



Standard Specification for Welded UNS N08020, N08024, and N08026 Alloy Tubes¹

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1. Scope

1.1 This specification² covers welded UNS N08020, N08024, and N08026 alloy boiler, heat exchanger, and condenser tubes for general corrosion-resisting and low- or high-temperature service.

1.2 This specification covers tubes 1/8 to 5 in. (3.18 to 127 mm), inclusive, in outside diameter and 0.015 to 0.500 in. (0.38 to 12.70 mm), inclusive, in wall thickness. Table 2 of Specification B 751 lists the dimensional requirements of these sizes. Tubes having other dimensions may be furnished provided such tubing complies with all other requirements of this specification.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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 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

- A 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
- B 751 Specification for General Requirements for Nickel and Nickel-Alloy Welded Tube
- B 899 Terminology Relating to Non-ferrous Metals and Alloys

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 For ASME Boiler and Pressure Vessel Code applications, see related Specification SB-468 in Section II of that code.

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.

3. Terminology

3.1 Definitions:

3.1.1 Definitions for terms defined in Terminology B 899 shall apply unless otherwise defined by the requirements of this document.

4. General Requirement

4.1 Material furnished in accordance with this specification shall conform to the applicable requirements of the current edition of Specification B 751 unless otherwise provided herein.

5. Ordering Information

5.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Examples of such requirements include, but are not limited to, the following:

- 5.1.1 Quantity (feet or number of lengths),
- 5.1.2 UNS number,
- 5.1.3 Size (outside diameter and minimum or average wall thickness),
- 5.1.4 Length (random or specific),
- 5.1.5 ASTM designation,
- 5.1.6 *Product Analysis*— State if required,
- 5.1.7 *Certification*— State if a certification or a report of test results is required,
- 5.1.8 *Purchaser Inspection*— State which tests or inspections are to be witnessed, if any, and
- 5.1.9 Supplementary requirements, if any.

6. Materials and Manufacture

6.1 The tubing shall be made from flat-rolled stock 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 in either the weld metal only, or in both the weld and base metal.

6.2 *Heat Treatment*— Tubing of UNS N08020 alloy shall be furnished in the stabilized-annealed condition. Tubing of UNS N08024 alloy shall be furnished in the annealed condition. Tubing of UNS N08026 alloy shall be furnished in the solution-annealed condition.

NOTE 1—The recommended annealing temperatures are 1800 to 1850°F (982 to 1010°C) for UNS N08020, 1925 to 1975°F (1052 to 1079°C) for UNS N08024, and 2050 to 2200°F (1121 to 1204°C) for UNS N08026.

7. Chemical Composition

7.1 The material shall conform to the composition limits specified in Table 1. One test is required for each lot as defined

TABLE 1 Chemical Requirements

Element	Composition, %		
	UNS N08020	UNS N08024	UNS N08026
Carbon, max	0.07	0.03	0.03
Manganese, max	2.00	1.00	1.00
Phosphorus, max	0.045	0.035	0.03
Sulfur, max	0.035	0.035	0.03
Silicon, max	1.00	0.50	0.50
Nickel	32.00–38.00	35.00–40.00	33.00–37.20
Chromium	19.00–21.00	22.50–25.00	22.00–26.00
Molybdenum	2.00–3.00	3.50–5.00	5.00–6.70
Copper	3.00–4.00	0.50–1.50	2.00–4.00
Columbium (Nb) + tantalum	8 × carbon–1.00	0.15–0.35	
Nitrogen	0.10–0.16
Iron ^A	remainder	remainder	remainder

^A By difference.

in Specification B 751.

7.2 If a product analysis is performed, it shall meet the chemistry limits prescribed in Table 1, subject to the analysis tolerances specified in Table 6 of Specification B 751.

8. Mechanical Properties and Other Requirements

8.1 *Mechanical Properties*—The material shall conform to the mechanical property requirements specified in Table 2. One

TABLE 2 Mechanical Property Requirements

Tensile Strength, min, ksi (MPa)	Yield Strength, min, ksi (MPa)	Elongation in 2 in. (50.8 mm), min, %
80 (551)	35 (241)	30.0

test is required for each lot as defined in Specification B 751.

8.2 *Flattening Test*—A flattening test shall be made on each end of one tube per lot. Superficial ruptures resulting from surface imperfections shall not be cause for rejection.

8.3 *Flange Test*—A flange test shall be made on each end of one tube per lot.

8.4 *Nondestructive Test Requirements*—Each tube shall be subjected to either a pressure test or a nondestructive electric test at the manufacturer's option. The purchaser may specify which test is to be used.

9. Keywords

9.1 welded tube; N08020; N08024; N08026

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall be applied only when specified by the purchaser in the inquiry, contract, or order:

S1. Corrosion Tests

S1.1 One intergranular corrosion test per lot shall be performed by the manufacturer on a sensitized specimen and tested in accordance with Practices A 262. When this supplementary requirement is specified, the specific practice (Practice B or Practice E) shall also be specified. If Practice B is specified, the specimen must pass with a rate of less than 0.002 in. (0.05 mm) per month. A lot for intergranular corrosion testing shall be the same as for mechanical testing.

S1.1.1 In addition to the anneal recommended in Note 1, the specimen shall be sensitized for 1 h at 1250°F (677°C) before being subjected to corrosion testing.

S1.1.2 If any corrosion test specimen fails the test, the material represented by such specimens may be reheat-treated and resubmitted for test.

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