

Ferritic Corrosion Resisting Steel

Material Data Sheet

Steel Designation:

Name

Material No.

X2CrTi12

1.4512

Scope

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; coal mining.

Chemical composition (heat analysis in %)

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

C = cold rolled strip; H = hot rolled strip

Mechanical properties at room temperature (in annealed condition)

Product form	Thickness mm max.	Yield strength $R_{p0.2}$ N/mm ² min.		Tensile strength R_m N/mm ²	Elongation min. in %	
		(longitudinal)	(transverse)		$A_{80\text{ mm}}^{1)}$ < 3 mm Dicke (longitudinal + transverse)	$A^{2)}$ ≥ 3 mm Dicke (longitudinal + transverse)
C	8	210	220	380 bis 560	25	
H	13,5					

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 ¹⁾	0,2 %-Yield strength at the temperature (in °C) of						
		100	150	200	250	300	350	400
C, H	+A	200	195	190	185	180	160	-

¹⁾ +A = annealed

Reference data for some physical properties (for guidance only)

Density at 20 °C Kg/dm ³	Modulus of elasticity kN/mm ² 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 ² /m
	20 °C	200 °C	400 °C			
7,7	220	210	195	25	460	0,60

Mean coefficient of thermal expansion 10⁻⁶ K⁻¹ 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 temperatures for hot forming and heat treatment¹⁾

Hot forming		Heat treatment		
Temperature °C	Type of cooling	Annealing ²⁾	Type of cooling	Microstructure
1100 - 800	Air	770 – 830°C	Air, water	Ferrite

¹⁾ Temperature of annealing shall be agreed for simulated heat-treated test pieces.

²⁾ If heat treatment is carried out in a continuous furnace, the upper part of the range specified is usually preferred, or even exceeded.

Processing / Welding

Standard welding processes for this steel grade are:

TIG-welding

Arc welding (E)

MAG-welding massive wire

Process	Filler metal	
	similar	higher alloyed
TIG	-	Thermanit X
MAG massive wire	Thermanit 409 Cb	Thermanit X
Arc welding (E)	-	Thermanit X

This steel can be weld according to all processes (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 annealing colors, which occur after hot forming or 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.

Remark

The material is magnetizable. According to DIN EN 10095, Appendix D material 1.4512 is deemed to be heat resisting.

Editor

THYSSENKRUPP MATERIALS INTERNATIONAL GMBH

Technical Sales / Quality Management

Am Thyssenhaus 1

45128 Essen

References

DIN EN 10088-2:2005-09

Beuth Verlag GmbH, Post box, D-10772 Berlin

Böhler Schweißtechnik Deutschland GmbH, Hamm

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.