BS 3449 : 1990

UDC 677.01 : 677.074 : 541.121 : 532.22 : 620.1

British Standard

Method for resistance of fabrics to water absorption (static immersion test)

Foreword

This British Standard has been prepared under the direction of the Textiles and Clothing Standards Policy Committee and forms a revision of BS 3449 : 1961, which is withdrawn.

In this revision, the method has been brought up to date by making minor changes throughout the text.

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

1 Scope

This British Standard describes a static immersion test which may be applied to any textile fabric for which a knowledge of the water absorption properties is required.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Principle

Specimens of conditioned fabric of known mass are immersed in water at a constant temperature for a specified length of time. The specimens are held down in a horizontal plane at a given depth below the surface by means of sinkers. The specimens are taken out of the water and surplus water is removed from them by centrifuging, the mass of the specimens is again determined and the absorption percentage is calculated.

3 Apparatus and reagent

3.1 *Immersion vessel,* of non-corrosive material, at least 130 mm deep, with a flat base, and the base area being large enough to accommodate at least four sinkers. The immersion vessel shall be clean.

3.2 *Four sinkers* (see appendix A).

3.3 *Balance,* to determine mass accurately to 1 mg.

3.4 *Centrifuge,* comprising a disc with a horizontal mounting surface of diameter 175 mm, capable of rotating at 700 r/min. The time required to attain the speed of 700 r/min from rest and vice versa shall be between 1 s and 2 s.

Approximately 50 ribs, each at least 1 mm in height, shall be provided in a radial arrangement on the surface of the disc. The ribs shall be equally spaced in angular direction so that the wet specimens cannot stick to the smooth surface.

Four steel pins, approximately 6 mm long and spaced approximately 60 mm away from the centre of the disc, shall be provided in an equally spaced arrangement around the disc to secure the specimens. The specimens press on to these pins during rotation.

The total mass of the disc and shaft propelled by the drive motor shall be 410 g.

The centrifuge shall be automatically switched off by a timer following the prescribed rotation cycle.

NOTE. It is recommended that a rotation cycle of 15 s is employed.

3.5 *Stop-watch,* having an accuracy of ± 1 s.

3.6 *Thermometer,* complying with BS 593.

3.7 *Four light-weight air-tight containers,* large enough to accommodate single specimens without creasing.

3.8 *Water,* complying with grade 3 of BS 3978, at a temperature of 20 ± 2 °C.

4 Atmosphere for conditioning and testing

The conditioning and testing atmosphere shall be the standard temperate atmosphere for testing textiles as defined in BS 1051, i.e. a relative humidity of 65 ± 2 % and a temperature of 20 ± 2 °C.

5 Test specimens

5.1 Dimensions

Cut each test specimen approximately 80 mm x 80 mm at approximately 45 ° to the warp or machine direction, avoiding creasing and distortion.

5.2 Number

Test four test specimens.

5.3 Selection

Take the test specimens from different places in the fabric, so that they represent the material as fully as possible.

5.4 Preparation

Remove loose yarns from the test specimen corners and handle the test specimens as little as possible.

6 Procedure

6.1 Condition the test specimens for at least 24 h in the standard temperate atmosphere for testing textiles (see clause 4).

6.2 After conditioning, record the mass of each test specimen to the nearest milligram.

6.3 Insert one test specimen between the cross-pieces of each of the four sinkers (3.2) with the diagonals of the test specimens in line with the arms of the cross-pieces.

6.4 Add to the immersion vessel (3.1) water (3.8) at 20 ± 2 °C to a depth of at least 100 mm.

NOTE. Use fresh water (3.8) for each set of four test specimens.

6.5 Hold the first sinker with the stem vertical so that the test specimen is just clear of the water surface, submerge it carefully to the bottom of the immersion vessel at the same time starting the stop-watch (3.5). Submerge the remaining three sinkers and test specimens at intervals of approximately 1 min.

6.6 If a test specimen becomes displaced appreciably during the process of submerging, restore it to its proper position with the tip of a glass rod; do not touch the water with the hands.

NOTE. When a test specimen and sinker are submerged, the test specimen, which may be lighter than water because of entrapped air, may press upwards against the underside of the upper arms of the cross-piece.

6.7 Take the first sinker and test specimen out of the water after they have been immersed for a period of 20 min ± 10 s. Remove the test specimen from the sinker immediately and remove loosely attached water from the test specimen with the centrifuge (3.4).

6.8 Weigh a lightweight air-tight container (3.7) and transfer the test specimen to it immediately centrifuging is complete.

6.9 Repeat 6.7 to 6.8 with the remaining three sinkers and test specimens after each has been immersed for a period of 20 min ± 10 s.

6.10 Determine the mass of each of the loaded containers to the nearest milligram.

7 Calculation and expression of results

7.1 Calculate the absorption (in %) for each test specimen from the following formula:

$$\text{Absorption} = \frac{W_2 - W_1}{M} \times 100$$

where

W_1 is the mass of the container (in g);

W_2 is the mass of the container plus wet test specimen (in g);

M is the mass of the conditioned test specimen (in g).

7.2 Calculate the mean percentage water absorption for the four test specimens to the nearest 1 %.

8 Test report

The test report shall include the following:

(a) the number and date of this British Standard, i.e. BS 3449 : 1990;

(b) the percentage water absorption of each test specimen;

(c) the mean percentage water absorption to the nearest 1 %;

(d) details of the sample tested.

Appendix

Appendix A. Sinkers

NOTE. All dimensions are nominal.

A sinker is illustrated in figure 1. It consists of a cross-piece and stem made entirely from 3 mm diameter brass rod. The cross-piece is made by silver-soldering together four lengths of brass rod which have first been bent into U-shapes and the stem is soldered to the cross-piece. The spacing in the cross-piece is 3 mm and each of the four arms is 65 mm long. The length of the stem is 125 mm. After construction, each sinker is chromium-plated.

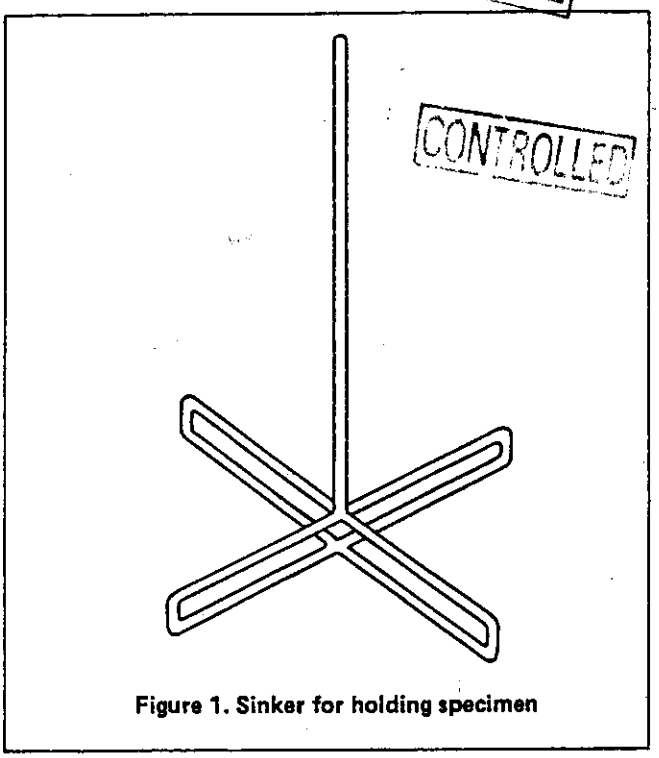

Figure 1. Sinker for holding specimen

Publications referred to

BS 593 Specification for laboratory thermometers
BS 1051 Glossary of terms relating to the conditioning, testing and mass determination of textiles
BS 3978 Specification for water for laboratory use