



## Standard Specification for Steel Line Pipe, Black, Furnace-Butt-Welded<sup>1</sup>

This standard is issued under the fixed designation A1037/A1037M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers furnace-butt-welded, black, plain-end or threaded-end, steel pipe for use in the conveyance of fluids under pressure. Pipe in sizes NPS  $\frac{1}{2}$  to 4, inclusive, with nominal wall thickness 0.350 in. [8.9 mm] or less, as given in ASME B36.10M is included. Pipe having other dimensions, in this size range, may be furnished provided such pipe complies with all other requirements of this specification.

1.2 For plain-end pipe, it is intended that the pipe be capable of being circumferentially welded in the field when welding procedures in accordance with the requirements of the applicable pipeline construction code are used.

1.3 The values stated in either inch-pound units or in SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values in each system are not exact equivalents; therefore, each system is to be used independently of the other.

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

A450/A450M Specification for General Requirements for Carbon and Low Alloy Steel Tubes

A530/A530M Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe

A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys

#### 2.2 ASME Standard:

ASME B36.10M Welded and Seamless Wrought Steel Pipe<sup>3</sup>

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990.

#### 2.3 API Standards:

5L Specification for Line Pipe<sup>4</sup>

5B Specification for Threading, Gauging, and Thread Inspection of Casing, Tubing, and Line Pipe Threads<sup>4</sup>

### 3. Terminology

3.1 *Definitions*—For terminology used in this specification, refer to Terminology A941.

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *furnace-butt-welded pipe, n*—pipe produced in multiple lengths from coiled skelp and subsequently cut into individual lengths, having its longitudinal butt joint forge welded by the mechanical pressure developed in rolling the hot-formed skelp through a set of round pass welding rolls.

3.2.2 *lot, n*—a quantity of pipe of the same ordered diameter, heat, wall thickness, and grade as given in Table 1.

3.2.3 *specified outside diameter (OD), n*—the outside diameter specified in the purchase order or the outside diameter listed in ASME B36.10M for the nominal pipe size specified in the purchase order.

### 4. General Requirements

4.1 Pipe furnished under this specification shall conform to the applicable requirements of Specification A530/A530M unless otherwise provided herein.

### 5. Ordering Information

5.1 It is the purchaser's responsibility to specify in the purchase order all information necessary to purchase the needed material. Examples of such information include, but are not limited to, the following:

5.1.1 Specification designation and year-date,

5.1.2 Quantity (feet or metres),

5.1.3 Grade (A or B),

5.1.4 Size (either nominal (NPS) or outside diameter, and wall thickness),

5.1.5 Length,

5.1.6 End finish (plain-end, special plain-end, or threaded-end, see 15.1),

5.1.7 End use of the pipe,

<sup>4</sup> Available from The American Petroleum Institute (API), 1220 L. St., NW, Washington, DC 20005.

**TABLE 1 Lot Size and Sample Size for Mechanical Testing**

| Size Designation    | Lot Size                                            | Sample Size |
|---------------------|-----------------------------------------------------|-------------|
| <NPS 2              | 25 tons [23 Mg] or fraction thereof                 | 1           |
| NPS 2 through NPS 4 | 50 tons [45 Mg] or 500 lengths, or fraction thereof | 1           |

5.1.8 Special requirements, and

5.1.9 Bar coding (see 18.3).

## 6. Materials and Manufacture

6.1 The steel shall be made by one or more of the following processes: basic-oxygen, electric-furnace, or open-hearth.

6.2 The pipe shall be made by the furnace-butt-welding process.

## 7. Chemical Composition

7.1 The steel shall contain, by heat and product analyses, no more than 0.25 % carbon, 1.20 % manganese, 0.045 % sulfur, and 0.045 % phosphorus.

7.2 As a minimum, the required analysis shall contain the following elements: carbon, manganese, phosphorus, sulfur, chromium, columbium, copper, molybdenum, nickel, silicon, and vanadium.

7.3 Product analyses shall be made on at least two samples from each heat of steel.

7.4 All analyses shall be in accordance with Test Methods, Practices, and Terminology A751.

7.5 If one or both of the product analyses representing a heat fails to conform to the specified requirements, the heat shall be rejected, or analyses shall be made on double the original number of test samples that failed, each of which shall conform to the specified requirements.

## 8. Tensile Requirements

8.1 The material shall conform to the requirements for tensile properties given in Table 2 and in 8.4.

8.2 The yield strength corresponding to a total extension under load of 0.5 % of the gage length shall be determined.

8.3 Longitudinal tests shall be performed for all pipe. Such tests shall be either strip specimens taken 90° from the weld or full section specimens, at the option of the manufacturer.

8.4 The minimum elongation in 2 in. [50 mm] for each grade shall be that determined by the following equation:

$$e = CA^{0.2}/U^{0.9} \quad (1)$$

**TABLE 2 Tensile Requirements**

| Grade | Yield Strength, min |     | Tensile Strength, min |     |
|-------|---------------------|-----|-----------------------|-----|
|       | psi                 | MPa | psi                   | MPa |
| A     | 30 000              | 205 | 48 000                | 330 |
| B     | 35 000              | 240 | 60 000                | 415 |

where:

$e$  = minimum elongation in percent, rounded to the nearest percent,

$C$  = constant = 625 000 [1940],

$A$  = cross-sectional area of the tensile test specimen in in.<sup>2</sup> [mm<sup>2</sup>], based upon the specified outside diameter or the nominal specimen width and the specified wall thickness, rounded to the nearest 0.01 in.<sup>2</sup> [1 mm<sup>2</sup>]. If the area thus calculated is greater than 0.75 in.<sup>2</sup> [485 mm<sup>2</sup>], the value of 0.75 in.<sup>2</sup> [485 mm<sup>2</sup>] shall be used, and

$U$  = specified minimum tensile strength, psi [MPa].

## 9. Flattening Test

9.1 A test specimen at least 4 in. [100 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 9.2.1. Except as allowed by 9.3, during the first step, which is a test for ductility of the weld, no cracks or breaks on the inside, outside, or end surfaces at the weld shall be present before the distance between the plates is less than two thirds of the specified diameter of the pipe. As a second step, the flattening shall be continued as a test for ductility away from the weld. During the second step, no cracks or breaks on the inside, outside, or end surfaces away from the weld, shall be present before the distance between the plates is less than one third of the specified outside diameter of the pipe but is not less than five times the wall thickness of the pipe. During the third step, which is a test for soundness, the flattening shall be continued until the test specimen breaks or the opposite walls of the test specimen meet. Evidence of laminated or unsound material or of incomplete weld that is revealed by the flattening test shall be cause for rejection.

9.2 The flattening test specified in 9.1 shall be made as follows:

9.2.1 Test specimens taken from the front end of the first pipe intended to be supplied from each coil and the back end of the last pipe intended to be supplied from each coil shall be flattened with the weld located at 90° from the line of direction of force.

9.2.2 Test specimens taken from pipe at any two locations intermediate to the front end of the first pipe and the back end of the last pipe intended to be supplied from each coil shall be flattened with the weld located at 0° from the line of direction of force.

9.3 When low  $D$ -to- $t$  ratio pipe is tested, because the strain imposed due to geometry is unreasonably high on the inside surface at the six and twelve o'clock locations, cracks at these locations shall not be cause for rejection if the  $D$ -to- $t$  ratio is less than 10.

## 10. Hydrostatic Test

10.1 Each length of pipe shall be subjected to the hydrostatic test without leakage through the weld seam or the pipe body.

10.2 Each length of pipe NPS 2 or larger shall be tested, by the manufacturer, to a minimum hydrostatic pressure calculated from the following relationship: