Call Letters	PSTC-53
Date of Issuance	6/66
Revised	11/70
Revised	8/85
Revised	8/89
Revised	6/00
Revised	10/03

PERFECT INTERNATIONAL INSTRUMENT
东莞宝大仪器有限公司
全球服务电话:400-6677223

Thermosetting Properties of Electrical Grade Tapes

1. DEFINITION

1.1 Thermosetting pressure sensitive tapes are produced with adhesive systems that cure or harden after exposure to heat, and remain set regardless of subsequent temperature cycles. The curing reaction involved is not reversible by heat, and tapes once heat-cured, remain cured. Thermosetting properties are measured by a bond separation test and are reported as the time to failure of a heat cured adhesive-to-adhesive bond under a prescribed load at a specified temperature.

2. SIGNIFICANCE

2.1 This test offers a means of differentiating between thermosetting and nonthermosetting tapes as application of stress on the bond after cure will result in bond failures within a few minutes for nonthermosetting adhesives, while bonds of true thermosetting adhesive tapes will hold for a controlled time before failure.

2.2 The length of time to failure of an adhesive-to-adhesive bond is also a measure of holding strength of the cured tape at an elevated temperature.

2.3 The test method is suitable for specification acceptance and service evaluation.

3. TEST SPECIMENS

3.1 Condition the roll for at least 24 hours prior to testing in an atmosphere maintained at 23°C ± 2°C (73.4°F ± 3.6°F) and a relative humidity (RH) of 50% ± 5% at that temperature. The sample shall be placed so that the conditioning atmosphere shall have free access to all normally exposed surfaces of the sample roll.

3.2 Discard at least three but no more than six outer wraps of the tape from the sample roll.

3.3 Six 150 mm (6")-long strips shall be removed from the roll in accordance with Appendix D so that the adhesive surface contacts neither the fingers nor any foreign object.

3.4 Each test sample shall consist of two strips fastened together to form a 24 mm (1")-long adhesive-to-adhesive lap joint.

3.5 A 2,040 g ± 45 g (4 ½ lb.) rubber-covered steel roller (see Appendix B), without application of additional pressure, shall then be passed over the joint once in each direction (lengthwise) at the speed of 10 ± 0.5 mm/s (12" per minute).

3.6 The specimen shall be cut to 12 mm (½") width with a sharp razor blade. If different width specimens with the same unit loading must be used, significant differences in test results may result.

4. EQUIPMENT

4.1 A 2,040 ± 45 g (4 ½ lb.) rubber-covered steel roller (ChemInstruments: www.ChemInstruments.com).

4.2 Oven, forced air capable of maintaining 130°C ± 2°C (266°F ± 3.6°F) (www.VWR.com, etc.)

4.3 500 g ± 5 g test weights capable of being attached to the specimens.

4.4 Rack to hold strips in a vertical position.

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5. TEST METHODS

5.1 Set an oven at the temperature specified in the following table according to the type of adhesive to be tested or at a temperature and time recommended by the manufacturer.

Tape Adhesive	Thermosetting Test Temperature	Thermosetting Time, hours
Natural or synthetic rubber	130°C (266°F)	2
Acrylic polymer	130°C (266°F)	2
Silicone polymer	200°C (392°F)	3

5.2 Place three assemblies of adhesive-to-adhesive samples on the shelf of an oven maintained at the thermosetting temperature for the time specified in the preceding table with no stress on the bond and a 150 gram load placed on the splice. Other alternate conditions may be used if agreed upon between the manufacturer and customer.

5.3 Remove the assemblies from the oven and allow them to cool for five minutes at room temperature.

5.4 Hang the specimens vertically in the oven at the test temperature with a 500-gram mass fastened to one end of each specimen (see Figure 1). Continue the test for a prescribed time, or until failure occurs by bond separation.

6. REPORT

6.1 Complete identification of the tape sample.

6.2 Report the average time of bond separation plus the maximum and minimum, if specified.

6.3 Report the average time of bond separation plus maximum and minimum if specified, together with the time/temperature cycle used to thermoset the adhesive. A minimum of 5 sets from randomly selected rolls is acceptable for reporting an average result.

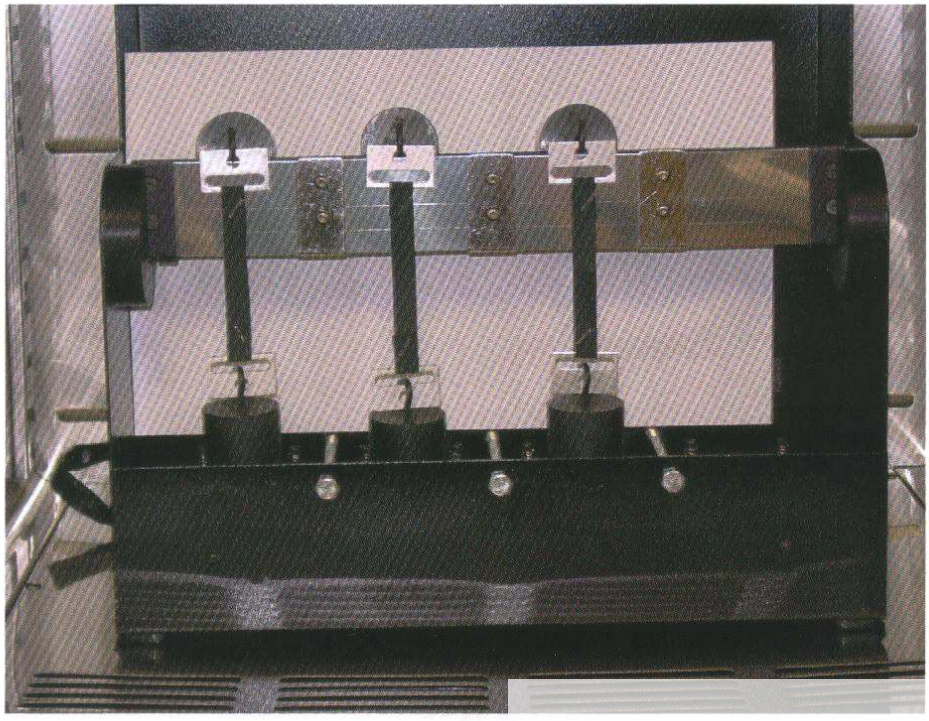

Figure 1. Tape samples mounted on test rack in oven.

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