

NAS 185N (UNS S31254)

NAS High Corrosion Resistant Super Stainless Steel

NAS 185N (SUS 312L, UNS S31254) is a high corrosion resistant austenitic stainless steel with a high nickel, high chromium, high molybdenum alloy design, and provides excellent corrosion resistance in severe corrosion environments such as high temperature seawater. Depending on the environment, this stainless steel offers high economy combined with corrosion resistance comparable to that of Nickel alloy and pure titanium. Nippon Yakin supplies this product in plate, sheet and strip form.

Steel Grade/Standard

NAS	JIS G4304/4305	ASTM A240	EN 10088-2/10028-7
NAS 185N	SUS 312L	UNS S31254	1.4547

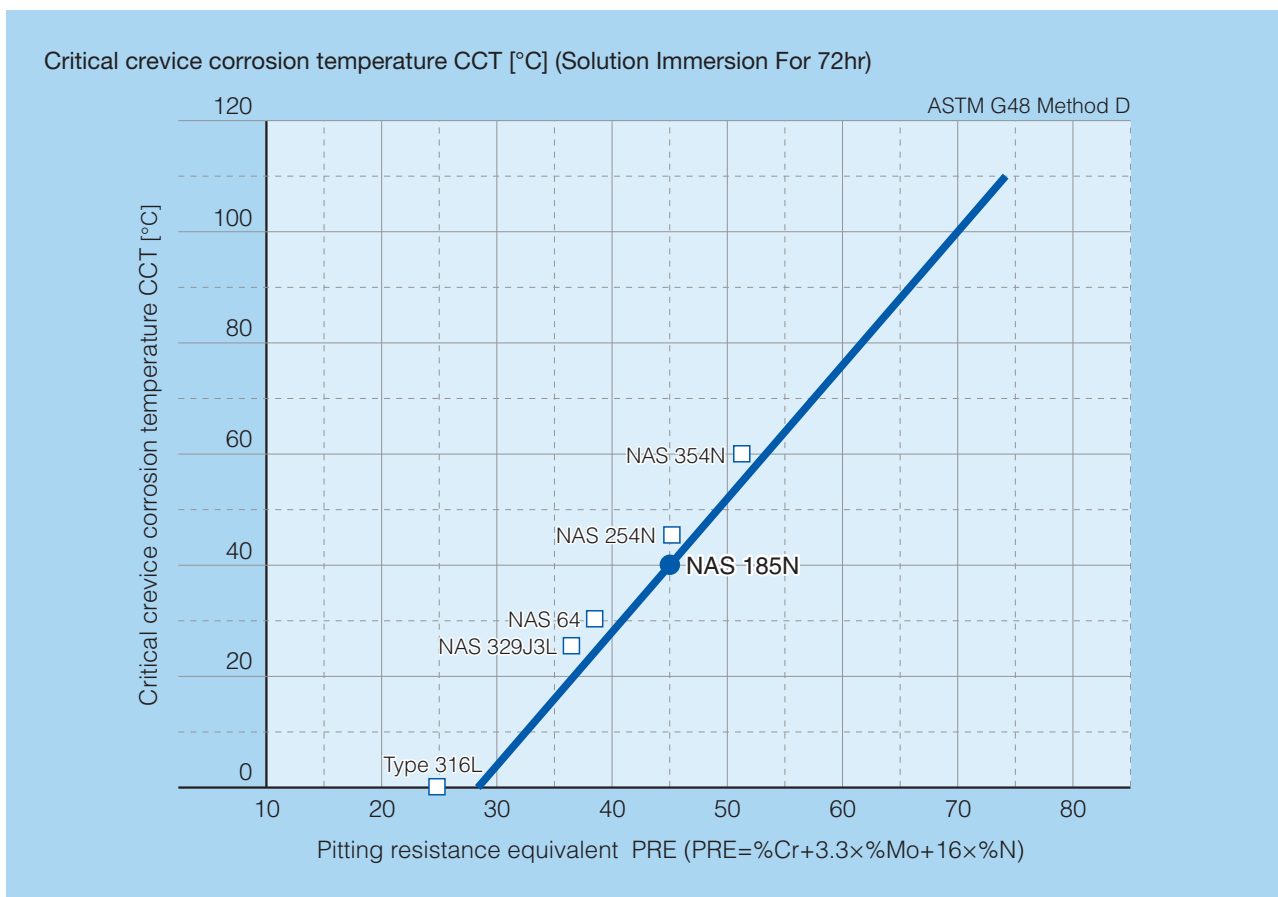
Chemical Composition

	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	N
Specification (SUS 312L)	≦0.020	≦0.80	≦1.00	≦0.030	≦0.015	17.50~19.50	19.00~21.00	6.00~7.00	0.50~1.00	0.16~0.25
Specification (UNS S31254)	≦0.020	≦0.80	≦1.00	≦0.030	≦0.010	17.5~18.5	19.5~20.5	6.0~6.5	0.50~1.00	0.18~0.22

Physical Properties

Density	[g/cm ³]	8.02
Specific heat	[J/kg · K] 20°C	464
Electrical resistivity	[μΩ · cm]	88.2
Thermal conductivity	[W/m · K]	12.3
Average coefficient of thermal expansion [10 ⁻⁶ /°C]	20~200°C	15.6
	20~300°C	16.1
	20~400°C	16.8
Young's modulus	[MPa]	16.7 × 10 ⁴
Magnetism		None
Melting range	[°C]	1360~1405

Crevice Corrosion Resistance



Stress Corrosion Cracking Resistance

Test method: U-bending test piece, Boiling MgCl₂ solution, 300hr

Alloy	Main chemical composition (wt%)	45% (154°C)	42% (142°C)	40% (138°C)	38% (134°C)	35% (126°C)	30% (115°C)	25% (110°C)	20% (108°C)
Type 304	18Cr-8Ni	x	x	x	x	x	x	x	x
Type 316L	17Cr-12Ni-2Mo	x	x	x	x	x	x	x	○
NAS 64	25Cr-6Ni-3.3Mo-0.16N	x	x	x	x	x	x	○	○
NAS 155N	18Cr-15Ni-4Mo-3Cu-0.15N	x	x	x	x	x	○	○	○
NAS 185N	20Cr-18Ni-6Mo-0.8Cu-0.2N	x	x	x	x	○	○	○	○

○ : No Stress Corrosion Cracking x : Occurrence of Stress Corrosion Cracking

Mechanical Properties

Mechanical Properties at Room Temperature

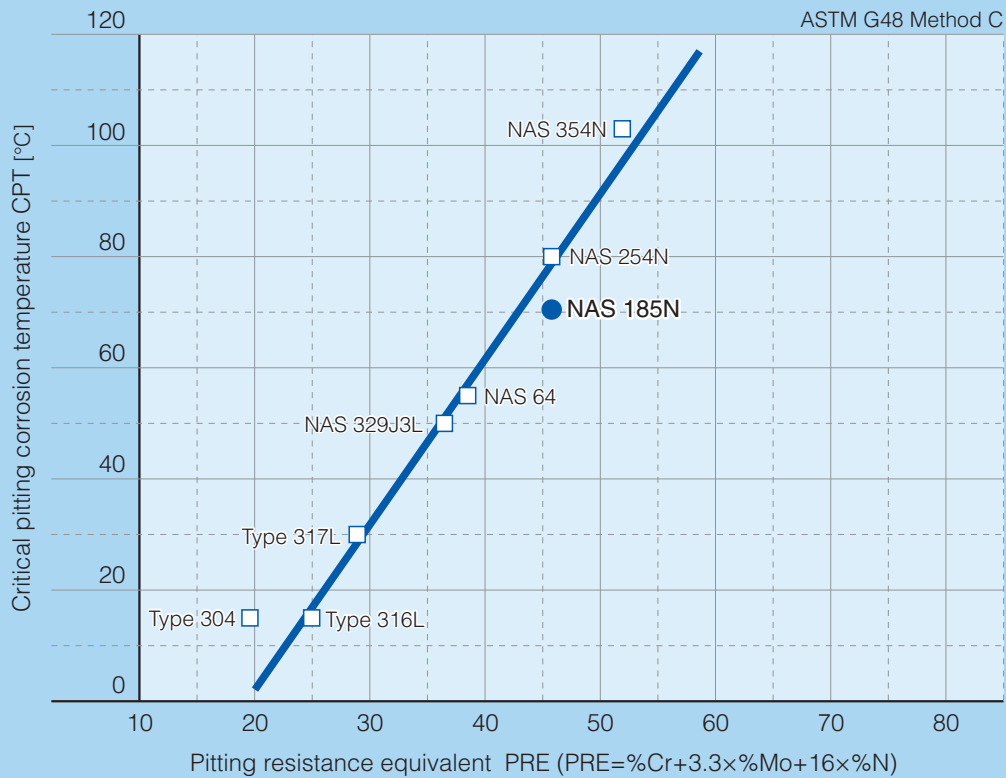
		0.2% proof stress [MPa]	Tensile strength [MPa]	Elongation [%]	Hardness	
					[Hv]	[HB]
Specification (SUS 312L)		≥ 300	≥ 650	≥ 35	≤ 230	≤ 223
Specification (UNS S31254)	Sheet and strip	≥ 310	≥ 690	≥ 35	—	≤ 223
	Plate	≥ 310	≥ 655	≥ 35	—	≤ 223
Example	Cold-rolled sheet 1.5mm ^t	379	744	41	182	—

Corrosion Resistance

NAS 185N is a high Cr, high Mo stainless steel which provides excellent pitting corrosion resistance and crevice corrosion resistance in high Cl environments. As a high Ni steel, it also offers excellent stress corrosion cracking resistance.

Pitting Corrosion Resistance

Critical pitting corrosion temperature CPT [°C] (Solution Immersion For 72hr)



Workability

The hot and cold workability of NAS 185N is basically the same as that of standard austenitic stainless steels such as Type 304, Type 316, etc. However, the fact that this is a high strength material must be considered in both cold and hot working.

Weldability

Various welding methods are applicable in the same manner as with the standard austenitic stainless steels, including shielded metal arc welding, TIG welding, and plasma welding. Alloy 276 welding consumable should be used.

Machinability

As a feature of high Ni stainless steels, although machining is difficult in comparison with the standard austenitic stainless steels, it is easier than with Ni-based alloys. A ultrahard tool should be used in machining if at all possible. It is also advisable to use a slower feed rate and deeper cutting depth.

Heat Treatment

Because NAS 185N is an austenitic stainless steel, heat treatment is equivalent to that with the standard austenitic stainless steels. The following heat treatment conditions are normally used:

Solution heat treatment: 1125~1175°C; Water cooling

Pickling

A mixture of nitric acid and hydrofluoric acid is used in pickling. However, due to the high corrosion resistance of NAS 185N, 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

- Seawater environments: Marine structures, seawater desalination systems, heat exchangers using seawater, condenser tubes, etc.
- Pulp and paper plants: Various types of bleaching systems, scrubbers, etc.
- Medical and pharmaceutical product plants: Centrifugal separators, reaction tanks, etc.

For more information, please contact:

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