



# Standard Specification for Nickel-Chromium-Molybdenum-Cobalt-Tungsten-Iron-Silicon Alloy (UNS N06333) Welded Pipe<sup>1</sup>

This standard is issued under the fixed designation B723; 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

1.1 This specification covers wrought alloy UNS N06333 in the form of welded pipe intended for heat-resisting applications and general corrosive service.

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 *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 appropriated 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:*<sup>2</sup>

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

**B718** Specification for Nickel-Chromium-Molybdenum-Cobalt-Tungsten-Iron-Silicon Alloy (UNS N06333) Plate, Sheet, and Strip

## 3. General Requirement

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

<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 Oct. 1, 2014. Published October 2014. Originally approved in 1983. Last previous edition approved in 2009 as B723 – 00 (2009). DOI: 10.1520/B0723-00R14.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 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 (temper) (**Table 1**).

4.1.4 *Dimensions:*

4.1.4.1 Nominal pipe size or outside diameter and schedule number or nominal wall thickness.

4.1.4.2 Length (specific or random).

4.1.5 Quantity (feet or metres, or number of pieces).

4.1.6 *Certification*—State if certification or a report of test results is required.

4.1.7 *Samples for Product (Check) Analysis*—State whether samples for product (check) analysis should be furnished.

4.1.8 *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.

## 5. Material and Manufacture

5.1 The pipe shall be made from flat-rolled alloy conforming to Specification **B718**, by an automatic welding process with no addition of filler metal.

5.2 Pipe shall be furnished annealed after welding, with oxide removed. When final heat treatment is performed in a protective atmosphere, descaling is not necessary.

## 6. Chemical Requirements

6.1 The material shall conform to the requirements as to chemical composition specified in **Table 1**.

6.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations in the Dimensions of Pipe table in Specification **B775**.

## 7. Mechanical and Other Requirements

7.1 The mechanical properties of the material at room temperature shall conform to those shown in **Table 2**.

**TABLE 1 Chemical Requirements**

Element	Composition Limits, %
Carbon	0.10 max
Manganese	2.0 max
Phosphorus	0.03
Sulfur	0.03
Silicon	1.5 max
Chromium	24.0–27.0
Nickel	44.0–48.0
Molybdenum	2.5–4.0
Cobalt	2.5–4.0
Tungsten	2.5–4.0
Iron <sup>A</sup>	remainder

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

**TABLE 2 Mechanical Properties**

Tensile Strength, Min psi (MPa)	Yield Strength, 0.2 % offset, min psi (MPa)	Elongation in 2 in. or 50 mm, or 4D, min %	Hardness <sup>A</sup>
80 000 (551)	35 000 (241)	30	75 to 95 HRB

<sup>A</sup> Hardness values are informative only and not to be construed as the basis for acceptance.

**TABLE 3 Dimensions of Pipe**

Nominal Pipe Size, in.	Outside Diameter, in. (mm)	Nominal Wall Thickness, in. (mm)			
		Schedule No. 5	Schedule No. 10	Schedule No. 40	Schedule No. 80
1/8	0.405 (10.29)	...	0.049 (1.24)	0.068 (1.73)	0.095 (2.41)
1/4	0.504 (13.72)	...	0.065 (1.65)	0.088 (2.24)	0.119 (3.02)
3/8	0.675 (17.15)	...	0.065 (1.65)	0.091 (2.31)	0.126 (3.20)
1/2	0.840 (21.34)	0.065 (1.65)	0.083 (2.11)	0.109 (2.77)	0.147 (3.73)
3/4	1.050 (26.67)	0.065 (1.65)	0.083 (2.11)	0.113 (2.87)	0.154 (3.91)
1	1.314 (33.38)	0.065 (1.65)	0.109 (2.77)	0.133 (3.38)	0.179 (4.55)
1 1/4	1.660 (42.16)	0.065 (1.65)	0.109 (2.77)	0.140 (3.56)	0.191 (4.85)
1 1/2	1.900 (48.26)	0.065 (1.65)	0.109 (2.77)	0.145 (3.68)	0.200 (5.08)
2	2.375 (60.33)	0.065 (1.65)	0.109 (2.77)	0.154 (3.91)	0.218 (5.54)
2 1/2	2.875 (73.03)	0.083 (2.11)	0.120 (3.05)	0.203 (5.16)	0.276 (7.01)
3	3.500 (88.90)	0.083 (2.11)	0.120 (3.05)	0.216 (5.49)	0.300 (7.62)
3 1/2	4.000 (101.60)	0.083 (2.11)	0.120 (3.05)	0.226 (5.74)	0.318 (8.08)
4	4.500 (114.30)	0.083 (2.11)	0.120 (3.05)	0.237 (6.02)	0.337 (8.56)
5	5.563 (141.30)	0.109 (2.77)	0.134 (3.40)	0.258 (6.55)	0.375 (9.53)
6	6.625 (168.28)	0.109 (2.77)	0.134 (3.40)	0.280 (7.11)	0.432 (10.97)
8	8.625 (219.08)	0.109 (2.77)	0.148 (3.76)	0.322 (8.18)	0.500 (12.70)
10	10.750 (273.05)	0.134 (3.40)	0.165 (4.19)	0.365 (9.27)	0.500 (12.70)
12	12.750 (323.85)	0.156 (3.96)	0.180 (4.57)	0.375 (9.53)	0.500 (12.70)

7.2 *Flattening Test*—One flattening test shall be made on one end of one pipe from each lot.

### 7.3 *Nondestructive Test Requirements:*

7.3.1 Pipe shall be subjected to a pressure test or nondestructive electric test at the manufacturer's option.

## 8. Dimensions and Permissible Variations

8.1 *Lengths*—Pipe lengths shall be in accordance with the following regular practice.

8.1.1 Unless otherwise agreed upon, all sizes from 1/8 in. (3.17 mm) to 8 in. (203 mm) nominal pipe size are available in a length up to 24 ft (7.32 m). The aim range will be 20 to 24 ft (6.10 to 7.32 m) with the permissible range of 15 to 24 ft (4.57 to 7.32 m). Short lengths are acceptable and the number

and minimum length shall be agreed upon between the manufacturer and purchaser.

8.1.2 If definite cut lengths are desired the lengths acquired shall be specified in the order. When material is ordered cut to length, the length shall conform to the permissible variations prescribed in Specification **B775**.

8.1.3 No jointers are permitted unless otherwise specified.

## 9. Number of Tests

9.1 *Chemical Analysis*—One per lot.

9.2 *Mechanical Properties*—One test per lot.

9.3 *Flattening*—One test per lot.

9.4 *Nondestructive*—Each piece in each lot.

## **10. Keywords**

### **10.1 UNS N06333; welded pipe**

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