British Standard

Testing coated fabrics

Part 31. Method 34. Method for determination of resistance to scuffing and snagging

Essais des supports textiles revêtus
Partie 31. Méthode 34. Méthode de détermination de la résistance à l'usure et au pochage

Prüfung beschichteter Gewebe
Teil 31. Verfahren 34. Bestimmung der Abriebfestigkeit und der Zieheranfälligkeit

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

Foreword

During use coated fabrics are commonly subjected to rapid glancing blows or direct impacts against hard objects and surfaces. If the object is sharp or pointed, a cut or snag of the material may be caused. If the object is blunt, then rather more extensive, but perhaps less severe, abrasion or scuffing damage will be produced.

The present method simulates both types of damage, and it is envisaged that the method will prove relevant in the assessment of materials for such applications as shoe uppers, travel goods, protective clothing, buoyancy aids and inflatables.

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

1 Scope

This Part of BS 3424 describes a method for assessing the resistance of coated fabrics to damage by scuffing or snagging.

NOTE. The titles of the publications referred to in this standard are listed on page 7.

2 Definitions

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

2.1 abrasion damage. Surface damage visible that is not composed of snag sites.

2.2 snag site. Damage consisting of penetrative damage of a limited extent, such as a cut, puncture or partial delamination.

2.3 snag/abrasion count. The probable number of snag/abrasion sites in the area of that part of the test piece being assessed. It is denoted as n (see **9.2**).

3 Principle

The coated fabric to be tested is wrapped around and stuck to the curved surface of a short cylindrical steel bar. This test assembly is tumbled in a rotating drum containing granite chippings, causing an abrasive/scuffing action. The damage to the surface of the coated fabric is then assessed by comparison with a standard damage scale and by counting the sites of damage.

4 Apparatus

4.1 *Drum abrasion/snag tester*, consisting of a drum having an internal diameter of 254 ± 1 mm and an internal depth of 95 ± 1 mm. The drum rotates on its axis at a speed of 30 ± 2 r/min. The cylindrical wall of the drum is constructed of nylon and is not less than 25 mm thick. The front and back faces of the drum are of rubber 6 mm thick of hardness 74 ± 5 IRHD*. The rubber faces are supported on the outside by steel plates 1.6 mm thick. The front face of the drum is removable, to allow the drum to be loaded, and is held in place by three retaining bolts set at 120 ° relative to each other. To the cylindrical wall of the drum are fixed nine equally spaced stainless steel rods 95 mm long x 19 mm diameter, with their axes parallel to the drum axis. The drum backplate is a push fit onto its driving shaft and is held in place with a grub screw, allowing easy removal of the drum for loading. Beneath the drum is a removable tray to collect any spillage.

A timing device switches off the machine automatically after the completion of a preset test duration. A schematic illustration is shown in figure 1 and figure 2.

4.2 *Cylindrical metal test bars,* 50.8 mm long x 25.4 mm diameter with each end of the cylinder plugged with a rubber disc of hardness 97 IRHD, 25.4 mm diameter and approximately 1 mm thick, the exposed edge of the rubber disc being rounded to a radius of approximately 0.55 mm. The total mass of each bar, including the rubber end discs is 203 ± 3 g.

NOTE. Due to abrasive wear it is recommended that the rubber end discs are replaced when severely worn or damaged, this being necessary approximately every 20 h of testing.

4.3 *Damage severity scales*

4.3.1 *Two 'standard damage' scales,* for assessing the general severity of damage. One scale is black and one white; both are prepared from the same polyurethane coated fabric, but with black and white pigmentation respectively. Each scale consists of five test pieces of polyurethane coated fabric, graded from 1, showing little or very minor damage, to 5, showing severe damage.

4.3.2 *Damage sites counting template,* of translucent plastics material 83 mm x 51 mm covered with an opaque film and having 13 circular holes or cells each of area 0.5 cm^2 randomly spaced within a central rectangle of area 20 cm^2, i.e. approximately 56 mm x 36 mm (see figure 3).

4.4 *Granite chippings,* of 6 mm to 20 mm pink granophyric monzonite.

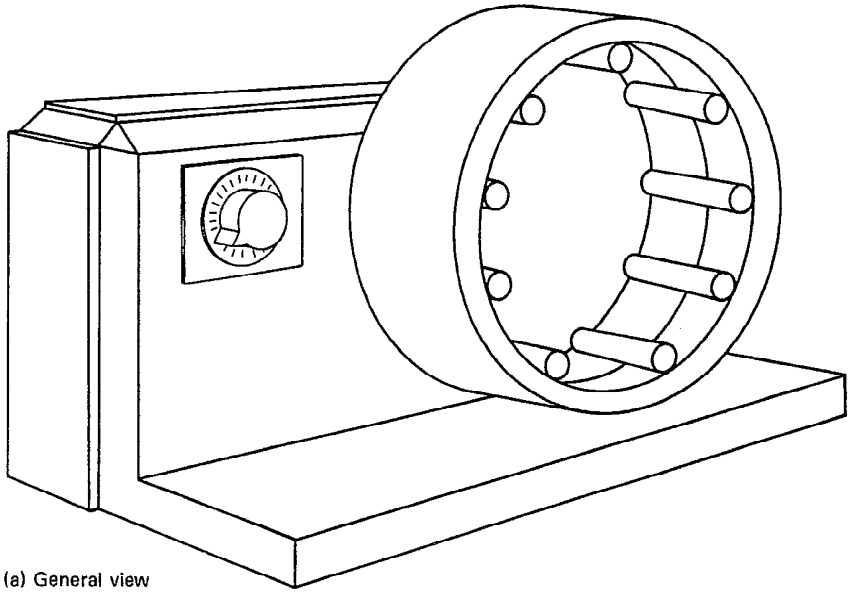
4.5 *Sieve,* consisting of a perforated plate having 19.0 mm square holes, complying with BS 410.

4.6 *Sieve,* consisting of a perforated plate having 6.7 mm square holes, complying with BS 410.

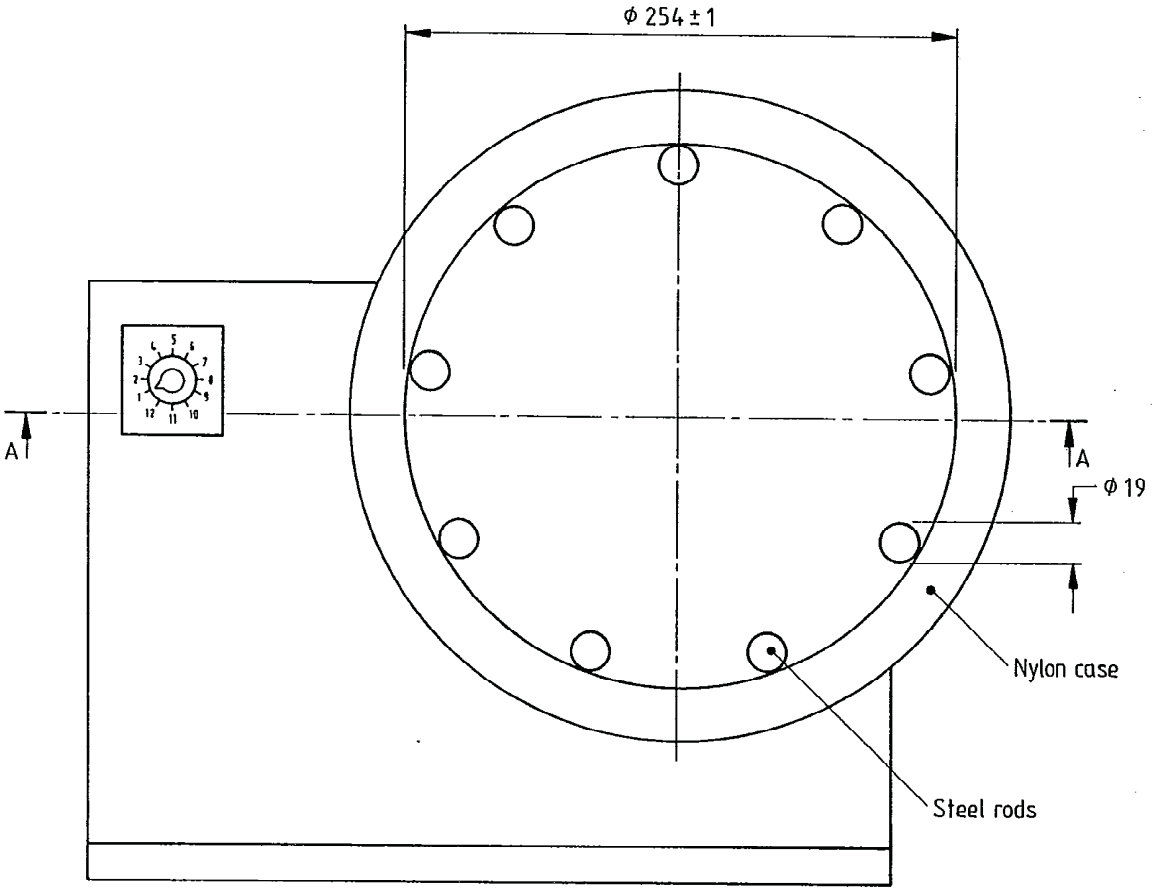
5 Selection of test specimens

Cut two test specimens 83 mm x 51 mm from the longitudinal direction of the coated fabric and test two pieces 83 mm x 51 mm from the transverse direction of the coated fabric. Ensure that the specimens are as widely dispersed as possible within the sample, and that, as far as possible, no two test specimens contain the same longitudinal or transverse threads and are not taken within 50 mm of any selvedge.

*International rubber hardness degrees.



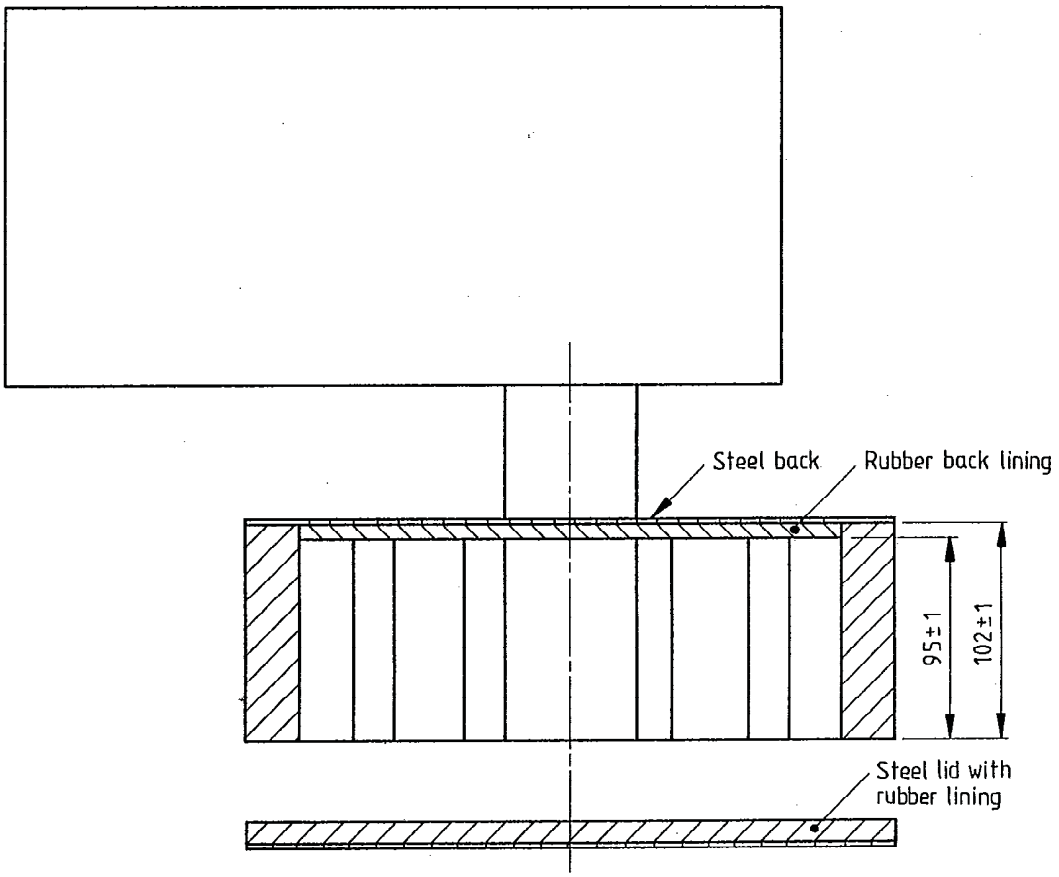
(a) General view



All dimensions are in millimetres.

(b) Front elevation

Figure 1. Drum abrasion/snag tester



All dimensions are in millimetres.

NOTE. This view is a cross section through the drum centre.

Figure 2. Plan view of drum abrasion/snag tester through A-A (see figure 1)

6 Preparation of test assemblies

6.1 Thin/flexible materials

Apply double sided adhesive tape to the reverse of the coated fabric test specimen, ensuring that the tape extends to all edges of the test specimen. Place the metal bar (**4.2**) carefully and centrally along a short edge of the test specimen and wrap the test specimen carefully around the metal bar, pressing it firmly all over, ensuring that no wrinkles or creases are introduced. Butt joint the two opposing edges of the test specimen.

NOTE. If there is a gap of 1 mm to 2 mm this may be ignored, but any overlap should be carefully trimmed away to form a butt joint.

6.2 Thick/stiff materials

Apply a suitable adhesive* according to the manufacturer's instructions that is compatible with the coated fabric under test. Bond the test specimen to the metal bar as described in **6.1**.

7 Preparation of new granite chippings

Sieve at least 1.5 kg of unused chippings through the 19.0 mm sieve (**4.5**) and discard any chippings retained on the sieve. Sieve the chippings passing through the 19.0 mm sieve through the 6.7 mm sieve (**4.6**) and retain the chippings retained by the 6.7 mm sieve. Discard the residue. Continue in this manner until 1.5 kg of chippings retained on the 6.7 mm sieve is obtained.

Remove the abrasion drum from the machine and tip in the 1.5 kg of sieved chippings. Replace the abrasion drum into the machine and re-attach the front plate to the drum and reassemble the drum carefully onto the motor shaft and secure in place.

Run the machine for 2 h. Remove the drum and tip the chippings onto the 6.7 mm sieve. Discard all dust and small chippings that pass through this sieve when it is agitated. Wash the retained chippings and dry them for at least 1 h at 100 °C and allow to cool to room temperature.

8 Test procedure

Remove the abrasion drum from the machine and brush out any dust present from a previous test. Weigh 1 kg of prepared granite chippings (see clause **7**) and add them to the drum together with four test assemblies (see clause **6**). Close the drum and re-attach it to the machine. Set the timer on the machine for 2 h or such other period as required by the product specification. Switch on the machine. When the machine is fully stopped and isolated remove the test assemblies from the machine. Carefully remove the coated fabric test specimens from the cylindrical metal test bars (**4.2**) and flatten out, without stretching, the coated fabric test specimens. Clean all granite dust off the surface of the test specimens with a damp cloth and dry them gently with a lint free cloth.

Clean any adhesive from the cylindrical metal bars using a suitable solvent, ensuring that the rubber end discs are not damaged by the solvent used.

Tip the used granite chippings onto the 6.7 mm sieve (**4.6**) and agitate to remove dust and small particles. Wash and dry the chippings retained on the sieve as described in clause **7** and make up the mass to 1 kg using prepared chippings (see clause **7**). Record the number of tests for which the batch of chippings has been used. Discard the batch of used chippings after four tests and select a new batch of 1 kg from chippings prepared in accordance with clause **7**.

9 Assessment of damage

9.1 Deterioration in appearance

Using the black damage scale (**4.3.1**) for the assessment of dark shades and the white damage scale (**4.3.1**) for the assessment of light shades, compare the test specimens with the standard damage scale under the viewing conditions described in BS 950 : Part 2 and record the number of the damage scale most closely resembling the appearance of the test specimen. If the damage is judged to lie midway between two standard damage scales, record a half point to the score, e.g. if the damage is judged to lie midway between 3 and 4, report a score of 3½. If the damage is less than 1 report a score of ½. If there is no damage report a score of **0**. If the damage is greater than 5 report 'greater than 5'.

9.2 Snag count

Place the opaque template (**4.3.2**) symmetrically on a test specimen with the film side down and, with the aid of a X10 stereoscopic microscope or X10 lens, count the number of cells or holes in which there is a snag A (see **2.2**). Do not count the number of snags; but count only the number of cells containing snags. The snag count n (see **2.3**) for the assessed area of the specimen (20 cm^2), is then derived by reference to table 1.

NOTE. Theoretically if every cell contains a snag site the total number of snags could be infinite, but for the sake of simplicity this is reported as 'over 200'. The mathematical basis of table 1 is given below.

$$n = \frac{\log C - \log (C - A)}{0.4343} \times \frac{\text{(area of specimen assessed)}}{\text{(area of single cell)}}$$

where

n is the snag count or abrasion count;
C is the number of cells in template;
A is the number of cells containing snags/abrasions.

*For a list of suitable adhesives, apply to Enquiry Section, BSI, Linford Wood, Milton Keynes, MK14 6LE, enclosing a stamped addressed envelope for reply.

Table 1. Snag/abrasion count reference table

A	*n*
1	3
2	7
3	10
4	15
5	19
6	25
7	31
8	38
9	47
10	59
11	75
12	103
13	over 200

9.3 Abrasion count

Count the number of sites of abrasion damage (see **2.1**) in the manner described in **9.2**, discounting snag sites and convert the cell count to abrasion count by reference to table 1.

9.4 Loss of finish

For coatings which show a very superficial and uniform change of appearance (which may be no more than a loss of gloss), but which cannot be assessed by an abrasion count, the severity of the type of damage is recorded by allocating a score A to D, from the following scale:

A little or no change of finish appearance;
B moderate change of finish appearance;
C pronounced change of finish appearance;
D complete loss of finish.

10 Test report

The test report shall include the following information:

(a) the description of the coated fabric;

(b) the duration of the test, if different than 2 h;

(c) the snag count (see **9.2**);

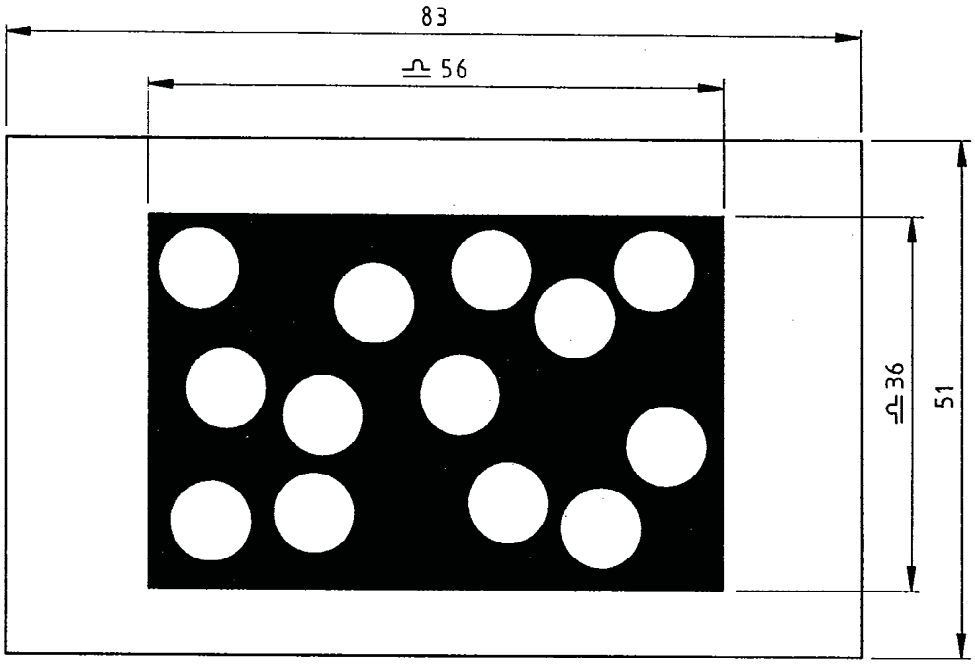
(d) the abrasion count (see **9.3**);

(e) the deterioration in appearance in accordance with the relevant standard damage scale in **9.1**;

(f) where requested, the loss of finish (see **9.4**);

(g) reference to this method of test, i.e. method 34 of BS 3424 : Part 31;

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



All dimensions are in millimetres.

Figure 3. Damage sites counting template

Publications referred to

BS 410 Specification for test sieves
BS 950 Specification for artificial daylight for the assessment of colour
Part 2 Viewing conditions for the graphic arts industry

This British Standard, having been prepared under the direction of the Fibres, Yarns, Fabrics and Production Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 October 1990

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