Designation: B660 – 15

Standard Practices for Packaging/Packing of Aluminum and Magnesium Products[1]

This standard is issued under the fixed designation B660; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These practices describe methods of packaging/packing aluminum and magnesium products, in preparation for storage or shipment, both foreign and domestic. Assuming proper and normal handling in transit, these practices are designed to deliver the products to their destination in good condition. For DoD redistribution, see Supplementary Requirements.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 Aluminum and magnesium products must be preserved and packed so as to be adequately protected from possible damage during shipment and storage. Major damage types are:

1.3.1 Mechanical, including bending, crushing, denting, scratching, or gouging during handling and storage; and abrasions resulting from vibration during transport of the material.

1.3.2 Corrosion, or water stain, resulting from exposure of packed material to water, either externally applied, or as condensate caused by temperature variations in a humid atmosphere.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D779 Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry Indicator Method (Withdrawn 2011)[3]

D1732 Practices for Preparation of Magnesium Alloy Surfaces for Painting

D1974 Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes

D3950 Specification for Strapping, Nonmetallic (and Joining Methods)

D3951 Practice for Commercial Packaging

D3953 Specification for Strapping, Flat Steel and Seals

D4727/D4727M Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes

D5168 Practice for Fabrication and Closure of Triple-Wall Corrugated Fiberboard Containers

D5486/D5486M Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing

F1667 Specification for Driven Fasteners: Nails, Spikes, and Staples

2.2 *ANSI Standard:*

ANSI/AHA A135.4 Basic Hardboard[4]

2.3 *Federal Specifications:*[5]

A-A-1249 Paper, Wrapping, Tissue

A-A-1671 Tape, Gummed (Paper, Reinforced, Asphalt Laminated)

A-A-55057 Panels, Wood/Wood-Based; Construction and Decorative

PPP-B-566 Box, Folding, Paperboard

PPP-C-96 Can, Metal, 28 Gage and Lighter

PPP-D-705 Drum, Shipping and Storage: Steel 16 and 30 Gallon Capacity

PPP-D-723 Drum, Fiber (inactive for new design)

PPP-D-729 Drum, Shipping and Storage: Steel, 55 Gallon

PPP-P-704 Pails, Metal: (Shipping, Steel, 1 through 12, Gallons)

PPP-T-495 Tubes, Mailing, and Filing

[1] These practices are under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and are the direct responsibilities of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

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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.

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

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

[5] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://www.dodssp.daps.mil.

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

2.4 *Federal Standards:*[5]
APA-PS1 U.S. Product Standard (For Construction and Industrial Plywood)
MIL-STD-3010 Test Procedures for Packaging Materials
2.5 *Military Specifications:*[5]
MIL-C-11796 Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-DTL-17667 Paper, Wrapping, Chemically Neutral (Non-Corrosive)
MIL-PRF-121 Barrier Materials, Greaseproof, Waterproof, Flexible, Heat-Sealable
MIL-PRF-16173 Corrosion Preventive Compound, Solvent Cutback, Cold Application
MIL-PRF-32033 Lubricating Oil, General Purpose, Preservative (Water Displacing, Low Temperature)
MIL-PRF-7870 Lubricating Oil: General Purpose, Low Temperature
2.6 *Military Standard:*[5]
MIL-STD-129 Marking for Shipment and Storage
2.7 *Other Standards:*[6]
Aluminum Standards and Data-Protective Oil for Aluminum

3. Classification

3.1 *Levels of Protection*—The following levels of protection apply equally to preservation and packing:

3.1.1 *Level A*—The degree required for protection against the most severe conditions known or anticipated to be encountered during shipment, multiple rough handling, and intransit storage.

3.1.2 *Commercial Packaging*—The degree required for protection of material during shipment from supplier to user for immediate use or limited storage in a dry, heated storage facility. The methods and materials employed by the supplier to satisfy the requirements of the commercial distribution system to provide protection against corrosion, deterioration, and damage during shipment to a user may be used.

4. Terminology

4.1 *Definitions:*

4.1.1 *corner protector, n*—protective material placed under ties to protect edges of a package.

4.1.2 *deckboard, n*—piece of lumber at right angles to stringers or skids of a pallet to form a bearing surface.

4.1.3 *filler, n*—piece of material placed in a package to fill void space for the purpose of squaring out the contents.

4.1.4 *framing member, n*—parts forming the main structure of a crate.

4.1.5 *gross weight, n*—bare item weight and the weight of all packaging and packing materials.

4.1.6 *header, n*—member of skid-type base used to join the ends of two or more skids and provide added strength to the base.

4.1.7 *interleaving, n*—placement of a sheet of protective material between two adjacent pieces of metal.

4.1.8 *net weight, n*—bare item weight.

4.1.9 *nominal, adj*—referring to lumber size, rough sawn commercial size of soft wood lumber common to the industry.

4.1.10 *splice, v*—to unite or join the ends of material such as lumber, plywood, or paper overlaid veneer.

4.1.11 *tension tied, v*—securement applied with mechanical tools.

5. General Requirements

5.1 *Materials, Methods, and Containers*—Materials, methods, and containers shall conform to the requirements of this standard. Those exceeding the requirements may be substituted as negotiated by purchaser and producer or supplier.

5.1.1 Materials not covered by applicable specifications or not specifically described herein shall be of high quality and shall be compatible with and protect the contents.

5.1.2 *Splicing Requirement*—When container members must be spliced to obtain the required length or width, the adjacent edges of the two pieces being spliced shall be butt-jointed as specified in 5.1.2.1 and each piece fastened to the splice board. The fastening shall conform to the requirements specified for construction of the panels being spliced. Nails must be clinched.

5.1.2.1 Splice boards shall be applied to extend on each side of the joint at least two times the width of and the same thickness as the box boards.

5.1.3 The inside dimensions of boxes shall be commensurate with the size of the item.

5.2 *Internal Packaging Materials:*

5.2.1 *Material Compatibility*—Internal packaging materials shall not adversely affect the contents.

5.2.2 *Blocking and Bracing*—Articles not completely filling the shipping container shall be blocked, braced, fastened, or otherwise secured. Articles having projecting parts that may be broken or may puncture the container shall be rigidly supported, suspended, or otherwise protected. Clearance of at least 1 in. (25.4 mm) shall be provided between projecting parts and the adjacent inside face of the container. Blocking and bracing shall be prevented from coming in direct contact with any unprotected surface of the item by use of suitable cushioning material.

5.3 *Handling:*

5.3.1 *General*—Containers and pallets in their shipping configuration shall be provided with lifting and hoisting provisions commensurate with their weight, size, and intended mode of transportation to ensure safe and efficient movement.

5.3.2 *Hoisting*—Convenient means shall be provided on all shipping containers (except Figs. S1.1-S1.4) and pallets weighing more than 200 lb (90.72 kg) gross which will permit hoisting by attaching suitable slings at the bottom of the containers and pallets.

5.3.3 *Forklift Truck Compatibility*—Unless otherwise specified herein and except Figs. S1.1-S1.4, boxes, containers, and pallets grossing over 200 lb (90.72 kg) must be capable of

[6] Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, http://www.aluminum.org.

being handled from at least two sides by forklift trucks. For DoD use, standard 40 by 48 in. (1016 by 1219.2 mm) pallets must have four-way forklift entry. Openings shall be a minimum of 3 in. (76.2 mm) high and at least 20 in. (508 mm) apart inside-to-inside, symmetrically about the center of balance. Containers may have a single opening 40 in. (1016 mm) wide or more to provide forklift access.

6. Detailed Requirements

6.1 *Packaging Preservation*—Packaging shall be Level A, or commercial preservation as follows:

6.1.1 *Level A*—Detailed requirements for packaging (preservation) of aluminum and magnesium products are listed alphabetically by product in Table 1. When Level A is specified, items shall be preserved in accordance with the detailed requirements outlined herein.

TABLE 1 Packaging (Preservation) and Packing for Level A (Note—For Commercial Packaging, See Section 8)

Product	Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 4	Maximum[A] Net Weight Per Container, lb (kg) (7.16)
Bar, rod and wire (cold-finished, drawn, extruded, rolled, and forged):			
Coiled, bare	AL-oiled, Mg-Chrome pickled (6.1.1.1-6.1.1.3)	Wrapped coils (Fig. 19). Wrap with one layer of Type IIB barrier.	120 (54.43)
Coiled, covered	none required	Wrapped coils (Fig. 19). Wrap with one layer of Type IIB barrier.	120 (54.43)
Spooled for military requirements: 5, 10, 15, 20, 30, lb (2.27 kg, 4.54 kg, 6.80 kg, 9.07 kg, 13.61 kg) per spool (other: standard commercial weights)	none required	Wooden boxes (Figs. 1-4). Boxes shall be case-lined with one layer of Type IIA barrier or two layers of Type III barrier.	300 (136.08)
Straight lengths	AL-oiled, Mg-Chrome pickled (6.1.1.1-6.1.1.3)	Wooden boxes (Figs. 5-7). Boxes shall be case-lined with one layer of Type IIA barrier or two layers of Type III barrier. or	1000[B] (453.59)
		Corrugated fiberboard boxes, Class weather-resistant (S6.1) or	300 (136.08)
		Fiber-drums (7.14)	200 (90.72)
Blooms and billets	See ingot	...	
Bus conductors (cold-finished, drawn, extruded and rolled)	See bar, straight lengths	...	
Cable (bare and covered):			
Size 1/0 and smaller	none required	Wrapped coils (Fig. 19). Wrap with one layer of Type IIB barrier. or	(bare) 250 (113.40) (covered) 200 (90.72)
		Reels (Fig. 23).	(bare) 1250 (566.99) (covered) 1000 (453.59)
Size larger than 1/0	none required	Reel (Fig. 23).	(bare) 1600 (725.75) (covered) 1300 (589.67)
Casting and forgings, finished.	none required	Wooden boxes (Figs. 1-4) or Style 1 Crate Fig. 16). Boxes and crates shall be case lined with one layer of Type IIA barrier or two layers of Type III barrier.	2000 (907.18)
Castings and forgings, rough	none required	Bare bundles (Fig. 20).	1000 (453.59)
Conduit	See ANSI schedule pipe.	...	