



Designation: D 5330/D 5330M – 04

## Standard Specification for Pressure-Sensitive Tape for Packaging, Filament- Reinforced<sup>1, 2</sup>

This standard is issued under the fixed designation D 5330/D 5330M; 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 Department of Defense.*

### 1. Scope

1.1 This specification covers filament-reinforced, pressure-sensitive adhesive tape.

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 of the other, without combining values in any way.

1.3 The following precautionary caveat pertains only to the test methods portion, Section 14, 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 use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>3</sup>

D 996 Terminology of Packaging and Distribution Environments

D 1974 Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes

D 3330/D 3330M Test Method for Peel Adhesion of Pressure-Sensitive Tape

D 3611 Practice for Accelerated Aging of Pressure-Sensitive Tapes

D 3652/D 3652M Test Method for Thickness of Pressure-Sensitive Tapes

D 3654/D 3654M Test Methods for Shear Adhesion of Pressure-Sensitive Tapes

D 3715/D 3715M Practice for Quality Assurance of Pressure-Sensitive Tapes

D 3759/D 3759M Test Method for Tensile Strength and Elongation of Pressure-Sensitive Tapes

D 3815/D 3815M Practice for Accelerated Weathering of Pressure-Sensitive Tapes by Carbon-Arc Exposure Apparatus

D 3889/D 3889M Test Method for Adherence to Linerboard of Pressure-Sensitive Tape at Low Temperature

D 3951 Practice for Commercial Packaging

D 4332 Practice for Conditioning Containers, Packages, or Packaging Components for Testing

D 4727/D 4727M Specification for Corrugated and Solid Fiberboard Sheet (Container Grade) and Cut Shapes

#### 2.2 Federal Specifications:

PPP-T-97 Tape, Packaging/Industrial, Filament Reinforced<sup>4</sup>

PPP-T-680 Tape, Pressure-Sensitive Adhesive: Packaging and Packing of<sup>4</sup>

#### 2.3 ISO Standard:

ISO 9000:2000 Quality Management Systems—Fundamentals and Vocabulary<sup>5</sup>

ISO 9001:2000 Quality Management Systems—Requirements<sup>5</sup>

ISO 9004:2000 Quality Management Systems—Guidelines for Performance Improvements<sup>5</sup>

### 3. Terminology

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

### 4. Classification

#### 4.1 Types:

4.1.1 *Type I*—Cut-resistant (polyester-reinforced).

4.1.2 *Type II*—Medium-tensile strength.

4.1.3 *Type III*—High-tensile strength.

<sup>1</sup> 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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<sup>2</sup> This specification is intended to replace Federal Specification PPP-T-97. Types are the same in both specifications.

<sup>3</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>4</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, Attn: NPODS.

<sup>5</sup> Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

4.1.4 *Type IV*—High-tensile strength, weather-resistant.

## 5. Ordering Information

5.1 The inquiry or order shall include the following:

5.1.1 Type required (see 4.1);

5.1.2 Roll width and length; unless otherwise specified, direct substitution of SI or inch-pound shall be allowed (see 8.1);

5.1.3 Level of packaging, packing, and marking if other than commercial (see Section 18);

5.1.4 If certification is required (see Section 17); and

5.1.5 ASTM specification designation and date of issue.

## 6. Materials and Manufacture

6.1 The materials used in the construction of the tapes shall be such that they ensure performance of the tape over the temperature range from  $-55.5$  to  $71^{\circ}\text{C}$  [ $-65$  to  $160^{\circ}\text{F}$ ] and shall conform to the requirements of this specification.

6.2 *Backing*—The backing shall serve as the carrier for the adhesive and shall not serve as the reinforcing material.

6.3 *Adhesive*—The adhesive shall be pressure-sensitive and water-insoluble and shall require no moisture, heat, or other preparation prior to or after application to clean, dry surfaces.

6.4 *Reinforcements*—The adhesive shall be reinforced by embedding longitudinal filaments in a smooth layer throughout the length of the roll. The filaments shall be covered by a uniform layer of adhesive forming a smooth adhering surface.

6.5 *Rolls*—The tape shall be wound in rolls, adhesive side in, on paper-fiber or plastic cores. 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 tape is unwound, the backing shall not tear, the reinforcing filaments shall not ravel, and the adhesive shall not transfer or split from the face of the tape to the backing of the adjacent layer before or after aging (see Section 14).

## 7. Physical Properties

7.1 The tape shall comply with the physical property requirements listed in Table 1 when tested in accordance with Section 14.

**TABLE 1 Properties**

	Type I	Type II	Type III	Type IV	Test
<b>Adhesion</b>					
before (N/100 mm, min)	27.4	27.4	27.4	27.4	14.4.1
aging (oz/in., min)	25	25	25	25	14.4.1
after (N/100 mm, min)	27.4	27.4	27.4	27.4	14.4.1
aging (oz/in., min)	25	25	25	25	14.4.1
<b>Adhesion at low temperature, No separation of the tape from the Kraft paper</b>					
<b>Elongation, %</b>					
min	12	3	3	3	14.4.1
max	24	8	8	8	14.4.1
<b>Holding power</b>					
max slippage, mm	5	5	5	5	14.4.1
in.	$3/16$	$3/16$	$3/16$	$3/16$	14.4
Tensile, min, N/100 mm	3500	5250	7440	7000	14.4.1
lb/in.	200	300	425	400	14.4.1
Thickness, max, mm	0.305	0.305	0.305	0.305	14.4.1
in.	0.012	0.012	0.012	0.012	14.4.1

7.2 *Type IV Requirements*—Type IV tape shall meet the following additional requirements when tested in accordance with 14.4.2:

7.2.1 No lifting of the tape in the overlap area,

7.2.2 No pulling loose from the fiberboard (except in areas in which the fiberboard was buckled),

7.2.3 No flaking, cracking, or separation of the backing when the overlap section of the tape is stripped back at  $180^{\circ}$  at a rate of 100 to 150 mm/s [4 to 6 in./s],

7.2.4 No transfer of the adhesive to the lower layer of tape when tested as in 7.2.3, and

7.2.5 No brittleness of the adhesive (excluding adhesive exposed by buckling of the fiberboard). An embrittled adhesive will crack, flake, or powder when flexed manually.

## 8. Dimensions, Mass, and Permissible Variations

8.1 *Width*—The width of the roll shall be 12, 18, or 24 mm [ $1/2$ ,  $3/4$ , or 1 in.], or any other commercially available width, as specified (see 5.1.2). A tolerance of  $\pm 1.5$  mm [ $\pm 1/16$  in.] shall be allowed on all widths.

NOTE 1—Uses of pressure-sensitive tape in closure, sealing, and reinforcing methods call for their commonly available commercial widths. The widths common in the inch-pound system are not identical to the available SI replacement widths. The most frequent width conversions are as follows:

SI, mm	Inch-pound, in.
12	$1/2$
18	$3/4$
24	1
48	2
72	3

NOTE 2—The effect of this width difference on package performance is not significant.<sup>6</sup>

8.2 *Length*—The length of the rolls shall be 55 m [60 yd], as specified (see 5.1.2).

8.3 *Splices*—The tape shall consist of a single length of tape, except that any single roll may contain a maximum of one splice. The splices shall have a minimum overlap of 100 mm [4 in.] and shall not separate when the roll is unwound by hand or machine.

## 9. Workmanship, Finish, and Appearance

9.1 The tape shall be constructed uniformly and free of defects that impair its usefulness for the purposes intended (see 10.1). The adhesive coating shall be a uniform coating covering the entire side of the tape. The edges shall be clean, straight, and unbroken. The rolls shall be wound evenly. The finished product shall conform to the levels of quality established herein.

## 10. Significance and Use

10.1 The pressure-sensitive, filament-reinforced tapes covered by this specification are intended for use in closing and reinforcing fiberboard boxes and for bundling items for shipment.

<sup>6</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D10-1004.