



# Standard Specification for Nickel Seamless Pipe and Tube<sup>1</sup>

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.

## 1. Scope\*

1.1 This specification<sup>2</sup> 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:*<sup>3</sup>

**B 829** 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.

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 **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 **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**.

<sup>1</sup> 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.

Current edition approved Nov. 1, 2005. Published December 2005. Originally approved in 1941. Last previous edition approved in 2003 as B 161 - 03.

<sup>2</sup> 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).

<sup>3</sup> 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

**TABLE 2 Chemical Requirements**

Element	Composition, %	
	Nickel (UNS N02200)	Low-Carbon Nickel (UNS N02201)
Ni, <sup>A</sup> 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	—	0.02
Si, max	0.35	0.35
S, max	0.01	0.01

<sup>A</sup> Element shall be determined arithmetically by difference.

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. (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 N02200	UNS N02201
Annealed:		
5 in. (127 mm) outside diameter and under	10 000 psi (70 MPa)	8000 psi (55 MPa)
Over 5 in. outside diameter	8000 psi (55 MPa)	6700 psi (45 MPa)
Stress-Relieved:		
All sizes	16 200 psi (110 MPa)	15 000 psi (105 MPa)

9.1.1 When so agreed upon by the manufacturer and purchaser, pipe or tube may be tested to  $1\frac{1}{2}$  times the allowable fiber stress given above.

9.1.2 If any pipe or tube shows leaks during hydrostatic testing, it shall be rejected.

9.2 *Nondestructive Electric Test*—Each pipe or tube shall be examined with a nondestructive electric test as prescribed in Specification [B 829](#).

## 10. Keywords

10.1 seamless pipe; seamless tube; N02200; N02201

## APPENDIXES

### (Nonmandatory Information)

#### X1. CONVERTER SIZES

X1.1 Small-diameter and light-wall tube in outside diameters  $1\frac{1}{4}$  in. (31.8 mm) and under may be furnished in the conditions listed in [Table X1.1](#) when so specified. The material is furnished in a limited range of sizes and the manufacturer

should be consulted as to the various outside diameters and wall thicknesses that may be furnished. Material will have a bright finish. Such material shall conform to the applicable requirements in [Table X1.1](#) and [Table X1.2](#).