LAMINERIES MATTHEY
NOTZ group advanced metal solutions

Stainless Steel

1.4310.4

		EN	UNS (ASTM)	AISI	LMSA
Designation	**X10CrNi18-8**	1.4310	S30100	301	**D101**

Chemical composition

Fe	C	Cr	Ni	Si	Mn	P	S	Mo	N
Bal.	0.09 - 0.12	16.0 - 17.0	6.3 - 6.8	≤ 2.0	≤ 2.0	≤ 0.045	≤ 0.045	≤ 0.80	≤ 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. Typical chemical composition for Lamineries MATTHEY stainless steel 1.4310.4.

Main technical properties and features

The tensile strengths of austenitic stainless steels are average but can be increased considerably, for certain types, by cold rolling. The 1.4310, X10CrNi18-8, is the most widely used stainless steel for the production of springs. It reaches very high mechanical strength through cold working. Its austenitic structure is rather unstable and its corrosion resistance is lower than, for example, that of the 1.4435, 316L, or of the 1.4301, X5CrNiMo 18-10. An increase of the mechanical strength of the 1.4310, X10CrNi18-8, by more than 250 N/mm^2 can be achieved by tempering at 280 to 420 °C after having been highly cold worked. This tempering is interesting in that it also increases the fatigue strength limit.

Lamineries MATTHEY SA proposes a special version of the 1.4310: the 1.4310.4. Its chemical composition has been adapted in order to increase the reaction to work hardening (Ni content between 6.4 and 6.6 %). 1.4310.4 is also specially cast in order to avoid unwanted inclusions. Its austenitic structure is unstable and a high mechanical strength can be reached, using a significantly weaker rate of cold deformation than is the case for the conventional 1.4310. The stainless 1.4310.4 also offers an improved fatigue strength limit as well as a higher increase of the tensile strength after tempering than with the conventional 1.4310. These properties make the 1.4310.4 highly suitable for demanding spring applications such as the manufacture of snap domes.

Typical uses

Often used for the manufacture of springs and other products requiring a good fatigue resistance such as switches, watch and clock components, snap domes, etc.

Typical manufacturing range

		Thickness (mm)	Width (mm)	Length (mm)
Rolled products	Strip in coils [1]	0.010 - 0.400	1.5 - 200.0	-
	Strip as sheets [1]	0.010 - 0.400	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_{p02} (N/mm^2)	R_m (N/mm^2)	Hardness HV
C700 [1]	soft	-	700 - 1000	170 - 250
C1000 [1]	¼ hard	-	1000 - 1300	310 - 410
C1300 [1]	½ hard	200 min.	1300 - 1500	390 - 480
C1500 [1]	hard	370 min.	1500 - 1800	410 - 520
C1700 [1]	Extra hard	490 min.	1700 - 2000	450 - 630
C1700 [1]	spring	550 min.	1900 min.	580 min.

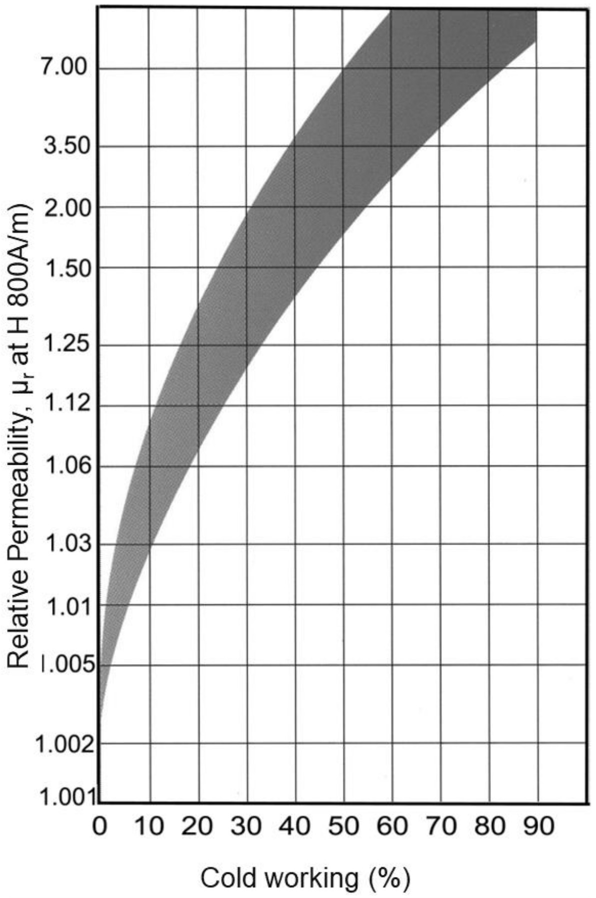
[1] These tempers do not correspond exactly to the EN 10151 standard and are only indicative.

Physical properties

Modulus of elasticity	kN/mm^2	195 [1]
Poisson ratio		0.29
Density	g/cm^3	7.90
Melting point	°C	1410
Linear dilatation coefficient	10^{-6}·/ ºC	16.8
Thermal conductivity at 20°C	W/m °K	14.7
Electrical resistivity	μΩcm	70
Electrical conductivity	MS/m	1.4
Specific heat at 20°C	J/(kg. K)	460
Magnetic properties		Amagnetic in soft temper (μ = 1.0002 - 1.004) [2]

[1] The Modulus of elasticity of 1.4310.4 varies slightly with the amount of cold working and depends, therefore, on the temper as well as the direction of measurement, longitudinal or transverse to the rolling direction. In the longitudinal direction, the Young's Modulus decreases from approx. 205 kN/mm^2 in the annealed temper to 185 kN/mm^2 for a cold working of about 40% (Rm approx. 1400-1600 N/mm^2) and then increases gradually with further cold working. In all cases, the tempering process will increase the Young's Modulus and decrease its tendency to change as a function of cold work.

[2] The magnetic permeability increases very quickly with cold working and mechanical resistance. For the 1.4310.4, the austenite is very unstable and a significant amount can rapidly change to α - martensite and the alloy will become ferromagnetic (μ_r reaches 6 for a cold working of 50%, R_m approx. 1600 N/mm^2).



Tolerances (strip and foil)

Thickness

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.

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

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

Our tolerance "LMSA Standard" respects the EN Standard 1654 (Length of measurement 1000 mm).
Other tolerances upon request.

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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