Designation: ~~B983 – 13~~ B983 – 13a

Standard Specification for Precipitation Hardened or Cold Worked, Seamless Nickel Alloy Pipe and Tube[1]

This standard is issued under the fixed designation B983; 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~~ Scope*

1.1 This specification covers high strength, seamless pipe and tube of nickel alloys (UNS N07022, UNS N07725, UNS N07740, UNS N09945, UNS N09925, UNS N07718, UNS N10276, UNS N06985)[2] as shown in Table 1.

1.2 Pipe and tube shall be supplied in the cold worked or cold worked and precipitations hardened or solution annealed plus precipitation hardened and descaled conditions. When atmosphere control is used, descaling is not necessary.

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 *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:*[3]

B829 Specification for General Requirements for Nickel and Nickel Alloys Seamless Pipe and Tube
B899 Terminology Relating to Non-ferrous Metals and Alloys
E8 Test Methods for Tension Testing of Metallic Materials
E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

3. Terminology

3.1 Terms shall be defined in accordance with Terminology B899.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *average diameter, n*—See Terminology B899.

3.2.2 *pipe, n*—See Terminology B899 and Specification B829.

3.2.3 *tube, n*—See Terminology B899.

4. General Requirements

4.1 Material furnished under this specification shall conform to the applicable requirements of Specification B829 unless otherwise provided herein.

5. Ordering Information

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

5.1.1 *Alloy*—Table 1.

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[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 SAE J1086, 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.

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

TABLE 1 Chemical Requirements

Element	UNS N07022	UNS N07725	UNS N07740	UNS N09945	UNS N09925	UNS N07718	UNS N10276	UNS N06985
Carbon	0.010 max	0.03 max	0.005-0.08	0.005-0.04	0.03 max	0.08 max	0.02 max	0.015 max
Manganese	0.5 max	0.35 max	1.0 max	1.0 max	1.00 max	0.35 max	1.0 max	1.0 max
Silicon	0.08 max	0.20 max	1.0 max	0.5 max	0.50 max	0.35 max	0.08 max	1.0 max
Phosphorous	0.025 max	0.015 max	0.03 max	0.03 max	...	0.015 max	0.030 max	0.04 max
Sulfur	0.015 max	0.010 max	0.03 max	0.03 max	0.030 max	0.015 max	0.030 max	0.03 max
Chromium	20.0-21.4	19.0-22.5	23.5-25.5	19.5-23.0	19.5-23.5	17.0-21.0	14.5-16.5	21.0-23.5
Cobalt	1.0 max	...	15.0-22.0	...	...	1.0 max	2.5 max	5.0 max
Molybdenum	15.5-17.4	7.00-9.50	2.0 max	3.0-4.0	2.50-3.50	2.80-3.30	15.0-17.0	6.0-8.0
Columbium	...	2.75-4.00	...	2.4-4.5	0.50 max	4.75-5.50	...	...
Titanium	...	1.00-1.70	0.5-2.5	0.5-2.5	1.90-2.40	0.65-1.15	...	...
Aluminum	0.5 max	0.35 max	0.2-2.0	0.01-0.7	0.10-0.50	2.20-0.80	...	...
Zirconium	...	...	...	...	...	...	...	...
Boron	0.006 max	...	0.0006–0.006	...	...	0.006 max	...	...
Iron	1.8 max	Remainder[B]	3.0 max	Remainder[B]	22.0 min[A]	Remainder[B]	4.0-7.0	18.0-21.0
Copper	0.5 max	...	0.50 max	1.5-3.0	1.50-3.00	0.30 max	...	1.5-2.5
Nickel	Remainder[B]	55.0–59.0	Remainder[B]	45.0-55.0	38.0-46.0	50.0-55.0	Remainder[B]	Remainder[B]
Tantalum	0.2 max	...	...	...	...	...	...	...
Tungsten	0.8 max	...	...	...	...	...	3.0-4.5	1.5 max
Columbium + Tantalum	...	...	0.50–2.5	...	...	...	...	0.50 max
Vanadium	...	...	...	...	...	...	0.35 max	...

[A] Minimum: The element may be determined arithmetically by difference.
[B] Remainder: The element may be determined arithmetically by difference.

TABLE 4 Permissible Variations for Outside Diameter and Wall Thickness of Hot-Finished Tube[A]

Nominal Outside Diameter, in. (mm)	Outside Diameter, in. (mm)		Permissible Variations, % of Thickness of Specified Nominal Wall		% of Thickness of Specified Minimum Wall	
	Plus	Minus	Plus	Minus	Plus	Minus
¾ (19) to 1½ (38), incl	0.015 (0.4)	0.031 (0.8)	12.5	12.5	28.5	0
Over 1½ (38.1) to 4 (102), incl	0.031 (0.8)	0.031 (0.8)	12.5	12.5	28.5	0
Over 4 (102) to 9¼ (235), incl	0.062 (1.6)	0.031 (0.8)	12.5	12.5	28.5	0
Over 9¼ (235) to 12 (305), incl	0.110 (2.8)	0.110 (2.8)	12.5	12.5	...	...

[A] *Ovality*—Tube 5 in. (127 mm) and under in outside diameter, the tolerance on the outside diameter applies for individual measurements and includes ovality. Tube 5 in. (127 mm) in outside diameter, the mean outside diameter shall conform to the permissible variations of this table and individual measurements shall not exceed twice the permissible variations of this table.

TABLE 5 Permissible Variations for Outside Diameter and Wall Thickness of Seamless Hot-Worked Pipe[A,B]

Nominal Outside Diameter, in. (mm)	Outside Diameter, in. (mm)		Permissible Variations, % of Thickness of Specified Nominal Wall		% of Thickness of Specified Minimal Wall	
	Plus	Minus	Plus	Minus	Plus	Minus
1 (25) to 1.900 (48), incl	0.015 (0.40)	0.031 (0.79)	16.0	12.5	28.5	0
Over 1.900 (48) to 4½ (114), incl	0.031 (0.79)	0.031 (0.79)	16.0	12.5	28.5	0
Over 4½ (114) to 6½ (165), incl	0.047 (1.2)	0.047 (1.2)	16.0	12.5	28.5	0
Over 6½ (165) to 9¼ (235), incl	0.062 (1.6)	0.062 (1.6)	16.0	12.5	28.5	0
Over 9¼ (235) to 14 (356), incl	0.120 (30.5)	0.120 (3.05)	16.0	12.5	...	...
Over 14 (356) to 24 (610), incl	0.20 (5.08)	0.20 (5.08)	16.0	12.5	...	...

[A] *Ovality*—For pipe 5 in. (127 mm) and under in outside diameter, the tolerance on the outside diameter applies for individual measurements and includes ovality. For pipe over 5 in. (125 mm) in outside diameter, the mean outside diameter shall conform to the permissible variations of this table and individual measurements shall not exceed twice the permissible variations of this table.
[B] *Eccentricity*—The permissible variations in this table apply to individual measurements including eccentricity.

5.1.1.1 *Heat Treatment or Cold Work or Type* (Table 2 and Table 3.)
5.1.2 *Dimensions:*
5.1.2.1 *Tube*—Outside diameter, minimum or average wall thickness, and length.
5.1.2.2 *Pipe*—Standard pipe size and schedule (Specification B829).
5.1.3 *Ends*—Plain ends cut and deburred will be furnished.
5.1.4 *Certification*—State if certification or a report of test results is required (Section ~~15~~16).
5.1.5 *Samples for Check Analysis*—State whether samples for check analysis should be furnished.
5.1.6 *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~~15).