EN 10088-3 - 1.4418, QT 900

A hardenable stainless steel

Typical analysis %	C 0,03	Cr 16,0	Ni 5,0	Mo 1,0
Norm	EN 10088-3/95-1.4418 QT 900			
Delivery condition	Quenched and tempered			

(Replaces SS 2387 -05)

Physical properties

Density Kg/dm^3	7,7				
Modulus of elasticity kN/mm	215	212	205	200	190
Mean coeff. of thermal expansion 20^{0}C - Temp. 10^{-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.

Tensile strength Rm	N/mm^2	950 - 1100
Proof strength Rp_{02}	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^{0}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 stock standard condition the steel matrix consists of 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 bolting
- Propeller shafting
- Mixer and stirrer production
- Processing vessels and equipment for thermo mechanical pulp industry.
- Water turbine parts.
- Equipment for hydro power stations

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 304-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, pyrogallic 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.

EN 1.4418 does not show full resistance to crevice corrosion and should therefore among other things not be applied in non agitated seawater without a cathodic protection.

Machining

Drilling	High speed steel drills			
Drill dia, mm	6	12	18	25
Feed mm/rev	0,10	0,20	0,30	0,35
Cutting speed m/min	15	15	15	15

Turning	High speed steel tools	
	Rough	Fine
ISO machining group	P25	P10
Cutting depth mm	4	1,0
Feed mm/rev	0,4	0,2
Cutting speed m/min	90	140
	High speed steel tools	
	Rough	Fine
Cutting depth mm	4	1,0
Feed mm/rev	0,4	0,2
Cutting speed m/min	18	25

Milling	Cemented carbide tools	
	Rough	Fine
ISO machining group	P30	P15
Cutting depth mm	4	1,0
Feed mm/tooth	0,25	0,20
Cutting speed m/min	100	150
	High speed tools	
	Rough	Fine
Cutting depth mm	4	1,0
Feed mm/tooth	0,17	0,12
Cutting speed m/min	15	20

Bar finish

EN 10088-3/95-1.4418 QT 900 is available with a machined or centerless ground surface.

Stock standard

Please refer to our stock standard leaflet.

Hot forming

Hot forming should be made in the temperature interval: 850 - 1150^{0}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.

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^{0}C is recommended.

Technical service

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