

Martensitic-Austenitic Stainless Steel

EN 1.4418, QT 900

A hardenable stainless steel

Typical analysis %	C 0,03	Cr 16,0	Ni 5,0	Mo 1,0
Norm	EN 10088-3-1.4418 QT 900			
Delivery condition	Quenched and tempered			

Physical properties

Temperature	20 °C	100 °C	200 °C	300 °C	400 °C
Density kg/dm ³	7,7				
Modulus of elasticity GPa	200	195	185	175	170
Mean coeff. of thermal expansion 20 °C - Temp. x10 ⁻⁶ · K ⁻¹	-	10,3	10,8	11,2	11,6
Thermal conductivity W/m · K	15				
Specific thermal capacity J/kg · K	430				
Electrical resistivity Ω · mm ² /m	0,8				

Mechanical properties

Values at room temperature - QT 900,
Impact strength at -40 °C.

Tensile strength R _m	N/mm ²	900 - 1100
Proof strength R _{p02}	N/mm ²	min 750
Reduction of area Z	%	Min 40
Elongation A ₅	%	Min 16
Hardness	HB	280 - 340
Impact energy K _v at -40 °C Longitudinal- and transversal direction	J/cm ²	Min 32

EN 1.4418 is a high strength low carbon martensitic-austenitic stainless steel. It combines high strength with good weldability - properties, which are maintained after welding.

EN 1.4418 is designed for applications in slightly corrosive environments where above mentioned properties are required.

In our standard condition the steel matrix consists of appr. 80 % martensite, 10 % austenite and 10 % ferrite. This composition allows a low carbon martensitic structure after quenching and tempering. Martensite, some remaining austenite, chrome and molybdenum together contribute to the following characteristic properties:

- ⇒ High tensile strength.
- ⇒ High toughness – also in welds.
- ⇒ Better corrosion properties than for most of the existing stainless martensitic steels.
- ⇒ Very good fatigue resistance.

Typical application areas

- Shafting, Propeller shafting
- Propeller bolting
- Mixer and stirrer production
- Processing vessels and equipment for thermo mechanical pulp industry.
- Water turbine parts.
- Equipment for hydro power stations
- Shear pins
- Piston rods

Corrosion Resistance

Resistance to general corrosion of **EN 1.4418** is better than that of common 13 % and 17 % chrome stainless steels. It is similar to that of austenitic stainless steels of EN 1.4307-type. The steel appears to its best advantage in slightly to moderately corrosive environments like e.g.:

- Organic acids, acetic acid, citric acid, benzoic acid, stearic acid, pyrogallol acid, tannic acid and uric acid.

- Some inorganic acids e.g. nitric acid and boric acid.
- Salt solutions e.g. carbonates, nitrates and some sulphates.

Fabrication

Hot forming

Hot forming should be made in the temperature interval: 850 - 1150°C.

EN 1.4418 has got similar properties to those of 1.4301.

A full heat treatment i.e. quenching and tempering is recommended after hot forming. Only tempering can be made if the finishing temperature of the hot forming and the subsequent cooling rate are carefully controlled. A high finishing temperature and a fast cooling rate are required in most cases.

Cold forming

The elevated strength and the pronounced work hardening of the steel calls for special care during cold forming. Tools and presses must be very rigid and able to withstand high powers.

In comparison to austenitic stainless steels **EN 1.4418** may require an intermediate annealing operation at extreme cold forming work.

Tempering is recommended after cold working operations, which exceed 5% stretching of the material. Tempering or a full quenching and tempering operation should be made after extensive cold forming.

Machining

Martensitic-austenitic stainless steels such as **EN 1.4418** are quite similar to duplex steels regarding machining. Machinability is of course depending of heat treatment condition, if material is annealed or hardened and tempered.

Machinability depends to a great extent to material hardness.

Welding

The weldability of **EN 1.4418** is better than that of common martensitic stainless steels. This is thanks to the properties of the tempered structure containing low carbon martensite and finely dispersed austenite. Welding should preferably be made using Avesta Sheffield 248 SV welding consumables. Austenitic material of T316L type can be used provided lower tensile strength of the weld is allowed.

Preheating is normally not necessary except for heavy structures and in special cases. Heat treatment after welding is normally not necessary. After welding using welding consumables similar to the parent material a tempering at 580 - 590°C is recommended.

Bar finish

EN 1.4418 QT 900 is available with machined, ground or chrome plated surface.

Stock standard

Please refer to products stock standard:
www.valbrunanordic.se

Technical service

VALBRUNA NORDIC AB will be helpful in giving further advice and recommendations concerning choice of materials, welding, heat treatment etc.

MATERIAL STANDARDS

SS-EN 10088-3	Stainless steels-Semi-finished products, bars, rods, sections for general purposes
SS-EN 10272	Stainless steel bars for pressure purposes
ASTM A 276/ ASME SA-276	Stainless steel bars for general purposes