Material No.: 1.4539

Description

EN symbol (short)	X1NiCrMoCu 25 20 5
Alloy	904 L
UNS	N 08904
AFNOR	X1NiCrMoCu 25 20 5 / NF EN 10088-1 (06/2005) (FR)
BS	X1NiCrMoCu 25 20 5 /BS EN 10088-1 (06/2005) (GB)

Density kg/dm³	8,05
Hardness HB	<= 230
Composition	Nickel Chrome Molybdenum steel
Category	Corrosion resisting steels and alloys
Structure	austenitic
Corrosion	resistant to intercrystalline corrosion high resistance to pitting corrosion, tensile corrosion, crevice corrosion
Additional characteristics	chemically resistant

Description	Usually used in highly corrosive substances.

Chemical Composition

		C	Mn	P	S	Cr	Mo	Si	Ni	Cu	N	Fe
1.4539	**Min %**					19,00	4,00		24,00	1,20		
	Max %	0,02	2,00	0,030	0,010	21,00	5,00	0,70	26,00	2,00	0,150	
(Key to steel 2010)												
alloy 904 L N 08904	**Min %**					19,00	4,00		23,00	1,00		balance
	Max %	0,02	2,0	0,045	0,035	23,00	5,00	1,00	28,00	2,00		balance
ASTM B 677 (UNS 08904)												

Physical properties

Property	**Value**
Density: kg/dm³	8,05
Hardness: HB	<= 230
Rockwell Hardness Number max.	B 90 (N 08904-ASTM A 249)

Temperature	**Specific**	**Thermal**	**Electric**	**Modulus of**	**Expansion rate from**

T °C/F (°C/F)	heat J / kgK (Btu / lb °F)	conductivity W/mK (Btu·in / ft²·h·°F)	resistance µΩ · cm (Ω circ mill / ft)	elasticity kN/mm² (10^3 ksi)	70°F bis T 10^{-6} / K (10^{-6} / °F)
20 / 68	450 / (-)	12 / (-)	1,0 /(-)	195 (-)	
100 / 212				190 (-)	15,8 / (-)
200 /392				182 (-)	16,1 / (-)
300 / 572				174 (-)	16,5 / (-)
400 / 752				166 (-)	16,9 / (-)
500 / 932				158 (-)	17,3 / (-)

Temperature	0,2% Yield strength in high temperatures	1,0% Yield strength in high temperatures
°C /°F	Rp 0,2	Rp 1,0
	N/mm² / ksi	N/mm² /ksi
100 / 212	205 / 29,73	235 /34,00
200 / 392	175 / 25,38	205 / 29,73
300 / 572	145 /21,00	175 / 25,38
400 / 752	125 / 18,10	165 / 23,93
500 / 932	110 / 15,95	140 / 20,30

ksi value calculated

MECHANICAL PROPERTIES (20°C / 68°F)

Yield strength 0,2% offset min.N/mm² / (ksi)	220 /31	(solution annealed) (solution annealed)	(N 08904-ASTM A 249)
Tensile strength min (N/mm²) (ksi) Tensile strength min.ksi (Mpa)	490 / 71 71 / (490)	(solution annealed) (solution annealed)	(N 08904-ASTM A 249)
Elongation min.% Elongation min.%	35 35	(solution annealed in 2 in.or 50 mm (solution annealed)	(N 08904-ASTM A 249)
impact work ISO-V (J)	60		transverse

TEMPERATURE INFORMATION

Application area	
Operation temperature	ºF to 662 ºF
Working temperature	1940 ºF to 2084 ºF
Explanation report	duration 5 min per 5 mm width

Solution heat treatment	
Working temperature	2102 ºF to 1742 ºF
Explanation report	cool down:air/Water

STANDARDS / INFORMATION

Standards	Description
DIN EN 10216-5 (11/2004+B1) /	seamless steel pipes under compression load made from stainless steels
ASTM A 182	Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges,Forged Fittings and Valves and Parts for High-Temperature Service
ASTM A 240	sheet metal and ribbons from stainless Cr and Ni pressure containers
ASTM A 249	Standard Specification for Welded austenitic steel boiler, Superheaters, heat-exchangers,and condenser Tubes
ASTM A 276	Rods and cross-sections made of stainless and heat-resistant steel
ASTM A 312	Standard Specification for Seamless and welded austenitic stainless steel pipes
ASTM B 366	Standard Specification for Factory-Made Wrought nickel and nickel alloy fittings
ASTM B 673	Standard Specification for Welded Pipe
ASTM B 674	Standard Specification for Welded Tube
ASTM B 677	Standard Specification for UNS N08904,N08925 and N08926 Seamless Pipe and Tube
DIN EN 10028-7 (02/2008)	flat products made from steel for pressure tanks Part 7: Stainless steel
DIN EN 10088-1 (09/2005)	Stainless steels Part 1: List of stainless steels
DIN EN 10088-3 (09/2005)	stainless steels.Technical delivery conditions for semi-finished products,bars,rods,wire selection and bright products of corrosion resisting steels for general and construction purposes
DIN EN 10088-4 (08/2009)	stainless steel.Building industry: Technical transport conditions for corrosion resistant sheet metal and ribbons
DIN EN 10217-7 (05/2005)	Welded steel tubes under compression load. Stainless steel tubes

PROCESS INFORMATION

Chip removing process	tendency to cold work hardening
Welding	
- Material classification acc. CEN ISO/TR 15608	**8.2**
- Type	well weldable with all techniques
- Add. material	1.4519;2.4653
- Hints	interpass temperature must not go over 302°F

	special post heat treating not required

Main fields of application

Details of application	
Certifications	EN 10204 3.1 or 3.2
Chemical Industry	for processing sulfuric acid (e.g. sulfuric acid coolers) for processing phosphoric acid for the production of salt acid
cellulose/paper industry	
Flue gas desulphurization plants	
offshore plants	Sea water desalination plant
Fertilizer industry	

Range of products

Product type	Product
Processing / Construction	from sheets from pipes, fittings, flanges (welded) from bar steel (turning, milling)
Plates / Sheets	plates/sheets plate/sheet cuts
Fittings	welded reductions Welded T-pieces seamless elbows seamless reductions seamless T-pieces Other Fittings a.o. Weldolets, Nipples
Flanges / Collars / Flared tube ends	flared tube end collars various flanges (weld neck flange,blind flange etc.) weld neck flange/blind flange
Bumped boiler ends / caps / round blanks	from sheets from bar steel
Pipes / Tubes	welded pipes/tubes seamless pipes/tubes
Round bar	forged raw
Bar steel	flat steel section steel

	round bar steel hexagon steel