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Protective clothing and equipment for use in violent situations and in training —

Part 3: Personal defence shields — Requirements and test methods

ICS 13.310; 13.340.99

Committees responsible for this British Standard

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- APSS — Association of Police and Public Security Suppliers
- Association of Chief Police Officers in Scotland
- BSIF Test and Certification Association
- British Association for Chemical Specialities
- British Association of Women Police
- British Clothing Industry Association
- British Glove Association
- British Textile Technology Group
- Defence Industries Association
- Department of Health — Medical Devices Agency
- Home Office
- Ministry of Defence — UK Defence Standardization
- National Association of Healthcare Safety and Risk Practitioners
- Personal Safety Manufacturers' Association
- Police Federation of England and Wales
- Police Purchasing Manager Association
- Police Uniform Project Group
- SATRA Technology Centre
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Foreword

This part of BS 7971 has been prepared by Subcommittee PH/3/12.

The following parts of BS 7971 are currently published or in preparation:

- *Part 1: General requirements;*
- *Part 2: Guidance on risk assessment and on the selection, use, cleaning and maintenance of protective clothing and equipment;*
- *Part 3: Personal defence shields — Requirements and test methods;*
- *Part 4: Limb protectors — Requirements and test methods;*
- *Part 5: Footwear — Requirements and test methods;*
- *Part 6: Gloves for protection against mechanical, thermal and chemical risks — Requirements and test methods;*
- *Part 7: Slash-resistant gloves — Requirements and test methods;*
- *Part 8: Blunt trauma body, shoulder, abdomen and genital protectors — Requirements and test methods;*
- *Part 9: Training suits and equipment — Requirements and test methods;*
- *Part 10: Coveralls — Requirements and test methods.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 19 and a back cover.

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Introduction

Personal defence shields are items of protective equipment which are generally, but not exclusively, carried by serving police officers and prison officers whilst engaged in operational duties, and during training. They are also used by civilians engaged in activities where the risks of attack and assault are similar e.g. private security personnel, bullion handlers, escorts and couriers.

The purpose of a personal defence shield is to provide a first line of defence, and thereby reduce or prevent the potentially injurious effects of commonly-faced hazards to the health and safety of the user. These include attack by violent individuals (often using weapons such as metal bars, pieces of timber, baseball bats, axes, spikes and knives), lofted missiles (e.g. bricks or bottles) and certain other hazards (e.g. petrol bombs and attack with corrosive or irritant chemicals and solvents). A personal defence shield can also protect the user when utilized as a means of restraining a violent individual, thus reducing or preventing that individual's ability to continue to present a hazard to the health and safety of the user.

Personal defence shields are generally used in conjunction with other items of protective clothing and equipment (e.g. helmets, body and limb protectors, gloves and protective footwear). Whilst these items do not provide adequate protection against some hazards, it is considered that the use of a personal defence shield can either protect against the hazard or reduce its effects to a level at which the user can be protected by the other items of protective clothing and equipment.

Personal defence shields can take any one of several forms, from relatively small shields for use when ease of movement, often in confined spaces, is of paramount importance, to shields that provide full body coverage to the total height of the user. Shields can be of different shapes and frontal aspects, for example, round, rectangular, oval, flat or convex. Experience has also shown that due to the particular physiological demands on officers engaged in public order operations, it is desirable for personal defence shields to have a low mass whilst providing the appropriate body coverage and level of protection.

The test methods specified in this part of BS 7971 have been designed to measure the performance of personal defence shields with respect to the protection they can be expected to provide against the commonly-faced hazards listed above. The severity of these tests cannot compare directly with the conditions to which police officers, prison officers and other users can be exposed in real life situations, but experience has shown that shields which pass such tests can significantly reduce the incidence and/or severity of injuries.

1 Scope

This part of BS 7971 specifies performance requirements and test methods for personal defence shields for use by police and prison officers and others who might be exposed to attack and assault in the course of their duties, for use in operational situations and in training.

NOTE 1 Information and guidance on the selection and use of personal defence shields is given in Annex A.

NOTE 2 Guidance on risk assessment and the selection, care and maintenance of protective clothing and equipment for use in violent situations and in training is given in BS 7971-2¹⁾.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendments) applies.

BS 7971-1, *Protective clothing and equipment for use in violent situations and in training — Part 1: General requirements*.

BS 7971-4:2002, *Protective clothing and equipment for use in violent situations and in training — Part 4: Limb protectors — Requirements and test methods*.

¹⁾ In preparation.

3 Terms and definitions

For the purposes of this part of BS 7971, the terms and definitions given in BS 7971-1 and the following apply.

3.1

personal defence shield

device constituting a barrier between a hazard and the user, held or carried by that user in order to reduce or prevent the occurrence of personal injury

3.2

shield blade

outermost layer of the shield providing the protective coverage

3.3

crack

parting of the structure(s) of a material, partial or full-thickness, along an indeterminate length, resulting from the application of force

3.4

cut

parting of the structure(s) of a material, partial or full-thickness, along an indeterminate length, produced by the use of a sharp-edged implement

3.5

strike face

<of a shield> outer face of the shield blade

3.6

strike face

<of a test specimen> face of a test specimen to be struck by the impactors

3.7

witness material

plastic material which is readily deformed and retains its altered shape

4 Shield types and performance levels

Personal defence shields shall be of one of three types as specified in Table 1. The performance level of each type of shield shall be as specified in Table 1.

Table 1 — Types and performance levels for personal defence shields

Type	Performance level ^a	Hazard against which protection is provided	Hazard level	Examples of intended use
1	2	Mechanical impact; petrol bombs	Moderate	Where close contact with opponents is expected
2	3	Mechanical impact and slashes from heavy blades e.g. machetes and samurai swords; petrol bombs	High	Where close contact with determined opponents and frenzied force blows are expected
3	3	Mechanical impact and slashes from heavy blades e.g. machetes and samurai swords; petrol bombs; also after exposure to chemicals listed in BS 7971-1	High	Where close contact with determined opponents and frenzied force blows and attacks with chemicals are expected

^a See also BS 7971-1.

5 Performance requirements

5.1 General

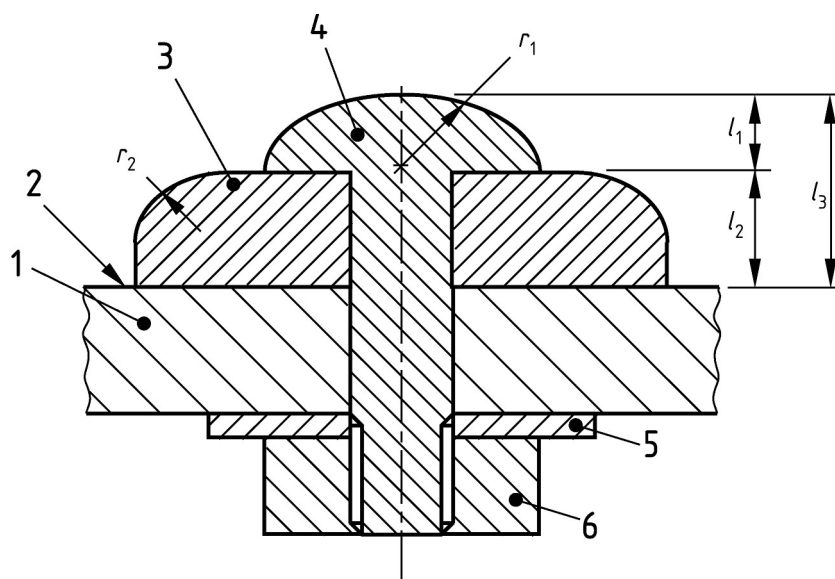
Personal defence shields shall conform to the general requirements for protective clothing and equipment for use in violent situations and in training specified in BS 7971-1, as applicable.

5.2 Surface condition

All materials, fixings, fasteners and surfaces shall be free of sharp edges and rough surfaces when assessed in accordance with 7.1. The radius of curvature of all edges of the shield blade shall be greater than 1.5 mm. The radius of curvature of corners of surface steps, bolt heads and fixings on the strike face shall be in accordance with Table 2 as shown in Figure 1. The maximum height of any step shall be 6 mm. The maximum height of any projection consisting of a number of steps shall be 10 mm.

Table 2 — Minimum radius of curvature of exposed edge of steps

Height of step mm	Minimum radius of curvature of exposed edge mm
Up to and including 0.9	0.5
1.0 to 2.9	1.0
3.0 to 3.9	2.0
4.0 to 4.9	3.0
5.0 to 6.0	4.0



Key

- | | | | |
|---|-----------------|---|-----------|
| 1 | Shield blade | 4 | Bolt head |
| 2 | Strike face | 5 | Washer |
| 3 | Washer assembly | 6 | Lock nut |
- l_1 height of bolt head (maximum 6 mm)
 l_2 height of washer assembly (maximum 6 mm)
 l_3 total height of projection (maximum 10 mm)
 r_1 radius of curvature of the bolt head
 r_2 radius of curvature of edge of washer assembly
 r_1 and r_2 shall conform to Table 2.

Figure 1 — Illustration of radii of curvature and height of steps and bolt heads on the strike face of a shield

5.3 Ergonomic performance and compatibility

When assessed in accordance with BS 7971-1, the personal defence shield shall have a test score equal to or less than the value specified in Table 3.

Table 3 — Maximum test scores

Shield type	Performance level	Maximum test score
Type 1	2	13
Type 2	3	6
Type 3	3	6

5.4 Flame resistance

When subjected to flame preconditioning in accordance with the method given in 7.3 the shield shall conform to the following requirements.

- During the procedure, no flaming debris shall separate from the shield.
- Within 5 s after the flames from the liquid in the pan below the shield have gone out completely or have died down to a height of less than 100 mm, no part of the shield or its fittings shall show any flame.
- After a further 25 s, no part of the shield or its fittings shall show a persistence of glowing combustion (afterglow).
- After the procedure no part of the shield shall show visible signs of having melted with dripping.

5.5 Impact deformation resistance

When a test specimen is tested in accordance with 7.4, the maximum deformation of the witness material shall not exceed 25 mm and there shall be no visible evidence of fragments within the witness material.

5.6 Blunt impact resistance

When a shield tested in accordance with 7.5, there shall be no visible evidence of fragments on the splinter sheet and no cracking of the shield blade.

5.7 Blade cut resistance of Type 2 and Type 3 shields

When test specimens from Type 2 shields and from Type 3 shields are tested in accordance with 7.6, no cut or crack shall extend more than 50 mm vertically from the top edge of the shield blade.

5.8 Impact energy attenuation

For shields including energy attenuating materials, test specimens shall be tested in accordance with 7.7. The mean peak transmitted force recorded below the anvil shall not exceed 8 kN, and no single value shall exceed 12 kN.

6 Procedures for conditioning and preparation of test specimens

6.1 Chemical preconditioning of Type 3 shields

Type 3 shields shall be subjected to chemical preconditioning in accordance with 7.2, using the chemicals specified in BS 7971-1. On each shield, preconditioning shall be carried out at each of the impact sites identified in the examination in accordance with 6.5.2.

After chemical preconditioning the shields shall be conditioned in accordance with 6.3.

6.2 Flame preconditioning

Shields shall be preconditioned using the method given in 7.3. After preconditioning, test specimens for testing in accordance with 7.4, 7.6 and 7.7 shall be cut in accordance with 6.5.2 and 6.7. Whole shields and test specimens shall be conditioned in accordance with 6.3 or 6.4, as applicable.