EN ISO	Main constituent: %	Grain size / density	Characteristics and Applications
MARATHON 104 EN ISO 14174: S A FB 2 AC	CaF_2 23 SiO_2 14 CaF_2+CaO+MgO+MnO 65	Grain size acc. EN ISO 14174: 3 – 20 (0.3 – 2.0 mm)	Marathon 104 is an agglomerated fluoride-basic flux for submerged arc welding of stainless / heat resistant steel grades and Ni-base alloys. This flux is – above all – recommended for highest demands on crack resistance and the mechanical properties of the weld metal, especially with heavy wall thickness. Combined with stainless wire grades it provides a high degree of purity in the weld metal, with good mechanical properties and good corrosion resistance. The flux does not compensate chromium loss. Its metallurgical behavior in regard of carbon, silicon and manganese is neutral. Good slag detachability and nice bead appearance. The weld metal is characterized by good mechanical properties and high resistance to hot cracking and is recommended for the highest demanding applications, e.g. creep resistant (Thermanit ATS), non-magnetic and cryogenic applications (especially recommended for LNG applications with Thermanit Nimo C 276).
MARATHON 444 EN ISO 14174: SA FB 2 AC	SiO_2 7 CaO+MgO+CaF_2+MnO 61 CaF_2 19	Grain size acc. EN ISO 14174: 3-16 (0.3-1.6mm)	Marathon 444 is a highly basic agglomerated welding flux, designed for welding and cladding of nickel-base-alloys. The weld metals show excellent mechanical properties with high hot cracking resistance.

Finishing chemicals

Product Name	Product type	Characteristics and Applications
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.
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.
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.
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.


böhler
by voestalpine
böhler welding
by voestalpine
böhler welding
by voestalpine
böhler welding
voestalpine


böhler welding
by voestalpine
böhler welding
by voestalpine
böhler welding
by voestalpine
böhler welding

JOIN! voestalpine Böhler Welding

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

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

Tailor-Made Protectivity™ – The combination of our high-quality products and application expertise enables you to not only repair and protect metal surfaces and components. Our team of engineers, experienced in your specific applications, offer you customized solutions resulting in increased productivity for your demanding challenge. The result is what we promise: Tailor-Made Protectivity™.

In-Depth Know-How – As a manufacturer of soldering and brazing consumables, we offer proven solutions based on 60 years of industrial experience, tested processes and methods, made in Germany. This in-depth know-how makes us the internationally preferred partner to solve your soldering and brazing challenge through innovative solutions. The result is what we promise: Innovation based on in-depth know-how.

The Management System of voestalpine Böhler Welding Group GmbH, Peter-Mueller-Strasse 14-14a, 40469 Duesseldorf, Germany has been approved by Lloyd's Register Quality Assurance to: ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007, applicable to: Development, Manufacturing and Supply of Welding and Brazing Consumables.
More information: www.voestalpine.com/welding

Delhi Office
Office No. 201D, 2nd Floor,
D-21, Corporate Park, Sector-21,
Near Dwarka Sector-8 Metro Station,
Dwarka, New Delhi - 110 075
India

Factory
SP-183, RIICO Industrial Area,
Kaharani, Bhiwadi, Dist. Alwar,
Rajasthan - 301 019
India
T. +91 1493-298268

Application Technology Centre
A-140, Metropolitan, Ground Floor,
Road No. 23, Wagle Industrial Estate,
Thane (West) - 400 604
India
T. +91 22 2582 8855/56

voestalpine Bohler Welding India Pvt. Ltd.
A-140, Metropolitan, Road No. 23,
Wagle Industrial Estate,
Thane (West) - 400 604, Maharashtra,
India
T: +91 22 4228 4400
E: welding.india@voestalpine.com
www.voestalpine.com/welding

voestalpine
ONE STEP AHEAD.