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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Specification for Electric-Resistance-Welded Steel Pipe[1]

This standard is issued under the fixed designation A 135; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification[2] covers two grades of electric-resistance-welded steel pipe in NPS 2 to NPS 30 inclusive, with nominal (average) wall thickness up to 0.500 in. (12.70 mm), inclusive, and in nominal sizes NPS ¾ to NPS 5 inclusive with nominal (average) wall thickness 0.083 in. (2.11 mm) to 0.134 in. (3.40 mm), depending on size. Pipe having other dimensions (Note 1) may be furnished provided such pipe complies with all other requirements of this specification. The pipe is intended for conveying gas, vapor, water or other liquid; only Grade A is adapted for flanging and bending (Note 2). The suitability of pipe for various purposes is somewhat dependent upon its dimensions, properties, and conditions of service, so that the purpose for which the pipe is intended should be stated in the order. The pipe may be furnished either nonexpanded or cold expanded at the option of the manufacturer. When pipe is cold expanded, the amount of expansion shall not exceed 1.5 % of the outside diameter pipe size.

NOTE 1—A comprehensive listing of standardized pipe dimensions is contained in ANSI / ASME B 36.10M.

NOTE 2—This provision is not intended to prohibit the cold bending of Grade B pipe.

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

2. Referenced Documents

2.1 *ASTM Standards:*

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products[3,4,5]

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment[4]

A 751 Test Methods, Practices and Terminology for Chemical Analysis of Steel Products[3,4,5]

A 865 Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints[5]

A 941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys[5]

E 6 Terminology Relating to Methods of Mechanical Testing[6]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[7]

E 59 Practice for Sampling Steel and Iron for Determination of Chemical Composition[8]

E 213 Practice for Ultrasonic Examination of Metal Pipe and Tubing[9]

E 273 Practice for Ultrasonic Examination of Longitudinal Welded Pipe and Tubing[9]

E 309 Practice for Eddy-Current Examination of Steel Tubular Products Using Magnetic Saturation[9]

2.2 *ANSI Standards:*

B 1.20.1 Pipe Threads, General Purpose[10]

2.3 *Federal Standards:*

Fed. STD No. 123 Marking for Shipments (Civil Agencies)[11]

Fed. STD No. 183 Continuous Identification Marking of Iron and Steel Products[11]

2.4 *Military Standards:*

MIL-STD-129 Marking for Shipment and Storage[12]

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage[12]

2.5 *ANSI / ASME Standards:*

B 36.10M Welded and Seamless Wrought Steel Pipe[10,13]

3. Terminology

3.1 For definitions of terms relating to steel manufacturing and properties, refer to Terminology A 941.

[1] This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.09 on Carbon Steel Tubular Products.

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[2] For ASME Boiler and Pressure Vessel Code applications see related Specification SA-135 in Section II of that Code.

[3] *Annual Book of ASTM Standards*, Vol 01.03.

[4] *Annual Book of ASTM Standards*, Vol 01.05.

[5] *Annual Book of ASTM Standards*, Vol 01.01.

[6] *Annual Book of ASTM Standards*, Vol 03.01.

[7] *Annual Book of ASTM Standards*, Vol 14.02.

[8] Discontinued 1996; see *1995 Annual Book of ASTM Standards*, Vol 03.05.

[9] *Annual Book of ASTM Standards*, Vol 03.03.

[10] Available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

[11] Available from General Service Administration, Washington, DC 20405.

[12] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111–5094. Attn.: NOPD.

[13] Available from American Society for Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

3.2 For definitions of terms relating to mechanical testing, refer to Terminology E 6.

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *burr*, *n*—a rough or sharp edge left on pipe ends by cutting or sawing.

3.3.2 *lot*, *n*—all pipe of the same size, wall thickness and rolled length that is produced from the same heat of steel and subject to the same heat treatment.

3.3.3 *black thread*, *n*—a thread crease exhibiting the original pipe surface after machining.

4. Ordering Information

4.1 Orders for material under this specification should include the following, as required, to describe the desired material adequately:

4.1.1 Quantity (feet or number of lengths)

4.1.2 Name of material (electric-resistance-welded pipe),

4.1.3 Specification designation and year of issue,

4.1.4 Grade (see Table 1),

4.1.5 Size (nominal size, or outside diameter; and nominal wall thickness),

4.1.6 Length (specific or random, see 12.4),

4.1.7 End finish (plain or threaded, see 13.2),

4.1.7.1 Threaded and coupled, if specified,

4.1.7.2 Threads only, if specified,

4.1.7.3 Plain end, if specified,

4.1.8 Alternative electric test (see Section 11),

4.1.9 Tension test specimen (see Section 15),

4.1.10 Heat analysis, if required (see 6.1),

4.1.11 Certificate of compliance, if required (see Section 19), and

4.1.12 Special requirements.

5. Manufacture

5.1 The steel shall be made by either or both of the following processes: basic-oxygen or electric-furnace.

5.2 Steel may be cast in ingots or may be strand cast. When steels of different grades are essentially strand cast, identification of the resultant transition material is required. The producer shall remove the transition material by any established procedure that positively separates the grades.

5.3 The pipe shall be manufactured from flat rolled steel in individual lengths or in continuous length by electric-resistance or electric-induction welding without the addition of extraneous material.

5.4 The weld seam of electric-resistance welded pipe to Grade B pipe shall be heat treated after welding to a minimum temperature of 1000°F (540°C) or processed in such a manner that no untempered martensite remains.

6. Chemical Composition

6.1 The steel shall conform to the requirements prescribed in Table 2, based on the heat analysis. When specified in the order, the heat analyses shall be reported to the purchaser or a representative of the purchaser.

7. Product Analysis

7.1 An analysis may be made by the purchaser on samples of pipe selected at random and shall conform to the requirements specified in Table 2. Methods and Practices relating to chemical analysis shall be in accordance with Test Method, Practices, and Terminology A 751.

8. Mechanical Properties Requirements

8.1 *Tensile Properties*:

8.1.1 The material shall conform to the requirements as to tensile properties prescribed in Table 1.

8.1.2 The yield strength shall be determined by the offset method utilizing 0.2 % of the gage length or by the total extension under load method using 0.5 % of the gage length.

8.1.3 Table 3 gives the computed minimum elongation values for each 1/32-in. (0.8-mm) decrease in wall thickness. Where the wall thickness lies between two values shown in Table 3, the minimum elongation value shall be determined by the following equation, with the result rounded to the nearest whole number:

Grade	Equation
A	$E = 56t + 17.50$
B	$E = 48t + 15.00$

where:

E = elongation in 2 in. (50 mm), %, and

t = actual thickness of specimen, in.

8.2 The test specimen taken across the weld shall show a tensile strength not less than the minimum tensile strength specified for the grade of pipe ordered. This test will not be required for pipe under NPS 8.

9. Flattening Test

9.1 A specimen at least 4 in. (102 mm) in length shall be flattened cold between parallel plates in three steps with the weld located either 0° or 90° from the line of direction of force as required in 9.2. During the first step, which is a test for ductility of the weld, no cracks or breaks on the inside or outside surfaces shall occur until the distance between the plates is less than two thirds of the original outside diameter of the pipe. As a second step, the flattening shall be continued. During the second step, which is a test for ductility exclusive of the weld, no cracks or breaks on the inside or outside

TABLE 1 Tensile Requirements

	Grade A	Grade B
Tensile strength, min, ksi (MPa)	48 (331)	60 (414)
Yield strength, min, ksi (MPa)	30 (207)	35 (241)
Elongation in 2 in. (50 mm), min, %:		
Basic minimum elongation for walls 5/16 in. (7.9 mm) and over in thickness, longitudinal strip tests, and for all small sizes tested in full section.	35	30
For longitudinal strip tests, the width of the gage section shall be 1½ in. (38.1 mm) and a deduction for each 1/32-in. (0.8-mm) decrease in wall thickness below 5/16 in. (7.9 mm) from the basic minimum elongation of the following percentage points.	1.75 [A]	1.50 [A]

[A] Table 3 gives computed minimum values.