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.

Designation: A1069/A1069M – 23

Standard Specification for Stainless Steel Laser and Laser Hybrid Welded Bars, Plates, Sharp-Cornered Profile (SCP), and Built-up Shapes[1]

This standard is issued under the fixed designation A1069/A1069M; 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 laser and laser hybrid welded stainless steel bars, plates, sharp-cornered profile (SCP), and built-up shapes of structural quality for use in bolted or welded structural applications. SCP and built-up shapes are used in, but not limited to, the following applications: industrial and general structural applications like buildings, including architecturally exposed steel structures (AESS); architectural steel profiles, such as curtain wall and staircases.

NOTE 1—The term laser fusion is also used to describe laser welding.

1.1.1 Supplementary requirements of an optional nature are provided. They shall apply only when specified by the purchaser.

NOTE 2—Since the product covered by this specification is manufactured in small lots on dedicated production lines, minimum product quality requirements are ensured by requiring welding process specification and operator qualification at each manufacturing facility in accordance with AWS, ASME, or ISO requirements. If required, the purchaser can specify higher levels of weld inspection; supplementary requirements for mechanical and corrosion testing; and other requirements.

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

1.2 Shapes covered in this specification include those defined in Article 3.1.2 of Specification A6/A6M, square and rectangular hollow sections, and additional shapes, including customized, that are made from two or more shapes, plates, bar, sheet, or strip.

1.3 This specification establishes the minimum requirements for manufacturing of laser and laser hybrid welded stainless steel shapes and requires the welds to, at a minimum, match the tensile and yield strength of the base metal. If base metals of different strengths are used, the lower strength base metal shall be matched.

1.4 This specification refers to Specifications A240/A240M, A276/A276M, or A479/A479M for chemical requirements, but the mechanical test requirements are determined by the mechanical properties section of this standard. This standard includes four strength grades. The default strength grade 1 is determined by the base metal standard. Grades 2 through 4 are for specification of higher strength levels.

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:*[2]

A6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

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

[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 A01.17 on Flat-Rolled and Wrought Stainless Steel.

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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.

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

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Vessels and for General Applications
A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
A276/A276M Specification for Stainless Steel Bars and Shapes
A370 Test Methods and Definitions for Mechanical Testing of Steel Products
A380/A380M Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
A479/A479M Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
A480/A480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
A484/A484M Specification for General Requirements for Stainless Steel Bars, Billets, Shapes, and Forgings
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
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
A1084 Test Method for Detecting Detrimental Phases in Lean Duplex Austenitic/Ferritic Stainless Steels
E164 Practice for Contact Ultrasonic Testing of Weldments
E190 Test Method for Guided Bend Test for Ductility of Welds
E290 Test Methods for Bend Testing of Material for Ductility
E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

2.2 *ANSI/AISC Standard:*[3]

ANSI/AISC 370 Specification for Structural Stainless Steel Buildings

2.3 *ISO Standards:*[4]

ISO 4063 Welding and allied processes - Nomenclature of processes and reference numbers
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 17640 Non-destructive testing of welds—Ultrasonic testing—Techniques, testing levels, and assessment

2.4 *EN Standards:*[5]

EN 10204 Metallic Products: Types of Inspection Documents

2.5 *Federal Standards:*[6]

Federal Standard No. 123 Marking for Shipment (Civil Agencies)

2.6 *AWS Standards:*[7]

AWS A3.0M/A3.0 Standard Welding Terms and Definition, Including Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying
AWS D1.6/D1.6M Structural Welding Code – Stainless Steel
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

2.7 *ASME Standards:*[8]

ASME SA-370
ASME BPVC.IX-2019 ASME Boiler and Pressure Vessel Code, Section IX: Welding and Brazing Qualifications

2.8 *SAE Standard:*[9]

J1086 Practice for Numbering Metals and Alloys (UNS)

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions of general terms pertaining to this specification shall be those of Specification A6/A6M, "Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling" and Terminology A941, "Standard Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys."

3.1.2 Definitions of terms pertaining to welding terminology shall be those of AWS A3.0M /A3.0, "Standard Welding Terms and Definition, Including Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying."

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

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

[5] Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, http://www.cen.eu.

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Phila., PA 19111-5094, Attn: NPODS.

[7] Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, http://www.aws.org.

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

[9] Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, http://www.sae.org.