



Designation: D4727/D4727M – 22

Standard Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes¹

This standard is issued under the fixed designation D4727/D4727M; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification covers fiberboard primarily used for the fabrication of boxes and interior details such as pads, sleeves, liners, partitions, die-cut sheets, etc.

1.2 The performance of fiberboard boxes is largely dependent on the paper components from which they are fabricated and, in the case of corrugated boxes, on the flute structure as well. Therefore, a variety of grades reflecting varied performance levels are specified.

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

1.4 The following safety hazards caveat pertains only to the test portion, Sections 8 and 9, of this specification: *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.*

¹ This specification 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.

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2. Referenced Documents

2.1 ASTM Standards:²

[D585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Product \(Withdrawn 2010\)](#)³

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

[D1968 Terminology Relating to Paper and Paper Products](#)

[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](#)

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

[D5118/D5118M Practice for Fabrication of Fiberboard Shipping Boxes](#)

[D5168 Practice for Fabrication and Closure of Triple-Wall Corrugated Fiberboard Containers](#)

[D5639/D5639M Practice for Selection of Corrugated Fiberboard Materials and Box Construction Based on Performance Requirements](#)

[D6039/D6039M Specification for Open and Covered Wood Crates](#)

[D6199 Practice for Quality of Wood Members of Containers and Pallets](#)

[E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source](#)

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 The last approved version of this historical standard is referenced on www.astm.org.

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



E662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials

IEEE/ASTM-SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System

2.2 TAPPI Standards:⁴

T 402 Standard Conditioning and Testing Atmosphere

T 410 Weight per Unit Area (Basis Weight or Substance)

T 411 Thickness (Caliper) of Paper and Paperboard

T 441 Water Absorptiveness of Sized (Non-Bibulous) Paper and Paperboard (Cobb Test)

T 803 Puncture and Stiffness Test of Container Board

T 810 Bursting Strength of Corrugated and Solid Fiberboard

T 811 Edge Crush Test

T 812 Ply Separation of Solid and Corrugated Fiberboard (Wet)

2.3 Other Standards:

National Motor Freight Classification⁵

Uniform Freight Classification⁶

ISO 535 Paper and Board—Determination of Water Absorption—Cobb Method⁷

3. Terminology

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

3.2 Terminology specific to paper and boxes are found in Terminology D1968.

4. Classification

4.1 Type—Corrugated fiberboard (CF).

4.1.1 Classes—Domestic (D) and domestic/fire retardant (D/FR).

4.1.1.1 Variety—Singlewall (SW).

(1) Burst Grades—125, 150, 175, 200, 250, 275, and 350.⁸

(2) ECT Grades—23, 26, 29, 32, 40, 44, and 55⁹

4.1.1.2 Variety—Doublewall (DW).

(1) Burst Grades—200, 275, 350, 400, 500 and 600.⁸

(2) ECT Grades—42, 48, 51X, 61X, 71X, and 82X.^{9,10}

4.1.1.3 Variety—Triplewall (TW).

(1) Grades—700, 900, 1100, and 1300.¹¹

4.1.2 Classes—Weather-resistant (WR) and weather-resistant/fire retardant (WR/FR).

4.1.2.1 Variety—Singlewall (SW).

(1) Grades—V3c, and W5c.

4.1.2.2 Variety—Doublewall (DW).

(1) Grades—V11c, V13c, and V15c

4.1.3 Classes—Water and water-vapor resistant (WWVR) and water and water-vapor resistant/fire retardant (WWVR/FR).

4.1.3.1 Variety—Singlewall (SW).

(1) Grades—V3c WWVR, W5c WWVR.

4.1.3.2 Variety—Doublewall (DW).

(1) Grades—V11c WWVR and V13c WWVR.

4.2 Type—Solid Fiberboard (SF).

4.2.1 Class—Domestic (D) and Domestic/Fire Retardant (D/FR).

4.2.1.1 Grades—125, 175, 200, 275, 350, 500 and 600.⁸

4.2.2 Class—Weather-resistant (WR) and Weather Resistant/Fire Retardant (WR/FR).

4.2.2.1 Grades—V2s, V3s, V4s, W5s and W6s.

5. Ordering Information

5.1 Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

5.1.1 Title, number and date of this specification,

5.1.2 Type, class, variety and grade (see 4.1 and 7.1),

5.1.3 Size of sheet, pad, etc. (see 7.3.1.4),

5.1.4 Center line of score to center line of score or sheet edge (see 7.3.1.4),

5.1.5 Flute design of type corrugated fiberboard; variety SW and DW (see 6.4 and 6.4.1),

5.1.6 Mill run or trimmed sheets,

5.1.7 Dimensional direction of flutes of type Corrugated Fiberboard (CF),

5.1.8 Packing and marking requirements (see S3 and S4), and

5.1.9 Palletization requirements (see S3.1.1.1).

6. Materials and Manufacture

MATERIALS

6.1 Paperboard Components:

6.1.1 Facings and Outer Plies—The facings of corrugated fiberboard and the plies of solid fiberboard shall have bending qualities to satisfy the requirements of 7.6. The paperboard components of weather-resistant class material shall be treated with a suitable wet strength resin to make them water resistant. Similarly, the paperboard components of fire retardant class material shall be treated to make them fire retardant to meet the requirements of 7.7.1 and 7.7.2.

6.1.1.1 Outer Facing of Corrugated Fiberboard, Water- and Water Vapor Resistant Class—One outer facing of this material shall be a composite sheet comprised of one ply of sized, wet strength kraft linerboard laminated to a ply of linerboard conforming to 6.1.1 with a minimum of 6 lb/1000 ft² [29 g/m²] of polyethylene. The sized ply shall be on the exterior side of the facing, with the unsized linerboard next to the corrugated medium. At the supplier's option, both plies of linerboard may be of a sized wet strength material.

⁴ 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>.

⁵ National Motor Freight Classification is available from National Motor Freight Traffic Association, Inc. (NMFTA), 1001 N. Fairfax St., Suite 600, Alexandria, VA 22314-1798, <http://www.nmfta.org>.

⁶ Uniform Freight Classification is available from Rail Publication Service, 151 Ellis St. N.E., Suite 260, Atlanta, GA 30335-6021.

⁷ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁸ Grade numbers for single and double wall corrugated varieties and solid fiber types refer to the bursting strength in lb/in.² as determined by TAPPI T 810.

⁹ Grade numbers for single and double wall corrugated varieties refer to the edge crush in lb/in. as determined by TAPPI T 811.

¹⁰ Grade numbers for double wall corrugated varieties with an "X" indicate that the value should be used as a guide and that the actual required edge crush test value is yet to be determined.

¹¹ Grade number for triplewall refers to the dry puncture resistance in units as determined by TAPPI T 803.