

ASTM B725 / ASME SB725

Standard Specification for Welded Nickel (UNS N02200/UNS N02201) and Nickel Copper Alloy (UNS N04400) Pipe

This specification covers nickel (UNS N02200) and low carbon nickel (UNS N02201 and UNS N04400) in the form of welded and annealed or welded and stress relieved pipe intended for general corrosive service and for mechanical applications.

This specification covers outside diameter and nominal wall pipe in Schedules 5S, 10S, and 40S through 30-in. nominal pipe size shown in ANSI B36.19. Pipe having other dimensions may be furnished provided such pipe complies with all other requirements of this specification.

A. Chemical Composition :-

The material shall conform to the requirements as to chemical composition prescribed in Table 1.

Table 1

Element	Composition, %			Product (Check) Analysis Variations, under min or over max, of the Specified Limit of Element
	Nickel (unsN02200)	Low-Carbon Nickel (unsN02201)	Nickel-Copper (unsN04400)	
Nickel, min	99.0	99.0	63.0	0.6
Copper, max	0.25	0.25	28.0–34.0	0.03
Iron, max	0.4	0.4	2.5	0.03
Manganese, max	0.35	0.35	2.0	0.03
Carbon, max	0.15	...	0.3	0.01
Carbon, max	...	0.02	...	0.005
Silicon, max	0.35	0.35	0.5	0.03
Sulfur, max	0.01	0.01	0.024	0.003

B. Mechanical Properties and Other Requirements :-

- Mechanical Properties—The material shall conform to the requirements for mechanical properties prescribed in Table 2.

Table 2

Condition and Size	Tensile Strength, min, psi (MPa)			Yield Strength (0.2 % offset), min, psi (MPa)			Elongation in 2 in. or 50 mm (or 4D), min, %		
	Nickel	Low-Carbon Nickel	UNS N04400	Nickel	Low-Carbon Nickel	UNS N04400	Nickel	Low-Carbon Nickel	UNS N04400
Annealed 5 in. (127 mm) and under outside diameter	55000 (380)	50000 (345)	70000 (480)	15000 (105)	12000 (80)	28000 (195)	35	35	35
Over 5 in. (127 mm) in outside diameter	55000 (380)	50000 (345)	70000 (480)	12000 (80)	10000 (70)	25000 (170)	40	40	35
Stress-relieved All sizes	65000 (450)	60000 (415)	85000 (585)	40000 (275)	30000 (205)	55000 (380)	15	15	15

- Flattening Test.
- Nondestructive Tests— Pipe shall be subjected to the nondestructive tests outlined in the following test categories.
 - Category 1: Hydrostatic, eddy-current, or ultrasonic test at the manufacturer's option.
 - Category 2: Hydrostatic plus eddy-current or ultrasonic test at the manufacturer's option.
- Hydrostatic Test— When tested in accordance with the requirements of Point D.3, any pipe that leaks shall be rejected. Any leaking area may be cut out and the pipe retested.

C. Length :-

Variations from the specified length shall not exceed the amounts prescribed in Table 3.

Table 3^A

Outside Diameter, in. (mm)	Cut Length, in. (mm)	
	Over	Under
Under 2 (50.8)	1/8 (3.18)	0
2 (50.8) and over	3/16 (4.75)	0

^A These permissible variations in length apply to pipe before bending. They apply to cut lengths up to and including 24 ft (7.3 m). For lengths over 24 ft, an additional over-tolerance of 1/8 in. (3.18 mm) for each 10 ft (3.0 m) or fraction thereof shall be permissible up to a maximum additional over-tolerance of 1/2 in. (12.7 mm).

D. Test Methods :-

- The chemical composition, mechanical, and other properties of the material as enumerated in this specification shall be determined, in case of disagreement, in accordance with the following methods.

<u>Test</u>	<u>ASTM Designation</u>
Chemical Analysis	E 39
Tension	E 8
Rounding procedure	E 29

- Flattening Test—Pipe shall be capable of withstanding, without cracking, flattening under a load applied gradually at room temperature until the distance between the platens is five times the wall thickness.

- Hydrostatic Test—

- Each pipe shall be tested at a pressure calculated by the following equation:

$$P = 2St/D \quad \dots\dots\dots (1)$$

where: P = hydrostatic test pressure, psi (or MPa),

t = specified wall thickness, in. (or mm),

D = specified outside diameter, in. (or mm), and

S = allowable fiber stress for material in the condition furnished, as follows:

Condition and Size	Nickel, psi (MPa)	Low Carbon Nickel, psi (MPa)	Nickel-Copper, psi (MPa)
Annealed:			
5 in. (127 mm) outside diameter and under	10 000 (70)	8 000 (55)	17 500 (120)
Over 5 in. outside diameter	8 000 (55)	6 700 (45)	16 700 (115)
Stress relieved:			
All sizes	16 200 (110)	15 000 (105)	21 200 (145)

- The test pressure shall be held for a minimum of 5s.

- Electric Test—

- Each pipe shall be tested with an electric test in accordance with either Practice E 213 or E 571.
- For eddy-current testing, the calibration pipe shall contain, at the option of the manufacturer, any one of the following discontinuities to establish a minimum sensitivity level for rejection. The discontinuity shall be placed in the weld if visible.
 - Drilled Hole.
 - Transverse Tangential Notch.
 - Longitudinal Notch.

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