



Standard Specification for Electric-Fusion-Welded Austenitic Chromium-Nickel Stainless Steel Pipe for High-Temperature Service and General Applications¹

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1. Scope*

1.1 This specification² covers electric-fusion-welded austenitic chromium-nickel stainless steel pipe suitable for corrosive or high-temperature service, or both, or for general applications.

NOTE 1—The dimensionless designator NPS (nominal pipe size) has been substituted in this standard for such traditional terms as “nominal diameter,” “size,” and “nominal size.”

1.2 This specification covers the grades of alloy and stainless steel listed in Table 1. The selection of the proper grade and requirements for heat treatment shall be at the discretion of the purchaser, dependent on the service conditions to be encountered.

1.3 Five classes of pipe are covered as follows:

1.3.1 *Class 1*—Pipe shall be double welded by processes employing filler metal in all passes and shall be completely radiographed.

1.3.2 *Class 2*—Pipe shall be double welded by processes employing filler metal in all passes. No radiography is required.

1.3.3 *Class 3*—Pipe shall be single welded by processes employing filler metal in all passes and shall be completely radiographed.

1.3.4 *Class 4*—Same as Class 3 except that the weld pass exposed to the inside pipe surface may be made without the addition of filler metal (see 6.2.2.1 and 6.2.2.2).

1.3.5 *Class 5*—Pipe shall be double welded by processes employing filler metal in all passes and shall be spot radiographed.

1.4 Supplementary requirements covering provisions ranging from additional testing to formalized procedures for manufacturing practice are provided. Supplementary Requirements S1 through S6 are included as options to be specified when desired.

1.5 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 to be 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.

2. Referenced Documents

2.1 ASTM Standards:³

A240/A240M [Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications](#)

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

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

A941 [Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys](#)

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

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

2.2 ASME Boiler and Pressure Vessel Code:⁴

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 ASME Boiler and Pressure Vessel Code applications see related Specifications SA-358 in Section II of that Code.

³ 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.

⁴ 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.



TABLE 1 Continued

Grade	UNS Designation	Material, Type	ASTM Plate Specification No. and Grade	Filler Metal Classification and UNS Designation ^A for Applicable ^B AWS Specification											
				A5.4		A5.9		A5.11		A5.14		A5.22		A5.30	
				Class.	UNS	Class.	UNS	Class.	UNS	Class.	UNS	Class.	UNS	Class.	UNS
316N	S31654	316N	A-240 Type 316N	E316	W31610	ER316	-	S31680 W31640	...	...	...	E316T	W31631	IN316	S31680
316N	S31651	316N	A240 Type 316N	E316	W31610	ER316	-	S31680 W31640	...	...	...	E316T	W31631	IN316	S31680
316LN	S31653	316LN	A-240 Type 316LN	E316L	W31613	ER316L	-	S31683 W31643	...	...	...	E316LT	W31635	IN316L	S31683
316H	S31609	316H	A-240 Type 316H	E316H	W31610	ER316H	-	S31680 W31640	...	...	...	E316T	W31631	IN316	S31680
317	S31700	317	A240 Type 317	E317	W31710	ER317	-	S31780 W31740	...	...	...	E317LT	W31735	...	...
317L	S31703	317L	A240 Type 317L	E317L	W31713	ER317L	-	S31783 W31743	...	...	...	E317LT	W31735	...	...
...	S31727	...	A240	...	...	...	...	...	...	...	...	...	...	...	...
...	S32053	...	A240 S32053	...	...	...	...	...	...	...	...	...	...	...	...
321	S32100	321	A-240 Type 321	E347	W34710	ER321	W34710	S32180 W32140	...	...	...	E347T	W34733	IN348	S34780
321H	S32109	321H	A240 Type 321H	E321H	W34710	ER321H	W34710	S32180 W32140	...	...	...	E347T	W34733	IN348	S34780
347	S34700	347	A-240 Type 347	E347	W34710	ER347	-	S34780 W34740	...	...	...	E347T	W34733	IN348	S34780
347H	S34709	347H	A-240 Type 347H	E347H	W34710	ER347H	-	S34780 W34740	...	...	...	E347T	W34733	IN348	S34780
347HC	S34709	347HC	A240 Type 347HC	E347H	W34710	ER347H	W34710	S34780 W34740	...	...	...	E347T	W34733	IN348	S34780
348	S34800	348	A-240 Type 348	E347	W34710	ER347	-	S34780 W34740	...	...	...	E347T	W34733	IN348	S34780
XM-19	S22100	XM-19	A-240 Type XM-19	E209	W34710	ER209	-	S20980 W34740	...	...	...	E347T	W34733	IN348	S34780

TABLE 1 Continued

Grade	UNS Designation	Material Type	ASTM Plate Specification No. and Grade	A5.4		A5.9		A5.11		A5.14		A5.22		A5.30	
				Class.	UNS	Class.	UNS	Class.	UNS	Class.	UNS	Class.	UNS	Class.	UNS
XM-19	S22100	XM-19	A240 Type XM-19	E209	W32210	ER209	-	S20980 W32240	...	...	...	...	...	...	...
XM-29	S28300	XM-29	A-240 Type XM-29	E240	W92440	ER240	-	S23980 W92440	...	...	...	...	...	...	...
XM-29	S28300	XM-29	A240 Type XM-29	E240	W32410	ER240	-	S23980 W32440	...	...	...	...	...	...	...
...	S31254	...	S31254 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S30815	...	S30815 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S31725	...	S31725 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S31726	...	S31726 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S30600 ^D	...	S30600 ^D A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S34565	...	S34565 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S30415	...	S30415 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S32654	...	S32654 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	S31266	...	S31266 A240	...	...	...	-	...	ENiCrMo-13	W86059	ENiCrMo-13	W86059	ENiCrMo-13	N06059	...
...	S31266	...	S31266 A240	...	...	...	-	...	ENiCrMo-10	W86022	ENiCrMo-10	W86022	ENiCrMo-10	N06022	...
...	S32050	...	S32050 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	N08967	...	N08967 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...
...	N08367	...	N08367 A240	...	...	...	-	...	ENiCrMo-3	W86112	ENiCrMo-3	W86112	ENiCrMo-3	N06625	...

Section II, Materials

Section III, Rules for Construction of Nuclear Facility Components

Section VIII, Pressure Vessels

Section IX, Welding and Brazing Qualifications

2.3 *AWS Specifications:*⁵

A 5.22 Flux Cored Arc Welding

A 5.30 Consumable Weld Inserts for Gas Tungsten Arc Welding

A 5.4 Corrosion-Resisting Chromium and Chromium-Nickel Steel Covered Welding Electrodes

A 5.9 Corrosion-Resisting Chromium and Chromium-Nickel Steel Welding Rods and Bare Electrodes

A 5.11 Nickel and Nickel-Alloy Covered Welding Electrodes

A 5.14 Nickel and Nickel-Alloy Bare Welding Rods and Electrodes

2.4 *Other Standard:*⁶

SAE J1086 Practice for Numbering Metals and Alloys (UNS)

3. Terminology

3.1 *Definitions:*

3.1.1 The definitions in Specification ~~A 999/A 999M~~A999/A999M and Terminology ~~A 941~~and Terminology A941 are applicable to this specification.

4. Ordering Information

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for product under this specification. Such requirements to be considered include, but are not limited to, the following:

4.1.1 Quantity (feet, metres, or number of lengths),

4.1.2 Name of material (electric-fusion-welded pipe),

4.1.3 Grade (Table 1),

4.1.4 Class (see 1.3),

4.1.5 Size (outside diameter and nominal wall thickness),

4.1.6 Length (specific or random),

4.1.7 End finish (Section on Ends of Specification ~~A 999/A 999M~~A999/A999M),

4.1.8 Authorization for repair of plate defects by welding and subsequent heat treatment without prior approval if such is intended (see 9.3),

4.1.9 Specification designation,

4.1.10 Special requirements,

4.1.11 Statement invoking requirements of 16.4 if such is intended.

4.1.12 Circumferential weld permissibility (see Section 16),

4.1.13 Supplementary Requirements (S1 through S6),

4.1.14 Applicable ASME Code if known,

4.1.15 For ASME Code Section III applications, the service classification intended, and

4.1.16 Certification requirements (see Section on Certification of Specification ~~A 999/A 999M~~A999/A999M).

5. General Requirements

5.1 Material furnished to this specification shall conform to the applicable requirements of the current edition of Specification ~~A 999/A 999M~~A999/A999M unless otherwise provided herein.

6. Materials and Manufacture

6.1 *Materials:*

6.1.1 The steel plate material shall conform to the requirements of one of the grades of Specification ~~A 240/A 240M~~A240/A240M, listed in Table 1, except as provided in 6.3.2.3.

6.2 *Welding:*

6.2.1 The joints shall be full penetration double-welded or single-welded butt joints employing fusion welding processes 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. Where backing rings or strips are employed, the ring or strip material shall be of the same P-Number (Table QW-422 of Section IX) as the plate being joined. Backing rings or strips shall be completely removed after welding, prior to any required radiography, and the exposed weld surface shall be examined visually for conformance to the requirements of 6.2.3. Welds made by procedures

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

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