

Quality	X5CrNi18-10	Austenitic
Number	1.4301	Stainless Steel

Chemical composition

C%	Si%	Mn%	P%	S% a)	Cr%	Ni%	N%	
max	max	max	max	max			max	
0,07	1,00	2,00	0,045	0,015	17,5-19,5	8,0-10,5	0,11	EN 10088-1: 2005
± 0.01	+ 0.05	+ 0.04	+ 0.005	+ 0.003	± 0.2	± 0.1	± 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 - electrodes AWS
1460-1400	1180-950	1120-1000 (atmosfera controllata sary water)		not suitable	pre-heating post welding not necessary slow cooling
Sensitization	Quenching	Tempering	Stress-relieving	joint with steel	
not recommended	not suitable	not suitable	430-350 air	carbon	CrMo alloyed stainless E309-E308 E309-E308 E308 cosmetic welding E308 - E308L

Mechanical properties

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

size mm		Testing at room temperature						
from	to	R	Rp 0.2	A% (L)	A% (T)	Kv +20 °C (L)	Kv +20 °C (T)	HB a)
		N/mm ²	N/mm ² min	min		J min	J min	max
	160	500-700	190	45		100		215 +AT solubilization
160	250	500-700	190		35		60	215 +AT solubilization

a) for information only (L) = longitudinal (T) = transversal

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

size mm		Testing at room temperature						
from	to	R	Rp 0.2	A% (L)	A% (T)	Kv +20 °C (L)	Kv +20 °C (T)	
		N/mm ²	N/mm ² min	min	min	J min	J min	
	10 b)	600-950	400	25				
10	16	600-950	400	25				+AT solubilization
16	40	600-850	190	30		100		
40	63	580-850	190	30		100		
63	160	500-700	190	45		100		
160	250	500-700	190		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 +AT solubilization EN 10250-4: 2001

size mm		Testing at room temperature						
over	to	R	Rp 0.2	A%	A%	Kv +20 °C	Kv +20 °C	Kv -196 °C
		N/mm ²	N/mm ² min	min (L)	min (T)	J min (L)	J min (T)	J min (T)
	250	500-700	190		35	100	60	
	250	500-700	200	45	35	100	60	60

EN 10250-4: 2001

EN 10222-5: 2001

Work-hardened by cold-drawing EN 10088-3: 2005 in condition 2H (ex. +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									+AT material – approximate values			
Average	J	210	210	210	212	218	228	244	°C	R	Rp 0.2	A%
Test at	°C	-160	-120	-80	-40	0	+40	+80		N/mm ²	N/mm ²	%
									+24	520	210	45
									-80	860	270	35
									-196	1250	350	30
									-254	1680	440	30

X5CrNi18-10 n° 1.4301 austenitic stainless steel

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

R	N/mm ²	560	660	670	700	715	720	765	770	785	830	850
Rp 0.2	N/mm ²	300	430	450	470	490	500	530	560	580	600	700
A	%	55	46	42	38	38	36	36	36	34	34	32
Reduction	%	0	5	6	8	10	12	14	16	18	20	24

Minimum yield stress and tensile strength values at high temperatures on +AT material, EN 10088-3: 2005 / EN 10269: 2001

Rp 0.2	N/mm ²	155	140	127	118	110	104	98	95	92	90
R	N/mm ²	450	420	400	390	380	380	375	360	335	300
Test at	°C	100	150	200	250	300	350	400	450	500	550

Thermal expansion		10 ⁻⁶ • K ⁻¹	13.4	13.8	14.8	▶	16.0	16.5	17.0	17.5	18.8	20.2	
Modulus of elasticity	longitudinal	GPa	180				200	194	186	179	172	127	
Modulus of elasticity	tangential	GPa					78						
Poisson number		v					0.240	0.256					
Electrical resistivity		Ω • mm ² /m	0.55				0.64	0.73	0.86		1.00	1.11	1.21
Electrical conductivity		Siemens•m/mm ²						1.37					
Specific heat		J/(Kg•K)						500	510		550	585	630
Density		Kg/dm ³						7.93					
Thermal conductivity		W/(m•K)						15.0	16.3	17.5	19.9	21.5	25.1
Relative magnetic permeability		μr						1.021					
Temperature		°C	-196	-184	-128	-74	20	100	200	300	400	600	800

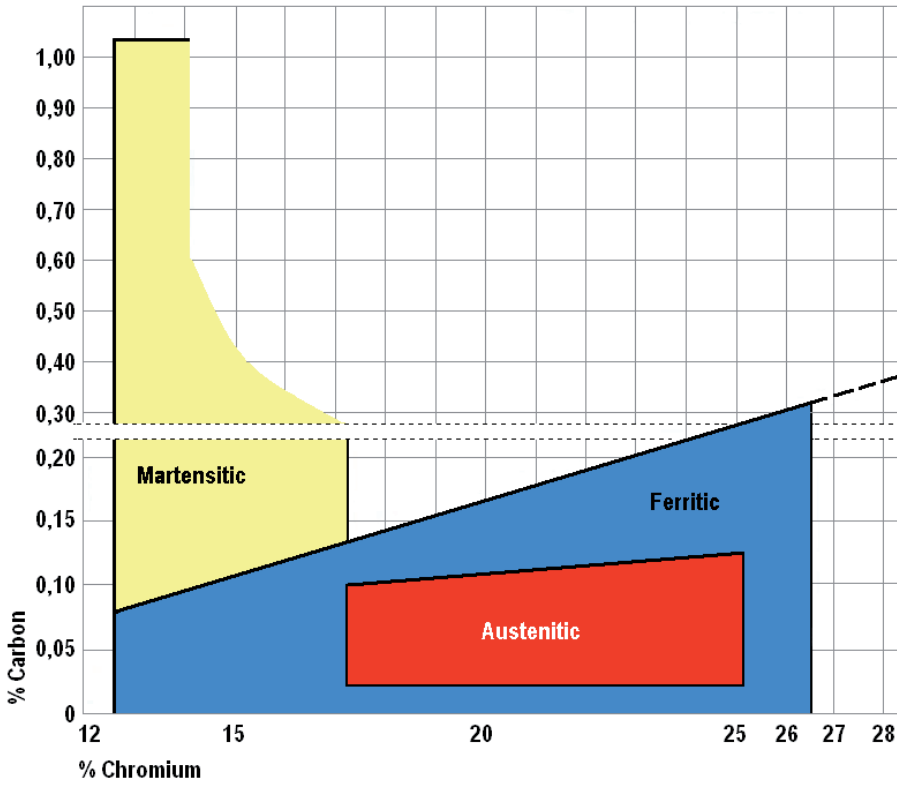
The symbol ▶ indicates between 20 °C and 100 °C, 20 °C and 200 °C

Corrosion resistance	Atmospheric		Chemical			x nitric acid, weak organic acids, rural and urban atmospheres
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x	x		x	x		

Magnetic	not
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
X5CrNi18-10		(304)	0Cr18Ni9	07Ch18N10		X04Cr19Ni9	

Carbon - Chromium correlation



Position of some stainless steel families, according to their Cr/C content (Hoepli, "Stainless steels")