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Draft Indian Standard

**GENERAL PURPOSE PRESSURE SENSITIVE ADHESIVE CLOTH TAPES —
SPECIFICATION**
(Third Revision of IS 3687)

(ICS 29.035.20)

Plastics Sectional Committee,
PCD 12

Last date for Comments:
13 April 2024

FOREWORD

(Formal clause will be added later)

This Indian Standard was originally published in 1966 and subsequently revised in 1977 and 1987. In first revision requirements for durability and keeping quality were incorporated. In second revision, requirements like pH, chloride content and sulphate content have been deleted as these were considered redundant and a modified durability test was incorporated. This revision (third) has been undertaken to incorporate varieties of cloth tapes used in the industry as on date, e.g. Double sided cloth tape, cotton-polyester blend cloth tapes. The specification of fabrics used in cloth tapes has been incorporated. The title and scope of the product has been modified to incorporate general purpose.

Some of the common uses of pressure sensitive cloth tapes are for packing heavy articles, such as pipe-lines, fittings, neon tubes, and cables so as to protect heavy polished surfaces against scratches and abrasion. They are also used for sealing bags, cans, cartons and other heavy duty containers to protect them from moisture.

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 related in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for general purpose pressure sensitive adhesive cloth tapes.

1.2 This standard excludes adhesive insulating cloth tapes used for electrical purposes and laminated cloth tapes.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute

the provisions of this 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 editions of the standards listed below:

<i>IS No.</i>	<i>Title</i>
IS 3073 : 1967	Assessment of Surface Roughness
IS 3434 : 1984	Glossary of terms for adhesives and pressure sensitive adhesive tapes (<i>first revision</i>)
IS 6911 : 2017	Stainless Steel Plate, Sheet and Strip — Specification (<i>second revision</i>)
IS 8402 : 1987	Methods of sampling and test for pressure sensitive adhesive tapes (<i>first revision</i>)

3 TERMINOLOGY

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

4 TYPES

4.1 There shall be three types of cloth tapes as follows:

- a) *Type 1* — Untreated cloth tapes;
- b) *Type 2* — Waterproofed cloth tapes coated with polyvinyl chloride or its copolymer, nitrocellulose, polyethylene or any other suitable material on its outer side; and
- c) *Type 3* — Both sides adhesive cloth tapes

4.2 There shall be four types of fabric used in making cloth tapes as follows:

Table 1 Types of fabrics

SI No.	Type	Weight (gm/m ²)	Threads (warp x weft)	Count (warp x weft)	Thickness (micron)	Tensile Strength (Kg/cm ²)	Elongation, percent
1.	100 percent Pure Cotton semi bleached free from Starch	80,0	60 × 48	30 × 30	180	9.0	15
		110.0	60 × 56	20 × 30	225	10	15
2.	Cotton Polyester mix; 3.1) warp(MD) - cotton, 3.2) weft(CD) - polyester)	110.0	60 × 56	20 × 30	225	10	15

3.	Cotton Polyester blend yarn	110.0	65 × 56	20 × 30	225	10	30
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5 REQUIREMENTS

5.1 Description

5.1.1 The pressure sensitive adhesive cloth tape shall consist of good quality fabric (*see 4.2*), coated uniformly on one side or both sides with a suitable pressure sensitive adhesive composition, requiring no moisture, heat or other special preparation prior to application.

5.1.2 The rolls shall be wound uniformly and evenly so that each succeeding turn coincides with the one below it.

5.1.3 Each roll of tape shall be reasonably free from overlapping, depressions and distortion and shall unroll without off-setting of the adhesive mass or tearing of the cloth.

5.1.4 For both side adhesive cloth tape, suitable release liner (Paper/filmic) shall be added.

5.2 Colour

The colour of the tape shall be as agreed to between the purchaser and the supplier.

5.3 Materials

5.3.1 *Base Cloth*

The base cloth shall be of cotton (bleached or unbleached) or polyester blend, flexible to ensure folding and conformity with the shape of the package (*see 4.2*).

5.3.2 *Adhesive*

The adhesive shall be homogeneous and free from solid particles to give a smooth finish on application to the base cloth. It shall emit no objectionable odour in either the dry or wet state, shall readily adhere to the base cloth. The adhesive shall not contain any heavy metals. It shall give high tack and strong bonding to the substrate.

5.3.3 *Printing*

Printing of the tape on the outer side shall be done based on requirement to display information or to improve aesthetic look. The printing shall be legible & shall give strong bonding to the substrate so that it does not transfer to the adhesive of the adjacent turn. It shall emit no objectionable odour in either the dry or wet state and shall readily adhere to the base paper. It shall not contain any heavy metals.

5.4 Dimensional Requirements

5.4.1 Width

Cloth tapes are available in a wide range of widths and the width of the tape shall be as agreed to between the purchaser and the supplier and none of the five observations for width measured suitably shall fall outside the tolerance given below. The width shall be determined by taking five determinations at random in a length of not less than one metre of tape from each sample roll:

Table 2 Specification based on width

Nominal Width (mm)	Tolerance (mm)
Up to 50	±1.0
Over 50	±1.5

5.4.2 Length

The length of the roll shall be as agreed to between the purchaser and the supplier and shall not vary by more than one percent from the specified length, when determined by unrolling the roll on a suitable winding machine fitted with a length metre capable of measuring to 0.1 metre.

5.5 Cores

All tapes shall be wound on cores of internal diameter 75.0 ± 1.5 mm, or as agreed to between the purchaser and the supplier and shall have sufficient rigidity to prevent the distortion of the roll under normal conditions of transportation and use.

5.6 Splices

A roll of tape shall not have more than one splice per 20 metres. The splices shall be so made as not to separate when unwound from the rolls.

5.7 Adhesion to Metal and Self

The adhesion to metal and self shall be as given below:

	Requirement	Test method
Single side adhesive cloth tape, N/10 mm, <i>Min</i>	2	5 and 13 of IS 8402
Double side adhesive cloth tape, N/10 mm, <i>Min</i>	4	Annex A

5.8 Stability

The tape shall part neatly from the under layer and shall show no evidence of deterioration in the adhesive or backing so as to make the tape unfit for use when aged as prescribed in 14 of IS 8402. The adhesion to metal and self of the tape shall not decrease by more than 12 percent when determined by the method prescribed in 5 and 13 of IS 8402 respectively.

5.9 Breaking Strength

The breaking strength of the tape shall be not less than 90 N per 10 mm width when determined by the method as prescribed in **6** of IS 8402.

5.10 Anchorage

The adhesive mass shall not come off from the cloth when tested as prescribed in **7** of IS 8402.

5.11 Durability Test — The tape shall pass the test when tested according to the method prescribed in **12** of IS 8402.

5.12 Keeping Quality

The rolls when stored on their cut edges in original unopened containers at $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity shall continue to comply with the requirements prescribed in **5** for a minimum period of one year from the date of manufacture.

Table 2 Minimum Requirements

TEST	UNIT	TEST METHOD	Type 1	Type 2	Type 3
Adhesion to Steel (Closed Side)	N/cm	IS 8402	2	2	4
Adhesion to Steel (Open Side)	N/cm	IS 8402	-	-	4
Thickness	mm	IS 8402	0.27	0.27	0.28
Breaking Strength	N/cm	IS 8402	90	90	90
Elongation	percent	IS 8402	15	15	15

5.12 Additional Requirement for Type 2 Tapes

5.12.1 Adhesion After Immersion in Water — The adhesion to metal shall be not less than as given in **5.7** when immersed in water and tested as prescribed in **10** of IS 8402.

5.12.2 Water Vapour Permeability — The tape shall have water vapour permeability of not more than 200 g/m^2 when tested as prescribed in **11** of IS 8402.

6 PACKING AND MARKING

6.1 Packing

The rolls shall be packed in suitable containers so that these are adequately protected from damage in transportation and from deterioration due to climatic conditions. They shall not adhere to each other or to the container.

6.2 Marking

6.2.1 Each container shall be marked legibly with the following information:

- a) Name and type of the material;
- b) Manufacturer's name and recognized trademark, if any;
- c) Month and year of manufacture;
- d) Length and width of the tape;
- e) Batch number of manufacture, when required; and
- f) Number of rolls in container,
- g) Shelf-life validity of the product;
- h) Directions for storage and use, if necessary.

6.2.2 BIS Certification Marking

Each roll may also be marked with the Standard Mark.

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

7 SAMPLING

7.1 The scale for sampling of the material shall be as prescribed in **3** of IS 8402.

7.2 Number of Tests

Tests for all the requirements as given in **5** shall be conducted on the composite sample.

7.3 Criteria for Conformity

The lot shall be declared as conforming to the specification if the composite sample satisfies all the requirements given in **5**.

ANNEX A *(Clause 5.7)*

DETERMINATION OF ADHESION STRENGTH TO METAL OF DOUBLE COATED TAPE

A-1 OUTLINE OF THE METHOD

Adhesion strength is determined by finding the force required to peel a strip of tape from a standard test panel at a specified angle and speed.

A-2 APPARATUS

A-2.1 Tensile Testing Machine

A pendulum or spring balance type tensile testing machine, with a uniform rate of travel of 30 cm/min of the moving head or carriage, and a scale graduated to 0.05 kg or less.

A-2.2 Stainless Steel Plates

Rectangular, 10 × 30 cm polished stainless steel plates (*see* Grade X07Cr18Ni9 of IS 6911).

A-2.2.1 The stainless steel plates shall be finished in the lengthwise direction to a surface roughness not greater than 80 µm (*see* IS 3073).

A-2.2.2 The stainless steel plates shall also be marked boldly or etched at intervals of 2 cm along both the longitudinal edges.

A-2.2.3 A steel roller of 80 ± 2 mm diameter and 50 ± 1 mm in width covered with rubber approximately 6 mm thick having hardness of 80 ± 5 IRHD. The mass of the roller which applies pressure to that specimen shall be 2.05 ± 0.05 kg. It shall be so constructed that the mass of the handle is not added to the mass of the roller during use (*see* Fig. 1 of IS 8402).

A-3 PREPARATION OF TEST SPECIMENS

Conditioning the rolls as specified in 4.1 and take all precautions as specified in 4.2 to 4.4 of IS 8402 for taking the test specimen. Test specimens shall be 0.5 to 3 cm in width and not less than 50 cm in length. If the width of tape is greater than 3 cm, then reduce it to 3 cm by cutting with a sharp blade.

A-4 PROCEDURE

A-4.1 Preparation of Steel Plate

Clean thoroughly the surface of the stainless steel plate with redistilled toluene using a clean piece of untreated tissue paper or cotton wool or cotton cloth for each cleaning. Suspend the plate in the toluene vapour bath for 5 min after the vapour line has reached the top of the plate, so that no liquid is in contact with the plate. Allow the plate to cool for approximately 30 min in an atmosphere maintained at a temperature of 27 ± 2 °C and 65 ± 5 percent relative humidity so that the plate attains a temperature of 27 ± 2 °C.

A-4.2 Application of Test Specimen

A-4.2.1 Face Side

Place the cleaned plate, test surface upwards, on the table. Apply at least 25 cm of the test specimen without stretching, adhesive side down, to the plate 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 then remove the liner and superimpose on the test strip a strip 0.025mm thick polyester film, as wide or slightly wider than that of the double coated tape.

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.

A-4.2.2 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 min at a temperature of 27 ± 2 °C and 65 ± 5 percent relative humidity.

A-4.3 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 steel plate. If the specimen breaks during the test, repeat the test on another specimen cut from the same roll.

A-4.4 Liner Side

A-4.4.1 Adhere the face side of the specimen to a strip of 0.025mm thick polyester film in the manner described in **A-2.4.2.2** so that the roller makes actual application of the tape to the film. Trim the film to be as wide as or slightly wider than the tape. Remove the liner

A-4.4.2 Continue in accordance with **A-4.2.1** through **A-4.3**

A-5 NUMBER OF TESTS

Carry out the determination on five test specimens taken from the same roll.

A-6 CALCULATION AND REPORTING

Calculate the load required to cause the separation of the tape from the steel plate 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.