thyssenkrupp

thyssenkrupp Materials (UK) Ltd

Stainless Steel 1.4742 — Material Data Sheet

This data sheet applies to hot and cold rolled sheet and strip, semi-finished products, bars, rods and sections.

Application

For construction parts, which should be resistant to scaling up to about 1000°C and extensively inured to the effects of sulphurous gases. The inclination to carbonisation in reduced gases is very low.

Chemical Composition (heat analysis in %)

Product Form	C	Si	Mn	P	S	Cr	Al
C, H, P, L	≤ 0.12	0.70 - 1.40	≤ 1.00	≤ 0.040	≤ 0.015	17.00 - 19.00	0.70 - 1.20

C = cold-rolled strip H = hot-rolled strip P = hot rolled sheet L= semi-finished products, bars, rods and sections

Mechanical Properties (at room temperature in annealed condition)

Product Form	Thickness a or diameter d mm	HB max. [1) 2) 3)]	Proof Strength[3)]		Tensile Strength	Elongation min. in %			
			$R_{p0.2}$ N/mm²	$R_{p1.0}$ N/mm²	R^m N/mm²	Long Products [3)]	Flat Products		
							0.5 ≤ a/d < 3	3 ≤ a/d	
C, H, P	a ≤ 12	212	270	-	500 - 700	15	13[5)]	15[4)]	15[5)]
L	d ≤ 25								

[1)] The maximum HB values may be raised by 100 units or the maximum tensile strength value may be raised by 200 N/mm² and the minimum elongation value be lowered to 20% for cold worked sections and bars of ≤ 35mm thickness.
[2)] For guidance only.
[3)] For rod, only the tensile values apply.
[4)] Longitudinal test piece.
[5)] Transverse test piece

Estimated average values about the long-term behaviour at elevated temperatures

Temperature °C	1% Elongation[1)] for		Rupture[2)] for		
	1,000 h N/mm²	10,000 h N/mm²	1,000 h N/mm²	10,00 h N/mm²	100,000 h N/mm²
500	80	50	160	100	55
600	27.5	17.5	55	35	20
700	8.5	4.7	17	9.5	5
800	3.7	2.1	7.5	4.3	2.3
900	1.8	1.0	3.6	1.9	1.0

[1)] Stress related to the output cross section, which leads after 1,000 or 10,000 h to a permanent elongation of 1%.
[2)] Stress related to the output cross section, which leads after 1,000 or 10,000 or 100,000 h to breakage.

Reference data on some physical properties

Density at 20°C kg/dm³	Thermal Conductivity W/m K at		Specific Thermal Capacity at 20°C J/kg K	Electrical Resistivity at 20°C Ω mm²/m
	20°C	500°C		
7.7	19	25	500	0.93

Coefficient of linear thermal expansion 10^{-6} K^{-1} between 20°C and				
200°C	400°C	600°C	800°C	1000°C
10.5	11.5	12.0	12.5	13.5

Guidelines on the temperature for hot forming and heat treatment*

Hot Forming		Heat Treatment +A (annealed), Microstructure		
Temperature °C	Type of Cooling	Temperature °C	Type of Cooling	Microstructure
1100 - 800	Air	800 - 860[1)]	Air, Water[2)]	Ferrite

[1)] If heat treatment is carried out in a continuous furnace , the upper part of the range specified is usually preferred or even exceed.
[2)] In special cases, furnace cooling is also permitted.
* according to SEW 470

Processing / Welding

Standard welding processes for this steel grade are:

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

Process	Filler Metal			
	Similar		Higher Alloyed	
TIG	-		Thermanit D / 1.489	
MAG Solid Wire	Thermanit 17 / 1.4015		Thermanit D / 1.4829; L / 1.4820	
Arc Welding (E)	Thermanit 17 / 1.4015		Thermanit D / 1.4829; L / 4820	
SAW	Wire	Powder	Wire	Powder
	Thermanit 17	Marathon 213	Thermanit D / 1.4820	Marathon 213

Ferritic chrome steels are heat sensitive. Therefore the steel 1.4742 should be welded with lowest possible heat input by using thin electrode diameter, low current intensity and stringer bead welding.
For wall thicknesses under 3mm, it is not necessary to preheat 1.4742. For thicker construction pars (>3mm) the preheating and interpass temperatures 200 - 300°C should not be under respectively over run.
1.4742 can be processed with similar or higher alloyed filler metals. With sulphurous atmospheres a ferritic top layer should be laid on the media side (Thermanit L 1.4820).

Cold Forming

When cold forming 1.4742, certain preventative measures should be observed. Sheets up to 3mm thickness can be cold bent if necessary preheating with 200 - 300°C should be done.

Products with thicknesses > 3mm must be preheated up to 600 - 800°C, concerning machinability 1.4742 can be compared to a low carbon steel.

Embrittlement

While heating 1.4742 over about 950°C embrittlement by grain growth occurs, which cant be removed anymore. A further embrittlement occurs in the temperature range between 400 and 550°C (475°C embrittlement). A longer abidance within this temperature range should be avoided. This loss of ductility can be corrected by a short heating up to 700 to 800°C.
In the temperature range of 600 to 900°C 1.4742 has the affinity to signma-phase-embrittlement, so that after longer application within this temperature range the ductile values are strongly reduced. The steel should not come into operation within this temperature range, if mechanical stress is existent.

Note

The material is magnetizable.

Editor

thyssenkrupp Materials (UK) Ltd
Cox's Lane
Cradley Heath
West Midlands
B64 5QU

Important Note