



Designation: D 5168 – 03

# Standard Practice for Fabrication and Closure of Triple-Wall Corrugated Fiberboard Containers<sup>1</sup>

This standard is issued under the fixed designation D 5168; 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.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This practice covers the fabrication and closure of new, 1100-grade, triple-wall corrugated fiberboard containers.

1.2 This practice indicates the factors and components that must be controlled in the manufacture of triple-wall fiberboard containers.

1.3 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

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

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- D 996 Terminology of Packaging and Distribution Environments
- D 3950 Specification for Strapping, Nonmetallic (and Joining Methods)
- D 3951 Practice for Commercial Packaging
- D 3953 Specification for Strapping, Flat Steel and Seals
- D 4675 Guide for Selection and Use of Flat Strapping Materials
- D 4727 Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes
- D 5330/D 5330M Specification for Pressure-Sensitive Tape for Packaging, Filament-Reinforced
- D 5486/D 5486M Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing
- E 380 Practice for Use of the International System of Units (SI)

### 2.2 TAPPI Standards:

- T 411 Test Method for Thickness of Paper and Paperboard<sup>3</sup>
- T 803 Puncture and Stiffness Test of Container Board<sup>3</sup>
- T 810 Bursting Strength of Corrugated and Solid Fiberboard<sup>3</sup>
- T 811 Edgewise Compression Strength of Corrugated Fiberboard (Short Column Test)<sup>3</sup>
- T 812 Ply Separation of Solid and Corrugated Fiberboard (Wet)<sup>3</sup>

### 2.3 Code of Federal Regulations:

CFR Parts 107-180 Title 49, Hazardous Materials Regulations<sup>4</sup>

### 2.4 Other Standards:

National Motor Freight Classification<sup>5</sup>  
Uniform Freight Classification<sup>6</sup>

### 2.5 Use of Other Specifications:

2.5.1 Nothing in this practice shall be construed to prohibit the use of containers of special design or of fiberboard containers 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 containers.

2.5.2 Exceptional commodities may require better containers than are specified herein. Containers for explosives and dangerous articles shall comply with the specifications prescribed in the Department of Transportation's (DOT) Office of Hazardous Materials Code of Federal Regulations, Title 49 CFR Parts 107-180. In addition, for the particular articles to which these regulations apply, if the requirements contained in this practice are more stringent, then they must also meet the requirements specified herein. (The DOT regulations apply to such

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.27 on Paper and Paperboard.

Current edition approved Oct. 1, 2003. Published December 2003. Originally approved in 1991. Last previous edition approved in 1998 as D 5168 – 98.

<sup>2</sup> 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.

<sup>3</sup> Available from TAPPI, Technology Park, P.O. Box 105113, Atlanta, GA 30348-5113.

<sup>4</sup> Available from the United States Government Printing Office, Superintendent of Documents, Washington, DC 20402.

<sup>5</sup> Available from the National Motor Freight Classification, 2200 Mill Road, Alexandria, VA 22314.

<sup>6</sup> Available from Short Line and Regional Railroad Association, 50 F Street, N.W., Suite 7020, Washington, DC 20001-1536.

articles as explosives, flammable liquids and solids, compressed gases, oxidizing materials, poisons, and so forth).

**3. Terminology**

3.1 *Definitions*—General definitions for packaging are found in Terminology D 996.

**4. Significance and Use**

4.1 Triple-wall corrugated fiberboard containers are used to unitize products into containers 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 is intended to cover some of the basic constructions and styles of commercially available triple-wall fiberboard packaging used to unitize and protect contents.

**5. Classification**

5.1 *Classes and Styles*—Triple-wall corrugated fiberboard containers may be furnished in the following classes, styles, and types of ends, as specified:

5.2 *Class:*

5.2.1 Non-weather-resistant containers are for domestic shipments and storage.

5.2.2 Weather-resistant containers are for export shipments and storage where high humidities or extreme climatic conditions may be encountered.

5.2.3 *Fire-Retardant Containers*—When specified, triple-wall containers shall use materials as specified in Specification D 4727.

5.3 *Style:*

5.3.1 *Style A*—Regular slotted container or alternate construction (see Fig. 1).

5.3.2 *Style B*—Full telescope container (see Fig. 2).

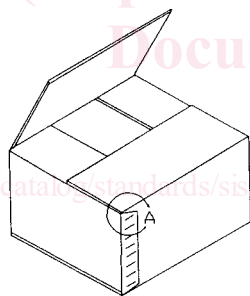
5.3.3 *Style C*—Half regular slotted container with short top flaps and cover or alternate construction (see Fig. 3).

**6. Ordering Information**

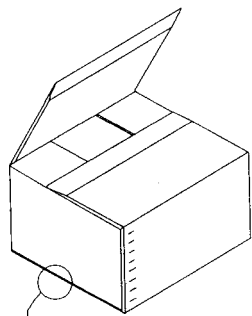
6.1 Purchasers should select the preferred options offered herein and include the following data in procurement documents:

- 6.1.1 Title, number, and date of this specification,
- 6.1.2 Class and style of container (see 5.1).
- 6.1.3 Inside dimensions (see 7.2),
- 6.1.4 Special features for Style A, B, and C containers,
- 6.1.5 Unless otherwise specified, packing and marking shall be in accordance with Practice D 3951,
- 6.1.6 Whether containers are to be shipped partly assembled or knocked down and in bundles,
- 6.1.7 When pallet bases are required (see 7.6.3), and
- 6.1.8 When gluing is permitted (see 7.5.1).

6.2 *Size and Weight Limitations*—When size and weight limitations of the carrier’s classification (see National Motor

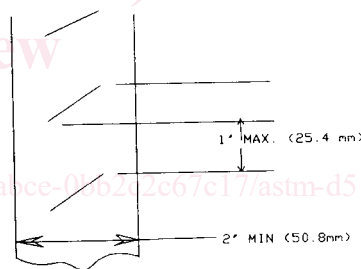


REGULAR SLOTTED BOX



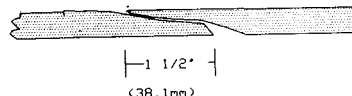
REGULAR SLOTTED BOX WITH CRUSHED ROLLED OVERLAPPING FLAPS

ALTERNATE CONSTRUCTION



DETAIL 'A'

NOTE:  
LAP MAY BE INTEGRAL WITH END OR SIDE PANEL AND MAY BE ON INSIDE OR OUTSIDE OF ADJACENT PANEL



DETAIL 'B'

**FIG. 1 Style A Box**

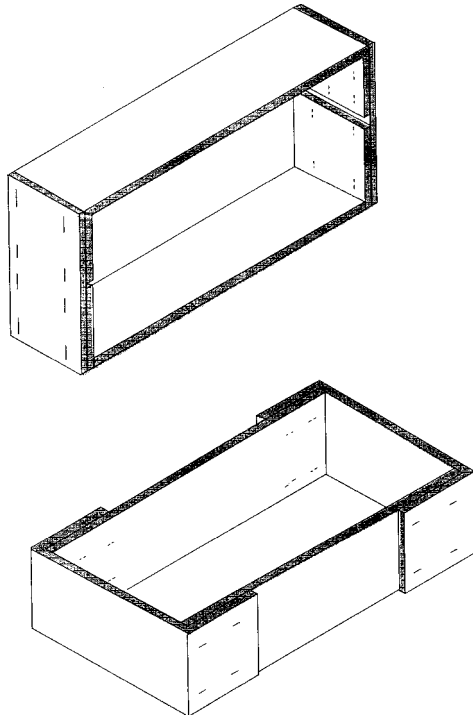
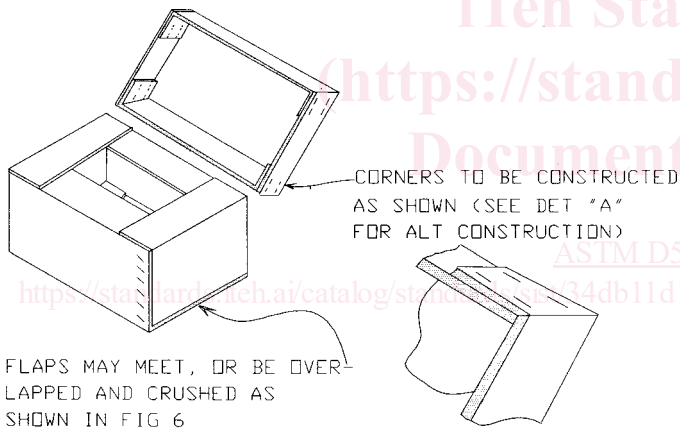


FIG. 2 Style B Box



FLAPS MAY MEET, OR BE OVERLAPPED AND CRUSHED AS SHOWN IN FIG 6

DETAIL "A"

FIG. 3 Style C Box

Freight Classification and Uniform Freight Classification) are exceeded, a special package permit should be obtained, when applicable.

## 7. Materials and Manufacture

### 7.1 Materials:

7.1.1 *Fiberboard*—The fiberboard shall consist of three corrugated mediums and four facings fabricated into a triple-wall structural material.

#### 7.1.1.1 *Corrugating Mediums:*

(1) *Weight of Mediums*—The weight of material used to fabricate the corrugated medium shall be no less than 26 lb/1000 ft<sup>2</sup> (127 g/m<sup>2</sup>), or as otherwise specified.

(2) *Flute Arrangement*—There shall be two A Flutes, with the remaining flute being either A or C Flute. Flute arrange-

ment shall be agreed upon between the purchaser and the supplier. In accordance with Department of Defense requirements, the flute combination shall be C-A-A (or meet equivalent performance levels).

7.1.1.2 *Facings*—The combined weight of facings shall be not less than 264 lb/1000 ft<sup>2</sup> (1289 g/m<sup>2</sup>), with the heaviest facings on the outside. For weather-resistant boxes the outer facings shall be highly water-resistant paperboard which has been treated with a suitable high-grade, wet strength resin. Water-resistant paperboard shall have a 35 % minimum wet mullen retention versus dry mullen when tested in accordance with TAPPI T 810 and T 812.

7.1.1.3 *Caliper*—The thickness of the finished fiberboard shall be no less than 0.525 in. (13.3 mm), when tested in accordance with TAPPI T 411.

7.1.1.4 *Puncture Resistance*—The fiberboard shall have a minimum puncture test value of 1100 in. oz per in. of tear (36 J) when tested in accordance with TAPPI T 803. Only one puncture reading on each specimen may fall below the allowable minimum and that reading shall be not more than 10 % below the allowable minimum reading.

7.1.1.5 *Short Column Crush*—The short column crush strength of the fiberboard shall be not less than 155 lb/in. (27 kN/m), minimum average, when tested in accordance with TAPPI T 811.

### 7.1.2 *Adhesive:*

7.1.2.1 For non-weather-resistant containers, the facings and corrugated medium shall be securely bonded with adhesive over the entire area of contact.

7.1.2.2 For weather-resistant containers, in addition to the requirements specified in 7.1.2.1, the adhesive shall be of the water-resistant type and the fiberboard shall show no ply separation greater than ¼ in. (6 mm) when tested in accordance with TAPPI T 812.

7.1.3 *Metal Fasteners (3x)*—Metal fasteners shall be commercially pre-formed staples or staples formed from commercial steel stitching wire. All metal fasteners shall have commercially-applied coating of zinc or copper wash.

7.2 *Dimensions*—Dimensions of the containers furnished shall be as specified (see 6.1). Unless otherwise specified, the container dimensions shall be inside measurements with a tolerance of ±¼ in. (6 mm).

7.3 *Certification*—The manufacturer shall furnish the procuring activity with certification that containers furnished under this specification meet the requirements specified herein.

### 7.4 *Style A Containers:*

7.4.1 *Construction*—Construction shall be in accordance with Fig. 1 (regular-slotted container). This container shall be one piece of triple-wall corrugated fiberboard scored and slotted (slots shall have a minimum width of ⅜ in. (10 mm)) to form a body piece having four flaps for closing each of two opposite faces. The flaps along the longer edge are the outer flaps, and those along the shorter edge are the inner flaps. Flaps shall not project beyond the edge of the container. All length flaps shall be equal in length, and all width flaps shall be equal in length. The outer flaps shall not overlap when closed nor have a gap to exceed ¼ in. (7 mm). The body joint (manufacturers joint) overlap shall be not less than 2 in. (50 mm) wide,