Designation: D7478/D7478M – 11 (Reapproved 2017)

Standard Specification for Heavy Duty Sheathed Wood Crates[1]

This standard is issued under the fixed designation D7478/D7478M; 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 This specification covers requirements for two types and two classes of sheathed crates each of which may have two base styles. The crates are designed for net loads not exceeding 30 000 pounds lb [13 607 kg] and to withstand the most severe overseas shipping and storage conditions.

1.2 The crates described by this specification are intended to protect items from atmospheric elements during shipment and storage. They are designed to withstand the rough handling of logistic operations including stacking and outside storage for a prolonged period.

1.3 Class 1 and 2 crates may be used interchangeably as desired. However, the Class 2 crate should be used when weight is a prime consideration, as the lack of diagonals and thinner plywood sheathing results in a lighter crate.

1.4 Demountable crates, Type II, should be used whenever it is expected that the contained item will require reshipping to another destination.

1.5 Sill bases, Style B, are intended for items that project below their mounting points, such as disassembled vehicles.

1.6 If the use of other construction method or techniques is acceptable and permitted (see 5.10), the resulting packaging systems shall be of equal or better performance than would result from the use of these specified materials and procedures. The appropriate distribution cycle, specified in Practice D4169 can be used to develop comparative procedures and criteria.

1.7 The values stated in either SI units or inch-pound units 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 the other. Combining values from the two systems may result in non-conformance with the standard. See IEEE/ASTM SI 10 for conversion of units.

1.8 *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.*

1.9 *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]

D996 Terminology of Packaging and Distribution Environments

D3953 Specification for Strapping, Flat Steel and Seals

D4169 Practice for Performance Testing of Shipping Containers and Systems

D4442 Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials

D4675 Guide for Selection and Use of Flat Strapping Materials[1]

D6199 Practice for Quality of Wood Members of Containers and Pallets

D6253 Practice for Treatment and/or Marking of Wood Packaging Materials

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

IEEE/ASTM SI 10 Standard for Use of International System of Units (SI): The Modern Metric System

2.2 *National Institute of Standards and Technology (NIST) Standards:*

PS 1 Voluntary Product Standard, Structural Plywood[3]

PS 20 American Softwood Lumber Standard[4]

[1] This specification is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.12 on Shipping Containers, Crates, Pallets, Skids and Related Structures.

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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] Available from APA, The Engineered Wood Association, 7011 South 19th St., Tacoma, WA 98466–5399, http://www.apawood.org.

[4] Available from American Lumber Standards Committee, Inc., (ALSC), P.O. Box 210, Germantown, MD 20875–0210, http://www.alsc.org.

2.3 *Hardwood Plywood and Veneer Association Standard:*[5]
ANSI/HPVA HP-1-2004 American National Standard for Hardwood and Decorative Plywood
2.4 *National Hardwood Lumber Association (NHLA) Standard:*[6]
NHLA Rules for the Measurement and Inspection of Hardwood and Cypress
2.5 *ASME Standards:*[7]
ASME B18.2.1-2010 Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
ASME B18.2.2-2010 Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.2.3.8M - 1981 Metric Hex Lag Screws
ASME B18.2.4.3M-1979 Metric Slotted Hex Nuts
ASME B18.5-2008 Round Head Bolts (Inch Series)
ASME B18.5.2.2M-1982 Metric Round head Square Neck Bolts
ASME B18.22M-1981 Metric Plain Washers
ASME B18.21.1-2009 Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
2.6 *International Standard:*[8]
ISPM 15 International Standards for Phytosanitary Measures Publication No. 15 (ISPM 15), Regulation of Wood Packaging Material in International Trade

3. Terminology

3.1 *Definitions*—General definitions for packaging and distribution environments are found in Terminology D996.

3.2 *Definitions of Terms Specific to This Standard:*
3.2.1 The crate component parts discussed herein were selected on the basis of part function. Alternate names are sometimes used by industry.

3.2.2 *diagonals*—diagonals are frame members positioned between parallel frame members and placed at nearly 45° angles to them. Diagonals serve as braces and ensure rigidity in the crate.

3.2.3 *end frame members*—end frame members are similar to side frame members but perpendicular to the long dimension.

3.2.4 *filler strips*—filler strips are boards placed across the ends of thin, non-load-bearing floorboards, which serve to fill the space below the lower frame member of the crate sides.

3.2.5 *frame members*—frame members are those parts which form the fundamental crate structure upon which the strength and rigidity of a lumber-sheathed crate depends.

3.2.6 *hanger-metal*—hanger-metal is a metal nailed strap used to aid in support of the intermediate sill in sill-type bases.

3.2.7 *headers*—headers are either transverse members at each end of skid bases or longitudinal members at each end of top joists. Headers in bases serve to hold the base together as a unit, to transfer loads to outside skids, and to provide a fastening member for end panels. Headers in top panels serve to position and support joists and to provide a fastening member for side panels.

3.2.8 *horizontal braces*—horizontal braces are members positioned between struts and parallel to the upper and lower frame members and serve to reduce the unsupported span of the sheathing.

3.2.9 *joists*—joists are members extending across the crate underneath the top, which serve to support and transfer vertical stacking loads to the side panels. Joists also serve to prevent crushing or buckling of crate tops when slings or grab hooks are used.

3.2.10 *lag screw strap*—lag screw strap is a metal reinforcing strap used on bolted crates sides and ends to reinforce and increase lag screw lateral resistance.

3.2.11 *load-bearing floorboards*—load-bearing floorboards are transverse base members which serve to distribute and transfer loads to the outside skids.

3.2.12 *rubbing strips*—rubbing strips are longitudinal members nailed to the skid bottom to provide for sling and forklift truck handling.

3.2.13 *sheathing*—sheathing is the plywood or boards nailed to the frame members and enclose the crate. Sheathing used on the top panels is called top sheathing; that used on the side or end panels is called side or end sheathing; that nailed to the top of skids is called flooring; and that nailed to the bottom of sills is called bottom sheathing.

3.2.14 *side frame members*—side frame members are the members of the crate top, without joists, which are parallel to the long dimension and serve as fastening members and to tie the crate construction together.

3.2.15 *sill bridging*—sill bridging are members of the same depth as the sills, which are inserted at right angles to the intermediate sills, and serve to prevent lateral sill turning or buckling.

3.2.16 *sills*—sills are the members, which with sill bridging form the frame work of sill-type bases. Sills carry and transfer loads to side panels and serve as fastening members. There are side, end, and intermediate sills.

3.2.17 *skids*—skids are longitudinal members attached to the crate bottom, which serve to support and transfer the load to the side panels.

3.2.18 *sleepers*—sleepers are members underneath the floor of skid-type bases to which the item is anchored (through the floor) so that the tie-down stress will be distributed.

3.2.19 *struts*—struts are vertical frame members, placed between the side and end panels' upper and lower frame members, and serve as columns for supporting vertical stacking loads. The end struts are sometimes referred to as corner posts.

[5] Available from Hardwood Plywood and Veneer Association (HPVA), P.O. Box 2789, Reston, VA 22090–0789, http://www.hpva.org.
[6] Available from National Hardwood Lumber Association (NHLA), 6830 Raleigh LaGrange Rd., Memphis, TN 38134, http://www.natlhardwood.org.
[7] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016–5990, http://www.asme.org.
[8] Available from the International Plant Protection Convention, www.ippc.int.