Designation: B775/B775M – 16

Standard Specification for General Requirements for Nickel and Nickel Alloy Welded Pipe[1]

This standard is issued under the fixed designation B775/B775M; 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 contains various requirements that, with the exception of Section 5 and Section 10, are mandatory requirements to the following ASTM nickel and nickel alloy, longitudinally welded piping specifications:[2]

Title of Specification	ASTM Designation[2]
Welded UNS N08020 Alloy Pipe	B464/B464M
Welded Nickel-Iron-Chromium Alloy Pipe	B514
Welded Nickel-Chromium-Iron-Alloy (UNS N06600, UNS N06603, UNS N06025 and UNS N06045) Pipe	B517
Welded Nickel and Nickel-Cobalt Alloy Pipe	B619/B619M
UNS N08904, UNS N08925, and UNS N08926 Welded Pipe	B673
UNS N08367 Welded Pipe	B675
Nickel-Alloy (UNS N06625, N06219, and N08825) Welded Pipe	B705
Ni-Cr-Mo-Co-W-Fe-Si Alloy (UNS N06333) Welded Pipe	B723
Welded Nickel (UNS N02200/UNS N02201) and Nickel Copper Alloy (UNS N04400) Pipe	B725

1.2 One or more of the test requirements of Section 5 apply only if specifically stated in the product specification or in the purchase order.

1.3 In case of conflict between a requirement of the product specification and a requirement of this general specification, only the requirement of the product specification needs to be satisfied.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *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 Safety Data Sheet (SDS) 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]

B168 Specification for Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, N06045, and N06696), Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617), and Nickel-Iron-Chromium-Tungsten Alloy (UNS N06674) Plate, Sheet, and Strip

B464/B464M Specification for Welded UNS N08020 Alloy Pipe

B514 Specification for Welded Nickel-Iron-Chromium Alloy Pipe

B517 Specification for Welded Nickel-Chromium-Iron-Alloy (UNS N06600, UNS N06603, UNS N06025, and UNS N06045) Pipe

B619/B619M Specification for Welded Nickel and Nickel-Cobalt Alloy Pipe

B673 Specification for UNS N08925, UNS N08354, and UNS N08926 Welded Pipe

B675 Specification for UNS N08367 Welded Pipe

B705 Specification for Nickel-Alloy (UNS N06625, N06219 and N08825) Welded Pipe

B723 Specification for Nickel-Chromium-Molybdenum-Cobalt-Tungsten-Iron-Silicon Alloy (UNS N06333) Welded Pipe

B725 Specification for Welded Nickel (UNS N02200/UNS N02201) and Nickel Copper Alloy (UNS N04400) Pipe

B880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys

B899 Terminology Relating to Non-ferrous Metals and Alloys

E8 Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E29 Practice for Using Significant Digits in Test Data to

[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 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**

Determine Conformance with Specifications
E39 Methods for Chemical Analysis of Nickel (Withdrawn 1995)[3]
E76 Test Methods for Chemical Analysis of Nickel-Copper Alloys (Withdrawn 2003)[3]
E112 Test Methods for Determining Average Grain Size
E213 Practice for Ultrasonic Testing of Metal Pipe and Tubing
E426 Practice for Electromagnetic (Eddy-Current) Examination of Seamless and Welded Tubular Products, Titanium, Austenitic Stainless Steel and Similar Alloys
E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)
E571 Practice for Electromagnetic (Eddy-Current) Examination of Nickel and Nickel Alloy Tubular Products
E1473 Test Methods for Chemical Analysis of Nickel, Cobalt and High-Temperature Alloys

2.2 *ANSI Standards:*[4]
B1.20.1 Pipe Threads
B36.10 Welded and Seamless Wrought Steel Pipe
B36.19 Stainless Steel Pipe

2.3 *Other Documents:*[5]
ASME Boiler and Pressure Vessel Code Section IX – Welding and Brazing Qualifications

2.4 *SAE:*[6]
SAE J 1086 Practice for Numbering Metals and Alloys (UNS)

3. Terminology

3.1 *Definitions* — Definitions for terms defined in Terminology B899 shall apply unless otherwise defined by the requirements of this document.

3.1.1 *average diameter, n*—the average of the maximum and minimum outside diameters, as determined at any one cross section of the pipe.

3.1.2 *nominal wall, n*—a specified wall thickness with a plus or minus tolerance from the specified thickness.

3.1.3 *welded pipe, n*—a round hollow produced by forming flat stock and joining the single longitudinal seam by welding, and produced to the particular dimensions commercially known as pipe sizes (NPS).

4. Chemical Composition

4.1 In case of disagreement, the chemical composition shall be determined in accordance with the following methods:

UNS No. Prefixes	ASTM Method
N02	E39
N04	E76
N06, N08	E1473

4.2 The ladle analysis of the material shall conform to the chemical requirements prescribed by the individual product specification.

4.3 The product (check) analysis of the material shall meet the requirements for the ladle analysis within the tolerance limits prescribed in Specification B880.

5. Test Requirements

5.1 *Flattening Test:*

5.1.1 A length of pipe not less than 4 in. [102 mm], shall be flattened 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.

5.1.2 The flattened specimen shall not exhibit cracks.

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

5.2 *Transverse Guided-Bend Weld Test:*

5.2.1 For welded pipe made either with or without the addition of filler and at the option of the manufacturer, the transverse guided bend weld test may be substituted in lieu of the flattening test. Two bend test 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 the pipe, which is attached to the end of the cylinder and welded as a prolongation of the pipe longitudinal seam. Except as provided in 5.2.2, one shall be subject to a face guided bend test 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, Paragraph QW 160 of the ASME Boiler and Pressure Vessel Code and shall be one of the types shown in QW 463.1 of that code.

5.2.2 For wall thicknesses over ⅜ in. [10 mm] 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 mm] 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.

5.2.3 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 that are less than ¼ in. [6 mm] measured in any direction shall not be considered.

5.3 *Pressure (Leak Test):*

5.3.1 *Hydrostatic*—Each pipe shall be tested by the manufacturer to a minimum internal hydrostatic pressure of 1000 psi [7 MPa] provided that the fiber stress, calculated from the following equation, does not exceed the allowable fiber stress for the material:

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

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

[5] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

[6] Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, http://www.sae.org.

where:

P = hydrostatic test pressure, psi [MPa)],
S = allowable fiber stress, for material in the condition (temper) furnished as specified in the product specification (S is calculated as the lower of ⅔ of the specified minimum 0.2 % offset yield strength or ¼ of the specified minimum ultimate strength for the material),
t = minimum wall thickness permitted, in. [mm], including minus tolerance, if any, and
D = nominal outside diameter of the pipe, in. [mm].

5.3.1.1 The test pressure shall be held for a sufficient time to permit the entire length of the welded seam to be inspected.

5.3.2 *Pneumatic (Air Underwater Test)*—Each pipe shall be tested at a pressure of 150 psi [1 MPa]. The test pressure shall be held for a minimum of 5 s. Visual examination is to be made when the material is submerged and under pressure. The full length of pipe must be examined for leaks.

5.3.3 If any pipe shows leaks during hydrostatic or pneumatic testing, it shall be rejected.

5.4 *Nondestructive Electric Test:*

5.4.1 *Eddy Current Testing*—Testing shall be conducted in accordance with Practices E426 or E571. The eddy current examination reference in this specification has the capability of detecting significant discontinuities, especially of the short, abrupt type.

5.4.1.1 Unless otherwise specified by the purchaser, the calibration standard shall contain, at the option of the manufacturer, any one of the following discontinuities to establish a minimum sensitivity level for rejection. The discontinuity shall be placed in the weld if visible.

5.4.1.2 *Drill Hole*—A hole not larger than 0.031 in. [0.8 mm] diameter shall be drilled radially and completely through the wall, care being taken to avoid distortion of the material while drilling.

5.4.1.3 *Transverse Tangential Notch*—Using a round file or tool with a ¼ in. [6 mm] diameter, a notch shall be filed or milled on the pipe outside diameter tangential to the surface and transverse to the longitudinal axis of the material. Said notch shall have a depth not exceeding 12.5 % of the specified wall thickness of the material, or 0.004 in. [0.10 mm], whichever is greater.

5.4.2 *Ultrasonic Testing*—Testing shall be conducted in accordance with Practice E213. The ultrasonic examination referred to in this specification is intended to detect longitudinal discontinuities having a reflective area similar to or larger than the calibration reference notches specified in 5.4.2.1. The examination may not detect circumferentially oriented imperfections or short, deep defects.

5.4.2.1 For ultrasonic testing, longitudinal calibration notches shall be machined on the outside and inside diameter surfaces. The depth of the notches shall not exceed 12.5 % of the specified wall thickness or 0.004 in. [0.10 mm], whichever is greater. The notch shall be placed in the weld, if visible.

5.4.3 *Calibration Frequency*—The frequency of calibration checks shall be as follows:

5.4.3.1 At the beginning of each production run.

5.4.3.2 At least every four hours during testing.

5.4.3.3 At the end of each production run.

5.4.3.4 After any suspected equipment malfunction or work stoppage.

5.4.3.5 If, during any check, the equipment fails to detect the calibration defects, the instrument must be recalibrated and all material tested since the last satisfactory check shall be retested.

5.4.4 *Acceptance and Rejection*—Material producing a signal equal to or greater than the calibration defect shall be subject to rejection.

5.4.4.1 Test signals that are produced by imperfections that cannot be identified or that are produced by cracks or crack-like imperfections shall result in rejection of the pipe, subject to rework and retest.

5.4.4.2 If the imperfection is judged as not fit for use, the tube shall be rejected, but may be reconditioned and retested providing the wall thickness requirements are met. To be accepted, retested material shall meet the original electric test requirements.

5.4.4.3 If the imperfection is explored to the extent that it can be identified, and the pipe is determined to be fit for use, the material may be accepted without further testing providing the imperfection does not encroach on minimum wall thickness requirements.

5.5 *Tension Test*—Tension testing shall be conducted in accordance with Test Methods E8.

5.5.1 The material shall conform to the tensile properties prescribed in the individual product specification.

5.6 *Hardness Test*—Hardness testing shall be conducted in accordance with Test Methods E18.

5.7 *Grain Size*—The measurement of average grain size may be carried out by the planimetric method, the comparison method, or the intercept method described in Test Methods E112. In case of dispute, the "referee" method for determining average grain size shall be the intercept method.

5.8 For purposes of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed value or a calculated value shall be rounded in accordance with the rounding method of Practice E29:

Requirements	Rounded Unit for Observed or Calculated Value
Chemical composition and tolerances	nearest unit in the last right-hand place of figures of the specified limit
Tensile strength and yield strength	nearest 1000 psi [7 MPa]
Elongation	nearest 1 %

6. Dimensions and Permissible Variations

6.1 Dimensions of pipe are shown in Table 1.

6.1.1 Permissible variations in outside diameter and wall thickness are shown in Table 2.

6.2 *Length*—When material is ordered as cut-to-length, the length shall conform to the permissible variations prescribed in Table 3. When material is ordered to random lengths, the lengths and variations shall be agreed upon between the manufacturer and purchaser.

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

TABLE 1 Dimensions of Pipe

NOTE 1—The following table is a reprint of Table 1 of ANSI B36.19.

NOTE 2—The decimal thicknesses listed for the respective pipe sizes represent their nominal wall dimensions.

NPS Designator [mm]	Outside Diameter		Nominal Wall Thickness							
	in.	mm	Schedule 5S[A]		Schedule 10S[A]		Schedule 40S		Schedule 80S	
			in.	mm	in.	mm	in.	mm	in.	mm
⅛ [10.29]	0.405	10.29	...	...	0.049	1.24	0.068	1.73	0.095	2.41
¼ [13.72]	0.540	13.72	...	...	0.065	1.65	0.088	2.24	0.119	3.02
⅜ [17.15]	0.675	17.15	...	...	0.065	1.65	0.091	2.31	0.126	3.20
½ [21.34]	0.840	21.34	0.065	1.65	0.083	2.11	0.109	2.77	0.147	3.73
¾ [26.67]	1.050	26.67	0.065	1.65	0.083	2.11	0.113	2.87	0.154	3.91
1.0 [33.41]	1.315	33.40	0.065	1.65	0.109	2.77	0.133	3.38	0.179	4.55
1¼ [42.16]	1.660	42.16	0.065	1.65	0.109	2.77	0.140	3.56	0.191	4.85
1½ [48.26]	1.900	48.26	0.065	1.65	0.109	2.77	0.145	3.68	0.200	5.08
2 [60.22]	2.375	60.33	0.065	1.65	0.109	2.77	0.154	3.91	0.218	5.54
2½ [73.03]	2.875	73.03	0.083	2.11	0.120	3.05	0.203	5.16	0.276	7.01
3 [88.90]	3.500	88.90	0.083	2.11	0.120	3.05	0.216	5.49	0.300	7.62
3½ [101.60]	4.000	101.60	0.083	2.11	0.120	3.05	0.226	5.74	0.318	8.08
4 [114.30]	4.500	114.30	0.083	2.11	0.120	3.05	0.237	6.02	0.337	8.56
5 [141.30]	5.563	141.30	0.109	2.77	0.134	3.40	0.258	6.55	0.375	9.52
6 [168.28]	6.625	168.28	0.109	2.77	0.134	3.40	0.280	7.11	0.432	10.97
8 [219.18]	8.625	219.08	0.109	2.77	0.148	3.76	0.322	8.18	0.500	12.70
10 [273.05]	10.750	273.05	0.134	3.40	0.165	4.19	0.365	9.27	0.500[B]	12.70[B]
12 [323.85]	12.750	323.85	0.156	3.96	0.180	4.57	0.375[B]	9.52[B]	0.500[B]	12.70[B]
14 [355.60]	14.000	355.60	0.156	3.96	0.188[B]	4.78[B]	...	...	...	...
16 [406.40]	16.000	406.40	0.165	4.19	0.188[B]	4.78[B]	...	...	...	...
18 [457.20]	18.000	457.20	0.165	4.19	0.188[B]	4.78[B]	...	...	...	...
20 [508.00]	20.000	508.00	0.188	4.78	0.218[B]	5.54[B]	...	...	...	...
22 [558.80]	22.000	558.80	0.188	4.78	0.218[B]	5.54[B]	...	...	...	...
24 [609.60]	24.000	609.60	0.218	5.54	0.250	6.35	...	...	...	...
30 [762.00]	30.000	762.00	0.250	6.35	0.312	7.92	...	...	...	...

[A] Schedules 5S and 10S wall thicknesses do not permit threading in accordance with ANSI B1.20.1.
[B] These do not conform to ANSI B36.10.

TABLE 2 Permissible Variations in Outside Diameter[A,B] and Wall Thickness[C] For Welded Pipe

NPS Designator [mm]	Permissible Variations in Outside Diameter			
	Over		Under	
	in.	mm	in.	mm
⅛ [10.29] to 1½ [48.26], incl	1/64 (0.015)	0.4	1/32 (0.031)	0.8
Over 1½ [48.26] to 4 [114.30], incl	1/32 (0.031)	0.8	1/32 (0.031)	0.8
Over 4 [114.30] to 8 [219.18], incl	1/16 (0.062)	1.6	1/32 (0.031)	0.8
Over 8 [219.18] to 18 [457.20] , incl	3/32 (0.093)	2.4	1/32 (0.031)	0.8
Over 18 [457.20] to 26 [660.40], incl	⅛ (0.125)	3.2	1/32 (0.031)	0.8
Over 26 [660.40] to 34 [863.60], incl	5/32 (0.156)	4.0	1/32 (0.031)	0.8
Over 34 [863.60] to 48 [1219.20], incl	3/16 (0.187)	4.8	1/32 (0.031)	0.8

[A] These permissible variations in outside diameter apply only to material as finished at the mill before subsequent swaging, expanding, bending, polishing, or other fabricating operations.
[B] Ovality is the difference between the maximum and the minimum outside diameter measured at any one cross section. There is no additional tolerance for ovality on material having a nominal wall thickness for more than 3 % of the outside diameter. On this material, the average of the maximum and the minimum outside diameter measurements will fall within the outside diameter tolerance shown in Table 2. An additional ovality allowance of twice the outside diameter tolerance spreads shown in Table 2, applied ±½, is allowed for material having a nominal wall thickness of 3 % or less of the nominal outside diameter.
[C] The wall thickness variation shall not exceed ±12.5 % of the nominal wall thickness.

6.4 *Ends*—Ends shall be reasonably square and free from burrs.

TABLE 3 Permissible Variations in Cut Length[A]

Outside Diameter, in. [mm]	Length Tolerance, in. [mm]	
	Over	Under
Cold finished: all sizes	¼ [6.4]	0
Hot finished: all sizes	¼ [6.4]	0

[A] These permissible variations in length apply to pipe in straight lengths. They apply to cut lengths up to and including 24 ft [7.3 m]. For lengths over 24 ft [7.3 m], an additional over-tolerance of ⅛ in. [3.2 mm] for each 10 ft [3 m] or fraction thereof shall be permitted up to a maximum additional over-tolerance of ½ in. [12.7 mm].

7. Workmanship, Finish, and Appearance

7.1 The material shall be uniform in quality and temper, smooth, and free from imperfections that would render it unfit for use.

8. Sampling

8.1 *Lot Definition:*

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

8.1.2 A lot for all other testing shall consist of all material from the same heat, nominal size (excepting length), and condition (temper). When final heat treatment is in a batch-type furnace, a lot shall include only those pipes of the same size and the same heat that are heat-treated in the same furnace charge. When heat treatment is in a continuous furnace, a lot shall include all pipe of the same size and heat, heat-treated in the same furnace at the same temperature, time at temperature,

and furnace speed during one production run. At no time shall a lot consist of more than 20 000 lb [9070 kg].

8.1.2.1 Where material cannot be identified by heat, a lot shall consist of not more than 500 lb [227 kg] of material of the same alloy in the same condition (temper) and nominal size (excepting length).

NOTE 1—For tension, hardness and flattening test requirements, the term lot applies to all lengths prior to cutting.

8.2 *Test Material Selection:*

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

8.2.2 *Mechanical and Other Properties*—Samples of the material to provide test specimens for mechanical and other properties shall be taken from such locations in each lot as to be representative of that lot. Test specimens shall be taken from material in the final condition (temper).

9. Retests and Retreatment

9.1 *Retests*—If the results of the mechanical tests of any group or lot do not conform to the requirements specified in the individual specification, retests may be made on additional pipes of double the original number from the same group or lot, each of which shall conform to the requirements specified.

9.2 *Retreatment*—If the individual pipes or the pipes selected to represent any group or lot fail to conform to the test requirements, the individual pipes or the group or lot represented may be reheat treated and resubmitted for test. Not more than two reheat treatments shall be permitted.

10. Specimen Preparation

10.1 *Room Temperature Tensile Specimen:*

10.1.1 Material shall be tested in the direction of fabrication. Whenever possible, the pipe shall be tested in full cross section. When testing in full section is not possible, longitudinal strip specimens or the largest possible round section shall be used. In the event of disagreement when full section testing is not possible, a longitudinal strip specimen with reduced gage length as contained in Test Methods E8 shall be used.

10.2 *Hardness Specimen:*

10.2.1 The hardness specimen shall be prepared in accordance with Test Methods E18. The test shall be made on the inside diameter surface of a specimen cut from the end, or on the inside of the pipe near the end, at the option of the manufacturer.

10.3 *Grain Size:*

10.3.1 If required, the grain size specimen shall be a transverse sample representing full wall thickness.

11. Inspection

11.1 Witnessing of testing or inspection by the purchaser's representative shall be agreed upon by the purchaser and the manufacturer as part of the purchase contract.

12. Rejection and Rehearing

12.1 Material tested by the purchaser that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

13. Certification

13.1 When specified in the purchase contract, a manufacturer's certification shall be furnished to the purchaser stating that the material has been manufactured, tested and inspected in accordance with this specification, and that the test results on representative samples meet specification requirements. When specified in the purchase contract, a report of the test results shall be furnished.

14. Product Marking

14.1 *Material Marking:*

14.1.1 The name or brand of the manufacturer, the name of the material or UNS number, the letters ASTM, the product specification number, heat number, class (if applicable) and nominal pipe size shall be legibly marked on each piece ½ NPS [21.34 mm] and larger and lengths greater than 3 ft [914 mm]. The material marking shall be by any method that will not result in harmful contamination.

14.1.2 For material smaller than ½ NPS, or lengths under 3 ft [914 mm], the information specified in 14.1.1 shall be legibly marked on each piece or marked on a tag securely attached to the bundle or box in which the material is shipped, at the option of the manufacturer.

15. Packaging and Package Marking

15.1 The following information shall be marked on the material or included on the package, or on a label or tag attached thereto: name of the material or UNS number, heat number, condition (temper), the letters ASTM, the product specification number, the nominal pipe size, gross, tare, and net weight, consignor and consignee addresses, contract or order number, and such other information as may be defined by the purchase contract.

16. Repair by Welding

16.1 For welded pipe whose diameter equals or exceeds NPS 4, weld repairs made with the addition of compatible filler metal may be made to the weld seam with welding procedures and welding operators qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX.

16.2 Weld repairs of the weld seam shall not exceed 20 % of the seam length.

16.3 Weld repairs shall be made only with the gas tungsten-arc welding process using the same classification of bare filler rod qualified to the most current AWS Specification A5.14 as the grade of nickel alloy pipe being repaired and as shown in Table 4. Alternatively, subject to approval by the purchaser, weld repairs shall be made only with the gas tungsten-arc welding process using a filler metal more highly alloyed than the base metal when needed for corrosion resistance or other properties.

16.3.1 Any weld repair shall have subsequent NDE such as 100 % radiography or ultrasonic examination in accordance with 5.4.2 performed to ensure sound weld repair. Hydrostatic testing in accordance with 5.3.1 shall be performed after all weld repair.

16.3.2 Repair welding is applicable to as-welded and solution annealed pipe, only.

16.4 Where heat treatment is a requirement for the material grade the heat treatment shall be performed after repair welding.

16.5 Pipes that have had weld seam repairs with filler metal shall be uniquely identified and shall be so stated and identified on the certificate of tests. When filler metal other than that listed in Table 4 is used, the filler metal shall be identified on the certificate of tests.

TABLE 4 Pipe and Filler Metal Specifications[A]

Filler Metal Classification and UNS Designation for Applicable AWS Specification[B]			
UNS Designation	ASTM Pipe Specification	A5.14	
		Class	UNS
N02200	B725	ERNi-1	N02061
N02201	B725	[C]	
N04400	B725	ERNiCu-7	N04060
N06002	B619/B619M	ERNiCrMo-2	N06002
N06022	B619/B619M	ERNiCrMo-11	N06030
N06030	B619/B619M	ERNiCrMo-11 ERNiCrWMo-1	N06030
N06230	B619/B619M		N06231
N06600	B517	ERNiCr-3	N06082
N06601	B168	[C]	
N06625	B705	ERNiCrMo-3	N06625
N08825	B705	ERNiCrMo-3[D]	N06625
N10276	B619/B619M	ERNiCrMo-4	N10276
N10665	B619/B619M	ERNiMo-7	N10665
N10675	B619/B619M	ERNiMo-10	N10675

[A] Pipe alloys not listed on this table – consult material manufacturer for recommended filler metal.
[B] Designation established in accordance with Practice E527 and SAE J 1086.
[C] Filler metal used is highly dependent on intended service temperature; consult material manufacturer for specific filler metal for end use temperature.
[D] Recommended filler metal; this material is highly dependent on intended service temperature for best filler metal selection; consult material manufacturer for specific filler metal given the end use temperature.

17. Keywords

17.1 welded pipe

SUMMARY OF CHANGES

Committee B02 has identified the location of selected changes to this standard since the last issue (B775–15) that may impact the use of this standard. (Approved May 1, 2016.)

(1) Updated and added metric values.

Committee B02 has identified the location of selected changes to this standard since the last issue (B775–13) that may impact the use of this standard. (Approved October 1, 2015.)

(1) Added weld repair of weld seams and renumbered Sections 16 and 17.