Designation: D6590/D6590M – 00 (Reapproved 2012)

Standard Specification for Pressure-Sensitive Tape for Sealing Fiber Containers and Cans[1,2]

This standard is issued under the fixed designation D6590/D6590M; 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.

1. Scope

1.1 This specification covers one type of pressure-sensitive tape for closing and sealing slip cover type containers such as fiber tubes and metal cans.

1.2 The values stated in either inch-pound or SI units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system must be used independently, without combining values in any way.

1.3 The following safety hazards caveat pertains only to the test methods portion 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 and health practices and determine the applicability of regulatory limitations prior to its use.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D996 Terminology of Packaging and Distribution Environments

D3330/D3330M Test Method for Peel Adhesion of Pressure-Sensitive Tape

D3611 Practice for Accelerated Aging of Pressure-Sensitive Tapes

D3652/D3652M Test Method for Thickness of Pressure-Sensitive Tapes

D3654/D3654M Test Methods for Shear Adhesion of Pressure-Sensitive Tapes

D3715/D3715M Practice for Quality Assurance of Pressure-Sensitive Tapes

D3759/D3759M Test Method for Breaking Strength and Elongation of Pressure-Sensitive Tape

D3811/D3811M Test Method for Unwind Force of Pressure-Sensitive Tapes

D3816/D3816M Test Method for Water Penetration Rate of Pressure-Sensitive Tapes

D3833/D3833M Test Method for Water Vapor Transmission of Pressure-Sensitive Tapes

D3951 Practice for Commercial Packaging

D5570 Test Method for Water Resistance of Tape and Adhesives Used as Box Closure

2.2 *Military Specification:*

MIL-C-2439 Container, Ammunition, Fiber Spirally Wound[4]

2.3 *ISO Standard:*

ISO 9002 Quality Systems Model for Quality Assurance in Production and Installation[5]

3. Terminology

3.1 *Definitions:*

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

4. Significance and Use

4.1 The polyester film backed pressure-sensitive tape described in this specification is intended for closure and sealing of containers with slip cover closure, such as fiber spirally wound tubes (MIL-C-2439) and metal cans where strength, water-resistance, water-vapor resistance and resistance to rain and other deteriorating elements are required.

5. Ordering Information

5.1 The inquiry or order shall include the following:

5.1.1 ASTM Designation and date of issue;

5.1.2 Roll width and length;

5.1.3 When backing certification is required;

5.1.4 When testing and inspection certification is required; and

[1] This specification is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.14 on Tape and Labels.

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[2] This specification is intended to replace Military Specification MIL-T-43036, Type II.

[3] 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.

[4] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

5.1.5 Level of packaging and packing, if other than commercial.

6. Materials and Manufacture

6.1 The materials used in the construction of the tape shall be such as to assure performance of the tape over the temperature range from −55 to 71°C [−65 to 160°F] and shall conform to the requirements of this specification.

6.2 *Backing*—The backing shall be a polyester film.

6.3 *Adhesive*—The adhesive shall be pressure-sensitive, water resistant, and shall require no moisture, heat or other preparation prior to or after application to clean, dry surfaces. The adhesive shall be coated in a smooth and evenly distributed layer on one side of the backing.

6.4 *Rolls*—The tape shall be evenly wound in rolls, adhesive side in, on cores made of paper-fiber or plastic. The core shall have sufficient rigidity to prevent distortion of the roll under normal conditions of transportation and use. The inside diameter of the core shall be 76 −0 +1.6 mm [3 −0, +1⁄16 in.]. When the roll is unwound, the backing shall not tear, the adhesive shall not transfer, nor split from the face of the tape backing to the adjacent layer before or after aging (see Table 1).

6.5 *Color*—The color of the tape shall be transparent or other commercially available color.

7. Physical Properties

7.1 The tape shall comply with the physical property requirements listed in Table 2 and the water resistance requirements of Test Method D5570.

8. Dimensions and Permissible Variations

8.1 The width of the rolls shall be 24, 36 or 48 mm [1, 1-½ or 2 in.], as specified [see 5.1.2].

8.1.1 A width tolerance of ± 1.5 mm [±1⁄16 in.] shall be allowed on all widths.

NOTE 1—The width of pressure-sensitive tapes in the common inch-pound system are not identical to the widths available in the SI system. For packaging applications this difference in width on packaging performance is not considered significant.

8.2 The length of the roll shall be 50 or 55 m [55 or 60 yd], or other commercially available lengths, (that is, 550 yd rolls) as specified (see 5.1.2).

8.3 *Splices*—The roll shall consist of a single length of tape except any single roll may contain a maximum of one splice.

8.3.1 Splices shall be such that they will not separate when the roll is unwound by hand or machine (see Table 1).

TABLE 1 Rolls

Test Method	Designation
Adhesion, as received and aged	D3330/D3330M Test Method A
Shear adhesion	D3654/D3654M Procedure A
Tensile	D3759/D3759M
Thickness	D3652/D3652M
Unwind as received and aged	D3811/D3811M
Water penetration rate	D3816/D3816M
Water vapor transmission rate	D3833/D3833M
Accelerated aging	D3611

TABLE 2 Physical Property Requirements

Test		Value	Referenced Test
Thickness, max	mm	0.10	Table 1
	mils	4	Table 1
Tensile strength, min			
Longitudinal,	(N/100 mm)	615	Table 1
	(lb/in.)	35	Table 1
Transvers,	(N/100 mm)	700	Table 1
	(lb/in.)	40	Table 1
Elongation, % min.		120	Table 1
Adhesion, min.			
Initial	(N/100 mm)	55	Table 1
	(oz/in.)	50	Table 1
Aged	(N/100 mm)	49	Table 1
	(oz/in.)	45	Table 1
Shear adhesion, minutes, min[A]			
Initial and Aged			
at 23°C [73.5°F]		3000	Table 1
at 65.5°C [150° F]		3000	Table 1
Unwind, max			
Initial	(N/100 mm)	70	Table 1
	(lb/in.)	4	Table 1
Aged	(N/100 mm)	70	Table 1
	(lb/in.)	4	Table 1
WPR, max	(g/m^2/24 h)	15.5	Table 1
	($g/100\ in.^2$/24 h)	1.0	Table 1
WVPR, max	(g/m^2/24 h)	15.5	Table 1
	($g/100\ in.^2$/24 h)	1.0	Table 1

[A] The shear adhesion test at 23°C [73°F] and at 65.5°C [150°F], both initial and aged, shall show no creepage or slippage in excess of 3 mm [⅛ in.].

8.4 *Stability on a Fiber Container*—The tape, when tested as described in 12.4.2 shall show no evidence of buckling, curling or lifting extending toward the center of the tape plies more than ¼ of the width of the tape from either side, and shall remove from the container without breaking. Adhesive transfer to the container shall not be cause for rejection.

8.5 *Low Temperature Removal*—The tape shall be removable from the container without breaking the tape backing, when tested as described in 12.4.3.

8.6 *Waterproof on Metal Cans*—The tape shall prevent the penetration of liquid water into the test cans for a period of 15 minutes when tested as described in 12.4.4.

9. Workmanship, Finish, and Appearance

9.1 The tape shall be uniformly constructed and free from defects that impair the usefulness of the tape for the purposes intended. The tape adhesive coating shall be uniform, covering entirely one side of the tape. The edges shall be clean, straight, and unbroken. The roll shall be evenly wound. The finished product shall conform to the levels of quality established herein.

10. Sampling

10.1 *End Item Examination*—The lot size for visual inspection shall be in accordance with Practice D3715/D3715M. The sample size shall be one roll.

10.2 *End Item Testing*—The lot size for end-item testing shall be in accordance with Practice D3715/D3715M. The acceptance quality level (AQL) shall be 4.0 %.

11. Specimen Preparation and Number of Tests

11.1 Specimen preparation shall be as specified in the appropriate test method.

11.2 Number of tests per unit of product shall be as specified in the appropriate test method.

11.3 First Article of Manufacture specimens shall consist of at least five rolls.

12. Test Methods

12.1 *Responsibility for Inspection*—Unless otherwise specified in the contract or order, the manufacturer is responsible for the performance of all inspection requirements as specified herein.

12.2 *Responsibility for Compliance*—All items must meet all requirements of Sections 6-16, 17. The inspections set forth in this specification shall become part of the manufacturer's overall inspection system or quality program for the contract of order. The absence of any inspection requirement in the specification shall not relieve the manufacturer of the responsibility of ensuring that all rolls of the tape submitted for acceptance comply with all the requirements of the contract or order. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the buyer to acceptance of defective material.

12.3 *Classification of Inspections:*

12.3.1 *First Article of Manufacture*—When a product is first manufactured in a plant, it shall be tested and inspected to determine compliance with all examination and tests of this specification by an independent laboratory. First article of manufacture examination needs only be repeated when there is a change in materials, processes, or plant of manufacture.

12.3.2 *Quality Conformance Inspections*—Quality conformance inspections shall consist of the following:

12.3.2.1 Adhesion, as received,

12.3.2.2 Shear Adhesion, as received,

12.3.2.3 Tensile and elongation, and

12.3.2.4 Unwind, as received.

12.4 Test Methods:

12.4.1 Conduct the tests in accordance with the test methods in Table 1, 12.4.2-12.4.4.

12.4.2 *Determination of Stability on Fiber Containers*—Determine the stability of the tape on fiber containers by applying 1 in. wide tape to a fiber container meeting MIL-C-2439, Types I and II, 50 to 150 mm [2 to 6 in.] in diameter so that it extends around the container perpendicular to the main axis of the container and onto itself a distance of approximately 50 mm [2 in.]. Make a release tab at least 150 mm [6 in.] in length by folding the extended tape adhesive to adhesive. Place this assembly in a cabinet maintained at 71 ± 2°C [160 ± 3.5°F] for ten days. Remove the container and condition for a minimum of 1 h. Remove the tape at a rate of approximately 1 m [3 ft] per second as roughly represented by a sharp yank. Make one test per sample selected.

12.4.3 *Determination of Low Temperature Removal*—Apply specimens of the tape to a MIL-C-2439, Types I and II, ammunition fiber container as described in 12.4.2. Place this assembly in an air circulating oven maintained at 68 ± 2°C [155 ± 3.5°F] for 24 h. Then transfer assembly to a compartment maintained at −55 ± 2°C [−67 ± 3.5°F] for 2 h. At the end of the conditioning period, remove the tape from the container at any angle at a rate of about 1 m [3 ft] per second as roughly represented by a sharp yank. Care should be taken to keep the assembly at the low temperature during removal of the tape. Make one test per sample selected.

12.4.4 *Determination of Waterproofness of Tape on a Metal Can*—Apply a 24 mm [1 in.] wide specimen of tape to a closed 4 oz seamless metal box with slip cover[6] containing 40 g of clean, dry calcium chloride so that it extends around the container once and onto itself approximately 1 in. (place a dab of adhesive at point tape overlaps itself). Position the tape so that it is centered along the lip of the slip cover and approximately one half the width extends on either side of the lip. Submerge the sealed container under one inch head of water, maintained at 4.4 ± 2°C [40 ± 3.5°F] for a period of 15 min. Remove the container and carefully dry the exterior with a paper towel or other suitable means. Remove the tape and container cover and visually examine the calcium chloride for evidence of wetting. Make three determinations. Wetting the calcium chloride is cause for rejection of the tape.

NOTE 2—*Application of Tape for Testing*—The following steps are recommended in applying this tape to telescope tubes, slip cover cans and similar circular containers to ensure a moisture-vapor-tight seal:

Step 1—Press the cap of the tube onto the body and hold under tension until the pressure inside equalizes with the pressure outside the tube. This can be checked by releasing the cap and if it does not come off, pressures have equalized.

Step 2—With the cap still firmly pressed in place, apply a short length of the tape placed so that one-half of the width falls on each side of the joint between the cap and body.

Press the tape firmly into place and continue to apply the tape around the tube maintaining approximately a 45 N [10 lb] tension on the tape until at least 1-¼ laps of tape have been applied (place a dab of adhesive where the tape over laps itself). Release tension, cut the tape from the roll leaving a free end of approximately 150 mm [6 in.] length which is folded adhesive to adhesive to form a tab to aid in removing the tape.

Step3—After application of the tape, the tube and the tape should be allowed to condition under standard conditions for approximately 24 h before testing of any type is begun.

13. Rejection and Rehearing

13.1 Materials that fail to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly in writing. In case of dissatisfaction with the results of any test, the producer or supplier may make claim for rehearing.

[6] The sole source of supply of the apparatus (Seamless box , Fisher Scientific Catalog #61 lists them as Boxes, Metal Seamless Tin # 3–490) known to the committee at this time is Fisher Scientific International, Inc., Liberty Lane, Hampton, N.H. 03842. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

14. Environmental Consideration

14.1 *Toxic Content*—The use of potentially toxic packaging materials is a concern for their potential presence in emissions when packaging is incinerated, or leachate when packaging is landfilled. Materials used in the manufacture of pressure-sensitive tapes covered by this specification shall not have any lead, cadmium, mercury, or hexavalent chromium intentionally introduced as a component during manufacture.

15. Certification

15.1 When specified (see 5.1.3) in the purchase order or contract, the manufacturer shall certify that the backing of the tape is as specified (see 6.2)

15.2 When specified (see 5.1.4) in the purchase order or contract the purchaser shall be furnished a certification stating that the samples representing each lot of tape have been tested and inspected as directed in this specification, the requirements have been met and that the tape has been produced in a manufacturing facility certified under ISO 9002.

16. Preparation for Delivery

16.1 Unless otherwise specified (see 5.1.5) in the order or contract, rolls of tape shall be packaged and packed in accordance with Practice D3951.