

IS : 7809 (Part 3/Sec 1) - 1986

Indian Standard (Reaffirmed 2011)
(Reaffirmed 2016)

**SPECIFICATION FOR
PRESSURE SENSITIVE ADHESIVE INSULATING
TAPES FOR ELECTRICAL PURPOSES**

PART 3 REQUIREMENTS FOR INDIVIDUAL MATERIALS

**Section 1 Plasticized Polyvinylchloride Tapes with
Non-Thermosetting Adhesive**

(First Revision)

Third Reprint NOVEMBER 2003

UDC 621.315.61-418:621.315.616.96

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**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BHADUR SHAH ZAFAR MARG
NEW DELHI 110002**

Gr 2

December 1986

**AMENDMENT NO. 1 NOVEMBER 1993
TO
IS 7809 (Part 3/Sec 1) : 1986 SPECIFICATION FOR
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(Page 4, clause 2.1.1, line 2) — Substitute 'F-PVCp/90/0/Tp' for 'F-PVC/90/0/Tp'.

(Page 6, clause 4.6) — Replace the existing clause by the following:

“4.6 Flammability — When tested in accordance with 6 of IS 7809 (Part 2) : 1977, the tapes shall comply with either:

(a) The requirements of 6.5(a) of IS 7809 (Part 2) : 1977 in which case it shall be designated by addition of 'FR', as indicated

F-PVCp/90/0/Tp/FR
or

(b) The requirements of 6.5 (b) of IS 7809 (Part 2) : 1977 in which case it shall be designated as usual and with no addition of 'FR'.”

(Page 6, clause 4.7) — Replace the existing clause by the following:

‘4.7 Electrolytic Corrosion — The electrolytic corrosion shall be measured in accordance to either visual test method as specified in 2 of IS 8516 : 1977 or the wire tensile strength method as specified in 3 of IS 8516 : 1977.’

(Page 6, clause 4.8) — Replace the existing clause by the following:

‘4.8 Stability to Accelerated Ageing — When testing for behaviour under accelerated ageing conditions by the method described in Appendix A, the layer shall part clearly from the underlayer and shall be tested for conformance to 'Adhesion to Backing' as specified in 4.3 of this standard.’

(*Page 6, clause 4.8*) — Add the following new clause after **4.8**:

‘4.9 Insulation Resistance Test — This test is to be performed as per 4 of IS 8516 : 1977 and in conjunction with IS 2259 : 1963. The central value of insulation resistance shall be at least 10^5 M Ω /25 mm width after 24 hours exposure at $27 \pm 2^\circ\text{C}$ and 93 ± 2 percent relative humidity.’

(ET 02)

Printed at Simco Printing Press, Delhi

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Section 1 Plasticized Polyvinylchloride Tapes with Non-Thermosetting Adhesive

(First Revision)

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Section 1 Plasticized Polyvinylchloride Tapes with
Non-Thermosetting Adhesive

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 3/Sec 1) (First Revision) was adopted by the Indian Standards Institution on 22 May 1986, after the draft finalized by the Solid Electrical Insulating Materials Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This Indian Standard (Part 3/Sec 1) was first printed in 1977. This revision is brought out to align with the conditions for carrying out adhesions of backing strength test in line with IEC Pub 454-2. It is proposed to introduce test for stability to accelerated ageing in this revision and withdrawal of the following test from the existing standard:

- a) Penetration at elevated temperature;
- b) Thermal endurance;
- c) Shear adhesion after immersion in water;
- d) Adhesion to backing at -7°C (for low application temperature type); and
- e) Elongation at -7°C (for low application temperature type).

0.3 This Indian Standard is being brought out on pressure sensitive adhesive tapes for electrical purposes in the following in three parts:

- a) Part 1 General requirements,
- b) Part 2 Methods of test, and
- c) Part 3 Requirements for individual materials.

0.4 This standard (Part 3/Sec 1) covers requirements for plasticized PVC tapes with non-thermosetting adhesive.

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0.5 This standard should be read in conjunction with IS : 7809 (Part 1)-1975* and IS : 7809 (Part 2)-1977†.

0.6 In the preparation of this standard, assistance has been derived from IEC Pub 434-3-1 (1976) 'Specification for pressure-sensitive adhesive tapes for electrical purposes: Part 3 Specification for individual materials, Sheet 1 Requirements for plasticized polyvinylchloride with non-thermosetting adhesive', issued by the International Electrotechnical Commission and BS 3924 : 1978 'Specification for pressure-sensitive adhesive tape for electrical purposes', issued by the British Standards Institution.

0.7 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, shall be rounded off in accordance with IS : 2-1960‡. 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

1.1 This standard (Part 3/Sec 1) covers requirements for pressure sensitive adhesive tapes made of plasticized PVC with a non-thermosetting adhesive.

2. TYPES AND DESIGNATION

2.1 The tapes have been classified in two types. The tapes with their designations are given below.

2.1.1 General Purpose Type — This type is suitable for application at temperature above 0°C, and designated as F-PVC/90/0/T_p.

NOTE — Experience has shown that these tapes have a temperature index of 90.

2.1.2 Low Temperature Application Type — This type is suitable for application at temperature not less than -18°C, and designated as F-PVC/75/18/T.

NOTE — Experience has shown that these tapes have a temperature index of 75.

3. GENERAL REQUIREMENTS

3.1 General — The materials shall conform to the requirements given in IS : 7809 (Part 1)-1975*. The limiting temperature and humidity specified in 7 of IS : 7809 (Part 1)-1975* are to be taken to mean the

*Specification for pressure-sensitive adhesive tapes for electrical purposes: Part 1 General requirements.

†Specification for pressure-sensitive adhesive tapes for electrical purposes: Part 2 Methods of test.

‡Rules for rounding off numerical values (revised).

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maxima which occur in normal storage due to natural variation and not the maximum continuously permitted conditions.

3.2 Width — The measured width shall be in accordance with **6.2** of IS : 7809 (Part 1)-1975* or as agreed between the purchaser and the supplier.

3.3 Length — The measured length shall be in accordance with **6.3** of IS : 7809 (Part 1)-1975* or as agreed between the purchaser and the supplier.

3.4 Thickness — The thickness shall be measured in accordance with IS : 7809 (Part 2)-1977†.

3.4.1 For the general purpose type, the preferred thicknesses are 0.125, 0.18, 0.22, 0.25 and 0.5 mm.

3.4.2 For the low application temperature type, the preferred thicknesses are 0.18 and 0.22 mm.

3.4.3 When other thicknesses are required, they shall be chosen from the R10 series of preferred numbers.

3.4.4 The tolerance over the entire range of thicknesses shall be ± 0.025 mm, unless otherwise specified.

3.5 When tested according to the relevant method described in IS : 7809 (Part 2)-1977†, the material shall conform to the performance requirements specified in **4**.

4. PERFORMANCE REQUIREMENTS

4.1 Tensile Strength — When tested in accordance with **9** of IS : 7809 (Part 2)-1977† the central value of tensile strength shall be not less than 150 N/10 mm width per mm thickness.

4.2 Adhesion to Steel — When tested in accordance with **10.3.2** of IS : 7809 (Part 2)-1977†, the central values of adhesion to steel shall not be less than 1.6 N/10 mm width.

4.3 Adhesion to Backing — When tested in accordance with **10.3.3** of IS : 7809 (Part 2)-1977†, the central value for adhesion to backing shall be not less than 1.3 N/10 mm width.

4.4 Electric Strength at Room Temperature — When tested in accordance with **12** of IS : 7809 (Part 2)-1977†, the central value of electric strength shall not be less than 40 kV/mm.

*Specification for pressure-sensitive adhesive tapes for electrical purposes: Part 1 General requirements.

†Specification for pressure-sensitive adhesive tapes for electrical purposes: Part 2 Methods of test.

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4.5 Electric Strength after Humid Conditioning — When tested in accordance with 13 of IS : 7809 (Part 2)-1977*, the central value of electric strength after 24 h at $27 \pm 2^\circ\text{C}$ and 93 ± 2 percent relative humidity shall be not less than 35 kV/mm. Alternatively tape can be immersed in water for 24 h at $27 \pm 2^\circ\text{C}$.

4.6 Flammability — When tested in accordance with 6 of IS : 7809 (Part 2)-1977* the tapes shall comply with either 6.5(a) or 6.5(b) of IS : 7809 (Part 2)-1977*.

4.7 Electrolytic Corrosion — The electrolytic corrosion shall be measured in accordance with 4 of IS : 7809 (Part 2)-1977*. The central value of insulations resistance shall be at least 10^{11} ohm after 24 hours exposure at $27 \pm 2^\circ\text{C}$ and 93 ± 2 percent relative humidity.

NOTE — The electrolytic corrosion requirement shall be checked either for the wire tensile test method or for the visual test method for materials which have passed the screening test by insulation test method (see IS : 8516-1977†).

4.8 Stability to Accelerated Ageing — When tested for behaviour under accelerated ageing conditions by the method described in Appendix A, the tape shall part cleanly from the underlayer and shall show no evidence of deterioration or change in properties of the adhesive or backing such as to make the tape unfit for use.

A P P E N D I X A*(Clause 4.8)***DETERMINATION OF STABILITY TO ACCELERATED AGEING****A-1. APPLICATION**

A-1.1 This test indicates the stability of the pressure-sensitive adhesive tape when the ageing conditions are accelerated by elevated temperature and humidity ($65 \pm 1^\circ\text{C}$ and approximately 80 percent relative humidity).

A-2. APPARATUS

A-2.1 The following apparatus are required for this test:

- a) Electric oven thermostatically controlled to a temperature of $65 \pm 1^\circ\text{C}$.
- b) Glass desiccator or other suitable vessel.

*Specification for pressure-sensitive adhesive tapes for electrical purposes: Part 2 Methods of test.

†Methods of test for determining electrolytic corrosion with insulating materials.

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- c) Stainless steel panels approximately 50 mm wide and at least 125 mm long, of approximately 16 gauge and finished in the lengthwise direction to a surface roughness not greater than 0.8 micron.
- d) A steel roller 80 ± 3 mm in diameter and 45 ± 1.5 mm in width, covered with rubber approximately 6 mm in thickness and having a shore durometer hardness of 80 ± 5 . The weight of the roller proper which applies pressure to the specimen shall be 2 ± 0.05 kg. It shall be so constructed that the weight of the handle is not added to the weight of the roller during use.

A-3. PROCEDURE

A-3.1 General Conditions for Tests — Each roll selected for test shall be conditioned for a minimum period of 24 hours at $27 \pm 2^\circ\text{C}$ and 65 ± 2 percent relative humidity prior to testing and all referred tests shall be conducted under these conditions. At least ten specimens of tape not greater than 25 mm (cut to width, if necessary) and not less than 7.5 mm wide shall be used for this test. The test procedure shall be as follows:

- a) Place one-half of the test specimens (that is, a minimum of five) adhesive side down on a steel panel, and superimpose on each a further specimen, adhesive side down with the end projecting over the steel panel to serve as a starting tape. Roll each tape specimen down using the specified roller once in each direction, ensuring that no air bubbles are entrapped.
- b) Place the assembly in the desiccator containing a solution of ammonium sulphate saturated at $65 \pm 1^\circ\text{C}$ (ammonium sulphate solution with excess solid at a temperature of 65°C gives a relative humidity of approximately 80 percent).

Place the desiccator in the oven maintained at a temperature of $65 \pm 1^\circ\text{C}$ for 96 hours. A humidity cabinet which will comply with the above conditions may be used.

- c) Remove the assembly from the desiccator, dry in the oven at $65 \pm 1^\circ\text{C}$ for 4 hours, then allow to cool for one hour under the standard conditions of temperature and humidity specified in IS : 2260-1973*.
- d) Remove the uppermost strips at an approximate speed of 300 mm/min and at right angles to the plate and use these to determine the adhesion strength after ageing. While removing, examine these strips for any evidence of adhesive deterioration. This is defined as a change in the properties of the adhesive such as to make the tape unfit for use because of adhesive transfer or because of lack of satisfactory holding properties.

*Specification for preconditioning, conditioning and testing of solid electrical insulating materials (first revision).

BUREAU OF INDIAN STANDARDS**Headquarters:**

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones 323 0131, 323 3375, 323 9402

Fax 91 11 3234062, 91 11 3239399, 91 11 3239382

Telegrams Manaksanstha
(Common to all Offices)**Central Laboratory:**

Plot No 20/9, Site IV, Sahibabad Industrial Area, Sahibabad 201010

Telephone

8-77 0032

Regional Offices:

Central Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 323 76 17

*Eastern 1/14 CIT Scheme VII M V I P Road, Maniktola, CALCUTTA 700054 337 86 62

Northern SCO 335-336, Sector 34-A, CHANDIGARH 160022 60 38 43

Southern C I T Campus IV Cross Road, CHENNAI 600113 235 23 15

†Western Manakalaya E9, Behind Marol Telephone Exchange, Andheri (East),
MUMBAI 400093 832 92 95**Branch Offices:**

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001 550 13 48

‡Peenya Industrial Area 1st Stage, Bangalore-Tumkur Road,
BANGALORE 560058 839 49 55

Gangotri Complex, 5th Floor Bhadbhada Road T T Nagar, BHOPAL 462003 55 40 21

Plot No 62-63, Unit VI, Ganga Nagar, BHUBANESHWAR 751001 40 36 27

Kalakathir Buildings 670 Avinashi Road, COIMBATORE 641037 21 01 41

Plot No 43, Sector 16 A, Mathura Road, FARIDABAD 121001 8-28 88 01

Savitri Complex, 116 G T Road, GHAZIABAD 201001 8-71 19 96

53/5 Ward No 29, R G Barua Road, 5th By-lane, GUWAHATI 781003 54 11 37

5-8-56C, L N Gupta Marg Nampally Station Road, HYDERABAD 500001 20 10 83

E-52, Chitaranjan Marg, C-Scheme, JAIPUR 302001 37 29 25

117/418 B, Sarvodaya Nagar, KANPUR 208005 21 68 76

Seth Bhawan, 2nd Floor, Behind Leela Cinema, Naval Kishore Road,
LUCKNOW 226001 23 89 23

NIT Building, Second Floor, Gokulpat Market, NAGPUR 440010 52 51 71

Patilputra Industrial Estate, PATNA 800013 26 23 05

Institution of Engineers (India) Building 1332 Shivaji Nagar, PUNE 411005 32 36 35

TC No 14/1421, University PO Palayam, THIRUVANANTHAPURAM 695034 6 21 17

*Sales Office is at 5 Chowringhee Approach, P O Princep Street,
CALCUTTA 700072 27 10 85

†Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007 309 65 28

‡Sales Office is at 'F' Block, Unity Building, Narashimaraja Square,
BANGALORE 560002 222 39 71

AMENDMENT NO. 2 JANUARY 2019
TO
IS 7809 (PART 3/SEC 1) : 1986 SPECIFICATION FOR
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Section 1 Plasticized Polyvinyl Tapes with Non-Thermosetting Adhesives

(First Revision)

[Page 6, clause 4.9 (see also Amendment No. 1)] — Insert the following new clause after 4.9:

5 SAMPLING

See Appendix B.

[Page 6, Appendix A] — Insert the following new Appendix B:

APPENDIX B
SAMPLING

B-1 LOT

In any consignment, the rolls of tape of same type and width made from the same backing material and one lot of adhesive and manufactured under essentially similar conditions shall constitute a lot.

B-2 SCALE OF SAMPLING

B-2.1 Samples shall be taken from each lot and tested separately for ascertaining the conformity of the lot to the requirement of the specification.

B-2.2 Unless otherwise agreed to between the buyer and the seller, the number of samples to be selected from a lot shall depend on col 1 and col 2 of Table 1. These samples shall be taken at random.

B-2.3 In order to ensure the randomness of selection, procedure given in IS 4905 may be followed. In case such a table is not available, the following

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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 of N/n (N being the lot size and n the number of rolls to be selected). Every r^{th} roll thus counted shall be withdrawn to give samples for test

B-3 NUMBER OF TESTS AND CRITERION FOR CONFORMITY

B-3.1 Tests for determining the conformity of the lot to the requirements of the specification shall be done on each lot separately. The number of rolls to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 1.

B-3.2 The rolls selected according to **B-2.2** shall be tested for all the requirements.

B-3.3 The lot shall be declared conforming to the requirements of this standard, if all the rolls satisfy the requirements for which they were tested.

Table 1 Number of Rolls to be Selected for Sampling
(Clause B-3.1)

Sl No.	Lot Size	No. of Rolls to be Selected n
(1)	(2)	(3)
i)	up to 100	2
ii)	101 to 500	5
iii)	500 to 1 000	7
iv)	1 001 and above	10

(ETD 02)

Publication Unit, BIS, New Delhi, India