International Standard 5470

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Rubber or plastics coated fabrics — Determination of abrasion resistance

Supports textiles revêtus de caoutchouc ou de plastique — Détermination de la résistance à l'usure

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Descriptors : coated fabrics, fabrics coated with plastics, fabrics coated with rubber, tests, wear tests, abrasion tests, test equipment.

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5470 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products*, and was circulated to the member bodies in April 1978.

It has been approved by the member bodies of the following countries :

Austria	India	Sri Lanka
Belgium	Korea, Rep. of	Sweden
Brazil	Mexico	Thailand
Czechoslovakia	Poland	Turkey
Egypt, Arab Rep. of	Romania	USA
France	South Africa, Rep. of	United Kingdom
Germany, F.R.	Spain	USSR
Hungary		

No member body expressed disapproval of the document.

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Rubber or plastics coated fabrics — Determination of abrasion resistance

1 Scope and field of application

1.1 This International Standard specifies a method of determining the resistance to abrasion of fabrics coated with rubber or plastics. The abrasion is measured by loss in mass.

1.2 Fabrics coated with rubber or plastics are used in many applications requiring resistance to abrasion. Typical applications are tarpaulins, swimming pool covers, etc. Data obtained by this method may be used to predict the behaviour of these coated fabrics, but not as an absolute criterion. It is preferable to limit the significance of the test by considering it only as a means of control when a fabric attains a resistance superior to a threshold given in comparison with an established minimum standard. This method is for testing the abrasion resistance of the coating only, and is useful for comparison purposes when comparing materials with the same or similar characteristics.

2 Reference

ISO 2231, *Fabric coated with rubber or plastics — Standard atmospheres for conditioning and testing.*

3 Principle

The abrasion resistance of fabrics coated with rubber or plastics is measured by subjecting a test piece to the rubbing action of two abrasion wheels under controlled conditions of pressure by the use of a revolving platform, double-head abrader. This action is maintained by the use of tungsten carbide abrasion wheels[1] and the proper selection of mass for varying the vertical force on the test piece.

4 Apparatus

4.1 Abrasion apparatus[2] (see the figure) consisting of :

a) a removable flat circular test piece holder;

b) a pair of pivoted arms to which the abrasion wheels are attached;

c) a motor for rotating the platform and test piece;

d) a fan for cooling the motor;

e) a counter for indicating the number of revolutions of the test piece holder.

The test piece holder shall be mounted to produce a circular surface travel of an essentially flat test piece in the plane of its surface at a uniform angular velocity. The abrasion wheels, which are attached to the free end of the pivoted arms, shall rotate and have a peripheral engagement with the surface of the test piece when resting on the test piece. The direction of travel of the periphery of the wheels and of the test piece at the contacting portions shall be at acute angles, the angle of travel of one wheel periphery being opposite to that of the other wheel. Motion of the abrasive wheels, in opposite directions, shall be provided by rotation of the test piece and the associated friction therefrom.

4.1.1 The test piece holder shall be supported by an adapter that is motor-driven and that provides motion for the circular travel of the test piece holder.

4.1.2 A clamping ring shall be used to secure the test piece to the test piece holder.

4.1.3 The abrasive wheels shall be mounted on independently pivoted arms which provide free floating action to compensate for any minor unevenness in the test piece and ensure uniform pressure of the abrasion wheels against the test piece at all times.

4.1.4 The pivoted abrader arms without auxiliary masses or counterweights shall apply a vertical force against the test piece of 2,45 N per wheel (exclusive of the mass of the wheel). A stud on the rear of the abrading arm may be used to carry a counterweight when it is desired to reduce the wheel load from 2,45 N to 1,31 N per wheel when testing thin flexible materials.

4.1.5 The abrader wheel bearings, i.e. the two pairs of bearings installed in the free end of the pivoting arms to support the abrasion wheels, shall not stick when caused to spin rapidly by a quick driving motion of the forefinger.

1) Tungsten carbide wheels are preferred; others may be permitted for the purpose of the test. However these wheels may require dressing in order to re-furbish their abrading surface.

2) The Taber abrader and S-35 wheels, manufactured by Teledyne Taber, North Tonawanda, New York, USA, meet these requirements.

4.1.6 The vertical distance from the centre of the pivot point of the abrader arms to the top of the test piece holder shall be approximately 25 mm. This measurement is specified to prevent possibility of errors incurred by installing a thrust bearing or the like to support the test piece platform. Adaptions shall be made so that the platform will remain at the above specified level. The test piece platform shall rotate in the plane of its surface. If it fails to do so, and exhibits a tendency to wobble, the holder and adapter shall be replaced or a thrust bearing shall be installed to support the test piece holder.

4.1.7 The angular velocity of the platform shall be between 6,10 and 7,33 rad/s depending upon the electrical supply.

4.2 Stiff brush, for removal of loose particles from the surface of the wheels, and a small vacuum cleaner attachment to remove the loose particles from the test piece during the test. Compressed air, which shall be free from moisture and oil, shall be used for cleaning the surface of the test piece. The air should be delivered to a manifold or nozzle where the pressure shall be maintained at 200 ± 35 kPa.

4.3 Balance, suitable for weighing to the nearest 1 mg.

5 Test pieces

5.1 Prepare five test pieces for each sample of single-coated fabric, unless otherwise specified. In the case of double-coated fabrics, cut five test pieces for each coated side.

5.2 Cut circular test pieces approximately 114 mm in diameter. Cut a 6 mm hole in the centre of the test piece. Care should be taken in cutting out test pieces. Ensure that the sample to be tested is free from holes, blisters or other imperfections.

5.3 If materials that cannot be clamped to the test piece holder are to be tested, it is necessary to cement these test pieces to some other substrate.

NOTE — A ten-ply white cardboard has been found satisfactory using a good rubber cement. However, it is essential that the cement does not adversely affect the fabric or coating. If a solvent base cement is used, allow the assembly to condition at least 16 h or until the assembly maintains a constant mass.

6 Time-interval between manufacturing and testing

6.1 For all test purposes, the minimum time between manufacturing and testing should be 16 h.

6.2 For non-product tests, the maximum time between manufacturing and testing should be four weeks, and for evaluations intended to be comparable, the tests, as far as possible, should be carried out after the same time interval.

6.3 For product tests, whenever possible, the time between manufacturing and testing should not exceed 3 months. In all other cases, tests should be made within 2 months from the date of receipt by the customer.

7 Procedure

7.1 Test the conditioned test pieces in the standard atmosphere for testing in accordance with ISO 2231, Atmosphere "A".

7.2 Install the wheels on their respective flanged holders as indicated by the printing on the side of each wheel.

7.3 Determine the original mass of the test piece or the assembly or both. Place the test piece, with the designated side up, over the rubber mat on the test piece holder. Screw the washer and knurled nut in place to hold the centre of the test piece. Place the ring clamp over the test piece and tighten the screw of the ring clamp.

7.4 The tester is equipped with a counter that operates in conjunction with the turntable. Set the counter to zero.

7.5 If the number of revolutions and the vertical force are not specified these shall first be decided (see 7.7).

7.6 Start the abrader and run to the end point. The end point shall be defined as that point just before abrading through the coating to the fabric.

7.7 The number of revolutions and the vertical force to be used shall first be decided by testing a test piece from each sample. The quality and thickness of the coating will indicate the required vertical force and number of revolutions needed to measure the abrasion resistance of the coating. After establishing the required vertical force and number of revolutions, test the specified number of test pieces for each sample. Do not abrade through to the fabric.

7.8 The vacuum cleaner and compressed air shall be turned on and used throughout the test. Wipe the rubber mat clean after each test.

7.9 At the conclusion of the test, weigh the test pieces.

8 Expression of results

Calculate the abrasion loss, DM, in milligrams per revolution, by the formula

$$\frac{m_0 - m_1}{n} \times 1\,000$$

where

m_0 is the original mass of the test piece, in grams;

m_1 is the mass of the test piece after the test, in grams;

n is the number of revolutions.

9 Test report

The test report shall include the following particulars :

a) identification of test pieces;

b) reference to this International Standard;

c) test conditions;

d) number of test pieces tested;

e) type of abrasion wheels;

f) total number of revolutions and vertical force used;

g) abrasion loss per revolution.

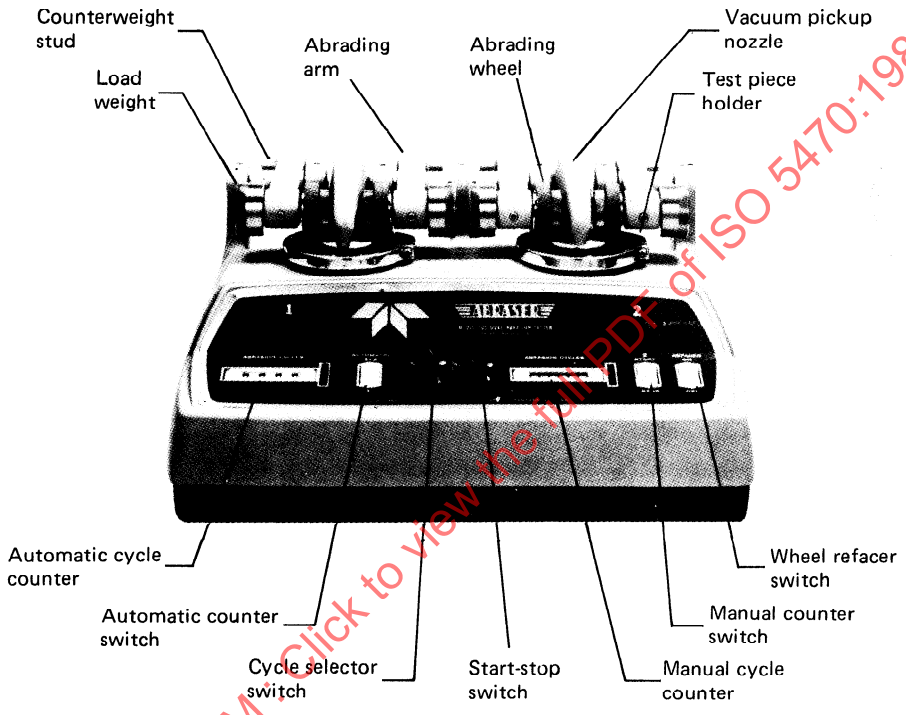

Figure — Typical double-head abrader

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