

Designation	X2CrNi19-11	EN 1.4306	UNS (ASTM) -	AISI 304L	LMSA D160
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Chemical composition

Fe	C	Cr	Ni	Mn	Si	P	S	N
Balance	≤ 0.03	18.0 - 20.0	10.0 - 12.0	≤ 2.00	≤ 1.00	≤ 0.045	≤ 0.015	≤ 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

Among all steel grades, austenitic steels are the most popular and most employed. Apart from a chromium content of 18 %, they contain nickel and perhaps molybdenum additives. The nickel addition enables the austenitic structure that improves the corrosion resistance.

The 304L grade has a low carbon content, which reduces the risk of carbide formation on the grain boundaries during heat treatment, thus increasing the intergranular corrosion resistance (continuously up to 350 °C). The corrosion resistance of the 1.4306 grade is satisfactory in chlorine environments, sea water and for pieces in prolonged contact with water. When high corrosion resistance is required the 316L grade is preferable. 304L-1.4306 stainless steel is suitable for cold forming and welding. During cold forming and rolling operations, the unstable austenite structure is transformed into ferromagnetic martensite. The magnetic permeability of 1.4306 grade is low in the annealed condition, however increases rapidly due to the formation of martensite induced by plastic deformation.

Typical uses

Frequently used to manufacture pressure gauges, various watch components, membranes for the chemical industry.

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	R _{p0.2} (N/mm ²)	R _m (N/mm ²)	A _{50mm} (%)	Hardness HV
C540 ^[1] soft	220 min.	540 - 750	40 min.	150 - 200
C750 ^[1] ¼ hard	400 min.	750 - 1000	15 min.	200 - 300
C950 ^[1] ½ hard	600 min.	950 - 1150	5 min.	250 - 390
C1100 ^[1] hard	900 min.	1100 - 1300	-	310 - 420
C1300 ^[1] extra hard	1000 min.	1300 min.	-	390 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		0.30
Density	g/cm ³	7.90
Melting point	°C	1420
Linear dilatation coefficient	10 ⁻⁶ /°C	16.0 (20-100°C) / 16.5 (20-200°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	73
Electrical conductivity at 20°C	MS/m	1.37
Specific heat at 20°C	J/(kg. K)	500
Magnetic properties		Slightly magnetic at soft annealed temper / high magnetic with cold rolling
Relative permeability (μ _{r max})		≤ 1.02 soft annealed temper. > 1.20 extra dur temper

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		LMSA extreme	
			≤ 0.5 mm	> 0.5 mm	≤ 0.5 mm	> 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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