



## Designation: ~~B517–05 (Reapproved 2014)~~ B517 – 19

# Standard Specification for Welded Nickel-Chromium-Iron-Alloy (~~UNS N06600, UNS N06603, UNS N06025, and UNS N06045~~) Pipe<sup>1</sup>

This standard is issued under the fixed designation B517; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. ~~Scope~~ Scope\*

1.1 This specification<sup>2</sup> covers welded, cold-worked, and annealed nickel-chromium-iron alloy (UNS N06600,<sup>3</sup> N06603, N06025, and N06045) pipe for general corrosive service and heat-resisting applications.

1.2 This specification covers outside diameter and nominal wall pipe shown in ANSI B36.19. Pipe having other dimensions may be furnished provided such pipe complies with all other requirements of this specification.

1.3 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.

1.4 *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~~ safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>4</sup>

**B775** Specification for General Requirements for Nickel and Nickel Alloy Welded Pipe

**B899** Terminology Relating to Non-ferrous Metals and Alloys

2.2 *ANSI Standard:*

**B36.19** **Stainless Steel Pipe**<sup>5</sup>

## 3. Terminology

3.1 Terms defined in Terminology **B899** shall apply unless defined otherwise in this standard.

## 4. General Requirement

4.1 Material furnished in accordance with this specification shall conform to the applicable requirements of the current edition of Specification **B775** unless otherwise provided herein.

## 5. Ordering Information

5.1 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:

<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.

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<sup>2</sup> For ASME Boiler and Pressure Code applications see related Specification SB-517 in Section II of that Code.

<sup>3</sup> New designation established in accordance with ASTM E527 and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

<sup>4</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.

<sup>5</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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

- 5.1.1 Alloy name or UNS number.
- 5.1.2 ASTM designation and year of issue.
- 5.1.3 Condition (temper).
- 5.1.4 *Dimensions*:
  - 5.1.4.1 Nominal pipe size or outside diameter and schedule number or nominal wall thickness.
  - 5.1.4.2 Length (specific or random).
  - 5.1.5 Quantity (feet or metres, or number of pieces).
  - 5.1.6 *Certification*—State if certification or a report of test results is required.
  - 5.1.6 *Samples for Product (Check) Analysis*—State whether samples for product (check) analysis should be furnished.
  - 5.1.7 *Purchaser Inspection*—If the purchaser wishes to witness tests or inspection of material at the place of manufacture, the purchase order must so state indicating which tests or inspections are to be witnessed.

## 6. Materials and Manufacture

6.1 Pipe shall be made from flat-rolled alloy by an automatic welding process with no addition of filler metal. Subsequent to welding and prior to final heat treatment, the material shall be cold worked either in both weld and base metal or in weld metal only.

6.2 Pipe shall be furnished with a scale-free finish. When bright annealing is used, descaling is not necessary.

## 7. Chemical Composition

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

7.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations in Specification **B775**.

## 8. Mechanical and Other Requirements

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

8.2 *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. The weld shall be positioned 90° from the direction of the applied flattening force.

**TABLE 1 Chemical Requirements<sup>A,B</sup>**

Element	Composition Limits, %				Product (Check) Analysis Variations, under min or over max, of the Specified Limit of Element
	N06600	N06603	N06025	N06045	
Nickel <sup>A</sup>	72.0 min	Bal	Bal	45.0 min	0.45
Nickel <sup>C</sup>	72.0 min	Remainder	Remainder	45.0 min	0.45
Chromium	14.0 min	24.0–26.0	24.0–26.0	26.0–29.0	0.15
Chromium	14.0–17.0	24.0–26.0	24.0–26.0	26.0–29.0	0.15 under min, 0.25 over max
	17.0 max				0.25
Iron	–6.0 min	–8.0–11.0	–8.0–11.0	21.0–25.0	0.10
Iron	6.0–10.0	8.0–11.0	8.0–11.0	21.0–25.0	0.10
	10.0 max				0.10
Manganese	–1.0	–0.15 max	–0.15 max	–1.0 max	0.03
Manganese	1.0	0.15	0.15	1.0	0.03
Carbon	–0.15 max	20.0–40.0	–0.15–0.25	–0.05–0.12	0.01
Carbon	0.15	20.0–40.0	0.15–0.25	0.05–0.12	0.01
Copper	–0.5 max	–0.50 max	–0.10 max	–0.3 max	0.03
Copper	0.5	0.50	0.10	0.3	0.03
Silicon	–0.5 max	–0.50 max	–0.5 max	–2.5–3.0	0.03
Silicon	0.5	0.50	0.5	2.5–3.0	0.03
Sulfur	–0.015 max	–0.010 max	–0.010 max	–0.010 max	0.003
Sulfur	0.015	0.010	0.010	0.010	0.003
Aluminum	...	2.4–3.0	1.8–2.4	...	...
Aluminum	...	2.4–3.0	1.8–2.4	...	...
Titanium	...	0.01–0.25	0.1–0.2	...	...
Phosphorus	...	–0.020 max	–0.02 max	–0.02 max	...
Phosphorus	...	0.020	0.02	0.02	...
Zirconium	...	0.01–0.40	0.01–0.10	...	...
Yttrium	...	0.01–0.15	0.05–0.12	...	...
Cerium	...	...	...	0.03–0.09	...

<sup>A</sup> Where ellipses (...) appear in this table, there is no requirement.

<sup>B</sup> All values are maximums unless identified as a minimum or a range is provided.

<sup>C</sup> Nickel shall be determined arithmetically by difference.