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INFORMATION SHEET

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MATERIAL	AISI 316L	FAMILY	Austenitic stainless steel	SHEET #	AISI316L.FIE

EQUIVALENCY

DIN	AFNOR	UNS	SS	ISO
1.4404 (X2CrNiMo17-12-2) 1.4435 (X2CrNiMo18-14-3)	Z2 CND 17-12/13	S31603	2348 / 2353	4404-316-03-I 4435-316-91-I

USE

This material is commonly used for the manufacture of the following product elements:

☒ Cannula (tube) ☒ Stylet (wire) ☒ Hub ☒ Handle
☒ Adaptor ☒ Stopcock

GENERAL CHARACTERISTICS

Straightness	Circularity	Concentricity *(only tube)*
2 mm difference for 1'000 mm length	- Tube : Circularity ≅ ID tolerance - Wire: Circularity ≅ OD tolerance	≤ 10% tube thickness
Outer surface finish	**Inner surface finish** *(only tube)*	**-**
N5 ($R_{a\ max}$ = 0.4)	N7 ($R_{a\ max}$ = 1.6)	-

MANUFACTURING

Turing, drilling, milling	Grinding	Laser cutting	Electro erosion machining
Not suggested	Good	Excellent	Good
Sharping	**Polishing**	**Laser marking**	**-**
Excellent	Good	Excellent	-

ASSEMBLING

Bonding	Press fit	Soldering	Laser welding / Plasma
Good	Not suggested	Good	Excellent

CHEMICAL COMPOSITION [%]

C	Si	Mn	P	S	Cr	Ni	Mo	N	-
≤ 0.03	≤ 1.0	≤ 2.0	≤ 0.045	≤ 0.03	16-18	10-14	2-3	≤ 0.1	-

The reference to the chemical composition is the one from UNS.
The chemical composition from other equivalent standards may be slightly different from that provided in this information sheet.

MECHANICAL PROPRIETIES

Material state	Tensile strength Rm [MPa]
Hard – Cannula	800 – 1'500
Annealed – Cannula	400 – 700
Hard – Stylet	1'400 – 2'400

PHYSICAL PROPRIETIES

Density ρ [kg/m^3]	Electrical resistivity ρ [μΩ × m]	Thermal conductivity λ [W/(m × K)] at 20°C
7'980	0.75	15
Modulus of elasticity E [GPa] at 20°C	**Coefficient of linear thermal expansion** α [10^{-6} / °C] between 20°C and 100°C	**Specific heat capacity** C_p [J/(kg × K)] at 20°C
200	16.5	500
Corrosion resistance		
Excellent corrosion resistance		

BIOCOMPATIBILITY (ISO 10993-1)

The austenitic stainless steel AISI 316L is a metallic material derived from AISI 316 stainless steel, material referenced in the American standard of surgical instruments ASTM F899, considered as clinically established and recognized material (state-of-the-art) for devices medical. It may require justifications and/or specific biocompatibility tests. The stainless steel AISI 316L is however referenced in the standard ISO 16061.
Their needs can be determined in a biological safety analysis of specific medical device. The customer is responsible to verify the compatibility of the material selected from its intended use.

STANDARDS

ISO 15510	Stainless steels -Chemical composition
ISO 9626	Stainless steel needle tubing for the manufacture of medical devices
ISO 7153-1	Surgical instruments - Metallic materials - Part 1: Stainless steel
ASTM F899	Standard Specification for Wrought Stainless Steels for Surgical Instruments
ISO 16061	Instrumentation for use in association with non-active surgical implants - General requirements