

# NAS625 (UNS N06625)

## Corrosion-Resistant and Heat-Resistant Nickel Alloy

NAS625 (NCF625, UNS N06625) is a nickel-chromium-molybdenum alloy with an additional of niobium. Matrix stiffening provided by molybdenum and niobium results in high strength. The alloy resists a wide range of severe corrosion environments. It also offers resistance to high temperatures. Uses include parts in chemical and garbage incinerator plants. Nippon Yakin supplies this product in plate, sheet, and strip forms.

### Grade/Standard

Nippon Yakin Grade	JIS G 4902	ASTM B443	EN
NAS625	NCF625	UNS N06625	—

### Chemical Composition

	C	Si	Mn	P	S	Ni	Cr	Mo	Al	Ti	Fe	Co	Nb+Ta
Specification (NCF625)	≤0.10	≤0.50	≤0.50	≤0.015	≤0.015	≥58.00	20.00~23.00	8.00~10.00	≤0.40	≤0.40	≤5.00	—	3.15~4.15
Specification (UNS N06625)	≤0.10	≤0.50	≤0.50	≤0.015	≤0.015	≥58.0	20.0~23.0	8.0~10.0	≤0.40	≤0.40	≤5.0	≤1.0	3.15~4.15

### Physical Properties

Density	[g/cm <sup>3</sup> ]	8.44
Specific heat	[J/kg · K]	407
Electrical resistivity	[μΩ · cm]	124
Thermal conductivity	[W/m · K]	9.8
Average coefficient of thermal expansion	[10 <sup>-6</sup> /°C] 30~200°C	13.2
	30~300°C	13.5
	30~400°C	13.9
Young's modulus	[MPa]	19.7 × 10 <sup>4</sup>
Magnetism		None
Melting range	[°C]	1290~1350



**NIPPON YAKIN KOGYO CO., LTD.**

## Mechanical Properties

## Mechanical Properties at Room Temperature

Grade 1 (annealed)

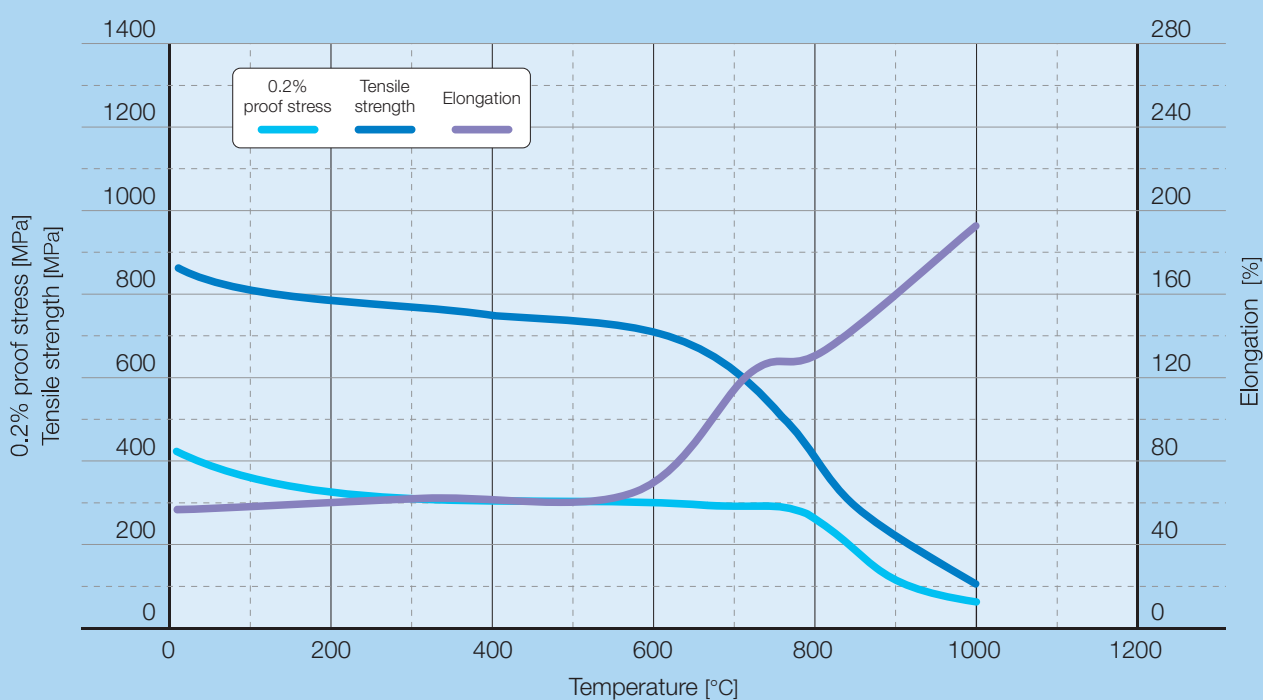
		0.2% proof stress [MPa]	Tensile strength [MPa]	Elongation [%]
Specification NCF625 (annealing)	$> 0.5\text{mm}^t, \leq 3.0\text{mm}^t$	$\geq 415$	$\geq 830$	$\geq 30$
	$> 3.0\text{mm}^t, \leq 70\text{mm}^t$	$\geq 380$	$\geq 760$	$\geq 30$
Specification UNS N06625 Grade 1 (annealed)	Cold-rolled sheet, strip	$\geq 414$	$\geq 827$	$\geq 30$
	Hot-rolled plate ( $\leq 70\text{mm}^t$ )	$\geq 379$	$\geq 758$	$\geq 30$
	Cold-rolled sheet ( $\leq 9.5\text{mm}^t$ )	$\geq 379$	$\geq 758$	$\geq 30$
Example	Hot-rolled plate 10mm <sup>t</sup>	399	816	61
	Cold-rolled sheet 3.0mm <sup>t</sup>	450	859	49

Grade 2 (solution annealed)

		0.2% proof stress [MPa]	Tensile strength [MPa]	Elongation [%]
Specification NCF625 (solution treatment)	$> 0.5\text{mm}^t, \leq 70\text{mm}^t$	$\geq 275$	$\geq 690$	$\geq 30$
Specification UNS N06625 Grade 2 (solution annealed)		$\geq 276$	$\geq 690$	$\geq 30$
Example	Hot-rolled plate 10mm <sup>t</sup>	323	738	71
	Cold-rolled sheet 3.2mm <sup>t</sup>	378	777	59

## High Temperatures Strength

Results of high-temperature tensile test (Grade 1)



## Corrosion Resistance

## Pitting Corrosion Resistance

Alloy	ASTM G48 Method A		ASTM G48 Method C
	22°C	50°C	Critical pitting corrosion temperature CPT (°C)
NAS185N	○	○	70
NAS825	○	×	30
NAS625*	○	○	103

\*Grade 1

Test conditions ASTM G48 Method A (○: No pitting corrosion, ×: Pitting corrosion)

• Test solution: 6%FeCl<sub>3</sub>

• Test temperature: 22°C, 50°C (Recommended temperature in this test)

• Test time: 72h

ASTM G48 Method C

• Test solution: 6%FeCl<sub>3</sub> + 1%HCl

• Test time: 72h

## Crevice Corrosion Resistance

Alloy	ASTM G48 Method D
	Critical crevice corrosion temperature CCT (°C)
NAS185N	40
NAS825	10
NAS625*	45

\*Grade 1

Test conditions ASTM G48 Method D

• Test solution: 6%FeCl<sub>3</sub> + 1%HCl

• Test time: 72h

## Acid Resistance

Alloy	Corrosion rate in sulfuric acid at 80°C (mm/y)					
	5%	10%	20%	40%	60%	80%
NAS185N	0.02	0.04	1.32	2.89	3.20	4.78
NAS825	0.01	0.03	0.30	0.21	0.23	0.73
NAS625*	<0.01	0.01	0.03	0.74	0.94	4.37

\*Grade 1

Test time: 24h

(Reference)

Alloy	JIS	UNS No.	Chemical composition
NAS185N	SUS312L	S31254	20Cr-18Ni-6Mo-0.8Cu-0.2N
NAS825	NCF825	N08825	40Ni-23Cr-3Mo-2Cu-0.7Ti
NAS625	NCF625	N06625	62Ni-22Cr-9Mo-3.7Nb-0.2Ti-0.2Al

**Workability**

Because the high-temperature strength of NAS625 is extremely higher than that of Type304, care is required when hot working. The cold workability of NAS625 is basically the same as that of standard austenitic stainless steels such as Type304, Type316, etc. However, the fact that this is a high strength material must be considered in cold 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. Susceptibility of NAS625 to solidification cracking is higher than that of Type304.

**Heat Treatment**

Annealing of NAS625 is normally performed at 871°C and higher followed by being quenched in water or rapidly cooled by other means.

Solution annealing of NAS625 is normally performed at 1093°C and higher followed by being quenched in water or rapidly cooled by other means.

**Pickling**

A mixture of nitric acid and fluoric acid is used in pickling. However, because descaling is somewhat difficult in comparison with Type304, alkali immersion before acid pickling, and if possible, shot blasting are extremely effective.

**Applications**

Chemical plants, Environment-related equipment, Oil and gas extraction.

**For more information, please contact:**

Nippon Yakin Kogyo Co., Ltd.

Material Solutions Sales Department

San-Ei Bldg., 5-8, 1-chome Kyobashi, Chuo-ku,

Tokyo 104-8365 Japan

TEL: +81-3-3273-4649 FAX: +81-3-3273-4642

URL: <https://www.nyk.co.jp/en/>

**Note regarding the handling of property data:**

The technical information contained in this product guide is representative values obtained in property tests and other items used to explain the performance of the product. With the exception of items specifically mentioned as provisions of a "Standard," the contents do not represent guaranteed upper limit or lower limit values. The respective data given on this technical information are typical examples and may be different in some cases from the data obtained from the actual product. No responsibility shall, therefore, be assumed for damages arising from using the technical information data. This information is also subject to change in the future without notice. To obtain the most recent information, please contact Nippon Yakin. No part of this document may be copied or reproduced in any form without the consent of Nippon Yakin.