BS 3424 : Part 18 : 1986

UDC [677.077.652:678.066.2] :677.017.6

British Standard

Testing coated fabrics

Part 18. Methods 21A and 21B. Methods for determination of resistance to wicking and lateral leakage to air

IMPORTANT NOTE. It is recommended that this Part be read in conjunction with the information in Part 0 'Foreword and general introduction'.

Foreword

In preparing this revision of method 21 of BS 3424 : 1973 the Rubber Standards Committee was anxious to clarify any confusion that may have evolved over the years as to where the differences lay between wicking, resistance to liquids and porosity or gas transmission. Each of these effects is being dealt with separately in this revision of BS 3424. In this respect attention is drawn to BS 3424 : Part 0 'Foreword and general introduction'. Wicking is important to those users of coated fabrics which may be in contact with liquids or gaseous media for long periods of time in circumstances where the coated fabric should not become contaminated by, or permit the passage of media over, an area greater than the initial area of contact with the coated fabric. Similarly, where coated fabrics are used as gaskets or other types of seal, users require the coated fabric to exhibit little or no lateral leakage. There may however be applications where wicking may be desirable. In such circumstances the methods described in this Part of BS 3424 are equally applicable.

This Part supersedes method 21 of BS 3424 : 1973.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

British Standards Institution

1 Scope

This Part of BS 3424 describes two methods for determining the resistance to wicking of fabrics coated on one or both sides or double texture or plied (laminated) fabrics.

NOTE. The titles of the publications referred to in this Part of BS 3424 are listed on the back page.

2 Definitions

For the purposes of this Part of BS 3424 the following definitions apply.

2.1 lateral leakage. The passage of gases along or through the textile materials element of a coated fabric or along interstices formed by the textile element and the coating polymer of the coated fabric.

2.2 wicking. The passage of liquids along or through the textile materials element of a coated fabric or along interstices formed by the textile element and the coating polymer of the coated fabric.

3 Method 21A. Determination of capillary action wicking

NOTE. Many coated fabrics, such as tarpaulins and salvage sheets, are exposed at their edges to water and other fluids, from which the coated fabric may be protecting machinery or other goods. This method of test is intended to provide evidence of the resistance of coated fabrics to capillary action wicking.

3.1 Principle

A strip of coated fabric is suspended in an appropriate dye liquor. The distance which the dye liquor rises up the coated fabric in a given period of time is measured.

3.2 Apparatus and reagents

3.2.1 600 mL *beaker.*

3.2.2 *Stainless steel rods* 40 mm long and 9.5 mm in diameter.

3.2.3 *Glass rod* 150 mm long and approximately 9 mm in diameter.

3.2.4 *Clamp and retort stand.*

3.2.5 *Means for cutting a circular hole of 10 mm diameter in the specimen.*

3.2.6 *Dye liquor,* 0.2 % *aqueous* solution of fluorescein sodium technical dye.

3.2.7 *Shallow tray,* at least 60 mm wide × approximately 30 mm long.

3.2.8 *Ultraviolet or mercury vapour lamp.*

NOTE. If the dye liquor (**3.2.6**) is not suitable for the coated fabric under test, the details of any alternative liquid medium used should be agreed between the contracting parties, and the details specified in the test report.

3.3 Preparation of test specimens

Cut four test specimens, each 150 mm × 50 mm; two with their length in the longitudinal direction and two with their length in the transverse direction. Select the test specimens from widely separated parts of the sample, but not from within 50 mm of the selvedge.

3.4 Conditioning and testing

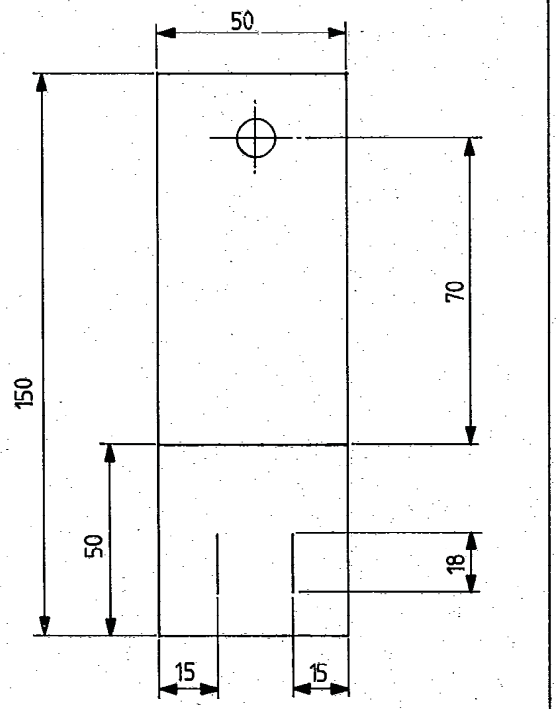
Condition the test specimens in accordance with BS 3424 : Part 2 : 1982, method 4 and carry out the test in this atmosphere.

3.5 Procedure

3.5.1 *Single faced specimens.* Draw an indelible line across both surfaces of each of the test specimens 50 mm from one end and at right angles to the longer edge. Make two incisions each 18 mm long and 15 mm from each edge parallel to the longer edges, as illustrated in figure 1. Cut a circular hole of 10 mm diameter in the middle of the test specimen with the centre of the hole 70 mm from the line drawn across the face of the test specimen (see figure 1). Prime the end of the test specimens with the liquid media, by allowing 30 mm of test specimen below the indelible line to rest in the shallow tray (**3.2.7**) containing a solution of dye liquor (**3.2.6**), and roll the stainless steel rod (**3.2.2**) twice over this length of test specimen in order to break down the liquid/air interface. Insert the stainless steel rod in the loop formed by the incisions in each specimen. Insert the glass rod (**3.2.3**) through the hole at the other end of the test specimen. Lower the tensioned specimens suspended from the glass rod (**3.2.3**) into a 600 mL beaker (**3.2.1**) containing the dye liquor and immerse the test specimens in the dye liquor up to a point where the upper meniscus just touches the indelible line, as shown in figure 2. After 24 h or such other period as is appropriate to the performance specification remove the test specimens and immediately examine the wicking effect using the ultraviolet or mercury vapour lamp (**3.2.8**). Record the height to the nearest millimetre to which the dyestuff has risen above the indelible marked line (i.e. the distance from the marked line to the uppermost extent of the wicking effect).

3.5.2 *Double faced or multi-ply specimens.* Where test specimens are double faced or multi-ply coatings, after immersion remove the test specimens from the dye liquor, remove the excess dye liquor and, as the level of the dye liquor is not visible, remove the coating or separate the plies using an appropriate technique from BS 3424 : Part 7 : 1982, method 9. When the coating has been stripped from one face of the test specimen, record the height in millimetres to which the dyestuff has risen above the bottom of the test specimen and then deduct 50 mm (50 mm being the height above the bottom of the test specimen that the marked line (see **3.5.1**) would normally be visible). Record this adjusted dimension as the wicking distance.

NOTE. As wicking may not cease immediately when the test specimen is removed from the dye liquor, it is essential that the specimen is delaminated and the measurements are carried out as quickly as possible.



All dimensions are in millimetres.

Figure 1. Coated fabric specimen prepared for wicking test

3.6 Expression of results

Calculate the mean of the two highest wicking results and record this as the wicking distance (in millimetres).

3.7 Test report

The test report shall include the following particulars:

(a) the description of the coated fabric;

(b) the wicking distance (in millimetres);

(c) reference to this method of test, i.e. method 21A of BS 3424 : Part 18 : 1986;

(d) details of any deviations from the standard test procedure, including the media, the dyestuff, time of immersion and temperature of test.

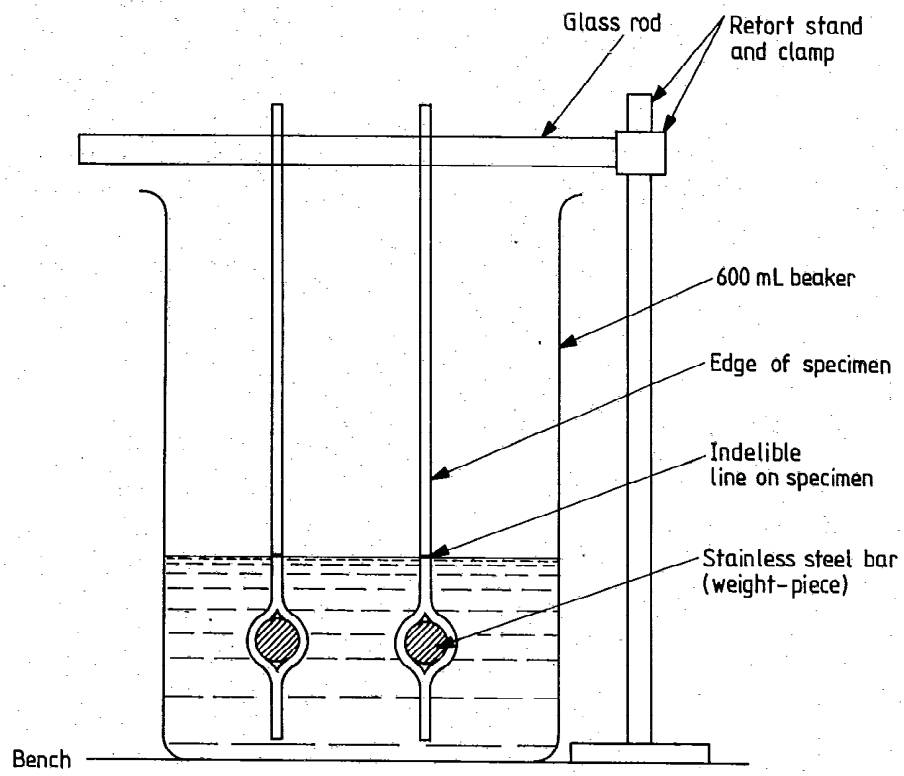


Figure 2. Arrangement of apparatus in wicking test

4 Method 21B. Determination of lateral leakage to air

NOTE. Many coated and multi-ply laminated fabrics are used as gaskets and pressure seals. In such and similar cases it is important to the user that the fluid being contained does not escape by lateral leakage along the textile materials element or along the interstices formed by the textile element and the coating polymer to the edges of the gasket or seal.

4.1 Principle

An annulus of the test fabric, with outer and inner edges cut and unsealed, is held by a mounting fabric so that its outer edge is presented to air at a specified pressure. The air, passing laterally along the textile, emerges from the inner edge into water covering the test specimen, escaping as bubbles into a funnel covering the inner edge of the annulus and surmounted by a burette in which it is measured.

4.2 Apparatus

4.2.1 *Permeameter,* as shown diagrammatically in figure 3.

4.2.2 *Laboratory clamp and stand.*

4.2.3 *Burette.*

NOTE. An ordinary 50 mL burette cut off at approximately the 30 mL mark is recommended.

4.2.4 *Glass funnel,* 100 mm in diameter, with its stem reduced to between 30 mm and 40 mm. Invert the funnel and butt joint the stem to the open end of the burette by 50 mm to 70 mm of close-fitting rubber tubing.

4.2.5 *Roller,* of mass 2 kg and length at least 60 mm.

4.2.6 *Scissors.*

4.2.7 *Adhesive.*

4.2.8 *Rubber tubing.*

4.3 Preparation of test specimens

4.3.1 Cut, from a piece of impervious material, a cap (CC in figure 4) 115 mm in diameter. On one face inscribe two concentric circles 105 mm and 75 mm in diameter respectively and mark the band between them.

4.3.2 Cut from the test sample a disc (LL in figure 4) 242 mm in diameter. On one face inscribe two circles as in **4.3.1** and on the second face inscribe two concentric circles, 230 mm and 200 mm in diameter, and mark the bands between the circles on each face. Inscribe a third concentric circle 62 mm in diameter on the second face.

4.3.3 From any piece of fabric, which need not be impervious, that is strong enough and capable of adhering to the face of specimen LL, cut a disc (AA in figure 4) 350 mm in diameter and on one face inscribe two concentric circles, 230 mm and 200 mm in diameter, and mark the band between them.

4.3.4 Make small slits or holes near the centres of specimen LL and disc AA.

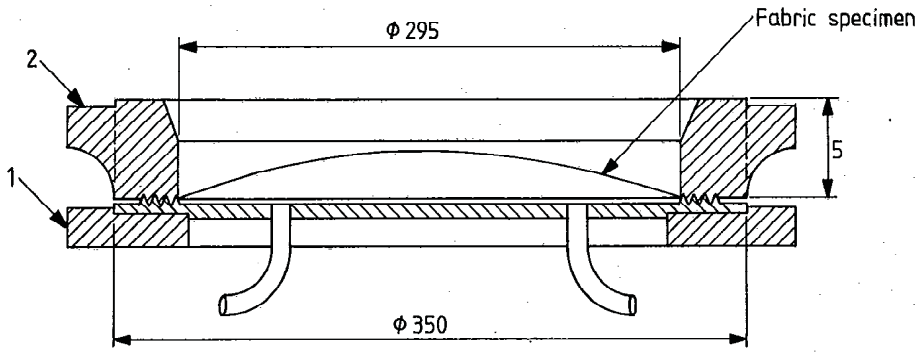
NOTE. These are to facilitate the entry of scissor points when these items are subsequently converted to annuli.

4.3.5 Using a method which will not damage the elastomer, clean the coated surfaces in the bands between the circles inscribed on CC, LL and AA to receive a self-curing adhesive, chosen to suit the elastomer of the coating.

4.3.6 Apply the adhesive to the bands, place the discs one on top of the other (i.e. LL on CC and AA on LL) with the bands of adhesive coinciding and make three passes over the joins with the roller (**4.2.5**) allowing the roller to act under its own weight.

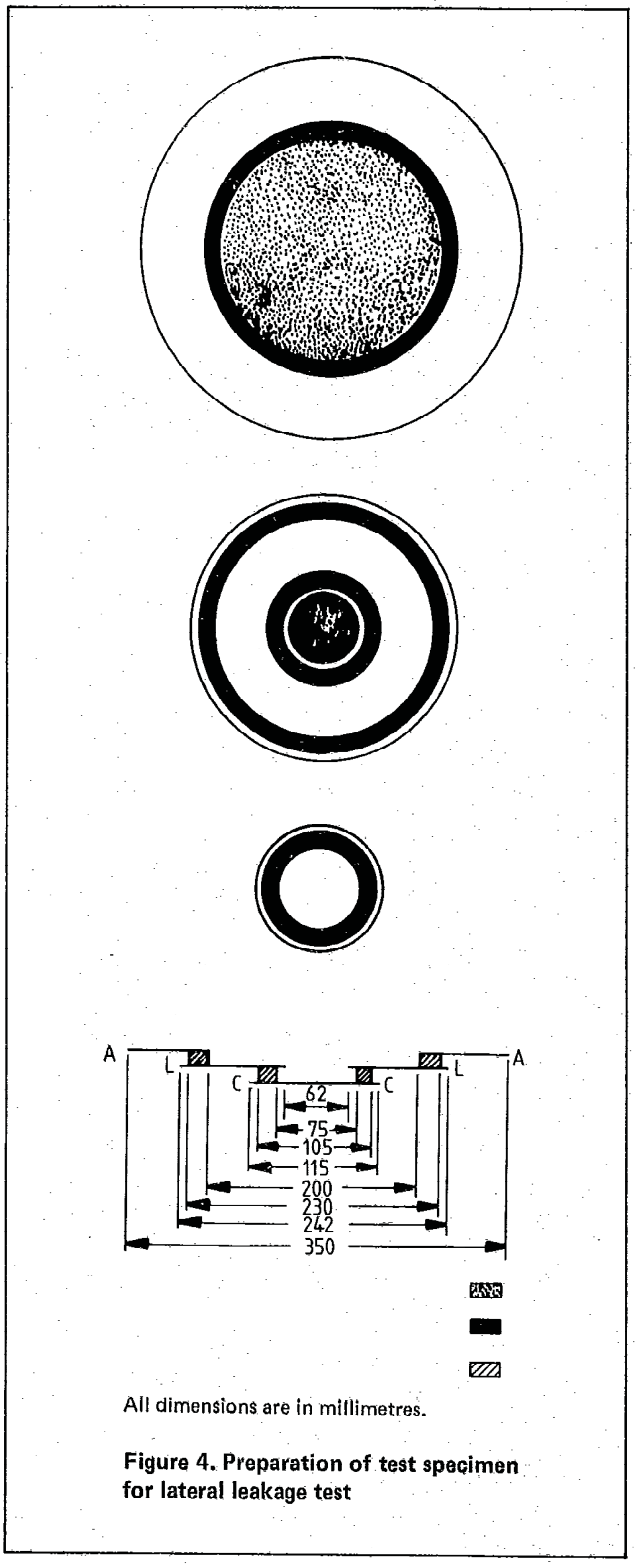
4.3.7 Set the specimen aside, for the adhesive to set.

4.3.8 Cut out the fabric bounded by the innermost circle on disc AA and then on specimen LL.



All dimensions are in millimetres.

Figure 3. Permeameter



All dimensions are in millimetres.

Figure 4. Preparation of test specimen for lateral leakage test

4.4 Conditioning and testing

Condition the test specimen for 24 h in accordance with BS 3424 : Part 2, method 4 and carry out the test in this atmosphere.

4.5 Procedure

4.5.1 Clamp the composite specimen in the permeameter (**4.2.1**) in the ordinary way, but omitting, as unnecessary, the greasing of the clamped margin.

4.5.2 Mount the burette (**4.2.3**) upside down, at about its mid-length, in the clamp (**4.2.2**). Attach a piece of rubber tubing to the jet of the burette to allow suction to be applied.

4.5.3 Apply and maintain an air pressure of 27.5 kPa beneath the specimen.

4.5.4 Flood the distended specimen with enough water to ensure that when the funnel and burette are charged the rim of the funnel is immersed but not touching specimen LL.

4.5.5 Open the tap in the burette, apply suction at the end of the rubber tubing to charge the funnel and burette, and close the tap.

4.5.6 Centre the funnel over cap CC, read the burette and collect the escaping air for 5 min or until such time as 20 mL of air have been collected, whichever is the less.

4.5.7 Record the duration of the test and the volume of air collected.

4.6 Test report

The test report shall include the following particulars:

(a) the description of the coated fabric;

(b) the volume of air (in millilmetres) collected per minute, without any correction for temperature or pressure;

(c) reference to this method of test, i.e. method 21B of BS 3424 : Part 18 : 1986;

(d) details of any deviation from the standard test procedure.

This British Standard, having been prepared under the direction of the Rubber Standards Committee, was published under the authority of the Board of BSI and comes into effect on 28 February 1986.

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The following BSI references relate to the work on this standard:
Committee reference RUM/13 Draft for comment 84/37091 DC

Publications referred to

BS 3424 Testing coated fabrics
*Part 0 Foreword and general introduction
Part 2 Method 4 Conditioning and selection of test specimens
Part 7 Method 9 Determination of coating adhesion strength

*Referred to in the foreword only.

Amendments issued since publication

Amd. No.	Date of issue	Text affected

British Standards Institution · 2 Park Street London W1A 2BS · Telephone 01-629 9000 · Telex 266933

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