

# Material Data Sheet

## Ferritic corrosion resisting steel

Materials Services  
Technology, Innovation  
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Steel designation	Name <b>X2CrTiNb18</b>	Material No. <b>1.4509</b>
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### Scope

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

### Application

Rail and road vehicles, container building, warehouse and transport devices for the sugar industry, sound absorber, coal mining.

### Chemical composition (heat analysis in %)

Product form	C	Si	Mn	P	S	Ti	Cr	Nb
C, H,	≤ 0.030	≤ 1.00	≤ 1.00	≤ 0.040	≤ 0,015	0.10-0.60	17.5–18.5	[3xC+0.30] to 1,00

C = cold rolled strip; H = hot rolled strip;

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

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

<sup>1)</sup> 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.

<sup>2)</sup> Values apply for test pieces with a gauge length of  $5,65 \sqrt{S_0}$ .

### Minimum values of the 0.2 %-Yield strength of ferritic steels at elevated temperatures

Product	Heat treatment condition <sup>1)</sup>	0,2 %-Yield strength at the temperature °C						
		100	150	200	250	300	350	400
N/mm <sup>2</sup> min.								
C, H	+A	230	220	210	205	200	180	-

<sup>1)</sup> +A = annealed

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

Density at 20 °C	Modulus of elasticity kN/mm <sup>2</sup> at				Thermal conductivity at 20 °C	Specific thermal capacity at 20 °C	Specific electrical resistivity at 20 °C
kg/dm <sup>3</sup>	20 °C	200 °C	400 °C	500 °C	W/m K	J/kg K	Ω mm <sup>2</sup> /m
7.7	220	210	195	-	25	460	0.60

### Mean linear thermal expansion coefficient [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 on the temperatures for hot forming and heat treatment<sup>1)</sup>

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

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

<sup>2)</sup> 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

For these steel types can be considered the following welding processions:

TIG-welding

Arc welding (E)

MAG-welding solid wire

Process	Filler metal	
	similar	higher alloyed
TIG	-	Thermanit X
MAG solid wire	Thermanit 430 L Cb Ti	Thermanit X
Arc welding (E)	Thermanit 430 L Cb Ti	Thermanit X

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 low amount of deformation is easily feasible above room temperature. Sharp bending parallel to the direction of rolling have to be avoided. Sheets with greater thicknesses and/or higher amount of deformation should be preheated up to 200 - 400 °C. If applicable, a hot forming at 700 - 900 °C can be necessary.

The corrosion resistance is affected by annealing colors, which occur after hot forming or welding, or scalings. These have to be removed by pickling (pickling solution), grinding or sand blasting. It is only allowed to use iron-free tools for these workings.

Machining does not differ from machining of non-alloy carbon steels with comparable or corresponding strength.

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### Reference

DIN EN 10088-2:2014-12  
Welding filler materials

Beuth Verlag GmbH, Postfach, D-10772 Berlin  
Böhler Schweißtechnik Deutschland GmbH, Hamm

### Important Note

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, we give 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.



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