

<b>Quality</b>	<b>X6CrNiMoTi17-12-2</b>	<b>Austenitic</b>	<i>Technical card 2018</i>
Number	<b>1.4571</b>	<b>Stainless Steel</b>	<i>Lucefin Group</i>

### Chemical composition

C%	Si%	Mn%	P%	S% <sup>a)</sup>	Cr%	Ni%	Mo%	Ti% <sup>b)</sup>	
max	max	max	max	max				max	
0,08	1,00	2,00	0,045	0,030	16,5-18,5	10,5-13,5	2,0-2,5	0,70	EN 10088-3: 2014
± 0.01	+ 0.05	+ 0.04	+ 0.005	+ 0.005	± 0.2	± 0.15	± 0.1	+ 0.05	

Product deviations are allowed. <sup>b)</sup> Ti 5 x C < 0.70

<sup>a)</sup> for improving machinability, it is allowed a controlled sulphur content of 0,015 % - 0,030 %; for polishability, it is suggested a controlled sulphur content of max 0,015 %

### Temperature °C

Melting range	Hot-forming	Solution annealing (Solubilization) +AT	Stabilizing	Soft annealing +A	MMA welding – AWS electrodes
1470-1450	1180-950	1120-1020 water	900-845 calm air	not suitable	<i>pre-heating</i> <i>after welding</i> not necessary      slow cooling
Sensitization	Quenching +Q	Tempering +T	Stress-relieving +SR		<i>joint with steel</i> carbon      CrMo alloyed      stainless
not suitable	not suitable	not suitable	420-240 air		E309-E308      E309-E308      E316L <i>cosmetic welding</i> E 318

**Chemical treatment** • *Pickling* (6 - 25% HNO<sub>3</sub>) + (0.5 - 8% HF) hot or cold. *Passivation* 20 - 25% HNO<sub>3</sub> hot

### Mechanical properties

**Heat-treated material** EN 10088-3: 2014 in conditions 1C, 1E, 1D, 1X, 1G, 2D

size		Testing at room temperature						
mm		R	Rp 0.2	A%	A%	Kv <sub>2</sub> +20 °C	Kv <sub>2</sub> +20 °C	HBW <sup>a)</sup>
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	min (T)	J min (L)	J min (T)	max
	160	500-700	200	40	-	100	-	215
160	250	500-700	200	-	30	-	60	215

<sup>a)</sup> for information only

(L) = longitudinal (T) = transversal

**Bright bars of heat-treated material** EN 10088-3: 2014 in conditions 2H, 2B, 2G, 2P

size		Testing at room temperature						
mm		R	Rp 0.2	A%	A%	Kv <sub>2</sub> +20 °C	Kv <sub>2</sub> +20 °C	
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	min (T)	J min (L)	J min (T)	
	10 <sup>b)</sup>	600-950	400	25	-	-	-	
10	16	580-950	380	25	-	-	-	
16	40	500-850	200	30	-	100	-	+AT solubilization
40	63	500-850	200	30	-	100	-	
63	160	500-700	200	40	-	100	-	
160	250	500-700	200	-	30	-	60	

<sup>b)</sup> in the range of 1 mm ≤ d < 5 mm, values are valid only for rounds – the mechanical properties of non round bars of < 5 mm of thickness have to be agreed at the time of request and order (L) = longitudinal (T) = transversal

### Forged +AT solubilization

size		Testing at room temperature						
mm		R	Rp 0.2	A%	Kv +20 °C	Kv +20 °C	Kv -196 °C	
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (T)	J min (L)	J min (T)	J min (T)	
	450	500-700	200	30	100	60	-	UNI EN 10250-4: 2001
	450	510-710	210	35	100	60	60	UNI EN 10222-5: 2001

(L) = longitudinal (T) = transversal

**Work-hardened by cold-drawing** EN 10088-3: 2014 in condition 2H (es. +AT+C)

size		Testing at room temperature			
mm		R	Rp 0.2	A%	
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	
	35	700-850	350	20	+AT+C700 cold-drawn material
	25	800-1000	500	12	+AT+C800 cold-drawn material

**Minimum values at high temperatures** on material +AT, EN 10088-3: 2014

Rp 0.2	N/mm <sup>2</sup>	185	175	165	155	145	140	135	131	129	127
Test at °C		<b>100</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>	<b>350</b>	<b>400</b>	<b>450</b>	<b>500</b>	<b>550</b>

Effect of **cold-working** (hot-rolled +AT+C). Approximate values

<b>R</b>	N/mm <sup>2</sup>	600	730	880	1040	1140	1280	1360	1600
<b>Rp 0.2</b>	N/mm <sup>2</sup>	230	590	780	920	1100	1220	1230	1420
Reduction %		<b>0</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>	<b>70</b>

Typical values at high temperature properties. For information only

<b>R</b>	N/mm <sup>2</sup>	518	455	443	433	423	375	261	155	78
<b>Rp 0.2</b>	N/mm <sup>2</sup>	208	179	159	146	145	146	146	112	55
Test temperature °C		<b>93</b>	<b>204</b>	<b>316</b>	<b>427</b>	<b>538</b>	<b>649</b>	<b>760</b>	<b>871</b>	<b>982</b>

<b>Thermal expansion</b>	10 <sup>-6</sup> · K <sup>-1</sup>	▶	16.5	17.5	18.0	18.5	19.0	
<b>Modulus of elasticity</b>	longitudinal GPa		200	194	186	179	172	165
<b>Poisson number</b>	$\nu$		0,30					
<b>Electrical resistivity</b>	$\Omega \cdot \text{mm}^2/\text{m}$		0.75	0.79	0.87	0.94	0.98	0.102
<b>Electrical conductivity</b>	Siemens·m/mm <sup>2</sup>		1.33					
<b>Specific heat</b>	J/(Kg·K)		500	500	520	530	540	540
<b>Density</b>	Kg/dm <sup>3</sup>		8.00					
<b>Thermal conductivity</b>	W/(m·K)		15	16	17.5	19	20.5	22
<b>Relative magnetic permeability</b>	$\mu_r$		1.02					
°C			<b>20</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>

The symbol ▶ indicates temperature between 20 °C and 100 °C, 20 °C and 200 °C .....

<b>Corrosion resistance</b>	Atmospheric	Chemical			x salts, organic acids, food
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	
x	x	x	x		

**Magnetic** no**Machinability** the presence of carbides and nitrides of titanium suggests to use carbide cutting inserts**Hardening** cold-drawn and other cold plastic deformations**Service temperature in air** continuous service up to 850 °C; intermittent service up to 800 °C

<b>Europe</b>	<b>USA</b>	<b>USA</b>	<b>China</b>	<b>Russia</b>	<b>Japan</b>	<b>India</b>	<b>Korea</b>
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X6CrNiMoTi17-12-2	S31635	Type 316Ti	06Cr17Ni12Mo2Ti	08Ch17N13M2T	SUS 316Ti	X04Cr17Ni12Mo2Ti	STS 316Ti

Behavior of yield strength as a function of the operative temperature

