

Respiratory protective devices — Methods of test —

Part 4: Flame tests

The European Standard EN 13274-4:2001 has the status of a
British Standard

ICS 13.220.4; 13.340.30

National foreword

This British Standard is the official English language version of EN 13274-4:2001.

The UK participation in its preparation was entrusted by Technical Committee PH/4, Respiratory protection, to Subcommittee PH/4/9, Test methods and interpretation, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible 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 Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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.

This British Standard, having been prepared under the direction of the Health and Environment Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 21 September 2001

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover 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

ICS 13.220.40; 13.340.30

English version

Respiratory protective devices - Methods of test - Part 4: Flame tests

Appareils de protection respiratoire - Méthodes d'essai -
Partie 4: Essais à la flamme

Atemschutzgeräte - Prüfverfahren - Teil 4:
Flammenprüfungen

This European Standard was approved by CEN on 17 June 2001.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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

Contents

	page
Foreword.....	3
Introduction	4
1 Scope	4
2 Normative references	4
3 Terms and definitions.....	4
4 Pre-requisites	4
5 General test requirements	4
6 Six burner static test: Method 1	5
6.1 Principle	5
6.2 Test rig	5
6.3 Procedure	5
7 Single burner static test: Method 2.....	5
7.1 Principle	5
7.2 Test rig	5
7.3 Procedure	6
8 Single burner moving specimen test: Method 3.....	6
8.1 Principle	6
8.2 Test rig	6
8.3 Procedure	6
Annex A (normative) Test results - Uncertainty of measurement.....	11
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	12

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 79 "Respiratory protective devices", 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 February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

EN 13274-4 is one of several parts, which are as follows:

Part 1: Determination of inward leakage and total inward leakage

Part 2: Practical performance tests

Part 3: Determination of breathing resistance

Part 4: Flame tests

Part 5: Climatic conditions

Part 6: Determination of carbon dioxide content of inhalation air

Part 7: Determination of particle filter penetration

Part 8: Determination of dolomite dust clogging

Annex A is normative.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard is intended as a supplement to the specific device standards for respiratory protective devices. Test methods are specified for complete or parts of devices. If deviations from the test method given in this standard are necessary, these deviations will be specified in the relevant device standard.

1 Scope

This European Standard specifies methods for flame tests to be applied to respiratory protective devices.

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 132, *Respiratory protective devices – Definitions of terms and pictograms*.

ISO 6941:1987/AMD 1:1992, *Textile fabrics - Burning behaviour - Measurement of flame spread properties of vertically oriented specimens*.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 132 apply.

4 Pre-requisites

In order to implement this European Standard, at least the following parameters need to be specified in the relevant device standard:

- Components to be tested;
- Test method, 1, 2, or 3;
- Number of specimens;
- Climatic conditioning;
- Mounting and orientation of specimens;
- Any deviations from the test procedure chosen;
- Pass/fail criteria

5 General test requirements

Unless otherwise specified, the values stated in this European Standard are expressed as nominal values. Except for temperature limits, values which are not stated as maxima or minima shall be subject to a limit deviation of $\pm 5\%$.

Unless otherwise specified, the ambient temperature for testing shall be between 16 °C and 32 °C and the temperature limits shall be subject to a limit deviation of ± 1 °C.

6 Six burner static test: Method 1

6.1 Principle

The specimen is exposed to a flame from an array of six burners for $(5 \pm 0,5)$ s at (950 ± 50) °C.

6.2 Test rig

The test rig consists mainly of a propane cylinder with flow control device, flow meter, pressure gauge, flash back arrester and six propane burners which are adjustable in height. Figure 1 shows a schematic diagram of the apparatus and the top view of the arrangements of the six burners. The purity of the propane shall be a minimum of 95%.

NOTE A "TEKLU" burner has been found to be suitable, and information on a source of supply can be obtained from the Secretariat of CEN/TC79.

6.3 Procedure

Mount the specimen such that the external parts have direct exposure to the flame.

Before lighting the burners, position the specimen centrally above the array of six burners and individually adjust the height of each burner such that the distance between the burner tip and specimen is 250 mm. Figure 2 shows the adjustment of the burner tips for one example of specimen.

With the specimen removed from above the burners, fully open the propane control valve on each of the six burners. Initially close the air control valve on each of the six burners. Ignite the burners and adjust the propane cylinder output regulator to a pressure, such that a flow meter in the main propane supply line indicates a total flow to all six burners of $(21 \pm 0,5)$ litres/min, propane.

NOTE A typical pressure range has been found to be 0,3 to 1,25 bar.

Adjust the flame temperature at a height of 250 mm above the burner tips in the centre of the flame, above one burner, to a temperature of (950 ± 50) °C, using a mineral insulated thermocouple probe of 1.5 mm diameter (see Figure 1). The flame temperature at a height of 250 mm above all burners shall be within the limits specified.

In order to achieve the correct temperature it may be necessary to adjust the air control valve on each burner to an optimum and to shield the whole test rig from the effect of external air flows.

Expose the specimen to the flames for $(5 \pm 0,5)$ s. Where components of the specimen are positioned such that they are not exposed directly to the flame, the test shall be repeated with the same, or with other samples, as appropriate, oriented in the appropriate position.

Observe and report whether or not the specimen continues to burn or presents any additional hazard to the wearer.

7 Single burner static test: Method 2

7.1 Principle

The specimen is exposed to a flame at a temperature of (800 ± 50) °C for $(12 \pm 0,5)$ s, such that the centre of the flame impinges on the edge of the specimen under test.

7.2 Test rig

The test rig consists mainly of a propane cylinder with flow control device, pressure gauge, flashback arrester, specimen support and burner (see Figure 3). The burner shall either be in accordance with 6.2 or with ISO 6941:1987/AMD 1:1992. The purity of the propane shall be a minimum of 95 %.

7.3 Procedure

Mount the material or component to be tested on the support such that it is orientated horizontally above the burner. Adjust the height of the burner tip to the lowest part of the horizontal specimen at a distance of (20 ± 2) mm. The edge of the specimen shall be positioned directly over the burner during the test. An example is shown in Figure 3.

With the specimen removed from above the burner, ignite the burner and adjust the flame height with the propane flow control valve to (40 ± 4) mm. Check that these settings give a flame temperature of (800 ± 50) °C at a point (20 ± 2) mm above the burner tip, measured with a mineral insulated thermocouple probe, 1,5 mm diameter (see Figure 4). In order to achieve the correct flame temperature at the correct flame height, it may be necessary to shield the whole test rig from the effect of external airflows.

Expose the specimen to the flame for $(12 \pm 0,5)$ s ensuring that the centre of flame impinges on the edge of the specimen.

Observe and report whether or not the specimen continues to burn or presents any additional hazard to the wearer.

8 Single burner moving specimen test: Method 3

8.1 Principle

The specimen under test is mounted such that it may be passed through a flame at a temperature of (800 ± 50) °C at a speed of (60 ± 5) mm/s.

8.2 Test rig

The test rig consists mainly of a propane cylinder with flow control device, pressure gauge, flash back arrester, specimen support, rotation motor with speed controller, and burner (see Figure 4). The burner shall be either be in accordance with 6.2 or with ISO 6941:1987/AMD 1:1992. The purity of the propane shall be a minimum of 95 %.

8.3 Procedure

Mount the component on the specimen support, and adjust the position such that the specimen under test passes directly over the tip of the burner when the support is rotated.

With the specimen directly over the burner, adjust the height between the tip of the burner and the lowest part of the specimen to (20 ± 2) mm.

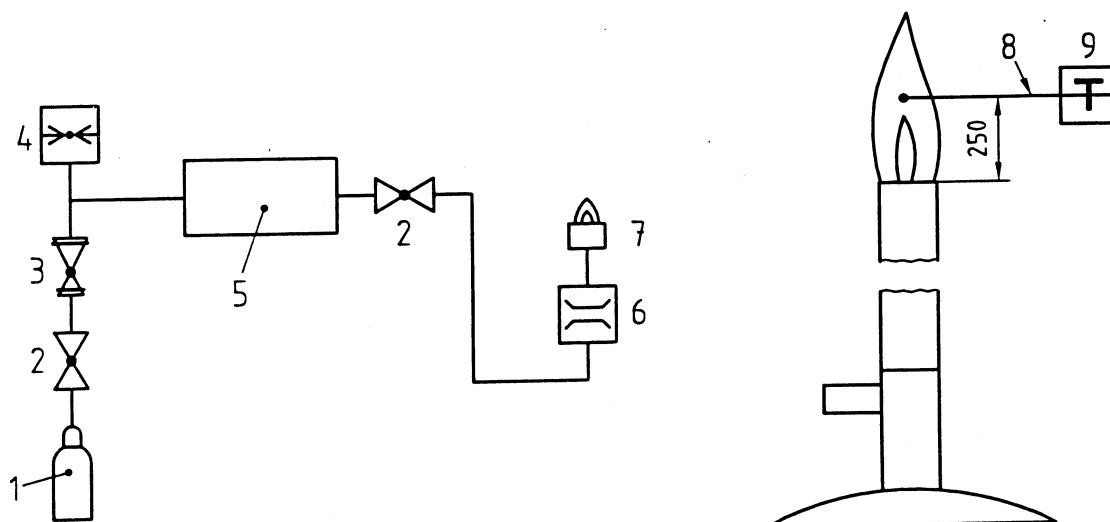
Adjust the rotation speed of the motor such that the linear speed of the specimen, measured at the burner is (60 ± 5) mm/s.

With the specimen removed from above the burner, ignite the burner and adjust the flame height with the propane flow control valve to (40 ± 4) mm. Check that these settings give a flame temperature of (800 ± 50) °C at a point (20 ± 2) mm above the burner tip, measured with a mineral insulated thermocouple probe, 1,5 mm diameter (see Figure 4). In order to achieve the correct flame temperature at the correct flame height it may be necessary to shield the whole test rig from the effect of external airflows.

Pass the specimen once through the flame. Repeat the test with the specimen mounted in a different orientation or with other specimen so that an assessment can be made of all materials or components, as specified by the relevant device standard. It is important that no part of the specimen passes through the flame more than once.

Observe and report whether or not the specimen continues to burn or presents any additional hazard to the wearer.

Dimensions in millimetres



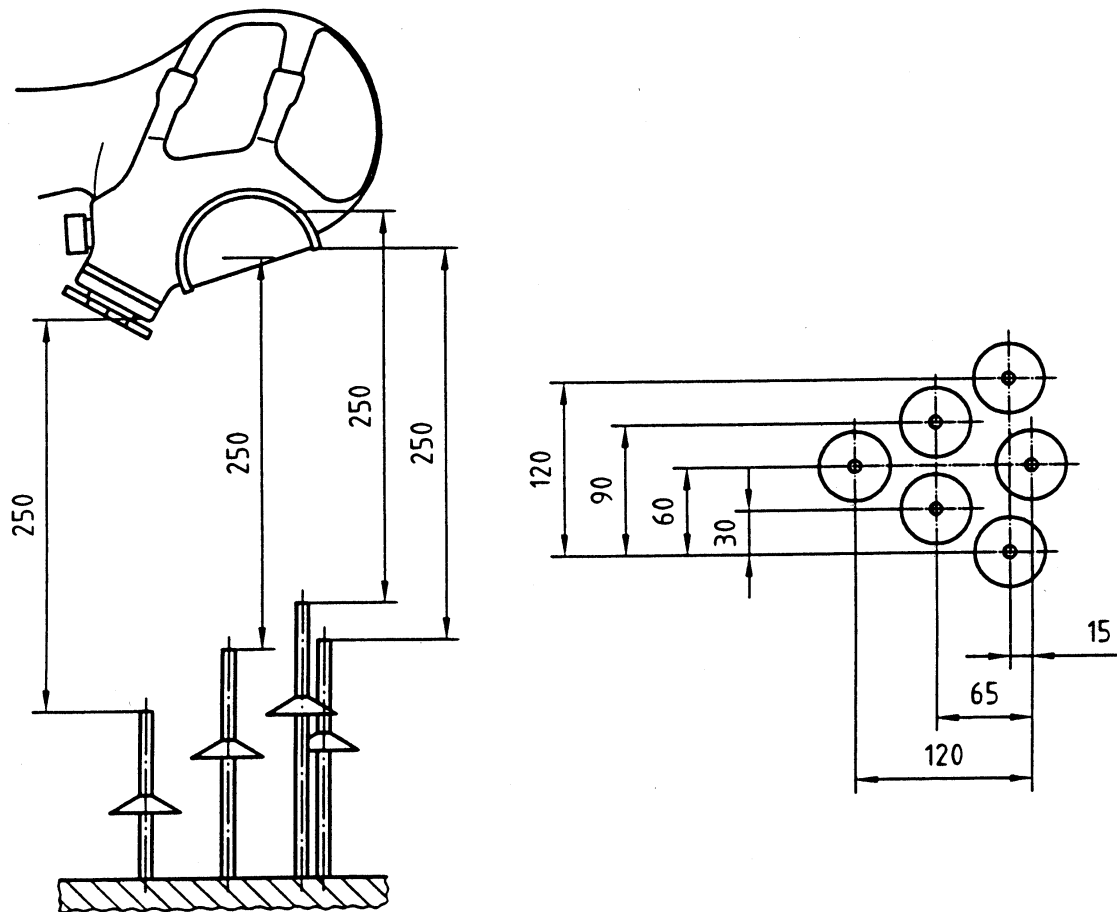
Key

- 1 Propane cylinder
- 2 Valve
- 3 Pressure reducer
- 4 Pressure gauge
- 5 Flame arrester

- 6 Flow meter
- 7 Burner
- 8 Thermocouple (Ø 1,5)
- 9 Temperature measuring device

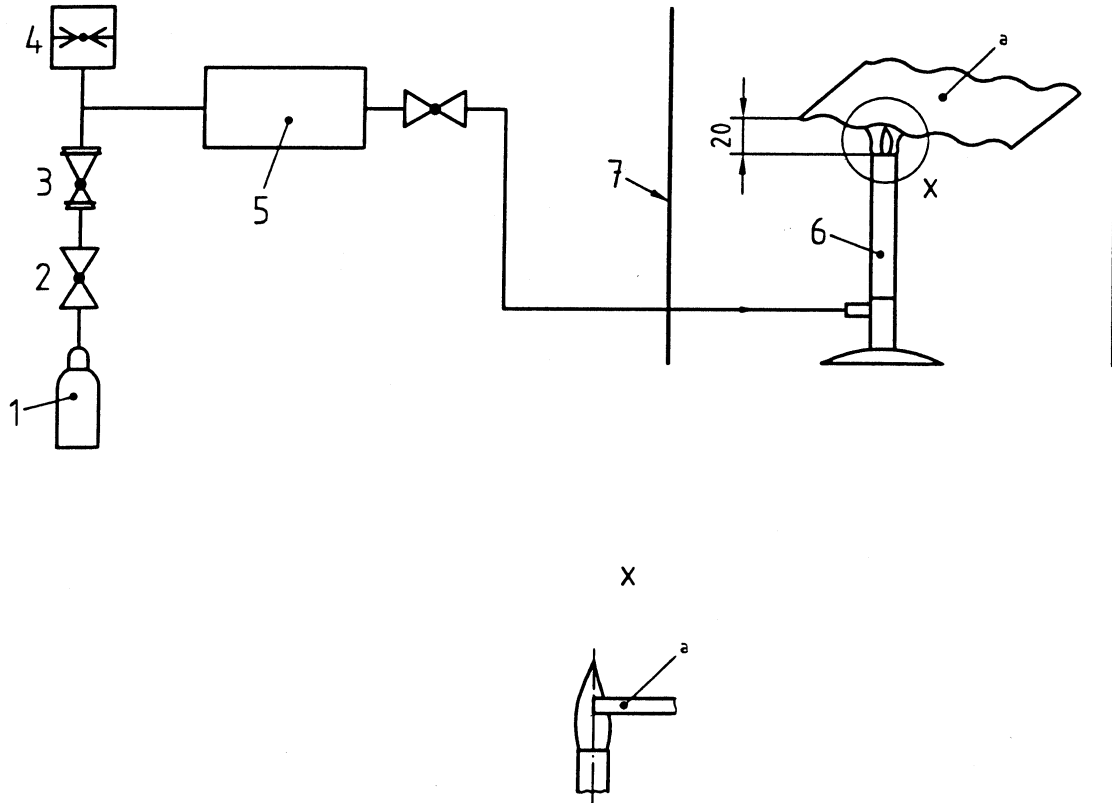
Figure 1 —Schematic diagram of apparatus for six burner static test

Dimensions in millimetres



Detail: plan view

Figure 2 —Schematic diagram of arrangement of six burners in six burner static test for facepiece

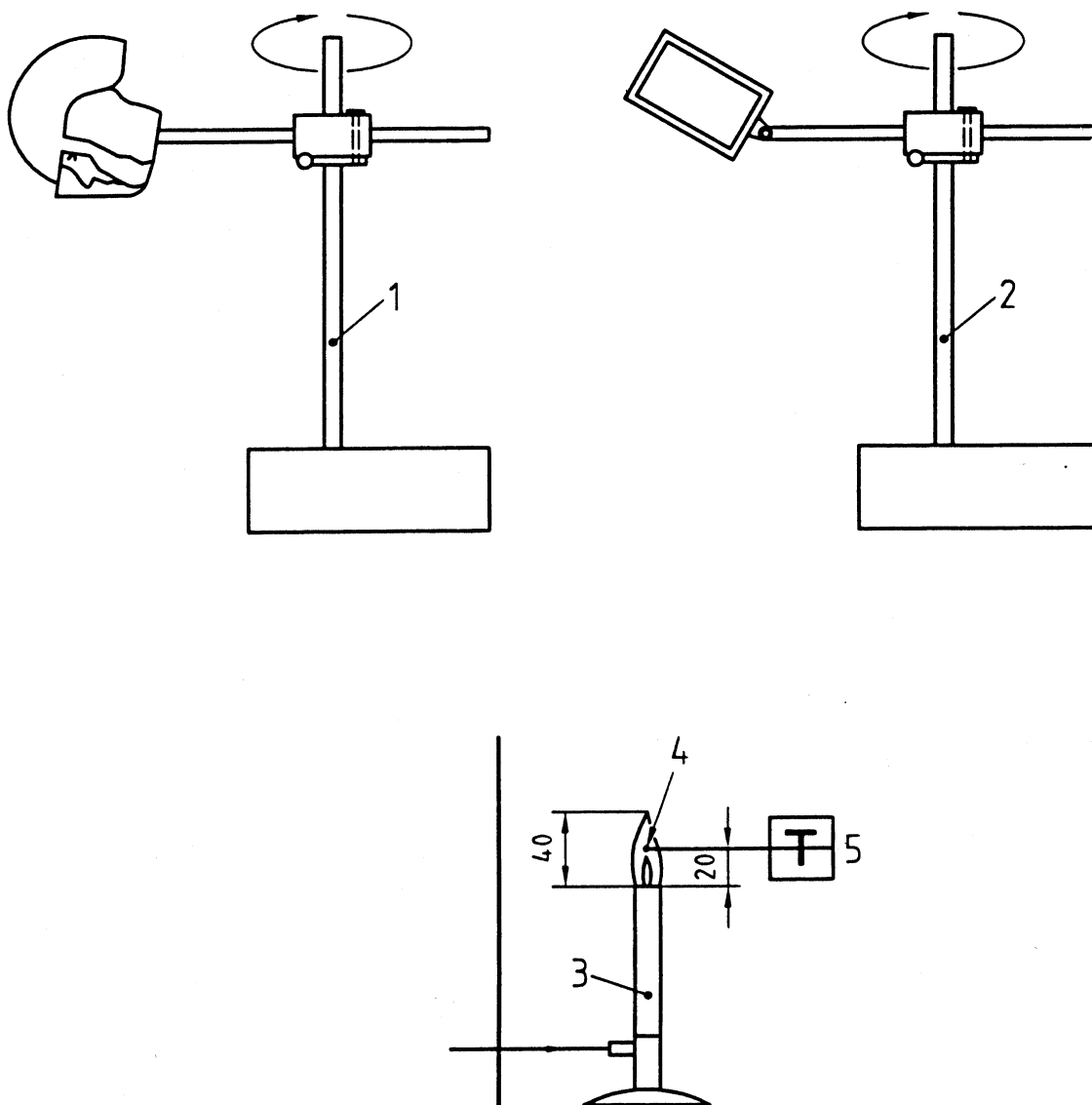


Key

- 1 Propane cylinder
- 2 Valve
- 3 Pressure reducer
- 4 Pressure gauge

- 5 Flame arrester
- 6 Burner
- 7 Shield
- a) Material under test

Figure 3 —Schematic diagram of apparatus for single burner static flammability test



Key

1 Rotating motor device (facepieces)

2 Rotating motor device (components)

3 Burner

4 Thermocouple ($\varnothing 1.5$)

5 Temperature measuring device

Figure 4 — Typical arrangement of apparatus for single burner moving specimen test for facepieces or components

Annex A (normative)

Test results - Uncertainty of measurement

For each of the required measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of measurement shall be evaluated. This estimate of uncertainty shall be applied and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 89/686/EEC.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The clauses of this standard are likely to support requirements in Clauses 3.6.1 and 3.10.1 of Annex II of Directive 89/686/EEC.

Compliance with this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

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: 020 8996 9000. Fax: 020 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: 020 8996 9001. Fax: 020 8996 7001. 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: 020 8996 7111. Fax: 020 8996 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 Membership Administration.
Tel: 020 8996 7002. Fax: 020 8996 7001. Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager.
Tel: 020 8996 7070.