1.4418 Stainless Steel
Data sheet

Introduction

The stainless steel 1.4418 is a high strength low carbon martensitic grade that offers very good corrosion resistance.

Some of the main properties of this stainless steel grade are:

- Very good corrosion resistance
- High mechanical properties
- Good weldability
- Acceptable machinability
- Magnetic

The main application fields for this 1.4418 grade are off-shore industry, chemical industry, hydraulic industry, mining industry…

Chemical Composition

Chemical composition of 1.4418 according to European Standard EN10088 is:

	C	Si	Mn	P	S	Cr	Mo	Ni	N
max						15,0	0,80	4,0	0,020
min	0,06	0,70	1,50	0,040	0,015	17,0	1,50	6,0	

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Physical Properties

According to European Standard EN 10.088, these are the typical values of some physical properties for a steel 1.4418:

Property	20ºC	Up to 100ºC	Up to 200ºC	Up to 300ºC
Density (g/cm^3)	7,7			
Modulus of Elasticity (GPa)	200	195	185	175
Coef. Of thermal expansion (x10^{-6}/ºC)		10,3	10,8	11,2
Thermal Conductivity W/mºC	15			
Thermal Capacity J/KgºC	430			
Electrical Resistivity mm^2/m	0,80			

- **General Corrosion:**

This quality has a general very good corrosion resistance compared to 1.4057 steel grade.

- **Pitting Corrosion:**

The pitting corrosion resistance is given basically by the chromium and molybdenum content. A parameter used to compare the pitting corrosion resistance of different grades is the number PRE [Pitting Resistance Equivalent] which is defined as follows:

$$PRE=\%Cr + 3,3*\%Mo+16*\%N$$

The higher this parameter is, the better the pitting corrosion resistance of the steel.

	1.4418	1.4057	1.4016
PRE	18	15	16

- **Stress Corrosion Cracking:**

Martensitic steels are generally susceptible to stress corrosion cracking. For applications requiring high stress corrosion cracking, Duplex steels such as 1.4362 and 1.4462 are more suitable.

- **Intergranular Corrosion**

In certain processes or high temperature applications, precipitation of chromium carbides at the grain's boundaries may happen. This Chromium is shifted from the matrix thus favouring intercrystallyne corrosion. The low C content of this grade 1.4418 makes it less likely to suffer from Chromium carbide precipitation in comparison with other martensitic stainless steel grades, and thus it has improved intergranular corrosion resistance.

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Mechanical Properties

The values of some mechanical properties at room temperature according to European standard EN10.088 for a martensitic grade 1.4418 can be found in the following table depending on the applied heat treatment:

Heat Treatment	Hardness (HB)	Rp0,2% (MPa)	Rm (MPa)	A (%)	Impact Energy (J)
Annealing	<320		<1100		
Q&T 760		>550	760-960	>16	>90
Q&T 900		>700	900-1100	>16	>80

Manufacturing

Martensitic steels have good aptitude to be worked by any manufacturing process such as hot forming, cold forming, welding or machining. The mechanical properties of this stainless steel grade can be modified by different heat treatments such as annealing or Q&T.

- **Weldability:**

Martensitic steels can be welded by any conventional welding method but pre heating of the material is recommended as well as the application of a post welding treatment.

- **Heat Treatment:**

The heat treatment for this steel may vary depending on the desired mechanical properties. The annealing heat treatment consists in heating the material up to 600-650ºC to then cool it in the furnace or air. Regarding the quench and tempering process (Q&T) following alternatives are available:

Heat Treatment	Quenching		Tempering
	Temperature (ºC)	Cooling	Temperature (ºC)
Q&T 760	950-1050	Oil / Air	590-620
Q&T 900	950-1050	Oil / Air	550-620

- **Machinability**

The 1.4418 is suitable for machining operations although its machinability will depend on the obtained hardness. When better performance during this process is required, an improved grade of machinability is available: Mecamax 1.4418.

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