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Standard Specification for Nickel-Iron-Chromium-Molybdenum-Copper Alloy ~~(UNS N08825 and N08221) Seamless Pipe and Tube~~(UNS N08825, N08221, and N06845) Seamless Pipe and Tube[1]

This standard is issued under the fixed designation B423; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification[2] covers nickel-iron-chromium-molybdenum-copper alloys (UNS N08825, N08221, and ~~N08221)*~~N06845)[3] in the form of cold-worked and hot-finished seamless pipe and tube intended for general corrosive service. The general requirements for pipe and tube are covered in Specification B829.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The following precautionary caveat pertains only to the test methods portion, Section 9, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[4]

B829 Specification for General Requirements for Nickel and Nickel Alloys Seamless Pipe and Tube

3. General Requirement

3.1 Material furnished under this specification shall conform to the applicable requirements of Specification B829 unless otherwise provided herein.

4. Ordering Information

~~4.1It~~4.1 It is the responsibility of the purchaser to specify all requirements that are necessary for the safe and satisfactory performance of material ordered under this specification. Examples of such requirements include, but are not limited to, the following:

4.1.1 Alloy name or UNS number,

4.1.2 ASTM designation,

4.1.3 Condition (see Appendix X2),

4.1.4 Finish (see Appendix X2),

4.1.5 *Dimensions*:

4.1.5.1 *Tube*—Specify outside diameter and nominal or minimum wall,

4.1.5.2 *Pipe*—Specify standard pipe size and schedule,

4.1.5.3 *Length*—Cut to length or random,

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[1] This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.07 on Refined Nickel and Cobalt and Their Alloys.

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[2] For ASME Boiler and Pressure Vessel Code applications see related specification SB-423 in Section II of that code.

~~[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.~~

[3] New designation established in accordance with Practice E527 and SAE J 1086, Practice for Numbering Metals and Alloys (UNS).

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***A Summary of Changes section appears at the end of this standard.**

4.1.6 *Quantity*—Feet (or metres) or number of pieces,
4.1.7 *Hydrostatic Test or Nondestructive Electric Test*—Specify type of test (see 6.2).
4.1.8 *Hydrostatic Pressure Requirements*—Specify test pressure if other than required by 9.1.1,
4.1.9 *Certification*—State if certification is required,
4.1.10 *Samples for Product (Check) Analysis*—State whether samples for product (check) analysis should be furnished (see 5.2),
4.1.11 *Purchaser Inspection*—If purchaser wishes to witness tests or inspection of material at place of manufacture, the purchase order must so state indicating which tests or inspections are to be witnessed, and
4.1.12 *Small-Diameter and Light-Wall Tube (Converter Sizes)*—See Appendix X1.

5. Chemical Composition

5.1 The material shall conform to the composition limits specified in Table 1. One test is required for each lot as defined in Specification B829.
5.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations of Specification B829.

6. Mechanical Properties and Other Requirements

6.1 *Tension Test*—The material shall conform to the tensile properties specified in Table 2. The sampling and specimen preparation are as covered in Specification B829.
6.1.1 Tensile properties for material specified as small-diameter and light-wall tube (converter sizes) shall be as prescribed in Table X1.1.
6.2 *Hydrostatic or Nondestructive Electric Test*—Each pipe or tube shall be subjected to either the hydrostatic test or the nondestructive electric test. The type of test to be used shall be at the option of the manufacturer, unless otherwise specified in the purchase order.

7. Dimensions and Permissible Variations

7.1 *Diameter and Wall Thickness* —The permissible variations in the outside diameter and wall thickness shall conform to the permissible variations prescribed in Tables 3, 4, and 5 of Specification B829.
7.2 Permissible variations for material specified as small-diameter and light-wall tube (converter size) shall conform to the permissible variations prescribed in Table X1.2.

8. Number of Tests

8.1 *Chemical Analysis*—One test per lot.
8.2 *Tension*—One test per lot.
8.3 *Hydrostatic or Nondestructive Electric Test*—Each piece in each lot.

9. Test Methods

9.1 *Hydrostatic Test*—Each pipe or tube with an outside diameter ⅛ 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 B829. The allowable fiber stress, for material in the condition furnished, is as follows:

TABLE 1 Chemical Requirements[A]

Element	UNS N08825	UNS N08221	UNS N06845
~~Nickel~~	~~38.0–46.0~~	~~39.0–46.0~~	
Nickel	38.0–46.0	39.0–46.0	44.0–50.0
~~Chromium~~	~~19.5–23.5~~	~~20.0–22.0~~	
Chromium	19.5–23.5	20.0–22.0	20.0–25.0
~~Iron~~	~~22.0 min~~	~~22.0 min~~[B]	~~remainder~~[B]
Iron	22.0 min[B]	22.0 min[B]	remainder[B]
~~Manganese~~	~~1.0 max~~	~~1.0 max~~	–
Manganese	1.0	1.0	0.5
~~Carbon~~	~~0.05 max~~	~~0.025 max~~	–
Carbon	0.05	0.025	0.05
Copper	1.5–3.0	1.5–3.0	2.0–4.0
~~Silicon~~	~~0.5 max~~	~~0.5 max~~	–
Silicon	0.5	0.5	0.5
~~Sulfur~~	~~0.03 max~~	~~0.03 max~~	–
Sulfur	0.03	0.03	0.010
~~Aluminum~~	~~0.2 max~~	~~0.2 max~~	–
Aluminum	0.2	0.2	...
Titanium	0.6–1.2	0.6–1.0	...
Molybdenum	2.5–3.5	5.0–6.5	5.0–7.0
Tungsten	...	...	2.0–5.0

[A] Maximum unless range or minimum is given. Where ellipses (...) appear in this table, there is no requirement and analysis for the element need not be determined or reported.
[B] Element shall be determined arithmetically by difference.