



MATERIAL No.: 316L/ S31603/ 1.4404

DESCRIPTION

EN symbol (short)	X2CrNiMo17-12-2	Density kg/dm³	7,95
AISI	AISI 316 L	Hardness HB	<215
UNS	S 31603 Grade TP 316 L	Rockwell Hardness Number max.	B90 (TP 316L-ASTM A 249)
AFNOR	X2CrNiMo17-12-2 / NF EN 10028-7 (01/2000) (FR)	Composition	chromium nickel molybdenum steels
BS	X2CrNiMo17-12-2 / B.S.EN 10028-7 (01-2000) (GB)	Category	Stainless steels steel, resistant to rust and acids
Registered work's label	V4a Supra NK	Structure	austenitic
		Corrosion	resistant to intercrystalline corrosion
Description	This austenitic stainless steel 1.4404 (316L) shows high acid resistance.		

CHEMICAL COMPOSITION

		C	Si	Mn	P	S	Cr	Mo	Ni	N
1.4404	Min %						16,50	2,00	10,00	
	Max %	0,030	1,00	2,00	0,045	0,015	18,50	2,50	13,00	0,110
(Key to steel 2010) DIN-Norms may deviate in some aspects due to different product types										
AISI 316 L	Min %						16,00	2,00	10,00	
	Max %	0,035	0,075	2,00	0,045	0,030	18,00	3,00	15,00	
ASTM A 249 (TP 316 L)										
S 31603	Min %						16,0	2,0	10,0	
	Max %	0,035	1,0	2,0	0,045	0,030	18,0	3,0	15,0	
ASTM A 312 (TP 316L)										

PHYSICAL PROPERTIES

Property	Value
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Density: kg/dm³	7,95				
Hardness: HB	<215				
Rockwell Hardness Number max.	B90 (TP 316L-ASTM A 249)				
magnetizable	no				
polishable	good				
Temperature T °C/F (°C/F)	Specific heat J / kgK (Btu / lb °F)	Thermal conductivity W/mK (Btu·in / ft ² ·h·°F)	Electric resistance μΩ · cm (Ω circ mill / ft)	Modulus of elasticity kN/mm ² (10 ³ ksi)	Expansion rate from 70°F bis T 10 ⁻⁶ / K (10 ⁻⁶ / °F)
20 / 68	500 (--)	15 (--)	0,75 (--)	200 (--)	
100 / 212					16,0 (--)
200 / 392				186 (--)	16,5 (--)
300 / 572					17,0 (--)
400 / 752				176 (--)	17,5 (--)
500 / 932				165 (--)	18,0 (--)
Temperature	1% Yield strength in high temperatures		Tensile strenght strength in high temperatures		
°C/°F	Rp 1,0		Rm		
	N / mm² / ksi		N / mm² / ksi		
100 / 212	199 / 28,9		430 / 62,4		
200 / 392	167 / 24,2		390 / 56,6		
300 / 572	145 / 21,0		380 / 55,1		
400 / 752	135 / 19,6		380 / 55,1		
500 / 932	128 / 18,6		360 / 52,2		

MECHANICAL PROPERTIES (20°C / 68°F)

0,2% Yield strength Rp 0,2 (N/mm²)	>190 N/mm ²	
1,0% Yield strength Rp 1,0 (N/mm²)	225	
Yield strength ksi (Mpa)	25 / (170)	TP 316L (ASTM A 249)
Tensile strenght Rm (N/mm²)	520-670	
Tensile strenght ksi (Mpa)	70 / (485)	TP 316L (ASTM A 249)
Elongation A5 (%)	40 / 30	lengthwise /transverse
Elongation min. %	35	TP 316L (ASTM A 249)
impact work ISO-V (J)	100 / 60	lengthwise /transverse

TEMPERATURE INFORMATION

Application area		
Operation temperature	-166 °F to 932 °F	in strain situation III (to -454°F)
Solution heat treatment		
Working temperature	1868 °F to 2012 °F	
Processing information	cool down: air (<2mm);water (<2mm)	
Solution heat treatment		
Working temperature	2102 °F to 1562 °F	
Processing information	cool down: air	

STANDARDS / INFORMATION

Standards	Description
ASTM A 182	Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service
ASTM A 213	Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes
ASTM A 249	Standard Specification for Welded austenitic steel boiler, Superheaters, heat-exchangers, and condenser Tubes
ASTM A 276	Rods and cross-sections made of stainless and heat-resistant steel
ASTM A 312	Standard Specification for Seamless and welded austenitic stainless steel pipes
ASTM A 403	Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
DIN EN 10028-7 (02/2008)	flat products made from steel for pressure tanks Part 7: Stainless steel
DIN EN 10088-2 (09/2005)	stainless steel; sheet metal and ribbons out of corrosion resistant steel for general purposes
DIN EN 10088-3 (09/2005)	Stainless steels. Technical delivery conditions for semi-finished products, bars, rods, wire selection and bright products of corrosion resisting steels for general and construction purposes
DIN EN 10216-2 (10/2007)	seamless steel pipes under compression load; pipes out of non-alloyed and alloyed steel with set properties in high temperatures
DIN EN 10217-7 (05/2005)	Welded steel tubes under compression load. Stainless steel tubes
DIN EN 10296-2 (02/2006)	welded circular steel pipes for machine construction and general technical applications, stainless steel
DIN EN 10297-2 (02/2006)	seamless circular steel pipes for machine construction and general technical applications, stainless steel

PROCESS INFORMATION

Welding	
- Material classification acc. CEN ISO/TR 15608	8.1
- Type	well weldable WIG MAG solid wire manual arc welding (E) No translation! Welding wire
- Add. material	1.4430;1.4576;1.4455; 1.4429
- Hints	special post heat treating not required

MAIN FIELDS OF APPLICATION

Details of application	This steel's composite is similar to steel no. 1.4401 however it's lower carbon content allows welding of sheet thicknesses above 0.2"
Certifications	Certified for purchase obligating pressure containers in accordance to AD-information sheet W2
Chemical Industry	apparatus construction transport unit for chloric medium
food processing industry	grounds for creamery grounds for brewery
cellulose/paper industry	different components
Environmental technology	clarification plants
textile industry	various containers and plant components
food processing industry	Pipe work to transport
offshore plants	various plant components

RANGE OF PRODUCTS

Product type	Product
Processing / Construction	from sheets from pipes, fittings, flanges (welded)
Plates / Sheets	plates/sheets
Fittings	welded reductions Welded T-pieces seamless elbows seamless reductions

	seamless T-pieces Other Fittings, Nipples
Flanges / Collars / Flared tube ends	flared tube end collars various flanges (weld neck flange, blind flange etc.)
Bumped boiler ends / caps / round blanks	from sheets from bar steel
Pipes / Tubes	welded pipes/tubes welded square pipes/tubes Hollow bar
Bar steel	round bar steel hexagon steel
Equipment	screws, screw nuts, shims, straight turning parts, designed components

[Pipe/Tube/Fitting/Flange/Valve/Plate](#)

Stainless Steel/Nickel Alloy/Duplex

