SPECIFICATION FOR PIPE, STEEL, ELECTRIC-FUSION (ARC)-WELDED (SIZES NPS 16 AND OVER)

SA-134

(Identical with ASTM Specification A 134-93 except that the following additional requirement applies)

All products furnished under this SA specification are intended for application under the rules for ASME Section III for Class III piping. Furnishing of such products is limited to manufacturers who hold the appropriate ASME Code Symbol Stamp. Weld procedures, welder, and welding machine operators shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX. The product shall meet all applicable requirements of Class III Piping including those requirements pertaining to heat treatment and butt welds. *The plate used to fabricate the pipe shall conform to SA-283 or SA-285.* Authorized inspection at the point of manufacture, and application of the appropriate Code Symbol Stamp is required.

The applicable ASME Partial Data Report Form, signed by an Authorized Inspector, and a certified mill test report shall be furnished for each lot of pipe. The term "lot" applies to all pipe of the same mill heat of material and wall thickness which is heat treated in one furnace charge. For pipe which is not heat treated, or which is heat treated in a continuous furnace, a lot shall consist of each 200 ft (61 m) or fraction thereof of all pipe of the same mill heat of material and wall thickness, subjected to the same heat treatment. For pipe which is heat treated in a batch-type furnace which is automatically controlled within a 50°F range and equipped with recording pyrometers so that the heating records are available, a lot may be defined the same as for continuous furnaces. Each length of pipe shall be marked in such a manner as to identify each such piece with the lot and the certified mill test report.

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 A2 on Steel Tubular Products.

NOTE 3 — A comprehensive listing of standardized pipe dimensions is contained in ANSI B36.10.

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 Structural Steel

A 283/A 283M Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

A 285/A 285M Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength

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A 370 Test Methods and Definitions for Mechanical Testing of Steel Products
A 570/A 570M Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality

2.2 *ASME Boiler and Pressure Vessel Code:*
Section IX Welding Qualifications

2.3 *American National Standards Institute Standard:*
B16.25 Buttwelding Ends
B36.10 Welded and Seamless Wrought Steel Pipe

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, metres, 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 14),

3.1.8 Hydrostatic test pressure (Section 8),

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 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. Qualification of Welding Procedure

6.1 The welding procedure shall be qualified in accordance with the American Welding Society Standard Qualification Procedure 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 6.2 and 6.3. Thicknesses less than $^{3}/_{8}$ in. (10 mm) shall be qualified for each wall thickness of pipe manufactured. Thicknesses $^{3}/_{8}$ to $^{3}/_{4}$ in. (10 mm to 19.0 mm), inclusive, shall be qualified in $^{3}/_{8}$ in. (10 mm) thickness.

6.2 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.

6.3 Two face-bend test specimens shall be prepared in accordance with Fig. 29 (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 $^{1}/_{8}$ 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 $^{1}/_{4}$ in. (6.3 mm) in any direction, shall not be considered.

7. Tensile Properties of Production Welds

7.1 Reduced-section tension test specimens required in Section 9 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

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be not less than the specified minimum tensile strength for the grade of steel used.

8. Hydrostatic Test (Note 5)

8.1 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 pressure may be reduced by agreement between the purchaser and the manufacturer.

8.2 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.

8.3 When specified in the order, pipe may be furnished without hydrostatic testing and each length so furnished shall include the mandatory marking of the letters "NH." Additionally, the certification, when required, shall state "Not Hydrostatically Tested" and the specification number and material grade, as shown on the certification, shall be followed by the letters "NH."

9. Test Specimens of Production Welds

9.1 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 manufacture 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.

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

10. Number of Production Weld Tests

10.1 One weld test specimen specified in Section 9 shall be made from each lot of 3000 ft (900 m) of pipe or fraction thereof of each size and wall thickness.

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

10.3 Each length of pipe shall be subjected to the hydrostatic test specified in Section 8, unless otherwise specified in 8.3.

11. Retests

11.1 If any specimen tested in accordance with Section 7 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.

12. Permissible Variations in Weights and Dimensions

12.1 *Thickness and Weight* — The wall thickness and weight for welded pipe under this specification shall be governed by the requirements of the specifications to which the steel was ordered.

12.2 *Circumference* — The outside circumference of the pipe shall not vary more than ±0.5% from the nominal outside circumference based upon the diameter specified, except that the circumference at ends shall be sized, if necessary, to meet the requirements of Section 14.

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12.3 *Straightness* — Finished pipe shall be commercially straight. When specific straightness requirements are desired, the order should so state, and the tolerances shall be a matter of agreement between the purchaser and the manufacturer.

12.4 *Ovality — Out-of-roundness* — The difference between major and minor outside diameter shall not exceed 1%. Closer tolerances may be established by agreement between the manufacturer and the purchaser. Where the *D/T* (outside diameter/wall thickness) is over 120, internal bracing should be utilized to achieve sizing of ends and ovality shall be by agreement between the manufacturer and the purchaser.

13. Lengths

13.1 Pipe lengths shall be supplied in accordance with the following regular practice:

13.1.1 The lengths shall be specified on the order with a tolerance of $\pm 1/2$ in. (13 mm), except that the shorter lengths from which test coupons have been cut may also be shipped.

13.1.2 When random lengths are specified, pipe shall be furnished in lengths having a minimum average of 29 ft (9 m) with a minimum length of 20 ft (6 m), but not more than 5% may be under 25 ft (8 m).

13.2 Pipe lengths containing circumferentially welded joints (Note 8) shall be permitted by agreement between the manufacturer and the purchaser. Tests of these welded joints shall be made in accordance with the procedure tests specified in Section 6 and the production weld tests specified in Section 7. The number of production weld tests shall be one per each lot of 100 joints or fraction thereof, but not less than one for each welder or welding operator.

NOTE 8 — Joints are defined for the purpose of this specification as a circumferential welded seam lying in one plane, used to join lengths of straight pipe.

14. Ends

14.1 Pipe shall be furnished with a plain right-angle cut or with bevel ends as specified. All burrs at the ends of pipe shall be removed.

14.1.1 Unless otherwise specified, pipe with beveled ends shall meet the requirements of ANSI B16.25.

14.2 Unless otherwise specified, the outside circumference of pipe ends for a distance of not less than 4 in. (100 mm) shall not vary more than ±60% of the nominal wall thickness of the pipe from the nominal outside circumference based on the diameter specified, except that the tolerance shall not be less than $\pm 3/16$ in. (5 mm).

14.3 By agreement between the manufacturer and the purchaser the ends of the pipe may be sized within agreed-upon tolerances if necessary to meet the requirements of special installations.

15. Finish

15.1 *Repair by Welding* — The welding of injurious defects in the pipe wall, provided their depth does not exceed one third the specified wall thickness, will be permitted. Defects in the welds, such as sweats or leaks, shall be repaired or the piece rejected at the option of the manufacturer. Repairs of this nature shall be made by completely removing the defect, cleaning the cavity, and then welding.

15.2 All repaired pipe shall be tested hydrostatically in accordance with Section 8, unless otherwise specified in 8.3.

16. Inspection

16.1 The inspector representing the purchaser shall have entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspection shall be made at the place of manufacture prior to shipment and unless otherwise specified, shall be so conducted as not to interfere unnecessarily with the operation of the works. If agreed upon, the manufacturer shall notify the purchaser in time so that he may have his inspector present to witness any part of the manufacture or tests that may be desired. The certification shall include reference to this specification and pipe grade (ASTM plate specification designation and plate grade, when applicable).

16.2 *Certification* — Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufactured and tested in accordance with this specification together with a report of the chemical and tensile tests shall be furnished. When hydrostatic test is omitted, the certificate shall include the letters "NH. "

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17. Rejection

17.1 Each length of pipe received from the manufacturer may be inspected by the purchaser and, if it does not meet the requirements of this specification based on the inspection and test method as outlined in the specification, the length may be rejected, and the manufacturer shall be notified. Disposition of rejected pipe shall be a matter of agreement between the manufacturer and the purchaser.

17.2 Pipe found in fabrication or in installation to be unsuitable for the intended use, under the scope and requirements of this specification, may be set aside and the manufacturer notified. Such pipe shall be subject to mutual investigation as to the nature and severity of the deficiency and the forming or installation, or both, conditions involved. Disposition shall be a matter for agreement between the purchaser and the manufacturer.

18. Certification

18.1 Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufactured and tested in accordance with this specification, including year date, together with a report of the chemical and tensile tests shall be furnished. The pipe grade shall be identified by the plate specification designation (year date not required) and the plate grade (where applicable).

19. Product Marking

19.1 Each section of pipe shall be marked with the manufacturer's distinguishing marking, this specification number and the pipe grade. The marking need not include the year date of the pipe or plate specification.

19.2 *Bar Coding* — In addition to the requirements in 19.1, bar coding is acceptable as a supplementary identification method. Bar coding should be consistent with the Automotive Industry Action Group (AIAG) standard prepared by the Primary Metals Subcommittee of the AIAG Bar Code Project Team.

20. Protective Coating

20.1 If agreed upon between the purchaser and the manufacturer, the pipe shall be given a protective coating of the kind and in the manner specified by the purchaser.

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