

Quality	X6CrNiTi18-10	Austenitic	<i>Technical card 2018</i>
Number	1.4541	Stainless Steel	<i>Lucefin Group</i>

Chemical composition

C%	Si%	Mn%	P%	S% ^{a)}	Cr%	Ni%	Ti%	
max	max	max	max	max			max	
0,08	1,00	2,00	0,045	0,030	17,0-19,0	9,0-12,0	> 5 x C < 0,70	EN 10088-3: 2014
± 0.01	+ 0.05	± 0.04	+ 0.005	± 0.005	± 0.2	± 0.1	+ 0.05	

Product deviations are allowed

^{a)} for improving machinability, it is suggested a controlled sulphur content of 0,015 % - 0,030 %

Temperature °C

Melting range	Hot-forming	Solution annealing (Solubilization) +AT	Stabilizing	Soft annealing +A	MMA welding – AWS electrodes <i>pre-heating</i> <i>post welding</i>
1430-1400	1200-1000	1120-1010 water	900-840 calm air	not suitable	not necessary slow cooling
Sensitization	Quenching +Q	Tempering +T	Stress-relieving +SR		<i>joint with steel</i>
not suitable	not suitable	not suitable	450-200 furnace		carbon CrMo alloyed stainless E309-E308 E309-E308 E308-E347 <i>cosmetic welding</i> E347

Chemical treatment - Pickling (6 - 25% HNO₃) + (0.5 - 8% HF) hot or cold. Passivation 20 - 45% HNO₃ cold

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 ₂ +20 °C	Kv ₂ +20 °C	HBW ^{a)}	
from	to	N/mm ²	N/mm ² min	min (L)	min (T)	J min (L)	J min (T)	max	
	160	500-700	190	40	-	100	-	215	+AT
160	250	500-700	190	-	30	-	60	215	solubilization

^{a)} 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 ₂ +20 °C	Kv ₂ +20 °C		
from	to	N/mm ²	N/mm ² min	min (L)	min (T)	J min (L)	J min (T)		
	10 ^{b)}	600-950	400	25	-	-	-		
10	16	580-950	380	25	-	-	-	+AT	
16	40	500-850	190	30	-	100	-	solubilization	
40	63	500-850	190	30	-	100	-		
63	160	500-700	190	40	-	100	-		

^{b)} 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%	A%	Kv +20 °C	Kv +20 °C	Kv -196 °C	
from	to	N/mm ²	N/mm ² min	min (L)	min (T)	J min (L)	J min (T)	J min (T)	
	450	500-700	190	-	30	100	60	-	UNI EN 10250-4:01
	450	510-710	200	40	30	100	60	60	UNI EN 10222-5:01

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 ²	N/mm ² min	min		
	35	700-850	350	20		+AT+C700 cold-drawn material
	25	800-1000	500	12		+AT+C800 cold-drawn material

Transition curve determined by Kv impacts. Material solubilized at 1050 °C

Transition curve determined by Kv impacts. Material solubilized at 1050 °C								+AT material – Approximate values					
Average	J	230	240	240	250	250	260	260	°C	R	Rp 0.2	A	
Test at	°C	-160	-120	-80	-40	0	+40	+80		N/mm ²	N/mm ²	%	
									+24	500	200	401	
									-80	855	300	35	
									-196	1440	380	30	
									-254	1645	630	20	

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

R	N/mm ²	600	710	850	1000	1120	1240	1360	1500	1600
Rp 0.2	N/mm ²	280	600	760	880	990	1100	1200	1330	1390
A	%	38	20	9	8	8	8	8	8	8
Reduction	%	0	10	20	30	40	50	60	70	75

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

Rp 0.2	N/mm ²	175	165	155	145	136	130	125	121	119	118
Test at	°C	100	150	200	250	300	350	400	450	500	550

Thermal expansion	10 ⁻⁶ · K ⁻¹	▶	16.0	16.5	17.0	17.5	18.0	
Modulus of elasticity	longitudinal GPa		200	194	186	179	165	
Poisson number	ν		0.30	0.30	0.31	0.32		
Electrical resistivity	$\Omega \cdot \text{mm}^2/\text{m}$		0.73					
Electrical conductivity	Siemens·m/mm ²		1.37					
Specific heat	J/(Kg·K)		500					
Density	Kg/dm ³		7,90					
Thermal conductivity	W/(m·K)		15.0					
Relative magnetic permeability	μ_r		1.02					
°C			20	100	200	300	400	500

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

Corrosion resistance	Atmospheric		Chemical			x intergranular corrosion, industrial furnace
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x	x	x	x	x		

Magnetic	no
Machinability	low on cold-work hardened material
Hardening	cold-drawn and other cold plastic deformations
Service temperature in air	continuous service up to 850 °C; intermittent service up to 750 °C

Europe	USA	USA	China	Russia	Japan	India	R. Corea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X6CrNiTi18-10	S32100	321	0Cr18Ni11Ti	06Ch18N10T	SUS 321	X04Cr18Ni10Ti	STS 321

Weight loss due to oxidation; comparison between various refractory steels

