



Designation: A1134/A1134M – 26

Standard Specification for Cold-Formed Welded Stainless Steel Structural Tubing in Rounds and Shapes¹

This standard is issued under the fixed designation A1134/A1134M; 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 cold-formed welded unannealed austenitic, ferritic-martensitic, and austenitic-ferritic duplex stainless steel tubing in rounds and shapes, intended for structural purposes and other applications where mechanical properties, and corrosion resistance are needed. The alloys covered are listed in [Table 1](#).

1.2 This specification covers cold-formed as-welded structural tubing in the following size ranges:

1.2.1 Tubing with one longitudinal weld with perimeter up to 48 in. [1219 mm] and wall thickness from 0.049 in. up to $\frac{5}{8}$ in. [1.24 mm to 15.9 mm].

1.2.2 Tubing with two (2) longitudinal welds and press brake formed with an outside perimeter between 32 in and 88 in [812 mm and 2235 mm] and wall thickness from $\frac{1}{4}$ in. up to 1 in. [6.35 mm to 25.4 mm].

1.3 Tubes shall be furnished in one of the following shapes as specified by the purchaser: round, square, rectangular, or special.

1.4 Supplementary requirements of an optional nature are provided and when desired shall be stated in the order.

1.5 *Units*—This specification is expressed in both inch-pound units and in SI units. However, unless the purchase order or contract specifies the applicable M specification designation [SI units], the inch-pound units shall apply. The values stated in either inch-pound units or SI units are to be regarded separately as standard. SI units are shown in brackets. The values stated in each system may not be exact equivalent; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appro-*

priate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

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

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

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

[A380/A380M](#) Practice for Cleaning, Descaling, Pickling, and Passivation of Stainless Steel Parts, Equipment, and Systems

[A700](#) Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

[A751](#) Test Methods and Practices for Chemical Analysis of Steel Products

[A923](#) Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels

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

[A1016/A1016M](#) Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes

[A1058](#) Test Methods for Mechanical Testing of Steel Products—Metric

[A1084](#) Test Method for Detecting Detrimental Phases in Lean Duplex Austenitic/Ferritic Stainless Steels

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

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 www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



TABLE 1 Alloys (Chemistry per Specification A240/A240M)

UNS # ^A	Type ^B	UNS # ^A	Type ^B
Austenitic		Ferritic or Martensitic	
S20153	201LN ^C	S40977	...
S30153	301LN ^C	S41003	...
S30400	304	S41008	410S
S30403	304L		
S30409	304H		
S30416	...	S32101	...
S30453	304LN ^C	S32202	...
S30908	309S	S32205	2205 ^C
S31008	310S	S32304	2304 ^C
S31254	...	S32550	255 ^C
S31600	316	S32750	2507 ^C
S31603	316L	S32760	...
S31609	316H	S82011	...
S31635	316Ti ^C	S82441	...
S31653	316LN ^C		
S31655	...		
S31703	317L		
S32100	321		
N08367	...		
N08904	904L ^C		
N08926	...		

^A Designation established in accordance with Practice E527 and SAE J 1086.

^B Unless otherwise indicated, an alloy designation originally assigned by the American Iron and Steel Institute (AISI).

^C Common name, not a trademark, widely used, not associated with one producer.

2.2 SAE Standards:³

SAE J 1086 Numbering Metals and Alloys

2.3 ASME Standards:⁴

ASME Boiler and Pressure Vessel Code Section IX

2.4 AWS Specifications:⁵

AWS Specification D1.6/D1.6M

2.5 ISO Standards:⁶

ISO 15614 Specification and qualification of welding procedures for metallic standards

3. Terminology

3.1 *Definition of Terms*—For definitions of terms used in this standard that are not included in 3.2 refer to:

3.1.1 Terminology A941 for general steel terminology;

3.1.2 Test Method and Definitions A370 or Test Methods A1058 for mechanical testing of steel products terminology; and

3.1.3 Test Methods and Practices A751 for chemical analysis of steel products terminology.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *cold-formed*—formed to final shape by a cold working process.

3.2.2 *structural tubing*—tubing of various shapes used for load bearing structural applications, specified by nominal outside dimensions and nominal wall.

³ Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.

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 American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

⁶ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

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 Name of material, UNS designation or Type (according to Specification A240/A240M) (see Table 1).

4.1.2 ASTM specification designation and year of issue to which the product is to be furnished and be certified as meeting.

4.1.3 Quantity (length (mill lengths, cut lengths, or multiple lengths (see 13.2)), mass, or number of pieces).

4.1.4 Name of material (cold-formed welded stainless steel structural tubing).

4.1.5 Form round, square, rectangular, special (see 1.3).

4.1.6 Alloy designation (Section 1, Table 1).

4.1.7 Dimensions:

4.1.7.1 Round-outside diameter and wall thickness for all conditions (Section 13).

4.1.7.2 Square and rectangular outside dimensions and wall thickness (Section 14).

4.1.7.3 Special (to be specified).

4.1.8 Type of melting (see 9.2).

4.1.9 Requirements for certifications and for reporting chemical analyses and test results (Sections 9 and 20).

4.2 The option for the purchaser, in agreement with the manufacturer, to specify additional requirements, includes but is not limited to:

4.2.1 Condition of weld(s) (Section 6).

4.2.2 Strength Grade (Section 8, Table 2).

4.2.3 Surface finish (Section 16).

4.2.4 Individual supplementary requirements.

4.2.5 End use.

4.2.6 Special requirements.

4.2.7 Special marking (Section 19).

4.2.8 Special packing (Section 20).

5. Materials and Manufacture

5.1 The tubes shall be cold-formed continuously or individually from flat-rolled stainless steel strip or plate and joined

TABLE 2 Tensile Requirements (Cold-Formed Shaped Tubing)

Strength Grade ^A	Yield strength, min		Tensile strength, min		Elongation in 2 in. or 50 mm min., %
	ksi	MPa	ksi	MPa	
	Austenitic				
1	35	240	80	550	25
2	45	310	85	590	20
3	70	485	100	690	18
Duplex (Austenitic-Ferritic)					
4	70	485	95	660	20
5	90	620	110	760	10

^A Strength grade 1 shall be supplied for austenitic alloys and strength grade 4 for duplex alloys, unless otherwise specified in the order. Strength grades 2 and 3 may not be available for all austenitic alloys and tube sizes. Strength grade 5 may not be available for all Duplex alloys and tube sizes. Other tensile test requirements may be agreed upon by the purchaser and the manufacturer of the tubes. Tensile test requirements for ferritic/martensitic tubes shall be agreed upon by the purchaser and the manufacturer of the tubes.