



**MATERIAL No.: 316L/ S31603/ 1.4404**

**DESCRIPTION**

<b>EN symbol (short)</b>	X2CrNiMo17-12-2	<b>Density kg/dm<sup>3</sup></b>	7,95
<b>AISI</b>	AISI 316 L	<b>Hardness HB</b>	<215
<b>UNS</b>	S 31603 Grade TP 316 L	<b>Rockwell Hardness Number max.</b>	B90 (TP 316L-ASTM A 249)
<b>AFNOR</b>	X2CrNiMo17-12-2 / NF EN 10028-7 (01/2000) (FR)	<b>Composition</b>	chromium nickel molybdenum steels
<b>BS</b>	X2CrNiMo17-12-2 / B.S.EN 10028-7 (01-2000 ) (GB)	<b>Category</b>	Stainless steels steel, resistant to rust and acids
<b>Registered work's label</b>	V4a Supra NK	<b>Structure</b>	austenitic
		<b>Corrosion</b>	resistant to intercrystalline corrosion
<b>Description</b>	This austenitic stainless steel 1.4404 (316L) shows high acid resistance.		

**CHEMICAL COMPOSITION**

		C	Si	Mn	P	S	Cr	Mo	Ni	N
<b>1.4404</b>	<b>Min %</b>						16,50	2,00	10,00	
	<b>Max %</b>	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										
<b>AISI 316 L</b>	<b>Min %</b>						16,00	2,00	10,00	
	<b>Max %</b>	0,035	0,075	2,00	0,045	0,030	18,00	3,00	15,00	
ASTM A 249 (TP 316 L)										
<b>S 31603</b>	<b>Min %</b>						16,0	2,0	10,0	
	<b>Max %</b>	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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<b>Density: kg/dm<sup>3</sup></b>	7,95				
<b>Hardness: HB</b>	<215				
<b>Rockwell Hardness Number max.</b>	B90 (TP 316L-ASTM A 249)				
<b>magnetizable</b>	no				
<b>polishable</b>	good				
<b>Temperature T</b> °C/F (°C/F)	<b>Specific heat</b> J / kgK (Btu / lb °F)	<b>Thermal conductivity</b> W/mK (Btu·in / ft <sup>2</sup> ·h·°F)	<b>Electric resistance</b> μΩ · cm (Ω circ mill / ft)	<b>Modulus of elasticity</b> kN/mm <sup>2</sup> (10 <sup>3</sup> ksi)	<b>Expansion rate from 70°F bis T</b> 10 <sup>-6</sup> / K (10 <sup>-6</sup> / °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 (--)
<b>Temperature</b>	<b>1% Yield strength in high temperatures</b>		<b>Tensile strenght strength in high temperatures</b>		
°C/°F	<b>Rp 1,0</b>		<b>Rm</b>		
	<b>N / mm<sup>2</sup> / ksi</b>		<b>N / mm<sup>2</sup> / ksi</b>		
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)

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

## TEMPERATURE INFORMATION

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

## STANDARDS / INFORMATION

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

## PROCESS INFORMATION

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

#### MAIN FIELDS OF APPLICATION

<b>Details of application</b>	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"
<b>Certifications</b>	Certified for purchase obligating pressure containers in accordance to AD-information sheet W2
<b>Chemical Industry</b>	apparatus construction transport unit for chloric medium
<b>food processing industry</b>	grounds for creamery grounds for brewery
<b>cellulose/paper industry</b>	different components
<b>Environmental technology</b>	clarification plants
<b>textile industry</b>	various containers and plant components
<b>food processing industry</b>	Pipe work to transport
<b>offshore plants</b>	various plant components

#### RANGE OF PRODUCTS

<b>Product type</b>	<b>Product</b>
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

