



Designation: **A774/A774M – 09 A774/A774M – 13**

# Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures<sup>1</sup>

This standard is issued under the fixed designation A774/A774M; 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 five grades of as-welded, wrought austenitic stainless steel fittings for low-pressure piping and intended for low and moderate temperatures and general corrosive service. Users should note that certain corrosive conditions may restrict the use of one or more grades. For applications requiring a product that requires heat treatment or full pressure rating, refer to Specification **A403/A403M**. The term “fittings” applies to butt and socket welding parts such as 45° and 90° elbows, tees, reducers, wyes, laterals, crosses, and stub ends.

1.2 This specification covers as-welded fittings 3 through 48 in. [75 through 1225 mm] in outside diameter and in nominal wall thicknesses 0.062 through 0.500 in. [1.6 through 12.7 mm]. **Table 1** and **Table 2** list the common diameters and nominal thicknesses of fittings in this specification.

1.3 This specification does not apply to cast fittings. Cast austenitic steel fittings are covered by Specification **A351/A351M**.

1.4 Optional supplementary requirements are provided for fittings where a greater degree of examination is desired. These supplementary requirements call for additional tests. When desired, one or more of these may be specified in the order.

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

1.6 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.

## 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:<sup>2</sup>

**A240/A240M** Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

**A351/A351M** Specification for Castings, Austenitic, for Pressure-Containing Parts

**A403/A403M** Specification for Wrought Austenitic Stainless Steel Piping Fittings

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

**E527** Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

### 2.3 ASME Standard:

**Section IX**, **Welding Qualifications**, **Qualifications**, **ASME Boiler and Pressure Vessel Code**<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 **A01.22** on Steel Forgings and Wrought Fittings for Piping Applications and Bolting Materials for Piping and Special Purpose Applications.

Current edition approved Oct. 1, 2009; Oct. 1, 2013. Published November 2009; October 2013. Originally approved in 1980. Last previous edition approved in 2006 as **A774/A774M – 06**; **A774/A774M – 09**. DOI: 10.1520/A0774\_A0774M-09; 10.1520/A0774\_A0774M-13.

<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, <http://www.asme.org>.

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

2.4 *MSS Standard:*

**SP 43 Wrought Stainless Steel Butt Welding Fittings**<sup>4</sup>

2.5 *AWS Standards:*

**A5.4 Corrosion-Resisting Chromium and Chromium-Nickel Steel Covered Welding Electrodes**<sup>5</sup>

**A5.9 Corrosion-Resisting Chromium and Chromium-Nickel Steel Welding Rods and Bare Electrodes**<sup>5</sup>

2.6 *SAE Standard:*

**J1086 Unified Numbering System for Metals and Alloys**<sup>6</sup>

**TABLE 1 Common Tubular Fittings Sizes, Outside Diameter<sup>A</sup>**

in. [mm]	in. [mm]
3 [76]	12¾ [325]
3½ [90]	14 [355]
4 [100]	16 [405]
4½ [115]	18 [460]
6 [150]	20 [510]
6⅝ [170]	24 [610]
8 [205]	30 [760]
8⅝ [220]	36 [915]
10 [255]	40 [1015]
10¾ [275]	42 [1070]
12 [305]	48 [1220]

<sup>A</sup> Other sizes may be furnished provided they comply with all other requirements of this specification.

**TABLE 2 Common Tubular Fittings Nominal Thicknesses<sup>A</sup>**

in. or gage	in.	[mm]
16 gage	0.062	[1.6]
14 gage	0.078	[2.0]
12 gage	0.109	[2.8]
11 gage	0.125	[3.2]
10 gage	0.140	[3.6]
8 gage	0.172	[4.4]
¾ in.	0.187	[4.8]
¼ in.	0.250	[6.4]
⅝ in.	0.312	[8.0]
⅞ in.	0.375	[9.5]
½ in.	0.500	[12.5]

<sup>A</sup> Other thicknesses may be furnished provided they comply with all other requirements of this specification.

### 3. Ordering Information

3.1 See Specification **A960/A960M** and the following:

3.1.1 Dimensions (outside diameter and specified wall thickness, see **Table 1** and **Table 2**),

3.1.2 Grade (**Table 3**), and

3.1.3 End use, if known.

### 4. General Requirements

4.1 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.

### 5. Manufacture

5.1 The fittings shall be made from flat-rolled steel, such as in Specification **A240/A240M**. The flat rolled steel shall be in the solution annealed condition unless other heat treat conditions are agreed upon by the manufacturer and the purchaser. The fittings shall be formed by a hot or cold process, and welded by a shielded welding process with or without the addition of filler metal.

<sup>4</sup> Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, <http://www.mss-hq.com>.

<sup>5</sup> Available from American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126, <http://www.aws.org>.

<sup>6</sup> Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.



TABLE 3 Chemical Requirements

NOTE 1—Where an ellipsis (...) appears in this table, there is no requirement.

Grade	Composition, %											
	UNS Designation <sup>A</sup>	Carbon, max <sup>B</sup>	Manganese, max	Phosphorus, max	Sulfur, max	Silicon, max	Chromium	Nickel	Molybdenum	Titanium	Columbium plus Tantalum	Nitrogen, max
TP 304L	S30403	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	...	...	...	0.10
TP 316L	S31603	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	...	...	0.10
TP 317L	S31703	0.030	2.00	0.045	0.030	1.00	18.0–20.0	11.0–15.0	3.0–4.0	...	...	0.10
TP 321	S32100	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	<sup>C</sup>	...	...
TP 347	S34700	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	<sup>D</sup>	...

<sup>A</sup> New designation established in accordance with Practice E527 and SAE J1086.<sup>B</sup> The carbon analysis shall be reported to the nearest 0.01 % except for the low carbon (0.030) types, that shall be reported to the nearest 0.001 %.<sup>C</sup> Ti = 5X(C+N) – 0.70.<sup>D</sup> The columbium plus tantalum content shall be not less than ten times the carbon content and not more than 1.10 %.

5.2 Fittings shall be furnished clean and free of scale.

## 5.3 Welding:

5.3.1 The joints shall be full penetration double-welded or single-welded butt joints employing fusion-welding processes with or without the addition of filler metal as defined under Definitions, ASME Boiler and Pressure Vessel Code, Section IX. This specification makes no provision for any difference in weld quality requirements regardless of the weld joint-type employed (single or double) in making the weld. Welding procedures and welding operators shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX.

5.3.2 For fittings employing multiple passes, the root-pass may be made without the addition of filler metal.

5.3.3 The alloy content (chromium, nickel, molybdenum, columbium, and tantalum) of the deposited weld metal shall conform to that required of the base metal or for equivalent weld metal as given in the AWS filler metal specification A5.4 or A5.9, except that, when welding on Types 304L base metal, the deposited weld metal shall correspond, respectively, to AWS Types E308L (ER308L) and, when welding on Type 321 base metal, the weld metal shall correspond to AWS Types E347 (ER347 or ER321).

## 6. Chemical Composition

6.1 The steel shall conform to requirements of chemical composition for the respective material prescribed in Table 3.

6.2 The purchaser may make a product analysis on products made to this specification in accordance with Specification A960/A960M.

6.3 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.

6.4 Mill certificates of analysis of each heat of steel shall be furnished on request.

## 7. Mechanical Properties

7.1 The material used in making these fittings shall conform to the test requirements listed in Table 4 for the specified grade. Mechanical tests made on the sheet or plate by the manufacturer shall qualify the sheet or plate material.

TABLE 4 Mechanical Test Requirements

Type <sup>A</sup>	UNS Designation	Tensile Strength		Yield Strength		Elongation in 2 in. [50 mm], min, %	Hardness, max <sup>B</sup>	
		ksi	[MPa]	ksi	[MPa]		Brinell	Rockwell B
304L	S30403	70-95	485-655	25	170	40.0	183	88
316L	S31603	70-95	485-655	25	170	40.0	217	95
317L	S31703	75-100	515-690	30	205	35.0	217	95
321	S32100	75-100	515-690	30	205	40.0	217	95
347	S34700	75-100	515-690	30	205	40.0	202	92

<sup>A</sup> Unless otherwise indicated, a grade designation originally assigned by the American Iron and Steel Institute (AISI).<sup>B</sup> Either Brinell or Rockwell B Hardness is permissible.