



Designation: D6880/D6880M – 19

## Standard Specification for Wood Boxes<sup>1</sup>

This standard is issued under the fixed designation D6880/D6880M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope\*

1.1 This specification covers the fabrication of wood boxes. These wood boxes, when constructed, filled and closed, shall be used for the packing of contents not exceeding 1000 lb [454 kg].

1.2 If the use of other construction methods or techniques is acceptable and permitted (see 5.1), the resulting boxes shall be of equal or better performance than would result from the use of the specified materials and procedures. An appropriate distribution cycle, specified in Practice D4169, can be used to develop comparative procedures and criteria.

1.3 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 [IEEE/ASTM SI-10](#) for conversion of units.

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

1.5 *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:<sup>2</sup>

[D996 Terminology of Packaging and Distribution Environments](#)

<sup>1</sup> 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.

Current edition approved Aug. 1, 2019. Published November 2019. Originally approved in 2005. Last previous edition approved in 2011 as D6880/D6880M – 11. DOI:10.1520/D6880\_D6880M-19.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[D3951 Practice for Commercial Packaging](#)

[D3953 Specification for Strapping, Flat Steel and Seals](#)

[D4169 Practice for Performance Testing of Shipping Containers and Systems](#)

[D4675 Guide for Selection and Use of Flat Strapping Materials<sup>1</sup>](#)

[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 Modernized Metric System](#)

2.2 *American Society of Mechanical Engineers (ASME) Standards:*<sup>3</sup>

[B18.2.1 Square and Hex Bolts and Screws-Inch Series](#)

[B18.2.2 Square and Hex Nuts \(Inch Series\)](#)

[B18.5 Round Head Bolts \(Inch Series\)](#)

[B18.22M Metric Plain Washers](#)

2.3 *APA – The Engineered Wood Association:*<sup>4</sup>

[APA PS-20 American Softwood Lumber Standard](#)

2.4 *ISO Standards:*<sup>5</sup>

[ISO 4033 Hexagon High Nuts \(Style 2\)—Product Grades A and B](#)

[ISO 8677 Cup Head Square Neck Bolts with Large Head—Product Grade C](#)

[ISO 8678 Cup Head Square Neck Bolts with Small Head and Short Neck—Product Grade B](#)

2.5 *National Hardwood Lumber Association (NHLA) Standard:*<sup>6</sup>

[Rules for the Measurement and Inspection of Hardwood and Cypress](#)

<sup>3</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

<sup>4</sup> Available from APA – The Engineered Wood Association, 7011 S. 19th Street, Tacoma, WA 98466-5333, <https://www.apawood.org>.

<sup>5</sup> Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

<sup>6</sup> Available from National Hardwood Lumber Association (NHLA), 6830 Raleigh LaGrange Rd., Memphis, TN 38134, <http://www.natllhardwood.org>

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

2.6 American Wood Protection Association (AWPA) Standard:<sup>7</sup>

- P36 Standard for Copper Naphththenate (CuN)
- P37 Standard for Oxine Copper (Copper-8-Quinolinolate) (Cu8)

2.7 Military Standard:<sup>8</sup>

MIL-DTL-2427 Box, ammunition packing: Wood, nailed

2.8 International Standards for Phytosanitary Measures (ISPM) Publication:<sup>9</sup>

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.

<sup>7</sup> Available from American Wood Protection Association (AWPA), P.O. Box 361784, Birmingham, AL 35236-1784, <http://www.awpa.org>.

<sup>8</sup> Available from ASSIST Quick search, <http://assist.daps.dla.mil>.

<sup>9</sup> Available from the International Plant Protection Convention, <http://www.ippc.int>.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *batten*—reinforcement on a box used to hold a series of boards together to create rigidity – generally set in from each end to prevent board splitting.

3.2.2 *box*—a container with structural framework fastened together to form a rigid enclosure.

3.2.3 *cleat*—lumber used to strengthen or support the framework of a box.

3.2.4 *diagonal*—angle members placed between vertical and horizontal members within a component to provide rigidity to the box.

### 4. Classification

4.1 Classes

Class 1 – Light Duty

Class 2 – Heavy Duty

4.2 *Styles* Style 1 - Uncleated Ends (Fig. 1)

Style 2 - Full Cleated Ends, Butt Joints (Fig. 2)

Style 2½ - Full Cleated Ends, Notched Cleats (Fig. 3)

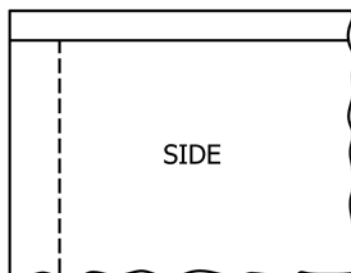
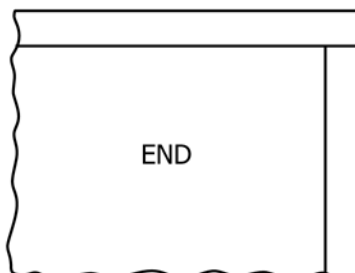
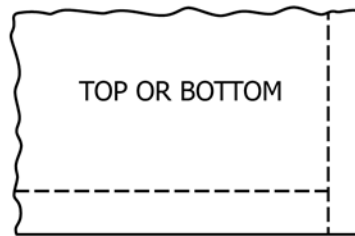
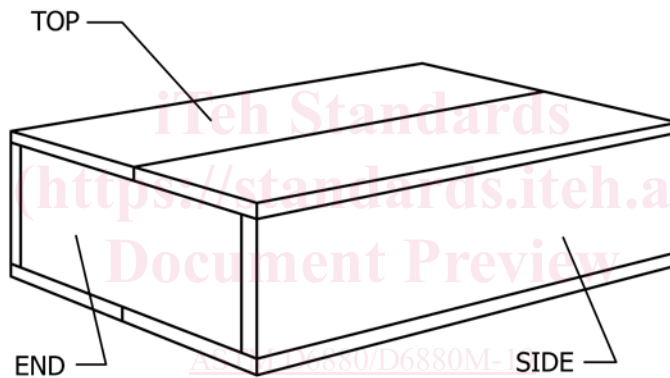


FIG. 1 Style 1 Box (Uncleated Ends)

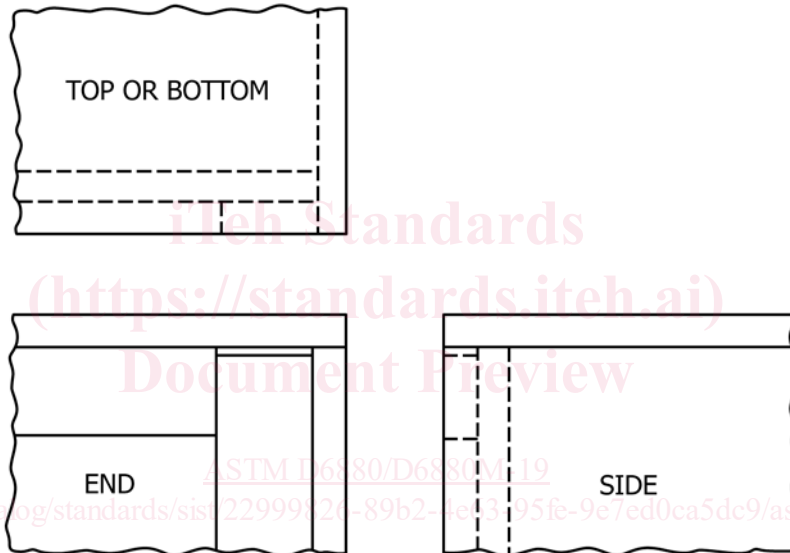
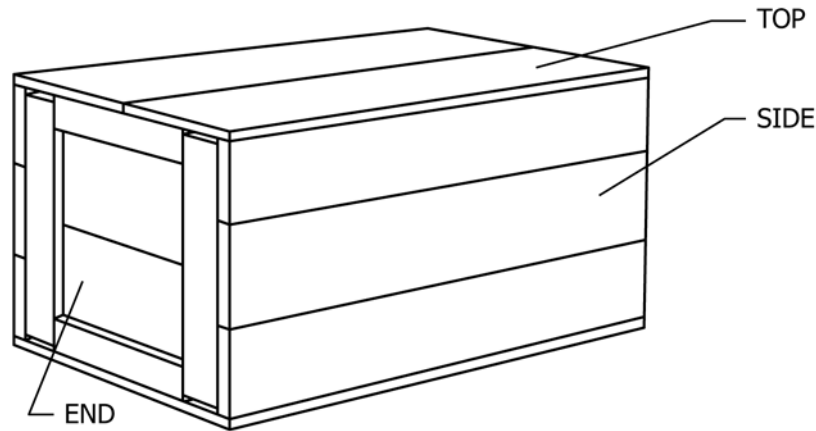


FIG. 2 Style 2 Box (Full Cleated Ends, Butt Joints)

- Style 4 - Exterior End Cleats (Fig. 4)
- Style 4 ½ - Horizontal Exterior End Cleats (Fig. 4)
- Style 5 - Interior End Cleats (Fig. 5)
- Style 7 - Skidded Base with Separate Hood (Fig. 6)
- 4.3 Water-Repellent Wood Preservative Treatment
  - Treatment A - Without treatment
  - Treatment B - With treatment

**5. Ordering Information**

- 5.1 Purchasers should include the following information in procurement documents:
  - 5.1.1 Specification title, number and date.
  - 5.1.2 Box class, style, and treatment (see 4.1 – 4.3).
  - 5.1.3 Description of contents and contents weight, if known.
  - 5.1.4 When alternate materials and construction methods are acceptable and permitted (see 1.2).
  - 5.1.5 Inside box dimensions specified in inches [mm] in order of length by width by height. (see 7.1).

- 5.1.6 When cleats are cut or notched for water drainage (see 7.3).
- 5.1.7 When 2- or 4-way entry skids are required (see 7.4).
- 5.1.8 When rubbing strips are required (see 7.4).
- 5.1.9 When beveled skids are required (see 7.4).
- 5.1.10 When re-closable top panel closure is required (see 7.2.1).
- 5.1.11 When water-repellant wood preservative treatment is required (see 7.6).
- 5.1.12 When boxes are shipped assembled or knocked down (see 8.1).
- 5.1.13 When special packing and marking of boxes are required (see 7.9).
- 5.1.14 When ISPM 15-compliance is required (see 8.3).

**6. Material**

6.1 *Materials.* All materials shall meet the requirements of this specification and referenced documents. Materials shall be

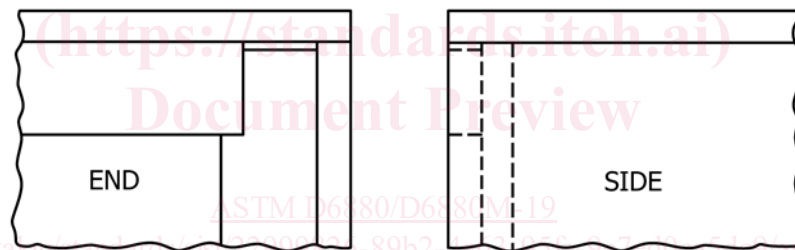
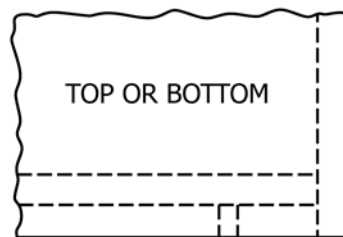
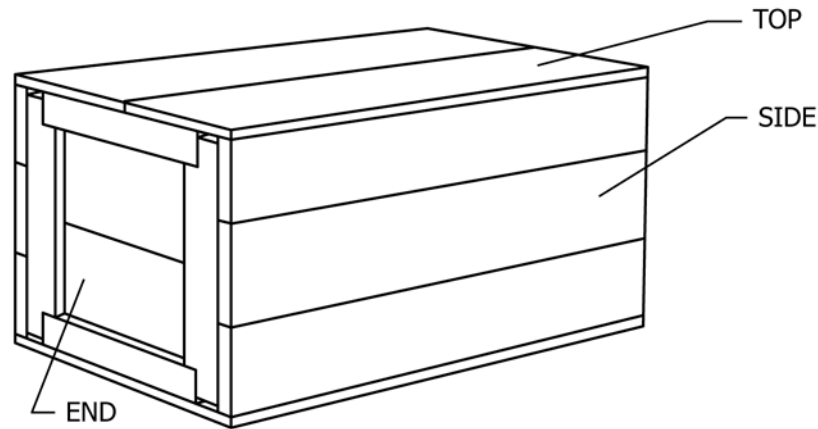


FIG. 3 Style 2-1/2 Box (Full Cleated Ends; Notched Cleats)

free of defects, which adversely affect performance or serviceability of the finished box. Materials shall not affect or be affected by the product being packed. The use of recycled material is encouraged. All virgin, recycled, and repair materials used in box manufacturing shall meet the requirements of this specification and the referenced documents.

6.1.1 *Lumber.* Lumber shall conform to Practice D6199, PS-20, or the NHLA rules, as applicable. Tables 1 and 2 cite nominal dimensions for wood pieces (commercial tolerances will apply). Thicker or wider pieces are acceptable.

6.1.2 *Fasteners.* Fasteners are classified as nails, lag bolts, bolts, nuts, screws, staples, and straps.

6.1.2.1 *Nails.* Nails shall conform to Specification F1667 and other industry standards. Nails are classified as plainshank, helically threaded, annularly threaded, fluted, or twisted square wire.

6.1.2.2 *Lag bolts, bolts, screws, nuts, and washers.* Lag bolts, bolts, screws, nuts, and washers conform to ASME B18.2.1, ASME B18.5 (ISO 8677 or 8678), ASME B18.2.2 (ISO 4033), ASME B18.21.1 (B18.22M), and other industry standards.

6.1.2.3 *Metallic Straps.* Strapping used to reinforce box shall conform to Specification D3953, Guide D4675, and other industry standards.

6.1.3 *Preservatives.* Water-repellent wood preservatives shall be a solution containing either copper naphthenate, conforming with Practice D6253, MIL-DTL-2427H, and AWPA Standards P36 with a minimum concentration of 2.0 % copper metal, oxine copper (formerly referred to as copper-8-quinolinolate) conforming with Practice D6253, MIL-DTL-2427H, and AWPA Standard P37 with a minimum concentration of 1.8 % copper metal, or 3 % zinc naphthenate conforming with Practice D6253 and MIL-DTL-2427H.

## 7. Construction

7.1 *Dimensions.* Boxes shall be designed to the cited inside length, width, and depth (see 5.1.4). A tolerance of  $-0, +1/4$  in. [6 mm] shall be permitted.

7.2 *Box sides, tops, bottoms and ends.* Wood thickness shall be as specified in Tables 1 and 2. No piece shall be less than 2 in. [50 mm] wide. When a side, top, bottom, or end is