



Designation: ~~B660-02~~ Designation: **B 660 – 08**

Standard Practices for Packaging/Packing of Aluminum and Magnesium Products¹

This standard is issued under the fixed designation B 660; 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 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 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:~~

~~1.2.1 Mechanical, including bending, crushing, denting, scratching, or gouging during handling and storage; and abrasions resulting from vibration during transport of the material.~~

~~1.2.2 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.~~

~~Note 1—A complete metric companion to Practices B660 is being developed—Practices B660M; therefore, no metric equivalents are presented in these practices.~~

~~1.3~~

~~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.~~

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~~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

D 779 Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry- Indicator Method

D 1732 Practices for Preparation of Magnesium Alloy Surfaces for Painting

D 1974 Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes

D 3950 Specification for Strapping, Nonmetallic (and Joining Methods)

D 3951 Practice for Commercial Packaging

D 3953 Specification for Strapping, Flat Steel and Seals

D 4727/D 4727M Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes

D 5168 Practice for Fabrication and Closure of Triple-Wall Corrugated Fiberboard Containers

D 5486/D 5486M Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing

F 1667 Specification for Driven Fasteners: Nails, Spikes, and Staples

2.2 ANSI Standard:

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*, Vol 15.09, 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.

ANSI/AHA A135.4 Basic Hardboard³

2.3 *Federal Specifications:*⁴

- 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

2.4 *Federal Standards:*⁴

- APA-PS1 U.S. Product Standard (For Construction and Industrial Plywood)
- ~~FED-STD-101 Preservation, Packaging and Packing Materials: Test Procedure~~ MIL-STD-3010 Test Procedures for Packaging Materials

2.5 *Military Specifications:*⁴

- MIL-C-11796 Corrosion Preventive Compound, Petrolatum, Hot Application
- ~~MIL-P-17667 Paper, Wrapping, Chemically Neutral (Non-Corrosive) (inactive for new design)~~ 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:*⁴

- MIL-STD-129 Marking for Shipment and Storage

2.7 *Other Standards:*⁵

- 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*—protective material placed under ties to protect edges of a package.
- 4.1.2 *deckboard*—piece of lumber at right angles to stringers or skids of a pallet to form a bearing surface.
- 4.1.3 *filler*—piece of material placed in a package to fill void space for the purpose of squaring out the contents.
- 4.1.4 *framing member*—parts forming the main structure of a crate.
- 4.1.5 *gross weight*—bare item weight and the weight of all packaging and packing materials.
- 4.1.6 *header*—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*—placement of a sheet of protective material between two adjacent pieces of metal.
- 4.1.8 *net weight*—bare item weight.
- 4.1.9 *nominal*—referring to lumber size, rough sawn commercial size of soft wood lumber common to the industry.
- 4.1.10 *splice*—to unite or join the ends of material such as lumber, plywood, or paper overlaid veneer.
- 4.1.11 *tension tied*—seurement applied with mechanical tools.

³ Annual Book of ASTM Standards, Vol 02.05.

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

⁴ Annual Book of ASTM Standards, Vol 01.08.

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

⁵ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, <http://www.aluminum.org>.

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

Product	Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2	Maximum ^a Net Weight Per Container (7.17) tainer, 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. 1). Wrap with one layer of Type IIB barrier.	120-120 (54.43)
— 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. 1). Wrap with one layer of Type IIB barrier.	120-120 (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 per spool (other: standard commercial weights)	none required	Wooden boxes (Figs. 2-5). Boxes shall be case-lined with one layer of Type IIA barrier or two layers of Type III barrier.	300-300 (136.08)
— 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. 6-8). Boxes shall be case-lined with one layer of Type IIA barrier or two layers of Type III barrier.	1000 ^B (453.59)
— 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.	1000 ^B (453.59)
		Corrugated fiberboard boxes, Class weather-resistant (S6.1)	300-300 (136.08)
		Corrugated fiberboard boxes, Class weather-resistant (S6.1)	300 (136.08)
		Fiber drums (7.14)	200-200 (90.72)
		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. 1). Wrap with one layer of Type IIB barrier.	(bare) 250 (covered) 200 (113.40)
— Size 1/0 and smaller	none required	Wrapped coils (Fig. 19). Wrap with one layer of Type IIB barrier.	(bare) 250 (113.40) (covered) 200 (90.72)
		Reels (Fig. 9).	(bare) 1250 (covered) 1000 (566.99)
		Reels (Fig. 23).	(bare) 1250 (566.99) (covered) 1000 (453.59)

TABLE 1 Continued

Product	Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2 Packing (Section 7) for Barrier, see Table 4	Maximum ^A Net Weight Per Container (7.17) tainer, lb (kg) (7.16)
—Size larger than 1/0	none required	Reel (Fig. 9).	(bare) 1600 (covered) 1300 (bare) 1600 (725.75) (covered) 1300 (589.67)
<u>Size larger than 1/0</u>	<u>none required</u>	<u>Reel (Fig. 23).</u>	<u>(bare) 1600</u> <u>(725.75)</u> <u>(covered) 1300</u> <u>(589.67)</u>
<u>Castings and forgings, finished.</u>	<u>none required</u>	<u>Wooden boxes (Figs. 2-5) or Style Fig. 10).</u> <u>Boxes and crates shall be case lined with one layer of Type IIA barrier or two layers of Type III barrier.</u>	<u>2000-2000</u> <u>(907.18)</u>
<u>Castings and forgings, finished.</u>	<u>none required</u>	<u>Wooden boxes (Figs. 1-4) or Style 1 Crate Fig. 16).</u> <u>Boxes and crates shall be case lined with one layer of Type IIA barrier or two layers of Type III barrier.</u>	<u>2000 (907.18)</u>
<u>Castings and forgings, rough</u>	<u>none required</u>	<u>Bare bundles (Fig. 11).</u>	<u>1000-1000</u> <u>(453.59)</u>
<u>Castings and forgings, rough</u>	<u>none required</u>	<u>Bare bundles (Fig. 20).</u>	<u>1000 (453.59)</u>
Conduit	See ANSI schedule pipe.	...	
<u>Extruded profiles (metal less than 1 lb per linear foot)^C</u>	<u>AL-oiled, Mg-Chrome-pickled (6.1.1.1-6.1.1.3)</u>	<u>Wooden boxes (Figs. 6-8). Boxes shall be case lined with one layer of Type IIA barrier or</u>	<u>2000-2000</u> <u>(907.18)</u>
<u>Extruded profiles (metal less than 1 lb per linear foot)^C</u>	<u>AL-oiled, Mg-Chrome-pickled (6.1.1.1-6.1.1.3)</u>	<u>Wooden boxes (Fig. 5-7). Boxes shall be case lined with one layer of Type IIA barrier or</u>	<u>2000 (907.18)</u>
<u>Fittings (pipe and conduit)</u>	<u>AL-oiled, Mg-Chrome-pickled (6.1.1.1-6.1.1.3)</u>	<u>Gorrugated fiberboard boxes, Class weather-resistant (56.1) or</u>	<u>300-300</u> <u>(136.08)</u>
<u>Fittings (pipe and conduit)</u>	<u>AL-oiled, Mg-Chrome-pickled (6.1.1.1-6.1.1.3)</u>	<u>Gorrugated fiberboard boxes, Class weather-resistant (56.1) or</u>	<u>300 (136.08)</u>
	<u>External threads shall be covered with suitable thread protectors.</u>	<u>Wooden boxes (Figs. 2-5) or Style 1 crate (Fig. 10) dependent upon size of fittings. Boxes and crates shall be case lined with one layer Type IIA barrier.</u>	<u>100-100 (45.36)</u>
	<u>External threads shall be covered with suitable thread protectors.</u>	<u>Wooden boxes (Figs. 1-4) or Style 1 crate (Fig. 16) dependent upon size of fittings. Boxes and crates shall be case lined with one layer Type IIA barrier.</u>	<u>100 (45.36)</u>
Foil ^{D,E}			
—Coiled	Foil shall be wound on aluminum fiber or steel cores. End of coil shall be secured with pressure sensitive tape. Sheared edges shall be protected from flanges and adjacent coils with suitable edge protectors. Each coil, or coils (see 7.10) shall be wrapped with aluminum 0.001 in. thick aluminum foil.	Wooden boxes (Figs. 2-5). Coils shall be suspended by extended cores or wood dowels through the core. Core extension or dowel shall be inserted in wood flanges so that periphery of coil does not contact inner surface of box (Fig. 12). Minimum flange thickness shall be as specified in 7.10.	500-500 (226.80)
<u>Coiled</u>	<u>Foil shall be wound on aluminum fiber or steel cores. End of coil shall be secured with pressure sensitive tape. Sheared edges shall be protected from flanges and adjacent coils with suitable edge protectors. Each coil, or coils (see 7.10) shall be wrapped with aluminum 0.001 in. (0.0254 mm) thick aluminum foil.</u>	<u>Wooden boxes (Figs. 1-4). Coils shall be suspended by extended cores or wood dowels through the core. Core extension or dowel shall be inserted in wood flanges so that periphery of coil does not contact inner surface of box (Fig. 24). Minimum flange thickness shall be as specified in 7.10.</u>	<u>500 (226.80)</u>

TABLE 1 *Continued*

Product	Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2 Packing (Section 7) for Barrier, see Table 4	Maximum ^A Net Weight Per Container (7.17) tainer, lb (kg) (7.16)
	Foil wrap shall be a conformable wrap completely enclosing the coil or coils and edge protectors on each core or dowel (Fig. 12).	Corrugated fiberboard boxes, Class weather-resistant (S6.1) suspended as above.	300-300 (136.08)
	Foil wrap shall be a conformable wrap completely enclosing the coil or coils and edge protectors on each core or dowel (Fig. 24).	Corrugated fiberboard boxes, Class weather-resistant (S6.1) suspended as above.	300 (136.08)
— Flat	none required	Wooden boxes (Figs. 2-5). Contents shall be wrapped with one separate layer of Type IIA barrier.	500-500 (226.80)
— Flat	none required	or Wooden boxes (Figs. 1-4). Contents shall be wrapped with one separate layer of Type IIA barrier.	500 (226.80)
		or Corrugated fiberboard boxes, Class weather-resistant (S6.1)	300-300 (136.08)
		Corrugated fiberboard boxes, Class weather-resistant (S6.1)	300 (136.08)
Forgings	See castings	...	
Forging stock	See bar	...	
Impact extrusions	none required	Wooden boxes (Figs. 2-5). Boxes shall be lined with one layer of Type IIA barrier.	700-700 (317.51)
Impact extrusions	none required	or Wooden boxes (Figs. 1-4). Boxes shall be lined with one layer of Type IIA barrier.	700 (317.51)
		or Corrugated fiberboard boxes, Class weather-resistant (S6.1)	300-300 (136.08)
		Corrugated fiberboard boxes, Class weather-resistant (S6.1)	300 (136.08)
Ingot:			
— 500 lb per piece and over	none required	Loose	...
— 500 lb (226.80 kg) per piece and over	none required	Loose	...
— 30–500 lb per piece	none required	Bare bundles (Fig. 13). Size of bundle straps shall be as shown in Table 3. A minimum of two straps shall be used per bundle.	3500-3500 (1587.57)
— 30–500 lb (13.61-226.80 kg) per piece	none required	Bare bundles (Fig. 22). Size of bundle straps shall be as shown in Table 7. A minimum of two straps shall be used per bundle.	3500 (1587.57)
— Less than 30 lb per piece	none required	Pallets (Fig. 14). Size pallet straps shall be as shown in Table 3.	2500-2500 (1133.98)
— Less than 30 lb (13.61 kg) per piece	none required	or Pallets (Fig. 21). Size pallet straps shall be as shown in Table 7.	2500 (1133.98)
		or Self-palletized bundle. Interlocking ingots that are self-palletized may be shipped in strapped bundles not over 42 in. high. Bundle shall be strapped with a minimum of one 3/4-in. steel strap.	1500-1500 (680.39)
		Self-palletized bundle. Interlocking ingots that are self-palletized may be shipped in strapped bundles not over 42 in. (1,066.8 mm) high. Bundle shall be strapped with a minimum of one 3/4-in. (19.05 mm) steel strap.	1500 (680.39)

TABLE 1 *Continued*

Product	Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2 Packing (Section 7) for Barrier, see Table 4	Maximum ^A Net Weight Per Container (7.17) (7.16)
—Grained and granulated ingot and shot	Product to be packed in wood boxes (Figs. 2-5), shall be packaged in Federal Specification PPP-B-566, boxes, folding, paperboard.	Wooden boxes (Figs. 2-5) _____ or _____ Federal Specification PPP-P-704 Steel Pails (7.12). Pails shall not be overpacked. _____ or _____ Federal Specification PPP-P-704 Steel Pails (7.12). Pails shall not be overpacked.	500 — 70 70 (31.75)
<u>Grained and granulated ingot and shot</u>	<u>Product to be packed in wood boxes (Figs. 1-4), shall be packaged in Federal Specification PPP-B-566, boxes, folding, paperboard.</u>	<u>Wooden boxes (Figs. 1-4)</u> _____ or _____ Federal Specification PPP-P-704 Steel Pails (7.12). Pails shall not be overpacked. _____ or _____ Federal Specification PPP-D-705 and PPP-D-729 Steel Drums (7.13). Drums shall not be overpacked. _____ or _____ Federal Specification PPP-D-705 and PPP-D-729 Steel Drums (7.13). Drums shall not be overpacked. _____ or _____ Federal Specification PPP-D-723 Fiber Drums (7.15). Drums shall not be overpacked. _____ Federal Specification PPP-D-723 Fiber Drums (7.15). Drums shall not be overpacked.	500 (226.80) 70 (31.75) 650-650 (294.84) 650 (294.84) 550-550 (249.48) 550 (249.48)
Paste and powder	Product to be packed in wooden boxes (Figs. 2-5) shall be packaged in 1, 2, or 10 lb friction top can in accordance with Federal Specification PPP-C-96, Type V, Class 2.	Wooden boxes (Figs. 2-5). _____ or _____ Federal Specification PPP-D-705 or PPP-D-729 Steel Drums (7.13). Drums shall not be overpacked.	50 — 600-600 (272.16)
<u>Paste and powder</u>	<u>Product to be packed in wooden boxes (Figs. 1-4) shall be packaged in 1 (0.45), 2 (0.91), or 10 (4.54) lb (kg) friction top can in accordance with Federal Specification PPP-C-96, Type V, Class 2.</u>	<u>Wooden boxes (Figs. 1-4).</u> _____ or _____ Federal Specification PPP-D-705 or PPP-D-729 Steel Drums (7.13). Drums shall not be overpacked.	50 (22.68) 600 (272.16)
Plate: ^F			
—Flat and tapered	At see Table 4, Mg see Table 5.	Pallets (Figs. 15-18) with pallet enclosures (Fig. 19, Fig. 20, and Fig. 21). Contents shall be wrapped with one layer of Type IIA barrier or two layers of Type III barrier.	4000-4000 (1814.37)
<u>Flat and tapered</u>	<u>At see Table 2, Mg see Table 3.</u>	<u>Pallets (Figs. 9-12) with pallet enclosures (Fig. 13, Fig. 14, and Fig. 15). Contents shall be wrapped with one layer of Type IIA barrier or two layers of Type III barrier.</u>	<u>4000 (1814.37)</u>
—Circles	At see Table 4, Mg see Table 5.	Pallets (Figs. 15-18) with pallet enclosures (Fig. 19, Fig. 20, and Fig. 21). Contents shall be wrapped with one layer of Type IIA barrier or two layers of Type III barrier.	4000-4000 (1814.37)
<u>Circles</u>	<u>At see Table 2, Mg see Table 3.</u>	<u>Pallets (Figs. 9-12) with pallet enclosures (Fig. 13, Fig. 14, and Fig. 15). Contents shall be wrapped with one layer of Type IIA barrier or two layers of Type III barrier.</u>	<u>4000 (1814.37)</u>
—Floor and tread	none required	Pallets (Figs. 15-18). Secure contents to pallet with minimum two lengthwise and two girthwise straps, size 1¼ by 0.031 in.	10-000-10-000 (4535.92)
—Plate and abrasive			
—Tread plate			
<u>Floor and tread</u>	<u>none required</u>	<u>Pallets (Figs. 9-12). Secure contents to pallet with minimum two lengthwise and two girthwise straps, size 1¼ by 0.031 in. (31.75 mm by .787 mm)</u>	<u>10 000 (4535.92)</u>
<u>Plate and abrasive</u>			
<u>Tread plate</u>			
Screw machine stock	See bar	...	

TABLE 1 *Continued*

Product	Preservation (6.1.1) Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2 Packing (Section 7) for Barrier, see Table 4	Maximum ^A Net Weight Per Container (7.17) tainer, lb (kg) (7.16)
Sheet:^G			
Flat and tapered			
— 90 lb per piece or less or 15 ft in length or less	Al see Table 4, Mg see Table 5.	Pallet enclosure (Fig. 21)	4000-4000 (1814.37)
— 90 lb (40.82 kg) per piece or less or 15 ft (4.572 m) in length or less	Al see Table 2, Mg see Table 3.	Pallet enclosure (Fig. 15)	4000 (1814.37)
		Contents of box shall be wrapped with two layers of Type IIA barrier or one layer of Type IIA barrier and one layer of Type III barrier.	(Not to exceed 200 sheets)
— Over 90 lb per piece or over 15 ft in length	Al see Table 4, Mg see Table 5.	Pallets (Figs. 15-18) with pallet enclosures (Fig. 19 and Fig. 20). Contents shall be wrapped with two layers of Type IIA barrier.	4000-4000 (1814.37)
— Over 90 lb (40.82 Kg) per piece or over 15 ft (4.572 m) in length	Al see Table 2, Mg see Table 3.	Pallets (Figs. 9-12) with pallet enclosures (Fig. 13 and Fig. 14). Contents shall be wrapped with two layers of Type IIA barrier.	4000 (1814.37)
<u>Coiled</u>	Al-coiled, Mg-Chrome-pickled (6.1.1.1-6.1.1.3)	Pallets (Figs. 15-18) with pallet enclosure (Fig. 20). Contents shall be wrapped with one layer of Type IIA barrier or two layers of Type III barrier.	4000-4000 (1814.37)
<u>Coiled</u>	Al-coiled, Mg-Chrome-pickled (6.1.1.1-6.1.1.3)	Pallets (Figs. 9-12) with pallet enclosure (Fig. 14). Contents shall be wrapped with one layer of Type IIA barrier or two layers of Type III barrier.	4000 (1814.37)
Roofing and siding	none required	Pallets (Figs. 15-18) with pallet enclosures (Fig. 19 and Fig. 20). Contents shall be wrapped with one layer of Type IIA barrier.	4000-4000 (1814.37)
Roofing and siding	none required	Pallets (Figs. 9-12) with pallet enclosures (Fig. 13 and Fig. 14). Contents shall be wrapped with one layer of Type IIA barrier.	4000 (1814.37)
<i>ASTM B660-08</i>			
Structural profiles (extruded and rolled)^G			
— Less than 150 lb per piece	Al-none required. Mg-Chrome-pickled.	Wooden boxes (Figs. 6-8). Boxes shall be case lined with one layer of Type IIA barrier or two layers of Type III barrier.	1000-1000 (453.59)
— Less than 150 lb (68.04 kg) per piece	Al-none required. Mg-Chrome-pickled.	Wooden boxes (Figs. 5-7). Boxes shall be case lined with one layer of Type IIA barrier or two layers of Type III barrier.	1000 (453.59)
		Corrugated fiberboard boxes, Glass weather-resistant (S.1.7.1) Corrugated fiberboard boxes, Class weather-resistant (S.1.7.1)	300-300 (136.08) 300 (136.08)
— 150 lb per piece and over 150 lb (68.04 kg) per piece and over	Al-none required. Mg-Chrome-pickled. Al-none required. Mg-Chrome-pickled.	Loose Loose	∞ ∞
Tubular products (drawn, extruded, and welded):			
— Coiled	Al-oiled, Mg-oiled (6.1.1.1-6.1.1.3). Stagger wound coils shall be tied through the core in two places with twine or pressure sensitive tape. Pancake or level layer wound coils shall not be tied.	Style 1 crates (Fig. 10). Crates shall be case lined with one layer of Type IIA barrier.	700-700 (317.51)

TABLE 1 *Continued*

Product	Preservation (6.1.1) Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2 Packing (Section 7) for Barrier, see Table 4	Maximum ^A Net Weight Per Container (7.17) tainer, lb (kg) (7.16)
Coiled	Al-oiled, Mg-oiled (6.1.1.1-6.1.1.3). Stagger wound coils shall be tied through the core in two places with twine or pressure sensitive tape. Pancake or level layer wound coils shall not be tied.	Style 1 crates (Fig. 16). Crates shall be case lined with one layer of Type IIA barrier.	700 (317.51)
—Straight lengths	Al-oiled, Mg-Chrome pickled (6.1.1.1-6.1.1.3). When the wall thickness of tube is less than 2½ % of the outside diameter, boxes shall be lined with suitable cushioning material.	Wooden boxes (Figs. 6-8). Boxes shall be case lined with one layer of Type IIA barrier; or Corrugated fiberboard boxes Class weather-resistant (S6.1); or	300-300 (136.08)
Straight lengths	Al-oiled, Mg-Chrome pickled (6.1.1.1-6.1.1.3). When the wall thickness of tube is less than 2½ % of the outside diameter, boxes shall be lined with suitable cushioning material.	Wooden boxes (Figs. 5-7). Boxes shall be case lined with one layer of Type IIA barrier; or Corrugated fiberboard boxes Class weather-resistant (S6.1); or	300 (136.08)
—ANSI schedule pipe	Al-no preservative required. Mg-Chrome pickled (6.1.1.1-6.1.1.3). External threads shall be covered with suitable protectors.	Fiber tubes (7.16); Fiber tubes (7.16).	200-200 (90.72) 200 (90.72)
ANSI schedule pipe	Al-no preservative required. Mg-Chrome pickled (6.1.1.1-6.1.1.3). External threads shall be covered with suitable protectors.	Wooden boxes (Figs. 6-8). Boxes shall be case lined with one layer of Type IIA barrier or two layers of Type III barrier; or 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	800-800 (362.87)
		Style 2 and 3 crates Fig. 22 to Fig. 23). Crates shall be case lined with one layer of Type IIA barrier; or	4000-4000 (1814.37)
		Style 2 and 3 crates (Fig. 17 and 18). Crates shall be case lined with one layer of Type IIA barrier; or	4000 (1814.37)
—Construction pipe	Al-no preservative required. Mg-Chrome pickled (6.1.1.1-6.1.1.3).	Fiber tubes (7.16); Fiber tubes (7.16).	200-200 (90.72) 200 (90.72)
Construction pipe	Al-no preservative required. Mg-Chrome pickled (6.1.1.1-6.1.1.3).	Same as for ANSI scheduled pipe above.	See Packing
Welding and brazing rod	Al-no preservative required. Mg-Chrome pickled (6.1.1.1-6.1.1.3).	Same as for ANSI scheduled pipe above.	See Packing
—Coiled	none required	Wrapped coils (Fig. 1). Wrap with one layer of Type IIA barrier or two layers of Type III barrier.	120-120 (54.43)
Coiled	none required	Wrapped coils (Fig. 19). Wrap with one layer of Type IIA barrier or two layers of Type III barrier.	120 (54.43)
—Straight lengths, 36 in.	Package 5 lb per fiber tube with metal ends or 10 lb per fiberboard carton. 10 fiber tubes or 8 cartons shall be overpacked in a weather-resistant fiberboard carton in accordance with Practice D 4974. All corners and seams of boxes, including manufacturer's joint, shall be sealed with Specification D 5486/D 5486M, Type III or IV, Class 1, minimum 2-in. wide tape.	Wooden boxes (Figs. 2-5). Fiberboard boxes shall be overpacked in wooden boxes.	1000-1000 (453.59)

TABLE 1 *Continued*

Product	Preservation (6.1.1) Preservation (6.1.1)	Packing (Section 7) for Barrier, see Table 2 Packing (Section 7) for Barrier, see Table 4	Maximum ^A Net Weight Per Container (7.17) tainer, lb (kg) (7.16)
Straight lengths, 36 in. (914.4 mm)	<u>Package 5 lb (2.27 kg) per fiber tube with metal ends or 10 lb (4.54 kg) per fiberboard carton.</u> <u>10 fiber tubes or 8 cartons shall be overpacked in a weather-resistant fiberboard carton in accordance with Practice D 1974. All corners and seams of boxes, including manufacturer's joint, shall be sealed with Specification D 5486/D 5486M, Type III or IV, Class 1, minimum 2 in. (50.8 mm) wide tape.</u>	<u>Wooden boxes (Figs. 1-4). Fiberboard boxes shall be overpacked in wooden boxes.</u>	1000 (453.59)
—Inert gas welding electrode	<u>1, 5, 10, 12½, 15, or 30-lb spools—</u> <u>Individual spools shall be adequately protected by application of moisture-resistant barrier and packaged single or in multiple in fiberboard boxes Practice D 1974, Type CF, Class weather-resistant.</u>	<u>Fiberboard boxes in accordance with Practice D 1974, Type CF, Class weather-resistant, Grade V3c. All corners and seams of boxes, including manufacturer's joint, shall be sealed with Specification D 5486/D 5486M, Type III or IV, Class 1, minimum 2 in. wide tape. Three 5/8 by 0.015 in. flat steel straps, one lengthwise and two girthwise, shall be applied to each box. Maximum gross weight and dimensions of the box specification shall not be exceeded.</u> <u>or</u>	See Packing
<u>Inert gas welding electrode</u>	<u>1, 5, 10, 12½, 15, or 30 lb (.45 kg, 2.27 kg, 4.54 kg, 5.67 kg, 6.80 kg, or 13.61 kg) spools.</u> <u>Individual spools shall be adequately protected by application of moisture-resistant barrier and packaged single or in multiple in fiberboard boxes Practice D 1974, Type CF, Class weather-resistant.</u>	<u>Fiberboard boxes in accordance with Practice D 1974, Type CF, Class weather-resistant, Grade V3c. All corners and seams of boxes, including manufacturer's joint, shall be sealed with Specification D 5486/D 5486M, Type III or IV, Class 1, minimum 2 in. (50.8 mm) wide tape. Three 5/8 by 0.015 in. (15.88 by .381 mm) flat steel straps, one lengthwise and two girthwise, shall be applied to each box. Maximum gross weight and dimensions of the box specification shall not be exceeded.</u> <u>or</u>	See Packing
		<u>Wooden boxes (Figs. 2-5). Intermediate fiberboard boxes overpacked in wooden boxes, shall be closed in accordance with the closure method prescribed above for the fiberboard shipping in wooden containers.</u>	1000
		<u>Wooden boxes (Figs. 1-4). Intermediate fiberboard boxes overpacked in wooden boxes, shall be closed in accordance with the closure method prescribed above for the fiberboard shipping in wooden containers.</u>	1000 (453.59)

^A Maximum weights specified in this table are for shipments to DoD only.

^B Weight may be increased to 2000 lb (907.18 kg) for large quantities for manufacturing when specified in the contract or order.

^C For metal weighing 1 lb (.45 kg)/linear foot or more, see structural profiles.

^D Foil is sheet metal less than 0.006 in. (.152 mm) thick.

^E Foil for food handling applications shall be preserved and packed as specified in the contract or order.

^F Classification of sheet and plate: Sheet is 0.006 through 0.249 in. (.152 through 6.32 mm) thick; plate is 0.250 in. (6.35 mm) and thicker.

^G For metal weighing less than 1 lb (.45 kg)/linear foot, see extruded profiles.

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.

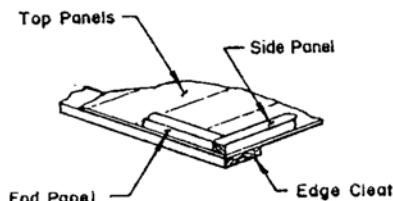
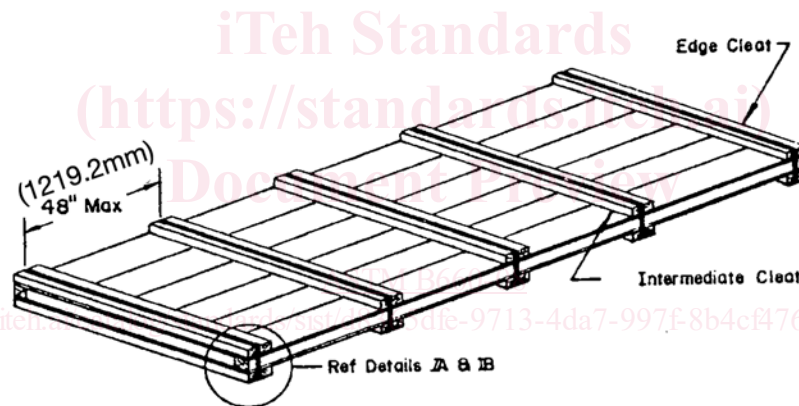
5.3.2 Hoisting—Convenient means shall be provided on all shipping containers (except Fig. 24, 32, Fig. 25, 33, Fig. 26, 34, and Fig. 27, 35) and pallets weighing more than 200 lb (90.72 kg) gross which will permit hoisting by attaching suitable slings at the bottom of the containers and pallets.

5.3.3 Forklift Truck Compatibility—Unless otherwise specified herein and except Fig. 24, 32, Fig. 25, 33, Fig. 26, 34, and Fig. 27, 35, boxes, containers, and pallets grossing over 200 lb (90.72 kg) must be capable of 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.

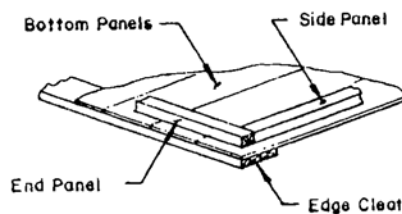
6. Detailed Requirements

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.



DETAIL A
TOP PANEL (INVERTED)



DETAIL B
BOTTOM PANEL

FIG. 32 Wood Box for Flat Sheet (Telescopic)^K

^K For DoD redistribution.

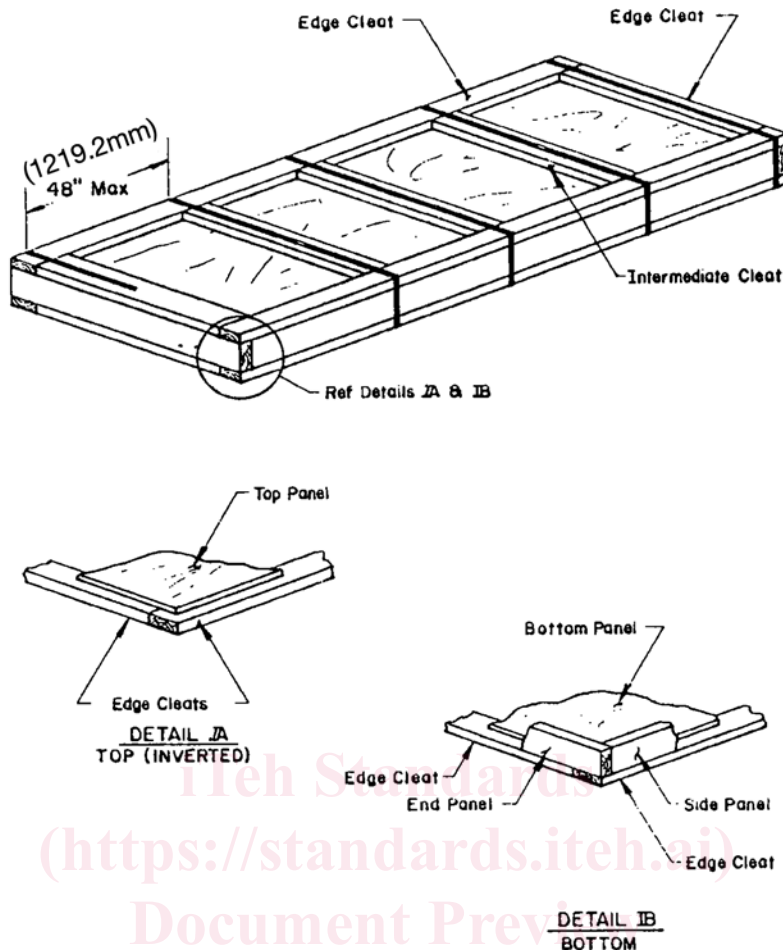


FIG. 33 Plywood or Paper Overlaid Veneer Box (Telescopic) for Flat Sheet^K

6.1.1.1 *Cleanliness*—Surfaces shall be commercially clean, and free from loose mill scale, dirt, foreign matter, or corrosion. The presence of residual rolling oil shall not be considered foreign matter.

6.1.1.2 *Preservatives*—Oil used for preservation of aluminum products shall conform to the requirements of Aluminum Standards and Data-Protective Oil for Aluminum, MIL-PRF-32033 or MIL-PRF-7870. Oil used for preservation of magnesium products shall conform to the requirements of MIL-PRF-16173, Grade 2, or MIL-C-11796, Class 3. Chrome pickle treatment of magnesium products shall conform to the requirements of Practices D 1732.

6.1.1.3 *Application of Preservative Coating*—The application of corrosion-preventive material demands careful attention; compounds shall not be applied to surfaces that show signs of moisture, condensation, frost, dirt, or other contaminants. The maximum corrosion resistance is obtained only by a thorough coating of a contaminant-free surface. It is essential that articles treated are not unduly handled until film is set. Application may be by dipping, brushing, rolling, spraying, or flowing onto the surface.

6.1.1.4 *Interleaving*—The interleaving paper shall fully cover the metal; for manual application, paper shall extend 1 in. (25.4 mm) beyond sides and ends, for machine application, paper may be same size as the metal provided the metal is fully covered.

6.1.1.5 *Wraps*—Application of wraps shall be in accordance with Table 1. Products may be machine-wrapped or hand-wrapped.

6.1.2 *Commercial Preservation*—When commercial preservation is specified, items will be given the degree of protection normally employed by the supplier against corrosion, deterioration, and damage during shipment.

6.2 *Material Requirements:*

6.2.1 *Fiberboard*—Fiberboard for boxes and liners shall conform to the requirements of Specification D 4727/D 4727M, class weather-resistant.

6.2.2 *Paper and Barrier Material*—Paper and barrier material shall conform to the requirements of Table 2/ Table 4.

6.2.3 *Wood*—The species of wood indicated in Table 6/ Table 5 and classified into groups as shown shall be used. The groups are set up to include, in any one group, species of woods that have approximately similar characteristics important to box design. These characteristics include density, flexural and compressive strength, stiffness, shock absorption, and nailholding power. When any species of wood is specified, any one or more species in the same group may be used. Groups I and II may be interchanged. Groups III and IV may be interchanged.

6.2.4 *Lumber*—All lumber dimensions used in these practices are nominal sizes except where minimum sizes are specified. At