



Standard Specification for Nickel-Chromium-Molybdenum-Tungsten-Alloys (UNS N06110) Welded Pipe¹

This standard is issued under the fixed designation B757; 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 covers welded UNS N06110² pipe in the annealed condition (temper) for general corrosion applications.

1.2 This specification covers pipe sizes in schedules shown in [Table 1](#).

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 The following precautionary caveat pertains only to the test method portion, Section 13, 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 Safety Data Sheet (SDS) 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:³

- [E8 Test Methods for Tension Testing of Metallic Materials](#)
- [E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)
- [E38 Methods for Chemical Analysis of Nickel-Chromium and Nickel-Chromium-Iron Alloys \(Withdrawn 1989\)⁴](#)
- [E213 Practice for Ultrasonic Testing of Metal Pipe and Tubing](#)

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 New designation established in accordance with Practice [E527](#) and SAEJ 1086, Recommended Practice for Numbering Metals and Alloys (UNS).

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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

[E354 Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys](#)

[E527 Practice for Numbering Metals and Alloys in the Unified Numbering System \(UNS\)](#)

[E571 Practice for Electromagnetic \(Eddy-Current\) Examination of Nickel and Nickel Alloy Tubular Products](#)

2.2 ANSI Standards:

[B2.1 Pipe Threads⁵](#)

[B36.19 Stainless Steel Pipe⁵](#)

3. Classification

3.1 *Class 1*—Welded, cold-worked, annealed, and nondestructively tested in accordance with [11.4.1](#).

3.2 *Class 2*—Welded, cold-worked, annealed, and nondestructively tested in accordance with [11.4.2](#).

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

4.1.1 *Alloy Name or UNS number.*

4.1.2 *ASTM Designation.*

4.1.3 *Dimensions:*

4.1.3.1 Pipe size (see [Table 1](#)).

4.1.3.2 Length (specific or random).

4.1.4 *Class* (see [11.4](#)).

4.1.5 *Quantity* (feet or number of pieces).

4.1.6 *Certification*—State if certification is required (see [Section 16](#)).

4.1.7 *Samples for Product (Check) Analysis*—State whether samples for product (check) analysis should be furnished ([10.2](#)).

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 (see [Section 14](#)).

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

TABLE 1 Dimensions of Welded Pipe^A

NOTE 1—The following table is a partial reprint of Table 1 of the American National Standard for Stainless Steel Pipe (ANSI B36.19).

NOTE 2—The decimal thicknesses for the respective pipe sizes represent their nominal wall dimensions.

Nominal Pipe Size in.	Outside Diameter in. (mm)	Nominal Wall Thickness, in. (mm)		
		Schedule 5SA	Schedule 10S	Schedule 40S
1/8	0.405 (10.29)	...	0.049 (1.25)	0.068 (1.73)
1/4	0.540 (13.72)	...	0.065 (1.65)	0.088 (2.24)
3/8	0.675 (17.15)	...	0.065 (1.65)	0.091 (2.31)
1/2	0.840 (21.34)	0.065 (1.65)	0.083 (2.11)	0.109 (2.77)
3/4	1.050 (26.67)	0.065 (1.65)	0.083 (2.11)	0.113 (2.87)
1	1.315 (33.40)	0.065 (1.65)	0.109 (2.77)	0.133 (3.38)
1 1/4	1.660 (42.16)	0.065 (1.65)	0.109 (2.77)	0.140 (3.56)
1 1/2	1.900 (48.26)	0.065 (1.65)	0.109 (2.77)	0.145 (3.68)
2	2.375 (60.33)	0.065 (1.65)	0.109 (2.77)	0.154 (3.91)
2 1/2	2.875 (73.03)	0.083 (2.11)	0.120 (3.05)	...
3	3.500 (88.90)	0.083 (2.11)	0.120 (3.05)	...
3 1/2	4.000 (101.6)	0.083 (2.11)	0.120 (3.05)	...
4	4.500 (114.3)	0.083 (2.11)	0.120 (3.05)	0.237 (6.02)
5	5.563 (141.3)	0.109 (2.77)	0.134 (3.40)	...
6	6.625 (168.3)	0.109 (2.77)	0.134 (3.40)	...

^A Schedules 5S and 10S wall thicknesses do not permit threading in accordance with the American National Standard for Pipe Threads (ANSI B2.1).

5. Materials and Manufacture

5.1 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 annealing, the material shall be cold-worked in either the weld metal only or both weld and base metal.

5.2 Pipe shall be furnished with oxide removed. When bright annealing is used, descaling is not necessary.

6. Chemical Composition

6.1 The material shall conform to the composition limits specified in [Table 2](#).

6.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations in [Table 3](#).

7. Mechanical and Other Requirements

7.1 *Mechanical Properties*—The material shall conform to the mechanical properties specified in [Table 4](#).

TABLE 2 Chemical Requirements^A

Composition Limits, %	
	UNS N06110
Ni	51.0 min
Cr	28.0–33.0
Fe	1.0 max
Mo	9.0–12.0
W	1.0–4.0
C	0.15 max
Mn	1.0 max
Si	1.0 max
P	0.015 max
S	0.015 max
Al	1.0 max
Ti	1.0 max
Cu	0.5 max
Cb	1.0 max

^A Element may be determined arithmetically by difference.

TABLE 3 Product (Check) Analysis Chemical Composition Variations

Element	Specified Limit of Element, % incl	Variation Under min or Over max of the Specified Limit of Elements
Ni	over 40.0 to 60.0	0.35
Cr	over 25.0 to 35.0	0.25
Fe	up to 1.0	0.05
Mo	over 9.0 to 12.0	0.15
W	over 1.0 to 4.0	0.07
C	over 0.0 to 0.20	0.01
Mn	up to 1.0	0.05
Si	over 0.25 to 1.0	0.05
P	up to 0.04	0.005
S	up to 0.02	0.003
	over 0.02 to 0.06	0.005
Al	over 0.10 to 1.0	0.05
Ti	over 0.10 to 0.50	0.03
	over 0.50 to 1.0	0.04
	over 1.0 to 2.0	0.05
Cb	over 0.1 to 1.0	0.04
Cu	up to 0.50	0.03

TABLE 4 Mechanical Property Requirements

Alloy	Tensile strength min, psi (MPa)	Yield strength 0.2 % offset min, psi (MPa)	Elongation in 2 in. or 50 mm, min, %
UNS N06110	95000 (655)	45000 (310)	60

7.2 *Flattening Test*—A section of pipe not less than 4 in. (102 mm) in length 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.

7.2.1 Superficial ruptures resulting from surface imperfections shall not be a cause for rejection.

7.3 *Nondestructive Test Requirements*—Tube shall be subjected to a pressure test or nondestructive electric test at the manufacturer’s option (see [13.2](#)).