

Designation	X2CrNiMo18-15-3	EN 1.4441	UNS (ASTM) S31673	AISI 316LVM	LMSA D345
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Chemical composition

Fe	C	Cr	Ni	Mo	Mn	Si	P	S	N
Balance	≤ 0.03	17.0 - 19.0	13.0 - 15.0	2.5 - 3.0	≤ 2.0	≤ 0.75	≤ 0.025	≤ 0.01	≤ 0.10

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 well-known and common used of 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 1.4441, 316LVM medical grade, is an austenitic stainless steel produced by electro-slag remelting (ESR) process. This gives the steel a high level of cleanliness and a high microstructure homogeneity. As a result, it has excellent fatigue resistance. 316LVM steel has a chemical composition similar to that of 316L steel, with a low carbon, a high nickel and molybdenum content and a much stricter tolerance of impurities. Thanks to its high cleanliness and low-carbon content, 316LVM steel has excellent resistance to intergranular, pitting and crevice corrosion. This steel is non-magnetizable, free of δ (Delta) ferrite, and remains non-magnetic even at high cold work hardening rates, no ferromagnetic martensite is formed. The 1.4441, X2CrNiMo18-15-3 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.

The 1.4441, 316LVM steel is biocompatible and is widely used for medical applications. This steel meets ISO 5832-1 and ASTM F139 standards for medical implants and instruments.

Typical uses

Thanks to its excellent polishability it can be used in the watch manufacture components and high precision electronics. Medical applications: surgical implants, vascular valves, medical instruments, surgical tools.

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
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 min.	-	380 min.

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

Physical properties

Modulus of elasticity	kN/mm ²	200
Poisson ratio		0.33
Density	g/cm ³	8.0
Melting point	°C	1370-1400
Linear dilatation coefficient	10 ⁻⁶ /°C	16.0 (20-100°C) / 17.0 (20-300°C) / 17.5 (20-400°C) / 18.0 (20-500°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		Amagnétique (μ ≤ 1.003)

Tolerances (strip and foil)

Thickness	Thickness (mm)		Lamineries MATTHEY			
	≥	<	LMSA Standard	LMSA Precision	LMSA Extreme	
<p>The table shown is an outline of our typical thickness tolerances available. They are tighter than industry standards.</p> <p>Our "LMSA Precision" and "LMSA Extreme" tolerances are available upon request.</p>	-	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		
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		LMSA extreme	
			≤ 0.5 mm	> 0.5 mm	≤ 0.5 mm	> 0.5 mm
	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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