



Standard Specification for Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)¹

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1. Scope

1.1 This specification covers electric-fusion (arc)-welded straight seam or spiral seam steel pipe NPS 16 and over in diameter (inside or outside as specified by purchaser), with wall thicknesses up to $\frac{3}{4}$ in. (19.0 mm), inclusive. Pipe having other dimensions may be furnished provided such pipe complies with all other requirements of this specification.

NOTE 1—Acceptability for many services may be controlled by codes or standards such as those published by the American National Standards Institute and American Society of Mechanical Engineers.

NOTE 2—For testing methods not specifically covered in this specification, reference can be made to Test Methods and Definitions A 370, with particular reference to Annex A 2 on Steel Tubular Products.

NOTE 3—A comprehensive listing of standardized pipe dimensions is contained in ANSI B 36.10.

1.2 The values stated in inch-pound units are to be regarded as the standard.

NOTE 4—The dimensionless designator NPS (nominal pipe size) has been substituted in this standard for such traditional terms as “nominal diameter”, “size”, and “nominal size”.

1.3 The following precautionary caveat pertains specifically to Section 5 of this specification. *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- A 36/A 36M Specification for Carbon Structural Steel²
- A 283/A 283M Specification for Low and Intermediate Tensile Strength Carbon Steel Plates²
- A 285/A 285M Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength²

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 Annual Book of ASTM Standards, Vol 01.04.

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 570/A 570M Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality⁴

2.2 ASME Boiler and Pressure Vessel Code: Section IX Welding Qualifications⁵

2.3 American National Standards Institute Standard: B 16.25 Buttwelding Ends⁶

B 36.10 Welded and Seamless Wrought Steel Pipe⁶

3. Ordering Information

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

3.1.1 Quantity (feet, meters, or number of lengths),

3.1.2 Name of material (electric-fusion-(arc) welded pipe),

3.1.3 Grade (Section 4),

3.1.4 Size (inside or outside diameter and nominal wall thickness),

3.1.5 Length (specified or random),

3.1.6 Specific straightness requirements (see 12.3),

3.1.7 End finish (Section 15),

3.1.8 Hydrostatic test pressure (Section 11),

3.1.9 ASTM designation, and

3.1.10 End use of material.

4. Material

4.1 The steel from which the pipe is made shall conform to Specifications A 283/A 283M, A 285/A 285M, A 570 or A 36/A 36M or to other ASTM specifications for equally suitable weldable material, as specified: For purposes of marking and certification, when required, the pipe grade of material shall be established by the A xxx plate specification designation and plate grade, when applicable.

5. Manufacture

5.1 The longitudinal edges of the steel shall be shaped to give the most satisfactory results by the particular welding

³ Annual Book of ASTM Standards, Vol 01.01.

⁴ Annual Book of ASTM Standards, Vol 01.03.

⁵ Available from American Society of Mechanical Engineers, 345 E. 47th St. New York, NY 10017.

⁶ Available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

process employed. The steel shall then be properly formed and may be tacked preparatory to welding. The weld shall be made by automatic means (except tack welds) and shall be of reasonably uniform width and height for the entire length of the pipe. By agreement between the purchaser and the manufacturer, manual welding by qualified procedure and welders may be used as an equal alternate under this specification.

5.2 All longitudinal seams, spiral seams, and shop girth seams shall be butt-welded.

6. Number of Production Weld Tests

6.1 One weld test specimen specified in Section 8 shall be made from each lot of 3000 ft (900 m) of pipe or fraction thereof of each size and wall thickness.

6.2 If any test specimen shows defective machining or develops flaws not associated with the welding, it may be discarded and another specimen substituted.

6.3 Each length of pipe shall be subjected to the hydrostatic test specified in Section 11, unless otherwise specified in 11.3.

7. Retests

7.1 If any specimen tested in accordance with Section 10 fails to meet the requirements, retests of two additional specimens from the same lot of pipe shall be made, each of which shall meet the requirements specified. If any of the retests fail to conform to the requirements, test specimens may be taken from each untested pipe length at the manufacturer's option. Each specimen shall meet the requirements specified, or that pipe shall be rejected.

8. Test Specimens of Production Welds

8.1 The weld-test specimens for the reduced-section tension test shall be taken perpendicularly across the weld and from the end of the pipe or alternatively, from flat test pieces of material conforming to the requirements in the specifications used in the manufacturer of the pipe. The alternative weld-test specimens shall be welded with the same procedure and by the same operator and equipment, and in sequence with the welding of the longitudinal joints in the pipe. The test pieces shall have the weld approximately in the middle of the specimen. The specimens shall be straightened cold, and shall be tested at room temperature.

8.2 Reduced-section tension-test specimens shall be prepared in accordance with Fig. 21 of Test Methods and Definitions A 370.

9. Qualification of Welding Procedure

9.1 The welding procedure shall be qualified in accordance with the American Welding Society Standard Qualification Procedure⁷ or ASME Section IX of the Boiler and Pressure Vessel Code as agreed to between the manufacturer and the purchaser using the tests and test values specified in 9.2 and 9.3. Thicknesses less than $\frac{3}{8}$ in. (10 mm) shall be qualified for each wall thickness of pipe manufactured. Thicknesses $\frac{3}{8}$ to $\frac{3}{4}$ in. (10 mm to 19.0 mm), inclusive, shall be qualified in $\frac{3}{8}$ -in. (10-mm) thickness.

⁷ Available from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33135.

9.2 Two reduced-section tension specimens (transverse weld) made in accordance with Fig. 21 of Test Methods and Definitions A 370, with the weld reinforcement removed, shall show a tensile strength not less than 100 % of the minimum specified tensile strength of the base material used.

9.3 Two face-bend test specimens shall be prepared in accordance with Fig. 2 (a) of Test Methods and Definitions A 370 and shall withstand being bent 180° in a jig substantially in accordance with Fig. 30 of Test Methods and Definitions A 370. The bend test shall be acceptable if no cracks or other defects exceeding $\frac{1}{8}$ in. (3.2 mm) in any direction be present in the weld metal or between the weld and the pipe metal after bending. Cracks that originate along the edges of the specimens during testing and that are less than $\frac{1}{4}$ in. (6.3 mm) in any direction, shall not be considered.

10. Tensile Properties of Production Welds

10.1 Reduced-section tension test specimens required in Section 8 taken perpendicularly across the weld with the weld reinforcement removed, shall show a tensile strength not less than 95 % of the specified minimum strength of the steel. At the manufacturer's option, the test may be made without removing the weld reinforcement, in which case the tensile strength shall be not less than the specified minimum tensile strength for the grade of steel used.

11. Hydrostatic Test (Note 5)

11.1 Each length of pipe shall be tested by the manufacturer to a hydrostatic pressure that will produce in the pipe wall a stress of 60 % of the specified minimum yield point of the steel used at room temperature. The pressure shall be determined by the following equation:

$$P = 2St / D$$

where:

- P = minimum hydrostatic test pressure, psi (Note 6) (not to exceed 2800 psi (19 MPa)),
- S = 0.60 times the minimum specified yield point of the steel used, psi (MPa),
- t = specified wall thickness, in. (mm), and
- D = specified outside diameter, in. (mm).

NOTE 5—A hydrostatic sizing operation is not to be considered a hydrostatic test or a substitute for it.

NOTE 6—When the diameter and wall thickness of pipe are such that the capacity limits of testing equipment are exceeded by these requirements, the test pressures may be reduced by agreement between the purchaser and the manufacturer.

11.2 Test pressure shall be held for not less than 5 s, or for a longer time as agreed upon between the purchaser and the manufacturer.

NOTE 7—When agreed upon between the purchaser and the manufacturer and so stated on the order, pipe may be tested to one and one half times the specified working pressure, except that the maximum test pressure shall not exceed 2800 psi (19 MPa) nor shall the maximum fiber stress exceed 85 % of specified minimum yield point of steel or to a fiber stress that does not exceed 85 % of the specified minimum yield point of the steel or 2800-psi (19-MPa) test pressure.

11.3 When specified in the order, pipe may be furnished without hydrostatic testing and each length so furnished shall