

**Stainless Steel 1.4512**

**Material Data Sheet**

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

**Application**

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

**Chemical Composition** (heat analysis in %)<sup>a)</sup>

C	Si	Mn	P	S	N	Cr	Mo	Ti
≤ 0.030	1.00	1.00	0.040	0.015	-	10.50-12.50	-	6 x (C+N) to 0.65

<sup>a)</sup> Maximum value unless otherwise stated.

**Mechanical Properties** (in annealed condition)

Product Form	Thickness mm max.	Yield Strength $R_{p0.2}$ n/mm <sup>2</sup>		Tensile Strength	Elongation min. in %	
		(longitudinal)	(transverse)	$R_m$ N/mm <sup>2</sup>	$A_{90mm}^{1)}$ < 3mm (longitudinal + transverse)	$A^{2)}$ ≥ 3mm (longitudinal + transverse)
C	8	210	220	380 - 560	25	
H	13.5					

<sup>1)</sup> Values apply for test pieces with a gauge length of 80mm and a width of 20mm. Test pieces with a gauge length of 50mm and a width of 12.5mm can also be used.

<sup>2)</sup> Values apply for test pieces with a gauge length of  $5.65 \sqrt{So}$ .

**Minimum values for the 0.2% proof strength of ferritic steels at elevated temperatures**

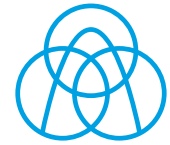
Product Form	Heat Treatment Condition	0.2% Yield Strength at a Temperature (in °C) of:						
		100	150	200	250	300	350	400
		N/mm <sup>2</sup> min						
C, H	+A	200	195	190	185	180	160	-

+A = Annealed

**Reference data on some physical properties**

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
10.5	11.0	11.5	12.0	12.0



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

Hot Forming		Heat Treatment		
Temperature °C	Type of Cooling	Annealing	Type of Cooling	Microstructure
1110 to 800	Air	770 to 830 <sup>2)</sup>	Water, air	Ferrite

<sup>1)</sup> For simulative heat treatment 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**

Standard welding process for these steel grades are:

- TIG-Welding
- MAG-Welding Solid Wire
- Arc Welding (E)

Process	Filler Metal	
	Similar	Higher Alloyed
TIG	-	Thermanit X
MAG Solid Wire	Thermanit 409 Cb	Thermanit X
Arc Welding (E)	-	Thermanit X

**Processing**

Cold forming with a small degree of deformation is easily feasible at temperature higher than room temperature. Sharp bending parallel to rolling direction should be avoided. Plates with larger thicknesses and/or higher degrees 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 colours 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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**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.