



Standard Specification for Wrought Carbon Steel Sleeve-Type Pipe Couplings¹

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This specification has been approved for use by agencies of the Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

^{ε1} NOTE—Sections 10 through 12 were renumbered editorially October 1988.

1. Scope

1.1 This specification covers wrought carbon steel sleeve type pipe couplings suitable for joining carbon steel pipes.

1.2 Type I couplings are intended for use on all schedules of pipe where the pipe wall thickness does not exceed the wall thickness of standard weight pipe. Type II couplings are intended for use on all schedules of pipe where the pipe wall thickness does not exceed the wall thickness of extra strong pipe.

1.3 This specification does not cover cast steel couplings.

NOTE 1—The values stated in inch-pound units are to be regarded as the standard.

NOTE 2—See Appendix X1 for rationale used to develop this specification.

2. Referenced Documents

2.1 ASTM Standards:

A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless²

A 106 Specification for Seamless Carbon Steel Pipe for High-Temperature Service²

A 234/A 234M Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures²

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

E 59 Method of Sampling Steel and Iron for Determination of Chemical Composition⁴

2.2 Manufacturer's Standardization Society of the Valve and Fittings Industry Standard:

MSS SP-25 Standard Marking System for Valves, Fittings, Flanges and Unions⁵

2.3 ASME Boiler and Pressure Vessel Code:

Section VIII Unfired Pressure Vessels⁶

Section IX Welding Qualifications⁶

2.4 Federal Regulations:

Title 46, Code of Federal Regulations (CFR), Shipping, Parts 41 to 69⁷

2.5 ANSI Standards:

B16.5 Pipe Flanges and Flange Fittings⁸

3. Classification

3.1 Couplings are furnished in two types as follows:

3.1.1 Type I—Couplings (see 1.2).

3.1.2 Type II—Couplings (see 1.2).

NOTE 3—Type II couplings may be used in place of Type I couplings for all schedules of pipe where the pipe wall thickness does not exceed the wall thickness of standard weight piping through 18 in. or Schedule 40 piping through 16 in.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Quantity (number of couplings of each size and type),

4.1.2 Name of material (sleeve type pipe couplings),

4.1.3 Size (nominal, see Tables 1 and 2),

4.1.4 Type (see 3.1),

4.1.5 ASTM designation and date of issue.

5. Materials and Manufacture

5.1 *Materials*—The couplings shall be manufactured from material having a chemical composition conforming to the requirements of 7.1, and with the mechanical properties of Section 9.

5.2 *Manufacture*—The initial form of the raw material shall be at the discretion of the manufacturer except couplings shall not be machined from unformed plate. The material shall be such that the finished couplings conform to all of the specified requirements (see Appendix X2).

5.3 Couplings fabricated by welding shall be (a) made by welders, welding operators, and welding procedures qualified under the provisions of ASME Boiler and Pressure Vessel Code, Section IX, (b) heat treated in accordance with Section 6 of this specification, and (c) nondestructively tested as follows:

⁷ Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

⁸ Available from American National Standards Institute, 1430 Broadway, New York, NY 10018.

¹ This specification is under the jurisdiction of ASTM Committee F-25 on Shipbuilding and is the direct responsibility of Subcommittee F25.13 on Piping Systems.

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² Annual Book of ASTM Standards, Vol 01.01.

³ Annual Book of ASTM Standards, Vol 01.03.

⁴ Annual Book of ASTM Standards, Vol 03.05.

⁵ Available from Manufacturer's Standardization Society of the Valve and Fitting Industry, 5203 Leesburg Pike, Falls Church, VA 22041.

⁶ Available from American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

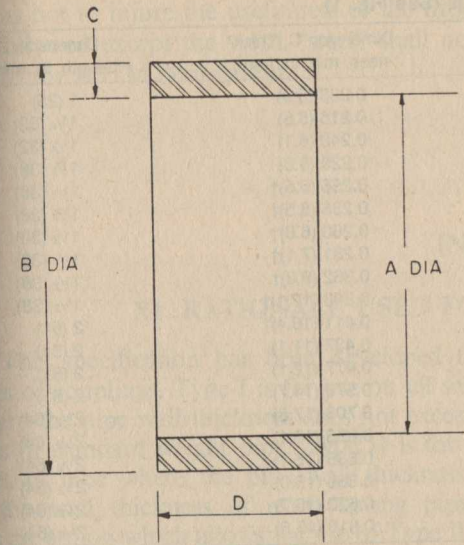


FIG. 1 Sleeve Type Pipe Coupling

5.3.1 *Sizes 3 in. NPS and Below*—Radiographically examined throughout the entire length of each fabricated weld in accordance with Paragraph UW-51 of ASME Code, Section VIII.

5.3.2 *Sizes 3 1/2 in. NPS through 16 in. NPS*—No nondestructive tests required, and

5.3.3 *Sizes 18 in. NPS and above*—Any method of non-destructive testing may be used provided the tests are conducted in accordance with the applicable parts of ASME Code, Section VIII.

6. Heat Treatment

6.1 Couplings Made from Plate or Tubular Products:

6.1.1 Couplings machined from tubular products need not be heat-treated.

6.1.2 Hot-formed couplings upon which the final forming operation is completed at a temperature above 1150°F (621°C) and below 1800°F (982°C) need not be heat treated provided they are cooled in still air. If the manufacturer elects to heat treat such couplings it shall be by one of the procedures described in 6.3.

6.1.3 Hot-formed couplings finished at a temperature in excess of 1800°F (982°C) shall subsequently be annealed, normalized, or normalized and tempered.

6.1.4 Cold-formed couplings upon which the final forming operation is completed at a temperature below 1150°F (621°C) shall be normalized, or shall be stress-relieved at 1100 to 1250°F (593 to 677°C) for 1 h/in. of thickness.

6.1.5 Couplings produced by fusion welding shall be post-weld heat treated at 1100 to 1250°F (593 to 677°C), when the nominal wall thickness at the welded joint is 3/4 in. or greater.

6.2 *Carbon Steel Couplings made from Forgings*—Couplings made from forgings shall subsequently be annealed, normalized, or normalized and tempered.

6.3 *Heat Treatment Procedures*—Couplings after forming at an elevated temperature shall be cooled to a temperature below the critical range under suitable conditions to prevent injuries by too rapid cooling, but in no case more rapidly than the cooling rate in still air. Couplings which are to be heat treated shall be treated as follows:

6.3.1 *Full Annealing*—Couplings shall be uniformly reheated to a temperature above the transformation range and, after being held for a sufficient time at this temperature, cooled slowly to a temperature below the transformation range.

6.3.2 *Normalizing*—Couplings shall be uniformly reheated to a temperature above the transformation range and subsequently cooled in air at room temperature.

6.3.3 *Tempering and Post Weld Heat Treatment*—Couplings shall be reheated to the prescribed temperature below the transformation range, held at temperature for not less

TABLE 1 Dimensions for Type I Couplings (See Fig. 1)

| Nominal size, in. | Dimension A, Inside Diameter, in. (mm) ^A | Dimension B, Outside Diameter, in. (mm) ^B | Dimension C, Thickness, min. in. (mm) | Dimension D, Length, in. (mm) ^C |
|-------------------|---|--|---------------------------------------|--|
| 1/4 | 0.589 (15.0) | 0.875 (22.2) | 0.143 (3.6) | 1 (25) |
| 3/8 | 0.724 (18.4) | 0.992 (25.2) | 0.134 (3.4) | 1 1/4 (32) |
| 1/2 | 0.889 (22.6) | 1.201 (30.5) | 0.156 (4.0) | 1 1/4 (32) |
| 3/4 | 1.099 (27.9) | 1.401 (35.6) | 0.151 (3.8) | 1 1/2 (38) |
| 1 | 1.364 (34.6) | 1.710 (43.4) | 0.173 (4.4) | 1 1/2 (38) |
| 1 1/4 | 1.709 (43.4) | 2.057 (52.2) | 0.174 (4.4) | 1 1/2 (38) |
| 1 1/2 | 1.949 (49.5) | 2.306 (58.6) | 0.179 (4.5) | 1 1/2 (38) |
| 2 | 2.424 (61.6) | 2.807 (71.3) | 0.192 (4.9) | 1 1/2 (38) |
| 2 1/2 | 2.924 (74.3) | 3.444 (87.5) | 0.260 (6.6) | 1 1/2 (38) |
| 3 | 3.545 (90.0) | 4.105 (104.3) | 0.280 (7.1) | 2 (51) |
| 3 1/2 | 4.070 (103.4) | 4.633 (117.7) | 0.282 (7.2) | 2 (51) |
| 4 | 4.570 (116.1) | 5.164 (131.2) | 0.297 (7.5) | 2 (51) |
| 5 | 5.660 (143.8) | 6.286 (159.7) | 0.313 (8.0) | 2 (51) |
| 6 | 6.720 (170.7) | 7.409 (188.2) | 0.345 (8.8) | 2 1/2 (64) |
| 8 | 8.720 (221.5) | 9.527 (242.0) | 0.404 (10.3) | 2 1/2 (64) |
| 10 | 10.880 (276.4) | 11.875 (301.6) | 0.498 (12.6) | 2 1/2 (64) |
| 12 | 12.880 (327.2) | 13.800 (350.5) | 0.460 (11.7) | 2 1/2 (64) |
| 14 | 14.140 (359.2) | 15.050 (382.3) | 0.455 (11.6) | 2 1/2 (64) |
| 16 | 16.160 (410.5) | 17.050 (433.1) | 0.445 (11.3) | 2 1/2 (64) |
| 18 | 18.180 (461.8) | 19.050 (483.9) | 0.435 (11.0) | 2 1/2 (64) |

^A Tolerances shall be (1) Sizes through 3 in. incl: +0.000, -0.010 in. (+0.000, -0.254 mm); (2) Sizes 3 1/2 in. through 10 in. incl: +0.030, -0.000 in. (+0.762, -0.000 mm); and (3) Sizes above 10 in.: +0.060, -0.000 in. (+1.524, -0.000 mm).
^B Tolerances shall be (1) Sizes through 10 in. incl: +0.125, -0.000 in. (+3.175, -0.000 mm); and (2) Sizes above 10 in.: +1.000, -0.000 in. (+25.4, -0.000 mm).
^C Tolerances for all sizes shall be +0.250, -0.000 in. (+6.4, -0.000 mm).

TABLE 2 Dimensions for Type II Couplings (See Fig. 1)

| Nominal size, in. | Dimension A, Inside Diameter, in. (mm) ^A | Dimension B, Outside Diameter, in. (mm) ^B | Dimension C, Thickness, min, in. (mm) | Dimension D, Length, in. (mm) ^C |
|-------------------|---|--|---------------------------------------|--|
| 1/4 | 0.589 (15.0) | 1.055 (26.8) | 0.233 (5.9) | 1 (25) |
| 3/8 | 0.724 (18.4) | 1.156 (29.4) | 0.216 (5.5) | 1 1/4 (32) |
| 1/2 | 0.889 (22.6) | 1.369 (34.8) | 0.240 (6.1) | 1 1/4 (32) |
| 3/4 | 1.099 (27.9) | 1.557 (39.5) | 0.229 (5.8) | 1 1/2 (38) |
| 1 | 1.364 (34.6) | 1.876 (47.7)† | 0.256 (6.5)† | 1 1/2 (38) |
| 1 1/4 | 1.709 (43.4) | 2.221 (56.4)† | 0.256 (6.5)† | 1 1/2 (38) |
| 1 1/2 | 1.949 (49.5) | 2.469 (62.7)† | 0.260 (6.6)† | 1 1/2 (38) |
| 2 | 2.424 (61.6) | 2.986 (75.8)† | 0.281 (7.1)† | 1 1/2 (38) |
| 2 1/2 | 2.924 (74.3) | 3.648 (92.7)† | 0.362 (9.2)† | 1 1/2 (38) |
| 3 | 3.545 (90.0) | 4.340 (110.2)† | 0.398 (10.1)† | 1 1/2 (38) |
| 3 1/2 | 4.070 (103.4) | 4.891 (124.2)† | 0.411 (10.4)† | 2 (51) |
| 4 | 4.570 (116.1) | 5.444 (138.3) | 0.437 (11.1) | 2 (51) |
| 5 | 5.660 (143.8) | 6.613 (168.0) | 0.477 (12.1) | 2 (51) |
| 6 | 6.720 (170.7) | 7.875 (200.0) | 0.578 (14.7) | 2 (51) |
| 8 | 8.720 (221.5) | 10.125 (257.2) | 0.703 (17.8) | 2 1/2 (64) |
| 10 | 10.880 (276.4) | 12.150 (308.6) | 0.635 (16.1) | 2 1/2 (64) |
| 12 | 12.880 (327.2) | 14.150 (359.4) | 0.635 (16.1) | 2 1/2 (64) |
| 14 | 14.140 (359.2) | 15.400 (391.2) | 0.630 (16.0) | 2 1/2 (64) |
| 16 | 16.160 (410.5) | 17.400 (442.0) | 0.620 (15.7) | 2 1/2 (64) |
| 18 | 18.180 (461.8) | 19.400 (492.8) | 0.610 (15.5) | 2 1/2 (64) |

^A Tolerances shall be (1) Sizes through 3 in. incl: +0.000, -0.010 in. (+0.000, -0.254 mm); (2) Sizes 3 1/2 in. through 10 in. incl: +0.030, -0.000 in. (+0.762, -0.000 mm); and (3) Sizes above 10 in.: +0.060, -0.000 in. (+1.524, -0.000 mm).

^B Tolerances shall be (1) Sizes through 10 in. incl: +0.125, -0.000 in. (+3.175, -0.000 mm); and (2) Sizes above 10 in.: +1.000, -0.000 in. (+25.4, -0.000 mm).

^C Tolerances for all sizes shall be +0.250, -0.000 in. (+6.4, -0.000 mm).

† Editorially corrected.

than 1 h/in. of thickness at the thickest section and cooled in the furnace or in still air.

7. Chemical Requirements

7.1 The couplings shall conform to the requirements as to chemical composition prescribed in Table 3.

7.2 Weld metal used in the construction of the couplings shall be mild steel analysis No. A1 of Table QW-442, Section IX of the ASME Boiler and Pressure Vessel Code.

8. Product Analysis

8.1 Product analyses may be made by the purchaser from finished products representing each lot. The chemical composition thus determined shall conform to the requirements specified in Table 3.

8.2 In the event the couplings do not conform to the requirements specified in Table 3, referee analyses shall be made on additional couplings from the same lot in accordance with Method E 59.

9. Mechanical Properties

9.1 The steel shall conform to the requirements as to tensile properties prescribed in Table 4.

9.2 The yield strength corresponding to a permanent offset of 0.2 % of the gage length of the specimen under load shall be determined.

9.3 Tension tests shall be made on material representative of and in the same condition of heat treatment as the finished coupling.

9.3.1 Records of the tension tests shall be certification that the material of the coupling meets the requirements of this specification provided the heat treatments are the same. If the raw material was not tested, the coupling manufacturer shall perform the required test on material representative of the finished coupling.

9.4 The tests required by this specification shall conform to those described in the latest issue of Test Methods and Definitions A 370.

10. Dimensions and Permissible Variations

10.1 The dimensions and permissible variations for sleeve couplings to this specification are prescribed in Tables 1 and 2.

11. Workmanship, Finish, and Appearance

11.1 Sleeve couplings shall have a workmanlike finish, free of scale and injurious defects. Ends shall be finished square and without burrs.

12. Hydrostatic Testing

12.1 Hydrostatic testing is not required by this specification.

12.2 All couplings shall be capable of withstanding, without failure, leakage, or impairment of serviceability; a test pressure equal to that prescribed in the specification for the pipe with which the fitting is recommended to be used.

13. Product Marking

13.1 Identification marks consisting of the manufacturer's symbol or name, the ASTM designation number, type and size shall be legibly stamped on each fitting, and in such a

TABLE 3 Chemical Requirements

| | Composition, max, % |
|------------|---------------------|
| Carbon | 0.30 |
| Manganese | 1.20 |
| Phosphorus | 0.05 |
| Sulfur | 0.06 |

TABLE 4 Tension Requirements

| | |
|--|----------|
| Tensile strength, min, ksi (MPa) | 60 (414) |
| Yield Point, min, ksi (MPa) | 35 (241) |
| Elongation in 2 in. or 50.8 mm, min, % | 23 |