



Designation: D5118/D5118M – 22

Standard Practice for Fabrication of Fiberboard Shipping Boxes¹

This standard is issued under the fixed designation D5118/D5118M; 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 practice covers the fabrication of new fiberboard boxes, liners, and sleeves.

1.2 This practice points out the factors and components that must be controlled in the manufacture of corrugated and solid fiberboard boxes, liners, and sleeves.

1.3 This practice does not directly cover the adequacy of fiberboard containers under all conditions of exposure to atmosphere, handling, shipping, and storage. However, references regarding how to assess the adequacy of container under these conditions are included in the practice.

1.4 The values stated in either inch-pound units 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 non-conformance with the standard.

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

1.6 *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.*

¹ This practice is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.27 on Fiberboard Shipping Containers, Containerboard and Related Structures and Materials.

Current edition approved Nov. 1, 2022. Published November 2022. Originally approved in 1990. Last previous edition approved in 2020 as D5118/D5118M – 15 (2020). DOI: 10.1520/D5118_D5118M-22.

2. Referenced Documents

2.1 ASTM Standards:²

D996 Terminology of Packaging and Distribution Environments

D1968 Terminology Relating to Paper and Paper Products

D1974 Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes

D2658 Test Method for Determining Dimensions of Fiberboard Boxes

D3950 Specification for Strapping, Nonmetallic (and Joining Methods)

D3951 Practice for Commercial Packaging

D3953 Specification for Strapping, Flat Steel and Seals

D4169 Practice for Performance Testing of Shipping Containers and Systems

D4727/D4727M Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes

D5639 Practice for Selection of Corrugated Fiberboard Materials and Box Construction Based on Performance Requirements

D6198 Guide for Transport Packaging Design

2.2 Federal Specifications:³

CID A-A-59692 Adhesives, Water-Resistant (For Closure of Fiberboard Boxes)

FED-STD-123 Marking for Shipment (Civil Agencies)

MIL-STD-129 Military Marking for Shipment and Storage

2.3 Code of Federal Regulations:³

Title 49 Transportation

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 Standardization Documents, Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, attn: NPODS.

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



2.4 Other Publications:

National Motor Freight Classification⁴

Uniform Freight Classification⁵

Federal Food, Drug and Cosmetic Act⁶

TAPPI 402 Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Hand sheets and Related Products⁷

ISTA Distribution Simulation⁸

3. Terminology

3.1 Definitions of terms relating to packaging are found in Terminologies D996 and D1968.

4. Significance and Use

4.1 Corrugated and solid fiberboard boxes, sleeves, and liners are used to unitize products into packages of size and shape suitable for manual or mechanical handling and to protect the contents against environmental, handling, shipping, and storage conditions.

4.2 This practice covers some of the basic constructions and styles of commercially available fiberboard packaging used to unitize and protect contents. This practice also provides references to aid in box design for performance and for testing boxes to gauge actual performance.

4.3 *Use of Other Specifications*—Nothing in this practice shall be construed to prohibit the use of boxes of special design or of fiberboard packages identified by package number in the current Uniform Freight Classification and National Motor Freight Classification when in the experience and judgment of the purchaser, the nature of the articles or material to be shipped justifies such boxes or packages. Some commodities may require less protection while other commodities may require better boxes than are specified herein. Containers for explosives and dangerous articles must also comply with regulations for the Transport of Hazardous Materials (CFR Title 49).

5. Styles

5.1 Fiberboard boxes covered by this practice may be of the following styles:

5.1.1 *RSC/0201*⁹—Regular slotted box (Fig. 7).

5.1.2 *OSC/0202*⁹—Overlap slotted box (Fig. 8).

5.1.3 *FOL/0203*⁹—Full overlap slotted box (Fig. 9).

5.1.4 *SFF/0206*⁹—Special full flap slotted box (Fig. 10).

5.1.5 *CSSC/0204*⁹—Center special slotted box (Fig. 11).

⁴ Available from National Motor Freight Classification, Inc., 1001 N. Fairfax St., Suite 600, Alexandria, VA 22314-1798, <http://www.nmfta.org>.

⁵ Available from National Railroad Freight Committee, 151 Ellis St., N.E., Suite 260, Atlanta, GA 30335-6021.

⁶ Available from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

⁷ Available from Technological Association of the Pulp and Paper Industry (TAPPI), 15 Technology Parkway South, Suite 115, Peachtree Corners, GA 30092, <http://www.tappi.org>.

⁸ Available from International Safe Transit Association (ISTA), 1400 Abbott Rd., Suite 380, East Lansing, MI 48823, <http://www.ista.org>.

⁹ Available from European Federation of Manufacturers of Corrugated Board (FEFCO), 37 Rue d'Amsterdam, 75008, Paris, France. Also known as the International Box Code System, that is, in RSC/0201, RSC stands for regular slotted container and 0201 is the international box code number for the RSC.

5.1.6 *CSOSC/0205*⁹—Center special overlap slotted box (Fig. 11).

5.1.7 *HSCC/0312*⁹—Half slotted box with cover (Fig. 12).

5.1.8 *DBLCC/0310*⁹—Double cover box (Fig. 13).

5.1.9 *IC/0325*⁹—Interlocking double cover box (Fig. 14).

5.1.10 *FTC/0301*⁹—Full telescope box (Fig. 15).

5.1.11 *FTHS/0320*⁹—Full telescope half slotted box (Fig. 16).

5.1.12 *OPF/0401*⁹—One piece folder (Fig. 17).

5.1.13 *FPP/0410*⁹—Five panel folder (Fig. 18).

5.1.14 Rigid Box/0600 Series—Bliss Style Box (Fig. 19).

5.1.15 *TSC*—Tongue and slot closure box (Fig. 20).

5.1.16 *TS*—Triple Slide Box (Fig. 21).

5.2 Other styles may also be applicable (see 8.1.3).

6. Requirements

6.1 Materials:

6.1.1 Fiberboard shall conform to type, class, variety, and grade of Specification D4727/D4727M unless otherwise specified. Flute structure shall be as specified in Specification D4727/D4727M (see 8.1.2).

6.1.2 Manufacturer's joints shall be secured by one of the following materials: (The joint is that seam of a box where the ends of the box blank are joined.)

6.1.2.1 *Cold adhesive* shall conform to CID-A-A-59692 and as specified herein. When boxes are used for packaging or packing food and the adhesive used may contact or be in proximity to the food, the adhesive shall comply with the Federal Food, Drug and Cosmetic Act and regulations promulgated thereunder.

6.1.2.2 *Hot melt adhesives* can be used when gross weight does not exceed 65 lb [30 kg], by overlapping the sides of box forming the joint not less than 1 ¼ in. [32 mm] and by firmly gluing this joint with hot melt adhesive consisting of 100 % solids contents of thermal-plastic materials, which will maintain bond at temperatures ranging from -20 °F [-29 °C] to +165 °F [+74 °C] above zero.

6.1.2.3 *Metal fasteners* shall be commercially preformed staples or staples formed from commercial steel stitching wire. All metal fasteners shall have commercially applied coating of zinc or copper wash.

6.1.2.4 *Manufacturer's joint tapes* shall be of the following constructions:

(1) For boxes not exceeding 65 lb [30 kg] gross weight sealing strips must not be less than 2 in. [51 mm] wide, and must comply with one of the following requirements:

(a) Two thicknesses of sulphate paper, total basis weight not less than 80 lb [130 g/m²] combined with a water-resistant compound and reinforced with not less than double strand nylon fiber not less than 210 denier forming a pattern with strands not more than ½ in. [13 mm] apart.

(b) Cloth having crosswise (filler) threads having a minimum tearing strength of 40 Elmendorf units. Inside and outside strips of sulphate paper not less than 2 in. [51 mm] wide; outside strip having a basis weight of not less than 60 lb [100 g/m²] having a bursting strength of not less than 60 psi [414 kPa]; inside strip having a basis weight not less than 40 lb [65 g/m²], and a bursting strength of not less than 40 psi [275 kPa].