

Quality	X5CrNiMo17-12-2	Austenitic	<i>Technical card 2018</i>
Number	1.4401	Stainless Steel	<i>Lucefin Group</i>

Chemical composition

C%	Si%	Mn%	P%	S% ^{a)}	Cr%	Ni%	N%	Mo%	
max	max	max	max	max			max		
0,07	1,00	2,00	0,045	0,030	16,5-18,5	10,0-13,0	0,10	2,0-2,5	EN 10088-3: 2014
± 0.01	+ 0.05	± 0.04	+ 0.005	± 0.003	± 0.2	± 0.15	+ 0.01	± 0.1	

Product deviation are allowed

^{a)} 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
1400-1380	1200-925	1100-1050 water	unnecessary	not suitable	<i>pre-heating</i> not necessary
					<i>post welding</i> slow cooling
Sensitization	Quenching +Q	Tempering +T	Stress relieving +SR	<i>joint with steel</i>	
sensitization test at 800-450	not suitable	not suitable	450-200 furnace	carbon	CrMo alloyed
				E309-E308	stainless E308
				<i>cosmetic welding</i> E 316 or E 16-8-2	

Chemical treatment ▪ *Pickling* (6 - 25% HNO₃) + (0.5 - 8% HF) hot ▪ *Passivation* 20 - 50% HNO₃ 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 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	200	40	-	100	-	215	+AT
160	250	500-700	200	-	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	200	30	-	100	-		solubilization
40	63	500-850	200	30	-	100	-		
63	160	500-700	200	40	-	100	-		
160	250	500-700	200	-	30	-	60		

^{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)	
	250	500-700	200	-	30	100	60	-	UNI EN 10250-4:01
	250	510-710	205	45	35	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

Average J	198	206	218	225	238	245	250
Test at °C	-160	-120	-80	-40	0	+40	+80

Approximate mechanical properties at low temperatures. Material solubilized at 1080 °C

R	N/mm ²	580	820	1270	1440
Rp 0.2	N/mm ²	245	330	520	580
A	%	55	50	45	40
Test at °C		+24	-74	-196	-254

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

R	N/mm ²	550	660	800	1000	1110	1220	1320	1430
R _{p 0.2}	N/mm ²	260	510	640	790	840	920	1020	1120
A	%	50	22	14	13	10	8	8	8
Reduction	%	0	10	20	30	40	50	60	70

Minimum yield stress and tensile strength values at high temperatures on material +AT, EN 10088-3: 2014/EN 10269: 2001

R _{p 0.2}	N/mm ²	175	158	145	135	127	120	115	112	110	108
R	N/mm ²	460	440	420	415	410	410	410	405	390	375
Test at	°C	100	150	200	250	300	350	400	450	500	550

Thermal expansion	10 ⁻⁶ • K ⁻¹		12.8	13.3	14.1	▶	16.0	16.5	17.0	17.5	18.8	20.2
Modulus of elasticity	longitudinal GPa						200	194	186	179		127
Poisson number	ν						0.256	0.280				
Electrical resistivity	Ω • mm ² /m		0.58		0.66	0.75		0.86		0.97	1.07	1.15
Electrical conductivity	Siemens•m/mm ²					1.33						
Specific heat	J/(Kg•K)					500		510		550	585	630
Density	Kg/dm ³					8.00						
Thermal conductivity	W/(m•K)					15.0		17.5	19.9			25.1
Relative magnetic permeability	μ _r					1.02						
°C			-184	-128	-74	20	100	200	300	400	600	800

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

Corrosion resistance	Atmospheric		Chemical			x halides, sulfuric acid, phosphoric, organic and formic acids
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x	x	x	x	x	x	

Magnetic	no
Machinability	low
Hardening	cold-drawn and other cold plastic deformations
Service temperature in air	continuous service up to 850 °C; intermittent service up to 800 °C

Europe	USA	USA	China	Russia	Japan	India	Rep. of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X5CrNiMo17-12-2	S31600	316	0Cr17Ni12Mo2	08Ch17N13M2	SUS 316	X04Cr17Ni12Mo2	STS 316

Approximate diagram of cold-drawn hardening

