Designation: ~~B710 – 20~~ B710 – 20a

Standard Specification for Nickel-Iron-Chromium-Silicon Alloy Welded Pipe[1]

This standard is issued under the fixed designation B710; 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[2] covers alloys UNS N08330 and UNS N08332 in the form of welded pipe intended for heat-resisting applications and general-corrosive service.

1.2 The pipe covered is nominal pipe sizes up to and including size 12, with the nominal wall thicknesses given as Schedules 5S, 10S, 40S, and 80S. Table 2 of Specification B775 is based on Table A1 of ANSI B36.19 and gives the nominal dimension of these sizes. Table 3 of Specification B775 lists the dimensional requirements of these sizes. Pipe having other dimensions may be furnished provided such pipe complies with all other requirements of this specification.

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, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

B536 Specification for Nickel-Iron-Chromium-Silicon Alloys Plate, Sheet, and Strip
B775 Specification for General Requirements for Nickel and Nickel Alloy Welded Pipe
B899 Terminology Relating to Non-ferrous Metals and Alloys

2.2 *ANSI Standard:*[4]

ANSI B36.19 Stainless Steel Pipe

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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.

Current edition approved ~~April 1, 2020~~Oct. 1, 2020. Published ~~April 2020~~November 2020. Originally approved in 1982. Last previous edition approved in ~~2015~~2020 as ~~B710 – 04 (2015).~~B710 – 20. DOI: ~~10.1520/B0710-20.~~10.1520/B0710-20A.

[2] For ASME Boiler and Pressure Vessel Code applications, see related Specification SB710 in Section 11 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.

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

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

3. Terminology

3.1 *Definitions*—Definitions for terms defined in Terminology B899 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 B775 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 (nominal pipe size and schedule),

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 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 pipe shall be made from flat-rolled alloy conforming to Specification B536, 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 either in both weld and base metal or in weld metal only.

TABLE 2 Mechanical Properties

Alloy	Condition	Tensile Strength, min, psi (MPa)	Yield Strength, 0.2 % offset, min, psi (MPa)	Elongation in 2 in. or 50 mm, or 4*D*, min,%	Hardness[A]
UNS N08330	annealed	70 000 (483)	30 000 (207)	30	70 to 90 HRB
UNS N08332	annealed	67 000 (462)	27 000 (186)	30	65 to 88 HRB

[A] Hardness values are informative only and not to be construed as the basis for acceptance.

6.2 *Heat Treatment*—Pipe of UNS N08330 alloy shall be annealed at 1900°F (1040°C), minimum. Pipe of UNS N08332 alloy shall be annealed at 2100°F (1150°C), minimum.

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 in Specification B775.

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 1 of Specification B775.

TABLE 1 Chemical Requirements

Element	Composition Limits, %	
	~~C~~	~~...[A]~~
~~Mn~~	~~2.00 max~~	
~~P~~	~~0.03 max~~	
~~S~~	~~0.03 max~~	
~~Si~~	~~0.75–1.50~~	
~~Cr~~	~~17.0–20.0~~	
~~Ni~~	~~34.0–37.0~~	
~~Cu~~	~~1.00 max~~	
~~Pb~~	~~0.005 max~~	
~~Sn~~	~~0.025 max~~	
Fe	remainder[B]	

TABLE 1 Chemical Requirements[A]

Element	Composition Limits, %	
	UNS N08330	UNS N08832
C	0.08	0.05 – 0.10
Mn	2.00	2.00
P	0.03	0.03
S	0.03	0.03
Si	0.75 – 1.50	0.75 – 1.50
Cr	17.0 – 20.0	17.0 – 20.0
Ni	34.0 – 37.0	34.0 – 37.0
Cu	1.00	1.00
Pb	0.005	0.005
Sn	0.025	0.025
Ti	...	0.20 – 0.60
Fe	remainder[B]	remainder[B]

[A] ~~Alloy UNS N08330: 0.08 max. Alloy UNS N08332: 0.05–0.10.~~ Maximum unless range or minimum is given. Where ellipses (...) appear in this table, there is no requirement and analysis for the element need not be determined or reported.
[B] Element shall be determined arithmetically by difference.

8. Mechanical Properties and Other Requirements

8.1 *Mechanical Properties*—The material shall conform to the mechanical property requirements specified in Table 2. One test is required for each lot as defined in Specification B775.

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

8.3 *Nondestructive Test Requirements*—Each pipe 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.

8.4 *Grain Size*—Annealed alloy UNS N08332 shall conform to an average grain size of ASTM No. 5 or coarser.

9. Lengths

9.1 Lengths may be ordered as either random lengths (normally 15 to 24 ft (4.6 to 8.3 m), with some agreed upon allowance for shorts) or specific cut lengths.

10. Keywords

10.1 high-temperature alloy; welded pipe; UNS N08330; UNS N08332