

Quality	X2CrNiMoCuWN25-7-4	Austenitic-Ferritic
Number	1.4501	Stainless Steel (Superduplex)

Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	Ni%	N%	Mo%	Cu%	W%	
max	max	max	max	max							EN 10088-1:
0,03	1,00	1,00	0,035	0,015	24,0-26,0	6,0-8,0	0,20-0,30	3,0-4,0	0,5-1,0	0,5-1,0	2005
± 0.005	+ 0.05	+ 0.03	+ 0.005	+ 0.003	± 0.25	± 0.10	± 0.02	± 0.10	± 0.07	± 0.05	

Product deviations are allowed.

PRE (Cr+3,3Mo+16N) > 40 (Pitting Resistance Equivalent)

Temperature °C

Melting range	Hot-forming	Solution annealing (Solubilization) +AT	Stabilizing	Soft annealing +A	MMA welding – AWS electrodes <i>pre-heating post welding</i>
1480-1440	1250-1100	1120-1050 water	not suitable	not suitable	not recommended
Embrittlement	Carbides precipitation	Sigma phase formation	Stress-relieving +SR	Recrystallizat. +RA	<i>oint with steel</i> carbon CrMo alloyed stainless
-50 +300	950-600	1000-600	not suitable	not suitable	<i>cosmetic welding</i>

Chemical treatment ▪ *Pickling* (52% HNO₃) + (65% HF) hot ▪ *Passivation* 20 - 45% HNO₃ cold

Mechanical properties

Heat-treated material EN 10088-3: 2005 in conditions 1C, 1E, 1D, 1X, 1G, 2D

size		Testing at room temperature							
mm		R	Rp 0.2	A%	A%	Kv +20 °C	Kv +20 °C	Kv -40 °C	HB a)
from	to	N/mm ²	N/mm ² min	min (L)	min (T)	J min (L)	J min (T)	J min ^{b)} (L)	max
	160	730-930	530	25		100		40	290
	75 ^{c)}	730-930	530	25	25	100	60		+AT solubilizat.

a) for information only. b) EN 10272 : 2003. c) EN 10088-2 : 2005. (L) = longitudinal (T) = trasversal

Cold-work

1.4501 steel can be adequately cold formed by various processes (cold-drawn, cold-reduced, deep-drawn). It is recommended that any cold work in excess of 10% - 20% is removed by solution annealing and water quenching. It should be noted that cold working above these limits can result in hardness levels above those specified in standards such as ISO 15156 / NACE MR0175.

Forged +AT solubilization EN 10250-4: 2001

size		Testing at room temperature					
mm		R	Rp 0.2	A%	A%	Kv +20 °C	Kv +20 °C
from	to	N/mm ²	N/mm ² min	min (L)	min (T)	J min (L)	J min (T)
	160	730-930	530	25	20	100	60

Typical values at high temperature, hot-formed flats +AT (Rolled Alloys US data sheet)

Test		thickness up to 30 mm.			thickness 31 to 70 mm	
temperature		R	Rp 0.2	R	Rp 0.2	
°C	°F	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
20	68	780	580	750	550	
50	122	725	500	700	470	
100	212	700	470	670	430	
150	302	680	450	620	400	
200	392	670	430	610	380	
250	482	650	400	600	370	
300	572	635	385	590	360	

X2CrNiMoCuWN25-7-4 n° **1.4501** Superduplex

Minimum yield stress and tensile strength values at high temperatures on material +AT EN 10028-7: 2007

R_{p0.2}	N/mm ²	500 ^{a)}	450	420	400	380
R	N/mm ²	711 ^{a)}	680	660	640	630
Prova a	°C	50	100	150	200	250

^{a)} determined by linear interpolation

Thermal expansion	10 ⁻⁶ • K ⁻¹	▶	13.0	13.5	14.0
Modulus of elasticity	longitudinal GPa		200	194	186
Poisson number	ν		0.32		
Electrical resistivity	Ω • mm ² /m		0.80	0.89	0.95
Electrical conductiv.	Siemens•m/mm ²		1.25		
Specific heat	J/(Kg•K)		500		523
Density	Kg/dm ³		7.80		
Thermal conductivity	W/(m•K)		15.0		16.3
Relative magnetic permeability	μ _r		29		
°C			20	100	200
					300

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

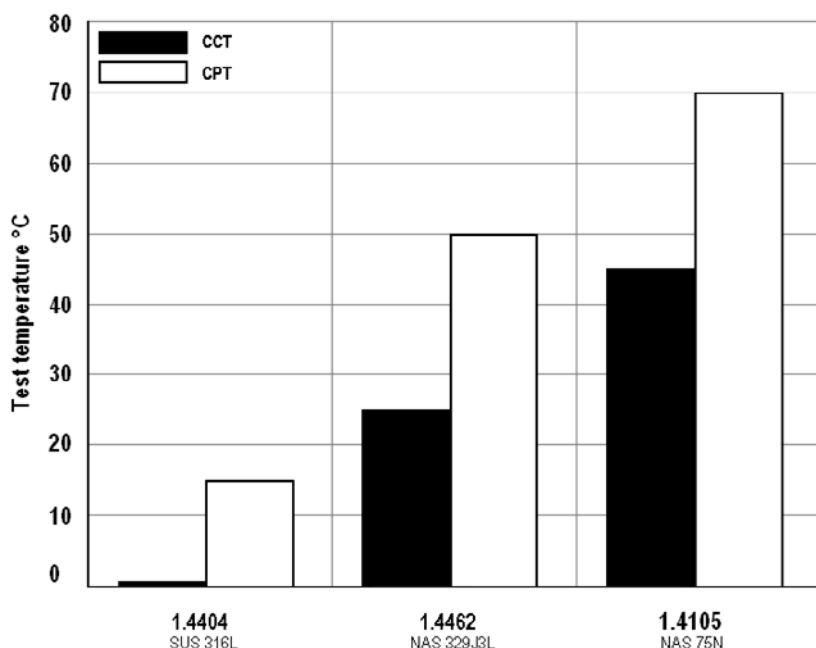
Corrosion resistance	Atmospheric	Chemical	x erosion, pitting, crevice, organic and inorganic a. stress corrosion cracking
Brackish water	<i>industrial</i> <i>marine</i>	<i>medium</i> <i>oxidizing</i> <i>reducing</i>	
x	x x	x	

Magnetic	yes
Machinability	a higher wear rate of the tools than that of austenitic steels
Hardening	cold-drawn and other cold plastic deformations
Service temperature	not recommended for uses to temperatures greater than +300 °C and lower -50 °C

Europe	USA	USA	China	Russia	Japan	India	R. Corea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X2CrNiMoCuWN25-7-4	S32760	Type F 55	022Cr25Ni7Mo3WCuN		SM25Cr		

Corrosion resistance in various acids (test time: 24 h)

acid	concentration	temperature	1.4105 superduplex	1.4462 duplex	1.4404 austenitic
formula	name	%	°C	corrosion rate (mm/y)	
H ₂ SO ₄	sulphuric	10	boiling	1.45	3.70
HCl	hydrochloric	1	boiling	0.01	5.41
HNO ₃	nitric	60	boiling	0.06	0.11
H ₃ PO ₄	phosphoric	80	boiling	3.90	5.52
CH ₃ COOH	acetic	80	boiling	< 0.01	< 0.01



Pitting corrosion and Crevice corrosion resistance

CCT = critical crevice corrosion temperature

CPT = critical pitting corrosion temperature

Nippon Yakin literature
method ASTM G48 C/D