BRITISH STANDARD

BS EN
12274-5:2003

Slurry surfacing — Test method —

Part 5: Determination of wearing

The European Standard EN 12274-5:2003 has the status of a British Standard

ICS 93.080.20

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 12274-5:2003.

The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/2, Surface dressing, sprays and slurry surfacing, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 21 May 2003

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 13 and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 41903 7

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12274-5

January 2003

ICS 93.080.20

English version

Slurry surfacing - Test method - Part 5: Determination of wearing

Matériaux bitumineux coulés à froid - Méthode d'essai - Partie 5: Détermination de l'usure

Dünne Asphaltschicht in Kaltbauweise - Prüfverfahren - Teil 5: Bestimmung des Verschleißes

This European Standard was approved by CEN on 21 November 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 12274-5:2003 E

Contents

Foreword

This document (EN 12274-5:2003) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2003, and conflicting national standards shall be withdrawn at the latest by April 2005.

This European Standard is one of a series of standards as listed below:

EN 12274-1, *Slurry surfacing Test methods Part 1: Sampling for binder extraction.*

EN 12274-2, *Slurry surfacing Test methods Part 2: Determination of residual binder content.*

EN 12274-3, *Slurry surfacing Test methods Part 3: Consistency.*

EN 12274-4, *Slurry surfacing Test methods Part 4: Determination of cohesion of the mix.*

EN 12274-5, *Slurry surfacing Test methods Part 5: Determination of wearing.*

EN 12274-6, *Slurry surfacing Test methods Part 6: Rate of application.*

EN 12274-7[1], *Slurry surfacing Test methods Part 7: Shaking abrasion test in suitability of mineral aggregates to slurry mixes.*

EN 12274-8[1], *Slurry surfacing Test methods Part 8: Visual assessment.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a test method for the design of slurry mix based on the determination of the minimum binder content of the mix under wet track abrasion conditions.

This European Standard applies to slurry surfacing to be used in surface layers.

NOTE For some course mixtures the precision is poor due to loss of aggregates comes up, a comment will be made in the report.

[1] In preparation.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12274-3, *Slurry surfacing — Test method — Part 3: Consistency.*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (Hardness between 10 IRHD and 100 IRHD).*

3 Terms and definitions

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

3.1
set
end of the non-reversible process when the emulsion coalescence takes place

NOTE 1 The coalescence of an emulsion is the non-reversible phase starting from the beginning of the breaking of the emulsion to the total setting when the bitumen emulsion reverts to bitumen in presence of a mineral.

NOTE 2 After the set of a slurry surfacing:

– it is not possible to stir the mixture;

– free emulsion during washing with water cannot be observed;

– an absorbent paper is not stained when pressed slightly onto the surface of the slurry.

3.2
set time
time elapsed between placing a slurry surfacing and its setting

3.3
quick setting slurry
slurry with a set time less than or equal to 30 min

3.4
slow setting slurry
slurry with a set time more than 30 min

4 Principle

Samples are prepared with different binder contents. The samples are tested under water, after which the mass-loss by abrasion is measured.

The test consists of an abrasive action operated by means of a hard rubber cylinder which exerts a planetary side gear rubbing pressure, applied for 5 min, on the surface of a test sample of slurry previously prepared, cured in an oven, and moistened by immersion.

By using this procedure, the minimum amount of emulsion to withstand the abrasive action of traffic is determined.

5 Materials

5.1 Coarse aggregates and sand

A sufficient amount of the separated aggregates to be used in the slurry shall be dried in an oven at (100 5) °C to reach constant mass.

NOTE Constant mass is deemed to be achieved when the difference between successive weighings at 30 min intervals does not exceed 0,1 % of the mass.

5.2 Reactive filler

The filler, e.g. cement or hydrated lime, shall be dried in an oven at (110 5) °C to reach constant mass.

NOTE Constant mass is deemed to be achieved when the difference between successive weighings at 30 min intervals does not exceed 0,1 % of the mass.

5.3 Emulsion

The emulsion shall be manually homogenized using a glass rod.

6 Apparatus

6.1 Apparatus used for preparation of samples

6.1.1 Drying oven, with a forced air system and a minimum capacity of 80 l capable of maintaining a temperature of (60 5) °C in the vicinity of the test sample.

6.1.2 **Oven**, thermostatically controlled to maintain a temperature of (110 5) °C.

6.1.3 **Climatic chamber**, capable of maintaining a temperature of (5 3) °C in the vicinity of the test sample and a humidity of (60 10) %.

6.1.4 **Balance**, accurate to 0,1 g.

6.1.5 **Timing device**, accurate to 1 s.

6.1.6 Ring-shaped, annular metal moulds, with an internal diameter of (279,0 0,5) mm and an external diameter of (295,0 0,5) mm. The heights of these moulds shall be as follows:

Type A (6,3 0,5) mm;

Type B (10,0 0,5) mm;

Type C (13,0 0,5) mm;

Type D (19,0 0,5) mm.

6.1.7 Ladles or beakers, of 1 l, 2 l and 5 l capacity.

6.1.8 End-rounded spatula, or metal rod.

6.1.9 Levelling plate, with a straight edge, chamfered to a sharp edge on one of its faces and having a handle.

6.1.10 Test piece bases, made of unchipped roofing felt, of at least 300 mm diameter and weighing (700 70) g/m².

6.2 Apparatus used for testing

6.2.1 Abrasion machine, consisting of an electric motor capable of driving a planetary gear system which rotates its vertically-mounted abrasion head about its own axis, as well as providing a planetary motion applied directly to the test sample.

NOTE The machine is designed to provide the abrasive head with a rotating speed of about 144 min^{-1} for 61 complete cycles of the planetary system while exerting a constant vertical kinetic-friction force of (22,3 2,0) N.

6.2.2 Test bath, of sufficient volume to keep the test sample submerged for the duration of the test. The bottom of the bath shall be fitted with three spindles designed to fix the test base plate in place.

6.2.3 Test base plate, comprising a thick metal disc diameter (310 1) mm and thickness (5,0 0,2) mm. The disc shall have at least three knurled head screw fasteners arranged symmetrically on the baseplate periphery, in order to secure the sample during the test.

6.2.4 Installation of the abrasion machine

The test base plate shall be fixed by means of dowels to the test bath bottom. The abrasion machine and the test bath should be firmly fixed together by means of an appropriate device throughout the test.

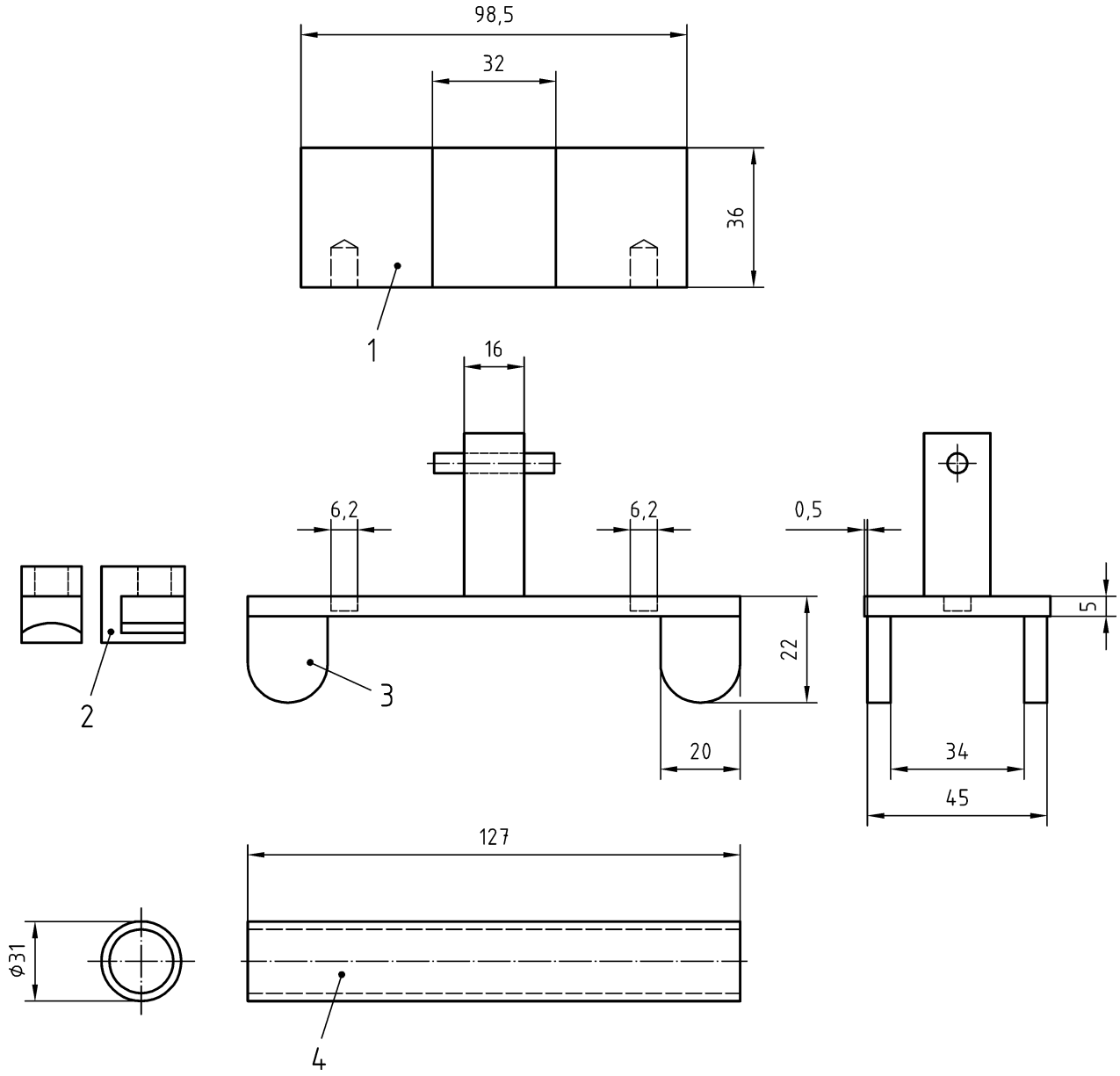
6.2.5 Auxiliary bath, capable of storing the test samples at (25 2) °C before testing.

6.2.6 Abrasion head, fitted with a piece of hose (127 1) mm made of 80° Shore hardness rubber conforming to ISO 48 and reinforced with a double cord surface. The hose shall have an internal diameter of (19 0,5) mm and an external diameter of about 31 mm and shall be capable of withstanding a pressure of 2,533 MPa (standard atmosphere).

NOTE 1 A drawing of the abrasion head is given in Figure 1.

NOTE 2 An example of an apparatus is shown in Figure 2.

Dimensions in millimetres



Key

1 Counterweight
2 Bridle
3 Base
4 Hose

NOTE Tolerances for the dimensions: 1 %

Figure 1 — Abrasion head, mass of the four parts 2 300 g

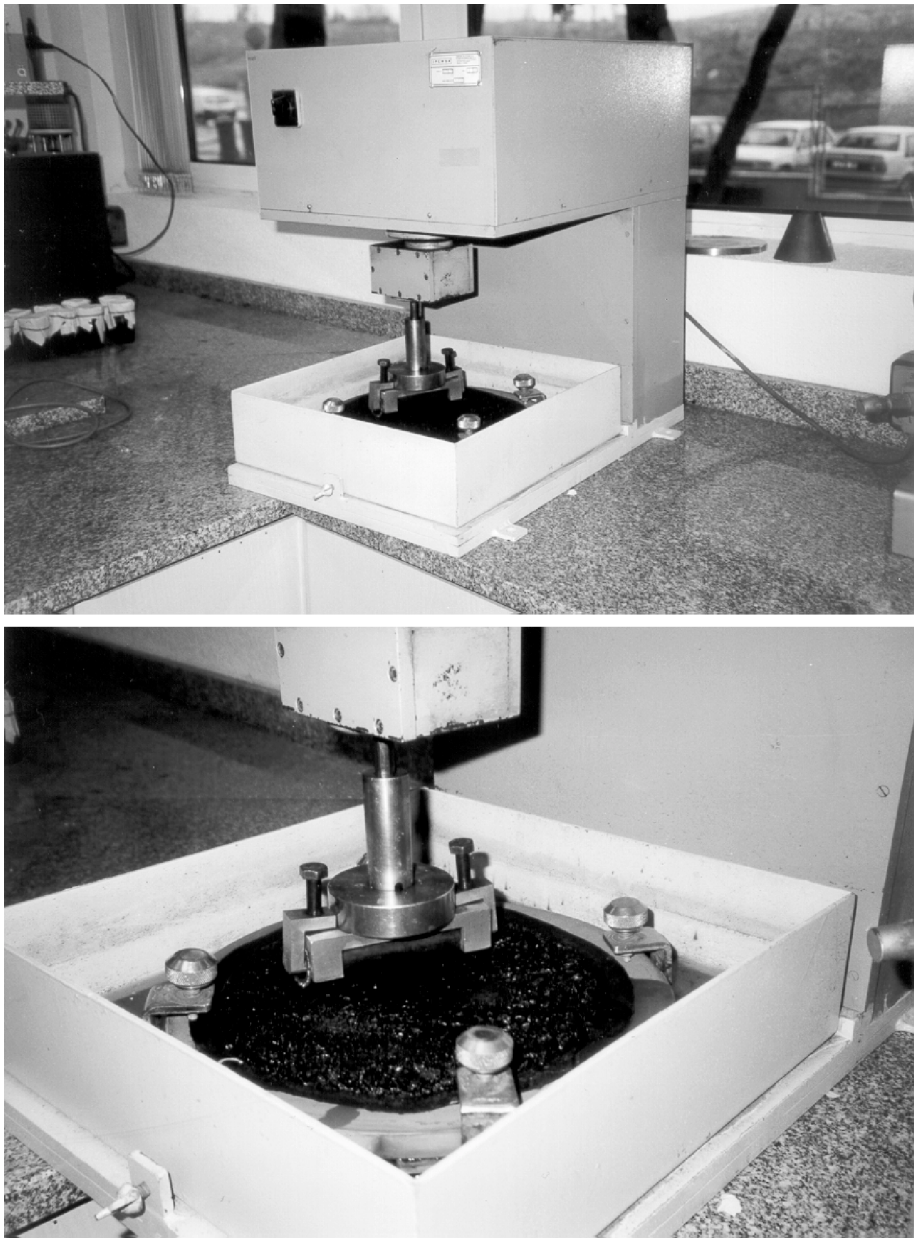


Figure 2 — Example of apparatus

7 Preparation of sample

7.1 Conditioning temperature

All materials that are going to be used in sample preparation shall remain for at least 2 h before testing at a temperature given in Table 1.

Table 1 — Conditioning temperature

Slurry type	Conditioning temperature °C
Slow setting slurry	Ambient temperature
Quick setting slurry	5 3

7.2 Water content

The proportion of water shall be previously determined according to EN 12274-3.

7.3 Aggregates and filler

Weigh aggregates and filler in the same proportions as the design mix in accordance with the amount in Table 2 using a ladle or beaker and mix with a spatula until a homogeneous mixture is obtained.

Table 2 — Sample size

Maximum aggregate size mm	Amount of aggregates and filler g
4,0	1 500 10
5,6	
6,3	
8,0	
10,0	3 000 10
11,2	
16,0	

7.4 Water and additive

Add water and additive (if necessary), and stir the mixture until all the aggregates and filler are completely wetted.

The calcium carbonate content of the water shall be less than 250 ppm.

7.5 Emulsion

Add emulsion in an amount as required in the design mix to the mixture and stir it for (45 1) s using a spatula or metal rod until a homogeneous mixture is obtained.

NOTE A mechanical mixer may be used. However care should be taken to ensure that no component is ejected from the mixing containers during the mixing process.

7.6 Sample size

The annular moulds shall be those corresponding to the maximum size of the aggregate in accordance with Table 3.

Table 3 — Mould type

Maximum aggregate size mm	Mould size
4,0	A
5,6	
6,3	B
8,0	
10,0	C
11,2	
16,0	D

NOTE The mould used should be the smallest whose height exceeds the maximum size of the aggregate by at least 15 %.

Centre the mould over the felt supports and pour the slurry into the mould. Spread the sample and level to a flat face. During this operation, the handling of the slurry shall be minimized to avoid segregation.

7.7 Curing

The moulds containing the specimen, together with the test base plate shall be cured in an oven at (60 5) °C, until constant mass is achieved.

NOTE Constant mass is deemed to be achieved when the difference between successive weighings at 30 min intervals does not exceed 0,1 % of the mass.

8 Test procedure

8.1 After curing, remove the test mould sample and base plate from the oven and allow to cool to ambient temperature. Remove the mould from the sample and weigh the sample on a balance and record the mass.

8.2 Submerge the test sample and base plate in the auxiliary water bath at (25 2) °C for 60 min to 75 min.

8.3 Submerge the test sample and base plate in the test bath where it is fixed to the disc-plate by means of the three screw fasteners. Fully submerge the test sample throughout the test in water of (25 2) °C.

8.4 Install the rubber hose piece, prepared in accordance with 6.2.7, in the abrasion head and test it on to the test sample.

8.5 Run the machine for (300 2) s.

A new hose piece shall be used for each new test, but a second test is permitted if the unused upper side of the hose piece is rotated 180° before coming into contact with the test sample.

8.6 On completion of the test, remove the sample and base plate and wash them under a gentle flow of tap water in order to rinse away loose particles from the material. Place the sample and base plate in an oven for 15 h at least, at (60 5) °C until a constant mass is obtained. Allow the sample to cool to ambient temperature and record the final mass, in accordance with 8.1. Record the mass value reading.

NOTE To achieve more information about the durability and adhesive properties, it is also possible to note measurements after six days.

9 Expression of results

9.1 The test sample mass-loss L shall be determined as the difference found between the original mass of the test sample and base plate obtained in accordance with 8.1 minus the mass on completion of the test, as indicated in 8.6.

$$L = W_a - W_b$$

where

L is the sample's mass-loss during test, in gram (g) with an accuracy of 1 g;

W_a is the sample's mass before testing, in gram (g) with an accuracy of 1 g;

W_b is the sample's mass after testing, in gram (g) with an accuracy of 1 g.

9.2 The differential value obtained in 9.1, shall then be multiplied by the conversion factor 32,9 in order to compute the mass-loss of the test sample in gram per square metre (g/m²).

NOTE This conversion factor is applicable only for an abrasion surface obtained by testing 0,03038 m², (equivalent to a circle with a diameter of 197 mm) using a rubber cylinder 127 mm long.

9.3 The test result obtained from the wet abrasion test shall be recorded in gram per square metre. The test result shall be obtained by calculating the mean value of at least three test samples from the same mix tested in accordance with this standard.

10 Test report

The test report shall state that the test has been performed in accordance with this European Standard and shall contain the following information:

a) type and size of aggregates used;

b) type and amount of filler used;

c) type and amount of emulsion used;

d) type and amount of additives used;

e) date of test;

f) location of test;

g) name of the person responsible for the test;

h) results as calculated in clause 9;

i) remarks;

j) signature of the person responsible for the test.

Bibliography

ASTM D–3910–90, *Standard practices for design, testing and construction of slurry seal.*

ISSA TEST METHOD, *Test method for wet track abrasion of slurry surfaces.*

NTL 320/87 (SPAIN), *Abrasión por via húmeda de las lechadas bituminosas.*

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.

Revisions

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

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

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. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

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 and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

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 Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL