

Specification for

Protective helmets for firefighters

UDC 614.842.83.081:614.891.1:687.434

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Personal Safety Equipment Standards Policy Committee (PSM/-) to Technical Committee PSM/42 upon which the following bodies were represented:

- Association of Metropolitan Authorities
- British Fire Services' Association
- Chief and Assistant Chief Fire Officers' Association
- Fire Brigades' Union
- Home Office
- Industrial Safety (Protective Equipment) Manufacturers' Association
- Institution of Fire Engineers
- London Fire and Civil Defence Authority
- Ministry of Defence

This British Standard, having been prepared under the direction of the Personal Safety Equipment Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 30 November 1989

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First published March 1965
First revision November 1989

The following BSI references relate to the work on this standard:
Committee reference PSM/42
Draft for comment 86/43456 DC

ISBN 0 580 17763 7

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Definitions	1
3 Construction	1
4 Performance	3
5 Marking and labelling	3
Appendix A Determination of wearing height and vertical distance	5
Appendix B Environmental conditioning	5
Appendix C Test for shock absorption	5
Appendix D Solvent conditioning	7
Appendix E Test for resistance to penetration	7
Appendix F Test for strength of retention system	8
Appendix G Test for resistance to flame	9
Appendix H Test for resistance to radiant heat	10
Appendix J Test for electrical insulation	12
Appendix K Test for durability of brim	12
Figure 1 — Apparatus for testing shock absorption	6
Figure 2 — Test block for testing resistance to penetration	9
Figure 3 — Striker for testing resistance to penetration	10
Figure 4 — Apparatus for testing resistance to radiant heat	11
Table 1 — Minimum wearing height	2
Publications referred to	Inside back cover

Foreword

This British Standard has been prepared under the direction of the Personal Safety Equipment Standards Policy Committee and is a revision of BS 3864:1965, which is withdrawn. Changes in circumstances since 1965 render a revision desirable. The degree of protection demanded has increased and there have also been advances in helmet design.

In addition, there is now greater emphasis within standards on requirements for performance rather than construction, to avoid inhibiting technical innovation. This British Standard is intended for traditional style helmets, but is not intended to exclude radical designs which might arise, including any which combine head and respiratory protection.

Greater freedom of design is now permitted in the shape of the outer shell and in the type of chin strap or other retention system. Other notable changes introduced in this revision are the testing of impact resistance in areas of the helmet other than the crown and the application of a test for resistance to penetration by an object resembling a roof slate.

A proportion of the energy of an impact is absorbed by the helmet, thereby reducing the force of the blow sustained by the head. The structure of the helmet may be damaged in absorbing this energy and any helmet that sustains a severe blow needs to be replaced even if damage is not apparent.

It is important that protective equipment be worn in the manner for which it was designed. Adjustments to suit the individual wearer or any auxiliary equipment should be correctly set and the chin strap or other retention system should be correctly fastened.

The protection given by a helmet depends on the circumstances of the accident, and wearing a helmet cannot always prevent death or long-term disability.

Attention is drawn to the Health and Safety at Work etc. Act 1974 and the obligations which it places on the wearer and on others with responsibility for the safety of the wearer.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, 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 specifies requirements for protective helmets for personnel engaged in firefighting duties. It is not necessarily suitable for special applications such as aircraft fires.

Requirements and the corresponding methods of test where appropriate are given for:

- a) shape and construction;
- b) shock absorption;
- c) resistance to penetration;
- d) strength of retention system;
- e) resistance to flame and radiant heat;
- f) electrical insulation;
- g) durability of brim;
- h) marking and labelling.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

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

2.1 shell

the material that provides the general outer form of the helmet

2.2 comb

a vertical ridge protruding from the basic shape (see 2.4) of the shell at the crown and rear, and lying along the central longitudinal vertical plane and including its associated fairings and radiusing

2.3 brim

a ridge protruding outwards from the basic shape (see 2.4) of the shell forming the lower edge of the shell and including its associated fairings and radiusing

2.4 basic shape

the outer shape which the helmet would have if it had neither comb nor brim nor any of the fairings or radiusing associated with these

2.5 chin strap

a flexible strap intended to pass under the wearer's jaw to retain the helmet in position

2.6 retention system

a device or assembly intended to retain the helmet in position on the wearer's head

2.7 headband

a part of the retention system encircling the head in the region corresponding to the AA' plane of a headform as defined in BS 6489

2.8 central longitudinal vertical plane

the vertical plane of symmetry of a human head or the corresponding plane of a headform or of a helmet as it is intended to be worn on the head

2.9 transverse plane

any plane that is at right angles to the central longitudinal vertical plane

2.10 wearing height

the vertical measurement from the lower edge of the headband to the highest point of the headform on which the helmet is mounted measured either at the front (midway between the sides of the headform) or the side (midway between the front and back of the headform) whichever gives the greater distance

2.11 vertical distance

the vertical measurement between the top of the headform on which the helmet is mounted and the highest point on the outside surface of the helmet with any vertical adjustment fully slackened

3 Construction

3.1 Construction of the whole helmet

3.1.1 General. The helmet shall consist of a shell complying with 3.2 and a retention system complying with 3.3.

NOTE The helmet may be fitted with an adjustable headband or other means of adjusting the circumference of the lower part of the interior of the helmet which rests against the head.

Any metal parts of the helmet shall be so placed, or so protected, as not to touch the wearer when the helmet is being worn in the normal way. When the helmet is mounted on a headform complying with BS 6489 in the manner in which it is intended to be worn, no metal part shall pierce the helmet between its inside and outside surfaces at any point above the HH' plane (as defined in BS 6489).

3.1.2 Vertical distance. When measured as described in Appendix A, the vertical distance shall be not greater than 75 mm.

3.1.3 Wearing height. When measured as described in Appendix A, the wearing height shall be in accordance with Table 1.

Table 1 — Minimum wearing height

Headform size code (see BS 6489)	Minimum wearing height
	mm
A	76
C	79
E	82
G	85
J	88
K	90
M	93
O	96

3.2 Shell

3.2.1 Shape and dimensions of the shell. The outer shape of the shell shall conform to the basic shape described in 3.2.2 except where modification is permitted by 3.2.3.

NOTE The term basic shape (see 2.4) does not refer to the general shape of the helmet but is used to describe one aspect or part of it (see 3.2.2).

3.2.2 Basic shape. The curvatures of the basic shape shall be convex at all points.

3.2.3 Modifications to the basic shape

3.2.3.1 Comb. The shape of the helmet may deviate from the basic shape due to the presence of a single comb as defined in 2.2 including its associated fairing or radiusing. If a comb is present, then any transverse normal cross section of it shall not show any of the following:

- a) more than two concave regions on either side of the comb;
- b) curvature with a radius of less than 5 mm;
- c) any point on the side of the comb having a tangent making an acute angle with the longitudinal vertical plane more than 80° except for any concave region merging into the basic shape.

For this purpose a transverse normal cross section is one that is formed by a transverse plane (see 2.9) normal to any point that is on the surface of the comb in the central longitudinal vertical plane.

NOTE The cross section of a simple comb will have one concave region on each side where it merges into the basic shape. The angles between the tangents in these regions and the longitudinal vertical plane are permitted to exceed 80° and probably will. If the comb incorporates a plinth the cross section will have two concave regions on each side, the upper of which is the top surface of the plinth. It is the angle between the tangent to this surface and the longitudinal vertical plane which is not permitted to exceed 80°, i.e. to be nearly horizontal. The top of the comb cannot avoid having a horizontal tangent.

3.2.3.2 Brim. The shape of the helmet may deviate from the basic shape due to the presence of a brim including its associated fairings or radiusing. No part of the brim shall protrude above the plane AA' when the helmet is mounted on a headform complying with BS 6489 in the manner in which it is designed to be worn. Any vertical cross section of the brim shall not show any of the following:

- a) more than one concave region on either side of the cross section;
- b) concave curvature with a radius of less than 20 mm;
- c) any point having a curvature such that it could retain liquid when the helmet is worn on the head.

3.2.3.3 External protrusions. The external shape of the shell and the shape of the comb and brim may be modified by radiused protrusions for the purpose of fastening together the parts of the helmet or attaching accessories. Such protrusions shall not exceed 5 mm if located above the AA' plane or 10 mm if located below the AA' plane.

3.2.4 Internal protrusions. On the inside of the helmet there shall be no sharp edges and any internal protrusions shall be covered by protective padding.

3.2.5 Attachments. The helmet shall incorporate or have directly attached to it means for the wearer easily to attach and detach a neck curtain and a visor without the use of tools unless the helmet is fitted with such a curtain and/or visor.

3.2.6 Material. If the helmet incorporates a material known to be adversely affected by contact with hydrocarbons, organic cleaning fluids, paints, adhesives, transfers or other extraneous additions then the helmet shall carry on its information label an appropriate warning as specified in item d) of 5.2.

For those parts of the helmet coming into contact with the skin, materials shall not be used which are known to cause skin disorders and the materials used shall be known not to undergo significant alteration from the effects of sweat and toiletries.

3.3 Retention system

The helmet shall be fitted with means for retaining it on the head. The system shall incorporate either a chin strap, as defined in 2.5, or a chin piece designed to fit under the wearer's jaw. All essential parts of the chin strap or chin piece shall be attached to the helmet so that they cannot be detached without the use of tools. The chin strap shall be capable of being adjusted easily in length by the wearer while the helmet is being worn. Means shall be provided for adjusting the tightness of fitting of the chin piece.