Standard Specification for Nickel-Alloy (UNS N06625, N06219 and N08825) Welded Pipe[1]

This standard is issued under the fixed designation B 705; 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 N06625,* UNS N06219* and UNS N08825* pipe in the annealed condition (temper) for general corrosion applications.

1.2 This specification covers pipe sizes in schedules shown in the Permissible Variations in Outside Diameter and Wall Thickness for Welded Pipe table of Specification B 775.

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 methods portion, Section 8, 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 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:*[2]

B 751 Specification for General Requirements for Nickel and Nickel Alloy Welded Tube

B 775 Specification for General Requirements for Nickel and Nickel Alloy Welded Pipe

B 880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys

2.2 *ASME Boiler and Pressure Vessel Code:*[3]

Section IX Welding and Brazing Qualifications

3. General Requirement

3.1 Material furnished in accordance with this specification shall conform to the applicable requirements of the current edition of Specification B 775 unless otherwise provided herein.

4. Definition of Terms

4.1 *Class 1*—Welded, cold-worked, annealed, and nondestructively tested in accordance with 9.1.

4.2 *Class 2*—Welded, cold-worked, annealed, and nondestructively tested in accordance with 9.2.

4.3 *Grade 1*—Annealed condition, relevant for UNS N06625.

4.4 *Grade 2*—Solution annealed condition, relevant for UNS N06625.

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:

5.1.1 Alloy name or UNS number,

5.1.2 ASTM designation,

5.1.3 *Dimensions*:

5.1.3.1 Pipe size,

5.1.3.2 Length (specific or random),

5.1.4 Class (see 3),

5.1.5 Grade if UNS N06625 is specified. If neither grade of N06625 is specified, grade 1 will be supplied.

5.1.6 Quantity (feet or number of pieces),

5.1.7 *Certification*— State if certification is required,

5.1.8 *Samples for Product (Check) Analysis*—State whether samples for product (check) analysis should be furnished (7.2), and

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

5.1.9 *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 witnesses.

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

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

7. Chemical Composition

7.1 The material shall conform to the composition limits specified in Table 1. One test per lot shall be performed.

7.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations per Specification B 880.

8. Mechanical Properties and Other Requirements

8.1 *Mechanical Properties*—The material shall conform to the mechanical properties specified in Table 2. One pipe per lot shall be examined.

8.2 *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. One pipe per lot shall be examined.

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

8.3 *Transverse Guided Bend Test*:

8.3.1 At the option of the pipe manufacturer, the transverse guided bend test may be substituted in lieu of the flattening test. Two bend specimens shall be taken transversely from pipe or the test specimens may be taken from a test plate of the same material and heat as pipe, which is attached to the end of the cylinder and welded as a prolongation of the pipe longitudinal seam. Except as provided in 8.3.2, one shall be subjected to a face guided bend and a second to a root guided bend test. One specimen shall be bent with the inside surface of the pipe against the plunger and the other with the outside surface of the pipe against the plunger. Guided bend test specimens shall be prepared and tested in accordance with Section IX, Part QW 160 of the ASME Boiler and Pressure Vessel Code and shall be one of the types shown in QW462.2 and QW462.3 of that code. One bend test (two bend specimens) per lot shall be examined.

8.3.2 For specified wall thicknesses ⅜ in. (9.5 mm) and over, but less than ¾ in. (19 mm) side bend tests may be made instead of the face and root bend tests. For specified wall thicknesses ¾ in. (19) and over, both specimens shall be subjected to the side bend tests. Side bend specimens shall be bent so that one of the side surfaces becomes the convex surface of the bend specimen.

8.3.3 The bend test shall be acceptable if no cracks or other defects exceeding ⅛ in. (3 mm) in any direction be present in the weld metal or between the weld and the pipe or plate metal after bending. Cracks which originate along the edges of the specimen during testing, and are less than ¼ in. (6.5 mm) measured in any direction shall not be considered.

TABLE 1 Chemical Requirements

	Composition Limits, %		
	UNS N06625	UNS N06219	UNS N08825
Ni	58.0 min[A]	Bal	38.0–46.0
Cr	20.0–23.0	18.0-22.0	19.5–23.5
Fe	5.0 max	2.0-4.0	22.0 min[A]
Mo	8.0–10.0	7.0-9.0	2.5 3.5
Cb + Ta	3.15–4.15	...	...
C	0.10 max	0.05 max	0.05 max
Mn	0.50 max	0.50 max	1.0 max
Si	0.5 max	0.70-1.10	0.5 max
P	0.015 max	0.020 max	...
S	0.015 max	0.010 max	0.03 max
Al	0.4 max	0.50 max	0.2 max
Ti	0.40 max	0.50 max	0.6–1.2
Co (if determined)	1.0 max	1.0 max	...
Cu	...	0.50 max	1.5–3.0

[A] Element may be determined arithmetically by difference.

TABLE 2 Mechanical Property Requirements

Alloy	Grade	Tensile Strength min, psi (MPa)	Yield Strength 0.2 % Offset, min, psi (MPa)	Elongation in 2 in. or 50 mm, min, %
UNS N06625	1 (annealed)	120 000 (827)	60 000 (414)	30
UNS N06625	2 (solution annealed)[A]	100 00 (690)	40 000 (276)	30
UNS N06219		96 000 (660)	39 000 (270)	30
UNS N08825		85 000 (586)	35 000 (240)	30

[A] Solution annealed at 2000°F (1093°C) minimum, with or without subsequent stablization anneal at 1800°F (982°C) minimum to increase resistance to sensitization.

9. Nondestructive Testing

9.1 *Class 1*—Each piece in each lot shall be subjected to one of the following four tests: hydrostatic, pneumatic (air underwater), eddy current, or ultrasonic.

9.2 *Class 2*—Each piece in each lot shall be subjected to a leak test and an electric test as follows:

9.2.1 *Leak Test*—Hydrostatic or pneumatic (air underwater).

9.2.2 *Electric Test*— Eddy current or ultrasonic.

9.3 The manufacturer shall have the option to test to Class 1 or 2 and select the nondestructive test methods, if not specified by the purchaser.

10. Product Marking

10.1 In addition to the requirements of Specification B 751, UNS N06625 tubes shall be marked with grade information.

11. Keywords

11.1 N06219; N06625; N08825; welded pipe

SUMMARY OF CHANGES

Committee B02 has identified the location of selected changes to this standard since the last issue (B 705 – 03) that may impact the use of this standard.

(1) Added Transverse Guided Bend Test option.