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Draft Indian Standard

**PRESSURE SENSITIVE ADHESIVE (PSA) BASED PAPER TAPES FOR PACKAGING
— SPECIFICATION**

(ICS 83.180)

Plastics Sectional Committee,
PCD 12

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FOREWORD

(Formal clauses to be added later)

Adhesive paper tapes are manufactured by coating uniformly on one side of the paper with a water-soluble adhesive composition, water-based pressure sensitive adhesive, hot melt pressure sensitive adhesive. These are used for bonding and sealing corrugated and solid fibreboard containers, paper boxes, paper cartons, small packages, and secondary packaging.

This standard is intended to improve and bring current practices of PSA based self-adhesive tapes. This standard covers all types of PSA based paper tapes used in the packaging industry.

During the preparation of this standard, considerable assistance has been derived from 'IS 4185 : 1989 Adhesive paper tapes — Specification (*first revision*)'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard prescribes the requirement and the method of sampling and test for pressure sensitive adhesive (PSA) paper tapes for packaging.

2 REFERENCES

2.1 The Indian standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are

encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 3434 shall apply.

4 REQUIREMENTS

4.1 Description: The tape shall consist of a hard-sized kraft paper coated uniformly on one side with an adhesive and self-wound and the other side of the tape shall be either plain or printed and top coated with release coat.

4.2 Materials

4.2.1 Base Paper

The base paper shall consist of kraft paper (bleached or unbleached), hard-sized to resist adhesive penetration and flexible to ensure folding and conformity with the shape of the package. The base paper shall also conform to Grade 2 of IS 1397. Caution is to be exercised in selection of adhesive so that the tensile and tear strength of PSA based paper tapes shall continue to be in acceptable level in accordance with Table 1 when tested by the method described in 12.3 of IS 1060 (Part 1).

4.2.2 Adhesive

The adhesive shall be homogeneous and free from solid particles to give a smooth finish on application to the base paper. It shall not emit objectionable odour in either the dry or wet state and shall readily adhere to the base paper. The adhesive shall not contain any material which is known to be toxic as per CMR (Carcinogenic Mutagenic & Reprotoxic chemicals) requirements. It should be specially formulated to give high tack and strong bonding to the substrate.

4.2.3 Printing Ink

Printing of the tape on the outer side shall be done based on requirement to display information or to improve aesthetic look. The Inks can transfer on paper by Gravure/Flexo or other printing process. The printing shall be legible and shall give strong bonding to the surface and shall not transfer or bleed into adhesive surface. It shall not emit objectionable odour in either the dry or wet state and shall readily adhere to the base paper. It shall not contain any material which is known to be toxic as per CMR (Carcinogenic Mutagenic & Reprotoxic chemicals) requirements.

4.2.4 Release Coat

The release coat shall be homogeneous and free from solid particles to give a smooth finish on application to the other side of base paper. It should not affect the property of the adhesive and printed surface. It shall not emit objectionable odour in either the dry or wet state, shall have good anchorage to the base paper and printed surface. The release coat shall not contain any material which is known to be toxic as per CMR (Carcinogenic Mutagenic & Reprotoxic chemicals) requirements.

4.3 Dimensional Requirements

4.3.1 Self-adhesive and water activated paper tapes are available in a wide range of widths and strengths and a tape shall be chosen according to the size and mass of the package to be sealed. Table 1 gives a guide to this selection and also indicates the grams per square meter of adhesive coating appropriate to the particular type of package and tape.

Table-1
(Clause 4.2.1 and 4.3)
Typical examples of applications of paper tapes

Sl No.	Types of packages	Machine Direction Breaking Strength Kg per inch, Width, Minimum	Mass Per Unit Area Coating of the Adhesive g/m ² , Minimum	Tape Width Mm, Minimum	Cross Direction Tear Strength mN, Minimum
(1)	(2)	(3)	(4)	(5)	(6)
i)	Large heavy wrapped bales	18	40	72	840
ii)	Fibreboard cases	14	30	48	700
iii)	Paper boxes and cartons	14	30	48	700
iv)	Small packages	11	30	24	600

4.3.2 The tape shall be evenly and firmly wound on a cylindrical core having an inside diameter of not less than 76 mm and outside diameter not less than 82 mm. The cylindrical core shall be rigid enough not to collapse under ordinary conditions of transportation and usage. On unwinding a roll of a paper tape, adjacent layers shall show no signs of adhering to each other. The adhesive side of the tape shall face the core unless specified otherwise by the purchaser. The edges of the roll shall be neatly cut and the tape on each roll shall be one continuous strip or shall be suitably joined at not more than one joint in 50 m length roll.

4.3.3 Unless specified otherwise by the purchaser, the tape shall be supplied in nominal width of 24, 48, 72 or 100 mm and length of 50 m to 100 m. A tolerance of ± 2 percent shall be allowed on the nominal length of the tape.

4.4 The product shall also conform to the requirements given in Table 2.

Table 2
(Clause 4.4)
Requirements of paper tapes

Sl No.	Parameters		Required Values			Test Method
i.	Types of Paper (GSM), <i>Min</i>		60	70	80	Annex B
ii.	Total Tape Thickness, mm, <i>Min</i>		0.09	0.1	0.12	3 of IS 7809 (Part 2)
iii.	Peel adhesion, to metal, gm/25mm, <i>Min</i>		3000	3000	3000	5 of IS 8402
iv.	Breaking Strength, Kg/25mm, <i>Min</i>		11	14	18	6 of IS 8402
v.	Elongation percentage, <i>Min</i>		5	5	5	6 of IS 8402
vi.	Tear Index, <i>Min</i>	a) MD, mNm ² /g	8	8.0	8.	IS 1060 (Part 6/Sec 1)
		b) CD, mNm ² /g	10	10	10	IS 1060 (Part 6/Sec 1)
vii.	Tear Strength	a) MD, mN	480	560	680	IS 1060 (Part 6/Sec 1)
		b) CD, mN	600	700	840	IS 1060 (Part 6/Sec 1)
viii.	Shear strength, hrs, <i>Min</i>		24	24	24	ISO 13445
ix.	Adhesion to Self, gm/25mm, <i>Min</i>		1000	1000	1000	13 of IS 8402
x.	Adhesion of slam label to the paper tape, gm/25mm, <i>Min</i>		350	350	350	Annex C
xi.	Bursting Strength, kPa, <i>Min</i>		300	350	400	IS 1060 (Part 6/Sec 2)
xii.	Loop Tack, gm/25mm, <i>Min</i>		1500	1500	1500	Annex D
xiii.	Drop Box Test, mm, <i>Min</i>		1000	1000	1000	IS 7028 (Part 4)

5 APPLICATION, USE AND STORAGE

5.1 The self-adhesive paper tape can be applied manually and using automatic machines with sufficient amount of pressure. The method of applying paper tape and the amounts required for the securing of fibre board cases and cartons is shown in Fig. 1 ('U' Seal) and Fig. 2 ('H' Seal) which

emphasize the small quantity necessary for sealing. Any excess sealing such as passing the tape around the case may not serve any useful purpose.

5.2 Self-adhesive tapes are to be kept in the original waterproof wrappers stored in cool and dry place away from direct sun light.

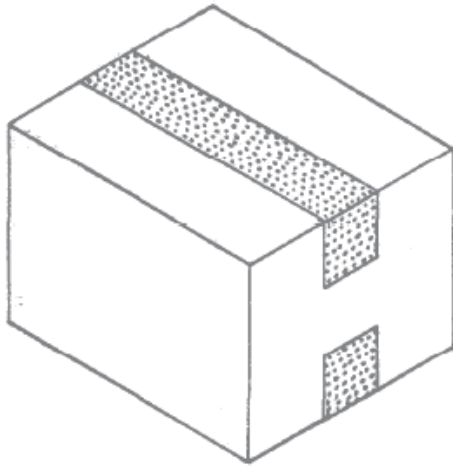


FIG. 1 'U' SEAL

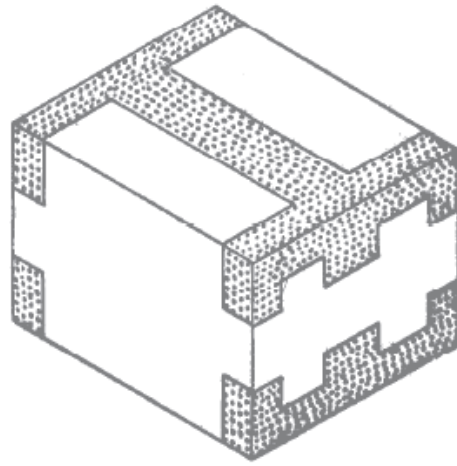


FIG 2. 'H' SEAL

6 PACKING AND MARKING

6.1 Packing

Unless specified otherwise, the paper tape rolls shall be packed in waterproof wrappers. These rolls shall be packed in suitable containers so that they are adequately protected from damage in transportation and from deterioration due to climatic conditions.

6.2 Marking

Each roll and container shall be marked legibly with the following information:

- a) Name of the product;
- b) Indication of the source of manufacturer;
- c) Length and width of the paper tape;
- d) Month and year of manufacture;
- e) Shelf-life validity of the product;
- f) Batch of manufacture;
- g) Number of rolls in container; and
- h) Directions for storage and use, if necessary.

7 SAMPLING

7.1 Lot

The number of rolls of paper tapes made from the same backing material and one lot of adhesives and manufactured under the same conditions shall constitute a lot.

7.2 The conformity of the lot to the requirements of this standard shall be determined on the basis of *tests carried out on the samples* selected from the lot.

7.3 Unless agreed to otherwise between the purchaser and the supplier, the number of rolls to be selected from the lot shall be in accordance with col 2 of Table 3. The rolls shall be selected from at least 10 percent of the containers. An equal number of rolls, as far as possible, shall be drawn from each container.

Table 3 Sample Size and Criteria for Conformity
(clause 7.3)

No. of rolls in the lot (1)	No. of Rolls to be selected (2)	Permissible No. of Defective Rolls (3)	Sub-Sample size (4)
Up to 150	8	0	2
151 “ 300	13	1	3
301 “ 500	20	2	4
501 “ 1000	32	3	5
1001 “ 3000	50	5	6
3001 “ 10000	80	7	7
10001 and above	125	10	8

7.3.1 The selection of containers as well as the selection of rolls shall be done at random. For this purpose, random number tables shall be used.

7.4 All test (refer Table 2) are to be carried for sub samples (refer col 4 of Table 3) and the number of rolls specified as per Table 3 shall constitute the sample. Three test specimens shall be taken from each of the rolls in the sub sample (refer col 4 of Table 3)

7.4.1 Remove any damaged layer of paper tape from the outside of the rolls; then discard, in all cases, at least three undamaged layers. Cut a length of undamaged paper tape long enough to carry out the tests.

7.5 Criteria for Conformity

The lot shall be considered to be in conformity with the requirements of this standard if the following conditions are satisfied:

- a) Each of the three test specimens (*see 7.3 and 7.4*) tested for all the tests shall satisfy the relevant requirements of this standard

ANNEX A
(Clause 2)
REFERENCES

<i>Indian / International Standards</i>	<i>Title</i>
IS 196 : 1966	Atmospheric conditions for testing
IS 1060 (Part 1) : 2022	Methods of sampling and test for paper and allied products Part 1: Test methods for general purpose (<i>second revision</i>)
IS 1060 (Part 6) : 2014	Methods of sampling and test for paper and allied products Part 6: Methods of test for paper Section 2 Determination of bursting strength of paper
IS 1397 : 2020	Kraft Paper for packing and wrapping — Specification (<i>third revision</i>)
IS 1398 : 1982	Specification for Packing paper, waterproof, bitumen laminated (<i>second revision</i>)
IS 2508 : 2016	Polyethylene Films and sheets — Specification (<i>third revision</i>)
IS 3073 : 1967	Assessment of surface roughness
IS 4185 : 1989	Adhesive Paper tapes – Specification (<i>first revision</i>)
IS 6911 : 1992	Stainless steel plate, sheet and strip standard
IS 7028 (Part 4) : 1987	Performance tests for complete, filled transport packages Part 4: Vertical impact drop test
IS 7028 (Part 7) : 2002	Performance Tests for Complete, Filled Transport Packages Part 7: Low Pressure Test.
IS 7030 : 1988	Identification of parts for complete, filled transport packages when testing
IS 7031 : 2022	Method of conditioning for testing of complete, filled transport packages
IS 7809 (Part 2) : 1977	Specification for pressure sensitive adhesive tapes for electrical purpose Part 2 : Methods of test
IS 8402 : 1987	Methods of sampling and Test for pressure sensitive adhesive tapes (<i>first revision</i>)
ISO 13445 : 2003	Adhesives — Determination of shear strength of adhesive bonds between rigid substrates by the block-shear method

ANNEX B
[Table 2, Sl No. i]
GRAMS PER SQUARE METER (GSM)

B-1 GENERAL

Select 10 sheets at random and cut from each sheet a test piece of size 25 × 25cm. Weigh the sheets individually and calculate the substance of each test piece. Report both the individual values and the mean.

B-2 APPARATUS

B-2.1 A balance sensitive to 0.25 percent of the load applied and so graduated that reading of this degree of accuracy may be made.

B-2.1.1 A suitably calibrated sheet-weighing balance, designed to indicate the weight of the sheet directly when only one sheet of the paper of the given size is weighed on it, may be used.

B-3 PROCEDURE

Carry out the determination on sheets selected at random. Take a test piece of size 25 × 25 cm from each sheet. Measure the sides correct to 0.5 percent for each dimension. Determine the area of the test piece, correct to the nearest 0.25 percent of the area. Weigh the test piece correct to 3 significant figures. Conduct the determination on all the test pieces.

NOTE — The use of a template of equivalent accuracy is permitted.

B-4 CALCULATION

$$\text{Substance in g/m}^2 = 10000 \times \frac{m}{axb}$$

where,

m = mass in g of the test piece,
 a = length in cm of the test piece, and
 b = width in cm of the test piece.

B-5 REPORT

Report the individual test results and mean result.

ANNEX C

[Table 1, Sl No. x]

ADHESION OF SLAM LABEL TO THE PAPER TAPE

C-1 OUTLINE OF THE METHOD

Adhesion of slam label is determined by finding the force required to peel a strip of slam label from the top surface of the tape at a specified angle and speed.

C-2 PROCEDURE

C-2.1 Application of test specimen: Prepare the steel plate and apply the paper tape test specimen. Turn the free ends over on to the back of the plate, removing the surplus. Apply the slam label test specimen to the backing of the paper tape - Apply at least 25 cm of the test specimen without

stretching, adhesive side down, to the tape backing so that the tape lies centrally on the plate and parallel to the longer side leaving the remainder of the test specimen extending beyond the steel plate sufficient to be accommodated in the testing equipment. Precautions shall be taken so that no air bubbles are trapped between the tape and the plate.

NOTE – In the case of tapes less than 3 cm wide, cut other strips from the same sample roll and apply them parallel and adjacent to the test specimen to provide a total width of 3 cm for rolling purposes only.

C-2.2 Place the roller centrally across the test specimen at one end of the plate and pass the roller once in each direction at constant speed of approximately 30 cm/min, ensuring that no additional pressure on the roller is applied during the process. Allow the steel plate with the test specimen to remain undisturbed for 10 ± 0.5 minutes at a temperature of $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity.

C-2.3 Fold the free end of the test specimen at an angle of 180° and peel off 3 cm from the steel plate leaving at least 22 cm in contact with the steel plate. Clamp this exposed end of the plate in the lower Jaw (while using a vertical pendulum or spring balance type machine), or attach the whole plate to the moving carriage (if the testing machine is of the horizontal type). Attach the free end of the tape to the head of the tension measuring device and disengage the pawls, if any. Start the tensile testing machine and take readings at 2 cm intervals when the tape is pulled from the steel plate, disregarding the pulling of first 5 cm and last 3 cm. The mean of five readings shall give the results for individual test specimens, that is, the load required to cause the separation of the tape from the paper tape backing plate. If the specimen breaks during the test, repeat the test on another specimen cut from the same roll.

C-3 CALCULATION AND REPORTING

Calculate the load required to cause the separation of the tape from the paper tape backing in terms of kg/cm width. If the variation of any of the five results exceeds ± 10 percent of the mean of the five results, all of them shall be discarded and a further set of five test Specimens shall be tested. The mean of the fresh five values obtained shall be reported as adhesion Strength to the metal.

ANNEX D [Table 1, SI No. xii] **LOOP TACK**

D-1 GENERAL

D-1.1 These test methods are designed to assess the tack properties of pressure-sensitive adhesives. They are specifically applicable to adhesives that swiftly form a bond of measurable strength upon contact with another surface. Tack force is quantified as the force needed to separate the adhesive from the adherend at the interface shortly after contact, under a load equivalent to the weight of the pressure-sensitive articles (such as tape, labels, stickers, etc.) on a one square inch contact area.

D-1.2 The following test methods are covered in this annexure:

Test method A (using tensile tester)

Test method B (using loop tack tester)

D-2 SUMMARY OF TEST METHODS

D-2.1 These procedures involves bringing a loop of pressure-sensitive adhesive, along with its backing, into controlled contact with a 24 mm × 24 mm (1 sq. in.) stainless steel surface, applying only the weight of the pressure-sensitive article itself. Subsequently, the pressure-sensitive article is detached from the substrate, and the force required for removal is measured using a recording instrument.

D-2.2 *Test Method A (using a tensile tester)* is applicable when measuring loop tack and involves employing a loop made from a 175 mm specimen strip.

D-2.3 *Test Method B (using a loop tack tester)* is applicable when measuring loop tack and involves employing a loop made from a 125 mm (5 in.) specimen strip.

D-3 SIGNFICANCE AND USE

D-3.1 These test methods provides a quantifiable assessment of the tack property exhibited by pressure-sensitive adhesives. They are specifically formulated to measure the adhesive mass's tack property, recognizing that the tackiness of an adhesive can vary based on the backing material used (typically, stiffer backings yield higher tack values). These test methods are suitable for quality control, quality assurance and research purposes.

D-3.2 Test Method A (using a tensile tester) utilizes a 175mm (7 in.) specimen strip and Test Method B (using a loop tack tester) makes use of a specimen strip 125mm (5in.) in length. That is the only specimen strip that fits properly in the loop tack tester.

D-3.3 When the adhesive isn't pre-applied onto a backing, these methods necessitate the utilization of a clear nominal 50 micron (2 mil) PET film backing for specimen preparation. It's crucial to note that using alternative backing materials can alter the specimen's performance.

D-3.7 For double-coated products, laminate a piece of nominal 50 micron (2 mil) PET onto the untested side. Similarly, for unsupported products, laminate a piece of nominal 50 microns (2 mil) PET onto the non-liner side.

D-4 TEST METHOD A (USING TENSILE TESTER)

D-4.1 Apparatus

D-4.1.1 *Tensile tester*— A constant rate of extension type.

D-4.1.2 *Test fixture* — To be mounted into the jaws of the tensile tester. A panel held by the test fixture allows for a 625 mm² (1sq in.) contact area of the pressure sensitive adhesive article. Alternately, the test fixture may include a raised area that allows a 625sq. mm (1 sq. In.) contact area of the pressure sensitive article.

D-4.1.3 Apparatus for cutting

D-4.1.3.1 Die Cutter — A 25 mm × 175mm rectangular mallet-type die cutter with mallet, or use a clicking press cutter with corresponding die of equivalent dimension, for sample preparation.

D-4.1.3.2 If a fixed dimension die is unavailable, substitute a 25 mm steel bar with a double razor knife or other apparatus suitable for cutting the specimen into the specified dimensions to prepare the 24 mm wide specimen strips.

D-4.1.4 Absorbent lint-free cleaning wipes — Material produced from entirely virgin raw materials and containing less than 0.25 percent by weight of solvent-leachable materials.

D-4.1.5 Masking tape — 25 mm wide.

D-4.1.6 50 micron (2mil) polyester (PET) — To be used as support medium in evaluating unsupported adhesives such as transfer tapes, laminating adhesive, or other film free adhesives.

D-4.2 Reagent

Appropriate reagents include acetone, methyl ethyl ketone, di-acetone alcohol, n-heptane and toluene, reagent or analytical grade, or an ethanol cleaner for water based adhesives.

D-4.3 Sample Preparation

D-4.3.1 Cut the sample into 25 mm × 175 mm specimen strips aligned with the machine direction of the pressure-sensitive article. Deviating from these dimensions may yield altered results. Cut at least three specimen strips for each adhesive intended for testing.

D-4.3.2 Condition the specimens to be tested for a minimum of 24 hours maintaining a temperature of 27 ± 2 °C and a relative humidity of 65 ± 5 percent, prior to the test.

D-4.4 Procedure

D-4.4.1 Ensure the tensile tester is calibrated according to instructions supplied by the manufacturer.

D-4.4.2 Set instrument crosshead speed at 300 mm per minute.

D-4.4.3 Place the test fixture in the lower grip of the tensile tester. It is important that the test fixture be level and straight in the lower grip. Set gaps for the crosshead using the minimum and maximum gap setting on the extension cycle. Set gaps 25 mm ± 1 mm (critical) and 100 mm ± 3 mm (optional) from the bottom of the upper grips to the face of the stainless steel portion of the test fixture when the test fixture is locked in the lower grips. Set the chart recorder speed for 50 mm per minute. Set the chart recorder load scale to 90 N full scale.

D-4.4.4 Clean the stainless steel panel thoroughly, removing any residue using an appropriate reagent as specified in section **D-4.2**. Use a fresh piece of cleaning wipe for each cleaning session. Repeat this process for a total of three washes after the test panel appears clean. Allow two minutes to pass after cleaning to ensure complete evaporation of the cleaning solvent. It is the user's responsibility to ensure that the cleaning method employed effectively removes all residue from the old test fixture.

D-4.4.5 Completely remove the release liner (the pressure sensitive article normally includes a release liner) from the specimen.

D-4.4.6 Bend the specimen entirely back on itself, ensuring to avoid creating any creases. The specimen takes on a teardrop-shaped loop configuration, with the adhesive surface facing outward.

D-4.4.7 Secure the ends of the loop together using a strip of masking tape, measuring 25 mm (1 inch) in width. This masking tape shall cover the loop ends to prevent any contamination of the grips on the tensile tester.

D-4.4.8 Insert the taped end of the specimen loop into the upper grips, ensuring that the bottom edge of the masking tape aligns evenly with the bottom edges of the grips.

D-4.4.9 Begin by activating the tensile tester, causing the crosshead to descend. Ensure that the mid-section of the specimen loop makes contact with the center of the stainless steel portion of the test fixture. As the crosshead reaches its lowest point, it will promptly reverse direction and ascend. At this minimum position, the specimen loop shall entirely cover the 645 sq. mm (1 sq. in.) area of the stainless steel portion of the test fixture, with no excessive overhang of the edges.

NOTE — If tensile tester does not have automatic cycling, cycling must be done manually.

D-4.4.10 Record the maximum force required to detach the specimen loop from the stainless steel portion of the test fixture, along with noting the mode of failure.

D-4.4.11 Record the failure mode as adhesive failure, cohesive failure or adhesive transfer.

D-4.4.12 Repeat this procedure at least two more times for each adhesive being tested, ensuring a minimum of three replicates. Use a new specimen strip for each test iteration.

D-4.4.13 Upon completion of testing, clean the stainless steel portion of the test fixture using an approved reagent. When not in use, protect the surface from scratches by covering it with surface protective tape.

D-5 TEST METHOD B (USING LOOP TACK TESTER)

D-5.1 Apparatus

D-5.1.1 *Loop tack tester*

D-5.1.2 *Stainless steel test panel* — 25 mm × 150 mm, stainless steel

D-5.1.3 Apparatus for cutting

D-5.1.3.1 Die cutter — A 25 mm × 125 mm rectangular mallet-type die cutter with mallet for sample preparation.

D-5.1.3.2 If a fixed dimension die is not accessible, you can replace it with a 25 mm steel bar along with a double razor knife or any other appropriate tool capable of cutting the specimen into the required dimensions for preparing the 25 mm wide specimen strips.

D-5.1.4 Absorbent lint-free cleaning wipes— Materials produced from entirely virgin raw materials and containing less than 0.25 percent by weight of solvent-leachable materials.

D-5.1.5 Masking tape — 12.5 mm wide.

D-5.1.8 A nominal 50 micron (2mil) PET film — To be used as support medium in evaluating unsupported adhesives such as transfer tapes, laminating adhesives, or other free film adhesives.

D-5.2 Reagents

Suitable reagents encompass acetone, methyl ethyl ketone, di-acetone alcohol, n-heptane, and toluene, all of reagent or analytical grade. Alternatively, an ethanol cleaner can be utilized for water-based adhesives.

D-5.3 SAMPLE PREPARATION

D-5.3.1 Slice the sample into 25 mm × 125 mm specimen strips along the machine direction of the pressure-sensitive articles. Using strips of different lengths may alter results and will not properly fit into the loop tack tester. Ensure to cut at least three specimen strips for each adhesive undergoing testing.

NOTE — For transfer or unsupported adhesives slated for testing, these must first be laminated onto a nominal 50-micron PET film, serving as an adhesive support, before proceeding to cut the samples into the 25 mm × 125 mm specimen strips.

D-5.3.2 Prior to conducting the test, condition the specimens to be tested in the testing room for at least 24 h at 27 ± 2 °C and a relative humidity of 65 ± 5 percent.

D-5.4 PROCEDURE

D-5.4.1 Make sure that the loop tack tester is leveled.

D-5.4.2 Clean the stainless steel panel thoroughly, removing any residue using an appropriate reagent as specified in section **D-5.2**. Use a fresh piece of cleaning wipe for each cleaning session. Repeat this process for a total of three washes after the test panel appears clean. Allow two minutes to pass after cleaning to ensure complete evaporation of the cleaning solvent. It is the user's

responsibility to ensure that the cleaning method employed effectively removes all residue from the old test fixture.

D-5.4.3 Reinsert the test panel into its original position and tighten the four clamp screws securely.

D-5.4.4 Remove the release liner entirely from the specimen, ensuring complete separation from the pressure-sensitive article.

D-5.4.5 Bend the specimen completely back on itself, taking care to avoid creasing. The specimen shall form a teardrop-shaped loop with the adhesive surface facing outward.

D-5.4.6 Secure the ends of the specimen loop together using a strip of masking tape measuring 12 mm in width.

D-5.4.7 Insert the specimen loop into the specimen jaw until it makes contact with the guide pins near the center of the jaws. This insertion method ensures proper positioning of the specimen. Confirm that the grips are in their uppermost position.

D-5.4.8 Calibrate the force gauge to zero following the instructions provided by the manufacturer.

D-5.4.9 Activate the loop tack tester. The upper assembly will complete one full cycle and automatically shut off when the force gauge again reaches its starting position.

D-5.4.9.1 This cycle initiates with the upper assembly descending, bringing the specimen loop into contact with the test surface, establishing a bond.

D-5.4.9.2 Subsequently, the assembly ascends, and the force gauge measures the force required to break the bond.

D-5.4.9.3 The cycle concludes as the assembly returns to its initial starting position.

D-5.4.10 Record the maximum force necessary to detach the specimen loop from the stainless steel panel, along with documenting the mode of failure.

D-5.4.10.1 Record the failure mode as adhesive failure, cohesive failure, or adhesive transfer.

D-5.4.11 Repeat the procedure at least two more times for each adhesive undergoing testing, ensuring a minimum of three replicates. Utilize a fresh specimen strip for each test iteration.

D-5.4.12 Once testing is finished, clean the stainless steel panel using an approved reagent from section **D-5.2**. When not in use, cover the surface with protective tape to prevent scratches.

D-6 CALCULATION

10.8.1 Calculate the average peak reading in Newton/10mm using at least three specimens for each adhesive.

D-7 REPORT

Report the following:

D-7.1 Test method (A or B)

D-7.2 Identification of the adhesive.

D-7.3 Reagents(s) and methods used for cleaning the stainless steel portion of the test fixture.

D-7.4 Conditioning times for prepared specimens.

D-7.5 Adhesive type and coating thickness in mm.

D-7.6 Backing material used for the adhesive.

D-7.7 Release liner used, if any.

D-7.8 Temperature and humidity conditions.

D-7.9 Average peak reading in Newton/10mm.

D-7.10 Visuals failure mode as adhesive failure, cohesive failure or adhesive transfer.

D-7.11 Length of the specimen strip in mm (in.)