Welding Solutions for the Nuclear Industry

voestalpine Böhler Welding
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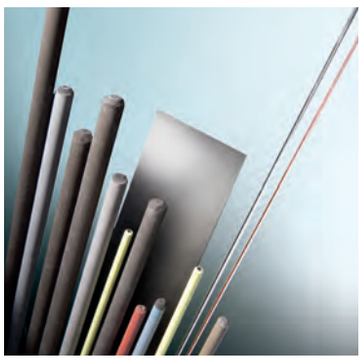
voestalpine Böhler Welding

Metallurgical Expertise for Best Welding Results

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



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

Our customers benefit from:

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

Customer first

Absolute customer focus is our guiding principle. We see ourselves as a provider of solutions to challenging welding projects. We ensure that our customers get the right filler metals, use them correctly, and that all welding process parameters are adjusted for the best possible performance. We consider it as our responsibility to guarantee that we deliver to our customers, now and in the future, the best possible solutions. We also strive to develop new products, optimize existing products, and streamline processes so as to achieve very short turnaround times.

Experienced and committed employees

We rely on committed employees who have been trained to the highest standards. It is their knowledge, skills, and personal commitment that ensure the long-term success of our company and its customers. In combination with our premium quality products, the individual technical support provided by our globally acting application technicians and specialist welding engineers empowers our customers to master even the most difficult and challenging welding tasks.

Three competencies – three brands

In our efforts to afford our customers the best possible support and promote development in line with specific targets, we have built our core competences within Joint Welding, Repair & Maintenance Welding and Soldering & Brazing. This way we offer our customers the largest and most comprehensive product portfolio of filler materials within our three brands:

- Böhler Welding
- UTP Maintenance
- Fontargen Brazing

Welding Solutions for demanding industries

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

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

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

Nuclear Industry and voestalpine Böhler Welding

Nuclear power is with 15% of the global electrical power generation regarded as one of the major ways of producing electrical power with low CO_2-emission. It is a fact that in the last decade a rise in the number of nuclear power-plants has been made, especially in the Asian countries. voestalpine Böhler Welding is an industry leader who supplies the nuclear industry with uncompromised quality products combined with expertise and technical support.

New reactors under construction in 2013 globally:

PWR	Pressurized Water Reactor	38
VVER	Russian PWR	14
BWR	Boiling Water Reactor	4
PHWR	Pressurized Heavy Water Reactor	5

voestalpine Böhler welding is known as a global leader in the supply of welding-consumables to the nuclear Industry with a 50 year impeccable track record. voestalpine Böhler Welding has a proven track record in the supply of high quality and innovative welding consumables to the nuclear industry, where it is known that welding itself is the most critical operation within the construction of a nuclear power plant. Therefore, special attention must be paid to the welding procedure as well as the production and delivery of welding consumables. We have offered high quality solutions using the widest range of technical expertise with a consistent QA/QC standard. Trusted deliveries have been made to the world's leading nuclear equipment manufacturers, for use in both new reactors and plant modernizations all over the world.

Replacements in nuclear power plants are principally done for reactor-vessel-heads, pressurizers and steam-generators, with as a main goal to improve safety, energetic performance and plant life extension.

Serving different nuclear technologies

Core and secondary parts of most reactor types in service today such, as Pressurized Water Reactor (PWR)/VVER, Boiling Water Reactor (BWR), Pressurized Heavy Water Reactor (PHWR), are built with our welding consumables, as are reprocessing plants and research reactors. Our products meet the needs from the nuclear industry in terms of tight chemical compositions and product cleanliness, as well as strength and corrosion resistance. Nuclear projects have a higher standard of product safety and reliability, requiring partners with strong experience.

Product selection advice and technical support

Teaming up with voestalpine Böhler Welding also means gaining access to industry-leading service and support. This covers everything from product selection and own testing facilities. We understand the industry's requirements and our plants have the relevant qualifications, approvals and streamlined processes to obtain them.

Materials testing, Application Engineering and R&D

To help you choose the best solution among alternatives, we offer the option to test and finally qualify candidate products. We have built up industry knowledge through many years of cooperation with major reactor technology providers, engineering companies and design institutes. Today, we have more than 30 dedicated nuclear specialists and welding engineers who can support you in technical questions and recommendations regarding welding and metallurgy related to your nuclear project. Our technicians our supported by our certified in-house laboratories, which are also at your disposal.

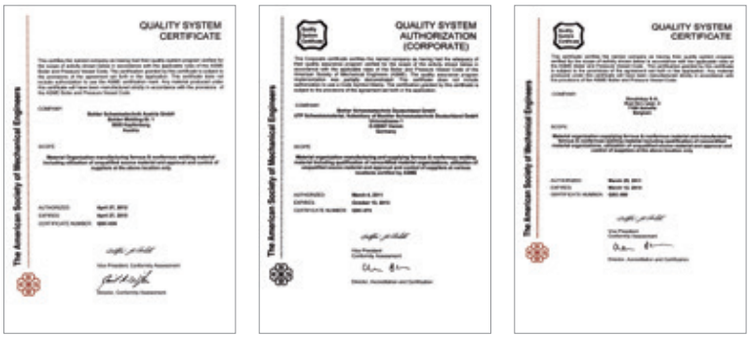
Certified products, quality control and documentation

Our products are known for their outstanding quality and hence comply with the strictest quality standards. We are well acquainted with leading trade standards and regulations such as ASME NQA-1, NCA-3800,RCC-M, RCC-MR, KTA 1408.2, 10 CFR 50 as specific project specifications. This ensures not only that we produce products with industry leading tolerance accuracies, but also that our grades for the nuclear industry meet the relevant industry standards with certified material and quality documents in detail.

A further proof for the international appreciation of the high quality of our welding consumables is the Quality System Certificate (Materials), ASME sec. III-NCA 3800, which has been awarded by ASME to the following production sites:

- Hamm and Bad Krozingen in Germany
- Seneffe in Belgium
- Kapfenberg in Austria

Each nuclear process sets its own special demands on the materials used and therefore it is of importance that these materials are chosen with care. We provide on the next pages some examples to illustrate the choice for key nuclear industry applications in a Pressurized Water Reactor. For more specific information, also concerning welding consumable choice for other type of nuclear reactors or for future Generation IV reactors, we invite you to get in touch with our local specialists or specialists in our factories. Modifications on the products are possible in case of sufficient quantities.



Our productions facilities for nuclear products are certified according to ASME III-NCA 3800

voestalpine Böhler Welding: top-AREVA-supplier

Pressurized Water Reactor (PWR)

On a global scale the Pressurized Water Reactor is the most common type of reactor. The reactor itself in the nuclear plant is constructed inside the containment vessel, which is an overarching structure with layers of thick concrete and steel.

The PWR-nuclear plant can be divided into 3 circuits:

The Primary Circuit which holds:

- The **Reactor Pressure Vessel (RPV):** this is a coolant (also called primary water) filled vessel where the nuclear fuel and control rods are located. Movement of the control rods regulates the rate of the nuclear reaction (and the heat generated). Submerging the control rods shuts down the plant completely
- Stainless Steel **Piping** is used to transport the cold coolant to the reactor vessel and hot coolant to the Steam Generator. In order to keep the coolant flowing the transport is supported by pumps
- The **Pressurizer (PRZ):** The basic design of the pressurized water reactor includes a requirement that the coolant (water) in the reactor coolant system must not boil. The coolant must remain in the liquid state at all times, especially in the reactor vessel. To achieve this, the coolant in the reactor coolant system is maintained at a pressure sufficiently high that boiling does not occur at the coolant temperatures experienced while the plant is operating. To pressurize the coolant system to a higher pressure than the boiling point of the coolant at operating temperatures, a separate pressurizing system is required.
- In the **Steam-Generator (SG)** the hot coolant is transported through large bundles of small nickel-alloy tubes with a total length of 140 km, which heats a secondary flow of water; and steam is generated. The collected steam is sent to the turbine by way of a steam line into the Secondary Circuit. These separate circuits have an important safety role because they constitute one of the primary barriers between the radioactive and non-radioactive sides of the plant as the primary coolant becomes radioactive from its exposure to the core.

Depending on the design of the PWR the number of Steam-Generators can be different, also called loops

- The EPR designed by Areva is a 4 loop-reactor
- The AP1000 designed by Westinghouse is a 2 loop reactor
- The VVER-1800 designed by Rosatom is a 3 loop-reactor

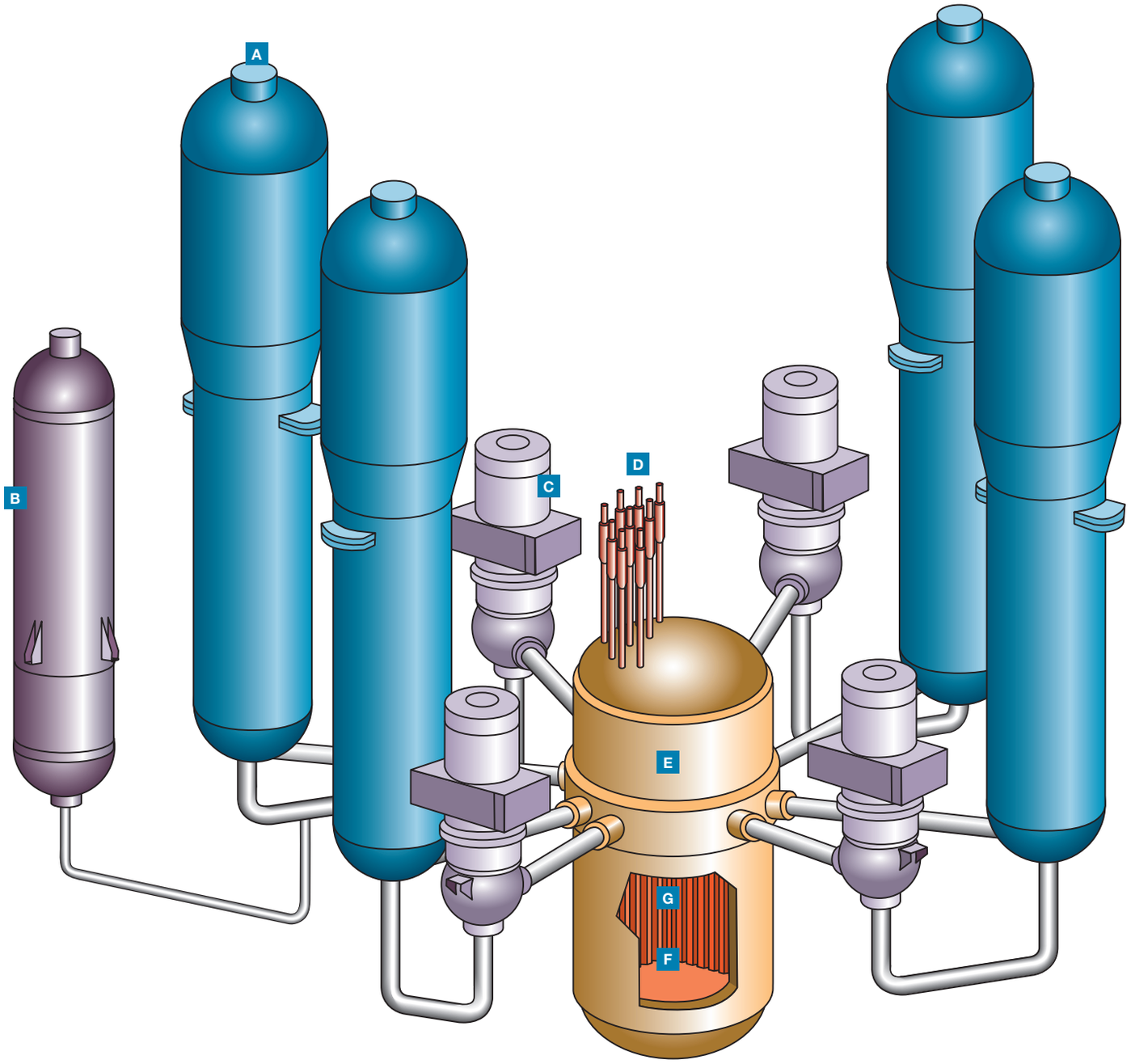
The Secondary Circuit:

- The turbine generates electrical power. The steam which passes through the turbine is transported through a cooling water condenser.
- The condenser will send the newly cooled liquid back to the steam generator to maintain indirectly the core temperature to an required level and will also send coolant to the coolant tower into the tertiary circuit.

The tertiary circuit:

- The coolant tower decreases the temperature of the liquid moving through it, and transported back to the condenser. The vapor that rises from the cooling tower is ordinary water.

The secondary and tertiary circuit can also be found in thermal-power plants, and will not be referred to in this brochure. Although it must be mentioned that voestalpine Böhler Welding has a wide choice of welding consumables for the use of the construction and maintenance of parts for the secondary and tertiary circuit.



A	Steam Generators
B	Pressurizer
C	Reactor Coolant Pump
D	Control Rod Drive Mechanism
E	Reactor Vessel
F	In-core Instrumentation
G	Internal Equipment

Scheme of the primary circuit of a PWR, showing RPV, SG, PRZ, Pumps, piping

Materials choice and welding consumables recommendations in the Primary Circuit of a PWR

Nuclear Pressure Vessel Codes: Each country defines its own regulations for their nuclear Industry. The most widely adopted are the French nuclear standard RCC-M and the ASME codes of the American Society of mechanical Engineering (ASME Sec. III Div 1 and ASME Sec. XI). These codes specify the requirements in terms of design, fabrication, testing, inspection and quality assurance. A nuclear power plant consists of different parts for which we go in deeper detail below.

When a nuclear power plant is constructed welding consumables must be selected with care and be in compliance with the applied code. The welding consumables must be of reliable high quality, meet to the mechanical (strength/ toughness at different temperatures) and chemical requirements (e.g. high resistance to neutron irradiation brittleness) and have good weldability.

Reactor Pressure Vessel (RPV)

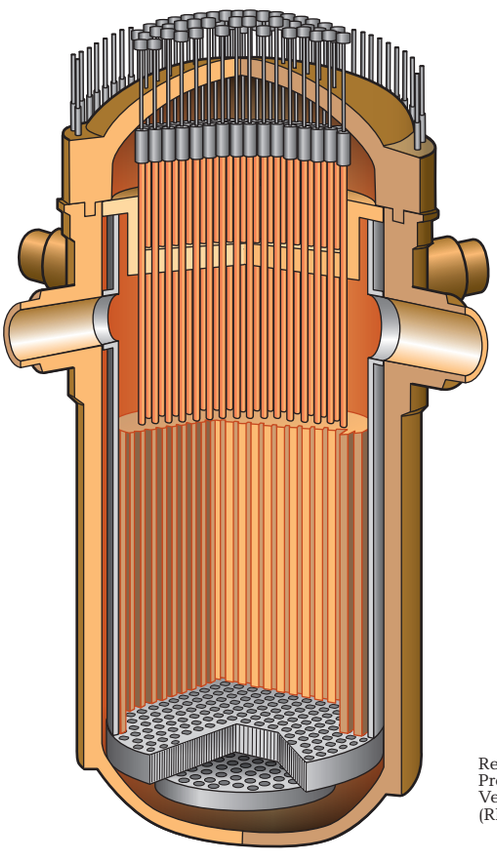
The Reactor Pressure Vessel consists of a thick-walled cylindrical steel vessel enclosing the reactor core in a nuclear power plant. The vessel is made of special fine-grained low alloy ferritic steel, well suited for welding and with a high toughness. The inside is lined with austenitic steel cladding to protect against corrosion. For a 1,300 MWe pressurized water reactor, the pressure vessel is about 12 m high, the inner diameter is 5 m, and the wall of the cylindrical shell is about 250 mm thick. The overall weight amounts to approx. 530 t without internals. The vessel is designed for a pressure of 175 bar and a process-temperature of 350 °C, materials and welding which correspond to this pressure and temperature must be used.

Reactor Pressure Vessel Body: The reactor vessel body is the largest component and is designed to contain the fuel assembly, coolant, and fittings to support coolant flow and support structures. It is usually cylindrical in shape and is open at the top to allow the fuel to be loaded. The inner surface constitutes a severe corrosive environment due to the circulating coolant contaminated with radioactive elements. The inner surface in direct contact with the coolant is cladded with stainless steel or nickel-base welding consumables, in order to protect the vessel from corrosion.
The most economical way to clad such a large surface is by means of cladding with a strip with the submerged or electroslag process (higher production-efficiency compared to SAW-strip cladding). For smaller surfaces and not-easily accessible surfaces GTAW or SMAW welding process can be used.

Reactor Pressure Vessel Head: This structure is attached to the top of the reactor vessel body. It contains penetrations to allow the control rod driving mechanism to attach to the control rods in the fuel assembly. The coolant level measurement probe also enters the vessel through the reactor vessel head. The head provides access for the replacement of spent fuel, and Alloy 600 penetration nozzles for control rod drive mechanisms and instrumentation.
The closure head is typically made of low alloy steel and clad with stainless steel like the rest of the reactor vessel.

Recently, many reactor closure heads in existing PWR systems have experienced corrosion damage and are being replaced.

Fuel Assembly: The fuel assembly of nuclear fuel usually consisting of uranium or uranium/ plutonium mixes. The fuel assembly is usually a rectangular block of gridded fuel rods.



Reactor Pressure Vessel (RPV)

Consumable selection for Reactor Pressure Vessel

				Welding consumable standard	Welding Consumable Selection according to Construction Code	
	Base Metal	Weld/ Cladding	Welding Process	ASME II-C	RCC-M	ASME
Pressure boundary base materials	16MND5 SA-508 Gr. 3 Cl. 1 20Mn-MoNi5-5	Homogeneous ferritic welds of pressure boundary	SAW	EG	Union S 3 NiMo 2 / UV 420 TTR	–
				EF2	Union S 3 NiMo 0.8 / UV 420 TTR	Union S 3 NiMo 0.8 / UV 420 TTR
			GTAW	ER90S-D2	Union I MoMn	Union I MoMn
			SMAW	E8018-G	BÖHLER FOX EV 65 R	BÖHLER FOX EV 65 R
				E9018-G	Phoenix SH Schwarz 3 K Ni 2	Phoenix SH Schwarz 3 K Ni 2
		First layer cladding of pressure boundary	SAW Strip	EQ309L	SOUDOTAPE 309 L Q5 / RECORD INT 101 Q5	SOUDOTAPE 309L Q5 / RECORD INT101 Q5
			GTAW	ER309L	Thermanit 25/14 E-309L	Thermanit 25/14 E-309L
					BÖHLER CN 23/12-IG	BÖHLER CN 23/12 -IG
			SMAW	E309L-16	SOUDOCROM L 309 L Q5	BÖHLER FOX CN 24/13-AR
		Subsequent layers cladding of pressure boundary	SAW Strip	EQ308L	SOUDOTAPE 308 L Q5 / RECORD INT 101 Q5	SOUDOTAPE 308 L Q5 / RECORD INT 120 Q5
			GTAW	ER308L	Thermanit JE-308L	Thermanit JE-308L
					BÖHLER EAS 2-IG	BÖHLER EAS 2-IG
			SMAW	E308L-16	Thermanit JEW 308L-16	Thermanit JEW 308L-16
					BÖHLER Fox EAS 2-AR	BÖHLER FOX EAS 2-AR
		Dissimilar safe end to nozzle welds	GTAW	ERNiCrFe-7	Thermanit 690	Thermanit 690
Closure head penetrations base metals (Ni Base to ferric)	Alloy 690	Dissimilar closure head penetrations	SMAW for buttering	ENiCrFe-7	Thermanit 690	Thermanit 690
					UTP 6229 Mn	
			GTAW for weld	ERNiCrFe-7	Thermanit 690	Thermanit 690
		Dissimilar closure head penetration to flange welds	GTAW	ERNiCrFe-7	Thermanit 690	Thermanit 690
Internals base metals	Z2CN19-10 AISI 304L	Welding consumables for reactor internals	GTAW	ER308L	Thermanit JE-308L	Thermanit JE-308L
					BÖHLER EAS 2-IG	BÖHLER EAS 2-IG
			SMAW	E308L-15	Thermanit JE Spezial	Thermanit JE Spezial
					BÖHLER FOX EAS 2 R	BÖHLER FOX EAS 2 R
	Z2CND 18-12 AISI 316L		GTAW	ER316L	Thermanit GE 316L	Thermanit GE 316L
					BÖHLER EAS4 M-IG	BÖHLER EAS4 M-IG
			SMAW	E316L-15	Thermanit GE Spezial	Thermanit GE Spezial
					BÖHLER FOX EAS 4 M R	BÖHLER FOX EAS 4 M R

Steam Generator (SG)

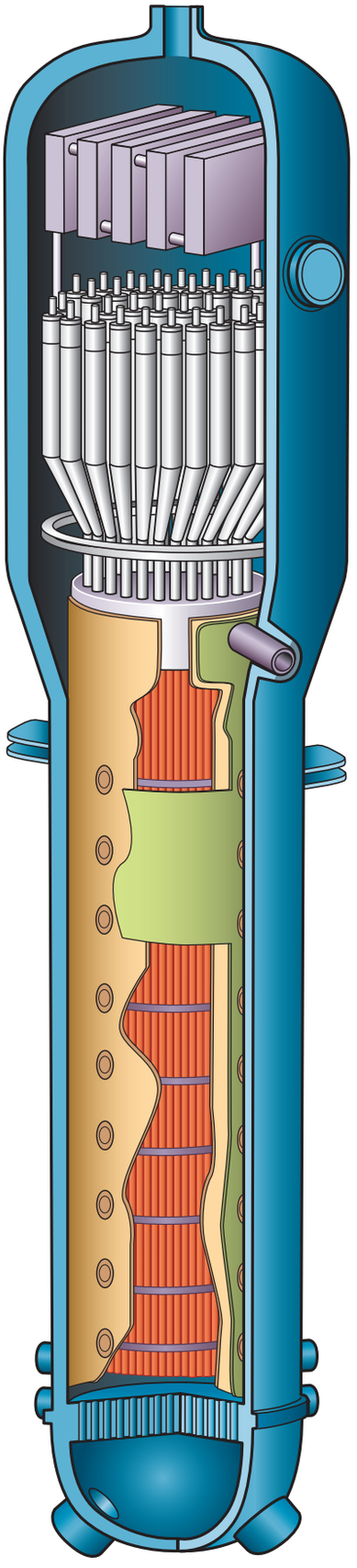
In commercial power plants steam generators can measure up to 21 m in height and weigh as much as 800 tons. Each steam generator can contain anywhere from 3,000 to 16,000 tubes.
The principal materials being used are low alloyed high strength – high-toughness materials. The inside of the vessel is also submitted to the same corrosive environment as the RPV, an internal stainless clad is also required.
The internal tubing is submitted to the primary coolant where Primary Water Stress Corrosion Cracking is the main problem, to overcome this problem alloy 690 has been chosen as the solution in new and replacement Steam Generators.

Pressurizer (PRZ)

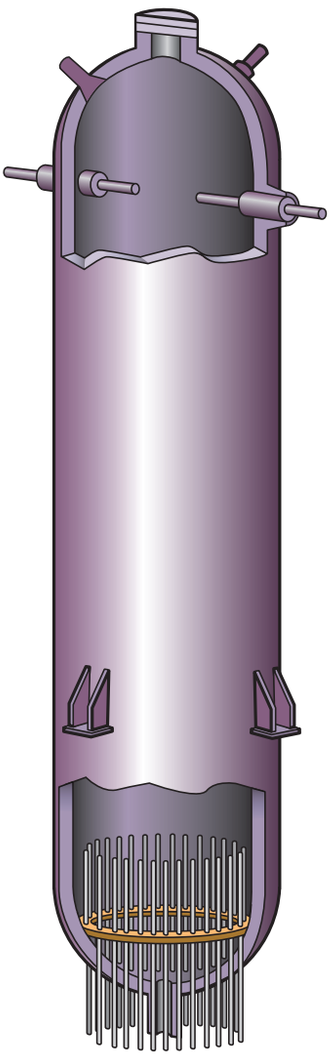
The materials applied and the welding processes applied in a pressurizer is basically the same as in the steam-generator This unit is a tall, cylindrical tank typically connected at the bottom to a reactor coolant loop hot leg through surge line piping. Spray is introduced near the top of the pressurizer through a nozzle and line from a cold leg. Heater bundles are installed over the lower portion of the pressurizer. Pressure relief devices are mounted at the top of the unit.

Nuclear Piping

The reliable operation and integrity of nuclear pressure equipment are of great importance for the safety of nuclear facilities. The requirements apply to the design, manufacturing, inspection, testing and installation of nuclear piping as well as piping supports. Stainless steel type 304L and 316L is primarily used for the piping and elbows in the primary circuit.



Steam Generator (SG)



Pressurizer (PRZ)

Consumable selection for SG, PRZ and Piping

	Base Metal	Weld/ Cladding	Welding Process	Welding consumable standard ASME II-C	Welding Consumable Selection according to Construction Code RCC-M	ASME
Pressure retaining parts base metal Tube sheet base metal	18MND5 SA-508 Gr. 3 Cl. 2	SG and PRZ: Shell to shell welds SG: Channel head to tubes-sheet Bundle wrapper to Lower shell weld Feed-water nozzle to conical shell PRZ: Man-way, safety valve, venting nozzle Surge nozzle Shell to shell welds	SAW	EG (EF3-mod)	Union S 3 NiMo 1 / UV 420 TTR BÖHLER 3 NiMo 1-UP / BÖHLER BB 24 SC	Union S 3 NiMo 1 / UV 420 TTR BÖHLER 3 NiMo 1-UP / BÖHLER BB 24 SC
				EG (EF6-mod)	–	Union S 3 NiMoCr / UV 418 TT
				EM2	–	Union S 3 NiMoCr-M2 / UV 418 TT-M2
			GATW	ER90S-D2	Union I MoMn	Union I MoMn
				ER100S-1	Union I NiMoCr-M2	Union I NiMoCr-M2
			SMAW	E8018-G	BÖHLER FOX EV 65 R	BÖHLER FOX EV 65 R
				E9018-G	BÖHLER FOX EV 65 R+	BÖHLER FOX EV 65 R +
					Phoenix SH Schwarz 3 K Ni	Phoenix SH Schwarz 3 K Ni 2
					Comet J 66 ELH Q5	Phoenix SH Schwarz 3 K Ni
					–	Phoenix SH Schwarz 3 K Ni Mn
						BÖHLER FOX EV 70 R
				E9018-M	–	Phoenix SH Schwarz 3 K Ni M
		SG and PRZ: First layer cladding: ■ Pressure boundary ■ Nozzles SG: Tube sheet cylindrical shell	SAW Strip	EQ309L	SOUDOTAPE 309 L Q5 / RECORD INT 101 Q5	SOUDOTAPE 309 L Q5 / RECORD INT 101 Q5
			GTAW	ER309L	Thermanit 25/14 E-309L	Thermanit 25/14 E-309L
					BÖHLER CN 23/12 IG	BÖHLER CN 23/12 IG
			SMAW	E309L-16	SOUDOCROM L 309 Q5	BÖHLER FOX CN 24/13-AR
		SG and PRZ: Subsequent layer cladding: ■ Pressure boundary ■ Nozzles SG: Tube sheet cylindrical shell	SAW Strip	EQ308L	SOUDOTAPE 308 L Q5/ RECORD INT 101 Q5	SOUDOTAPE 308 L Q5 / RECORD INT 120 Q5
			GTAW	ER308L	Thermanit JE-308L	Thermanit JE-308L
					BÖHLER EAS 2-IG	BÖHLER EAS 2-IG
			SMAW	E308L-16	Thermanit JEW 308L-16	Thermanit JEW 308L-16
					BÖHLER FOX EAS 2-AR	BÖHLER FOX EAS 2-AR
		SG: Tube-sheet cladding	SAW strip	EQNiCrFe-14	SOUDOTAPE 690 Q5 / RECORD NFT 690 Q5	SOUDOTAPE 690 Q5 / RECORD NFT 690 Q5
				EQNiCrFe-7	SOUDOTAPE NiCrFe-7 Q5 / RECORD NFT NiCrFe-7 Q5	SOUDOTAPE NiCrFe-7 Q5 / RECORD NFT NiCrFe-7 Q5
			ES-strip	EQNiCrFe-14	SOUDOTAPE 690 Q5 / RECORD EST 690 Q5	SOUDOTAPE 690 Q5 / RECORD EST 690 Q5
				EQNiCrFe-7	SOUDOTAPE NiCrFe-7 Q5 / RECORD EST NiCrFe-7 Q5	SOUDOTAPE NiCrFe-7 Q5 / RECORD EST NiCrFe-7 Q5
			GTAW	ERNiCrFe-7	Thermanit 690	Thermanit 690
			SMAW	ENiCrFe-7	Thermanit 690	Thermanit 690
SG: Tubes, clad-ded tube-sheet, partition plate, channel head	Alloy 690	SG: Homogenous welds between: ■ tubes ■ tube-sheet ■ partition plate ■ channel head	GTAW	ERNiCrFe-7	Thermanit 690	Thermanit 690
			SMAW	ENiCrFe-7	Thermanit 690	Thermanit 690
SG: Safe end, partition-plate, welded tube-sheet, primary nozzle weld, channel head PRZ: Safe end welds	alloy 690 to low alloy	SG: Dissimilar welds: ■ Partition plate to tube-sheet ■ Safe end to primary nozzle PRZ: Safe end to nozzles	GTAW	ERNiCrFe-7	Thermanit 690	Thermanit 690
			SMAW	ENiCrFe-7	Thermanit 690	Thermanit 690
PRZ surgeline Piping, fittings	Z2CND 18-12 AISI 316 L	PRZ: Branch connections, safe ends, heater elements, connection parts Piping: Weld joining surge line with main coolant line	GTAW	ER316L	Thermanit GE 316L	Thermanit GE 316L
					BÖHLER EAS 4 M-IG	BÖHLER EAS4 M-IG
			SMAW	E316L-16	Thermanit GE Spezial	Thermanit GE Spezial
					BÖHLER FOX EAS 4 M R	BÖHLER FOX EAS 4 M R
Main coolant line	Z2CN 19-10 AISI 304L	Pipes, elbows	GTAW	ER308L	Thermanit JE-308L	Thermanit JE-308L
					BÖHLER EAS 2-IG	BÖHLER EAS 2-IG
			SMAW	E308L-16	Thermanit JEW 308L-16	Thermanit JEW 308L-16
					BÖHLER FOX EAS 2-AR	BÖHLER FOX EAS 2-AR

Nuclear decommissioning industry

The nuclear decommissioning and nuclear-spent-fuel storage industry is also a prime user of high quality stainless and low alloy steels for different types of transport or storage canisters and boxes for low- to high level nuclear-spent-fuel.

Nuclear-spent-fuel canisters are designed to safely store bundles of nuclear spent fuel at plant sites, and some designs allow transport to long-term storage sites and nuclear fuel reprocessing plants. The design of the canisters and internal structures serves as the containment boundary to confine radioactive spent fuel and provide a leak-tight, inert atmosphere to ensure that the integrity of the fuel cladding is maintained.

For that purpose high toughness materials are used such as 2.5Ni and 3.5Ni-alloys, voestalpine Böhler Welding has a wide selection of welding consumables for the different welding processes available. Also corrosion is a main issue in the storage canister, a stainless-steel clad might be needed when necessary; different solutions exist and are applied from voestalpine Böhler Welding.

References

Voestalpine Böhler Welding, with its worldwide production implementations, is one of the most successful producers of welding consumables globally. The production range of SAW fluxes, wires, coated electrodes, which are intended for critical nuclear applications, where the highest quality is required, are widely applied and appreciated by our customers. The production of our welding consumables is carried out under a stringent Quality Assurance System and audited by inspection bodies and customers in order to assure the high quality required by our customers. Our factories have been audited according to ASME and RCC-M by many of our customers who are using our products for their critical nuclear welding-applications.
Longer service life requirements and new designs of nuclear power plants often mean higher demands on the installation and hence higher requirements for the materials to be used:

- Improved mechanical properties/toughness
- Higher restrictions in the chemistry of the weld-deposit: e.g. Co, V, B, Cu, P, ferrite content
- Wider range of application: welding parameters, welding process, service temperature

In these situations the existing welding-consumables' chemical and mechanical properties can often still be used, in the contrary case our R&D-departments are ready for the challenge to improve or develop a welding consumable which meet the new critical requirements for the project. Many customers in the list below have called upon our expertise to make their nuclear project to a success in the last 50 years. Together we make everything possible as partners in the nuclear industry!

Consumables from voestalpine Böhler Welding are used in installations in:

Argentina:	2	China:	30	Germany:	26	South Korea:	7	Switzerland:	5	Other:	12
Brazil:	3	France:	30	Slovakia:	2	Spain:	4	USA:	7		

Consumables from voestalpine Böhler Welding are used in below recent designs

EPR	France / China / Finland	CAP 1400	China	ACPR 1000	China	VVER	Slovakia / Czech Republic
AP 1000	China/USA	CPR 1000	China	APR 1000	South Korea	ITER	France

Customer references:

Areva	Doosan Heavy Industries and Construction Co.
Babcock and Wilcox	ENSA
China First Heavy Industries	Harbin Electric Corporation (QHD) Heavy Equipment Co
China Nuclear Industry 23 Construction Co.	Mangiarotti Nuclear S.p.A.
China Nuclear Industry Fifth Construction Co	SENPEC
China Second Heavy Industries (CNEG)	Westinghouse
Dong Fang (Guangzhou) Heavy Machinery	and many more

If the product list is missing, please contact us.

The industry experts of voestalpine Böhler Welding possess a deep technical understanding of industry-specific welding applications and processes. They have profound industry-related project expertise and are ready to discuss welding challenges with customers.

Please contact our Global Industry Segment Manager:

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voestalpine Böhler Welding

Welding know-how joins steel

Customers in over 120 countries join the expertise of voestalpine Böhler Welding. Focused on filler metals, voestalpine Böhler Welding offers extensive technical consultation and individual solutions for industrial welding and soldering applications. Customer proximity is guaranteed by 40 subsidiaries in 28 countries, with the support of 2,200 employees, and through more than 1,000 distribution partners worldwide. voestalpine Böhler Welding offers three specialized and dedicated brands to cater our customers' and partners' requirements.

böhler welding

Böhler Welding – More than 2,000 products for joint welding in all conventional arc welding processes are united in a product portfolio that is unique throughout the world. Creating lasting connections is the brand's philosophy in welding and between people.

utp maintenance

UTP Maintenance – Decades of industry experience and application know-how in the areas of repair as well as wear and surface protection, combined with innovative and custom-tailored products, guarantee customers an increase in the productivity and protection of their components.

fontargen brazing

Fontargen Brazing – Through deep insight into processing methods and ways of application, Fontargen Brazing provides the best brazing and soldering solutions based on proven products with German technology. The expertise of this brand's application engineers has been formulated over many years of experience from countless application cases.

forwarded by:

Global Industry Segment Management
Nuclear Industry

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