

# NAS Ni201 (UNS N02201)

## NAS High Corrosion Resistant Pure Nickel

Pure Nickel (NAS Ni201) offers excellent corrosion resistant against caustic soda, chlorine gas, etc. In particular, it is used as a material for caustic soda manufacturing equipment by diaphragm electrolysis method. Nippon Yakin supplies this product in plate, sheet and strip form.

### Grade/Standard

NAS	JIS H4551	ASTM B162	EN
NAS Ni201	NW2201	UNS N02201	2.4068

### Chemical Composition

	C	Si	Mn	S	Ni	Cu	Fe
Specification (NW2201)	≤0.02	≤0.3	≤0.3	≤0.010	≥99.0	≤0.2	≤0.4
Specification (UNS N02201)	≤0.02	≤0.35	≤0.35	≤0.01	≥99.0	≤0.25	≤0.40

### Physical Properties

Density	[g/cm <sup>3</sup> ]	8.88	
Specific heat	[J/kg · K]	456	
Electrical resistivity	[μΩ · cm]	9.5	
Thermal conductivity	[W/m · K]	60.7	
Average coefficient of thermal expansion	[10 <sup>-6</sup> /°C]	21~ 93°C	13.3
		21~ 260°C	14.2
		21~ 538°C	15.3
		21~ 816°C	16.2
		21~1093°C	17.1
Young's modulus	[MPa]	20.6 × 10 <sup>4</sup>	
Modulus of rigidity	[MPa]	7.7 × 10 <sup>4</sup>	
Poisson's ratio		0.28	
Curie point	[°C]	360	
Melting range	[°C]	1433~1444	

Acid Resistance

Test condition: 24h immersion test

Type of acid	Test temperature (°C)	Concentration (wt%)	Corrosion rate [mm/y]	
			NAS Ni201 (UNS N02201)	Type 316L (UNS S31603)
Sulfuric acid	80	5	1.01	1.67
		10	1.15	4.69
		20	1.86	71.9
		40	3.83	765
		60	13.7	704
		80	0.79	33.7
	Boiling	5	2.24	8.19
		10	3.87	24.6
		20	6.10	179
		40	25.8	3129
Hydrochloric acid	80	0.1	0.99	0.02
		1	7.28	2.73
		2	13.4	6.75
		3	15.9	14.9
	Boiling	0.1	1.07	0.01
		1	15.9	8.86
		2	29.6	27.5
		3	48.1	76.6
Hydrofluoric acid	80	0.1	0.36	0.50
		1	0.57	14.5
		2	0.90	35.4
		3	0.99	54.1
Nitric acid	Boiling	20	9946	0.02
		40	>10000	0.05
		60	>10000	0.17
Phosphoric acid	Boiling	20	3.52	0.04
		40	6.96	0.25
		60	13.8	0.56
		80	72.50	25.0

## Mechanical Properties

### Mechanical Properties at Room Temperature

		Thickness [mm]	Tensile strength [MPa]	0.2% Proof stress [MPa]	Elongation [%]
Specification (NW2201)	Annealing	≤1.2	≥345	≥80	≥30
		≤1.2~2.7	≥345	≥80	≥35
		≥2.7	≥345	≥80	≥40
	As hot-rolled	≥1.5	≥350	≥85	≥30
Specification (UNS N02201)	Annealing	—	≥345	≥80	≥40

## Corrosion Resistance

### Alkali Resistance

NAS Ni201 provides extremely high corrosion resistance against alkalis.

Test condition: 24h immersion test

Alkali	Test temperature (°C)	Concentration (wt%)	Corrosion rate [mm/y]	
			NAS Ni201 (UNS N02201)	Type 304 (UNS S30400)
Sodium hydroxide	Boiling	20	<0.01	0.01
		40	0.02	2.77
		60	0.03	13.3

### Workability

Because the work hardenability of Pure Nickel is low, it is suitable for severe cold working by methods such as spinning and coining.

### Weldability

Possible welding methods include shielded metal arc welding, TIG, MIG, and resistance welding. ENi-1 welding consumable should be used for TIG and MIG welding.

### Heat Treatment

Heat treatment should be performed in the range of 700~850°C followed by air cooling.

### Applications

Materials for caustic soda manufacturing equipment, cell phone terminals, various types of battery parts, automotive electrical/electronic device parts

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#### For more information, please contact:

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#### 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. This information is also subject to change in the future without notice. To obtain the most recent information, please contact Nippon Yakin.