

Quality	X2CrNi19-11	Austenitic	<i>Technical card</i>
Number	1.4306	Stainless Steel	<i>Lucefin Group</i>

Chemical composition

C%	Si%	Mn%	P%	S% ^{a)}	Cr%	Ni%	N%	
max	max	max	max	max			max	
0,03	1,00	2,00	0,045	0,030	18,0-20,0	10,0-12,0	0,11	EN 10088-1: 2005
+ 0.005	+ 0.05	± 0.04	+ 0.005	+ 0.005	± 0.2	± 0.15	± 0.01	

Product deviations are allowed

^{a)} for 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)	Stabilizing	Soft annealing	MMA welding – AWS electrodes		
					<i>pre-heating</i>	<i>post welding</i>	
1450-1400	1200-900	1100-1050 water	885 calm air	not suitable	not required	slow cooling	
Sensitization	Quenching	Tempering	Stress-relieving	<i>joint with steel</i>			
	not suitable	not suitable	450-230	carbon	CrMo alloyed	stainless	
				E309-E308	E309-E308	E308	
				<i>cosmetic welding</i>			
				E308 L			

Mechanical properties

Hot-formed EN 10088-3: 2005 in conditions 1C, 1E, 1D, 1X, 1G, 2D

size		Testing at room temperature						
mm		R	Rp 0.2	A% (L)	A% (T)	Kv +20 °C (L)	Kv +20 °C (T)	HB ^{a)}
from	to	N/mm ²	N/mm ² min	min		J min	J min	max
	160	460-680	180	45		100		215
160	250	460-680	180		35		60	215

^{a)} for information only

(L) = longitudinal (T) = transversal

Cold-processed EN 10088-3: 2005 in conditions 2H, 2B, 2G, 2P

size		Testing at room temperature						
mm		R	Rp 0.2	A% (L)	A% (T)	Kv +20 °C (L)	Kv +20 °C (T)	
from	to	N/mm ²	N/mm ² min	min	min	J min	J min	
	10 ^{b)}	600-930	400	25				
10	16	600-930	380	25				+AT solubilization
16	40	460-830	180	30		100		
40	63	460-830	180	30		100		
63	160	460-680	180	45		100		
160	250	460-680	180		35		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 EN 10250-4: 2001

size		Testing at room temperature						
mm		R	Rp 0.2	A% (T)	C%	Kv +20 °C (L)	Kv +20 °C (T)	
from	to	N/mm ²	N/mm ² min	min	min	J min	J min	
	250	460-680	180	35		100	60	+AT solubilization

Work-hardened by cold-drawing EN 10088-3: 2005 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

Approximate mechanical properties at low temperatures. Material solubilized at 1050 °C

R	N/mm ²	1450	1300	1000	600
Rp 0.2	N/mm ²	350	320	320	290
A	%	40	45	50	55
Test at	°C	-254	-196	-100	0

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

R	N/mm ²	620	800	950	1080	1150
R_{p 0.2}	N/mm ²	250	450	620	790	950
A	%	48	38	32	25	20
Reduction %		0	10	20	30	40

Minimum values at high temperatures on material +AT, EN 10088-3: 2005 solubilized

R_{p 0.2}	N/mm ²	145	130	118	108	100	94	89	85	81	80
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	172	165
Poisson number	ν	0.30	0.30	0.30	0.31	0.31	0.32	0.32
Electrical resistivity	Ω · mm ² /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 max}	~ 2	1.02					
Temperature	°C	-196 °C	20	100	200	300	400	500

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

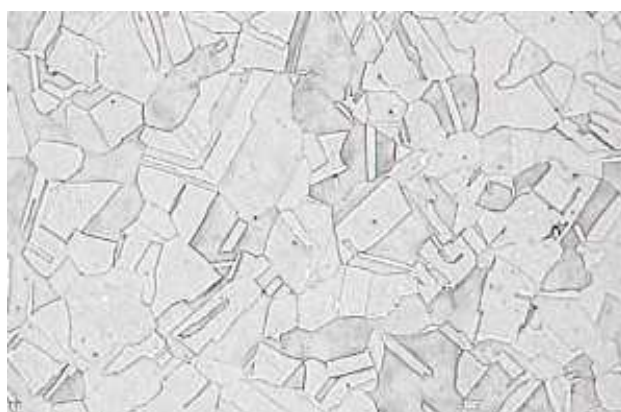
Corrosion resistance	Atmospheric		Chemical			x intercrystalline corrosion, foods, colouring and organic substances
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x	x		x	x	x	

Magnetic	no
Machinability	high
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	Republic of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X2CrNi19-11		(304L)	022Cr19Ni10	(03Ch18N11)		X02CrNi19-10	

1.4306 untreated steel
Austenite and 5% ferrite delta

500 x

1.4306 solubilized steel
Grain size 4-5, according to ASTM E 112 standard

100 x