



Designation: B 677 – 99

Standard Specification for UNS N08904, UNS N08925, and UNS N08926 Seamless Pipe and Tube¹

This standard is issued under the fixed designation B 677; 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 UNS N08904, UNS N08925, and UNS N08926* seamless, cold-worked or hot-finished pipe and tube intended for general corrosive service.

1.2 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 ASTM Standards:

A 450/A450M Specification for General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes²

E 8 Test Methods for Tension Testing of Metallic Materials³

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁴

E 354 Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys⁵

3. Terminology Definitions

3.1 *average diameter*—the average of the maximum and minimum outside diameters as determined at any one cross section of the tube or pipe.

3.2 *pipe*—seamless tube conforming to the particular dimensions commercially known as standard pipe sizes (Appendix X1).

3.3 *tube*—a hollow product of round or any other cross section having a continuous periphery.

4. Ordering Information

4.1 Orders for materials under this specification shall include the following information:

¹ This specification is under the jurisdiction of ASTM Committee B-2 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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* New designation established in accordance with ASTM E 527 and SAE J1086, Recommended Practice for Numbering Metals and Alloys (UNS).

² Annual Book of ASTM Standards, Vol 01.01.

³ Annual Book of ASTM Standards, Vol 03.01.

⁴ Annual Book of ASTM Standards, Vol 14.02.

⁵ Annual Book of ASTM Standards, Vol 03.05.

4.1.1 Alloy name or UNS number.

4.1.2 ASTM designation and year of issue.

4.1.3 Finish.

4.1.4 *Dimensions*:

4.1.4.1 *Tube*—Outside diameter and the average or minimum wall thickness.

4.1.4.2 *Pipe*—Standard pipe size and schedule (Appendix X1).

4.1.4.3 *Length*, (cut to length or random).

4.1.5 Quantity (feet or number of pieces).

4.1.6 *Nondestructive Testing* (see 7.2):

4.1.6.1 *Pressure Requirements*—Test pressure if other than required by 7.2.1.

4.1.6.2 Specify if an electric test is to be performed (see 7.2.2).

4.1.7 *Ends*—Plain ends cut and deburred will be furnished. If threaded ends or ends beveled for welding are desired, give details.

4.1.8 *Certification*—State if certification is required (Section 16).

4.1.9 *Samples for Product (Check) Analysis*—State whether samples for product (check) analysis should be furnished (see 6.2).

4.1.10 *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 (Section 14).

5. Materials and Manufacture

5.1 The material shall be supplied in the solution-treated condition.

NOTE 1—The recommended heat treatment shall consist of heating to a temperature of 1950 to 2100°F (1065 to 1150°C) for UNS N08904 or 2010 to 2100°F (1100 to 1150°C) for UNS N08925 and UNS N08926, followed by quenching in water or rapid cooling by other means.

6. Chemical Composition

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



TABLE 1 Chemical Requirements

Element	UNS N08904	UNS N08925	UNS N08926	Product (Check) Analysis Variations, under min or over max of the Specified Limit of Element, %	
				UNS N08904 UNS N08925	UNS N08926
Carbon, max	0.020	0.020	0.020	0.005	0.005
Manganese, max	2.0	1.0	2.00	0.04	0.04
Phosphorus, max	0.045	0.045	0.03	0.005	0.005
Sulfur, max	0.035	0.030	0.01	0.005	0.003
Silicon, max	1.00	0.50	0.5	0.05	0.03
Nickel	23.0 to 28.0	24.0 to 26.0	24.00 to 26.00	0.20	0.25
Chromium	19.0 to 23.0	19.0 to 21.0	19.00 to 21.00	0.20	0.25
Molybdenum	4.0 to 5.0	6.0 to 7.0	6.0 to 7.0	0.10	0.15
Copper	1.0 to 2.0	0.8 to 1.5	0.5 to 1.5	0.10	0.04
Nitrogen	...	0.1 to 0.2	0.15 to 0.25	...	0.01
Iron ^a	balance	balance	balance	...	...

6.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations prescribed in Table 1.

7. Mechanical Properties and Other Requirements

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

7.2 Nondestructive Tests:

Each pipe and tube shall be subjected to either a hydrostatic test or a nondestructive electric test in accordance with specification A 450/A 450M, at the manufacturer's option. The purchaser may specify which test is to be used.

7.2.1 Hydrostatic Test:

7.2.1.1 Each pipe or tube with an outside diameter $\frac{1}{8}$ in. (3.2 mm) and larger and with wall thickness of 0.015 in. (0.38 mm) and over shall be tested by the manufacturer to an internal hydrostatic pressure of 1000 psi (6.9 MPa) provided that the fiber stress calculated in accordance with the following equation does not exceed the allowable fiber stress, S , indicated below:

$$P = 2St/D \quad (1)$$

where:

P = hydrostatic test pressure, psi (or MPa),

S = allowable fiber stress for material in the condition (temper) furnished, 20 000 psi (138 MPa),

t = minimum wall thickness, in. (or mm); equal to the specified average wall minus the permissible "minus" wall tolerance, Table 3, or the specified minimum wall thickness, and

D = outside diameter of the tube, in. (or mm).

7.2.1.2 The test pressure shall be held for a minimum of 5 s.

7.2.1.3 Visual examination is to be made when the material is under pressure. The full length of material must be examined for leaks. If any pipe or tube shows leaks during the hydrostatic test, it shall be rejected.

7.2.1.4 When so agreed upon between the manufacturer and the purchaser, pipe or tube may be tested to one and one-half times the allowable fiber stress given in 7.2.1.

7.2.2 When specified by the purchaser, a nondestructive electric test in accordance with Specification A 450/A 450M may be used instead of or in addition to the hydrostatic test.

8. Dimensions and Permissible Variations

8.1 *Diameter and Wall Thickness*—The permissible variations in the outside diameter and wall thickness of pipe and tube shall not exceed those prescribed in Table 3.

8.2 *Length*—When pipe or tube is ordered cut-to-length, the length shall not be less than that specified, but a variation of $\pm \frac{1}{8}$ in. (3.2 mm) will be permitted, except that for lengths over 30 ft (9.1 m), a variation of $\pm \frac{1}{4}$ in. (6.4 mm) will be permitted.

8.3 *Straightness*—Material shall be reasonably straight and free of bends and kinks.

9. Workmanship, Finish, and Appearance

9.1 The material shall be uniform in quality and temper, smooth, commercially straight, and free of injurious imperfections.

10. Sampling

10.1 Lot—Definition:

10.1.1 A lot for chemical analysis shall consist of one heat.

10.1.2 A lot for mechanical properties testing shall consist of all material from the same heat, nominal size (excepting length), and condition (temper).

10.2 Test Material Selection:

10.2.1 *Chemical Analysis*—Representative samples shall be taken during pouring or subsequent processing from each lot.

10.2.1.1 *Product (Check) Analysis* shall be wholly the responsibility of the purchaser.

TABLE 2 Mechanical Properties of Pipe and Tube

Alloy	Temper	Tensile Strength, min, psi (MPa)	Yield Strength, 0.2 % offset, min, psi (MPa)	Elongation in 2 in. or 50 mm (or 4D), min, %
UNS N08904	solution annealed	71 (490)	31 (220)	35
UNS N08925	solution annealed	87 (600)	43 (300)	40
UNS N08926	solution annealed	94 (650)	43 (295)	35