BS 8479:2008

BRITISH STANDARD

Textiles –

Method for determination of propensity of fabrics to snagging –

Rotating chamber method

ICS 59.080.01

British Standards

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ISBN 978 0 580 56168 9

The following BSI references relate to the work on this standard:
Committee reference TCI/24
Draft for comment 07/30142621 DC

Publication history

First published November 2008

Amendments issued since publication

Amd. no.	Date	Text affected

Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 November 2008. It was prepared by Technical Committee TCI/24, *Physical testing of textiles*. A list of organizations represented on this committee can be obtained on request to its secretary.

Information about this document

This standard gives a method of test which uses a rotating chamber containing snagging pins to measure the propensity of fabric test samples to snagging. Another procedure for this test which uses external snagging pins attached to a "mace" is under development. It is envisaged that this procedure will be added to the standard in a future revision.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its methods are expressed as a set of instructions, a description, or in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

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Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

Snagging is a phenomenon in which undesirable loops of varying sizes appear on the surface of a garment, usually as a result of the fabric catching on sharp points or objects. Fabrics made of filament yarns, both textured and untextured, are most prone to snagging. However, certain fabrics made of spun staple yarns, and certain fabric structures e.g. satin and sateens, can also be prone to snagging. It is important to be able to measure the propensity of fabrics to snagging so that fabrics with the lowest propensity to snagging can be selected for making garments.

1 Scope

This British Standard gives a method for determining the propensity of fabrics to snagging, and related surface defects. The standard is applicable to knitted and to woven fabrics.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 3870-1, *Stitches and seams – Part 1: Classification and terminology of stitch types*

BS EN ISO 139, *Textiles – Standard atmospheres for conditioning and testing*

BS EN ISO 12947-1, *Textiles – Determination of the abrasion resistance of fabrics by the Martindale method – Part 1: Martindale abrasion testing apparatus*

3 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

3.1 snag
undesirable loop on the surface of a woven or knitted fabric

NOTE Snags can be of various sizes and are usually the result of the fabric catching on sharp points or objects.

3.2 protrusion
partially formed snag

3.3 filamentation
fibrous or hairy appearance on the surface of a fabric due to broken yarn filaments

3.4 pulled thread
thread in a fabric that is tighter than the threads adjacent to it

3.5 shiner
thread that is more lustrous (and generally tighter) than the threads adjacent to it

NOTE Shiners most commonly occur in fabrics made of continuous filament yarn. They often occur as a result of snagging, as this causes the yarn to be pulled.

3.6 indentation
concave distortion of the surface of a fabric

4 Principle

Specimens of the fabric under test are mounted on felt-covered polyurethane tubes and tumbled randomly in a test chamber rotating at a constant speed, the inside of which is fitted with rows of pointed pins. The specimens are then examined for the presence of snags and other surface defects.

5 Apparatus

5.1 *Test chamber*, the inner surface of which has a regular octagonal cross-section, closed at one end and with an openable flap at the other (see Note), as illustrated in Figure 1, with an internal diameter between opposite parallel faces of (224.5 ± 0.3) mm and a depth of (228.0 ± 0.1) mm.

NOTE The opening should be sufficiently large to permit access to the inside of the chamber for cleaning.

The inner surface shall be made of a non-absorbent material, such as stainless steel or polypropylene, that is known to be resistant to degradation by generally available cleaning materials. It shall not have any surface finish, such as paint or varnish, that might be abraded during the tests.

The inner surface, including both ends, shall be smooth and free from defects.

The chamber shall be fitted with, or to, a device which is able to rotate the chamber about its horizontal axis at a constant speed of (60 ± 2) r/min.

The chamber shall be fitted with four lines of inward pointing pins made of metal with a minimum harness value of 58 Rockwell (C scale). Each pin shall have a nominal diameter of (1.0 ± 0.1) mm. The top (1.5 ± 0.1) mm of each pin shall be tapered to a sharp point. The point shall be free from hooks and burrs. Pins with rounded ends shall not be used. The lines of pins shall run parallel to the long axis of the chamber and shall be evenly spaced round the inner circumference of the chamber. The pins shall either be fitted to a series of bars which are recessed into the chamber wall, or be fixed directly into the chamber wall. The holes into which the pins are secured shall be blind so that the pins cannot be forced down into the bar or the chamber wall during the test, thus altering their height.

The length of each pin protruding into the chamber, i.e. the length from the tip of the pin to the point at the centre of the pin which is level with the surface of the bar or chamber wall [see Figure 1c)] shall be (5.0 ± 0.3) mm. The pins shall be inclined at an angle of 60° ± 0.5° to the wall of the chamber in the direction of rotation of the chamber. There shall be 20 pins in each line, spaced (10.0 ± 0.5) mm apart.

5.2 *Temperature and humidity controlled room*, in which the atmosphere conforms to the standard atmosphere specified in BS EN ISO 139.

5.3 *Four polyurethane tubes*, (70 ± 1) mm long, inside diameter (25 ± 1) mm and wall thickness (3 ± 0.5) mm [see Figure 2a)].

5.4 *Four pieces of woven wool felt*, conforming to BS EN ISO 12947-1, each piece (70 ± 0.5) mm × (110 ± 0.5) mm.

5.5 *Double sided adhesive tape*, with adhesion properties sufficient to hold the felt onto the tubes.

5.6 *Polyurethane or rubber based adhesive.*

5.7 *Locking rings*, for placing inside the ends of the polyurethane tubes to secure the test specimens during the test procedure, comprising lengths of natural black rubber strip, or similar material, of Shore hardness 50, (88.5 ± 0.5) mm long, (25.0 ± 0.5) mm wide and (2.5 ± 0.5) mm thick.

5.8 *Lockstitch sewing machine*, capable of producing lockstitch type 301 as detailed in BS 3870-1, and fitted with a needle and polyester thread suitable for sewing the fabric under test.

NOTE A medium ballpoint needle (size Nm 90, designated in accordance with ISO 8239:1987) and 470 dtex polyester corespun thread (ticket number 75 or 80 as designated in accordance with BS 4134:1990) are recommended. A preliminary test should be carried out with a double layer of the fabric under test to determine whether this needle and thread can sew the fabric without causing damage or distortion. If damage or distortion occurs, different needles and threads should be tried until a suitable combination is found.

5.9 *Specimen template*, comprising a flat piece of rigid material, e.g. acrylic sheet, (140 ± 0.5) mm × (140 ± 0.5) mm, approximately 2 mm thick.

5.10 *Viewing cabinet*, with a matt black surface, fitted with a light source comprising a white fluorescent tube or bulb arranged so as to give uniform illumination over the width of the test specimen and masked in such a way that the observer does not look directly into the light when viewing the test specimen. The light source shall be positioned such that the light strikes the test specimen at an angle of between 5° and 15° to the plane of the test specimen.

NOTE The colour temperature of the light source is not critical.

5.11 *Assessment mask*, comprising a flat piece of rigid material, e.g. PVC sheet, with a matt black surface, (140 ± 0.5) mm × (120 ± 0.5) mm with an oblong aperture (110 ± 0.5) mm × (70 ± 0.5) mm.

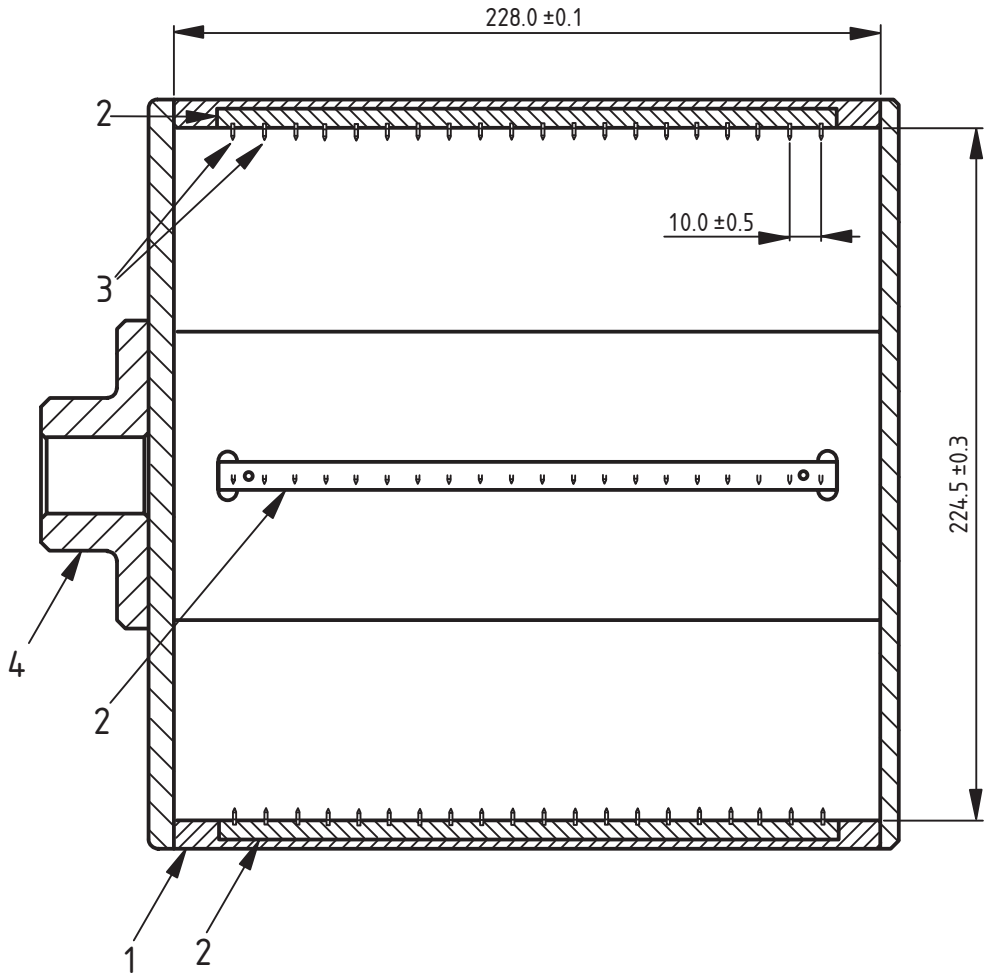
5.12 *Steel rule or gauge*, for measuring the length of snags on the test specimens.

5.13 *Stiff brush*, for cleaning fibrous debris off the pins.

5.14 *Vacuum cleaning device*, for removing dust and debris from the inside of the chamber.

Figure 1 **Test chamber**

Dimensions in millimetres

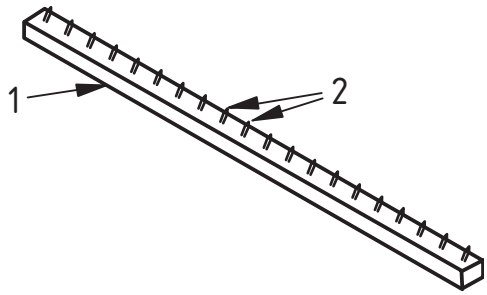


Key

1 Test chamber
2 Pin bars
3 Pins
4 Device for rotating the test chamber

a) Sectional view of test chamber

Figure 1 **Test chamber** (*continued*)



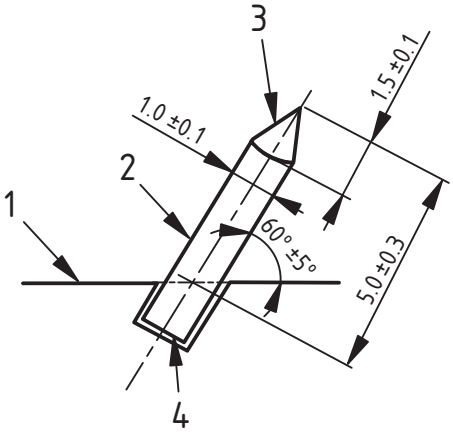
Key

1 Pin bar

2 Pins

b) Isometric view of a pin bar

Linear dimensions in millimetres



Key

1 Surface of pin bar

2 Pin

3 Pointed end of pin

4 Flat end of pin fitted into blind hole in pin bar

c) Detailed view of a pin

6 Preparation of test specimen tubes

Cut a piece of the double sided adhesive tape (**5.5**) long enough to wrap around one of the polyurethane tubes (**5.3**) to give a single layer over the whole surface, excluding the rounded edges at the ends of the tube. Cover the tube with the tape as shown in Figure 2b).

Wrap a piece of felt (**5.4**) around the tube over the adhesive tape, with the shorter sides of the felt parallel to the long axis of the tube. Press the felt firmly onto the tube so that it sticks securely to the adhesive tape. Apply a layer of adhesive (**5.6**) to each of the shorter sides of the felt, butt them together and hold them firmly in place until they are stuck [see Figure 2c)].

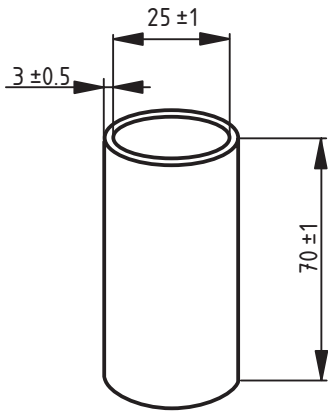
Repeat this procedure with the remaining three tubes.

If reusing tubes that have been used previously, check the condition of the felt and the tubes before each test. If the felt has lifted away from the tube, if the join has parted, or if the felt is soiled or damaged, remove the felt and re-cover the tube with a new piece of felt. If the exposed ends of any of the tubes have cracked, discard them and use new tubes.

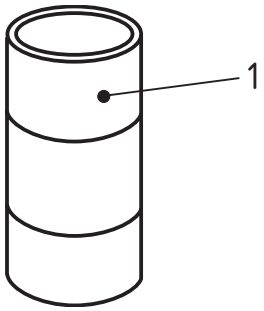
Condition the felt covered tubes in the standard atmosphere (see **5.2**) for a minimum of 16 h, and keep them in the standard atmosphere until needed for the test.

Figure 2 **Covering of test specimen tubes with felt**

Dimensions in millimetres



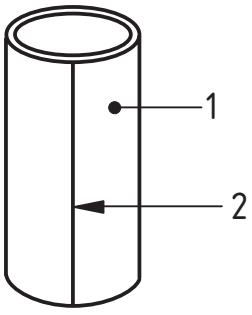
a) Test specimen tube



Key

1 Double sided adhesive tape

b) Test specimen tube covered with double sided adhesive tape



Key

1 Felt

2 Short ends of felt butted together and glued

c) Test specimen tube covered with felt

7 Pre-treatment of fabric

Unless otherwise agreed between the interested parties, the fabric shall be tested as received.

If washing or cleaning of the fabric prior to testing is agreed, this shall be carried out as agreed between the interested parties, and the details shall be recorded in the test report.

8 Conditioning of fabric

Condition the roll of fabric, swatch or sample length supplied for testing, in the standard atmosphere (see **5.2**) for a minimum of 4 h prior to preparation of the test specimens.

9 Preparation of test specimens

9.1 Using the specimen template (**5.9**) cut four test specimens (140 ± 0.5) mm × (140 ± 0.5) mm from the roll, swatch or length of fabric submitted for testing, ensuring that where there are different length or width yarns in the fabric these are all represented in each test specimen.

9.2 If the fabric has a pattern, all areas of the pattern shall be included in the test specimens. If it is not possible to include all areas in the four test specimens specified in **9.1** then one or more additional sets of four test specimens shall be prepared in accordance with **9.1**.

NOTE An example of positioning of test specimens on a length of fabric is given in Annex A.

9.3 Fold each test specimen in half, with the upper or outer surface of the fabric to the inside. Fold two test specimens with the fold running parallel to the warp, or the length direction, and the other two with the fold running parallel to the weft, or the width direction. Using the lockstitch sewing machine (**5.8**) sew a seam along the long raw edges of each test specimen to produce an open ended tube of fabric.

NOTE It is important that the tube of fabric fits onto the test specimen tube in such a way that the fabric is not so loose that it can wrinkle, or so tight that it distorts the test specimen tube. To ensure this, it is recommended that the seam is sewn 8 mm from the edge for woven fabrics and 9 mm to 10 mm from the edge for knitted fabrics. However, for some fabrics a different seam position might be needed, depending on the fabric structure. It is recommended that some extra test specimens are used in a preliminary evaluation to determine the best position for the seam for the particular fabric being tested.

9.4 Turn each test specimen so the outer or upper face of the fabric is on the outside.

9.5 Fit each test specimen onto a test specimen tube by carefully sliding it, by hand, over the felt covering. Align the seam in the test specimen with the join in the felt covering and ensure that the seam lies as flat as possible. Turn the raw edges of the test specimen into the ends of the test specimen tube.

9.6 For each test specimen use two locking rings (**5.7**). Roll each ring into a spiral and insert them into the ends of the test specimen tube so that they fit securely and hold the ends of the test specimen in place. Ensure that the locking rings do not extend beyond the ends of the test specimen tube.

9.7 Condition the test specimen tubes fitted with the test specimens in the standard atmosphere (see **5.2**) for 16 h prior to the test, and keep them in the standard atmosphere until needed for the test.

10 Procedure

Carry out the testing in the standard atmosphere (see **5.2**).

Before each test, clean the inside of the test chamber and the pins with the vacuum cleaning device and the brush, and ensure that they are free from visible fibres and debris. Inspect the pins and replace any that show visible damage.

NOTE 1 When cleaning the chamber with the vacuum device it is essential to take care not to damage the pins with the nozzle of the cleaner.

NOTE 2 In addition to cleaning before each test, thorough cleaning, maintenance and verification of the test chamber should be carried out in accordance with Annex B.

Place the test specimen tubes fitted with the test specimens in the test chamber. Close the flap securely.

Set the chamber rotating at 60 r/min and run it for a total of 2 000 revolutions.

On completion of the test period remove the covered tubes from the chamber.

Check that the locking rings in the ends of the tubes are still in place. If any have come out, discard the test specimens and repeat the test with a new set of test specimens.

Remove the locking rings from the ends of the tubes to release the ends of the test specimens. Remove the test specimens from the tubes by cutting along the stitching line. Do not trim the test specimens.

11 Assessment

11.1 General

The assessment shall be carried out in a darkened room, and the test specimens shall be viewed with normal or corrected vision, without magnification, from a distance of between 300 mm and 500 mm.

NOTE Owing to the subjective nature of the assessment, it is recommended that wherever possible the assessment is carried out by more than one observer.

11.2 Procedure for grading and classifying test specimens for snagging and other surface defects

Place each test specimen in turn in the viewing cabinet (**5.10**) with the test specimen oriented such that the warp, or length direction, of the fabric is vertical, and hold it in place by means of a piece of double sided adhesive tape.

Position the assessment mask (**5.11**) over the test specimen, carefully aligning the aperture so the tested area is visible to the assessor.

Grade each specimen in accordance with the grading system given in Table 1. If the grading appears to be between two grades, report an intermediate grading e.g. 3-4.

Table 1 **Grading system**

Grade	Description	Appearance
5	None	No snags or other surface defects
4	Slight	Snags or other surface defects in isolated areas
3	Moderate	Snags or other surface defects partially covering the surface
2	Distinct	Snags or other surface defects covering a large proportion of the surface
1	Severe	Snags or other surface defects covering the entire surface

In addition, classify the type, or types, of surface defects present on each test specimen in accordance with the classification system given in Table 2. For test specimens with two or more different surface defects, record all the types present.

Table 2 **Classification system for surface defects**

Defect type	Defect description
A	Snagging
B	Protrusions
C	Indentations
D	Shiners, pulled threads or other distortions of the fabric structure, occurring in close proximity to snag loops and/or not associated with any snag loop
E	Visible defects due to colour contrasts [A)]
F	Filamentation
G	Any other defects specific to the fabric type and which detract from the original surface appearance. A description shall be included in the test report
X	No visible surface defects

[A)] These often occur in printed, colour woven or colour knitted fabrics.

*NOTE Standardized grading photographs may be used to make an additional assessment of snagging if agreed between the interested parties. If this is done the photographs to be used should be agreed between the parties concerned. The procedure given in **11.2** should be used, and full details of the grading photographs used should be given in the test report.*

11.3 Procedure for assessment of the lengths and numbers of snags

Measure a representative sample of snags as follows. If there are 10 snags or fewer measure all of them. If there are more than 10 snags measure 10 of them covering the full range of lengths present. Record all the length measurements, and classify the snags as follows:

a) ⩽2 mm: short;

b) >2 mm ⩽5 mm: medium;

c) >5 mm: long.

If there are 10 snags or fewer, record the number of snags in each length category.

If more than 10 snags are present, inspect the snags on the whole test specimen and record an estimate of the numbers of snags in each length category as either ⩽10 or >10.

EXAMPLE 1 (10 snags or less)

Total number of snags: 9

Count of number of snags in each length category:

a) ⩽2 mm (short): 2

b) >2 mm ⩽5 mm (medium): 5

c) >5 mm (long): 2

EXAMPLE 2 (more than 10 snags)

Total number of snags >10 (estimated approximate number of snags 50)

Estimate of number of snags in each length category:

a) ⩽2 mm (short): >10

b) >2 mm ⩽5 mm (medium): >10

c) >5 mm (long): ⩽10

12 Test report

The test report shall include at least the following information:

a) the number and date of this British Standard;

b) details of any washing or cleaning to which the fabric was subjected prior to testing (see Clause **7**);

c) the grade of each test specimen, in accordance with Table 1 and the classification, for each test specimen, of any surface defects, in accordance with Table 2;

EXAMPLES A test specimen with snags in isolated areas and no other defects would be Grade 4 Type A. A test specimen with snags partially covering the surface, and shiners, would be Grade 3 Type A,D.

d) the mean grade for the four test specimens;

e) for test specimens with defects classified as Type G, a description of the appearance of the defects;

f) if grading photographs are used (see Note to **11.2**) full details of the grading photographs, the individual grade of each test specimen and the mean grade;

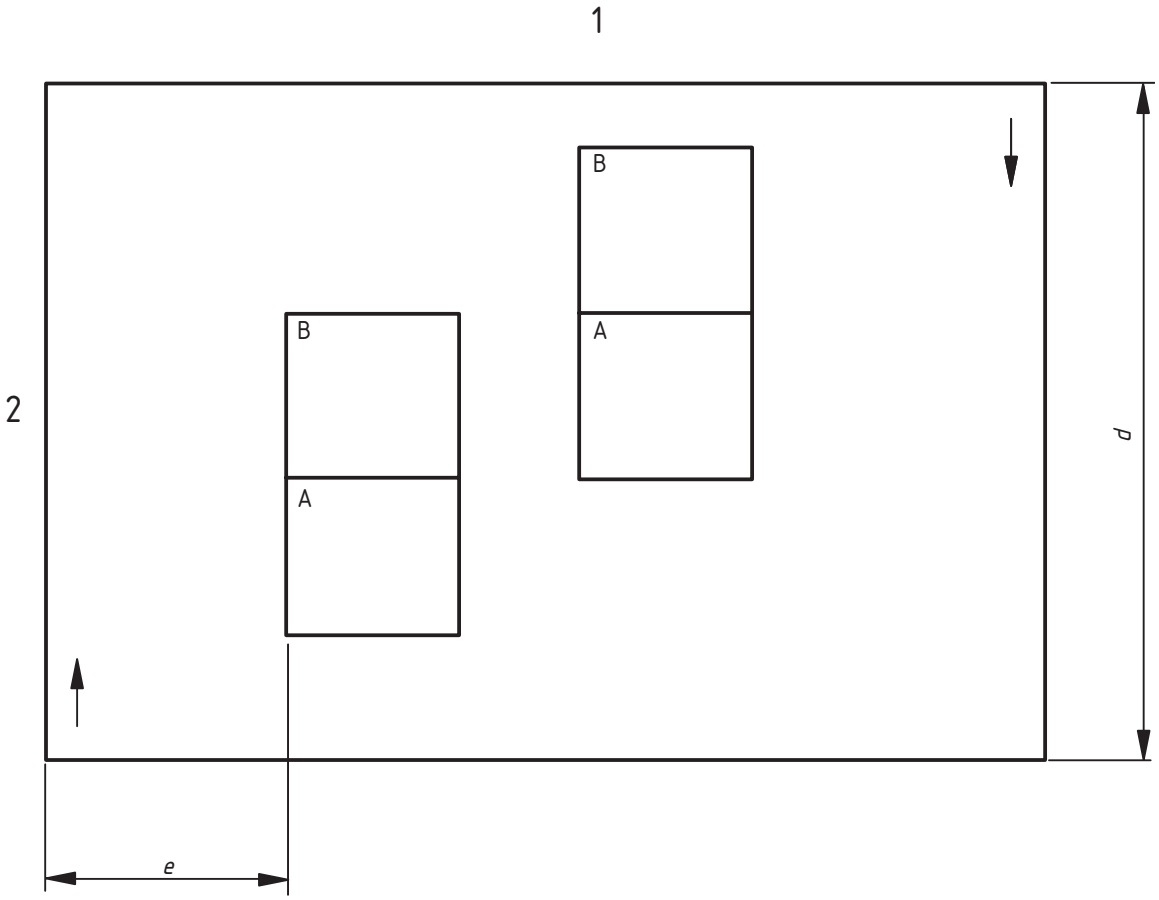
g) if the test specimen has snags, the number of snags in each length category;

h) details of any deviations from the method given in this standard.

Annex A (informative) Example of the location of test specimens on a length of fabric supplied for test

An example of the location of test specimens on a length of fabric supplied for test is shown in Figure A.1.

Figure A.1 **Example of the location of test specimens**



Key

1 Fabric weft, or width direction

2 Fabric warp, or length direction

Arrows indicate selvedges

d = 450 mm

e = 50 mm minimum

Specimens labelled A to be oriented on the test specimen tubes with the warp, or length direction, parallel to the longitudinal axis of the tube.

Specimens labelled B to be oriented on the test specimen tubes with the weft, or width direction, parallel to the longitudinal axis of the tube.

Annex B (informative) Recommendations for periodic cleaning, and for verification, of the test chamber

B.1 Periodic cleaning

In addition to cleaning the inside of the test chamber to remove fibres and debris before each test (see Clause **10**), periodically, the inside of the test chamber should be thoroughly cleaned, using a mild detergent solution, to remove any contamination or residue from the test specimens. After cleaning care should be taken to ensure that the test chamber is completely dry before it is used again.

B.2 Verification

Before a test chamber is put into routine use for the first time, it is recommended that test specimens from a series of different fabrics which are representative of those tested by the laboratory should be tested in the chamber. At least two of these fabrics with different snagging grades, preferably between 1-2 and 4, should be selected, and lengths of these fabrics, together with the original test specimens, should be retained for verification purposes.

At regular intervals, for example every 6 months, new specimens of the verification fabrics should be tested and compared with the original test specimens.

If the verification specimens indicate that drift in chamber performance has occurred the pins should be checked, and replaced as necessary.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4134:1990, *Method for designation of ticket numbers of industrial sewing threads*

ISO 8239:1987, *Sewing machine needles – Fitting dimensions – Tolerances and combinations*

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Tel +44 (0)20 8996 9001
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