



Designation: A1097/A1097M – 22

Standard Specification for Steel Casing Pipe, Carbon, Electric-Fusion (Arc)-Welded (NPS 10 and Larger)¹

This standard is issued under the fixed designation A1097/A1097M; 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 covers electric-fusion (arc)-welded straight seam or spiral seam steel casing pipe NPS 10 (**Note 1**) and larger in diameter (outside diameter as specified by purchaser) with wall thickness 0.200 in. [5.1 mm] or greater. It shall be permissible to specify and furnish pipe having other dimensions provided such pipe complies with all other requirements of this specification. The pipe is intended for use as casing or encasement in horizontal underground boring, tunneling, or open trench applications.

1.2 This specification is expressed in both inch-pound units and in SI units; however, unless the purchase order or contract specifies the applicable M specification designation (SI units), the inch-pound units shall apply. The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. 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 nonconformance with the standard.

1.3 The text of this specification contains notes and footnotes that provide explanatory material. Such notes and footnotes, excluding those in tables and figures, do not contain any mandatory requirements.

1.4 The following precautionary caveat pertains only to the test method portion, Sections 11, 12, and 13 of this specification. *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 establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—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 This specification is under the jurisdiction of ASTM Committee A01 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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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:²

- A36/A36M Specification for Carbon Structural Steel
- A515/A515M Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
- A516/A516M Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
- A572/A572M Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
- A370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
- A1011/A1011M Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- A1018/A1018M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 AWS Standard:³

- D1.1/D1.1M Structural Welding Code – Steel

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.

³ Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

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



3. Terminology

3.1 Definitions of terms used in this specification shall be in accordance with Terminology A941.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *defect*—an imperfection of sufficient size or magnitude to be cause for rejection.

3.2.2 *imperfection*—any discontinuity or irregularity found in the pipe.

4. Ordering Information

4.1 Orders for material under this specification shall contain information concerning as many of the following items as are required to describe the desired material adequately:

- 4.1.1 Quantity (feet, meters, or number of lengths),
- 4.1.2 Name of material (steel casing pipe),
- 4.1.3 Size (outside diameter and nominal wall thickness),
- 4.1.4 Pipe Section Lengths (see Section 9),
- 4.1.5 End finish (Section 10),
- 4.1.6 Steel ASTM specification designation and grade (Section 5),
- 4.1.7 ASTM specification designation and year of issue, and
- 4.1.8 Special Requirements (if any).

5. Materials and Manufacture

5.1 The pipe shall be made by the electric-fusion (arc) welded process. All seams of welded pipe shall be butt joints and girth, longitudinal, or helical orientation made using complete joint penetration welds.

5.2 The longitudinal edges of the steel shall be shaped to give the most satisfactory results by the particular welding process employed. The weld shall be of reasonably uniform width and height for the entire length of the pipe.

5.3 The steel from which the pipe is made shall conform to Specifications A515/A515M, A516/A516M, A572/A572M, A36/A36M, A1011/A1011M, or A1018/A1018M Classification SS, HSLA, or HSLA-F, or to other ASTM specifications for equally suitable weldable material. For purposes of testing, marking, and certification when required, the requirements for the pipe grade of material shall be established by the Specification A1097 steel specification designation and grade, when applicable.

6. Qualification of Welding and Welding Procedures

6.1 Welding operators and procedures shall be qualified in accordance with the AWS D1.1/D1.1M or other welding code acceptable by the purchaser.

7. Weights Per Unit Length

7.1 For pipe the weight per unit length shall be calculated as follows:

$$W = C(D - t)t \quad (1)$$

where:

- C = 10.69 [0.02466],
- W = weight per unit length, lb/ft [kg/m],
- D = specified outside diameter, in. [mm], and

t = specified nominal wall thickness, in. (to three decimal places) [mm (to two decimal places)].

8. Permissible Variations in Weights and Dimensions

8.1 *Weight*—Each length of pipe weight when measured shall not vary more than 5 % under its theoretical weight, calculated using its length and its weight per unit length (see Section 7).

8.2 *Outside Diameter*—The outside diameter of casing pipe measured circumferentially shall not vary more than the lesser of ± 1 % from the specified outside diameter, or $\pm \frac{3}{4}$ in. [19 mm] in circumference.

8.3 *Roundness*—The pipe diameter as measured along any single plane shall not vary more than 1 % from the specified diameter.

8.4 *Straightness*—The maximum deviation from a straight line, over the entire pipe length, shall be 0.1 % of the pipe length.

8.5 *Thickness*—The pipe wall thickness when inspected shall not be less than 87.5 % of the nominal thickness at any location. Pipe wall thickness shall not be in excess of 112.5 % of the nominal thickness unless approved by the purchaser. Thickness requirements are independent of the weight requirements of 8.1.

9. Lengths

9.1 The lengths shall be as specified on the order with a tolerance of $\pm \frac{1}{2}$ in. [13 mm], except that the shorter lengths from which test coupons have been cut may also be shipped.

10. Ends

10.1 Casing pipe shall be furnished with interlocking joint ends, beveled ends, or plain ends. The pipe end shall not vary by more than $\pm \frac{1}{8}$ in. [3 mm] from a plane perpendicular to the pipe axis.

10.2 Casing pipe specified with plain ends shall have either flame-cut or machine-cut ends, with the burrs at the ends removed.

10.3 For ends specified to be beveled, the bevel angle shall be $30^\circ +5^\circ$, -0° , measured from a line drawn perpendicular to the axis of the pipe.

10.4 For ends specified with interlocking joints, the joint shall be machined either directly on the pipe end or on a ring that is butt welded to the end of the pipe section. Attached rings may be thicker than the pipe wall and may be made from any steel compliant with 5.3.

11. Number of Tests

11.1 One reduced-section weld tension test shall be made, representing each lot of 1000 ft [300 m] of pipe or fraction thereof of each diameter and thickness.

11.2 It shall be permissible to discard any test specimen that shows defective machining or develops imperfections and substitute another test specimen from the same lot.