

Austenitic Heat Resisting Steel

Material Data Sheet

Steel designation:

Name

Material No.

X8CrNi25-21

1.4845

Scope

This data sheet applies for hot and cold rolled sheet and strip and bars, semi-finished products, rods and sections as well as for seamless and welded steel tubes for mechanical and general engineering purposes.

Application

For construction parts which should be resistant to scaling up to about 1050 °C and extensively inured to the effect of sulfurous gases. Inclination to carburization in reduced gases, especially above 900 °C, is very low.

Chemical composition (Heat analysis in %)

Product form	C	Si	Mn	P	S	Cr	Ni	N
C, H, P, L	≤ 0,10	≤ 1,50	≤ 2,00	≤ 0,045	≤ 0,015	24,00-26,00	19,00-22,00	≤ 0,11
T _{w/s} *	≤ 0,15	≤ 0,75	≤ 2,00	≤ 0,045	≤ 0,030	24,00-26,00	19,00-22,00	

C = cold rolled strip; H = hot rolled sheet; P = hot rolled sheet; L = semi-finished products, bars, sections; T_w = welded tubes; T_s = seamless tubes

* according to DIN EN 10269-2:2005-02 / DIN EN 10297-2:2007-06

Mechanical properties at room temperature in the solution annealed condition

Product form	Thickness <i>a</i> or Diameter <i>d</i> mm	HB max. ¹⁾²⁾³⁾	Proof strength ³⁾		Tensile strength <i>R_m</i> N/mm ²	Elongation A % min.		
			<i>R_{p0,2}</i> N/mm ² min.	<i>R_{p1,0}</i>		Long products ³⁾	Flat products	
							0,5 ≤ <i>a/d</i> < 3	3 ≤ <i>a/d</i>
C,H,P	<i>a</i> ≤ 12	192	210	250	500 - 700	350 ¹⁾	33 ⁴⁾⁵⁾	35 ⁴⁾⁵⁾
L	<i>d</i> ≤ 25							
T _{w/s} *		-	230	270	min. 500	33 ⁴⁾ /35 ⁵⁾	35 ⁴⁾⁵⁾⁶⁾	35 ⁴⁾⁵⁾⁶⁾

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 ≤ 35 mm thickness.

²⁾ For guidance only.

³⁾ For rod, only the tensile values apply.

⁴⁾ Longitudinal test piece

⁵⁾ Transverse test piece

⁶⁾ After cold forming the elongation for wall thicknesses ≤ 35 mm amounts to minimum 20 %.

* according to DIN EN 10296-2:2005-02 / DIN EN 10297-2:2007-06

Creep properties - estimated average values about the long-term behaviour at elevated temperature*

Temperature °C	1 %-Elongation ¹⁾ for			Rupture ²⁾ for	
	1000 h	10 000 h	1000 h	10 000 h	100 000 h
		N/mm ²		N/mm ²	
600	100	90	170	130	80
700	45	30	80	40	18
800	18	10	35	18	7
900	10	4	15	8,5	3

¹⁾ Stress related to the output cross-section, which leads after 1000 or 10 000 h to a permanent elongation of 1 %.

²⁾ Stress related to the output cross-section, which leads after 1000, 10 000 or 100 000 h to breakage.

* for guidance only

Tack welds have to be affixed with relatively shorter distances from each other (significantly shorter than these of non-alloyed steels), in order to prevent strong deformation, shrinking or flaking tack welds. The tacks should be subsequently grinded or at least be free from crater cracks.

1.4845 in connection with austenitic weld metal and too high heat input the addiction to form heat cracks exists. The addiction to heat cracks can be confined, if the weld metal features a lower content of ferrite (delta ferrite). Contents of ferrite up to 10 % have a favorable effect and do not affect the corrosion resistance generally. The thinnest layer as possible have to be welded (stringer bead technique) because a higher cooling speed decreases the addiction to hot cracks.

A preferably fast cooling has to be aspired while welding as well, to avoid the vulnerability to intergranular corrosion and embrittlement.

1.4845 is very suitable for **laser beam welding**. With a welding groove width smaller 0,3 mm respectively 0,1 mm product thickness the use of filler metals is not necessary. With larger welding grooves a similar filler metal can be used. With avoiding oxidation within the seam surface during laser beam welding by applicable backhand welding, e. g. helium as inert gas, the welding seam is as corrosion resistant as the base metal. A hot crack hazard for the welding seam does not exist, when choosing an applicable process.

1.4845 is also suitable for **laser beam fusion cutting** with nitrogen or flame cutting with oxygen. The cut edges only have small heat affected zones and are generally free of micro cracks and thus are well formable. While choosing an applicable process the fusion cut edges can be converted directly. Especially, they can be welded without any further preparation.

While processing only stainless tools like steel brushes, pneumatic picks and so on are allowed, in order to not endanger the passivation.

It should be neglected to mark within the welding seam zone with oleigerous bolts or temperature indicating crayons.

The high corrossions resistance of this stainless steel is based on the formation of a homogeneous, compact passive layer on the surface. Annealing colors, scales, slag residues, tramp iron, spatters and such like have to be removed, in order to not destroy the passive layer.

For cleaning the surface the processes brushing, grinding, pickling or blasting (iron-free silica sand or glass spheres) can be applied. For brushing only stainless steel brushes can be used. Pickling of the previously brushed seam area is carried out by dipping and spraying, however, often pickling pastes or solutions are used. After pickling a carefully flushing with water has to be done.

Remark

In quenched condition the material can be slightly magnetizable. With increasing cold forming the magnetizability increases.

Heat resisting tubes are delivered regarding testing in accordance to DIN EN 10296-2 respectively DIN EN 10297-2. In Germany, SEW 470 still applies for heat resisting tubes.

Editor

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References

DIN EN 10095:1999-05	Beuth Verlag GmbH, Postfach, D-110772 Berlin
DIN EN 10296-2:2006-02	
DIN EN 10297-2:2006-02	
Stahl-Eisen-material data sheet 470:1976-02	Verlag Stahleisen GmbH, Postfach 10 51 64, D-40042 Düsseldorf
MB 821 "Properties"	Informationsstelle Edelstahl Rostfrei, Postfach 10 22 05,
MB 822 "The converting of stainless steel"	D-40013 Düsseldorf
Böhler Schweisstechnik Deutschland GmbH, Hamm	

Important note

Information given in this data sheet about property or applicability of materials respective products are no assurance of characteristics but serve for description.

Information, with which we like to advise you, relate to the experience of the producers and our own. Warranty for the results of the treatment and application of the products cannot be granted.