

Designation	X2CrNiMo17-12-2	EN 1.4404	UNS (ASTM) -	AISI 316L	LMSA D320
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Chemical composition

Fe	C	Cr	Ni	Mo	Mn	Si	P	S	N
Balance	≤ 0.03	16.5 - 18.5	10.0 - 13.0	2.0 - 2.5	≤ 2.0	≤ 1.0	≤ 0.045	≤ 0.015	≤ 0.11

Values (Weight %). In order to achieve maximum homogeneity and consistent quality, the actual manufacturing tolerances are tighter and more precisely than the composition indicated.

Main technical properties and features

Austenitic stainless steels are the most common and well-known of all stainless steel grades. In addition to the chromium content of around 17 %, austenitic stainless steel contain additions of molybdenum, titanium and niobium. The addition of nickel allows to obtain an austenitic structure that increases corrosion resistance. The absence of a second phase, such as cold rolled induced martensite or ferrite, is beneficial to enhance corrosion resistance.

Stainless steel 1.4404, 316L is the low carbon version of 1.4401 (316) grade. Due to the lower carbon content, this grade exhibits an excellent behaviour to grain boundary chromium carbide precipitation when heat input is applied. For example, during welding, the resistance to intergranular corrosion is increased. The 1.4404 grade has a good resistance to corrosion. Its general characteristics are comparable to those of grade 1.4435 (316L), but with a slightly lower molybdenum and nickel content, which decreases slightly the resistance to pitting corrosion.

The 1.4404 grade can be easily welded by all standard welding processes, except by oxyacetylene torch. Depending on the welding conditions, a small amount of magnetizable residual ferrite can be present along the welding line. A post-weld treatment is not necessary if the alloy is welded in the soft temper.

Typical uses

Frequently used to manufacture pressure gauges, various watch components, membranes for the chemical industry. Used for parts requiring a prolonged skin contact, and for parts that need to resist to pitting corrosion.

Typical manufacturing range

	Thickness (mm)	Width (mm)	Length (mm)
Rolled products Strip in coils ^[1]	0.010 - 0.500	1.5 - 200.0	-
Strip as sheets ^[1]	0.015 - 0.500	10.0 - 200.0	100 - 3000

^[1] Not all our production possibilities are presented here. Other dimensions or product forms available upon request. Some combinations of thicknesses and widths are not possible.

Mechanical properties of strips

Temper	Rp _{0.2} (N/mm ²)	R _m (N/mm ²)	A _{50mm} (%)	Hardness HV
C650 ^[1] soft	220 min.	650 - 850	30 min.	190 - 250
C530 ^{[1], [2]} soft	220 min.	530 - 680	30 min.	150 - 200
C680 ^[1] ¼ hard	-	680 - 1000	-	200 - 300
C950 ^[1] ½ hard	-	950 - 1150	-	250 - 390
C1100 ^[1] hard	-	1100 - 1300	-	310 - 420
C1250 ^[1] extra hard	-	1250 - 1550	-	380 - 500

^[1] These tempers do not exactly correspond to the EN 10151 and EN 10088 and are only indicative

^[2] The temper C530 is only possible for thicknesses superior or equal to 0.1mm. For thicknesses < 0.1mm, the corresponding temper is C650.

Physical properties

Modulus of elasticity	kN/mm ²	200
Poisson ratio		0.33
Density	g/cm ³	8.0
Melting point	°C	1410
Linear dilatation coefficient	10 ⁻⁶ /°C	16.5 (20-100°C) / 17.5 (20-300°C) / 18.5 (20-500°C) / 19.0 (20-600°C) / 19.5 (20-700°C)
Thermal conductivity at 20°C	W/m °K	15
Electrical resistivity at 20°C	μΩcm	75
Electrical conductivity at 20°C	MS/m	1.35
Specific heat at 20°C	J/(kg. K)	500
Magnetic properties		Non-magnetic in the soft temper (μ = 1.005)

Tolerances (strip and foil)

Thickness	Thickness (mm)		Lamineries MATTHEY			
	≥	<	LMSA Standard	LMSA Precision	LMSA Extreme	
	-	0.025	-	-	± 0.001	
	0.025	0.050	± 0.003	± 0.002	± 0.0015	
	0.050	0.065	± 0.004	± 0.003	± 0.002	
	0.065	0.100	± 0.006	± 0.004	± 0.003	
	0.100	0.125	± 0.008	± 0.006	± 0.003	
	0.125	0.150	± 0.008	± 0.006	± 0.004	
	0.150	0.250	± 0.010	± 0.008	± 0.004	
	0.250	0.300	± 0.012	± 0.008	± 0.005	
	0.300	0.400	± 0.012	± 0.009	± 0.005	
	0.400	0.500	± 0.015	± 0.010	± 0.006	
	0.500	0.600	± 0.020	± 0.012	± 0.007	
	0.600	0.800	± 0.020	± 0.014	± 0.007	
	0.800	1.000	± 0.025	± 0.015	± 0.009	
	1.000	1.200	± 0.025	± 0.018	± 0.012	
	1.200	1.250	± 0.030	± 0.020	± 0.012	
	1.250	1.500	± 0.035	± 0.025	± 0.014	
The table shown is an outline of our typical thickness tolerances available. They are tighter than industry standards. Our "LMSA Precision" and "LMSA Extreme" tolerances are available upon request.						
Width	Our width tolerances "Standard" is +0.2, -0.0 (or ± 0.1 mm upon request). They are available for slit widths < 125 mm and thicknesses < 1.00 mm. Special tolerances upon request.					
Camber	Width (mm)		Camber max. (mm/m)			
	>	≤	LMSA standard ≤ 0.5 mm	LMSA standard > 0.5 mm	LMSA extreme ≤ 0.5 mm	LMSA extreme > 0.5 mm
Our tolerance "LMSA Standard" respects the EN Standard 1654 (Length of measurement 1000 mm). Other tolerances upon request.	3	6	12	-	6	-
	6	10	8	10	4	5
	10	20	4	6	2	3
	20	250	2	3	1	1.5
Surface	Special surface qualities upon request					
Flatness	Special requirement on the longitudinal or transversal flatness upon request					

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