



Standard Specification for Nickel Seamless Pipe and Tube¹

This standard is issued under the fixed designation B 161; 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.

ϵ^1 NOTE—Table 2 was corrected editorially in November 2008.

1. Scope*

1.1 This specification² covers nickel (UNS N02200)* and low-carbon nickel (UNS N02201)* in the form of cold-worked seamless pipe and tube in the conditions shown in Table 1 and Table X1.1.

1.1.1 Hot-worked material is available. Properties are to be agreed upon between the manufacturer and purchaser.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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.*

2. Referenced Documents

2.1 ASTM Standards:³

B 829 Specification for General Requirements for Nickel and Nickel Alloys Seamless Pipe and Tube

E 426 Practice for Electromagnetic (Eddy-Current) Examination of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys

E 571 Practice for Electromagnetic (Eddy-Current) Examination of Nickel and Nickel Alloy Tubular Products⁴ 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 B 829 unless otherwise provided herein.

4. Ordering Information

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 and year of issue.

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.

4.1.6 *Quantity*—Feet or number of pieces.

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-161 in Section II of that Code.

* New designation established in accordance with ASTM E 527 and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

³ Annual Book of ASTM Standards, Vol 02.04.

⁴ 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.

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

TABLE 1 Mechanical Properties

| 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 (UNS N02200) | Low-Carbon Nickel (UNS N02201) | Nickel (UNS N02200) | Low-Carbon Nickel (UNS N02201) | Nickel (UNS N02200) | Low-Carbon Nickel (UNS N02201) |
| Annealed: | | | | | | |
| 5 in. (127 mm) and under outside diameter | 55 000 (380) | 50 000 (345) | 15 000 (105) | 12 000 (80) | 35 | 35 |
| Over 5 in. (127 mm) in outside diameter | 55 000 (380) | 50 000 (345) | 12 000 (80) | 10 000 (70) | 40 | 40 |
| Stress-Relieved: | | | | | | |
| All sizes | 65 000 (450) | 60 000 (415) | 40 000 (275) | 30 000 (205) | 15 | 15 |

4.1.7 *Hydrostatic Test or Nondestructive Electric Test*—Specify test (see 6.2).

4.1.8 *Hydrostatic Pressure Requirements*—Specify test pressure if other than required by Specification B 829.

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.

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 2.

5.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations in Specification **B829:B 829**.

6. Mechanical and Other Properties

6.1 *Tension Test*—The material shall conform to the tensile properties specified in Table 1. The sampling and specimen preparation are as covered in Specification **B829:B 829**.

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 Test or Nondestructive Electric Test*—Each pipe or tube shall be subjected to the Nondestructive Electric Test or the Hydrostatic Test. Unless specified by the purchaser, either test may be used at the option of the producer.

7. Dimensions and Permissible Variations

7.1 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 $\frac{1}{8}$ in. (3 mm) and larger and with wall thickness of 0.015 in.

TABLE 2 Chemical Requirements

| Element | Composition, % | |
|----------------------|---------------------|--------------------------------|
| | Nickel (UNS N02200) | Low-Carbon Nickel (UNS N02201) |
| Ni, ^A min | 99.0 | 99.0 |
| Cu, max | 0.25 | 0.25 |
| Fe, max | 0.40 | 0.40 |
| Mn, max | 0.35 | 0.35 |
| C, max | 0.15 | — |
| C, max† | 0.15 | — |
| C, max | — | 0.02 |
| Si, max | 0.35 | 0.35 |
| S, max | 0.01 | 0.01 |

^A Element shall be determined arithmetically by difference.

†Corrected editorially.