

ASTM B423 / ASME SB423

SPECIFICATION FOR NICKEL-IRON-CHROMIUM MOLYBDENUM-COPPER ALLOY (UNS N08825 AND N08221) SEAMLESS PIPE AND TUBE

This specification covers nickel-iron-chromium-molybdenum- copper alloys (UNS N08825 and N08221) in the form of cold-worked and hot-finished seamless pipe and tube intended for general corrosive service.

A. General Requirement :-

1. Material furnished under this specification shall conform to the applicable requirements of Specification B 829 unless otherwise provided herein.

B. Chemical Composition :-

The material shall conform to the composition limits specified in Table 1.

Table 1

Element	UNS N08825	UNS N08221
Nickel	38.0–46.0	39.0–46.0
Chromium	19.5–23.5	20.0–22.0
Iron	22.0 min	22.0 min
Manganese	1.0 max	1.0 max
Carbon	0.05 max	0.025 max
Copper	1.5–3.0	1.5–3.0
Silicon	0.5 max	0.5 max
Sulfur	0.03 max	0.03 max
Aluminum	0.2 max	0.2 max
Titanium	0.6–1.2	0.6–1.0
Molybdenum	2.5–3.5	5.0–6.5

C. Mechanical Properties and Other Requirements :-

1. Tension Test–

- i. The material shall conform to the tensile properties specified in Table 2. The sampling and specimen preparation are as covered in Specification B 829.
- ii. Tensile properties for material specified as small-diameter and light-wall tube (converter sizes) shall be as prescribed in Table 3.

Table 2

Alloy	Condition and Size	Tensile Strength, min, ksi (MPa)	Yield Strength 0.2% Offset, min, ksi (MPa)	Elongation in 2 in. or 50 mm (4D), min, %
UNS N08825	hot-finished annealed	75 (517)	25 (172)	30
UNS N08825	cold-worked annealed	85 (586)	35 (241)	30
UNS N08825	Hot-forming quality (hot-finished or cold-drawn annealed)	(A)	(A)	(A)
UNS N08221	cold-finished, annealed	79 (545)	34 (234)	30

(A) Hot-forming quality is furnished to chemical requirements and surface inspection only. No mechanical properties are required.

Table 3(A)

Condition	Tensile Strength, min, ksi (MPa)	Yield Strength 0.2% Offset, min, ksi (MPa)	Elongation in 2 in. or 50 mm (4D), min, %
Annealed (B, C)	85–115 (586–793)	35 (241)	30
Half-hard (D)	105 (724) min	75 (517)	15
Full-hard (E)	125 (862) min	100 (689)	5

(A) Not applicable to outside diameters under 1/8 in. (3.2 mm) and wall thickness under 0.015 in. (0.381 mm).

(B) This condition is sometimes designated as "No. 1 Temper."

(C) The minimum tensile strength value applies only to tubing in straight lengths.

(D) This condition is sometimes designated as "No. 2 Temper."

(E) This condition is sometimes designated as "No. 3 Temper."

2. Hydrostatic or Non-destructive Electric Test–

- i. The type of test to be used shall be at the option of the manufacturer, unless otherwise specified in the purchase order.

D. Test Methods :-

1. Hydrostatic Test–

- i. Each pipe or tube with an outside diameter 1/8 in. (3 mm) and larger and with wall thickness of 0.015 in. (0.38 mm) and over shall be tested in accordance with Specification B 829. The allowable fiber stress, for material in the condition furnished, is as follows:

UNS N08825 hot finished, annealed: 16600 psi (114 MPa)

UNS N08825 cold-worked, annealed: 21200 psi (146 MPa)

UNS N08221 cold finished, annealed: 19700 psi (138 MPa)

- ii. When so agreed upon between the manufacturer and purchaser, pipe or tube may be tested to 1(1/2) times the allowable fiber stress given in point D.1.i.

2. Non-destructive Electric Test–

- i. Each pipe or tube shall be examined with a non-destructive electric test in accordance with Specification B 829.

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