BS 4948 : October 1973
UDC 677.616.22.017.852

Method for

Assessment of the visible soiling by body contact of upholstery fabrics

Amd 3004

Amendments issued since publication

Amd. No.	Date of issue	Text affected
3004	31-07-79	16. [illegible]

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Foreword

This standard is the second in a series of standard test methods being developed for upholstery fabrics.

A background paper describing the development of the test method is published in *Textile Institute and Industry*, 1971 Vol. 9, No. 12.

BS 4948 : 1973

British Standard Method for

Assessment of the visible soiling of upholstery fabrics

1. Scope

'This British Standard specifies a method for the assessment of the visible soiling of upholstery fabrics which occurs in those areas which come into direct contact with the body during use, e.g. upholstered arms, the tops of the backs of some chairs and settees and the lower front edge of seats. Upholstery fabrics the use-surface of which is coated with a plastics material are excluded, as are airborne soiling and staining from other causes.'

2. Principle

A conditioned specimen is mounted in one end of a cylinder containing soiled wool felt cubes. In the opposite end of the cylinder is mounted a piece of standard cotton fabric as used for colour fastness testing. The cylinder is rotated so that the soiled cubes impinge on both fabrics. The test is continued until the measured reflectance of the standard cotton fabric has decreased by a given extent. The test specimen is then removed and the appearance change which results from the soiling is assessed.

3. Apparatus

The following are required.

(1) A soiling machine* comprising an even number of cylinders, preferably in multiples of four, mounted so that they can be rotated within a circumscribing diameter of 700 mm. The cylinders are located with their longest symmetrical axis in the plane of rotation and at right angles to a diameter of the circumscribing circle such that their central point is 240 ± 25 mm from the axis of rotation, measured perpendicularly. Cylinder dimensions are 100 ± 5 mm internal diameter and 300 ± 10 mm in length.

Removable lids are located at each end of the cylinder. The test specimen is secured against the lid by an annular collar of internal diameter not less than 75 mm. Means of rotating the cylinders at 24 ± 2 rev/min shall be provided together with the facility to change the direction of rotation at the end of a 10 minute period of operation. (See Fig. 1.)

(2) Wool felt cubes with sides measuring 12.5 ± 0.5 mm and of relative density 0.30 to 0.40 (see Appendix A).

(3) Standard, undyed, bleached cotton lawn or similar fabric free from starch or other finish, cut into circles of diameter 96 ± 1 mm (see Appendix A). At least six will be required.

(4) Grey scale for assessing staining (see BS 2661 and BS 2663).

(5) Photoelectric reflectometer and galvanometer (see Appendix A and Fig. 2).

(6) A synthetic sebum made up from the following:

20 g coconut oil	26 g stearic acid
20 g cotton seed oil	36 g oleic acid
24 g ground nut oil	40 g cholesterol
30 g trimyristin	20 g myristic alcohol
80 g tripalmitin	20 g cetyl alcohol
6 g tristearin	20 g octadecyl alcohol
8 g lauric acid	80 g liquid paraffin (relative density 0.83 to 0.87)
28 g myristic acid	40 g squalene†
82 g palmitic acid	

Analytical grade quality chemical should be used where available.

*An instrument conforming to these requirements may be obtained from Furniture Industry Research Association, Maxwell Road, Stevenage, Herts SG1 2EN.

(7) 1,1,1-trichloroethane

(8) Colloidal graphite having approximately 10 % graphite in a dispersion which is miscible with white spirit and chloroform

(9) White spirit, meeting the requirements of BS 245.

4. Atmosphere for conditioning and testing

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

5. Test specimens

5.1 Cut at least four circular test specimens of diameter 96 ± 1 mm from the material under test ensuring that no specimen is taken within 50 mm of the selvedges. Select the specimens to be truly representative of the overall surface texture of the material under test.

5.2 Cut at least four rectangles of the fabric under test, each measuring 50 mm x 55 mm for use in the ...essment.

6. Preparation of test specimens and standard cotton fabric

Expose the test specimens and the circles of standard cotton fabric to the standard atmosphere for testing textiles for at least 24 h.

7. Test procedure

7.1 Testing atmosphere

Conduct the test in the standard atmosphere for testing textiles.

7.2 General

The information given in Clause 7 relates to a four-cylinder machine. Larger quantities shall be used for larger machines.

7.3 Preparation of the soiled cubes

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7.3.1 *Preparation of soiling mixtur...* ~~(Solution 1)~~. Dilute 10 ml of the co... (Solution 2).

'Dilute the synthetic sebum (see clause 3 (6)) in 1740 ml of 1,1,1-trichloroethane (solution 1). Carry out this process and the subsequent soiling of the cubes (see 7.3.2) in a fume cupboard equipped with forced draught air circulation vented to the atmosphere outside the building in which the test is being conducted.'

.3.2 *Soiling of the cubes.* This ope... diameter such that it can conveniently fit inside the container of the soiling mixture dispersion. To a mixture of 250 ml of solution 1 and 15 ml of solution 2 add 20 wool felt cubes and immerse them until they become saturated. (This should take approximately 3 min). Remove the wool cubes, drain them and repeat the process with a further 20 wool felt cubes. Allow the soiled wool felt cubes to dry in an oven at 60 + 2 °C for not less ...is process can be repeated with further batches of 20 wool felt cubes until the remaining ...ling mixture is inadequate to cover them completely.' ...nd place them in

7.4 Standardization of the soiled cubes

7.4.1 Determine the mean value for reflectance of each roll or piece of the unsoiled, standard cotton fabric.

7.4.2 Mount two circular pieces of the standard cotton fabric by means of the annular collars in the lids at opposite ends of the cylinders of the soiling machine. Into this same cylinder place 40 of the soiled wool felt cubes, fasten the lids in place and run the machine for 90 min.

7.4.3 At the end of that period remove the pieces of standard cotton fabric and determine the loss of reflectance from the original state.

7.4.4 The required loss of reflectance is 25 ± 2 units (based on the 0 % to 100 % scale). If the loss in reflectance is less than that specified return the pieces of standard cotton fabric to the cylinder and run the machine for a further 15 min. If the loss in reflectance is more than that specified discard the cubes and start with a new batch.

7.4.5 Continue to determine the reflectance and if the loss has not reached the level specified in 7.4.4 repeat the procedure described in 7.4.4 until the required level of reflectance is obtained. This level of soiling should be achieved within a period of between 1.5 h and 3 h. If the rate of soiling is too slow or too fast reject the soiled cubes and prepare a second batch using a slightly different proportion of the graphite dispersion (solution 2) in the soiling medium. If the rate of soiling is too slow slightly increase the volume of the graphite dispersion used and vice versa. Normally an alteration of ± 0.5 ml of the diluted graphite dispersion in the soiling mixture constitutes a sufficient correction.

NOTE. When the soiling rate of the batch of 40 wool felt cubes is satisfactory, a larger number of wool felt cubes may be prepared simultaneously. The volume of soiling mixture prepared as described in 7.3.1 is suitable for the treatment of a total of 160 wool felt cubes, and this number can be tumbled together for at least 16 h in each cylinder of the soiling machine.

7.5 Procedure for test specimens

7.5.1 Ensure that the inner surfaces of each cylinder are clean before the test is conducted.

7.5.2 For each cylinder of the soiling machine mount a test specimen in one lid and a fresh piece of the standard cotton fabric in the other lid. Place 40 of the standardized soiled wool felt cubes in each cylinder, attach the lids and run the machine for not less than 1.5 h and not more than 3 h until the reflectance of the standard cotton fabric has decreased by 25 ± 2 units. Remove the test specimens and vacuum clean them prior to assessment. assessment.

NOTE 1. The vacuum cleaning does not remove the soiling mixture, but it does remove most of the white fibres originating from the wool felt cubes that may be picked up by some types of fabric (notably cut pile fabric and loop raised warp knitted fabrics).

NOTE 2. The wool felt cubes can usually be used for three soiling tests before their soiling potential falls below the acceptable level. When this occurs, the soiling power can be increased to an acceptable level by retumbling them overnight as described in 7.3.2. Not more than 160 wool felt cubes should be placed in each cylinder for the retumbling operation, which can be repeated several times until the wool felt cubes show signs of wear.

8. Assessment of the test specimens

From the centre of each soiled test specimen cut a rectangle measuring 50 mm x 55 mm, with its sides in the same directions as the specimens prepared as described in 5.2. Mount each rectangle on a card adjacent to a piece of the same dimensions of the unsoiled fabric under test. Assess the contrast between the soiled and unsoiled pieces of material using the grey scale for staining (see BS 2663).

9. Test report

The report shall state:

(1) that the test procedure was conducted in accordance with this British Standard
(2) the number of specimens tested
(3) the numerical rating for staining of each test specimen.

Appendix A

Additional information on apparatus

A.1 The wool felt cubes, designated quality WT33, may be obtained from R & R Whitehead Limited, Royal George Mills, Greenfield, Oldham, Lancs.

A.2 The standard undyed, bleached cotton fabric is the same as that specified in BS 2677 and is obtainable from The Society of Dyers and Colourists.

A.3 The photoelectric reflectometer* shall conform to the following description (see Fig. 2).

The reflectometer consists of an annular selenium barrier layer photoelectric cell, which is positioned with the sensitive surface parallel to and facing the test surface, and a light source which illuminates the test surface through a hole in the centre of the photoelectric cell. The photoelectric cell is 44 mm diameter (sensitive area 38 mm diameter) and the central hole is 10 mm diameter; the absorption characteristics of the cell are such that it exhibits maximum sensitivity to light at a wavelength of approximately 560 nm. The cell is held in an electrically insulated plastic housing, so that the sensitive surface is parallel to and 6 mm above the plane base of the housing, which in turn rests on the surface under test.

The light source, a 6 volt, 6 watt automobile type lamp, operated from a constant voltage supply, is enclosed in a ventilated metal lamp-house and positioned symmetrically above the hole in the photoelectric cell, the distance between the lamp filament and the sensitive surface of the cell being approximately 25 mm. The light beam reaching the test surface is first filtered by a heat-resisting glass filter 10 mm thick and at least 10 mm diameter. No colour modifying filters are to be used. The photoelectric cell is connected through the potentiometer to the galvanometer or other suitable current measuring device.

A constant voltage supply is necessary and a 6 volt accumulator or a 6 volt constant voltage transformer may be used.

The galvanometer is adjusted to read zero reflectance for a black tile and 100 % reflectance for a magnesium carbonate block. The black tile is also used as a background when measuring the reflectance of the soiled samples.

*An instrument conforming to this design, described as the 'EEL' PRS reflective head Mark III, may be obtained from Evans Electroselenium Limited (see Fig. 2).

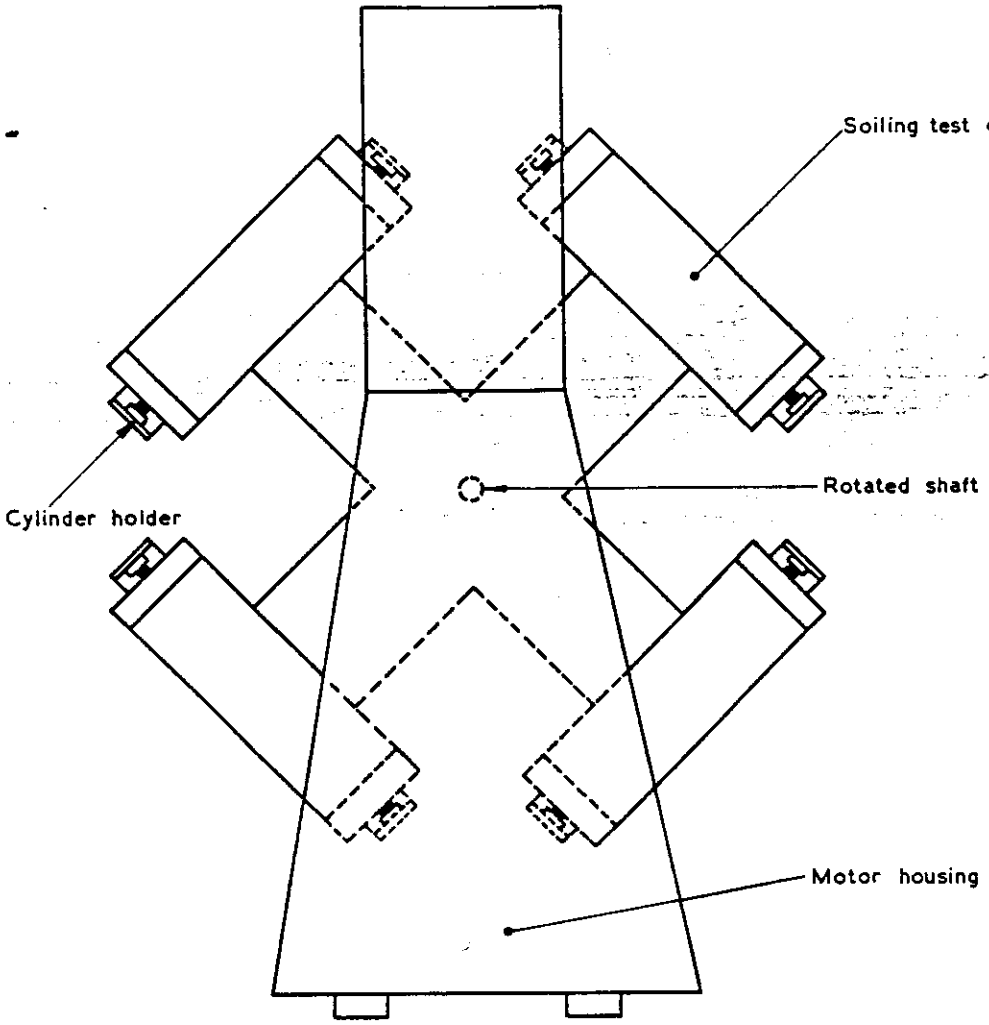

Fig. 1. Side view of soiling machine (safety guards removed)

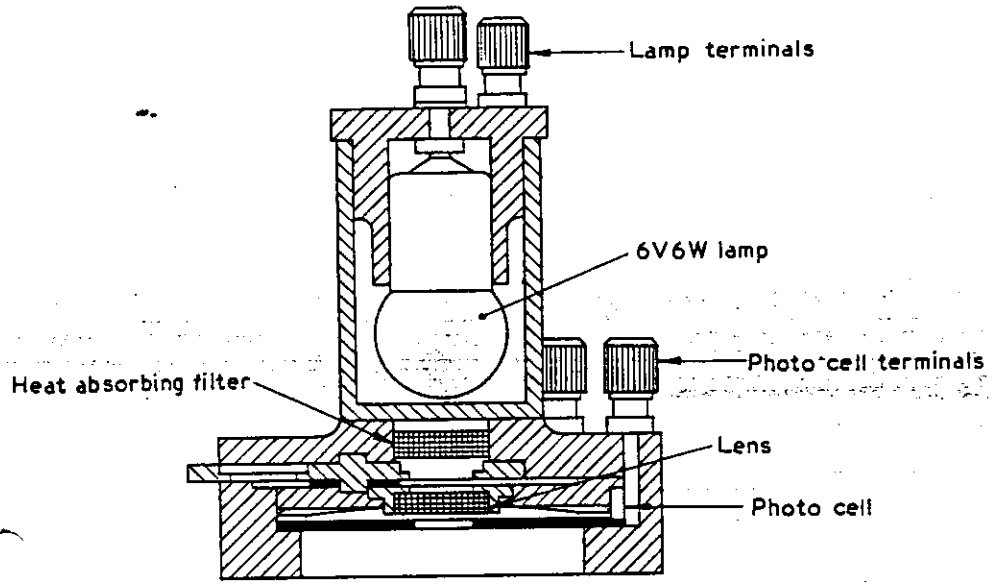

Fig. 2. Photoelectric reflectometer

BSI publications referred to in this standard

This standard makes reference to the following British Standards:

~~BS 245 White spirit~~
BS 1051 Glossary of terms relating to the conditioning and testing of textiles
BS 2661 Principles of colour fastness testing
BS 2663 Grey scale for assessing staining
BS 2677 Colour fastness to rubbing

'BS 245 Specification for mineral solvents (white spirit and related hydrocarbon solvents) for paints and other purposes'.

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