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TECHNICAL DATA SHEET

NICKEL 200/201

UNS N02200 & N02201
W.Nr. 2.4060/2.4066 & 2.4061/2.4068

Description

Nickel 200 and Nickel 201 are solid solution strengthened, commercially pure wrought alloys. The elemental restrictions of both alloys are combined into one, dual-certified chemistry, resulting in a single alloy with the desired characteristics of both alloys. When operating temperatures are expected to exceed 600°F, carbon content becomes critical. The lower carbon content of Nickel 201 makes the material resistant to graphitization and therefore less subject to embrittlement. Pressure vessels and components can be constructed from Nickel 201 according to the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 for use up to 1250°F.

Industries & Applications

Nickel 200/201 is used heavily in the chemical and electronics industries. It is also used in the aerospace, petrochemical, power generation and marine/offshore engineering industries. Typical applications where Nickel 200/201 is used include electronic and electroplating components, caustic evaporators, food processing equipment, caustic handling and storage equipment, synthetic fiber production, salt production and other processes where sodium hydroxide and fluorine are used.

Resistance to Corrosion

Nickel 200/201 offers excellent corrosion resistance in reducing and neutral media as well as in oxidizing atmospheres, provided the oxidizing media allows the formation of a passive oxide film. This oxide film accounts for the alloy's excellent resistance to corrosion in caustic environments. Nickel 200/201 is often used in environments containing alkalis, and it has varying use in sulfuric, hydrochloric, anhydrous hydrofluoric and non-aerated organic acids. Nickel 200/201 is resistant to stress corrosion cracking in chloride salts and to attack from non-oxidizing halides. Concentration and temperature can affect this alloy's resistance in certain environments.

Fabrication and Heat Treatment

All hot working and cold working practices can be utilized when shaping Nickel 200/201. Hot working temperatures should be between 1200°F and 2250°F with heavy forming to be performed at temperatures above 1600°F. Annealing should be performed at a temperature between 1300°F and 1600°F. Care should be taken when choosing the anneal temperature as time-at-temperature for this can greatly influence the mechanical properties and structure of the material.

Chemical Composition (%)

(Ni) Nickel	99.0 min
(Fe) Iron	0.40 max
(Mn) Manganese	0.35 max
(Si) Silicon	0.35 max
(Cu) Copper	0.25 max
(C) Carbon	0.02 max
(S) Sulfur	0.01 max

Physical Properties

Density @ Room Temp.	0.321 lb/in. ³
Elastic Modulus @ 78°F	29.7 x 10 ³ ksi
Young's Modulus @ 78°F	29.7 x 10 ³ ksi
Melting Point	2615°F to 2635°F
Specific Heat @ Room Temp.	0.109 Btu/lb•°F
Thermal Conductivity @ Room Temp.	487 Btu•in/ft ² •h•°F
Electrical Resistivity @ Room Temp.	58 Ω•circ mil/ft
Curie Temperature	680°F

Impact Properties

Condition	Charpy V-Notch
Hot-Rolled	200 ft-lb
Cold-Drawn/Annealed	228 ft-lb

Coefficient of Expansion*

Temperature (°F)	10 ⁻⁶ in/in • °F
-300	5.8
-100	6.2
200	7.4
600	8.0
1000	8.5
1400	8.9
2000	9.5

*Mean coefficient of linear expansion between 70°F (21°C) and temperature shown.

The information contained in this technical data sheet is intended to be used as a guide and may be revised at any time without prior notice. The information is believed to be reliable and accurate, however Corrosion Materials does not make any warranty or assume any legal liability with respect to the accuracy, completeness or usefulness of the information.

Mechanical Properties

Product Form	Condition	Tensile (min. ksi)	0.2% Yield (min. ksi)	Elongation (min. %)	Hardness* (HRB)
Round Bar	Hot Finished	60	15	35	45 to 80
Round Bar	Cold-Drawn/Annealed	55	15	40	45 to 70
Round Bar	Hot-Finished/Annealed	55	15	40	45 to 70
Plate	Hot-Rolled/Annealed	55	15	40	45 to 75
Sheet	Annealed	55	15	40	70 max
Tube & Pipe - Seamless	Annealed	55	15 [†]	40 [‡]	70 max

All properties in this table are for material in the solution annealed condition and are from the governing ASTM specification.

*Hardness is shown for information purpose only. [†]12 ksi min for sizes over 5" OD. [‡]35% min for sizes 5" OD and under.

Aqueous Corrosion Data

Media	Common Name	Temp. °F (°C)	Corrosion Rate (mpy)
5% CH ₃ CO ₂ H w/Air	Acetic Acid	70 (21)	40
10% CH ₃ CO ₂ H	Acetic Acid	86 (30)	3.4
56% CH ₃ CO ₂ H	Acetic Acid	176 (80)	66
85% CH ₃ CO ₂ H w/Air	Acetic Acid	70 (21)	400
98% CH ₃ CO ₂ H	Acetic Acid	241 (116)	12
50% NaOH	Caustic Soda	195 (90)	0.55
50% NaOH	Caustic Soda	310 (155)	0.5
75% NaOH	Caustic Soda	250 (120)	1.0
90% CH ₂ O ₂	Formic Acid (liquid)	70 (21)	4
90% CH ₂ O ₂	Formic Acid (vapor)	70 (21)	7
1% HCl	Hydrochloric Acid	214 (101)	680
10% HCl	Hydrochloric Acid	86 (30)	80
10% HCl	Hydrochloric Acid	221 (105)	8000
10% HNO ₃	Nitric Acid	216 (102)	12000
10% H ₃ PO ₄	Phosphoric Acid	75 (24)	0.6
10% H ₃ PO ₄	Phosphoric Acid	214 (101)	154
40% H ₃ PO ₄	Phosphoric Acid	75 (24)	1
500 ppm NaClO	Sodium Hypochlorite	77 (25)	0.8
2% H ₂ SO ₄	Sulfuric Acid	70 (21)	2
5% H ₂ SO ₄	Sulfuric Acid	140 (60)	10
5% H ₂ SO ₄ w/Air	Sulfuric Acid	86 (30)	61
19% H ₂ SO ₄	Sulfuric Acid	223 (106)	110
20% H ₂ SO ₄	Sulfuric Acid	70 (21)	4
50% H ₂ SO ₄ w/Air	Sulfuric Acid	86 (30)	16
50% H ₂ SO ₄	Sulfuric Acid	255 (124)	1000
93% H ₂ SO ₄ w/Air	Sulfuric Acid	86 (30)	10

Applicable Specifications*

Form	ASTM	ASME
Bar ^{1,2}	B160, B564 ³	SB160, SB564 ³
Plate ^{1,2}	B162	SB162
Sheet ^{1,2}	B162	SB162
Seamless Tube & Pipe ^{2,4}	B161	SB161

¹Hot worked/annealed. ²Dual certified to UNS N02200/N02201. ³Dual certified on diameters 3 1/2" and larger (Nickel 200 only). ⁴Annealed.

*EN10204-3.1 applied to all product forms.

Please contact Corrosion Materials for a complete list of items available from our extensive inventory, as well as our value-added processing services.

We supply a complete range of items in many alloys, including C-276, 22, B-2, B-3®, 200/201, 400, 405, K-500, 625, 600, 800H/HT®, 20, F255, 6B, Titanium Gr. 2 and Titanium Gr. 5.

Our machine shop, welding shop and processing departments are equipped with state-of-the-art manufacturing equipment allowing Corrosion Materials the ability to provide the service you desire along with the economic and technical advantages you need and deserve.

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