Designation: B928/B928M – 15 (Reapproved 2023)ε1

Standard Specification for High Magnesium Aluminum-Alloy Products for Marine Service and Similar Environments[1]

This standard is issued under the fixed designation B928/B928M; 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.

ε1 NOTE—Editorially updated Section 2 in October 2023.

1. Scope

1.1 This specification covers high magnesium aluminum-alloy products in the mill finish condition that are intended for marine hull construction and other marine applications where frequent or constant direct contact with seawater is expected and for similar environments (Note 1). Aluminum alloy products covered by this specification include the alloy-tempers of flat sheet, coiled sheet, and plate shown in Table 2 [Table 3] and Table 4 [Table 5], and alloy-tempers of extruded profiles shown in Table 6 [Table 7].

NOTE 1—There are other aluminum alloy-temper products that may be suitable for use in marine and similar environments, but which may not require the corrosion resistance testing specified by B928/B928M. See Specification B209/B209M for other aluminum sheet and plate alloy-temper products. For other aluminum extruded alloy-temper products see Specification B221 or B221M and/or other relevant specifications for aluminum extruded products.

1.2 Alloy and temper designations are in accordance with ANSI H35.1/H35.1 (M). The equivalent Unified Numbering System alloy designations are those of Table 1 preceded by A9, for example, A95083 for 5083 in accordance with Practice E527.

1.3 The values stated in either SI units (Table 3 and Table 5) or inch-pound units (Table 2 and Table 4) are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of each other. Combining values from the two systems may result in non-conformance with the standard.

1.4 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see Annex A2.

1.5 *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.*

1.6 *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 The following documents of the issue in effect on the date of material purchase, unless otherwise noted, form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B209/B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate

B221 Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

B221M Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

B557 Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products

B557M Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)

B660 Practices for Packaging/Packing of Aluminum and Magnesium Products

B666/B666M Practice for Identification Marking of Aluminum and Magnesium Products

B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products

B985 Practice for Sampling Aluminum Ingots, Billets, Castings and Finished or Semi-Finished Wrought Aluminum Products for Compositional Analysis

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

[1] This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

Current edition approved Oct. 1, 2023. Published October 2023. Originally approved in 2003. Last previous edition approved in 2015 as B928/B928M – 15. DOI: 10.1520/B0928_B0928M-15R23E01.

[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.

E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys (Withdrawn 2017)[3]
E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials
E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)
E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere (Withdrawn 2011)[3]
E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spark Atomic Emission Spectrometry
E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry
G66 Test Method for Visual Assessment of Exfoliation Corrosion Susceptibility of 5XXX Series Aluminum Alloys (ASSET Test)
G67 Test Method for Determining the Susceptibility to Intergranular Corrosion of 5XXX Series Aluminum Alloys by Mass Loss After Exposure to Nitric Acid (NAMLT Test)

2.3 *ANSI Standards:*[4]
H35.1/H35.1 (M) Alloy and Temper Designation Systems for Aluminum
H35.2 Dimensional Tolerances for Aluminum Mill Products
H35.2(M) Dimensional Tolerances for Aluminum Mill Products

2.4 *Other Standards:*
CEN EN 14242 Aluminum and Aluminum Alloys—Chemical Analysis—Inductively Coupled Plasma Optical Emission Spectral Analysis[5]

3. Terminology

3.1 *Definitions*—Refer to Terminology B881 for definitions of product terms used in this specification.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *exfoliation, n*—corrosion that proceeds laterally from the sites of initiation along planes parallel to the original rolling surface, generally at grain boundaries, forming corrosion products that force metal away from the body of the material, giving rise to a layered appearance.

3.2.2 *high magnesium aluminum alloys, n*—in the general sense, includes those 5xxx alloys containing 3 % or more nominal magnesium.

3.2.3 *intergranular corrosion, n*—corrosion that preferentially occurs at, or adjacent to, the grain boundaries of a metal or alloy.

3.2.4 *lot, n*—an inspection lot shall consist of an identifiable quantity of material of the same mill form, alloy, temper, cast or melt lot, and thickness, subjected to inspection at one time.

3.2.5 *sensitization, n*—the development of a continuous or nearly continuous grain boundary precipitate in 5xxx alloy-temper material, that causes the material to be susceptible to intergranular forms of corrosion.

3.2.6 *stress-corrosion cracking, n*—a cracking process that requires the simultaneous action of a corrodent, and sustained tensile stress. (This excludes corrosion-reduced sections, which fail by fast fracture. It also excludes intercrystalline or transcrystalline corrosion which can disintegrate an alloy without either applied or residual stress.)

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

4.1.1 This specification designation (which includes the number, the year, and the revision letter, if applicable),

4.1.2 Quantity in pieces or pounds [kilograms],

4.1.3 Alloy (see 7.1 and Table 1),

4.1.4 Temper (see 8.1 and Table 2 [Table 3] and Table 4 [Table 5] for sheet and plate or Table 6 [Table 7] for extrusions),

4.1.5 For sheet, whether flat or coiled, and

4.1.6 For sheet and plate, dimensions (thickness, width, and length or coil size).

4.1.7 For extruded products, dimensions and tolerances including but not limited to the following:

4.1.7.1 For rod and round wire—diameter.

4.1.7.2 For square cornered bar and wire—width and depth.

4.1.7.3 For sharp cornered hexagonal or octagonal bar and wire—distance across the flats.

4.1.7.4 For round tube—outside or inside diameter and wall thickness.

4.1.7.5 For square or sharp cornered tube other than round—distance across flats and wall thickness.

4.1.7.6 For round cornered bars, profiles, tube other than round, square, rectangular, hexagonal, or octagonal with sharp corners a drawing is required showing all dimensions and tolerances relevant for the manufacture of the product to requirements.

4.1.7.7 Length.

4.2 Additionally, orders for material to this specification shall include the following information when required by the purchaser:

4.2.1 Whether inspection or witness of inspection and tests by the purchaser's representative is required prior to material shipment (see 12.1),

4.2.2 Whether Practices B660 applies and, if so, the levels of preservation, packaging, and packing required (see 16.3),

4.2.3 Whether certification is required (see Section 14),

4.2.4 Whether G66 and G67 testing is the required lot release method for the H116 and H321 tempers (see 9.5),

4.2.5 Whether the G66 and G67 test results are to be included in the certification (see Section 14), and

4.2.6 Whether tensile testing should be in the longitudinal or long transverse direction (see 8.1.5).

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from Aluminum Association, Inc., 1400 Crystal Dr., Suite 430, Arlington, VA, 22202, http://www.aluminum.org.

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