Designation: ~~D6254/D6254M – 07~~ D6254/D6254M – 13

Standard Specification for Wirebound Pallet-Type Wood Boxes[1]

This standard is issued under the fixed designation D6254/D6254M; 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 This specification covers the fabrication of new fully enclosed wirebound pallet-type ~~wooden~~wood boxes intended for use as containers for domestic and overseas shipment of general materials and supplies, not exceeding 2500 lb [1134 kg] (see 4.1 and 10.1).

1.2 Wirebound pallet-type ~~wooden~~wood box performance is dependent on its fabricated components; therefore, a variety of types, classes, and treatments reflecting varied performance are ~~specified.~~ specified (see 4). This specification, however, does not cover wirebound pallet-type ~~wooden~~wood box performance under all atmosphere, handling, shipping, and storage conditions.

1.3 ~~If the~~ The use of other construction methods or techniques is acceptable and permitted (see 5.1.11), provided 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 provided in Practice D4169 can be used to develop comparative procedures and criteria.

1.4 *Units*—The values stated in either inch-pound 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 are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the standard. See for conversion of units.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D996 Terminology of Packaging and Distribution Environments
D3951 Practice for Commercial Packaging
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-Base Materials
D4444 Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters
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 the International System of Units (SI): The Modern Metric System
~~2.2 *Federal Specifications:*[3]~~
~~TT-W-572B Fungicide: Pentachlorophenol~~
2.2 *Code of Federal Regulations:*[3]
CFR Parts 107–180, Title 49, Hazardous Materials Regulations

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

Current edition approved ~~Oct. 1, 2007~~April 15, 2013. Published ~~November 2007~~September 2013. Originally approved in 1998. Last previous edition approved in ~~2005~~2007 as ~~D6254/D6254M – 99 (2005).~~D6254/D6254M – 07. DOI: ~~10.1520/D6254_D6254M-07.~~10.1520/D6254_D6254M-13.

[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 the Federal Supply Service Bureau, Specification Section, Suite 8100, 480 L'Enfant Plaza, SW, Washington, DC 20408.~~

2.3 *National Institute of Standards and Technology (NIST) Standard:*[4]
~~PS1–07~~ PS 1–07 ~~Voluntary Product Standard,~~ Structural Plywood
PS 20–05 American Softwood Lumber Standard
2.4 *Hardwood Plywood and Veneer Association Standard:*[5]
ANSI/HPVA HP-1-2004 American National Standard for Hardwood and Decorative Plywood
2.5 *National Motor Freight Traffic Association:*[6]
National Motor Freight Classification
2.6 *Uniform Classification Committee Standard:*[7]
Uniform Freight Classification
2.7 *American Wood ~~Preservers'~~Protection Association (AWPA):*[8]
~~P8–99~~AWPA P36 Standard for ~~Oil-Borne Preservatives~~Copper Naphthenate (CuN)
~~P9–98~~AWPA P37 ~~Standards for Solvents and Formulations for Organic Preservative Systems~~Standard for Oxine Copper (Copper-8-Quinolinolate) (Cu8)
2.8 *Material Handling Industry of America (MHIA)/ANSI Standard:*[9]
MHIA/ANSI MH1–2005 Pallets, Slip Sheets, and Other Bases for Unit Loads
2.9 *International Standard*[10]
International Standards for Phytosanitary Measures Publication No. 15 (ISPM 15) Regulation of Wood Packaging Material in International Trade
2.10 *U.S. Army Research, Development and Engineering Center (ARDEC)*[11]
MIL-DTL-2427H Box, ammunition packing: Wood, nailed

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:* The wood box components discussed herein were selected on the basis of part function. Alternate names are sometimes used by the wood packaging industry and end-users.

3.2.1 *batten*—reinforcement used to hold the faceboards together to create rigidity.

3.2.2 *binding wire*—round steel wire stapled to the faceboards which ends in a loop, the prong of which is firmly anchored in a board or twisted to form a loop.

3.2.3 *blank*—a flat unassembled wirebound box exclusive of pallet base and top.

3.2.4 *cleat*—lumber piece which forms the wirebound box framework and to which the faceboards are stapled.

3.2.5 *deckboard*—the material used to make up the pallet base top and bottom surfaces referred to as top and bottom deckboards.

3.2.6 *faceboard*—the material used for the front, end, bottom, sides, and top.

3.2.7 *lumber*—manufactured wood product derived from a log through sawing or planing.

3.2.8 *plywood*—panel built up of sheers of veneer called plies, united under pressure by a bonding agent to create a panel with an adhesive bond between plies.

3.2.9 *staple*—U-shaped piece of wire with pointed ends, driven astride the binding wires in fabricating the blank or attaching boards to battens.

3.2.10 *stringer*—a runner to which the riser batten and deckboards are attached and which serves as a spacer between top and bottom deckboards to permit mechanical handling equipment entry.

3.2.11 *veneer*—thin layer or sheet of wood.

[3] Available from U.S. Government Printing ~~Office Superintendent of Documents,~~ Office, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC ~~20401.~~20401, www.access.gpo.gov.
[4] Available from ~~APA–The Engineered Wood Association, 7011 South 19th St., Tacoma, WA 98446–5399.~~National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, www.nist.gov.
[5] Available from Hardwood Plywood and Veneer ~~Association, PO~~ Association (HPVA), P.O. Box 2789, Reston, VA ~~2290-0789.~~22090-0789, www.hpva.org.
[6] Available from National Motor Freight Traffic Association, ~~2200 Mill Rd., Alexandria, VA 22302.~~Inc. (NMFTA), 1001 N Fairfax St., Ste 600, Alexandria, VA 22314, www.nmfta.org.
[7] Available from the Uniform Classification Committee, Tariff Publishing Officer, 151 Ellis St., N.E. Suite 200, Atlanta, GA 30335.
[8] Available from American Wood ~~Preservers'~~Protection Association (AWPA), P.O. Box ~~5690, Granbury, TX 76049.~~361784, Birmingham, AL 35236-1784, awpa.com.
[9] Available from Material Handling Industry of America (MHIA) MH1 Secretariat, 8720 Red Oak Blvd., Suite 201, Charlotte, NC 28217, ~~http://www.mhiastore.org.~~www.mhiastore.org.
[10] ~~Product may be obtained from Mallinckrodt Baker, Inc., 222 Red School Lane, Phillipsburg, NJ 08865, Chemical Abstracts Service (CAS) Registry Number 20624-25-3 (J.T. Baker Product Number 8624) or an equivalent manufacturer.~~ Available from the International Plant Protection Convention (IPPC), www.ippc.int.
[11] ~~Product may be obtained from Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219-4785, CAS Registry Number 1667-99-8 (Fisher Scientific Product Number AC190050250) or an equivalent manufacturer.~~ Available from ASSIST Quicksearch, assist.daps.dla.mil/quicksearch

4. Classification

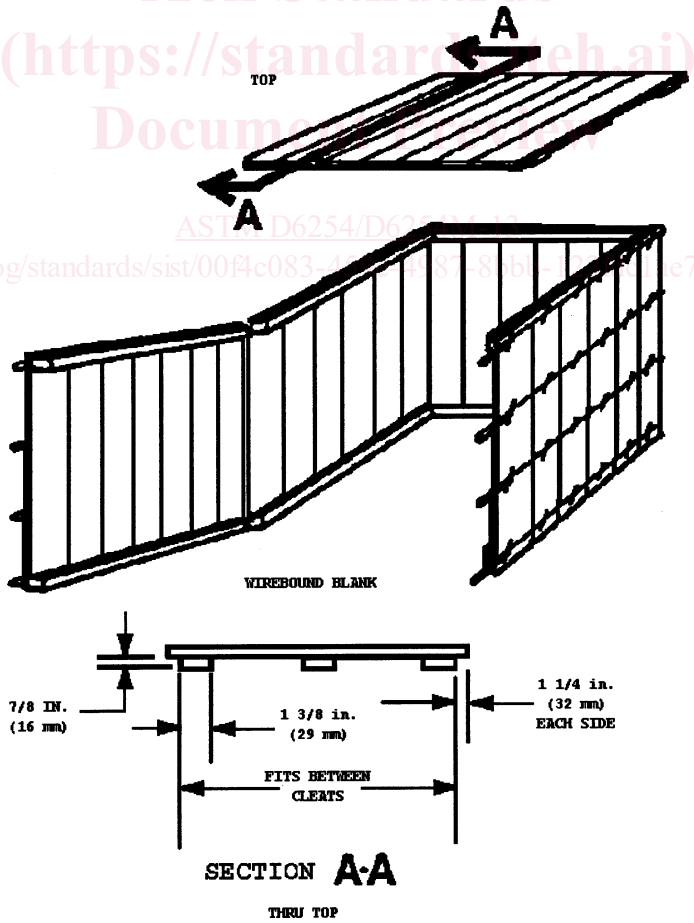
4.1 *Type:*
4.1.1 *Type I*—Sheathed lumber, 2500-lb [1134-kg] maximum load (see Fig. 1).
4.1.2 *Type II*—Sheathed lumber and veneer, 1500-lb [680-kg] maximum load (see Fig. 2).
4.1.3 *Type III*—Sheathed lumber and veneer with two different length sidewalls, 1500-lb [680-kg] maximum load (see Fig. 3).
4.1.4 *Type IV*—Sheathed plywood, 2500-lb [1134-kg] maximum load (see Fig. 4).

4.2 *Class:*
4.2.1 *Class 1*—Partial four-way entry base (see Fig. 5).
4.2.2 *Class 2*—Two-way entry base (see Fig. 5).
4.2.3 *Class 3*—Partial four-way entry base with two different length sidewalls (see Fig. 6).
4.2.4 *Class 4*—Two-way entry base with two different length sidewalls (see Fig. 6).

4.3 *Treatment:*
4.3.1 *Treatment A*—~~With water~~Without water-repellent preservative ~~treatment~~ (see ~~6.1.1.9~~6.1.6).
4.3.2 *Treatment B*—With ~~water~~ water-repellent wood preservative ~~treatment~~ (see ~~6.1.1.9~~6.1.6).
~~4.3.3 *Treatment C*—Without preservative treatment.~~

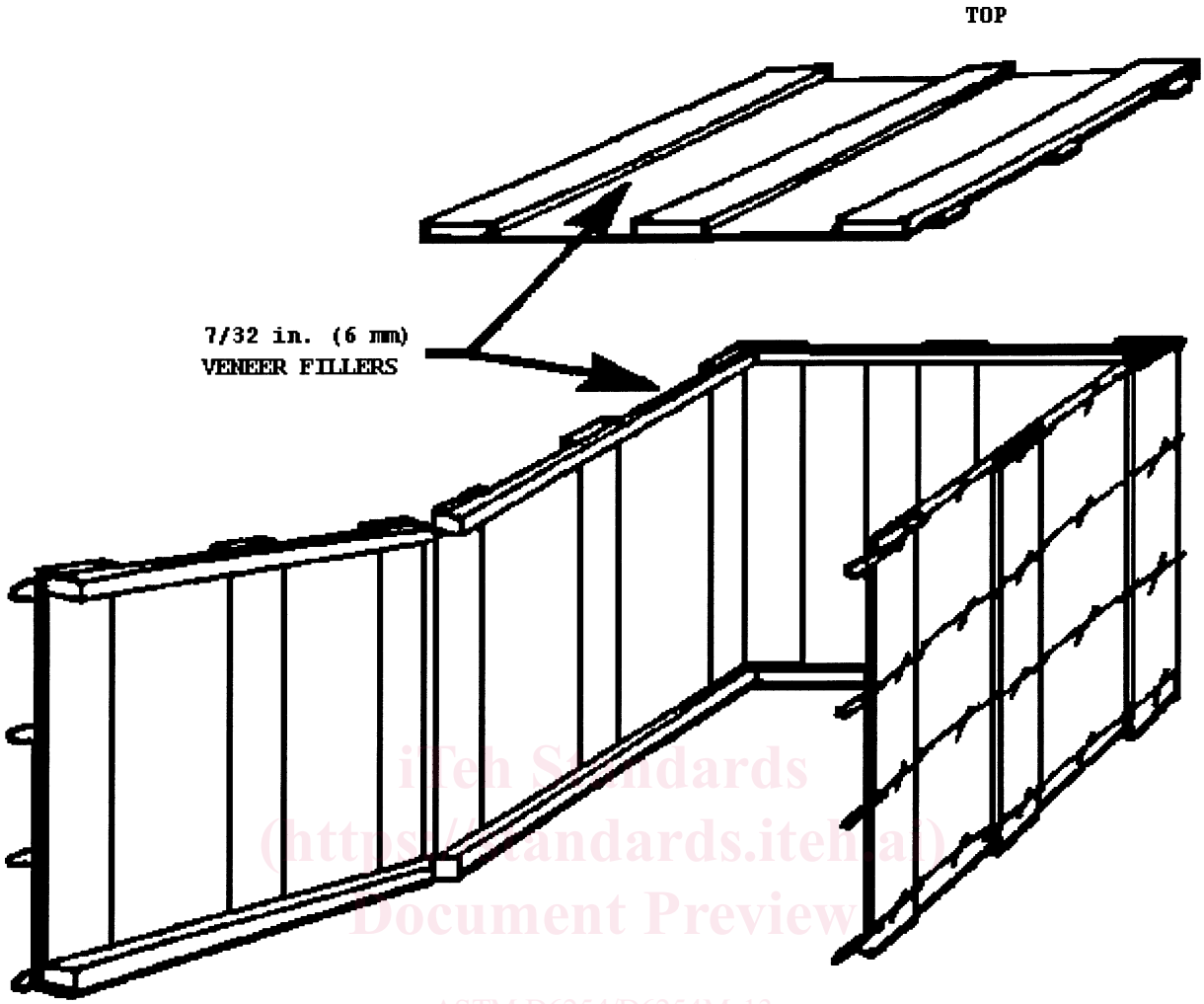
5. Ordering Information

5.1 Purchasers should select the preferred permitted options and include the following information in procurement and purchase order documents:
5.1.1 Specification title, number, and date.
5.1.2 Box type, class, and treatment required (see 4.1-4.3 and 7.1).
5.1.3 Contents weight.
5.1.4 Modifications to container manufacturer's identification (see ~~7.6~~7.5).



NOTE 1—All cleats (see ~~Fig. 5~~Figs. 5 and 7 ~~and Fig. 7~~), 13⁄16 ~~by~~× 7⁄8 in. nominal [16 ~~by~~× 16 mm].
~~Type I wirebound box (Select~~ Select Class 1 or 2 ~~base~~Base from Fig. 5~~).~~.

FIG. 1 Type I Wirebound ~~Box (Select Class 1 or 2 Base from~~ Box-Sheathed Lumber~~Fig. 5)~~



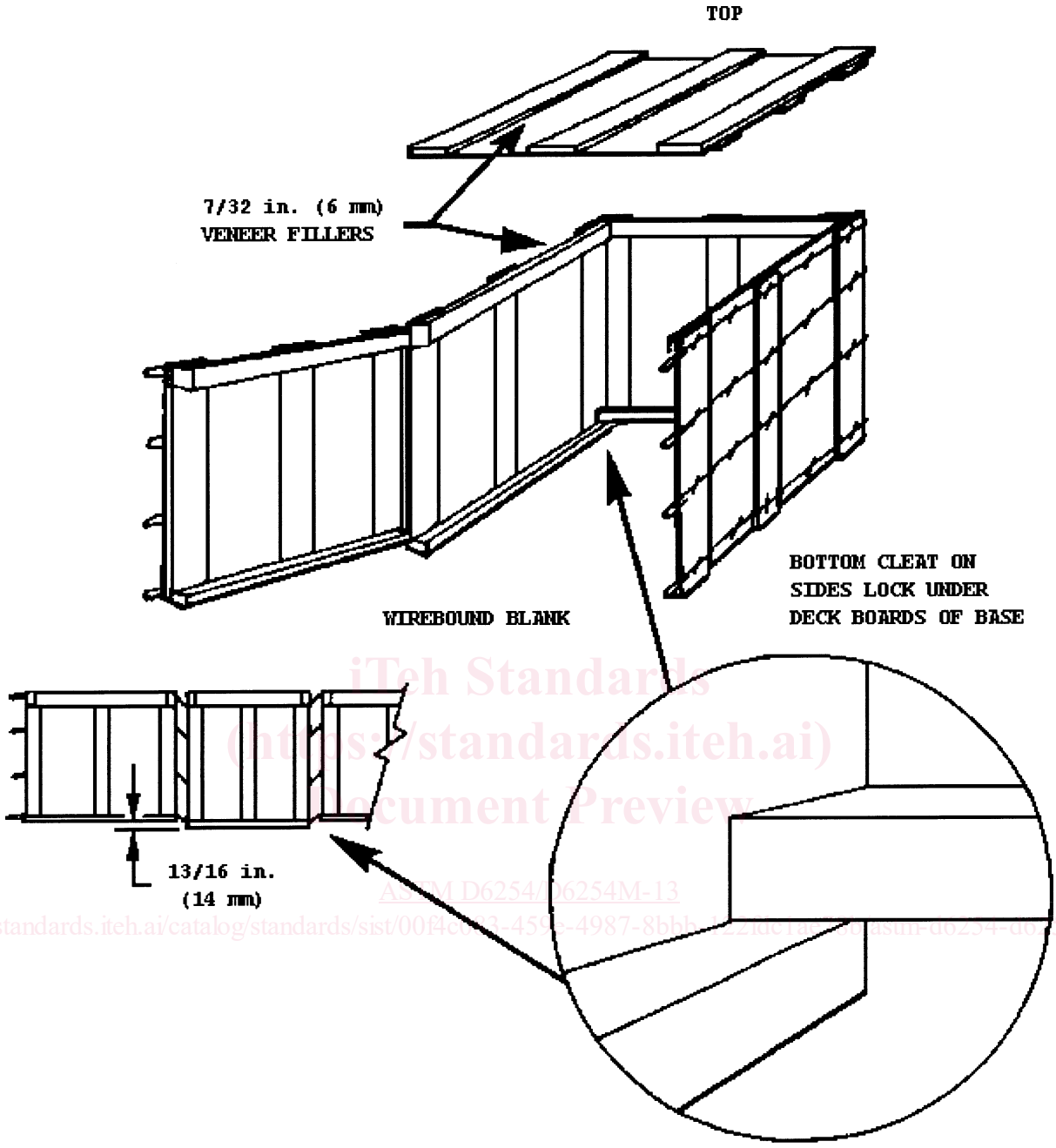
NOTE 1—Top battens (see Fig. 1 and Fig. 7) ⅞ ~~by~~× 1 ⅜ in. nominal [16 ~~by~~× 29 mm].
All cleats (see Fig. 5 and Fig. 7) 13⁄16 ~~by~~× ⅞ in. nominal [16 ~~by~~× 16 mm].
Corner and intermediate faceboards 4 in. nominal × ⅜ in. [90 × 8 mm] (width × thickness).
Select Class 1 or 2 Base from Fig. 5.

FIG. 2 Type II Wirebound ~~Box (Select Class 1 or 2 Base from~~ Box-Sheathed Lumber and Veneer.~~Fig. 5).~~

5.1.5 Box dimensions specified in order of length ~~by~~× width ~~by~~× depth (see ~~7.7~~7.6 and Fig. 7).
5.1.6 When preservative treatment is required (see 4.3 and ~~6.1.1.9~~6.1.6).
5.1.7 Whether boxes are to be shipped assembled or knocked down (see 9.1).
5.1.8 Whether additional markings are required (see 9.2).
5.1.9 Whether different strapping materials are required (see ~~S3.2.1).~~S2.2).
5.1.10 Whether additional support is required (see ~~S3.2.3).~~S2.2.3).
5.1.11 Whether other construction methods or techniques and proof are acceptable and ~~permitted (see~~ permitted.~~1.3).~~
~~5.1.11.1 Whether proof that other constructions methods or techniques are acceptable (see 1.3) is required.~~
5.1.12 When ISPM 15 compliance is required (see 9.3).

6. Materials and Manufacture

6.1 *Materials*—~~It is encouraged that recycled material be used when practical. All recovered, recycled, or virgin materials used in box manufacture shall meet the requirements of this specification and referenced documents. In addition, materials shall not affect or be affected by the product being packed.~~Materials shall be as specified herein. Materials not specified shall be selected by the contractor or box builder and shall be sufject to all provisions of this specification. Materials shall be free of defects, which adversely affect performance or serviceability of the finished product.

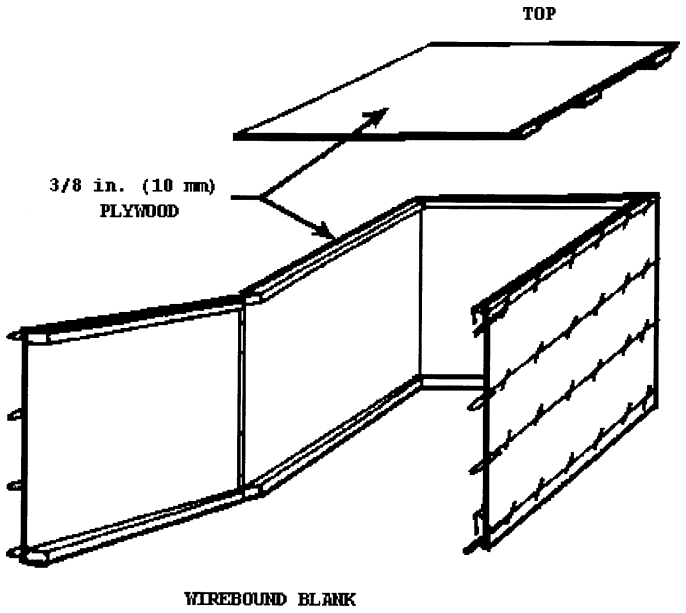


NOTE 1—Top cleat 13/16 ~~by~~ × 1 5/8 in. nominal [16 ~~by~~ × 35 mm].
Bottom cleat 13/16 ~~by~~ × 7/8 in. nominal [16 ~~by~~ × 16 mm].
Top battens 7/8 ~~by~~ × 1 3/8 in. nominal [16 ~~by 29~~ × 29 mm] (thickness × width).
Corner and intermediate faceboards 4 in. wide nominal × 3/8 in. thick [90 × 8 mm].
Select Class 3 or 4 Base from Fig. 6.

FIG. 3 Type III Wirebound ~~Box (Select Class 3 or 4 Base from~~Box-Sheathed Lumber and Veneer with Two Different Length ~~Fig. 6)~~Side-walls.

6.1.1 ~~*Wood—*~~*Lumber*~~—Wood used in box fabrication~~ Lumber components shall conform to Practice D6199 ~~as applicable. Group I Woods shall not be permitted for cleats. Nominal dimensions shall be as specified in Practice~~, PS 20, or the NHLA rules. All lumber sizes specified herein shall be nominal and shall be the minimum acceptable sizes for lumber components. Lumber components shall have a target thickness and width uniform in dimension ~~D6199.~~and 50 % of components shall meet or exceed the target dimensions at the time of component manufacture.

6.1.1.1 ~~*Wood*~~*Lumber Quality*—Grain divergence (grain slope), whether on a ~~wooden member~~ lumber face or edge, shall not exceed 1 in. [25 mm] per 10-in. [254-mm] length for pallet base and box frame members and shall not exceed 1 in. [25 mm] per 8-in. [203-mm] length for face boards. Members shall be free from decay and sufficiently smooth on the exterior surface to permit



NOTE 1—Top battens (see Fig. 1 and Fig. 7) ⅞ ~~by~~× 1⅜ in. nominal [16 ~~by~~× 29 mm].
All cleats (see Fig. 5 and Fig. 7) 1⁵⁄₁₆ ~~by~~× ⅞ in. nominal [16 ~~by~~× 16 mm]
Select Class 1 or 2 from Fig. 5

FIG. 4 Type IV Wirebound Box (~~Select Class 1 or 2 Base from~~ Sheathed Plywood.~~Fig. 5~~)

legible markings. Stains and discoloration not associated with decay will be permitted provided they are not so pronounced as to obscure markings. ~~Members~~ Lumber components shall be free from all defects that will interfere with specified stapling and nailing. Each ~~wood member~~lumber component shall be a single wood piece without any joints.

6.1.1.2 *Cleat and Batten Knots*—Any cleat or batten knot width shall not exceed ¼ the ~~member~~ width. Knots shall be sound and tight with no part within 1¼ in. [32 mm] of the cleat or batten end. Loose knots and knot holes shall not be permitted in cleats and battens. Group I Woods (low density hardwoods and softwoods) listed in Practice D6199 shall not be permitted for cleats.

6.1.1.3 *~~Face~~Faceboard and ~~Deck Board~~ Deckboard and Stringer Knots*—Any ~~face and deck board and~~ faceboard, deckboard, or stringer knot width shall not exceed 1½ in. [38 mm] nor ⅓ the ~~member~~ width. Knots shall be sound and tight with no part of any knot within 1 in. [25 mm] of the ~~member~~ end. Loose knots or knot holes not more than 1 in. [25 mm] wide shall be permitted, provided they are not within 1 in. [25 mm] of the ~~member~~ end.

6.1.1.4 *Splits Extending Entire Board Length*—Splits extending the entire board length shall be permitted for sides, top, bottom, and ends, provided the width of the narrowest piece of the board measured from the split is 1½ in. [38 mm] or greater, and a staple holds each piece end in place.

6.1.1.5 *Splits Diverging to Board Edge*—Splits diverging to an outer box edge shall not be permitted. Splits extending less than the entire board length and not diverging to a board edge shall be permitted for sides, top, bottom and ends, provided that if the split were extended, the resulting boards would comply with the minimum requirements of 6.1.1.4.

6.1.1.6 *Splits Extending Through Staple or Nail Holes*—Board-end slits, caused by a fastener, which are not longer than 3 in. [76 mm], are acceptable provided the split does not terminate in the board edge.

6.1.1.7 *Wane or Bark*—Wane along any ~~one wood member~~ lumber edge will be permitted for the full length ~~of the member~~ provided it does not exceed ⅜ in. [10 mm] in either direction from the ~~member~~ edge. Bark shall not be permitted on any ~~wood~~lumber component.

6.1.1.8 *Moisture Content*—At the time of box fabrication, wood member moisture content shall be in accordance with Practice D6199 except that there shall be no restriction on pallet base stringer's moisture content.

~~6.1.1.9 *Preservation Treatment*—When Treatment A or B is specified, pallet finished parts or complete pallet boxes shall be immersed or flooded completely so as to cover all interior and exterior surfaces for the time period specified. Treatment A shall utilize TT-W-572B, Composition C or D preservative, or a commercial equivalent, for a minimum of 3 min. Treatment B shall utilize either a 2 % copper naphthenate, a 3 % zinc naphthenate, or a 1.8 % oxine copper, formerly referred to as copper-8-quinolinolate, solution for a minimum of 1 min. Treating solutions shall conform to AWPA Standards P8–99 or P9–98.~~

6.1.2 *Plywood*—Type IV boxes shall use plywood conforming to ANSI/HPVA HP–1–2004 or PS1–07, Exposure 1 or Exterior panel. Plywood shall have no defects (knot holes, worm holes, and so forth) extending through the panel. Unless otherwise specified, plywood shall be finished unsanded.

6.1.3 *Binding Wire*—Binding wire shall be as a minimum, 13-gage, 0.0915-in. [2.324 mm] diameter, low carbon, annealed steel wire. The wire's physical properties shall permit satisfactory forming of the loop closures without fracturing the wire. The wire tensile strength shall be from 60 000 to 85 000-lb/in.^{2} [413 685 to 586 054 kPa].