

NAS 825 (UNS N08825)

NAS High Corrosion Resistant Nickel Alloy

NAS 825 (NCF 825, UNS N08825) is a high-Ni nickel alloy with high corrosion resistance, and possesses extremely high corrosion resistance against oxidizing and non-oxidizing acids. Nippon Yakin supplies this product in plate, sheet and strip form.

Steel Grade/Standard

NAS	JIS G4902	ASTM B424	DIN 17750
NAS 825	NCF 825	UNS N08825	2.4858

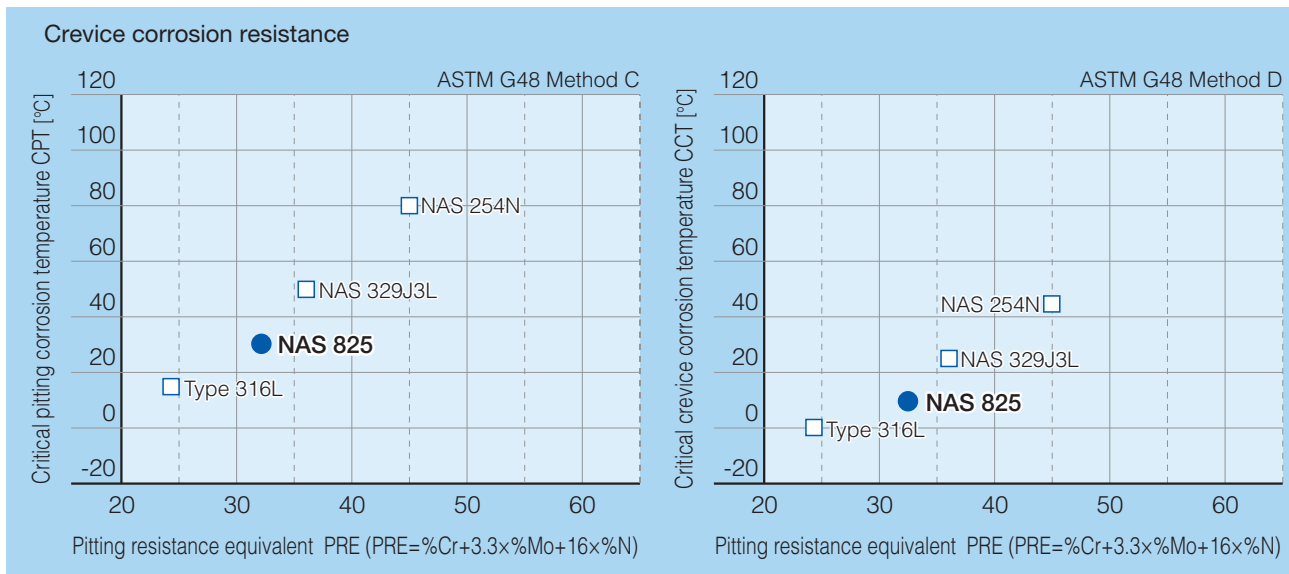
Chemical Composition

	C	Si	Mn	P	S	Ni	Cr	Fe	Mo	Cu	Al	Ti
Specification (NCF 825)	≦0.05	≦0.50	≦1.00	≦0.030	≦0.015	38.00~46.00	19.50~23.50	Bal.	2.50~3.50	1.50~3.00	≦0.20	0.60~1.20
Specification (UNS N08825)	≦0.05	≦0.5	≦1.0	—	≦0.03	38.0~46.0	19.5~23.5	≧22.0	2.5~3.5	1.5~3.0	≦0.2	0.6~1.2

Physical Properties

Density	[g/cm ³]	8.14
Specific heat	[J/kg · K] 20°C	444
Electrical resistivity	[μΩ · cm]	112
Thermal conductivity	[W/m · K]	10.9
Average coefficient of thermal expansion	[10 ⁻⁶ /°C] 20~100°C	13.4
	20~200°C	14.1
	20~500°C	15.1
	20~900°C	16.9
Young's modulus	[MPa]	19.4 × 10 ⁴
Magnetism		None
Melting range	[°C]	1370~1400

Pitting and Crevice Corrosion Resistance



Stress Corrosion Cracking Resistance

Results of stress corrosion cracking (SCC) test in boiling magnesium chloride solution (U-bending test specimen, immersion for 300h)

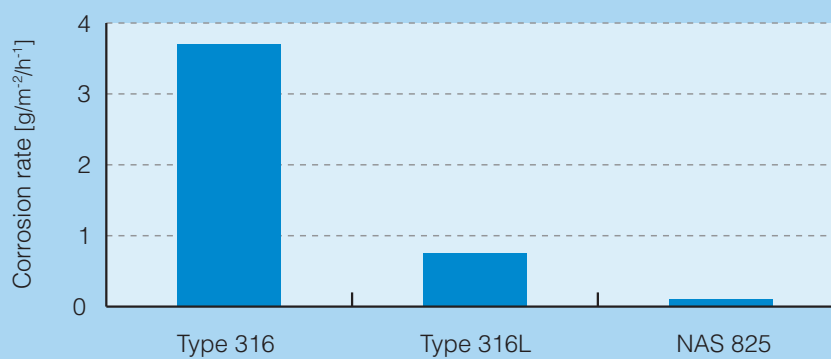
	Type 316L	NAS 329J3L	NAS 825	NAS 254N
Boiling 42% MgCl ₂ *	×SCC	×SCC	×SCC	×SCC
Boiling 35% MgCl ₂	×SCC	×SCC	○No SCC	○No SCC
Boiling 25% MgCl ₂	×SCC	○No SCC	○No SCC	○No SCC
Boiling 20% MgCl ₂	○No SCC	○No SCC	○No SCC	○No SCC

*JIS G0576, "Stress corrosion cracking test for stainless steels"

Intergranular Corrosion Resistance

Results of Intergranular corrosion test (JIS G0572)

(test solution: boiling 50% H₂SO₄-Fe₂(SO₄)₃, 120h; sensitization heat treatment conditions: 650°C × 2h)



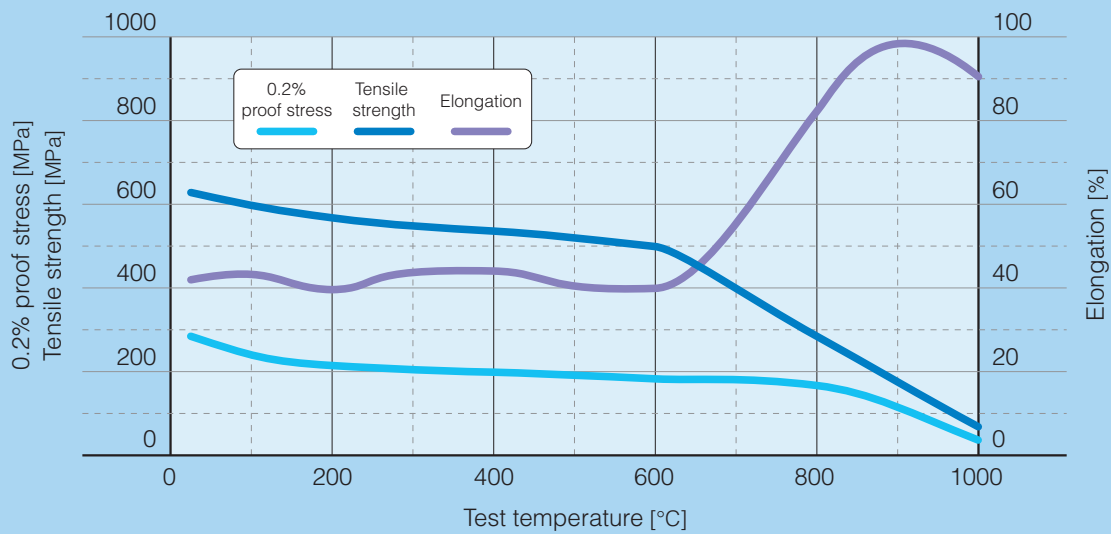
Mechanical Properties

Mechanical Properties at Room Temperature

		0.2% proof stress [MPa]	Tensile strength [MPa]	Elongation [%]	Hardness [HB]
	Specification (NCF 825)	≥ 235	≥ 580	≥ 30	≤ 207
	Specification (UNS N08825)	≥ 241	≥ 586	≥ 30	—
Example	Cold-rolled sheet 1.0mm ^t	262	612	47	—
	Hot-rolled plate 8.0mm ^t	253	615	54	144
	Hot-rolled plate 33.5mm ^t	255	616	48	137

High Temperature Strength

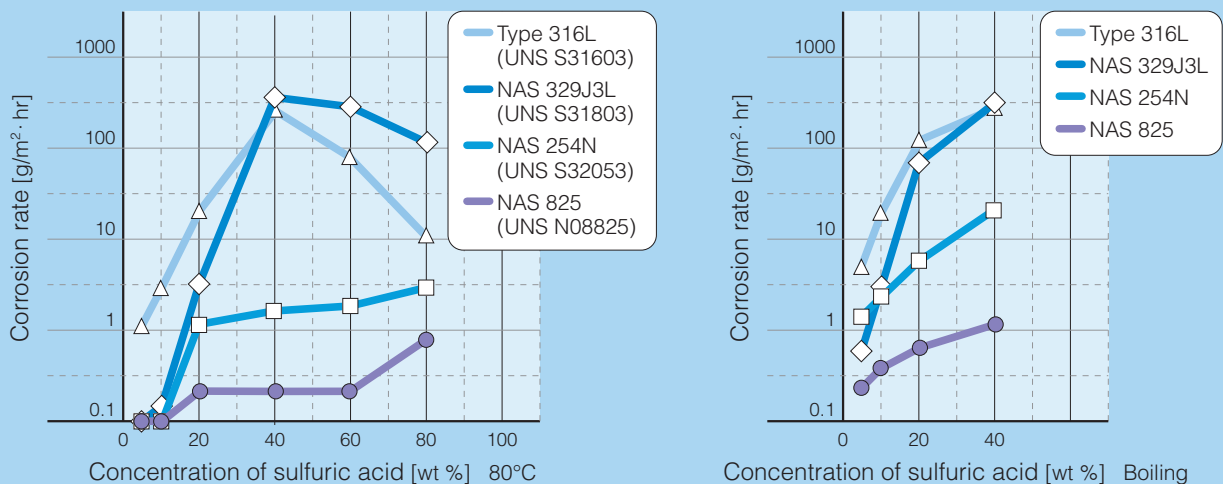
Results of high temperature tensile test



Corrosion Resistance

Because NAS 825 has high contents of chromium, molybdenum, and copper, it provides excellent general (overall) corrosion resistance against oxidizing and non-oxidizing acids. Corrosion resistance against sulfuric acid is particularly good. Due to its high contents of chromium, molybdenum, and nickel, pitting corrosion resistance, crevice corrosion resistance, and stress corrosion cracking (SCC) resistance under chloride environments are also excellent in comparison with Type 316L. Because the carbon content of NAS 825 is held to an extremely low level, sensitization during welding is minimal, and this is also an alloy with low grain boundary corrosion sensitivity.

Corrosion resistance against sulfuric acid



Workability

Cold and hot workability are approximately equal to those of standard austenitic stainless steels.

Weldability

Possible welding methods include shielded metal arc welding, TIG welding, and MIG welding, in the same manner as with standard austenitic stainless steels. As welding consumables, Alloy 625, DNiCrMo-3 should be used.

Machinability

NAS 825 has machinability approximately equivalent to standard austenitic stainless steels. In machining, use of a high speed steel tool or superhard tool and a slow feed speed and large cut depth are advised.

Heat Treatment

Heat treatment conforms to that for stable austenitic stainless steel (Type 321). Solution heat treatment should be performed somewhat lower than with Type 304, at 930~1030°C with rapid cooling.

Pickling

A mixture of nitric acid and hydrofluoric acid is used in pickling. However, due to the high corrosion resistance of NAS 825, scale is somewhat difficult to remove in comparison with Type 304. Therefore, the material should be immersed in an alkaline solution before pickling, or if possible, shot blasting is extremely effective.

Applications

Oil drilling, chemical plants

For more information, please contact:

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