



Designation: A814/A814M – 15 (Reapproved 2019)

Standard Specification for Cold-Worked Welded Austenitic Stainless Steel Pipe¹

This standard is issued under the fixed designation A814/A814M; 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 two classes of flanged and cold-bending quality cold-worked straight-seam single or double welded austenitic steel pipe intended for high-temperature and general corrosive services.

NOTE 1—When the impact test criterion for a low-temperature service would be 15 ft-lbf [20 J] energy absorption or 15 mils [0.38 mm] lateral expansion, some of the austenitic stainless steel grades covered by this specification are accepted by certain pressure vessel or piping codes without the necessity of making the actual test. For example, Grades 304, 304L, and 347 are accepted by the ASME Pressure Vessel Code, Section VIII Division 1, and by the Chemical Plant and Refinery Piping Code, ANSI B31.3 for service at temperatures as low as -425°F [-250°C] without qualification by impact tests. Other AISI stainless steel grades are usually accepted for service temperatures as low as -325°F [-200°C] without impact testing. Impact testing may, under certain circumstances, be required. For example, materials with chromium or nickel content outside the AISI ranges, and for material with carbon content exceeding 0.10 %, are required to be impact tested under the rules of ASME Section VIII Division 1 when service temperatures are lower than -50°F [-45°C].

1.2 Grades TP304H, TP304N, TP316H, TP316N, TP321H, TP347H, and TP348H are modifications of Grades TP304, TP316, TP321, TP347, and TP348, and are intended for high-temperature service.

1.3 Two classes of pipe are covered as follows:

1.3.1 *Class SW*—Pipe, single-welded with no addition of filler metal and

1.3.2 *Class DW*—Pipe, double-welded with no addition of filler metal.

1.4 Optional supplementary requirements are provided for pipe where a greater degree of testing is desired. These supplementary requirements call for additional tests to be made and, when desired, one or more of these may be specified in the order.

1.5 **Table 1** lists the dimensions of cold-worked single- or double-welded stainless steel pipe. Pipe having other dimen-

sions may be furnished provided such pipe complies with all other requirements of this specification.

1.6 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 are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. The inch-pound units shall apply unless the “M” designation of this specification is specified in the order.

1.7 *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

[A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels](#)

[A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)

[A480/A480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip](#)

[A999/A999M Specification for General Requirements for Alloy and Stainless Steel Pipe](#)

[E112 Test Methods for Determining Average Grain Size](#)

[E381 Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings](#)

[E527 Practice for Numbering Metals and Alloys in the Unified Numbering System \(UNS\)](#)

2.2 *ANSI Standards*:³

[B31.3 Process Piping](#)

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 A01.10 on Stainless and Alloy Steel Tubular Products.

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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 National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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

TABLE 1 Pipe Dimensions^A

NPS No.	Outside Diameter	Outside Diameter Tolerance	Schedule	Thickness	Wall
	in. [mm]	in. [mm]		in. [mm]	Tolerance in. [mm]
e 1/8	0.405 [10.29]	+0.004 [0.10] -0.002 [0.05]	10	0.049 [1.24]	±0.004 [0.10]
			40	0.068 [1.72]	±0.005 [0.12]
			80	0.095 [2.41]	±0.006 [0.15]
1/4	0.540 [13.72]	+0.005 [0.12] -0.003 [0.08]	10	0.065 [1.65]	±0.005 [0.12]
			40	0.088 [2.24]	±0.006 [0.15]
			80	0.119 [3.02]	±0.009 [0.23]
3/8	0.675 [17.15]	+0.006 [0.15] -0.004 [0.10]	10	0.065 [1.65]	±0.005 [0.12]
			40	0.091 [2.31]	±0.006 [0.15]
			80	0.126 [3.20]	±0.010 [0.25]
1/2	0.840 [21.34]	+0.007 [0.18] -0.005 [0.12]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.083 [2.11]	±0.006 [0.15]
			40	0.109 [2.77]	±0.009 [0.23]
			80	0.147 [3.73]	±0.011 [0.28]
3/4	1.050 [26.67]	+0.010 [0.25] -0.007 [0.18]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.083 [2.11]	±0.006 [0.15]
			40	0.113 [2.87]	±0.009 [0.23]
			80	0.154 [3.91]	±0.011 [0.28]
1	1.315 [33.40]	+0.010 [0.25] -0.007 [0.18]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.109 [2.77]	±0.009 [0.23]
			40	0.133 [3.38]	±0.011 [0.28]
			80	0.179 [4.55]	±0.014 [0.36]
1 1/4	1.660 [42.16]	+0.012 [0.30] -0.008 [0.20]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.109 [2.77]	±0.009 [0.23]
			40	0.140 [3.56]	±0.011 [0.28]
			80	0.191 [4.85]	±0.014 [0.36]
1 1/2	1.900 [48.26]	+0.015 [0.38] -0.008 [0.20]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.109 [2.77]	±0.009 [0.23]
			40	0.145 [3.68]	±0.011 [0.28]
			80	0.200 [5.08]	±0.015 [0.38]
2	2.375 [60.33]	+0.018 [0.46] -0.008 [0.20]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.109 [2.77]	±0.009 [0.23]
			40	0.154 [3.91]	±0.011 [0.28]
			80	0.218 [5.54]	±0.015 [0.38]
2 1/2	2.875 [73.03]	+0.020 [0.51] -0.009 [0.23]	5	0.065 [1.65]	±0.005 [0.12]
			10	0.120 [3.05]	±0.010 [0.25]
			40	0.203 [5.16]	±0.015 [0.38]
			80	0.276 [7.01]	±0.020 [0.51]
3	3.500 [88.90]	+0.025 [0.63] -0.010 [0.25]	5	0.083 [2.11]	±0.006 [0.15]
			10	0.120 [3.05]	±0.010 [0.25]
			40	0.216 [5.49]	±0.015 [0.38]
			80	0.300 [7.62]	±0.020 [0.51]
3 1/2	4.000 [101.6]	+0.025 [0.63] -0.010 [0.25]	5	0.083 [2.11]	±0.006 [0.15]
			10	0.120 [3.05]	±0.010 [0.25]
			40	0.226 [5.74]	±0.018 [0.46]
			80	0.318 [8.08]	±0.020 [0.51]
4	4.500 [114.3]	+0.025 [0.63] -0.010 [0.25]	5	0.083 [2.11]	±0.006 [0.15]
			10	0.120 [3.05]	±0.010 [0.25]
			40	0.237 [6.02]	±0.019 [0.48]
			80	0.337 [8.56]	±0.020 [0.51]

^A All dimensions in inches.

2.3 ASME Boiler and Pressure Vessel Code:⁴

Section VIII Division 1, Pressure Vessels

2.4 SAE Standard:⁵

SAE J 1086 Practice for Numbering Metals and Alloys (UNS)

3. Ordering Information

3.1 Orders for material under this specification should include the following as required, to describe the desired material adequately:

⁴ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁵ Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

- 3.1.1 Quantity (feet, centimetres, or number of lengths),
- 3.1.2 Name of material (austenitic steel pipe),
- 3.1.3 Class (1.3). If not specified by the purchaser, the producer shall have the option to furnish either single-welded (SW) or double-welded (DW) pipe,
- 3.1.4 Grade (Table 2),
- 3.1.5 Size (NPS or outside diameter and schedule number or average wall thickness),
- 3.1.6 Length (specific or random) (Section 10),
- 3.1.7 End finish (Section on Ends of Specification A999/A999M),
- 3.1.8 Optional requirements (Section 9), (Supplementary Requirements S1 to S8),
- 3.1.9 Test report required (Section on Certification of Specification A999/A999M),

TABLE 2 Chemical Requirements

Grade	UNS Designation ^A	Composition, %														
		Carbon, max ^B	Manganese, max ^B	Phosphorus, max	Sulfur, max	Silicon	Nickel	Chromium	Molybdenum	Titanium	Columbium plus Tantalum	Tantalum, max	Nitrogen ^C	Vanadium	Copper	Cerium
TP 201	S20100	0.15	5.5–7.5	0.060	0.030	1.00	3.5–5.5	16.0–18.0	...	...	...	...	0.25	...	...	...
TP 201LN	S20153	0.03	6.4–7.5	0.045	0.015	0.75	4.0–5.0	16.0–17.5	...	...	...	...	0.10–0.25	...	1.00	...
TP 304	S30400	0.08	2.00	0.045	0.030	1.00 max	8.0–11.0	18.0–20.0	...	...	...	...	...	...	...	...
TP 304H	S30409	0.04–0.10	2.00	0.045	0.030	1.00 max	8.0–11.0	18.0–20.0	...	...	...	...	...	...	...	...
TP 304L	S30403	0.030 ^D	2.00	0.045	0.030	1.00 max	8.0–13.0	18.0–20.0	...	...	...	...	...	...	...	...
TP 304N	S30451	0.08	2.00	0.045	0.030	1.00 max	8.0–11.0	18.0–20.0	...	...	...	...	0.10–0.16	...	...	...
TP 304LN	S30453	0.030	2.00	0.045	0.030	1.00 max	8.0–11.0	18.0–20.0	...	...	...	...	0.10–0.16	...	...	...
TP 309Cb	S30940	0.08	2.00	0.045	0.030	1.00 max	12.0–16.0	22.0–24.0	...	...	10 × C min, 1.10 max	...	...	...	...	...
TP309S	S30908	0.08	2.00	0.045	0.030	1.00 max	12.0–15.0	22.0–24.0	...	...	...	...	...	...	...	...
TP 310Cb	S31040	0.08	2.00	0.045	0.030	1.00 max	19.0–22.0	24.0–26.0	...	...	10 × C min, 1.10 max	...	...	...	...	...
TP 310S	S31008	0.08	2.00	0.045	0.030	1.00 max	19.0–22.0	24.0–26.0	0.75 max	...	...	...	...	...	...	...
TP 316	S31600	0.08	2.00	0.045	0.030	1.00 max	10.0–14.0	16.0–18.0	2.00–3.00	...	...	...	...	...	...	...
TP 316H	S31609	0.04–0.10	2.00	0.045	0.030	1.00 max	10.0–14.0	16.0–18.0	2.00–3.00	...	...	...	...	...	...	...
TP 316L	S31603	0.030 ^D	2.00	0.045	0.030	1.00 max	10.0–14.0	16.0–18.0	2.00–3.00	...	...	...	...	...	...	...
TP 316N	S31651	0.08	2.00	0.045	0.030	1.00 max	10.0–14.0	16.0–18.0	2.00–3.00	...	...	...	0.10–0.16	...	...	...
TP 316LN	S31653	0.030	2.00	0.045	0.030	1.00 max	10.0–14.0	16.0–18.0	2.00–3.00	...	...	...	0.10–0.16	...	...	...
TP 317	S31700	0.08	2.00	0.045	0.030	1.00 max	11.0–14.0	18.0–20.0	3.0–4.0	...	...	...	...	...	...	...
TP 317L	S31703	0.030	2.00	0.045	0.030	1.00 max	11.0–15.0	18.0–20.0	3.0–4.0	...	...	...	...	...	...	...
...	S31727	0.030	1.00	0.030	0.030	1.00	14.5–16.5	17.5–19.0	3.8–4.5	...	...	...	0.15–0.21	...	2.8–4.0	...
...	S32053	0.030	1.00	0.030	0.010	1.00	24.0–26.0	22.0–24.0	5.0–6.0	...	...	...	0.17–0.22	...	...	...
TP 321	S32100	0.08	2.00	0.045	0.030	1.00 max	9.00–13.0	17.0–19.0	...	E	...	...	...	...	...	...
TP 321H	S32109	0.04–0.10	2.00	0.045	0.030	1.00 max	9.00–13.0	17.0–19.0	...	F	...	...	...	...	...	...
TP 347	S34700	0.08	2.00	0.045	0.030	1.00 max	9.00–13.0	17.0–19.0	...	...	G	...	...	...	...	...
TP347H	S34709	0.04–0.10	2.00	0.045	0.030	1.00 max	9.00–13.0	17.0–19.0	...	...	H	...	...	...	...	...
TP 348	S34800	0.08	2.00	0.045	0.030	1.00 max	9.00–13.0	17.0–19.0	...	...	G	0.10	...	...	...	...
TP 348H	S34809	0.04–0.10	2.00	0.045	0.030	1.00 max	9.00–13.0	17.0–19.0	...	...	H	0.10	...	...	...	...
TP XM-10	S21900	0.08	8.0–10.0	0.045	0.030	1.00 max	5.5–7.5	19.0–21.5	...	...	...	...	0.15–0.40	...	...	...
TP XM-11	S21903	0.04	8.0–10.0	0.045	0.030	1.00 max	5.5–7.5	19.0–21.5	...	...	...	...	0.15–0.40	...	...	...
TP XM-15	S38100	0.08	2.00	0.030	0.030	1.50–2.50	17.5–18.5	17.0–19.0	...	...	...	...	...	...	...	...
TP XM-19	S20910	0.06	4.0–6.0	0.045	0.030	1.00 max	11.5–13.5	20.5–23.5	1.50–3.00	...	0.10–0.30	...	0.20–0.40	0.10–0.30	...	...
TP XM-29	S24000	0.08	11.5–14.5	0.060	0.030	1.00 max	2.3–3.7	17.0–19.0	...	...	...	...	0.20–0.40	...	...	...
...	S31254	0.020	1.00	0.030	0.010	0.80 max	17.5–18.5	19.5–20.5	6.0–6.5	...	...	...	0.18–0.22	...	0.50–1.00	...
...	S30815	0.05–0.10	0.80	0.040	0.030	1.40–2.00	10.0–12.0	20.0–22.0	...	...	...	...	0.14–0.20	...	...	0.03–0.08
...	N08367	0.030	2.00	0.040	0.030	1.00 max	23.5–25.5	20.0–22.0	6.0–7.0	...	...	...	0.18–0.25	...	0.75 max	...