



Designation: A1123/A1123M – 22

# Standard Specification for Carbon Steel Laser and Laser-Hybrid Welded, Sharp-Cornered Profile (SCP), Built-Up, Square, Rectangular, and Special Shape Tube<sup>1</sup>

This standard is issued under the fixed designation A1123/A1123M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

## 1. Scope

1.1 This specification covers laser beam or laser hybrid welded, built-up, carbon steel, sharp-cornered profiles (SCP) square, rectangular, or custom shape structural tubing for welded, riveted, or bolted construction. This specification does not include weathering steels, since most cannot be welded by these methods. SCP tubing is used in, but not limited to, the following applications: buildings and structures, including architecturally exposed steel structures (AESS); architectural steel profiles such as curtain wall, staircases, and others; industrial; and general structural applications.

NOTE 1—There is no standard for other sharp-cornered laser or laser hybrid welded carbon steel structural shapes, but Appendix X1 provides guidance on their specification.

1.2 The SCP structural tubing sections produced to this specification have a perimeter of 2845 mm [112 in.] or less and wall thickness of between 4.76 and 38.1 mm [3/16 and 1.50 in.]. The thicknesses of walls within a specified SCP tube shape can be different.

1.3 This specification establishes the minimum requirements for manufacturing of built-up, SCP laser, and laser hybrid welded carbon steel tube sections and requires the welds to, at a minimum, match the tensile and yield strength of the base metal.

NOTE 2—Product covered by this specification is manufactured in small lots on dedicated production lines. Product quality requirements are ensured through welding procedure qualification of the manufacturing facility in accordance with AWS, ISO, or CSA requirements. In addition to the standard weld inspection and weld quality requirements, the purchaser can specify higher levels of weld inspection; Supplementary S1 tensile, S2 bend, and S3 Charpy V-notch lot testing; and other requirements.

NOTE 3—Because of the varying requirements of the end-use applications, four different length tolerance and weld inspection levels may be specified.

<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 A01.09 on Carbon Steel Tubular Products.

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1.4 This specification uses Specifications A36/A36M, A572/A572M, EN 10025-2, or EN 10025-3 for the chemical and mechanical requirements of the designated strength grade.

1.5 The text of this specification contains notes and footnotes that provide explanatory material. Such notes and footnotes, excluding those in tables and figures, do not contain any mandatory requirements.

1.6 *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. 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 nonconformance with the standard.

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

1.8 *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:<sup>2</sup>

A36/A36M Specification for Carbon Structural Steel  
A370 Test Methods and Definitions for Mechanical Testing of Steel Products  
A572/A572M Specification for High-Strength Low-Alloy

<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.



**Columbium-Vanadium Structural Steel**

**A673/A673M** Specification for Sampling Procedure for Impact Testing of Structural Steel

**A700** Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

**A941** Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys

**E164** Practice for Contact Ultrasonic Testing of Weldments

**E165/E165M** Practice for Liquid Penetrant Testing for General Industry

**E190** Test Method for Guided Bend Test for Ductility of Welds

**E290** Test Methods for Bend Testing of Material for Ductility

**E1417/E1417M** Practice for Liquid Penetrant Testing

**2.2 ANSI/AISC Standard:<sup>3</sup>**

**ANSI/AISC 303** Code of Standard Practice for Steel Buildings and Bridges

**ANSI/AISC 360** Specification for Structural Steel Buildings

**2.3 AWS Standards:<sup>4</sup>**

**AWS A3.0M/A3.0** Standard Welding Terms and Definition, Including Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying

**AWS B2.1/2.1M** Specification for Welding Procedure and Performance Qualification

**AWS C7.2M** Recommended Practices for Laser Beam Welding, Cutting, and Allied Processes

**AWS C7.4/C7.4M** Process Specification and Operator Qualification for Laser Beam Welding

**AWS C7.6/C7.6M** Process Specification and Operator Qualification for Laser Hybrid Welding

**AWS D1.1/D1.1M** Structural Welding Code—Steel

**2.4 CSA Group Standard:<sup>5</sup>**

**CSA W47.1** Certification of Companies for Fusion Welding of Steel

NOTE 4—Fusion welding is another term used to describe laser beam or laser-hybrid welding.

**2.5 EN Standards:<sup>6</sup>**

**EN 10025-2** Hot rolled products of structural steels—Part 2: Technical delivery conditions for non-alloy structural steels

**EN 10025-3** Hot rolled products of structural steels—Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels

**EN 10204** Metallic Products: Types of Inspection Documents

**2.6 Federal Standard:<sup>7</sup>**

**Federal Standard No. 123** Marking for Shipment

**2.7 ISO Standards:<sup>8</sup>**

**ISO 3452-1** Non-destructive testing—Penetrant testing—Part 1: General Principles

**ISO 11666** Non-destructive testing of welds – Ultrasonic testing – Acceptance levels

**ISO 12932** Welding—Laser-arc hybrid welding of steels, nickel, and nickel alloys—Quality levels for imperfections

**ISO 13919-1** Welding and Laser-beam Welded Joints—guidance on Quality Levels for Imperfections—Part 1: Steel

**ISO 15609-4** Specification and Qualification of Welding Procedures for Metallic Materials—Welding Procedure Specification

**ISO 15609-6** Specification and qualification of welding procedures for metallic materials—Welding procedure specification—Part 6: Laser-arc hybrid welding

**ISO 15614-11** Specification and Qualification of Welding Procedures for Metallic Materials—Welding Procedure Test— Part 11: Electron and Laser Beam Welding

**ISO 15614-14** Specification and Qualification of Welding Procedures for Metallic Materials—Welding Procedure Test— Part 14: Laser-Arc Hybrid Welding of Steels, Nickel and Nickel Alloys

**ISO 17638** Non-destructive testing of welds – Magnetic particle testing

**ISO 17640** Non-destructive testing of welds—Ultrasonic testing—Techniques, testing levels, and assessment

**ISO 23277** Non-destructive testing of welds – Penetrant testing

**ISO 23278** Non-destructive testing of welds – Magnetic particle testing of welds – Acceptance levels

**2.8 U.S. Military Standard:<sup>9</sup>**

**MIL-STD-129** Military Marking for Shipment and Storage

### 3. Terminology

3.1 Definitions of general terms pertaining to this specification shall be those of Terminology **A941**.

3.2 Definitions of terms pertaining to welding terminology shall be those of AWS A3.0M/A3.0.

### 4. Ordering Information

4.1 Orders for material under this specification shall contain information concerning as many of the following items as are required to describe the desired material adequately. Such requirements shall include, but are not limited to:

4.1.1 Quantity (metres [feet] or number of lengths);

4.1.2 Name of material [laser-welded carbon steel sharp-cornered profiles (SCP) tube];

4.1.3 Size (outside dimensions and wall thickness for square and rectangular tube (mm [inch]), and drawings for custom shapes, if applicable);

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>4</sup> Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

<sup>5</sup> Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, <http://www.csagroup.org>.

<sup>6</sup> Available from European Committee for Standardization (CEN), Avenue Marix 17, B-1000, Brussels, Belgium, <http://www.cen.eu>.

<sup>7</sup> Available from U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

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

<sup>9</sup> Available from <https://www.acq.osd.mil/log/SCI/AIT.html/MIL-STD-129PCH4.pdf>.