

# INTERNATIONAL STANDARD

**IEC**  
**60454-2**

Third edition  
2007-06

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**Pressure-sensitive adhesive tapes  
for electrical purposes –**

**Part 2:  
Methods of test**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**PRESSURE-SENSITIVE ADHESIVE TAPES  
FOR ELECTRICAL PURPOSES –**
**Part 2: Methods of test**

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International Standard IEC 60454-2 has been prepared by IEC technical committee 15: Solid electrical insulating materials.

This third edition cancels and replaces the second edition published in 1994, and constitutes a technical revision. This revision includes improved text regarding the flame test (Clause 20), the improved text on adhesion (Clause 11) and a new Figures 9a and 9b.

The text of this standard is based on the following documents:

FDIS	Report on voting
15/377/FDIS	15/387/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 60454 series, under the general title *Pressure-sensitive adhesive tapes for electrical purposes*, can be found on the IEC website.

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# PRESSURE-SENSITIVE ADHESIVE TAPES FOR ELECTRICAL PURPOSES –

## Part 2: Methods of test

### 1 Scope

This part of IEC 60454 specifies methods of test for pressure-sensitive adhesive tapes for electrical purposes.

### 2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60216-1:2001, *Electrical insulating materials – Properties of thermal endurance – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-2:2005, *Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

IEC 60216-3:2006, *Electrical insulating materials – Thermal endurance properties – Part 3: Instructions for calculating thermal endurance characteristics*

IEC 60243-1:1998, *Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60426:1973, *Test methods for determining electrolytic corrosion with insulating materials*

IEC 60454-3 (all parts), *Pressure-sensitive adhesive tapes for electrical purposes – Part 3: Specifications for individual materials*

IEC 60589:1977, *Methods of test for the determination of ionic impurities in electrical insulating materials by extraction with liquids*

ISO 383: 1976, *Laboratory glassware – Interchangeable conical ground joints*

ISO 527-3:1995, *Plastics – Determination of tensile properties – Part 3: Test conditions for films and sheets*

ISO 2194:1991, *Industrial screens – Woven wire cloth, perforated plate and electroformed sheet – Designation and nominal sizes of openings*

ISO 3071:2005, *Textiles – Determination of pH of the aqueous extract*

ISO 3599:1976, *Vernier callipers reading to 0,1 and 0,05 mm*

ISO 10093:1998, *Plastics – Fire tests – Standard ignition sources*

EN 1939:2003, *Self-adhesive tapes – Determination of peel adhesion properties* (The peel adhesion test method of Clause 11 is based on test method A of EN 1939:2003. This standard is the result of the harmonisation of AFERA 5001 and PSTC-1,2,3 and 4, ASTM 3330/D, ASTM 3330/M and agreed by JATMA.)

NOTE EN: European Norm (Europe) – AFERA: Association des fabricants européens de rubans auto-adhésifs – PSTC: Pressure sensitive tape council (USA) – ASTM: American society for testing and materials (USA) – JATMA: Japanese adhesive tapes manufacturers association.

### 3 Conditioning and specimen preparation

Unless otherwise specified, rolls are to be conditioned for at least 24 h at  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % relative humidity and all test procedures are to be carried out in this atmosphere.

Remove and discard the three outer turns before taking any test specimens from the conditioned roll. Specimen preparation shall be done with care in a clean environment. Specific specimen preparation details will be included with the appropriate test method.

Further conditioning of test specimens may be required.

### 4 Determination of thickness

#### 4.1 Test apparatus

A dead-weight thickness gauge having two ground and concentric circular surfaces, flat within 0,001 mm and parallel to within 0,003 mm. The upper surface shall be 6 mm to 8 mm in diameter and the lower surface larger than the upper one. The upper surface shall move on the axis perpendicular to the two faces.

The gauge shall be graduated to read directly to 0,002 mm. The frame of the thickness gauge shall be of such rigidity that a load of 15 N applied to the gauge housing, out of contact with either the weight or the pressure foot spindle, will produce a deflection of the frame not greater than 0,002 mm (as indicated on the thickness gauge). The pressure exerted on the specimen shall be  $(50 \pm 5)$  kPa.

The accuracy of the thickness gauge shall be checked frequently by means of a set of steel gauges; the measuring errors of the thickness gauge shall not exceed 0,005 mm.

#### 4.2 Test specimens

Five specimens, at least 75 mm long, are cut from the roll at intervals not less than 300 mm. The specimen shall be allowed to relax for at least 5 min.

#### 4.3 Procedure

Place the test specimen between the jaws of the thickness gauge in contact with the fixed foot. Take care to ensure that no air bubbles are trapped. Lower the moving pressure foot gently on to the surface of the tape and take the reading on the gauge within 2 s. Read the measurement to the nearest 0,002 mm on the thickness gauge scale.

#### 4.4 Results

Report the central value as well as the maximum and minimum values of the five readings of thickness in millimetres.

### 5 Determination of width

#### 5.1 Method A

5.1.1 Use a steel rule graduated to 0,5 mm. The total measuring error of the rule shall not exceed 0,1 mm.

5.1.2 A specimen of tape, at least 450 mm long, is removed from the roll and placed adhesive side up on a smooth flat surface. The specimen shall be allowed to relax for at least 5 min.

The width of the relaxed specimen is measured with the adhesive side down to the nearest 0,5 mm using the rule. Ten measurements shall be made, uniformly distributed along the length of the specimen. The width shall be the mean value of the ten measurements.

## **5.2 Method B**

### **5.2.1 Principle**

The adhesive tape roll is placed between the jaws of a pair of calipers.

The width is the perpendicular distance, expressed in millimetres, between the opposite cut edges of the test specimen of adhesive tape. This method may not be suitable for slit or rewound rolls if the turns are not exactly coincident.

### **5.2.2 Apparatus**

Vernier calipers with a scale length not less than the roll width according to ISO 3599.

### **5.2.3 Test specimen**

One roll of tape.

### **5.2.4 Conditioning**

Conditioning shall conform to Clause 3 with the exception that it is not necessary to remove any layers unless damaged.

### **5.2.5 Procedure**

Hold the roll so that the cut edges are in a vertical plane. If the outer turns of the tape on the roll have crushed or damaged cut edges, these should be discarded prior to measurement.

Hold the calipers so that the scale shaft is in the horizontal plane.

Carefully close the caliper jaws so as to just touch the cut edges of the outer turns of the roll of tape, taking the following precautions:

- a) do not crush the roll edges;
- b) ensure that calliper jaws are perpendicular to cut edges.

Measure the roll width in millimetres to the nearest 0,1 mm.

Carry out two further measurements at equally spaced intervals around the circumference.

### **5.2.6 Results**

Report the mean value as the width of tape in millimetres.

## **5.3 Method C**

This method will only be used where a very high degree of accuracy is required.

Use a travelling microscope with a vernier control on one axis which has an accuracy of 0,001 mm. Using the specimen obtained and relaxed as in 5.1.2, measure the width to the nearest 0,01 mm, taking ten measurements. The width of the tape is taken as the mean value in millimetres.