



Lasting Connections

# WELDING SOLUTIONS FOR OIL & GAS UPSTREAM



voestalpine Böhler Welding  
[www.voestalpine.com/welding](http://www.voestalpine.com/welding)

voestalpine

ONE STEP AHEAD.

# LASTING CONNECTIONS

As a pioneer in innovative welding consumables, Böhler Welding offers a unique product portfolio for joint welding worldwide. More than 2000 products are adapted continuously to the current industry specifications and customer requirements, certified by well-respected institutes and thus approved for the most demanding welding applications.

## **Our customers 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

## SPECIALIZED WELDING CONSUMABLES FOR THE OIL & GAS UPSTREAM INDUSTRY

Böhler Welding provides high quality low-hydrogen consumables for the welding of high strength steels used in drilling units or offshore cranes, corrosion resistant alloys used for subsea and top side processing applications and low alloyed consumables for the welding of pressure control equipment.

In addition to joining applications, we also have an expertise in cladding, offering high quality nickel-base wires for the hot wire GTAW process and the most advanced solutions in electroslag strip cladding.

# OUR INDUSTRY COMPETENCE COMES FROM EXPERIENCED PEOPLE

Oil and gas play an important role in the future global energy supply model. However, the emergence of new and unconventional sources of oil and gas will change the landscape with regard to extraction and processing in many significant ways.

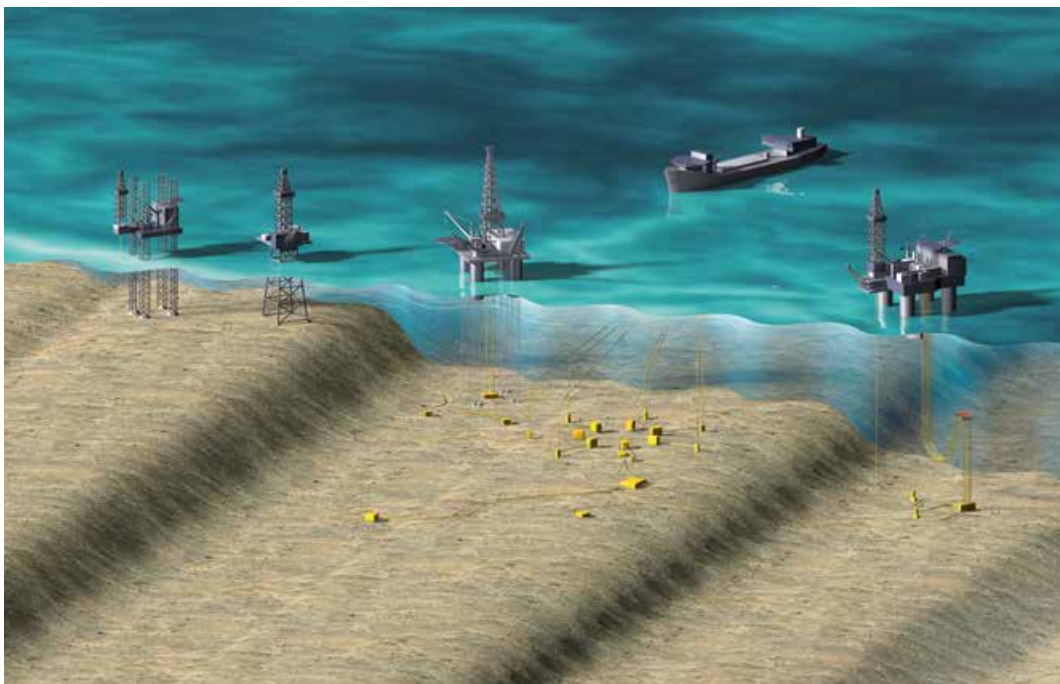
The Upstream Oil & Gas segment refers to the search for crude oil and natural gas, followed by their recovery and production. This segment is also referred to as the exploration and production (E&P) sector; it includes the search for potential underground or sub-sea oil and gas fields, the drilling of exploratory wells, and the subsequent drilling and operation of the wells that recover and bring the crude oil and/or raw natural gas to the surface.

The Downstream Oil & Gas segment refers to the processing and refining of the extracted crude oil and gas from both conventional and unconventional resources.

This segment is also referred to as hydrocarbon processing and includes refineries, natural gas processing plants, petrochemical processes (olefins and aromatics), as well as methanol plants.

voestalpine Böhler Welding Group provides high-quality-welding-filler-based solutions for safe, efficient, and cost-effective operation of upstream, midstream, and downstream facilities and equipment to these segments worldwide.

These products are supplied by regional manufacturing, development, sales, and support units under a range of product brand names that are recognized worldwide.



# SURFACE

Oil & Gas Upstream Surface Systems consist of the following. Offshore: Fixed or Floating Systems, constructed in dedicated fabrication sites, and shipyards. Utilized for exploration (drilling), production (extraction), processing and transportation of hydrocarbons and associated materials, connected to the sea bed, via S.U.R.F components. Onshore: Drilling packages, systems and surface well head components, the later using similar material combinations as noted in greater detail within the Sub Sea section of this document.

## Jack-up Rig Overview

### Hull

The hull of a jack-up unit is a watertight structure that supports equipment, systems, and human resources so as to enable operation of the unit. While afloat, the hull provides buoyancy and supports the weight of the legs, spud cans (footings), and topside equipment. These rigs operate in fixed locations with water of the order of 150 meters deep and drilling ranges in excess of 10,000 meters.

### Legs and footings

Legs and footings are steel structures that support the hull when it is in elevated mode, providing stability and resistance to lateral loading. Spud cans (footings) are required to increase the load-bearing area, the legs being able to extend over 150 meters or to be retracted and remain wholly above the surface of the water while the structure is being towed.

### Cantilever

A platform extension with drill floor and derrick that can facilitate connection to fixed platforms as part of a wider production system.

### Summary of materials used for construction of main components

Typical steel grades:

- » Hull: girders and deck plate:  
DIN StE355 (StE36) DIN T StE420 (TT StE43)
- » Cantilever: DIN StE355 (StE36) DIN T StE420 (TT StE43)
- » Legs: ALDUR 700QL1, A514grade Q, A517grF, SUPERELSO 690SR, API x65
- » Spud cans (footings): DIN StE355 (StE36)  
DIN T StE420 (TT StE43)



## Fixed and Floating Structures

### Fixed platforms

These generally consist of fixed tubular structures made from steel plates, tubes, and pipes in a braced format with nodal interfaces, fixed to the seabed via piles and templates, and normally restricted to water depths of less than 100 meters. These constructions are used as the base for topside structures, facilitating accommodation, utilities, exploration, and production of oil & gas, often linked by subsea systems. The typical components and steel grades offered are as follows:

### Jacket structure

- » Piles, bracing, and tubular components: Manufactured using a variety of diameters and thickness, depending on steel grade and design criteria
- » Nodes: Intersection of structural tubular components
- » Mud mats: Used to spread the load (weight) of the structure on the seabed, manufactured primarily of plate material

### Typical steel grades:

DIN StE355 (StE36) DIN T StE420 (TT StE43) API 2Y Gr 50&60

### Deck structure:

The deck is the framework within which individual modules are contained, and is constructed from a combination of steel plate girders, structural tubular connections, and nodal interfaces. Typical steel grades employed include DIN StE355 (StE36) DIN T StE420 (TT StE43) API 2Y Gr 50&60, present in a wide range of thicknesses and diameters.

### Topside and modules:

Depending on the size and design of the platform, the topside (deck) will include a number of functional modules relating to utilities (power and water), accommodation, drilling/production, processing, and transportation (helideck).

### Typical Material Grades:

Used include Carbon Steel for structural strength, general and process pipework, Austenitic and Duplex Stainless Steels, Nickel and Copper Alloy pipework and components for high temperature, and corrosion resistant applications. DIN StE355 (StE36) DIN T StE420 (TT StE43) API 2Y Gr 50&60.



## Floating Production Storage Offloading (FPSO) Floating LNG and Spar Systems

Floating systems are based on hull structures with ballast systems and are constructed using shipbuilding techniques, in some cases starting from a ship hull carcass or pontoon structure, designed individually to cover the needs of specific developments, including exploration (drilling) production (processing), storage, and offloading (to smaller transit tankers or via pipeline).

These structures are linked to the seabed via SURF systems.

### Hulls and pontoons:

As described above for fixed platforms, but with greater emphasis on structural plate; stiffeners and girders being generally made of carbon or high-strength low-alloy steel grades as stated. As such, the range of welding fillers described above would be suitable for the construction of these floating systems.

**Table 1: Typical Welding Consumable Combinations for Jack Up Rigs**

SMAW	BÖHLER FOX EV 65 (E8018-G)
	BÖHLER FOX EV 70 (E9018-D1)
	Thermanit NiMo 100 (E10018-D2)
GTAW	BÖHLER DMO-IG (ER80S-G)
	Union I Ni 1 MoCr (ER100S-G)
FCAW	Union RV NiMoCr (E111T1-GJ H4)
SAW	Union S 2 Mo + UV 418 TT (F8A6-EA2-A2)
	Union S 3 NiMoCr + UV 420 TT (F11A6-EG-F6)

**Table 2: Typical Welding Consumable Combinations for Jackets, Deck, Hull, Mooring Systems and Modules**

SMAW	BÖHLER FOX EV 50 (E7016-1)
	BÖHLER FOX EV 60 (E8018-C3)
GTAW	BÖHLER EMK 6 (ER70S-6)
	BÖHLER Ni 1-IG (ER80S-Ni1)
FCAW	BÖHLER Ti 52-FD (E71T-1)
	BÖHLER Ti 60-FD (E81 T1-Ni1)
SAW	Union S 3 Si + UV 400 (F7A4-EM10K)
	Union S 2 Si + UV 418 TT (F7A6-EM12K)
	Union S 2 Ni 370 + UV 421 TT (F7A8-EG-G)

### Topsides/modules:

As described in the previous section (q.v.).

### Mooring systems:

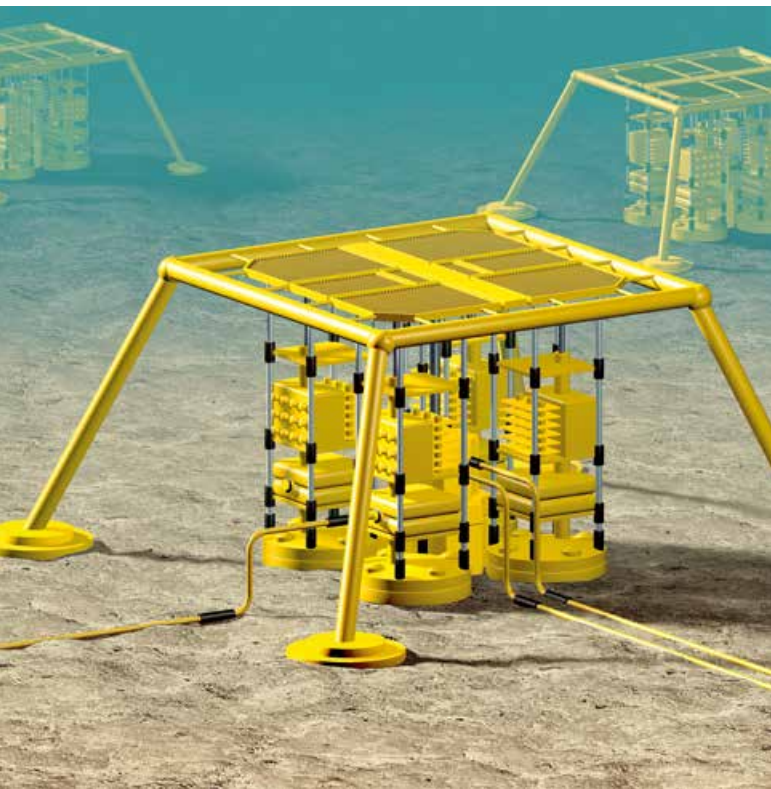
A mooring system is made up of a mooring line, anchor, and connectors, and is used for maintaining the position of a ship or floating platform in all depths of water, via a mooring line connected to an anchor in the seabed.

### Suction piles:

These are the predominant mooring and foundation system used for deep-water development projects worldwide. Tubular piles are driven into the seabed and a pump then sucks water out from the top of the pile, so driving it further into the seabed. Material grades used in mooring systems are generally used in fixed jacket and component structures and are covered by the welding processes and fillers offered in the previous section.

Table 3: Typical Welding Consumable Combinations for Modules

Carbon Steel		see Table 2	Carbon Steel		see Table 2	
Stainless Steel	SMAW	BÖHLER FOX EAS 4 M-A (E316L-17)	Nickel Alloys	SMAW	UTP 759 Kb (ENiCrMo13)	
	GTAW	BÖHLER EAS 4 M-IG (ER316L)			UTP 6222 Mo (ENiCrMo3)	
	FCAW	BÖHLER EAS 4 PW-FD (ER316LT1-4)			UTP 776 Kb (ENiCrMo4)	
	SAW	Thermanit GE-316L + Marathon 431 (ER316L)		GTAW-	UTP A 759 (ERNiCrMo13)	
Duplex Steel (22Cr and 25Cr)	SMAW	Avesta 2205 (ER 2209-17)		GMAW	UTP A 6222 Mo (ERNiCrMo)	
		Thermanit 25/09 CuT (E2595-15)			UTP A 786 (ERNiCrMo14)	
	GTAW	Avesta 2205 (ER 2209)		FCAW	UTP AF 6222 Mo PW (ENiCrMo3TI-4)	
		Thermanit 25/09 CuT (ER 2594)		SAW	UTP A 6222 Mo-3 + UTP FLUX 504 (ERNiCrMo3)	
	SAW	Avesta 2205 + Avesta Flux 805 (ER 2209)	Copper Nickel	SMAW	UTP 387 (ECuNi)	
		Thermanit 25/09 CuT + Marathon 431 (ER 2594)		GTAW	UTP A 387 (ERCuNi)	
			Titanium	GTAW	UTP A 902 (ER Ti-2)	
			Cladding		UTP A 6222 Mo-3 (ERNiCrMo3) GTAW/GMAW	
						SOU DOTAPE 625 (EQNiCrMo3) Strip
						RECORD EST 201 RECORD EST 236





# SUBSURFACE

## SURF SYSTEMS (SUBSEA UMBILICAL RISER AND FLOWLINE)

Regardless of which offshore upstream systems are used, they will all have a complete or partial SURF element as part of a wider extraction system from a fixed or floating system. This subsegment is seen as the fastest growing element of offshore upstream construction globally.

### **Subsea trees (Christmas trees):**

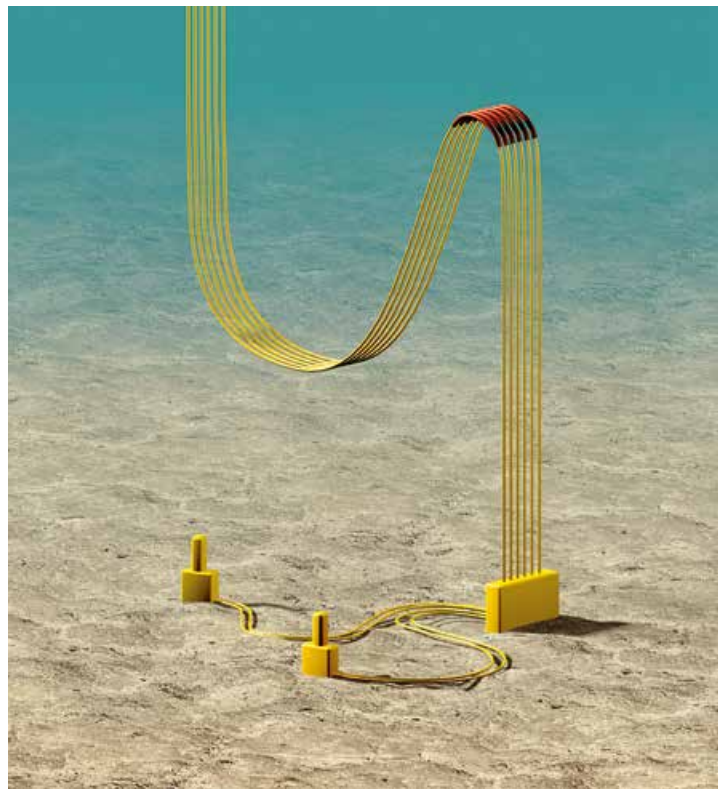
Used on offshore oil and gas fields, a subsea tree monitors and controls production from a subsea well. Fixed to the wellhead of a completed well, subsea trees can also manage fluids or gases injected into the well and control the flow. Subsea trees are used in offshore field developments worldwide, from shallow to ultradeep waters. The deepest subsea trees are installed in the waters off Brazil and in the US Gulf of Mexico, many of them rated for water depths of up to 3,500 meters. There are a number of types of subsea trees, rated for water depth, temperature, pressure, and flow.

### **Wellhead**

is the equipment at the surface of a well that is used to control the pressure at the point at which the hydrocarbons and water exit the ground.

### **Blowout preventer (BOP)**

is the equipment installed at the wellhead to control pressure in the annular space between the casing and the drill pipe or tubing during drilling, completion, and workover operations. These are often an integral component of subsea trees.



## RISERS

Risers are conduits for the vertical transfer of materials from the seafloor to the production and drilling facility on the surface and from the facility to the seafloor. There are a number of types of risers, including attached risers, pull-tube risers, steel-catenary risers, top-tensioned risers, riser towers, plus flexible riser configurations and drilling risers.

In the same way as pipelines or flowlines, risers (rigid or flexible) transport both the produced hydrocarbons and production materials such as injection fluids, control fluids, and gas lift. They are usually insulated to withstand seafloor temperatures and to maintain the viscosity of the hydrocarbon fluids they carry.

Whereas production and import/export risers transfer hydrocarbons and production materials during the production phase of the development, drilling risers transfer mud to the surface during drilling activities. Connected to the subsea BOP stack at the bottom and the rig at the top, drilling risers temporarily connect the wellbore to the surface to ensure that drilling fluids do not leak into the water.

## UMBILICALS

Umbilicals transfer power, chemicals, communications, and other input to and from subsea developments, and are the lifeline to subsea trees, manifolds, jumpers, sleds, and controls. As the connective medium between surface installations and subsea developments, umbilicals can also carry electrical, hydraulic, chemical-injection, and fiberoptic connections.

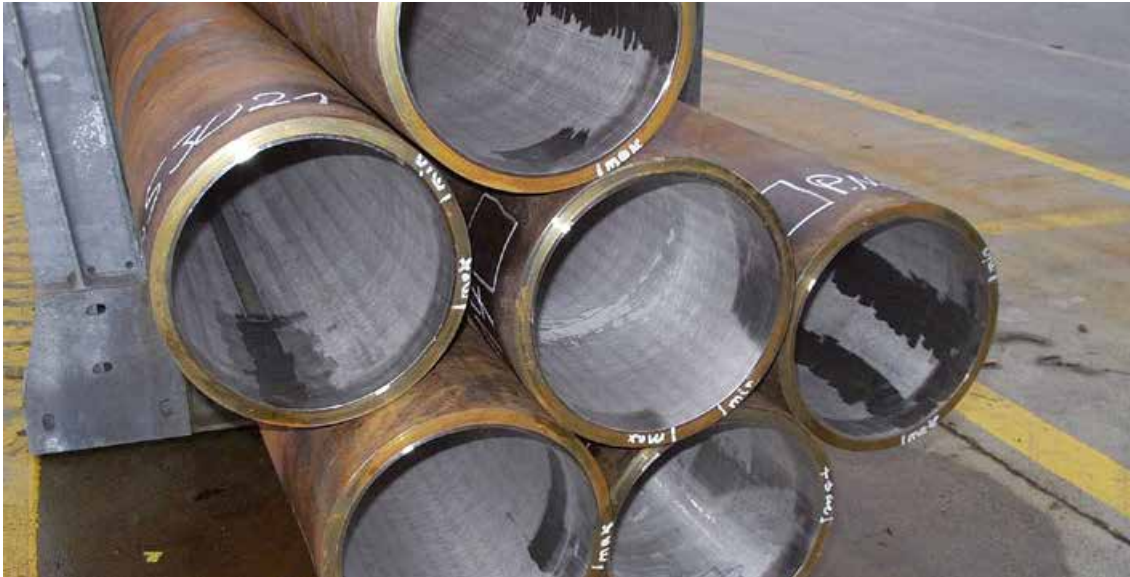
## SUBSEA PROCESSING

With production equipment located on the seafloor rather than a fixed or floating platform, subsea processing provides a cost-effective solution for offshore environments.

Conceived to overcome the challenges of extreme deep-water situations, subsea processing has become a viable solution for fields located in harsh conditions where processing equipment on the water's surface might be at risk. Subsea processing is also an emergent application that can increase production from mature or marginal fields.

# TYPICAL MATERIAL GRADES

Used in the general fabrication and construction of SURF systems



# PIPE MATERIAL FORGING AND FITTINGS

- » Carbon and high-strength low-alloy steel grades:  
APIx65/70 pipe EN 10208-2 grades L210 – L555MB, 4130/F22 AISI 8620 Mod. Structural components such as support and lifting frames, manifolds, well-heads, BOPs, connectors, and valve components, to secure the structural and mechanical strength of components.
- » Austenitic and martensitic stainless steels, 22Cr duplex and 25Cr super duplex:  
UNS S31603, N08904, S41500, S31803/32205 S32760. Used in the manufacturing of heat exchangers, fire fighting systems, ballast water systems, desalination systems, process and service water systems, subsea pipework systems, pressure vessels, flowlines, riser tubes, manifold piping, christmas tree piping, and hydraulic lines.
- » Nickel Alloys:  
Nickel chromium molybdenum alloys UNS N0 6625, N08825, N06059, N10276, utilized as alloy fittings, weld-cladding and joining of CRA weld-clad components, flowlines, and risers. Nickel-chromium-molybdenum and nickel-copper alloys are utilized for seawater, general aqueous corrosion, and high-temperature service applications.

## **Corrosion-resistant cladding materials:**

Increasing use of carbon and high-strength low-alloy steel components, weld clad with corrosion-resistant alloys (stainless, nickel alloys), to combat the effects of high-temperature, high-pressure, and corrosive environments as a cost-effective engineering solution in deep-water developments. The underlying product range offers solutions for weld-cladding and joining CRA forgings, plates, pipes, and fittings associated with SURF system components.

## **Corrosion-resistant alloy weld-cladding solutions:**

The underlying range of welding strips, fluxes and flux-cored consumables cover the weld-cladding of large surface areas associated with major components and vessels for upstream processing equipment. This equipment can be land-based, integrated into topside modules processing systems and, increasingly, on the seabed as part of a SURF system. Material grades include austenitic, super austenitic, 22Cr and 25Cr duplex stainless steels, nickel, copper and cobalt based alloys.

## **Roll-bonded CRA-clad plate joining using SAW/ESW high deposition rate welding processes:**

The underlying examples are supplemented by additional products, details of which can be obtained directly from voestalpine Böhler Welding.

## **Cobalt-based FCAW cladding solution:**

Others are available within the wider voestalpine Böhler Welding portfolio and information is available from regional organizations.



## Joining 1/4

	Typical Base Material Examples	Welding Process	Product Name	Classification AWS
Unalloyed	DIN StE355 (StE36) DIN T StE420 (TT StE43) API 2Y Gr 50&60	SMAW	BÖHLER FOX EV 47	A5.1 E7016-1
			BÖHLER FOX EV PIPE	A5.1 E7016-1
			BÖHLER FOX EV 50	A5.1 E7018-1
		GTAW	BÖHLER EML 5	A5.18 ER70S-3
			BÖHLER EMK 6	A5.18 ER70S-6
			GMAW	BÖHLER EMK 6 D
		Union K 52		A5.18 ER70S-6
		FCAW	BÖHLER Ti 52-FD	A5.20 E71T-1
			Union RV 71	A5.20 E71T-1CH4
		SAW Flux	UV 306	EN 760 SA AR1 77 AC H5
			UV 400	EN 760 SA AB 1 67 AC H5
			UV 418 TT	EN 760 SA FB 1 55 AC H5
		SAW	Union S 2 Si	A5.17 F7A2-EM12K
			Union S 2	A5.17 F7A6-EM12
Union S 3 Si	A5.17 F7A8-EH12K			
Medium-alloyed	DIN StE355 (StE36) DIN T StE420 (TT StE43) API 2Y Gr 50&60	SMAW	BÖHLER FOX 2,5 Ni	A5.5 E8018-C1
			BÖHLER FOX EV 60	A5.5 E8018-C3
	DIN StE355 (StE36) DIN T StE420 (TT StE43)		Phoenix SH V1	A5.5 E8018-C3
	ALDUR 700QL1		BÖHLER FOX EV 65	A5.5 E8018-G
	A514grade Q		BÖHLER FOX EV 70	A5.5 E9018-D1
	A517grF		Thermanit NiMo 100	A5.5 E10018-D2
	SUPERELSO 690SR		Phoenix NiMo 100	A5.5 E10018-D2
	API x65		Phoenix SH NI 2 K 100	A5.5 E11018-M
	DIN StE355 (StE36) DIN T StE420 (TT StE43)		Thermanit SH NI 2 K 100	A5.5 E11018-M
	APIx65/70 pipe EN 10208-2 Grades L210 – L555MB		Phoenix SH Ni 2 K 130	A5.5 E12018-G
	4130/F22 AISI 8620 Mod	GTAW	Union I CrMo 910	A5.28 ER80S-B2(mod.)
			BÖHLER DMO-IG	A5.28 ER80S-G
			BÖHLER Ni 1-IG	A5.28 ER80S-Ni1
			BÖHLER 2,5 Ni-IG	A5.28 ER80S-Ni2
			Union I Ni 1 MoCr	A5.28 ER100S-G
		GMAW	Union K 52 Ni	A5.28 ER80S-G
			Union MoNi	A5.28 ER90S-G
			BÖHLER NiMo1-IG	A5.28 ER90S-G
		FCAW	BÖHLER Ti 60-FD	A5.29 E81 T1-Ni1
			Union RV Ni 1	A5.29 E81 T1-Ni1
		Union MV NiMoCr	A5.28 E110C-K4MH4	
		Union RV NiMoCr	A5.29 E111T1-GJ H4	

## Joining 2/4

	Typical Base Material Examples	Welding Process	Product Name	Classification AWS
Medium-alloyed			Union MV Ni 1	A5.28 E80C-Ni1 H4
		SAW Flux	UV 420 TTR	EN 760 SA FB 1 65 DC
			UV 420 TTR-W	EN 760 SA FB 1 65 AC
			UV 420 TT	EN 760 SA FB 1 65 DC
			UV 418 TT	EN 760 SA FB 1 55 AC H5
			UV 420 TTR-C H4	EN 760 SA FB 1 65 DC H5
			UV 420 TTR-C	EN 760 SA FB 1 65 DC
			UV 421 TT	EN 760 SA FB 1 65 DC H5
		SAW	Union S 2 Ni 370	A5.23 F7A8-EG-G
			Union S 2 CrMo	A5.23 F8P2-EB2R-B2
			Union S 2 Mo	A5.23 F8P4-EA2-A2
			Union S 3 Mo	A5.23 F8A5-EA4-A4
			Union S 3 NiMo 1	A5.23 F10P8-EF-F3
			Union S 3 NiMoCr	A5.23 F11A8-EG-F6
			Union X 85 T	A5.23 F12A6-EG-G
	UNS S31603	SMAW	BÖHLER FOX EAS 2	A5.4 E308L-15
	N08904		BÖHLER FOX EAS 2-A	A5.4 E308L-17
	S41500		BÖHLER CN 23/12 Mo-FD	A5.4 E309L-17
	S31803/32205 S32760		BÖHLER FOX EAS 4 M-A	A5.4 E316L-17
			BÖHLER FOX SAS 2-A	A5.4 E347-17
Stainless	UNS S31603	GTAW	BÖHLER EAS 2-IG	A5.9 ER308L
	N08904		BÖHLER EAS 4 M-IG	A5.9 ER316L
	S41500		BÖHLER SAS 2-IG	A5.9 ER347
	S31803/32205 S32760	FCAW	BÖHLER EAS 2-FD	A5.22 ER308LT0-4
			BÖHLER EAS 2 PW-FD	A5.22 ER308LT1-4
			BÖHLER CN 23/12-FD	A5.22 ER309LT0-4
			BÖHLER CN 23/12 PW-FD	A5.22 ER309LT1-4
			BÖHLER EAS 4 M-FD	A5.22 ER316LT0-4
			BÖHLER EAS 4 PW-FD	A5.22 ER316LT1-4
			BÖHLER SAS 2 PW-FD	A5.22 ER347T-1
			BÖHLER CN 23/12 Mo-FD	A5.22 E309LMoT0-4(1)
		SAW Flux	Marathon 431	EN 760 SA FB 64 DC
			Avesta Flux 805	EN 760 SA AF 2 Cr DC
			BÖHLER BB 202	EN 760 SA FB 2 DC
			Avesta Flux 801	EN 760 SA CS 2 Cr DC
		SAW	Thermanit JE-308L	A5.9 ER308L
			Thermanit 25/14 E-309L	A5.9 ER309L
		Thermanit GE-316L	A5.9 ER316L	

## Joining 3/4

	Typical Base Material Examples	Welding Process	Product Name	Classification AWS
Duplex	UNS S31603	SMAW	Avesta 2205 basic	A5.4 E2209-15
	N08904		Avesta 2205	A5.4 E2209-17
	S41500		Avesta 2205-PW AC/DC	A5.4 E2209-17
	S31803/32205 S32760	GTAW	Avesta 2205	A5.9 ER 2209
	UNSS31803/32205	FCAW	Avesta FCW-2D 2205	A5.22 E2209T0 - 4 /-1
			Avesta FCW 2205-PW	A5.22 E2209T1 - 4 -1
		SAW Flux	Avesta Flux 805	EN 760 SA AF 2 Cr DC
		SAW	Avesta 2205	A5.9 ER 2209
Super Duplex	UNS S31603	SMAW	Thermanit 25/09 CuT	A5.4 E2595-15
	N08904		Avesta 2507/P100 rutile	A5.4 E2594-16 *M*
	S41500	GTAW	Thermanit 25/09 CuT	A5.9 ER 2594
	S31803/32205 S32760	FCAW	Avesta FCW 2507/P100-PW	A5.22 E2594T1-4/-1
		SAW Flux	Marathon 431	EN 760 SA FB 64 DC
			Avesta Flux 805	EN 760 SA AF 2 Cr DC
		SAW	Thermanit 25/09 CuT	A5.9 ER 2594
Nickel - Base	ALLOYS UNS N0 6625	SMAW	UTP 759 Kb	A5.11 ENiCrMo13
	N08825		UTP 6222 Mo	A5.11 ENiCrMo3
	N06059		UTP 776 Kb	A5.11 ENiCrMo4
	N10276		UTP 7015	A5.11 ENiCrFe-3
	ALLOY 400 UNS N04400 W.Nr. 2.4360 & 2.4361		UTP 068 HH	A5.11 ENiCrFe-3 (Mod)
			UTP 80 M	A5.11 ENiCu-7
	These consumables are also used for joining of CRA clad and/or dissimilar materials	GTAW	UTP A 6222 Mo	A5.14 ERNiCrMo3
			UTP A 759	A5.14 ERNiCrMo13
			UTP A 786	A5.14 ERNiCrMo14
			UTP A 068 HH	A5.14 ERNiCr-3
			UTP A 80 M	A5.14 ERNiCu-7
		GMAW	UTP A 6222 Mo-3	A5.14 ERNiCrMo3
		FCAW	UTP AF 6222 Mo PW	A5.34 ENiCrMo3TI-4
		SAW Flux	UTP FX 504	EN ISO 14174 SA AB 2 AC
	Non Ferrous	90:10 CuNi UNS C70600 & 70:30 CuNi UNS C70500 Alloys	SMAW	UTP 387
ASTM B861 & B862 Grade 2 Pipe		GTAW	UTP A 387	A5.7 ERCuNi
			UTP A 902	A5.6 ER Ti-2
Cladding	A wide variety of base materials including those above	GTAW/ GMAW	UTP A 6222 Mo-3	A5.14 ERNiCrMo-3
	are routinely weld clad	SAW	UTP A 6222 Mo + UTP FX 504	A5.14 ERNiCrMo-3
		FCAW	SK STELKAY 6 T-G	DIN8555 MF20GF40CTZ

## Strip Cladding

	Alloy	Welding Process	Layer	Strip	Flux
Low Alloy	1Ni-0,5Mo	SAW	1	SOUDOTAPE A	RECORD NiMo 5T
	Stainless	316L	ESW	2	SOUDOTAPE 309 L+316 L
ESW Single Layer			1	SOUDOTAPE 21.13.3 L	RECORD EST 122
				SOUDOTAPE 316 L	RECORD EST 316-1
		ESW High Speed	2	SOUDOTAPE 309 L+316 L	RECORD EST 136
317L		ESW	2	SOUDOTAPE 316 L	RECORD EST 317-2
		ESW Single Layer	1	SOUDOTAPE 21.13.3 L	RECORD EST 317-1
		ESW High Speed	2	SOUDOTAPE 21.13.3 L	RECORD EST 136 Mo
Duplex		ESW Single Layer	1	SOUDOTAPE 22.6.3 L	RECORD EST 4462-1
Super Duplex		ESW	2	SOUDOTAPE 22.6.3 L	RECORD EST 2584
254 SMO		ESW	2	SOUDOTAPE 254 SMO	RECORD EST 122
904 L		ESW	2	SOUDOTAPE 20.25.5 LCu	RECORD EST 122
	ESW Single Layer	1	SOUDOTAPE 20.25.5 LCu	RECORD EST 385-1	
Nickel	825	ESW	1	SOUDOTAPE 825	RECORD EST 138
	625	ESW	2	SOUDOTAPE 625	RECORD EST 201
		ESW Single Layer	1	SOUDOTAPE 625	RECORD EST 237
				SOUDOTAPE 625	RECORD EST 625-1
		ESW High Speed	2	SOUDOTAPE 625	RECORD EST 236
	400	SAW	2	SOUDOTAPE NiCu7	RECORD NiCuT
		ESW	2	SOUDOTAPE NiCu7	RECORD EST 400
	C22	ESW	2	SOUDOTAPE NiCrMo22	RECORD EST 259
	C276	ESW	2	SOUDOTAPE NiCrMo59 + SOUDOTAPE NiCrMo4	RECORD EST 259
	59	ESW	2	SOUDOTAPE NiCrMo59	RECORD EST 259
	C4	ESW	2	SOUDOTAPE NiCrMo7	RECORD EST 259
Copper Alloys	70Cu - 30Ni	SAW	2	SOUDOTAPE NiCu7 SOUDOTAPE CuNi30	RECORD NiCuT





# 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](http://www.voestalpine.com/welding)



