BRITISH STANDARD

BS 3424 :
Part 28 : 1995

Testing coated fabrics

Part 28. Method 31. Determination of specular gloss

BSI
STANDARDS

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PRI/78, Coated fabrics, upon which the following bodies were represented:

British Apparel and Textile Confederation
British Nonwovens Manufacturers' Association
British Plastics Federation
British Railways Board
British Rubber Manufacturers' Association Ltd.
British Textile Technology Group
Department of Health
Department of the Environment (Building Research Establishment)
Furniture Industry Research Association
Home Office
Industrial Safety (Protective Equipment) Manufacturers' Association
Made-Up Textiles Association
RAPRA Technology Ltd.
SATRA Footwear Technology Centre
Society of Motor Manufacturers and Traders Limited

This British Standard, having been prepared under the direction of the Sector Board for Materials and Chemicals, was published under the authority of the Standards Board and comes into effect on 15 November 1995

The following BSI references relate to the work on this standard:
Committee reference PRI/78
Draft for comment 93/307661 DC

ISBN 0 580 24537 3

Amendments issued since publication

Amd. No.	Date	Text affected

Contents

Foreword

This British Standard has been prepared by Technical Committee PRI/78.

The amount of visible light (i.e the luminous flux) which is actually reflected by an object, compared with the intensity of light perceived by the viewer can be deceptively different, depending upon the colour or colour combination. Everything else being equal (i.e. hue, saturation, perceived colour) the amount of light reflected by the coating of a coated fabric will largely be determined by the smoothness of the polymer coating (assuming the coating to be of a solid colour and not translucent, in which event the constructional properties of the substrate would play a significant part).

Naturally the conspicuity of a coated fabric will be directly proportional to the amount of light it actually reflects, but this does not mean that coated fabrics that exhibit the same specular gloss will be equally conspicuous or that coatings exhibiting high ratios of specular gloss will be more discernible. Some caution is therefore needed when selecting a coated fabric for a particular application. The apparatus and procedure specified is based upon ISO 2813 : 1994.

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

Method

1 Scope

This Part of BS 3424 describes a method of test for determining the specular gloss, using a reflectometer geometry of 20° or 60° or 85° of the polymeric coated surface of coated fabrics which are substantially smooth and are not deeply embossed. If the test is conducted on such structured surfaces no single value of specular gloss can be said to be representative of the coated fabric as a whole.

2 Normative references

This Part of BS 3424 incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back page. For dated references, only the edition cited applies, any subsequent amendments to or revisions of the cited publication apply to this Part of BS 3424 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

3 Definitions

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

3.1 surface gloss

Directionally selective reflecting properties responsible for the degree to which reflected highlights or the images of objects may be seen as superimposed on the surface.

3.2 specular reflection

Reflection without diffusion in accordance with the laws of optical reflection, as in a mirror.

3.3 specular reflectance

The ratio of the luminous flux reflected in a specular manner, for a specified source and receptor angle, to the luminous flux of the incident light.

3.4 specular gloss

The ratio of the luminous flux reflected from an object in the specular direction, for a specified source and receptor angle, to the luminous flux reflected from glass with a refractive index of 1.567 in the specular direction.

NOTE. To define the specular gloss scale, polished black glass with a refractive index of 1.567 is assigned the value of 100 for geometries of 20°, 60° and 85°.

4 Principle

The coated fabric is placed on a level surface with the polymer coating to be measured uppermost. Light is directed onto the polymer surface and the reflected light is compared with that reflected by a reference standard.

The result is reported as a specular gloss value together with the angle at which the measurement was made.

5 Apparatus

5.1 *Glossmeter*, conforming to ISO 2813.

5.2 *Primary reference standard*, comprising a clear fused-silica wedge, against which the black glass transfer standard is calibrated.

5.3 *Transfer standard*, comprising either, highly polished black glass (see table 1 for refractive index) or clear glass with the back and edges roughened and coated with black paint.

The top surfaces shall be plane to within 2 fringes per cm, as measured by an optical interference method.

NOTE 1. Information on the effect of refractive index on specular reflectance and specular gloss values is also given in table 1.

The glass surface shall be kept in a clean condition and free from surface scratches or damage.

NOTE 2. Black glass transfer standards are not as stable with time as is commonly assumed and should be recalibrated against a primary reference standard every 12 months.

5.4 *Working standards*, comprising ceramic tile, vitreous enamel, opaque glass or other uniform gloss materials calibrated against a primary reference standard (**5.2**) for an indicated area and direction of illumination.

Working standards shall be checked periodically by comparison with primary reference standards. The working standards shall be uniform and stable, and shall be calibrated by technically competent organizations. At least two standards, of different gloss levels, shall be available for each glossmeter geometry.

A black box or black velvet shall be used for setting and checking the zero point of the display, which shall be conducted at the start of every period of operation.

6 Calibration of apparatus

6.1 Calibrate the apparatus at the start of every period of operation and during operation at intervals sufficiently frequent to ensure that the instrument response is essentially constant.

6.2 Using either the primary reference standard (**5.2**), or the higher of two transfer standards (**5.3**), adjust the instrument reading to the correct or selected value in the upper part of the scale. If the black glass reference standard (**5.3**) is used, ensure the instrument indicates the relevant specular gloss (as given in table 1).

Next, take a transfer standard (**5.3**) of known specular gloss for the angle being used, but having a value in the lower half of the scale, and make a measurement with the same control settings.

NOTE 1. If the reading for the working standard is within 1 gloss unit of its assigned value, the proportionality is in accordance with **5.1.**.

For tests at 85° the reading for the working standard with a 60° gloss lower than 10 gloss units, shall be within 1 gloss unit of its assigned value. For the working standard with a 60° gloss higher than 10 gloss units, the reading shall be within 2 gloss units of its assigned value.

If this is not so, the instrument shall be adjusted or in accordance with the manufacturer's instructions, and the calibration procedure repeated until the working standard is measured within the required accuracy.

NOTE 2. It is assumed that the standards have not altered in any way or deteriorated by damage or distortion. The most common cause of incorrect results is lack of flatness, direction or failure to locate the surface in the correct plane for measurement. If a portable instrument is used to measure materials which are not placed horizontally, the instrument should either be calibrated in the orientation in which it is to be used, or a check should be made that the calibration is valid in other orientations.

7 Preparation of test pieces

Ensure that the coated surface to be tested is clean and flat and that any necessary cleaning does not damage the surface.

8 Testing atmosphere

Ensure that the ambient atmosphere throughout the test is at least 5 °C higher than the dew point for the relative humidity present (see BS 3574).

NOTE. For tests intended to be comparable, it is important that the temperature at which the tests are conducted are the same.

9 Determination of specular gloss

Calibrate the instrument using the working standard (**5.4**) and adjust the apparatus to give a reading corresponding to the relevant specular gloss given by table 1 for the chosen angle of measurement.

Take six readings, three in each of two directions at right angles, unless the surface is directionally textured, and report the mean and extreme values. If the surface is directionally textured, take six readings with the effect parallel to the plane of incidence and reflection of the instrument unless otherwise agreed. Report the mean and extreme values.

Table 1. Specular gloss values for polished black glass

Refractive index n	Specular gloss at angles of incidence of		
	20°	60°	85°
1.400	57.0	71.9	96.6
1.410	59.4	73.7	96.9
1.420	61.8	75.5	97.2
1.430	64.3	77.2	97.5
1.440	66.7	79.0	97.6
1.450	69.2	80.7	98.0
1.460	71.8	82.4	98.2
1.470	74.3	84.1	98.4
1.480	76.9	85.8	98.6
1.490	79.5	87.5	98.8
1.500	82.0	89.1	99.0
1.510	84.7	90.8	99.2
1.520	87.3	92.4	99.3
1.530	90.0	94.1	99.5
1.540	92.7	95.7	99.6
1.550	95.4	97.3	99.8
1.560	98.1	98.9	99.9
1.567[1)]	100.0[1)]	100.0[1)]	100.0[1)]
1.570	100.8	100.5	100.0
1.580	103.6	102.1	100.2
1.590	106.3	103.6	100.3
1.600	109.1	105.2	100.4
1.610	111.9	106.7	100.5
1.620	114.3	108.5	100.6
1.630	117.5	109.8	100.7
1.640	120.4	111.3	100.8

Table 1. Specular gloss values for polished black glass (*concluded*)

Refractive index n	Specular gloss at angles of incidence of		
	20°	60°	85°
1.650	123.2	112.8	100.9
1.660	126.1	114.3	100.9
1.670	129.0	115.8	101.0
1.680	131.8	117.3	101.1
1.690	134.7	118.8	101.2
1.700	137.6	120.3	101.2
1.710	140.5	121.7	101.3
1.720	143.4	123.2	101.3
1.730	146.4	124.6	101.4
1.740	149.3	126.1	101.4
1.750	152.2	127.5	101.5
1.760	155.2	128.9	101.5
1.770	158.1	130.4	101.6
1.780	161.1	131.8	101.6
1.790	164.0	133.2	101.6
1.800	167.0	134.6	101.7

[1] Primary reference standard.

10 Precision

There are no data available from the material obtained during the preparation of this Part of BS 3424 which would enable limits for repeatability and reproducibility to be obtained, but in view of problems associated with keeping coated fabric test pieces planar, it is unlikely that the mean results of tests from different laboratories obtained by different operators on test pieces from the same sample will be closer than four to six units (see ISO 2813).

11 Test report

The test report shall include the following information:

a) the identification of the surface tested;

b) the result of the test expressed as the mean and extreme values;

c) the angle at which the test was carried out;

d) any other relevant information;

e) the date(s) of the test;

f) a reference to this standard.

List of references (see clause 2)

Informative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS 3574 : 1989	*Specification for the controlled storage and packaging of vulcanized rubber and rubber products*

ISO publications

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) Geneva. (All publications are available from BSI Customer Services.)

ISO 2813 : 1994	*Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°.*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Contract requirements

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

Any person who finds an inaccuracy or ambiguity while using this British Standard should bring it to the attention of the Quality Manager, BSI without delay so that the matter may be investigated swiftly.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services, Sales Department at Chiswick:
Tel: 0181 996 7000; Fax: 0181 996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library, the Standardline Database, the BSI Information Technology Service (BITS) and its Technical Help to Exporters Service. Contact the Information Department at Chiswick:
Tel: 0181 996 7111; Fax: 0181 996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Customer Services, Membership at Chiswick: Tel: 0181 996 7002; Fax: 0181 996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL

9511—4—0.4k— FP

ISBN 0 580 24537 3 Product code 00557598 PRI/78