

**Ferritic Corrosion Resisting Steel**

**Material Data Sheet**

Steel Designation:

Name

Material No.

**X2CrTiNb18**

**1.4509**

**Scope**

This data sheet applies to hot and cold rolled sheet and strip.

**Application**

Rail and road vehicles; container construction; warehouse and transportation equipment of the sugar industry; absorbing duct; coal mining.

**Chemical composition (heat analysis in %)**

Product form	C	Si	Mn	P	S	N	Cr	Mo	Nb	Ti
C, H	≤ 0.030	≤ 1.00	≤ 1.00	≤ 0.040	≤ 0.015	-	17.5-18.5	-	[3xC+0.30] to 1.00	0.10-0.60

C = cold rolled sheet; H = hot rolled sheet;

**Mechanical properties at room temperature in solution annealed condition**

Product form	Thickness mm max.	Yield strength $R_{p0.2}$ N/mm <sup>2</sup> min.		Tensile strength $R_m$ N/mm <sup>2</sup>	Elongation min. in %	
		(longitudinal)	(transverse)		A <sub>80 mm</sub> <sup>1)</sup> < 3 mm Dicke (longitudinal + transverse)	A <sub>2</sub> <sup>2)</sup> ≥ 3 mm Dicke (longitudinal + transverse)
C	8	230	250	430 bis 630	18	

- 1) Values apply for test pieces with a gauge length of 80 mm and a width of 20 mm. Test pieces with a gauge length of 50 mm and a width of 12,5 mm can also be used.
- 2) Values apply for test pieces with a gauge length of  $5,65 \sqrt{S_0}$ .

**Minimum values for the 0,2 %-proof strength of ferritic steels at elevated temperatures**

Product form	Heat treatment condition	0,2 %-proof strength at a temperature (in °C) of						
		100	150	200	250	300	350	400
C, H	+A	230	220	210	205	200	180	-

+A = annealed

**Reference data for some physical properties (for guidance only)**

Density at 20 °C Kg/dm <sup>3</sup>	Modulus of elasticity kN/mm <sup>2</sup> at			Thermal conductivity at 20 °C W/m K	Specific thermal capacity at 20 °C J/kg K	Specific electrical resistivity at 20 °C Ω mm <sup>2</sup> /m
	20 °C	200 °C	400 °C			
7,7	220	210	195	25	460	0,60

Mean coefficient of thermal expansion 10<sup>-6</sup> K<sup>-1</sup> between 20 °C and

100 °C	200 °C	300 °C	400 °C	500 °C
10,0	10,0	10,5	10,5	-

**Guidelines for the temperatures for hot forming and heat treatment<sup>1)</sup>**

Hot forming		Heat treatment		
Temperature °C	Type of cooling	Annealing	Type of cooling	Microstructure
1100 - 800	Air	870 – 930°C <sup>2)</sup>	Air, water	Ferrite

1) For simulative heat treated test pieces the temperatures for solution annealing have to be agreed.

2) If heat treatment is carried out in a continuous annealing furnace, usually the upper area of the mentioned temperature range is preferred or even exceeded.

**Processing / Welding**

Standard welding processes for this steel grades are:

TIG-welding    Arc welding (E)

MAG-welding solid wire

Process	Filler metal	
	similar	higher alloyed
<b>TIG</b>	-	Thermanit
<b>MAG solid wire</b>	Thermanit 409 Cb	Thermanit
<b>Arc welding (E)</b>	-	Thermanit

This steel can be weld according to the above mentioned processes considering the general rules of technology by hand and automatically welding (except gas-welding).

**Processing**

Cold forming with a small degree of deformation is easily feasible at temperatures higher than room temperature. Sharp bending parallel to rolling direction should be avoided. Plates with larger thicknesses and/or higher degree of deformation should be preheated up to 200 to 400 °C. If applicable, hot forming at 700 to 900 °C could be necessary.

The corrosion resistance is affected by hot forming or annealing colors after welding or scaling. These have to be removed by pickling (pickling solution), grinding or sand blasting. Only iron-free tools are allowed for these workings.

Machining does not differ from machining of unalloyed carbon steels with comparable respectively corresponding strength.

**Editor**

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**References**

DIN EN 10088-2:2005-09

Beuth Verlag GmbH, Postfach, D-10772 Berlin

Böhler Schweißtechnik Deutschland GmbH

**Important Hint**

Information given in this data sheet about the condition or usability of materials respectively products are no warranty for their properties, but act as a description.

The information, given on for advice, comply to the experiences of the manufacturer as well as our own.

We cannot give warranty for the results of processing and application of the products.