



Designation: D6254/D6254M – 07

Standard Specification for Wirebound Pallet-Type Wood Boxes¹

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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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 boxes intended for use as containers for domestic and overseas shipment of general materials and supplies, not exceeding 2500 lb [1134 kg] (see 10.1).

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

1.3 If the use of other construction methods or techniques is acceptable and permitted (see 5.1.11), 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 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.*

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.

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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

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

2.3 Code of Federal Regulations:⁴

CFR Parts 107–180, Title 49, Hazardous Materials Regulations

2.4 National Institute of Standards and Technology (NIST) Standard:⁵

PS1–07 Voluntary Product Standard, Structural Plywood

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.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

⁵ Available from APA—The Engineered Wood Association, 7011 South 19th St., Tacoma, WA 98446–5399.

- 2.5 *Hardwood Plywood and Veneer Association Standard:*⁶
ANSI/HPVA HP-1-2004 American National Standard for
Hardwood and Decorative Plywood
- 2.6 *National Motor Freight Traffic Association:*⁷
National Motor Freight Classification
- 2.7 *Uniform Classification Committee Standard:*⁸
Uniform Freight Classification
- 2.8 *American Wood Preservers' Association (AWPA):*⁹
P8–99 Standard for Oil-Borne Preservatives
P9–98 Standards for Solvents and Formulations for Organic
Preservative Systems
- 2.9 *Material Handling Industry (MHIA)/ANSI Standard:*¹⁰
MHIA/ANSI MH1–2005 Pallets, Slip Sheets, and Other
Bases for Unit Loads

3. Terminology

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

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:*

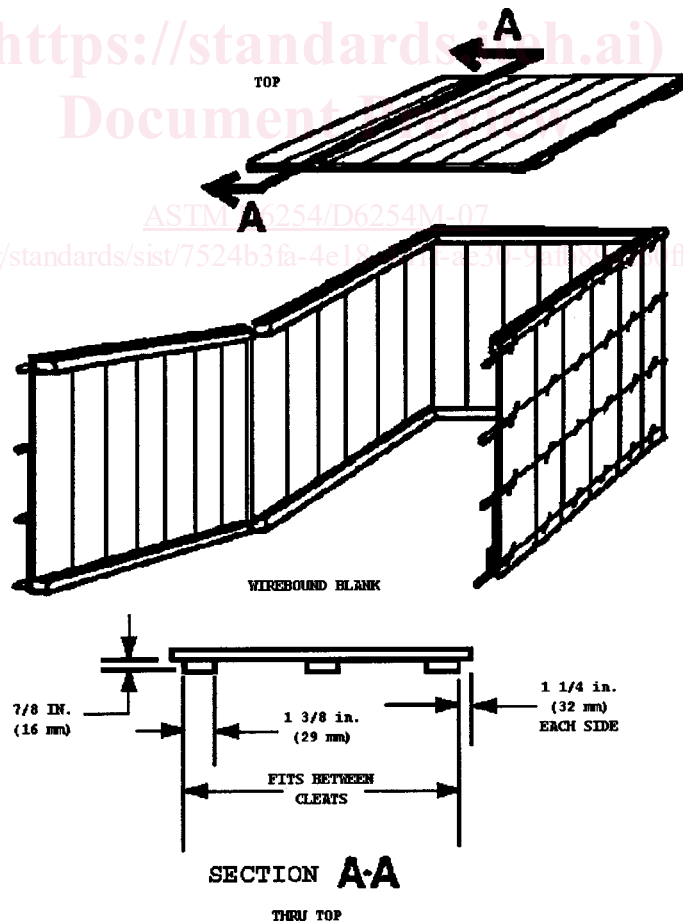
⁶ Available from Hardwood Plywood and Veneer Association, PO Box 2789, Reston, VA 2290-0789.

⁷ Available from National Motor Freight Traffic Association, 2200 Mill Rd., Alexandria, VA 22302.

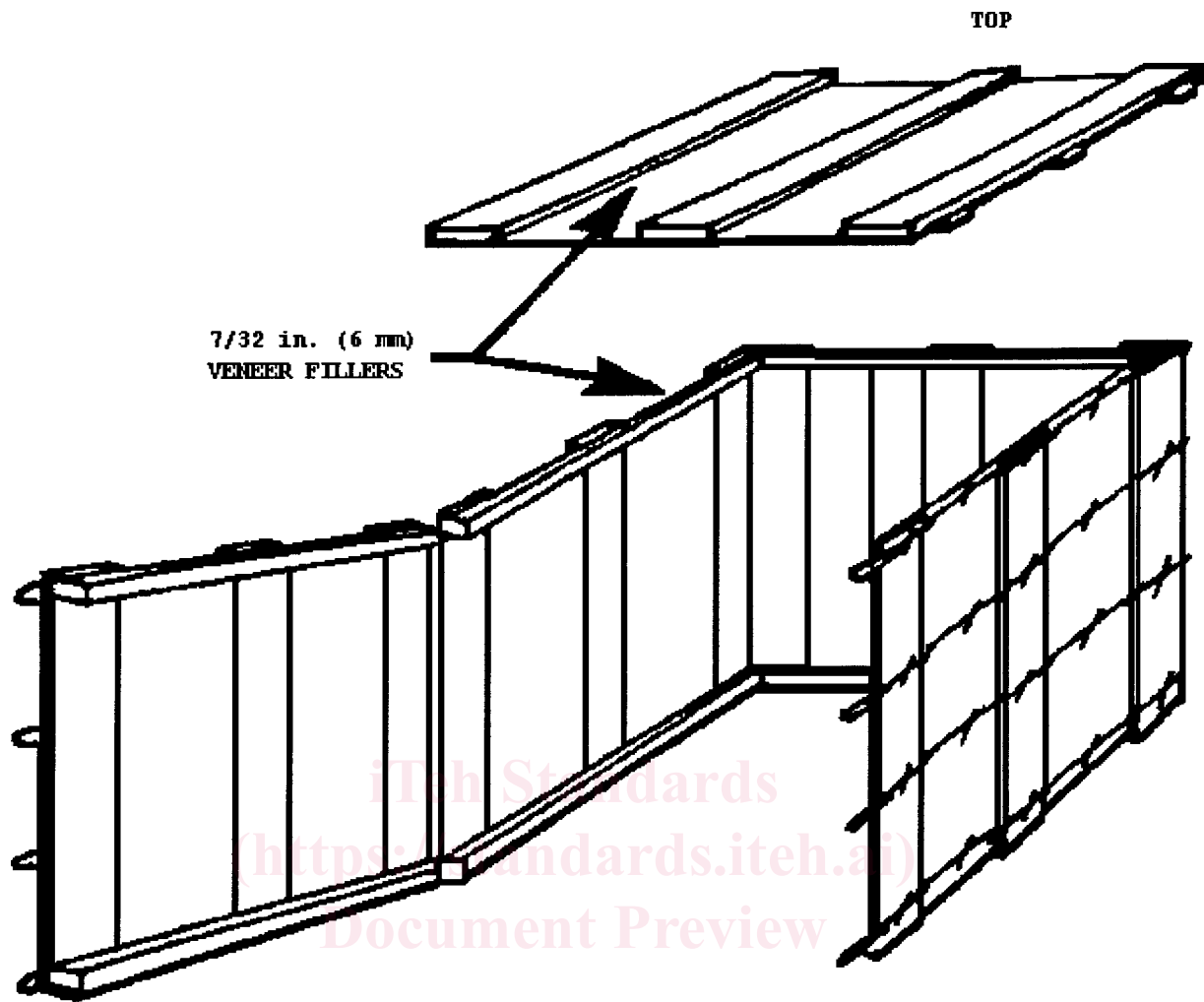
⁸ Available from the Uniform Classification Committee, Tariff Publishing Officer, 151 Ellis St., N.E. Suite 200, Atlanta, GA 30335.

⁹ Available from American Wood Preservers' Association (AWPA), P.O. Box 5690, Granbury, TX 76049.

¹⁰ Available from Material Handling Industry (MHIA) MH1 Secretariat, 8720 Red Oak Blvd., Suite 201, Charlotte, NC 28217, <http://www.mhiastore.org>.



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



WIREBOUND BLANK

NOTE 1—Top battens (see Fig. 1 and Fig. 7) $\frac{7}{8}$ by $1\frac{3}{8}$ in. nominal [16 by 29 mm].
All cleats (see Fig. 5 and Fig. 7) $1\frac{1}{16}$ by $\frac{7}{8}$ in. nominal [16 by 16 mm].

FIG. 2 Type II Wirebound Box (Select Class 1 or 2 Base from Fig. 5).

4.3.1 *Treatment A*—With water preservative treatment (see 6.1.1.9).

4.3.2 *Treatment B*—With water preservative treatment (see 6.1.1.9).

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 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).

5.1.5 Box dimensions specified in order of length by width by depth (see 7.7 and Fig. 7).

5.1.6 When preservative treatment is required (see 4.3 and 6.1.1.9).

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).

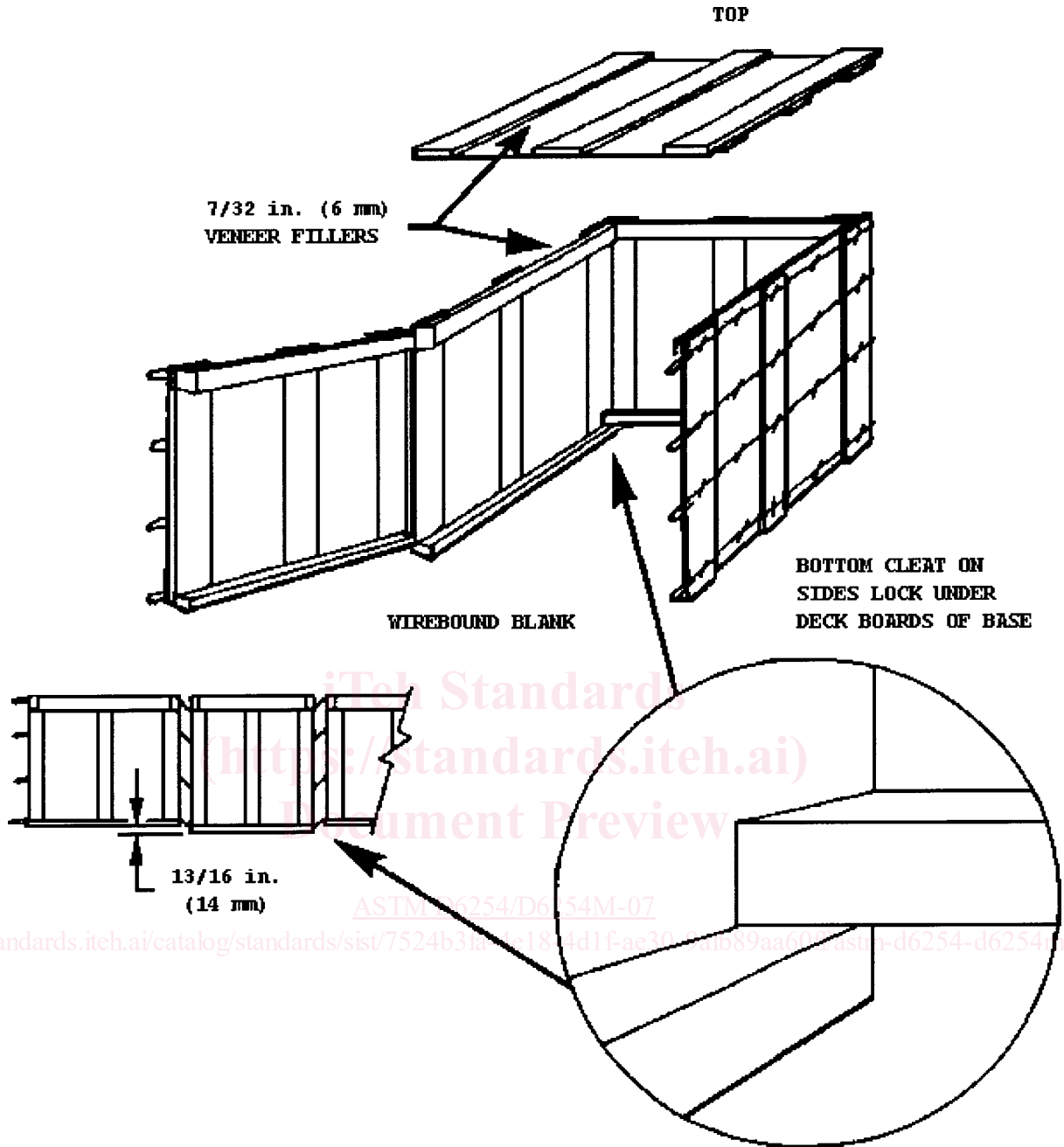
5.1.10 Whether additional support is required (see S3.2.3).

5.1.11 Whether other construction methods or techniques are acceptable and permitted (see 1.3).

5.1.11.1 Whether proof that other constructions methods or techniques are acceptable (see 1.3) is required.

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



NOTE 1—Top cleat $1\frac{3}{16}$ by $1\frac{5}{8}$ in. nominal [16 by 35 mm].
 Bottom cleat $1\frac{3}{16}$ by $\frac{7}{8}$ in. nominal [16 by 16 mm].
 Top battens $\frac{7}{8}$ by $1\frac{3}{8}$ in. nominal [16 by 29 mm].

FIG. 3 Type III Wirebound Box (Select Class 3 or 4 Base from Fig. 6)

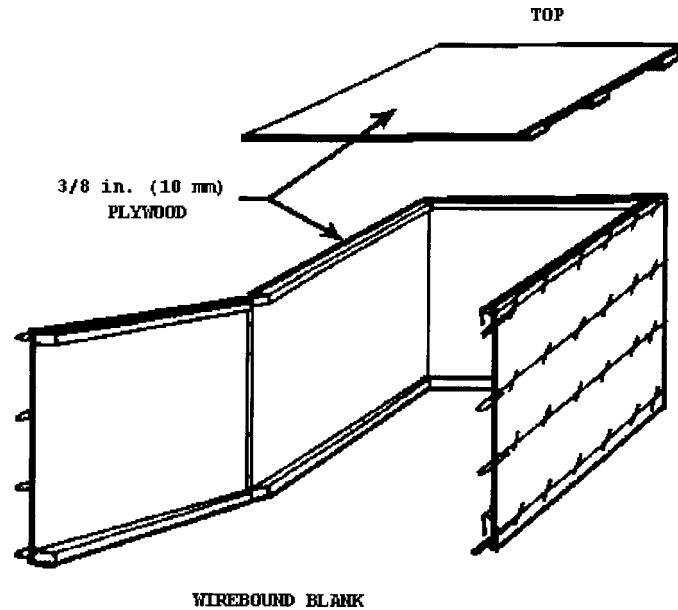
this specification and referenced documents. In addition, materials shall not affect or be affected by the product being packed.

6.1.1 *Wood*—Wood used in box fabrication shall conform to Practice D6199 as applicable. Group I Woods shall not be permitted for cleats. Nominal dimensions shall be as specified in Practice D6199.

6.1.1.1 *Wood Quality*—Grain divergence (grain slope), whether on a wooden member 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 legible markings. Stains and discoloration not associated with decay will be permitted provided they are not so pronounced as to obscure markings. Members shall be free from all defects that will interfere with specified stapling and nailing. Each wood member 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 $\frac{1}{4}$ the member width. Knots shall be



WIREBOUND BLANK
 NOTE 1—Top battens (see Fig. 1 and Fig. 7) 7/8 by 1 3/8 in. nominal [16 by 29 mm].
 All cleats (see Fig. 5 and Fig. 7) 1 1/16 by 7/8 in. nominal [16 by 16 mm]
FIG. 4 Type IV Wirebound Box (Select Class 1 or 2 Base from Fig. 5)

sound and tight with no part within 1 1/4 in. [32 mm] of the cleat or batten end. Loose knots and knot holes shall not be permitted in cleats and battens.

6.1.1.3 *Face and Deck Board and Stringer Knots*—Any face and deck board and stringer knot width shall not exceed 1 1/2 in. [38 mm] nor 1/3 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 1 1/2 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 edge will be permitted for the full length of the member provided it does not exceed 3/8 in. [10 mm] in either direction from the member edge. Bark shall not be permitted on any wood 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 AWWA 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].

6.1.3.1 *Coating*—The binding wire surface shall be galvanized. The galvanized coating shall be smooth and shall not flake nor peel when the wire is wound around a 3/16-in. [5-mm] diameter mandrel (see 8.2).

6.1.4 *Staples*—Staples shall be made from low carbon steel wire. The wire tensile strength shall be from 95 000 to 125 000 lb/in.² [655 002 to 861 844 kPa]. Staples shall be in accordance with Specification F1667, Type IV, Style 3.

6.1.4.1 *Coating*—The staple wire surface shall be galvanized. The galvanized coating shall be smooth and shall not flake nor peel when the wire is wound around a 3/16-in. [5-mm] diameter mandrel (see 8.2).

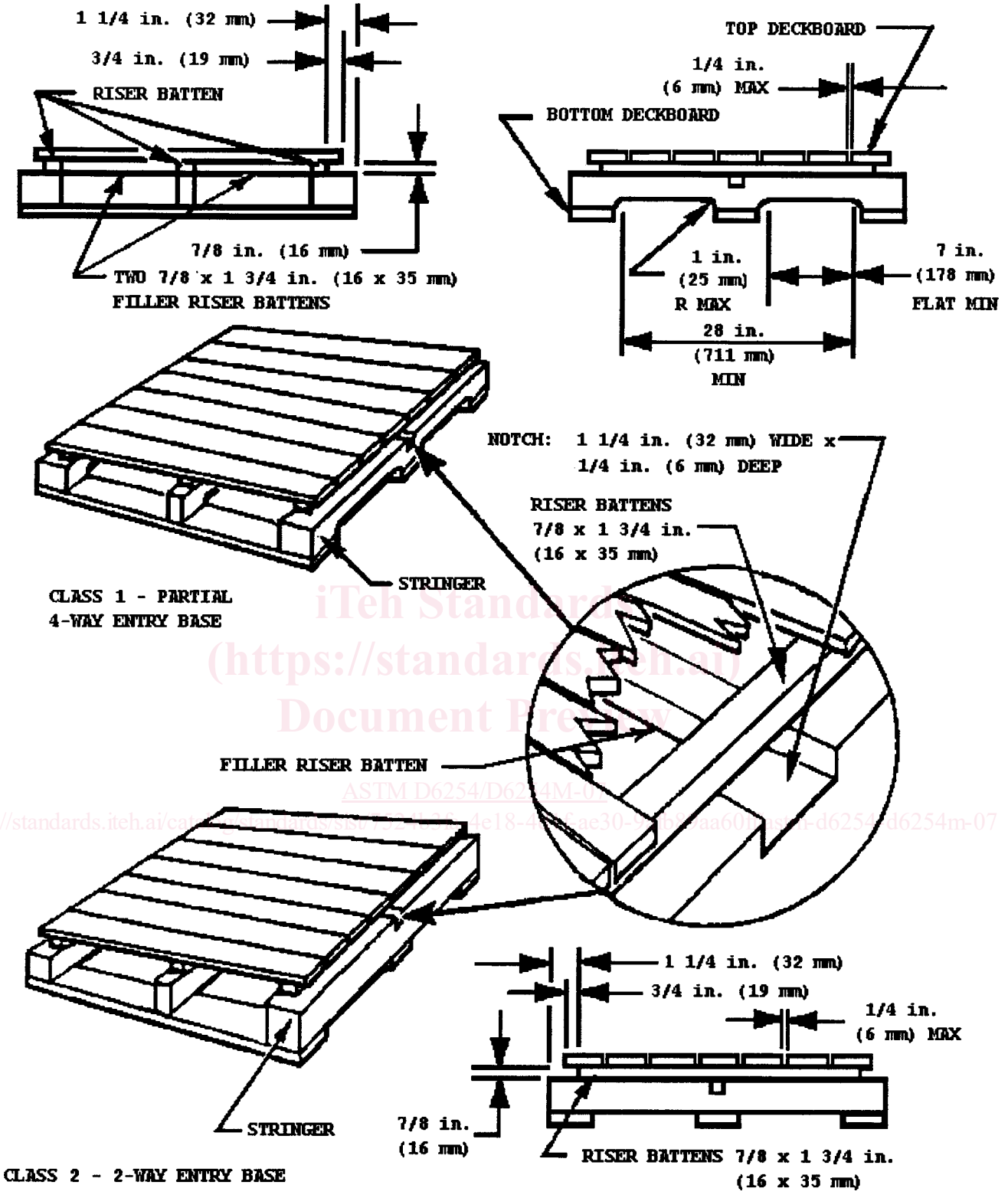


FIG. 5 Class 2—Pallet Bases (for Types I, II, and IV Boxes)