

NIROSTA® 4301

Material no.	1.4301 to EN 10 088-2		
Code names	D (DIN/EN)	X 5 CrNi 18-10	
	USA (ASTM)	304	
	Japan	SUS 304	
	CIS	08 Ch 18 N 10	

Chemical composition (in % by weight) ¹⁾	C	Cr	Ni	Mn
min.	–	17.0	8.0	–
max.	0.07	19.5	10.5	2.0

¹⁾ Special arrangements may be made within the analysis limits depending on the properties required.

Product forms	Hot-rolled wide strip, cold-rolled wide strip, slit strip, cut sheets, circles, blanks, precision strip
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Mechanical properties (transverse samples) at room temp. to EN 10 088-2	Dimensions range	$R_{p0.2}$ (0.2% yield strength) N/mm ²	$R_{p1.0}$ (1.0% yield strength) N/mm ²	R_m (tensile strength) N/mm ²	A_5 (elongation) %	A_{80} (elongation) %
	Cold-rolled strip $s \leq 8$ mm	≥ 230	≥ 260	540 – 750	≥ 45	≥ 45
	Hot-rolled strip $s \leq 13.5$ mm	≥ 210	≥ 250	520 – 720		

Minimum properties at elevated temperatures	Temperature °C	100	150	200	250	300	350	400	450	500	550
	$R_{p0.2}$ (0.2% yield strength) N/mm ²	157	142	127	118	110	104	98	95	92	90
	$R_{p1.0}$ (1.0% yield strength) N/mm ²	191	172	157	145	135	129	125	122	120	120

Heat treatment	Annealing temperature °C	Time min	Cooling	Microstructure
	1000 – 1100	~ 5/mm thickness	Water/air	Austenite (possibly some ferrite)

Physical properties	Density kg/dm ³	Modulus of elasticity in kN/mm ² at					Thermal expansion in $10^{-6} \cdot K^{-1}$ between 20 °C and					
	7.9	20 °C	100 °C	200 °C	300 °C	400 °C	500 °C	100 °C	200 °C	300 °C	400 °C	500 °C
		200	194	186	179	172	165	16.0	16.5	17.0	17.5	18.0
	Thermal conductivity at 20 °C W/m · K	Specific heat capacity at 20 °C J/kg · K			Electrical resistivity at 20 °C $\Omega \cdot mm^2/m$			Magnetisability				
	15	500			0,73			present ³⁾				

³⁾ NIROSTA® 4301 may be slightly magnetic in quenched condition. Magnetisability increases with increasing strain hardening.

Surface finish	1 D (II a), 2 H (III a), 2 B (III c), 2 R (III d), 1/2 G (IV), 2 M
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Edge finish	Untrimmed, cut edges, dressed edges on request
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Chemical resistance

Our publication "Chemical Resistance of NIROSTA® Steels" contains tables giving some guide to chemical resistance.

Processing

NIROSTA® 4301 has very good cold forming properties (e.g. bending, flanging, deep drawing, spinning, etc.). However, the higher strain hardening compared to unalloyed steels means that correspondingly greater forces are necessary for forming. By grading the chemical composition within the standard analysis and adding various other elements, specific forming (e.g. redrawing, ironing, spinning) or welding properties (e.g. longitudinal welded pipes) can be achieved according to requirements. For pressure vessels, cold forming, post heat treatment and welding should be carried out according to the regulations of AD Information Sheet HP 7/3.

This stipulates that post heat treatment is not necessary:

- a) where percent cold reduction $\leq 15\%$
and
- b) after welding.

Post heat treatment is necessary with percent cold reductions greater than 15%.

Heat tints or scale from post heat treatment or welding reduce corrosion resistance and should be removed chemically (e.g. pickling baths or pickling pastes) or mechanically (e.g. by grinding or blasting with glass beads or iron- and sulfur-free quartz sand).

Due to the tendency to strain hardening and to the poor thermal conductivity, machining should be carried out with tools made of good quality high-speed steel (good cooling required) or, better still, with carbide tools.

NIROSTA® 4301 can be polished.

Welding

Weldability:
NIROSTA® 4301 can be readily welded by all methods (except gas welding).

Filler metals:

Material no.	1.4316
THERMANIT®	JE

Approvals: This material and the filler metal are approved for use in the construction of pressure vessels.

Applications

Due to its good resistance to corrosion, good cold formability and good weldability, this steel is widely used for household goods, dishwashers, cutlery, in the consumer goods industry, in the automotive industry and in architecture. Its approval for use in construction is regulated in the German Institute for

Structural Engineering document Z.30.3-6. In addition, it is used for the construction of process equipment and vessels in the dairy, beer, wine and food processing and storage industries as well as in nitrogen chemistry.