



**MATERIAL No.: 316Ti/S31635/1.4571**

**DESCRIPTION**

<b>EN symbol (short)</b>	X6CrNiMoTi 17-12-2	<b>Density</b>	8,0
<b>AISI</b>	AISI 316 Ti	<b>kg/dm<sup>3</sup></b>	
<b>UNS</b>	S 31635 Grade TP 316Ti	<b>Hardness</b>	<=215
<b>AFNOR</b>	X6CrNiMoTi 17-12-2 / NF EN 10088-1 ( 06/2005) (FR)	<b>HB30</b>	
<b>BS</b>	X6CrNiMoTi 17-12-2 /B.S. EN 10088-1 ( 06/2005) (GB)	<b>Composition</b>	Nickel Chrome Molybdenum steel
<b>Registered work's label</b>	Cronifer 1810Ti	<b>Category</b>	Stainless steels steel, resistant to rust and acids
		<b>Structure</b>	austenitic
		<b>Corrosion</b>	resistant to intergranular corrosion high corrosion resistance against pitting corrosion

**CHEMICAL COMPOSITION**

		C	Si	Mn	P	S	Cr	Mo	Ni	Ti	N
<b>1.4571</b>	<b>Min %</b>						16,50	2,00	10,50		
	<b>Max %</b>	0,08	1,00	2,00	0,045	0,015*	18,50	2,50	13,50	5xC<=0,7	
(Key to steel 2010) *S: for long term products: S<=0,30, .....for untreated products: S=0,015-0,030 Norms allow deviations for S, Ni, Cu											
<b>AISI 316 Ti</b>	<b>Min %</b>						16,00	2,00	10,00		
<b>S 31635</b>	<b>Max %</b>	0,08	0,75	2,00	0,045	0,030	18,00	3,00	14,00	>=5x(C+N)<=0,7	0,10

**PHYSICAL PROPERTIES**

Property	Value
<b>Density: kg/dm<sup>3</sup></b>	8,0
<b>Hardness: HB30</b>	<=215
<b>magnetizable</b>	non

Temperature T °C/F (°C/F)	Specific heat J / kgK (Btu / lb °F)	Thermal conductivity W/mK (Btu·in / ft <sup>2</sup> ·h·°F)	Electric resistance μΩ · cm (Ω circ mill / ft)	Modulus of elasticity kN/mm <sup>2</sup> (10 <sup>3</sup> ksi)	Expansion rate from 70°F bis T 10 <sup>-6</sup> / K (10 <sup>-6</sup> / °F)
20 / 68	500(-)	15(-)	0,75 (-)	200 (-)	16,5(-)
200 / 392				186 (-)	17,5 (-)
300 / 572				172 (-)	18,0 (-)
400 / 752				165 (-)	18,5 (-)
500 / 932					19,0 (-)

Temperature	1,0% Yield strength in high temperatures	0,2% Yield strength in high temperatures	Tensile strength in high temperatures	E-Module in high temperatures
°C / °F	Rp 0, 2	Rp 1,0	Rm	
	N/mm <sup>2</sup> / ksi	N/mm <sup>2</sup> / ksi	N/mm <sup>2</sup> / ksi	N /mm <sup>2</sup>
50 / 122	205 / 29,73	240 / 34,80	490 / 71	
100 / 212	190 / 27,55	220 / 31,90	440 / 63,8	16,500
200 / 392	165 / 23,90	192 / 27,80	390 / 56,6	17,500
300 / 572	145 / 21,00	175 / 25,40	375 / 54,4	18,500
400 / 752	135 / 19,60	164 / 23,80	375 / 54,4	18,500
500 / 932	129 / 18,70	158 / 22,90	360 / 52,2	19,000

tubes up to 20mm width; sheets up to 50mm width  
ksi value calculated

#### MECHANICAL PROPERTIES (20°C / 68°F)

<b>1% Yield strength Rp 1,0 (Mpa/ksi)</b>	260 / 37,7	
<b>Tensile strength Rm (Mpa /ksi)</b>	520-670/ 75,4- 97,2	
<b>Elongation A5 (%)</b>	40	
<b>notch impact average ISO-V</b>	100/60 J	<75 mm transverse

#### TEMPERATURE INFORMATION

<b>Application area</b>		
<b>Operation temperature</b>	-166 °F to 932 °F	-454 °F minimum operating temperature by only in strain situation III
<b>Solution heat treatment</b>		
<b>Working temperature</b>	1886 °F to 2030 °F	
<b>Explanation report</b>	cool down: water/air	

<b>annealing</b>	
<b>Working temperature</b>	1436 °F to 1544 °F
<b>Explanation report</b>	cool down: water/oil,
<b>Solution heat treatment</b>	
<b>Working temperature</b>	1562 °F to 2102 °F
<b>Explanation report</b>	cool down: air

#### **STANDARDS / INFORMATION**

<b>Standards</b>	<b>Description</b>
<a href="#"><u>ASTM A 182</u></a>	Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service
<a href="#"><u>ASTM A 213</u></a>	Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes
<a href="#"><u>ASTM A 276</u></a>	Rods and cross-sections made of stainless and heat-resistant steel
<a href="#"><u>ASTM A 312</u></a>	Standard Specification for Seamless and welded austenitic stainless steel pipes
<a href="#"><u>ASTM A 403</u></a>	Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
<a href="#"><u>ASTM A 479</u></a>	Rods and cross-sections made of stainless and heat-resistant steel used in boilers and other pressure tanks
<a href="#"><u>DIN EN 10088-1 (09/2005)</u></a>	Stainless steels Part 1: List of stainless steels
<a href="#"><u>DIN EN 10088-3 (09/2005)</u></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="#"><u>DIN EN 10217-7</u></a>	Welded steel pipes under compression load Pipes made from stainless steel
<a href="#"><u>DIN EN 10296-2 (02/2006)</u></a>	Welded circular steel pipes for machine construction and general technical service stainless steel
<a href="#"><u>DIN EN 10297-2 (02/2006)</u></a>	Welded circular steel pipes for machine construction and general technical service stainless steel. Pipes made from stainless steel

#### **PROCESS INFORMATION**

<b>Chip removing process</b>	hardly machinable
<b>Welding</b>	
<b>- Material classification acc. CEN ISO/TR 15608</b>	<b>8.1</b>
<b>- Type</b>	WIG manual arc welding submerged arc welding Laser welding

	MAG solid wire
<b>- Add. material</b>	1.4430;1.4576 laser welding; consult specialist literature

#### MAIN FIELDS OF APPLICATION

<b>Details of application</b>	- good corrosion resistance to nitric acid and organic cold acid solutions - application areas; chemical industry; textile industry; cellulose industry
<b>Certifications</b>	
<b>Chemical Industry</b>	for processing nitric acid the production of acetic acid apparatus construction
<b>cellulose/paper industry</b>	chemical digestion containers
<b>Environmental technology</b>	clarification plants
<b>textile industry</b>	
<b>cellulose/paper industry</b>	
<b>Apparatus engineering</b>	
<b>water management</b>	
<b>pharmaceutical industry</b>	
<b>crude oil</b>	

#### RANGE OF PRODUCTS

<b>Product type</b>	<b>Product</b>
Processing / Construction	from sheets from pipes, fittings, flanges (welded)
Plates / Sheets	plates/sheets plate/sheet cuts
Fittings	welded elbows welded reductions Welded T-pieces seamless elbows seamless reductions seamless T-pieces Other Fittings a.o. Weldolets, Nipples
Flanges / Collars / Flared tube ends	various flanges (weld neck flange, blind flange etc.)
Bumped boiler ends / caps / round blanks	from sheets

Pipes / Tubes	welded pipes/tubes welded square pipes/tubes Hollow bar seamless pipes/tubes
Bar steel	flat steel section 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

