

# INTERNATIONAL STANDARD

# IEC 60454-2

Third edition  
2007-06

---

---

## Pressure-sensitive adhesive tapes for electrical purposes –

### Part 2: Methods of test



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

X

*For price, see current catalogue*

## CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references .....	7
3 Conditioning and specimen preparation.....	8
4 Determination of thickness .....	8
4.1 Test apparatus .....	8
4.2 Test specimens .....	8
4.3 Procedure .....	8
4.4 Results.....	8
5 Determination of width.....	8
5.1 Method A.....	8
5.2 Method B.....	9
5.3 Method C .....	9
6 Determination of roll length.....	10
6.1 Principle.....	10
6.2 Method A – Measurement of turns method .....	10
6.3 Method B – Length sensor method .....	11
7 Corrosion-related properties .....	11
7.1 General.....	11
7.2 Preparation of water extract for pH and conductivity determinations .....	11
7.3 Determination of pH value of water extract .....	12
7.4 Determination of conductivity of water extract .....	12
7.5 Detection of corrosive sulfur .....	13
7.6 Insulation resistance method .....	14
7.7 Visual method .....	14
7.8 Wire tensile strength method .....	14
8 Tensile strength and elongation at break .....	15
8.1 Apparatus.....	15
8.2 Test specimens .....	15
8.3 Procedure .....	15
8.4 Results.....	15
9 Low-temperature properties.....	15
9.1 Principle.....	15
9.2 Test specimen.....	16
9.3 Procedure .....	16
9.4 Flexibility.....	16
9.5 Electric strength .....	16
9.6 Results.....	16
10 Resistance to penetration at elevated temperatures .....	17
10.1 Apparatus.....	17
10.2 Test specimens .....	17
10.3 Procedure .....	17
10.4 Results.....	17
11 Adhesion .....	17

11.1	Principle .....	17
11.2	Materials .....	18
11.3	Apparatus .....	18
11.4	Test samples and test pieces .....	19
11.5	Procedure .....	20
11.6	Expression of results .....	20
12	Adhesion to backing at low temperatures .....	21
12.1	Test specimens .....	21
12.2	Procedure .....	21
12.3	Results .....	21
13	Shear adhesion to backing after liquid immersion .....	21
13.1	Apparatus .....	21
13.2	Test specimens .....	21
13.3	Procedure .....	22
13.4	Results .....	22
14	Curing properties of thermosetting adhesive tapes .....	22
14.1	Bond separation during thermal treatment (adhesive to backing) .....	22
14.2	Bond separation after thermal treatment (adhesion to backing) .....	22
15	Flagging tests .....	23
15.1	Principle .....	23
15.2	Apparatus .....	23
15.3	Test specimens .....	23
15.4	Preparation of specimens for test .....	24
15.5	Test conditions .....	24
15.6	Results .....	24
16	Water vapor permeability .....	24
16.1	Apparatus .....	24
16.2	Test specimens .....	24
16.3	Procedure .....	25
16.4	Results .....	25
17	Electric strength .....	25
17.1	General .....	25
17.2	Test specimens .....	25
17.3	Procedure .....	25
17.4	Results .....	25
18	Electric strength after humid conditioning .....	26
19	Resistance to flame propagation .....	26
19.1	Principle .....	26
19.2	Apparatus .....	26
19.3	Test specimen .....	26
19.4	Procedure .....	27
19.5	Results .....	27
20	Flame test .....	27
20.1	Principle .....	27
20.2	Apparatus .....	28
20.3	Preparation of test specimen .....	28
20.4	Procedure .....	29
20.5	Results .....	29

21 Thermal endurance .....	29
21.1 Determination of thermal endurance (based on IEC 60216-1 and IEC 60216-2).....	29
21.2 Voltage breakdown.....	30
21.3 Loss of mass .....	31
 Annex A (normative) Rollers to be used in various tests.....	 40
 Bibliography.....	 41
 Figure 1 – Measuring device for determination of roll length of tape (measurement of turns method) .....	 32
Figure 2 – Measuring device for determination of roll length of tape (length sensor method) .....	32
Figure 3 – Sequence of bends .....	33
Figure 4 – Dielectric strength test in water .....	33
Figure 5 – Sketch of penetration tester .....	34
Figure 6 – Steel test plate .....	35
Figure 7 – Arrangement for stripping the tape from the plate.....	35
Figure 8 – Flagging test – Preparation of test specimen.....	36
Figure 9a – Draught protection device .....	37
Figure 9b – Use of Bunsen burner and sliding plate with draught protection device.....	37
Figure 9 – Flame test enclosures .....	37
Figure 10 – Essential dimensions for flame test (proportions exaggerated for clarity of details) .....	38
Figure 11 – Dimensions of wedge .....	39
 Table 1 – Conditioning for low temperature properties .....	 16

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

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

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of December 2009 have been included in this copy.

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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of December 2009 have been included in this copy.

# 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.