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## DRAFT EAST AFRICAN STANDARD

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**Packaging ancillary materials — Specification — Part 2: Double-sided pressure sensitive adhesive tapes**

**EAST AFRICAN COMMUNITY**

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The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

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The committee responsible for this document is Technical Committee EASC/TC 066, *Packaging*.

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# Packaging ancillary materials — Specification — Part 2: Double-sided pressure sensitive adhesive tapes

## 1 Scope

This Draft East African Standard specifies the requirements, methods of sampling and test for double-sided pressure sensitive adhesive tapes used in packaging.

This standard does not apply to tapes with adhesives on one surface.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 29862, *Self adhesive tapes — Determination of peel adhesion properties*

ISO 29863, *Self adhesive tapes — Measurement of static shear adhesion*

ISO 11093-4, *Paper and board — Testing of cores — Part 4: Measurement of dimensions*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

## 3 Terms and definitions

### 3.1

#### **ancillary materials**

materials associated with packaging operations but are not intended to be part of the final product. These include but not limited to desiccants, staple pins, adhesives, pressure sensitive adhesive tapes, straps and packaging machinery

### 3.2

#### **adhesive**

substance capable of holding materials together by surface attachment

- 3.3 pressure sensitive adhesive tape**  
adhesive tape which in a dry state is permanently tacky at room temperature and adheres readily to surfaces upon application of pressure
- 3.4 open side(adhesive)**  
surface of the adhesive which is open which is exposed on normal unwinding or separation
- 3.5**  
blocking desired adhesion between touching layers of the material
- 3.6 carrier**  
base material on both surfaces of which a pressure sensitive adhesive is applied, to produce double sided tape
- 3.7 conditioning**  
process of subjecting material to specific temperature and relative humidity conditions for stipulated period of time
- 3.8 double sided tape**  
tape which has two available pressure adhesive coated surfaces
- 3.9 legging**  
occurrence on separation of strings or filaments of adhesive between the adhesive layer and the substrate to which it has been applied or release liner
- 3.10 pre release**  
unwanted separation of a tape from its release liner during unwinding
- 3.11**  
release liner removable material which protects the adhesive face or faces
- 3.12 open side (release liner)**  
surface of a release liner which is exposed on normal unwinding or separation
- 3.13 closed side (release liner)**  
surface of a release liner which normally remains in contact with the adhesive on unwinding
- 3.14 substrate**  
surface to which the pressure sensitive tape is applied
- 3.15 tack**  
property of the pressure sensitive adhesive tape that causes a bond, with measurable separation force, the instant the adhesive tape touches the substrate and without external applied pressure
- 3.16 adhesion**  
state which to surfaces are held together by interfacial forces

**3.17****shear adhesion**

ability to resist forces applied in the same plane at a tape

**3.18****peel adhesion**

force required to peel a strip of tape from a substrate at specified angle and speed

**3.19****permanent (adhesive)**

adhesive that has been designed to remain permanently in a position under specified service conditions

**3.20****transfer tape**

tape having two available pressure sensitive adhesive surfaces without need for a carrier and which may or may not have reinforcing fibres

**3.21****roll length**

length of the tape forming a reel or roll

A thermoplastic adhesive softens on heating and reverts to its original state on cooling. Such an adhesive could have a poor temperature range dependent on the softening temperature of the adhesive.

A thermosetting adhesive softens on initial heating but becomes firmer after further heating and remains so on cooling. It does not soften appreciably on subsequent reheating,

NOTE Adhesion to any particular surface can be significantly influenced by the choice of adhesive in use. The type of adhesive used on a tape can significantly affect its adhesion properties particularly at elevated temperatures.

**4 Classification**

The tapes are classified by carrier (or base material), maximum service temperature of the substrate and the adhesive type.

**4.1 Classification based on the type of adhesives**

4.1.1 Typical pressure sensitive adhesives used in the manufacture of double-sided tapes shall include:

- a) natural or synthetic rubber-based adhesives;
- b) polyacrylate based adhesives; and
- c) silicone compound based adhesives.

**4.2 Classification based on the maximum service temperature of the substrate**

Based on the maximum service temperature of the substrate, tapes shall be classified as per 5.2.1.

**4.3 Classification based on the carrier or base material**

Typical base materials include but are not limited to the following as shown in Table 1.

NOTE The type of adhesive used on a tape can significantly affect its adhesion properties particularly at elevated temperatures.

Typical pressure sensitive adhesives employed in the manufacture of double sided tapes include:



- a) natural or synthetic rubber based adhesives;
- b) polyacrylate based adhesives; and
- c) silicone compound based adhesives.

Adhesion to any particular surface can be significantly influenced by the choice of adhesive in use.

Adhesives may be classified as either thermoplastic or thermosetting adhesives. A thermoplastic adhesive softens on heating and reverts to its original state on cooling. Such an adhesive could have a poor temperature range dependent on the softening temperature of the adhesive. A thermosetting adhesive softens on initial heating but becomes firmer after further heating and remains so on cooling. It does not soften appreciably on subsequent reheating,

The combinations available are considerable and advice on product suitability should be sought from the manufacturer.

## 5 Requirements

### 5.1 General requirements

#### 5.1.1 Workmanship

5.1.1.1 Double-sided pressure sensitive adhesive tape shall consist of a base film, coated uniformly on both sides with pressure sensitive adhesive composition, requiring no moisture, heat or other special preparation prior to application. When the tape is unrolled there shall be no tearing of the carrier and liner.

5.1.1.2 The double-sided pressure sensitive adhesive tape shall be free from defects that may affect its performance. The entire area of the two sides of the tape shall have a smooth, continuous and uniform coating of adhesive.

5.1.1.3 The edges of the roll shall be neatly cut and free from fluff.

#### 5.1.2 Splices

A roll of double-sided pressure sensitive adhesive tape shall not have more than one splice in 20 m and not more than 3 in a roll. The splices shall be so made so as not to separate when unwound from the roll.

#### 5.1.3 Base material (carrier)

Double-sided pressure sensitive adhesive tapes shall consist of base material that resists penetration of the adhesive and shall be flexible to ensure folding.

Typical base materials include but are not limited to the following as shown in Table 1:

**Table 1 — The base material for double sided pressure sensitive tapes**

S/N	Designation	Carrier
i.	Solid	Woven cloth
		Non-woven cloth
		Paper
		Unplasticized polyvinylchloride
		Polypropylene

S/N	Designation	Carrier
		Polyester
		Plasticized polyvinylchloride
ii.	Foamed	Neoprene
		Polyethylene
		Polyvinylchloride
		Polyester
		Polyurethane
		Acrylate
iii.	Transfer tapes	With or without reinforcing fibres

#### 5.1.4 Adhesive

**5.1.4.1** Adhesive used shall be homogeneous and free from solid particles so as to give a smooth finish on application to the base material.

**5.1.4.2** Adhesive shall emit no objectionable odour and shall not be toxic.

**5.1.4.3** Adhesive shall readily adhere to the base material and the tape shall adhere immediately and firmly to clean, dry surfaces without wrinkling, curling, breaking or lifting.

**5.1.4.4** Adhesive shall be such that on unwinding a roll of the tape, adjacent layers shall show no sign of adhering to each other.

#### 5.1.5 Release liner

The rolls of tape shall be wound with a release liner which shall be made of plain or embossed plastics material, or double sided release paper interleaved between each successive turn of tape on the reel. The release liner shall be easily and cleanly removed without tearing, delamination or transference of adhesive

### 5.2 Specific requirements

#### 5.2.1 Maximum service temperature

**5.2.1.1** When tested in accordance with ISO 29863 the maximum service temperature of the tape system is based on the shear adhesion test. The maximum service temperature cannot exceed the maximum service temperature of the carrier as listed in Annex A.

**5.2.1.2** When tested in accordance with ISO 29863, the tape shall support a minimum load of 0.25 kg for 4 h at 23 °C and from the maximum load held with a slippage of not more than 2.5 mm after 4 h at each of the six test temperatures, the tape shall be classified by the numerical code obtained using Table 2.

**Table 2 — classification**

S/N	Test load kg	Test temperature °C					
		23	60	90	120	150	180
i.	2.0	4	4	4	4	4	4
ii.	1.0	3	3	3	3	3	3

S/N	Test load kg	Test temperature °C					
		23	60	90	120	150	180
iii.	0.5	2	2	2	2	2	2
iv.	0.25	1	1	1	1	1	1

**5.2.1.3** The digit corresponding to the maximum load supported at each test temperature with not greater than 2.5 mm slippage after 4 h shall be written in increasing temperature sequence to produce classifications such as those below.

#### Example 1

444331 This tape will hold a minimum of 2.0 kg at 23, 60 and 90 °C. a minimum of 1.0 kg at 120 and 150°C and a minimum of 0.25 kg at 180 °C.

#### Example 2

44433 This tape will hold a minimum of 2.0 kg at 23, 60 and 90°C and a minimum of 1.0 kg at 120 and 150°C. The tape fails to hold 0.25 kg at 180 °C, hence there is no sixth digit.

#### Example 3

31 This tape will hold a minimum of 1.0 kg at 23°C and 0.25 kg at 60 °C. The tape fails at other temperatures and masses and hence is classified by only two digits.

#### Example 3

4 This tape will hold a minimum of 2.0 kg at 23°C but fails at other temperatures and masses. It is suitable for room temperature (or below) applications only.

Thus the higher the numerical classification (444444 max.) the better the overall shear adhesion of the tape at elevated temperatures.

## 5.2.2 Dimensions

### 5.2.2.1 Core diameter

The nominal internal diameters of the cores on which tape is wound shall be 26 mm or 38 mm or 76 mm when tested in accordance with ISO 11093

### 5.2.2.2 Tolerance on width

The tolerance on widths shall be  $\pm 1.0$  mm for widths up to and including 19 mm and  $\pm 1.5$  mm for widths greater than 19 mm.

NOTE The width of the tape should be measured on the roll by means of a steel rule or other suitable device, graduated in 0.5 mm divisions.

### 5.2.2.3 Roll length

The actual length of a roll shall be not less than the stated length.

#### 5.2.2.4 Thickness

- a) Solid and transfer tapes: The thickness of the tape, measured in accordance with B.2, shall be within  $\pm 15\%$  of the declared value.
- b) Foamed tapes: The thickness of the tape, measured in accordance with B.3, shall be within  $\pm 25\%$  of the declared value.

#### 5.2.2.5 Peel adhesion

When tested in accordance with ISO 29862, the minimum adhesion to steel of each side of a permanent tape shall not be less than 2N per 10mm width.

### 6 Packaging

Double-sided pressure sensitive adhesive tape shall be packed in materials that protect it from contamination and damage during handling, storage and transportation.

### 7 Marking

The core of each roll of double-sided pressure sensitive adhesive tape shall be marked on the inside or on the edge with the following information:

- a) manufacturer's name and/or trade mark;
- b) words, "double-sided pressure sensitive adhesive tape";
- c) ; length and width
- d) base material;
- e) best before date; and
- f) country of origin.

### 8 Labelling

Double-sided pressure sensitive adhesive tape package shall be legibly and indelibly labelled with the following information:

- a) manufacturer's name and/or trade mark;
- b) batch/code number;
- c) words, "Double -sided pressure sensitive adhesive tape";
- d) best before date;
- e) length and width of the single-sided pressure sensitive adhesive tapes; and
- f) country of origin.

## 9 Sampling

### 9.1 Lot

**9.1.1** In any consignment, the rolls of tape made from the same base material and one lot of adhesive and manufactured under the same conditions shall constitute a lot.

**9.1.2** The rolls shall be selected at random and in order to ensure the randomness of selection, a random number table shall be used. In case such a table is not available, the following procedure may be adopted: Starting from any roll, count them in one order as 1, 2, 3, up to  $r$  and so on, where  $r$  is the integral part  $N/n$  being the lot size and  $n$  the number of rolls to be selected. Every roll thus counted shall be withdrawn to give samples for test.

**9.1.3** The number of rolls to be selected from a lot shall depend upon the size of the lot and shall be in accordance with Table 2. Tests for determining the conformity of the lot to the requirements of this standard shall be done on each lot separately.

**Table 3 — Sampling criteria for double-sided pressure sensitive adhesive tapes**

Lot size $N$	Number of rolls to be selected $n$
Up to 100	2
101 to 500	5
501 to 1 000	7
1 001 and above	10

**Annex A**  
(informative)

**List of double sided pressure sensitive tapes**

Types of double sided pressure sensitive adhesive tapes classified by carrier and properties are given in table 2.

**Table 4 — List of double sided pressure sensitive adhesive tapes**

S/N	Designation	Carrier	Nominal tape thickness range in mm	Maximum service temperature of the carrier in °C
i.	Solid	Woven cloth	0.18 – 0.3	120
		Non-woven cloth	0.08 – 0.20	120
		Paper	0.10 – 0.40	120
		Unplasticized polyvinylchloride	0.08 – 0.18	60
		Polypropylene	0.08 – 0.18	90
		Polyester	0.07 – 0.35	150
		Plasticized polyvinylchloride	0.10 – 0.25	90
ii.	Foamed	Neoprene	0.5 – 2.5	120
		Polyethylene	0.4 – 3.0	120
		Polyvinylchloride	1.0 – 3.0	90
		Polyester	0.5 – 0.25	120
		Polyurethane	0.5 – 2.5	120
		Acrylate	0.4 – 2.0	150
iii.	Transfer tapes	With or without reinforcing fibres	0.02 – 0.25	180

## Annex B (normative)

### Determination of thickness

#### B.1 Principle

Measurement of a single thickness of a test piece is determined over a specified area and under a specified static load by means of a precision micrometre.

#### B.2 Solid and/or transfer tapes

##### B.2.1 Apparatus

**B.2.1.1** Dead weight or digital micrometre, capable of being read to 0.002 mm with two ground and lapped concentric circular faces, flat within 0.001 mm and parallel to within 0.003 mm. The upper face shall be  $7 \pm$  mm in diameter and the lower face shall be larger than the upper one. The upper face shall move on an axis central and perpendicular to the lower face. The pressure exerted by the upper face on the lower one shall be  $50 \pm 5$  kPa. The frame of the micrometre shall be of such rigidity that a mass of 1.5 kg applied to the dial housing, out of contact with either the dead weight or the pressure foot spindle, shall not produce a deflection greater than 0.03 mm in the micrometer dial. When checked with calibrated steel gauges, the measuring errors of the micrometer shall not exceed 0.005 mm.

##### B.2.2 Preconditioning

Condition the test pieces by freely suspending them in an atmosphere of  $23 \pm 2$  °C and  $50 \pm 5$  % r.h for at least 2 h immediately before testing them. Ensure that the test rig and masses are in equilibrium with the test conditions by placing them in the oven for at least 2 h.

##### B.2.3 Preparation of test pieces

###### B.2.3.1 General

Remove and discard the three outer turns before cutting the test pieces from the preconditioned sample roll.

###### B.2.3.2 Solid tapes

Cut five test pieces, each approximately 75 mm long from the sample roll at intervals of not less than 300 mm. Remove the release liner and dust both sides of the tape with talc to de-tackify the adhesive.

###### B.2.3.3 Non-reinforced or glass fibre reinforced transfer tapes.

Cut five test pieces as instructed in B.2.3.2 but do not remove the release liner. Dust the face side with talc taking care when removing the excess because the tape is only lightly bonded to the release liner.

NOTE 1 Non-reinforced or glass fibre reinforced transfer tapes are dimensionally unstable when the release liner is removed.

NOTE 2 Lamination of a secondary release liner to the exposed adhesive is liable to produce inconsistent results due to entrapped air or reduction of thickness under lamination pressure.

### B.2.4 Conditioning

Condition the test pieces as described in B.2.2.

### B.2.5 Procedure

Clean the faces of the micrometer before making a measurement. Place the test piece between the pressure faces and gently lower the moving pressure foot onto the surface of the tape. Take the reading within 2 s to the nearest 0.002 mm.

For transfer tapes, remove the test piece and clean the face of the pressure foot thoroughly to remove adhesive which may have transferred to it. Remove the release liner from the test piece and determine the thickness of the release liner. Subtract the thickness of the release liner from the total test piece thickness to give the tape thickness expressed to the nearest 0.002 mm.

### B.2.6 Results

Report the thickness as the median value of the five determinations.

## B.3 Foamed tapes

### B.3.1 Apparatus

**B.3.1.1 Micrometer**, as specified in B.2.1.1, except the pressure exerted by the upper face on the lower face shall not exceed 500 Pa.

**B.3.1.2 Polished flat stainless steel disc**, 50 mm in diameter and approximately 0.76 mm thick.

### B.3.2 Preconditioning

Condition the sample roll in accordance with B.2.2.

### B.3.3 Preparation of test pieces

Cut and prepare five test pieces as described in B.2.3.

### B.3.4 Conditioning

Condition the test pieces as described in B.2.2.

### B.3.5 Procedure

Thoroughly clean the metal disc and determine and record its thickness following the procedure described in B.2.5. Ensure that the faces of the micrometer are clean, place the test piece between the faces and carefully place the metal disc on the top surface of the test piece. Lower the pressure foot gently on to the metal disc and take the reading within 2 s to the nearest 0.002 mm.

### B.3.6 Results

Report the thickness as the median value of the five determinations less the thickness of the metal disc.



## Bibliography

BS 7116:1990, *Double sided pressure sensitive adhesive tapes*

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