

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

Part 8: Blunt trauma torso, shoulder, abdomen and genital protectors — Requirements and test methods

ICS 13.340.10

Committees responsible for this British Standard

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- 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
- Home Office
- Medicines and Healthcare products Regulatory Agency
- Ministry of Defence — UK Defence Standardization
- National Association of Healthcare Safety and Risk Practitioners
- National Health Service
- Personal Safety Manufacturers’ Association
- Police Federation of England and Wales
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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Introduction	1
1 Scope	2
2 Normative references	2
3 Terms and definitions	2
4 Performance levels	3
5 Construction and performance requirements	3
6 Test methods	20
7 Information to be supplied by the manufacturer	36
Annex A (informative) Information and guidance on the use of torso, shoulder, abdomen and genital protectors	37
Annex B (normative) Additional test for ergonomic performance and compatibility for equestrian torso protectors	38
Bibliography	39
Figure 1 — Sizing pictograms for pedestrian and equestrian torso protectors, including examples of size ranges	4
Figure 2 — Pedestrian torso protectors zone of protection	6
Figure 3 — Equestrian torso protectors zone of protection	8
Figure 4 — Abdomen protectors zone of protection	10
Figure 5 — Position of hard genital protector relative to pelvic bones	11
Figure 6 — Dimensions of hard genital protector	13
Figure 7 — Dimensions of zone of protection of soft genital protectors for women	17
Figure 8 — Attachment points on protectors, and directions of force application, for restraint testing of abdomen protectors and genital protectors	27
Figure 9 — Cylindrical anvil with a guard ring	29
Figure 10 — Horizontal anvil for impact testing of hard genital protectors	30
Figure 11 — Flat impactor	31
Figure 12 — “Brick edge” impactor	32
Figure 13 — Ball impactor	33
Table 1 — Dimensions of zone of protection of pedestrian torso protectors	5
Table 2 — Dimensions of zone of protection of equestrian torso protectors	7
Table 3 — Dimensions of zone of protection of abdomen protectors	9
Table 4 — Size designations and dimensions for hard genital protectors	10
Table 5 — Dimensions of zone of protection of soft genital protectors for women	16
Table 6 — Test forces and maximum displacement for restraint testing of abdomen protectors and genital protectors	18
Table 7 — Test conditions for blade impact testing	19
Table 8 — Maximum test scores	20

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 hazards — Requirements and test methods;*
- *Part 7: Slash-resistant gloves — Requirements and test methods;*
- *Part 8: Blunt trauma torso, 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.*

It has been assumed in the drafting of this standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its 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 39 and a back cover.

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Introduction

Torso, shoulder, abdomen and genital protectors are items of protective clothing which are generally, but not exclusively, worn by serving police officers and prison officers whilst they are engaged in operational duties and in 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.

These protectors are intended to reduce the severity of, or prevent, soft tissue injuries resulting from blunt trauma to the areas covered. Such blunt trauma can arise as the result of impact from airborne missiles (house bricks, assorted types of bottle, metal bars, pieces of timber, fragments of wood, broken glass and slates, etc.), or can be due to assault by individuals using weapons such as bars, baseball bats and pieces of timber, or caused by individuals kicking or making violent physical contact with the wearer's body

These protectors are not intended to provide ballistic protection or protection against blows from sharp or pointed instruments (e.g. axes, spikes and knives).

For certain user groups, including police and prison officers, the protectors constitute a second line of defence, with a personal defence shield providing a degree of primary protection (see BS 7971-3). Whilst shields do not always prevent impacts with the wearer's body by missiles or weapons, they can reduce the energy of impacts to levels at which protectors can have a significant effect in the reduction of soft tissue or skeletal injuries. At times, however, circumstances can dictate that the shield is dispensed with or placed in a position which leaves the user exposed to a direct impact or assault. In these circumstances, and in the event of an unanticipated assault from behind, a torso protector and shoulder protectors can provide a level of protection from injury which the user would otherwise not have.

Experience has shown that many areas of the body are at risk of impact in the attack scenarios described above. This standard specifies requirements and test methods for torso, shoulder, abdomen and genital protectors. However, other areas of the body can also be at risk of impact in these attack scenarios, so protective clothing and/or equipment to protect these areas is also necessary.

The test methods specified in this part of BS 7971 have been designed to measure the performance of torso, shoulder, abdomen and genital protectors 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 protectors which pass such tests can significantly reduce the incidence and/or severity of injuries.

The requirements for torso protectors for equestrian use specified in this part of BS 7971 are more stringent than those specified for protectors for horse riders in BS EN 13158:2000.

1 Scope

This part of BS 7971 specifies performance requirements and test methods for blunt trauma torso, shoulder, abdomen and genital protectors 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. It specifies requirements for torso protectors for pedestrian use and for torso protectors for equestrian use.

NOTE 1 Information and guidance on the use of these protectors 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 7971-2.

This standard is not applicable to protectors intended to provide protection against ballistic or penetrating trauma (e.g. stabbing).

NOTE 3 Such body armour is specified in Police Scientific Development Branch publications [1], [2] and [3].

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*.

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

torso protector

sleeveless protector covering specific areas of the front and back of the torso

3.2

pedestrian torso protector

torso protector designed for use on foot

3.3

equestrian torso protector

torso protector designed for use on horse-back

NOTE Equestrian torso protectors are generally shorter at the front and longer at the back compared to pedestrian torso protectors.

3.4

shoulder protector

protector for addition to a torso protector covering the shoulder joint (the acromioclavicular joint and the glenohumeral joint) at the distal end of the collar bone, or for restraint to the body by a harness of straps or other system independent of a torso protector

NOTE Shoulder protectors can be permanently affixed to a torso protector or can be detachable.

3.5

abdomen protector

protector covering the front of the abdomen

3.6

genital protector

protector covering the genitalia

NOTE A genital protector can be permanently attached to an abdomen protector or can be completely independent.

4 Performance levels

Pedestrian and equestrian torso protectors and shoulder protectors shall be performance level 3 as specified in BS 7971-1.

Abdomen protectors and genital protectors shall be performance level 2 as specified in BS 7971-1.

5 Construction and performance requirements

5.1 General

Pedestrian torso protectors, equestrian torso protectors, shoulder protectors, abdomen protectors and genital protectors 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 Sizing of protectors, and dimensions of zones of protection and test areas

5.2.1 General

5.2.1.1 All protectors shall be marked with a size designation. The size shall be related to the body dimensions of the intended user, using the relevant control body dimensions, as specified in **5.2.2**, **5.2.3**, **5.2.4** or **5.2.5**, as applicable, and the relationship shall be explained in the information supplied by the manufacturer as specified in BS 7971-1. Sizing shall be verified in accordance with **6.3**, **6.4**, **6.5** or **6.6**, as applicable. For protectors that are stated to fit a range of differently sized people, the values of the control body dimensions of the largest size of user that the protector is stated to fit shall be used for sizing.

5.2.1.2 All protectors shall have a zone of protection which shall have the dimensions required for the largest size of user for whom the protector is designated by the manufacturer. The dimensions of the zone of protection shall be determined in accordance with **6.3**, **6.4**, **6.5** or **6.6**, as applicable, and shall conform to **5.2.2**, **5.2.3**, **5.2.4** or **5.2.5**, as applicable. The positions and dimensions of the zones of protection, relative to the coverage provided by the entire protector, shall be stated in the information supplied by the manufacturer as specified in BS 7971-1.

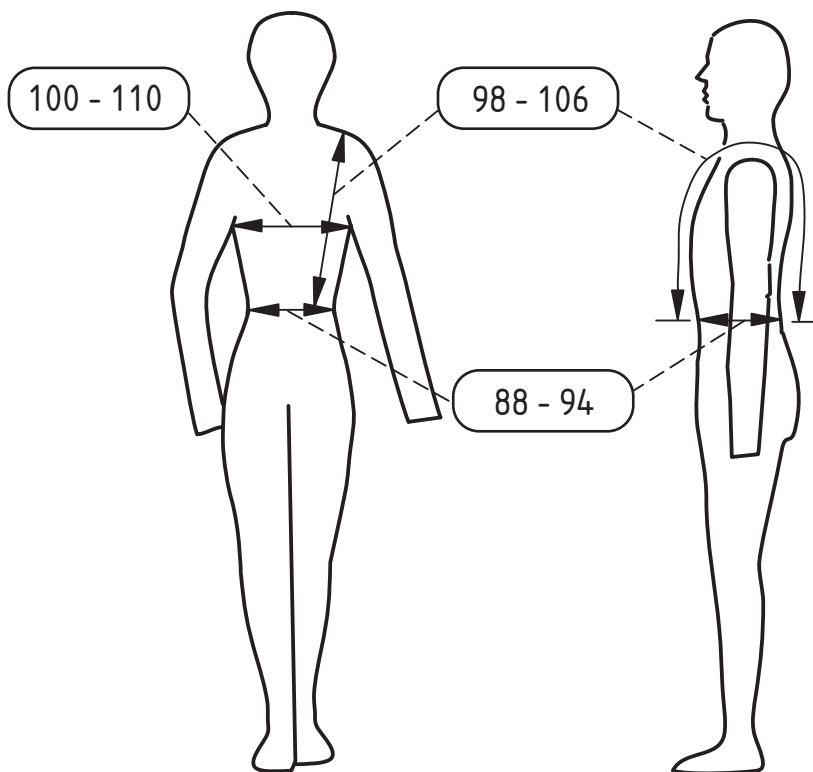
5.2.1.3 Unless otherwise specified for a particular protector or a particular test, test areas shall have the same dimensions as the zone of protection.

5.2.2 Torso protectors

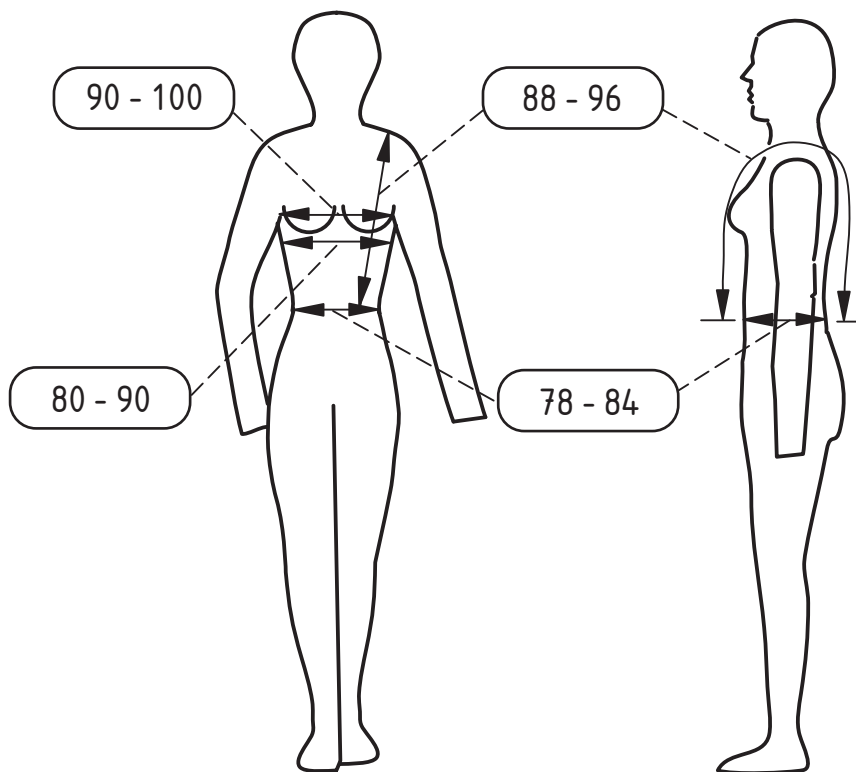
5.2.2.1 *Sizing of pedestrian torso protectors and equestrian torso protectors*

Torso protectors for men shall be sized using chest girth, waist girth and waist-to-waist over shoulder length as control dimensions. Torso protectors for women shall be sized using bust girth, under bust girth, waist girth and waist-to-waist over shoulder length as control dimensions. Sizing shall be verified in accordance with **6.3.1**.

For each protector, the size range of the intended users shall be indicated on a pair of sizing pictograms as shown in Figure 1. The sizing pictograms shall be printed on a label attached to the protector or given in the information supplied by the manufacturer (see Clause 7).



a) Pictograms for protectors for men



b) Pictograms for protectors for women

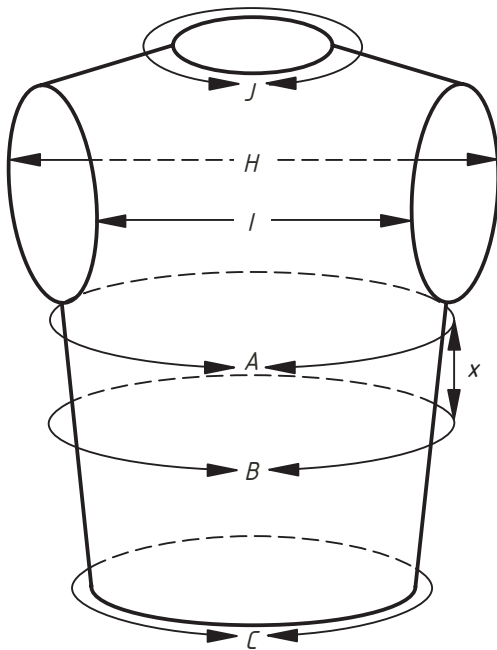
Figure 1 — Sizing pictograms for pedestrian and equestrian torso protectors, including examples of size ranges

5.2.2.2 Dimensions of the zone of protection of pedestrian torso protectors

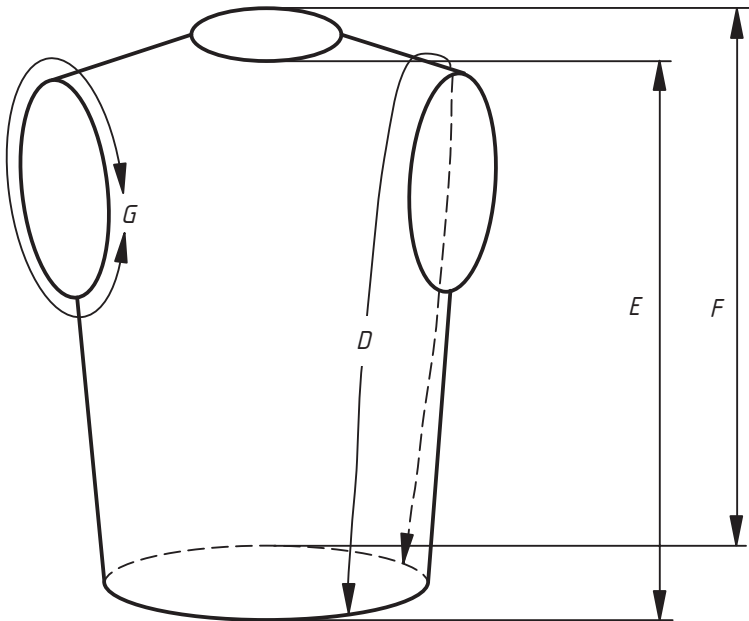
The dimensions of the zone of protection of pedestrian torso protectors measured on the inside of the protector shall be as given in Table 1 and illustrated in Figure 2.

Table 1 — Dimensions of zone of protection of pedestrian torso protectors

Dimension of zone of protection		Letter identifying dimension in Figure 2	Control dimension	Dimension of zone of protection as a percentage of control dimension
Protectors for men	Protectors for women			
Girth around chest of protector	Girth around bust of protector	<i>A</i>	Chest girth or bust girth	105 to 110
—	Under bust girth of protector	<i>B</i>	Under bust girth	105 to 110
Girth around waist of protector	Girth around waist of protector	<i>C</i>	Waist girth	105 to 110
Front lower edge to back lower edge over shoulder distance ^a	Front lower edge to back lower edge over shoulder distance ^a	<i>D</i>	Waist-to-waist over shoulder length	>105
Centre front length	Centre front length	<i>E</i>	Waist-to-waist over shoulder length	>38
Centre back length	Centre back length	<i>F</i>	Waist-to-waist over shoulder length	>50
Armhole circumference	Armhole circumference	<i>G</i>	Chest girth or under bust girth	<72
Minimum width between armholes across the back ^b	Minimum width between armholes across the back ^b	<i>H</i>	Chest girth or under bust girth	>28
Minimum width between armholes across the front ^b	Minimum width between armholes across the front ^b	<i>I</i>	Chest girth or bust girth	>22
Neck opening circumference	Neck opening circumference	<i>J</i>	Chest girth or under bust girth	<65
^a Measured in same way as waist-to-waist over shoulder length.				
^b Measured at a level halfway down the armhole opening.				



a) Horizontal dimensions



b) Vertical dimensions

Key

x 15 % of waist-to-waist over shoulder length

Figure 2 — Pedestrian torso protectors zone of protection

5.2.2.3 Dimensions of the zone of protection of equestrian torso protectors

The dimensions of the zone of protection of equestrian torso protectors shall be as given in Table 2 and illustrated in Figure 3. Dimensions *A* to *C* shall be measured on the inside of the protector and dimensions *K* to *R* shall be measured on the outside of the protector.

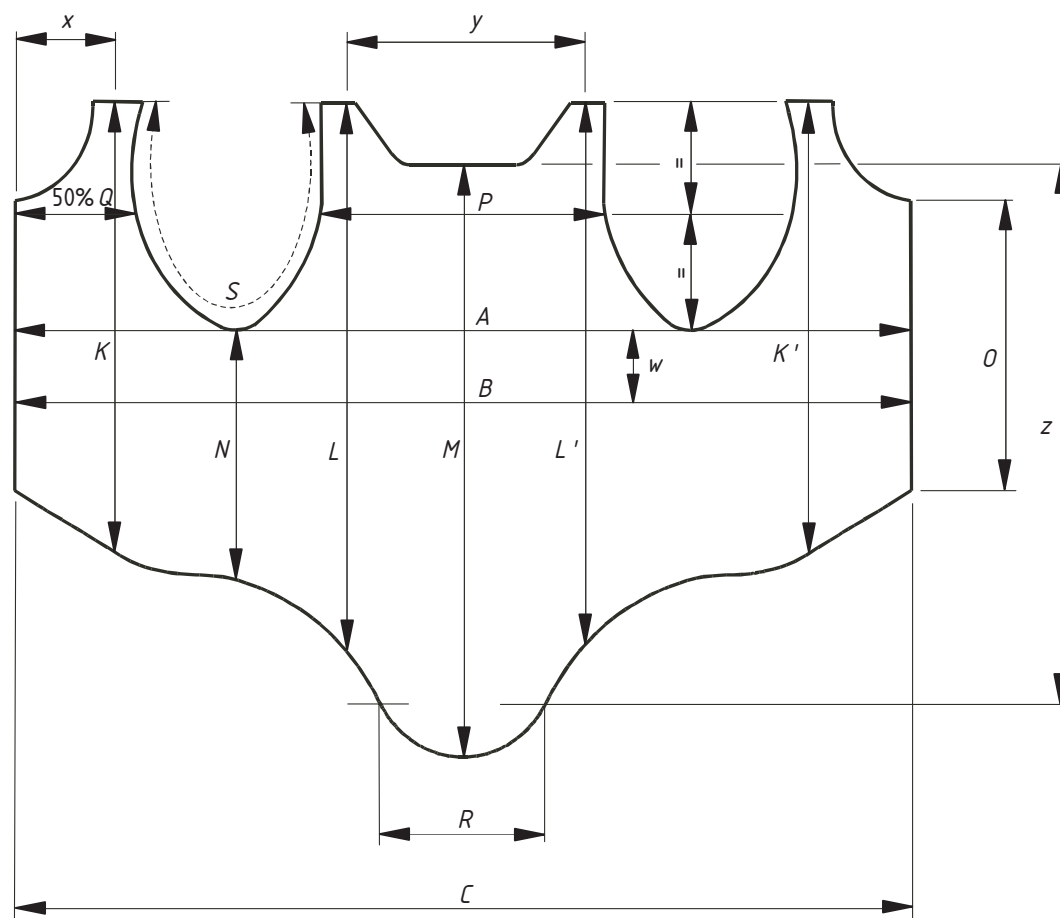
Table 2 — Dimensions of zone of protection of equestrian torso protectors

Dimension of zone of protection		Letter identifying dimension in Figure 3	Control dimension	Dimension of zone of protection as a percentage of control dimension
Protectors for men	Protectors for women			
Girth around chest of protector	Girth around bust of protector	<i>A</i>	Chest girth or bust girth	105 to 110
—	Under bust girth of protector	<i>B</i>	Under bust girth	105 to 110
Girth around waist of protector	Girth around waist of protector	<i>C</i>	Waist girth	105 to 110
Distance from top of shoulder to lower edge of protector at the front ^a	Distance from top of shoulder to lower edge of protector at the front ^a	<i>K</i> and <i>K'</i>	Waist-to-waist over shoulder length	>47
Distance from top of shoulder to lower edge of protector at the back ^b	Distance from top of shoulder to lower edge of protector at the back ^b	<i>L</i> and <i>L'</i>	Waist-to-waist over shoulder length	>63
Centre back length	Centre back length	<i>M</i>	Waist-to-waist over shoulder length	>57
Distance from bottom of armhole to lower edge of protector	Distance from bottom of armhole to lower edge of protector	<i>N</i>	Waist-to-waist over shoulder length	>17
Centre front length	Centre front length	<i>O</i>	Waist-to-waist over shoulder length	>33
Minimum width between armholes across the back ^c	Minimum width between armholes across the back ^c	<i>P</i>	Chest girth or under bust girth	>30
Minimum width between armholes across the front ^c	Minimum width between armholes across the front ^c	<i>Q</i>	Chest girth or bust girth	>23
Width of the back at a distance from the lower edge of the neck opening equal to 50 % of the waist-to-waist over the shoulder length	Width of the back at a distance from the lower edge of the neck opening equal to 50 % of the waist-to-waist over the shoulder length	<i>R</i>	Chest girth or under bust girth	>25
Armhole circumference	Armhole circumference	<i>S</i>	Chest girth or under bust girth	<72

^a Measured at a distance from the centre of the chest equal to 12.5 % of the chest girth or bust girth (i.e. distance *KK'* in Figure 3 is 25 % of the chest girth or bust girth.)

^b Measured at a distance from the centre of the back equal to 12.5 % of the chest girth or bust girth (i.e. distance *LL'* in Figure 3 is 25 % of the chest girth or bust girth.)

^c Measured at a level halfway down the armhole opening.

**Key**

- w 15 % of waist-to-waist over shoulder length
- x 12.5 % of chest girth or bust girth
- y 25 % of chest girth or bust girth
- z 50 % of waist-to-waist over shoulder length

Figure 3 — Equestrian torso protectors zone of protection

5.2.3 Shoulder protectors

The sizing and the dimensions of the zone of protection of shoulder protectors shall be as specified in BS 7971-4.

5.2.4 Abdomen protectors

5.2.4.1 Sizing

Abdomen protectors shall be sized using waist girth and total crotch length as control dimensions.

5.2.4.2 Minimum dimensions of the zone of protection

The minimum dimensions of the zone of protection of abdomen protectors shall be as given in Table 3 and illustrated in Figure 4.

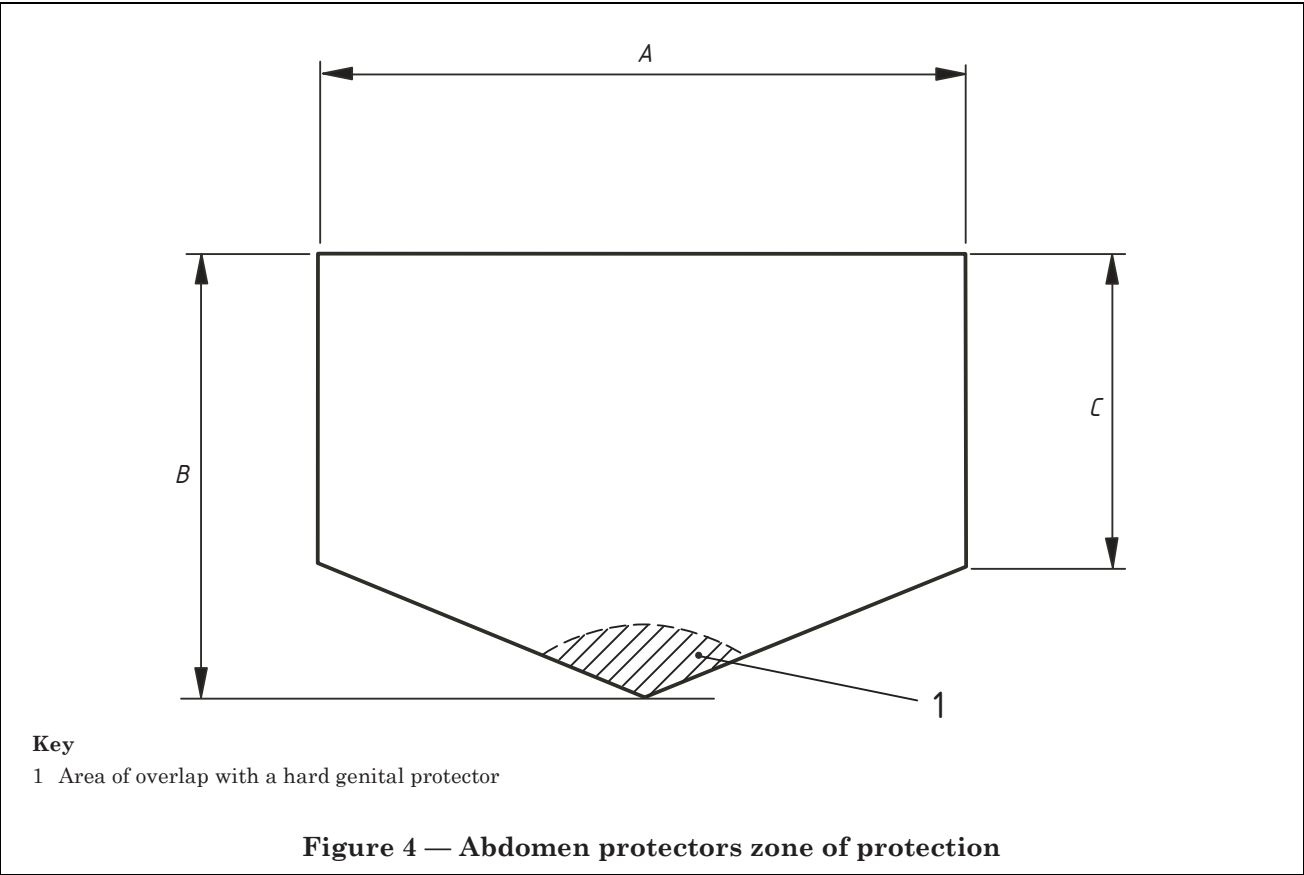
NOTE For an abdomen protector with an attached hard genital protector the minimum dimensions of the zone of protection of the abdomen protector are reduced by an amount corresponding to the area of overlap, as shown in Figure 4.

The abdomen protector shall have a zone of protection which either:

- has dimensions calculated using the user's waist girth as the control dimension, as indicated in Table 3 column 5; or
- is one of the nominal sizes given in Table 3 columns 6, 7, 8, 9 and 10.

Table 3 — Dimensions of zone of protection of abdomen protectors

1	2	3	4	5	6	7	8	9	10
Dimension of zone of protection	Letter identifying dimension in Figure 4	Sex of users	Nominal length of protector	Dimension of zone of protection as a percentage of control dimension	Dimension of zone of protection for each nominal size mm				
					Size 1	Size 2	Size 3	Size 4	Size 5
Minimum waist girth	A	Women	Short	28.0	224	258	291	325	358
			Regular						
			Long						
		Men	Short	28.0	224	258	291	325	358
			Regular						
			Long						
Minimum centre length	B	Women	Short	18.4	147	169	191	213	236
			Regular	20.8	166	190	215	240	265
			Long	23.0	184	212	239	267	294
		Men	Short	16.1	129	148	167	187	206
			Regular	18.4	147	169	191	213	236
			Long	20.7	166	190	215	240	294
Minimum side length	C	Women	Short	14.4	115	132	150	167	184
			Regular	16.3	130	149	168	188	207
			Long	18.0	144	166	187	209	230
		Men	Short	11.9	95	109	124	138	152
			Regular	13.6	109	125	141	158	174
			Long	15.3	122	141	159	177	196



5.2.5 Genital protectors

5.2.5.1 Sizing and dimensions of hard genital protectors

Sizes and dimensions of hard genital protectors shall be as specified in Table 4 and illustrated in Figure 5 and Figure 6. Dimensions of hard genital protectors shall be measured as specified in 6.6.1.

Table 4 — Size designations and dimensions for hard genital protectors

Size designation	Minimum internal depth, <i>A</i> ^a mm	Minimum internal length, <i>B</i> ^a mm	Minimum internal width at widest part, <i>C</i> ^b mm	Minimum protected volume, <i>D</i> ^b cm ³
Female size 1	20	100	55	70
Female size 2	25	110	65	110
Female size 3	30	120	75	150
Male size 1	40	120	85	170
Male size 2	45	130	95	225
Male size 3	50	140	105	300

^a See Figure 6b).
^b See Figure 6c).