

Method of test for penetration of erythemally weighted solar ultraviolet radiation through clothing fabrics

ICS 59.080.40

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee TCI/66, Apparel, to Subcommittee TCI/66/7, Penetration of solar UVR through clothing fabrics, upon which the following bodies were represented:

- British Clothing Industry Association
- British Leather Confederation
- British Textile Technology Group
- Consumer Policy Committee of BSI
- Department of Health
- Ministry of Defence
- National Physical Laboratory
- National Radiological Protection Board
- Society of Dyers and Colourists

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 January 1998

© BSI 05-1999

The following BSI references relate to the work on this standard:
Committee reference TCI/66/7
Draft for comment 97/123067 DC

ISBN 0 580 28970 2

Amendments issued since publication

Amd. No.	Date	Comments
10316	January 1999	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 References	1
3 Principle	1
4 Terms and definitions	1
5 Apparatus	2
6 Sample selection	3
7 Specimen preparation	3
8 Calibration	3
9 Measurement	4
10 Calculation of results	4
11 Test report	4
Annex A (normative) Calculation of UVR penetration	5
Annex B (informative) Transmittance characteristics of typical UVR transmitting and UVR cut-off filters	6
Figure B.1 — Transmittance characteristic of UVR transmitting filter	6
Figure B.2 — Transmittance characteristic of UVR cut-off filter	7
Table A.1 — Spectral weighting function for erythema ϵ_λ and spectral irradiance for a standard solar spectrum S_λ as a function of wavelength λ	5
List of references	Inside back cover

Foreword

This British Standard has been prepared by Subcommittee TCI/66/7 to provide a method for the assessment of the penetration of solar ultraviolet radiation through clothing fabrics. It is intended that subsequent standards dealing with clothing product labelling will refer to the method contained in this British Standard.

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.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard describes a method of test to establish the penetration of solar ultraviolet radiation (UVR), weighted spectrally for erythema (sunburn), through clothing fabrics (i.e. fabrics in close proximity to the skin surface) in a relaxed conditioned state.

This standard does not address related issues such as the design of fabrics and textile products for solar UVR protection, the classification of such products for their solar UVR protecting capabilities or the protection afforded by sunscreens, sunglasses or other non-fabric agents. It does not address the penetration of solar UVR through the brims of hats, shade cloth and umbrella fabric.

NOTE Shade structures which are not in close proximity to skin surfaces may provide in practice a lesser degree of solar UVR protection to the skin than indicated by laboratory testing, due to UVR back scattering.

2 References

2.1 Normative references

This British Standard 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 cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the publications apply to this British Standard 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.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Principle

The penetration of solar UVR through a fabric specimen is determined as the ratio of the erythemally weighted solar UVR irradiance measured by a detector with a test clothing fabric specimen in place to that measured with no fabric present.

NOTE The mathematical definition of the penetration of solar UVR through a fabric specimen used in this British Standard is given in Annex A.

4 Terms and definitions

For the purposes of this British Standard, the following definitions apply.

4.1

angular divergence

angle between the axis (normal to the specimen) and any ray in the irradiating or collecting beam

4.2

back scattering

deflection of optical radiation by scattering through angles greater than 90° with reference to the original direction of travel

4.3

conditioned fabric

fabric in equilibrium with the standard temperate atmosphere for testing described in BS EN 20139

NOTE For the purposes of this British Standard, fabric samples having been stored in this atmosphere for 16 h are considered to be in equilibrium with it.

4.4

erythema

reddening of the skin caused by various physical or chemical agents

NOTE This British Standard considers the photochemical effects of UVR.

4.5

erythemally effective

radiometric or spectroradiometric quantity which has been weighted for the effects of erythema

4.6

fabric

manufactured assembly of fibres and/or yarns that has a substantial surface area in relation to its thickness and sufficient mechanical strength to give the assembly inherent cohesion

4.7

fluorescence

absorption of radiation of a particular wavelength and its re-emission within a very short time as optical radiation of greater wavelength

NOTE In order to accurately determine the UVR transmittance of a sample, it is necessary to ensure that any optical radiation, outside the UVR region, generated by fluorescence by the sample, the filter or some other source, does not reach the detector system.

4.8

integrating sphere

hollow sphere whose internal surface is a non-selective diffuse reflector (Lambertian)