Designation: A758/A758M – 26

Standard Specification for Wrought-Carbon Steel Butt-Welding Piping Fittings with Improved Notch Toughness[1]

This standard is issued under the fixed designation A758/A758M; 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 wrought-carbon steel butt-welding seamless or welded fittings specially processed to ensure better notch toughness than that to be expected in fittings manufactured to the requirements of Specification A234/A234M.

1.1.1 Included are elbows, caps, tees, reducers, and other type fittings covered by ASME B16.9.

1.1.2 Heat treatment is required for all fittings.

1.1.3 Fittings with mandatory radiographic examination of welds are included.

1.1.4 Supplementary requirements are provided for use when additional testing or examination is desired.

1.1.5 Cast fittings, and fittings formed from all weld metal, are not included.

1.2 Several type of fittings are provided, as follows:

Type	Heat Treatment Required	Weld Seam Finish (6.3.2)	Radiography Required?
30	normalize	UW-35	no
31	normalize	UW-35	yes
32	normalize	UW-35 and ground flush	yes
40	normalize and temper	UW-35	no
41	normalize and temper	UW-35	yes
42	normalize and temper	UW-35 and ground flush	yes
50	quench and temper	UW-35	no
51	quench and temper	UW-35	yes
52	quench and temper	UW-35 and ground flush	yes

1.3 It shall be the responsibility of the purchaser to determine whether material meeting the requirements of this specification is satisfactory for the service application.

1.4 This specification is expressed in both inch-pound units and SI units. However, unless the order specifies the applicable "M" specification designation (SI units), the material shall be furnished to inch-pound units.

1.5 The values stated in either SI units or inch-pound 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 non-conformance with the standard.

1.6 *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 In addition to those reference documents listed in Specification A960/A960M, the following list of standards apply to this specification:

2.2 *ASTM Standards:*[2]

A234/A234M Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

A275/A275M Practice for Magnetic Particle Examination of Steel Forgings

A960/A960M Specification for Common Requirements for Wrought Steel Piping Fittings

E165/E165M Practice for Liquid Penetrant Testing for General Industry

E709 Guide for Magnetic Particle Testing

2.3 *ASME Boiler and Pressure Vessel Code (ASME Code):*[3]

Section VIII, Division 1

Section IX

2.4 *ASME Standard:*

B16.9 Standards for Steel Butt-Welding Fittings[3]

[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 A01.22 on Steel Forgings and Wrought Fittings for Piping Applications and Bolting Materials for Piping and Special Purpose Applications.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, http://www.asme.org.

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

2.5 *ASNT Standard:*
SNT-TC-1A Practice for Nondestructive Examination Personnel Qualification and Certification[4]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification refer to Specification A960/A960M.

4. Ordering Information

4.1 See Specification A960/A960M.

5. General Requirements

5.1 Product furnished to this specification shall conform to the requirements of Specification A960/A960M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the requirements of Specification A960/A960M constitutes non-conformance with this specification. In case of a conflict between the requirements of this specification and Specification A960/A960M, this specification shall prevail.

6. Materials and Manufacture

6.1 The steel shall be killed and shall be melted to a fine austenitic grain size practice.

6.2 The starting material shall be wrought and in the form of blooms, billets, slabs, forgings, bars, plates, sheets, seamless pipe or tube, or welded-with-filler-metal pipe or tube. Cast products shall not be used.

6.3 Any forming process, fusion-welding process, or combination of such processes, may be used.

6.3.1 All welding shall be fusion-welded in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code. Welding procedures, welders, and welding operators shall be qualified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.

6.3.2 All welded joints shall be finished in accordance with Paragraph UW-35 of Section VIII, Division 1, of the ASME Code.

6.3.3 Welded joints of Type 32, 42, and 52 shall be ground flush.

6.3.4 Welded joints of Types 31, 41, 51, 32, 42, and 52 shall be examined by radiography in accordance with the requirements of Paragraph UW-51 of Section VIII, Division 1, of the ASME Code, and shall conform to the requirements of Paragraph UW-51.

6.4 *Heat Treatment*—All fittings shall be heat treated subsequent to final welding and forming.

6.4.1 *Types 30, 31, and 32* fittings shall be normalized by uniformly heating to a temperature in the austenitizing range, but not to exceed 1700 °F [927 °C], and subsequently removed from the furnace and air-cooled individually to room temperature.

6.4.2 *Types 40, 41, and 42* fittings shall be normalized in accordance with 6.4.1. After normalizing, the fittings shall be tempered by heating to a temperature in the range from 1100 °F to 1250 °F [593 °C to 677 °C], soaking at that temperature for 30 min minimum per 1 in. [25 mm] of thickness, but not less than 15 min, and then air-cooled to room temperature.

6.4.3 *Types 50, 51, and 52* fittings shall be quenched-and-tempered by uniformly heating to a temperature in the austenitizing range, but not to exceed 1700 °F [927 °C], and then quenching in a liquid media from the austenitizing temperature to a temperature below 800 °F [427 °C]. After quenching, the fittings shall be reheated to a temperature in the range from 1100 °F to 1250 °F [593 °C to 677 °C], soaking at that temperature for 30 min minimum per 1 in. [25 mm] of thickness, but not less than 15 min, and then air-cooled to room temperature.

7. Chemical Composition

7.1 *Heat or Cast Analysis*—The results shall conform to the requirements for the applicable grade as specified in Table 1.

7.2 *Product Analysis*—The purchaser may make a product analysis on products made to this specification in accordance with Specification A960/A960M.

7.3 The steel shall not contain any unspecified elements for the ordered grade to the extent that it conforms to the requirements of another grade for which that element is a specified element having a required minimum content.

8. Mechanical Requirements

8.1 *Tensile Requirements:*

8.1.1 The fittings, as represented by tensile test specimens taken subsequent to final heat treatment, shall conform to the requirements for the applicable grade as specified in Table 2.

8.1.2 *Number and Location of Specimens:*

8.1.2.1 *Lot*—For tension testing, a lot shall consist of the fittings from a heat, in each heat treatment charge, with nominal wall thicknesses within 0.25 in. [6.5 mm] of the nominal thickness of the test specimen. In addition, for Types 32, 42, and 52, the lot definition shall include each heat or lot of weld metal. If heat treatment is performed in a continuous or batch-type furnace controlled within a range of plus-or-minus

TABLE 1 Chemical Requirements

Element	Cast or Heat Analysis
Carbon, max, %	0.27
Manganese, %	0.85–1.20
Phosphorus, max, %	0.035
Sulfur, max, %	0.035
Silicon, %	0.15–0.30
Vanadium, max, %	0.05
Residual elements[A,B]	
Chromium, max, %	0.25
Nickel, max, %	0.25
Molybdenum, max, %	0.08
Copper, max, %	0.35
Lead, max, %	0.05

[A] Individual limits of chromium, nickel, molybdenum, and copper may be exceeded by 0.05 % provided that their total does not exceed 0.90 % in both the heat and product analysis.
[B] These are not to be added to the melt and shall only occur as a result of unavoidable residuals from the melting stock.

[4] Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlingate Ln., Columbus, OH 43228-0518, http://www.asnt.org.