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BSI British Standards

Child use and care articles – Safety of children's sleep bags – Safety requirements and test methods

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Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 28, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 April 2009. It was prepared by Technical Committee CW/41, *Child use and care articles*. A list of organizations represented on this committee can be obtained on request to its secretary.

Information about this document

The committee is aware that sleep bags with sleeves are available but there is limited information available regarding their use and insulation effect. This standard is based on current industry codes of practice which exclude sleep bags with sleeves. As further information becomes available it will be considered by the committee.

The committee is considering the development of a test method for assessing the requirements for neck openings.

Use of this document

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

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

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 cannot confer immunity from legal obligations.

1 Scope

This British Standard specifies requirements for the safety of sleep bags for the use of children with a minimum weight of 4 kg designed to provide sufficient warmth so as to remove the need for additional bedding when sleeping in a cot or similar product in which a child is contained.

This standard does not apply to garments with sleeves and feet, i.e. sleep suits or baby gros, or to products designed primarily for outdoor use or to keep children warm when in a pushchair. It also does not apply to sleeping bags covered by BS EN 13537 and BS EN 13538.

NOTE Rationales for the inclusion of some of the requirements given in this standard are given in Annex A.

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 any amendments) applies.

BS 3084:2006, *Slide fasteners (Zips) – Specification*

BS 5335-1:1991, *Continental quilts – Part 1: Specification for quilts containing fillings other than feather and/or down*

BS 5335-2:2006, *Continental quilts – Part 2: Determination of thermal resistance for quilts filled with feather and/or down*

BS EN 71-1, *Safety of toys – Part 1: Mechanical and physical properties*

BS EN 71-3, *Safety of toys – Part 3: Specification for migration of certain elements*

BS EN 14878, *Textiles – Burning behaviour of children's nightwear – Specification*

BS EN 23758, *Textiles – Care labelling code using symbols (ISO 3758)*

BS EN 31092:1994, *Textiles – Determination of physiological properties – Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test) (ISO 11092:1993)*

BS EN ISO 139, *Textiles – Standard atmospheres for conditioning and testing*

BS EN ISO 5077:2008, *Textiles – Determination of dimensional change in washing and drying*

BS EN ISO 6330:2001, *Textiles – Domestic washing and drying procedures for textile testing*

BS EN ISO 7500-1:2004, *Metallic materials – Verification of static uniaxial testing machines – Part 1: Tension/compression testing machines – Verification and calibration of the force-measuring system*

BS EN ISO 10012, *Measurement management systems – Requirements for measurement processes and measuring equipment*

BS EN ISO 14184-1, *Textiles – Determination of formaldehyde – Part 1: Free and hydrolyzed formaldehyde (water extraction method)*

3 Terms and definitions

3.1 sleep bag
full length fabric bag with a neck opening and armholes but without sleeves, hood or specific areas for feet and legs, designed to contain a child and to provide sufficient warmth so as to remove the need for additional bedding when sleeping in a cot or similar product in which a child is contained

NOTE 1 The term "sleep bag" is used to differentiate from "sleeping bags" which are designed for use in leisure activities.

NOTE 2 There may be a filling material enclosed between an outer and an inner fabric.

3.2 thermal resistance
unit equal to ten times the temperature difference between the two faces of a sleep bag (in K) when the heat flow rate across the unit area is equal to 1 W/m^2

NOTE The thermal resistance of a sleep bag is also known as its tog value.

3.3 tog
unit of thermal resistance which is equal to one-tenth of a square metre kelvin per watt (m^2 K/W)

NOTE 1 tog = 0.1 m^2 K/W.

3.4 press stud fastener
fastening consisting of male and female component parts, attached to corresponding parts of the sleep bag and fastening together by aligning and applying force

3.5 slide fastener
fastening consisting of two flexible interlocking stringers, with or without end stops, and a slider so arranged that by moving along the stringers in one direction an opening is formed, and by moving it in the other direction the opening is closed

NOTE Slide fasteners are commonly known as zips.

4 Test conditions

4.1 General

Unless otherwise stated, conditioning and testing shall be carried out in the standard atmosphere for testing textiles as defined in BS EN ISO 139.

4.2 Tolerances

Unless otherwise stated, the following tolerances shall apply:

- forces: ±5% of the nominal force;
- dimensions: ±1.0 mm of the nominal dimension.

NOTE Unless otherwise specified, the test forces may be applied by any suitable device which does not adversely affect the results.

4.3 Number of samples and order of tests

A separate sample shall be used for the thermal resistance test in **7.3**.

A separate sample shall be used for the mechanical hazard testing in Clauses **7**, **8**, **9**, **10**, **11.2**, **11.3** and **12**, with the tests being undertaken in that order.

A separate sample shall be used for the dimensional stability test in **12.1**.

5 Apparatus

5.1 *Thermal resistance measuring apparatus*, consistent with BS 5335-1:1991, **D.2** and BS 5335-2:2006, **4.2** but with the following specific modifications.

a) The apparatus shall be horizontal, with the heat flow upwards, designed so that measurements can be made at the upper hot face of the apparatus and in the ambient air above the quilt.

b) The surface of the upper hot face of the apparatus shall be flat, isothermal, and be of a suitable conductive material (see BS EN 31092:1994, **5.1**, paragraph 2).

c) The central measuring area shall be a square of minimum size 200 mm × 200 mm, maximum size 350 mm × 350 mm. The guard area or effective guard area around the central measuring area shall be at least 15 mm wide.

d) Suitable means of measuring the temperature of the measuring area shall be used.

e) Suitable means of measuring the air temperature above the bed shall be used.

f) Both the upper hot face temperature and the temperature of the air layer above the quilt shall be capable of being controlled to ±2.0 °C.

5.2 *Finger probe with a conical end*, made from plastics or other hard smooth material, of diameter 7 mm (see Figure 1), capable of being mounted on a device for exerting a force in such a way that the conical end can be presented to openings in mesh.

5.3 *Constant rate of extension (CRE) tensile-testing machine*, provided with means for indicating and recording the force applied to the test specimen in stretching it to rupture. The metrological confirmation system for the tensile testing machine shall be in accordance with BS EN ISO 10012. Under conditions of use, the accuracy of the machine shall be Class 1 in accordance with BS EN ISO 7500-1:2004. The error of the indicated or recorded maximum force at any point in the range in which the machine is used shall not exceed ±1%. The machine shall be capable of maintaining a constant rate of extension of 100 mm/min, with an accuracy of ±10%. The machine shall be such that it is possible to set the gauge length to any value between 1.0 mm and 75 mm, to within ±0.5 mm.

5.4 *Button box with a slotted plate*, for testing of buttons, tack buttons, pom-poms and beads. Examples of different types of button box are shown in Figure 2a) and Figure 2b). The box shall be of sufficient size to accommodate the attachment to be tested but the shape and dimensions of the box are not critical. The slotted plate shall be as shown in Figure 3 made from gauge plate metal (1.65 ± 0.15) mm thick. The slot width, *W*, shall be such that the attachment being tested can slide onto the plate without damaging the means of attachment (e.g. sewing thread or shank).

NOTE 1 The slotted plate may be an integral part of the button box, or be interchangeable to allow the testing of attachments of different sizes or types.

NOTE 2 Slot widths of (3 ± 0.2) mm, (5 ± 0.2) mm and (7 ± 0.2) mm have been found to be suitable to test the majority of attachments used on children's sleep bags.

NOTE 3 It is recommended that the button box attachment to the load cell be articulated to make it easier to slide in the component under test.

5.5 *Press fastener upper grip*, for testing of press fasteners, including press stud fasteners, comprising a multi-pronged claw, with a minimum of three prongs and able to grasp a minimum of 70% of the circumference of the outer rim of the fastener. The prongs shall be evenly spaced. The profile of the claw shall be such that it is capable of gripping the fastener and can be tightened to grip it firmly without causing deformation of, or damage to the integrity of, the fastener rim.

An example of a suitable grip for the testing of 13, 14 and 15 ligne (8.25 mm, 8.5 mm and 9.5 mm) press stud fasteners is shown in Figure 4.

NOTE 1 The three-pronged claw used for tension testing in accordance with BS EN 71-1 should not be used as this does not have a suitable profile for testing fasteners and could exert a shearing force rather than a direct pull.

NOTE 2 Where the outer rim of the male side of the press fastener is not grippable, an alternative grip may be used to grip the centre post.

5.6 *Press fastener lower grip*, for testing of press fasteners including press stud fasteners, as shown in Figure 5.

NOTE The dimensions of this grip have been found to be suitable to test the majority of press fasteners used on children's sleep bags.

5.7 *Diamanté upper grip*, for testing of fused or glued on diamantés >3 mm, comprising a two pronged grip, as shown in Figure 6, capable of opening sufficiently to slide over the diamanté, and sprung loaded in order to grip under the edges of the diamanté as the grip rises.

5.8 *Diamanté lower grip*, for testing of fused or glued on diamantés >3 mm, comprising a central post as shown in Figure 7 and a clamping ring (see Figure 7).

5.9 *Flat-faced clamping device*, for use as the lower grip for testing of all attachments other than press fasteners, diamantés and slide fastener puller attachments, comprising a clamping device fitted with a front jaw face (25 ± 1) mm × (25 ± 1) mm, and a back jaw face not less than (25 ± 1) mm × (50 ± 1) mm.

5.10 *Wedge-type clamping device*, for use as the upper grip for testing of fabric embellishments such as bows and labels, comprising a spring loaded wedge-type clamping device or pinch grip.

5.11 *Clamping device with hook*, as shown in BS 3084:2006, Figure B.1, for testing of embellishments attached to slide fastener pullers.

5.12 *Masking plate*, as described in BS 3084:2006, ***B.2.2***, for testing of embellishments attached to slide fastener pullers.

5.13 *Washing machine*, single bath, with a process tank of (55 ± 2) L capacity, fitted with a side impeller with a diameter of 150 mm and a rotation speed of (560 ± 30) r.p.m., allowing for a continuous wash action, fitted with a temperature controller capable of maintaining wash temperatures of (40 ± 2) °C, (50 ± 2) °C and (60 ± 2) °C.

5.14 *Spin dryer*.

5.15 *Tumble dryer*, conforming to BS EN ISO 6330:2001, **5.2.1**.

5.16 *Mesh drying trays*, with a non-rusting finish, large enough for the test specimens to be laid out flat.

5.17 *Balance*, capable of weighing up to at least 2 kg with an accuracy of ±25 g.

5.18 *Ballast pieces*, made of 100% knitted polyester texturized filament fabric having a mass per unit area of (310 ± 20) g/m^2. Ballast pieces shall consist of four thicknesses of fabric, overlocked together on all four sides and bar tacked at the corners. The pieces shall measure (20 ± 4) cm × (20 ± 4) cm. Each ballast piece shall weigh (50 ± 5) g.

5.19 *Thermometer*, with an accuracy of ±2 °C.

5.20 *Timer*, capable of measuring 15 min with an accuracy of ±30 s.

Figure 1 **Finger probe**

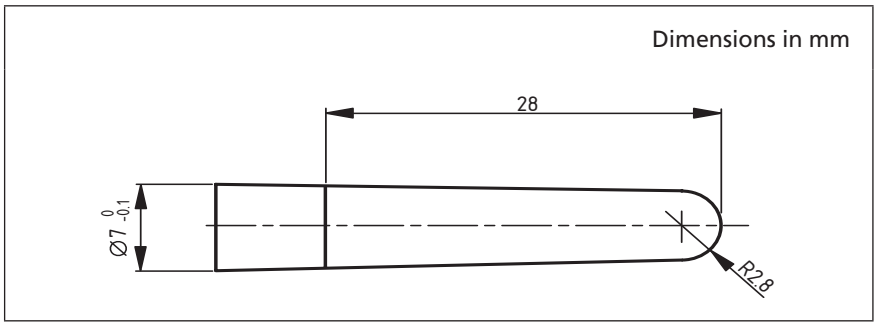
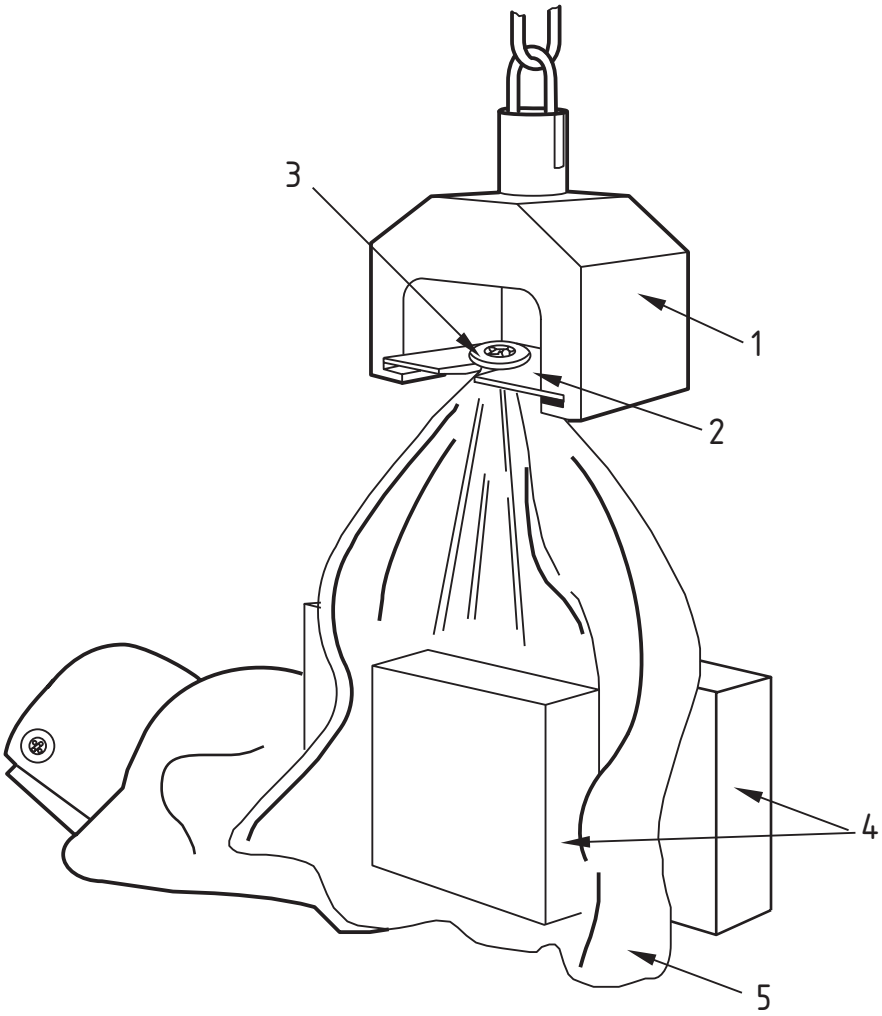


Figure 2 **Examples of button boxes**

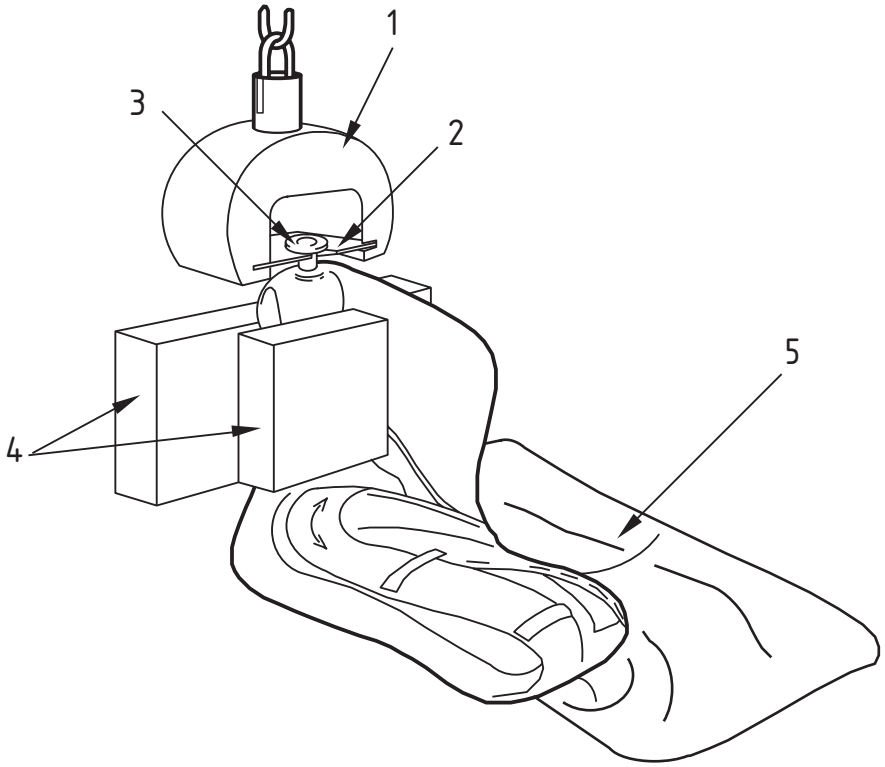


Key

1 Button box
2 Slotted plate
3 Button under test
4 Flat faced clamping device
5 Sleep bag fabric

a) Example of a button box showing a button under test

Figure 2 **Examples of button boxes** *(continued)*



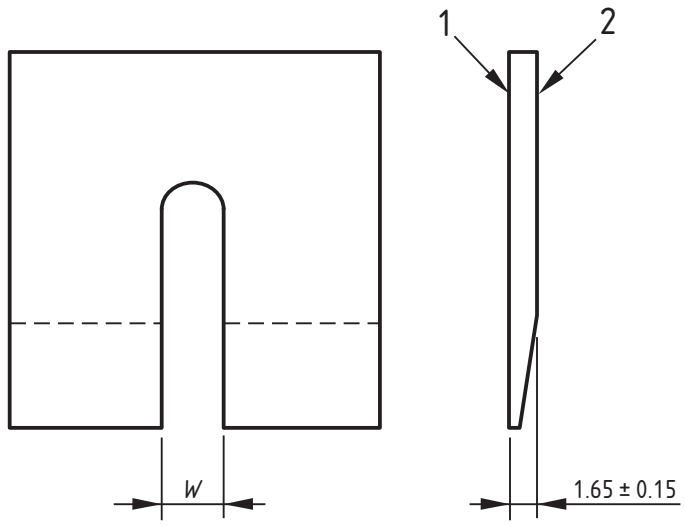
Key

1 Button box
2 Slotted plate
3 Button under test
4 Flat faced clamping device
5 Sleep bag fabric

b) Example of a button box showing a tack button under test

Figure 3 **Plate for use in button box**

Dimensions in millimetres



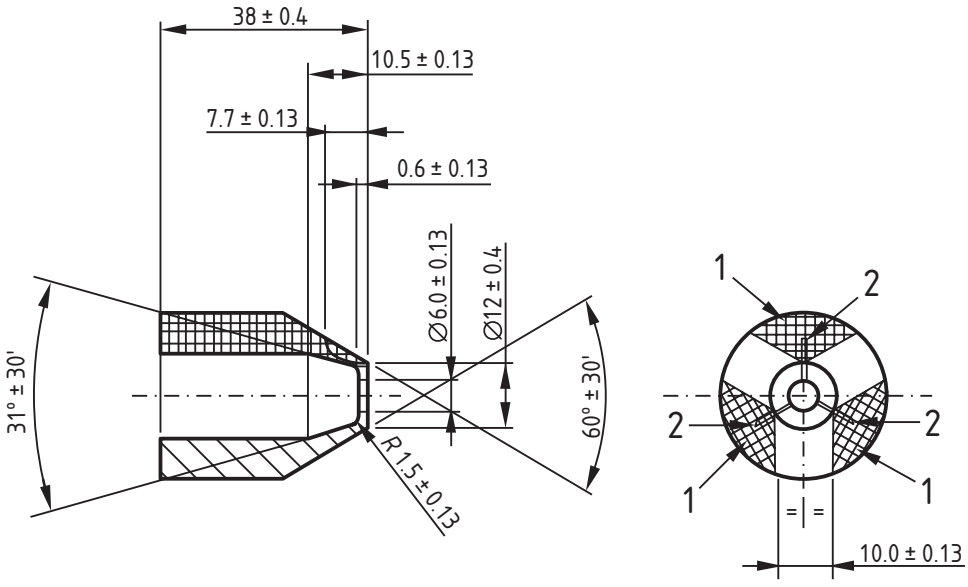
Key

1 Upper surface

2 Lower surface

Figure 4 **Example of a suitable grip for testing 13, 14 and 15 ligne (8.25 mm, 8.5 mm and 9.5 mm) press stud fasteners**

Linear dimensions in millimetres



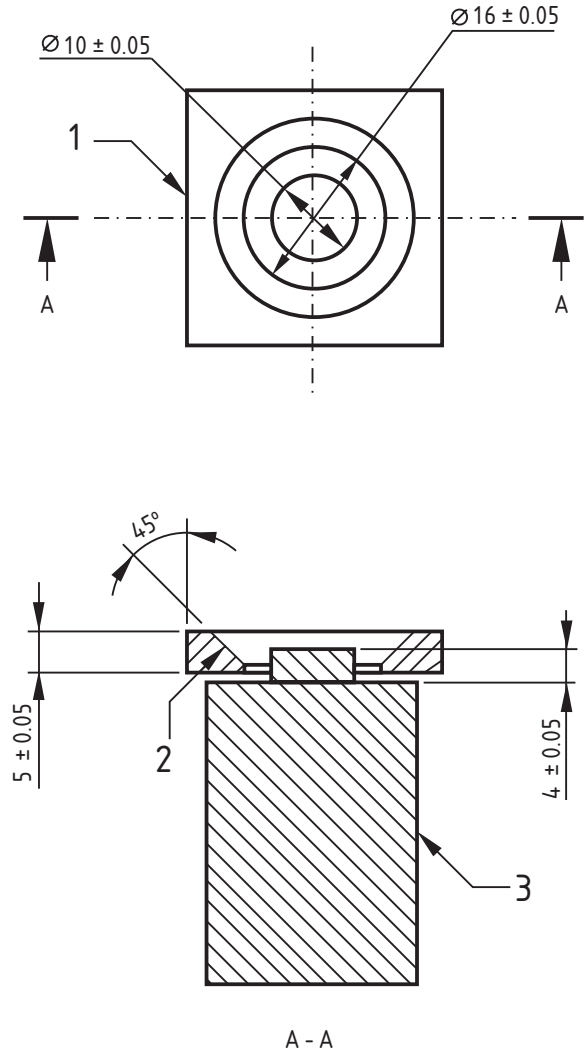
Key

1 Areas to be machined away to produce blank jaw segments

2 Slots produced by a 0.4 mm wide slitting saw

Figure 5 **Press fastener lower grip**

Linear dimensions in millimetres



Key

1 Clamping ring
2 Chamfer to allow for upper grip head
3 Central post

Figure 6 **Diamanté upper grip**

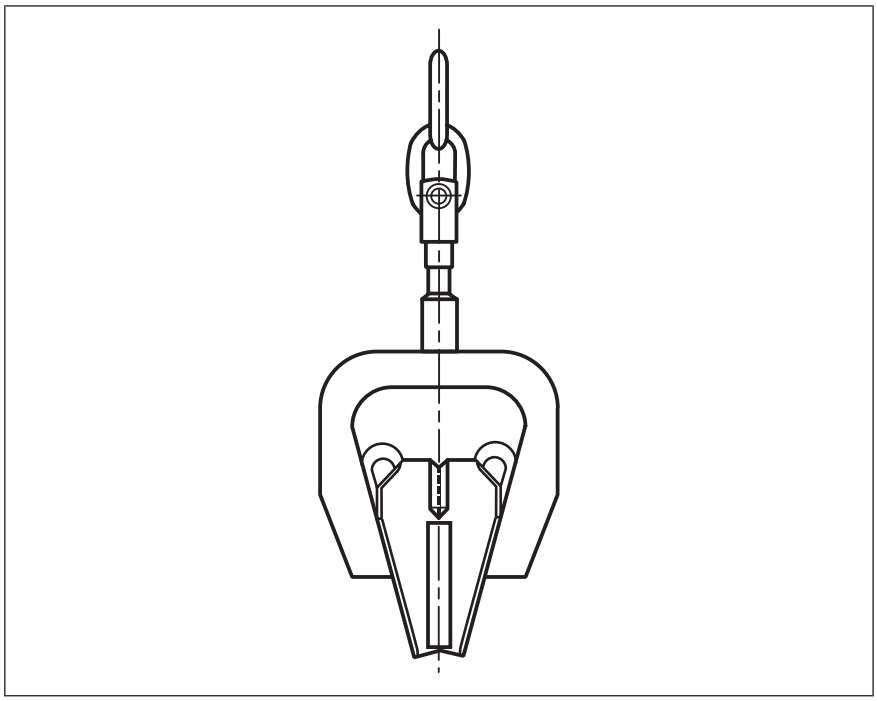
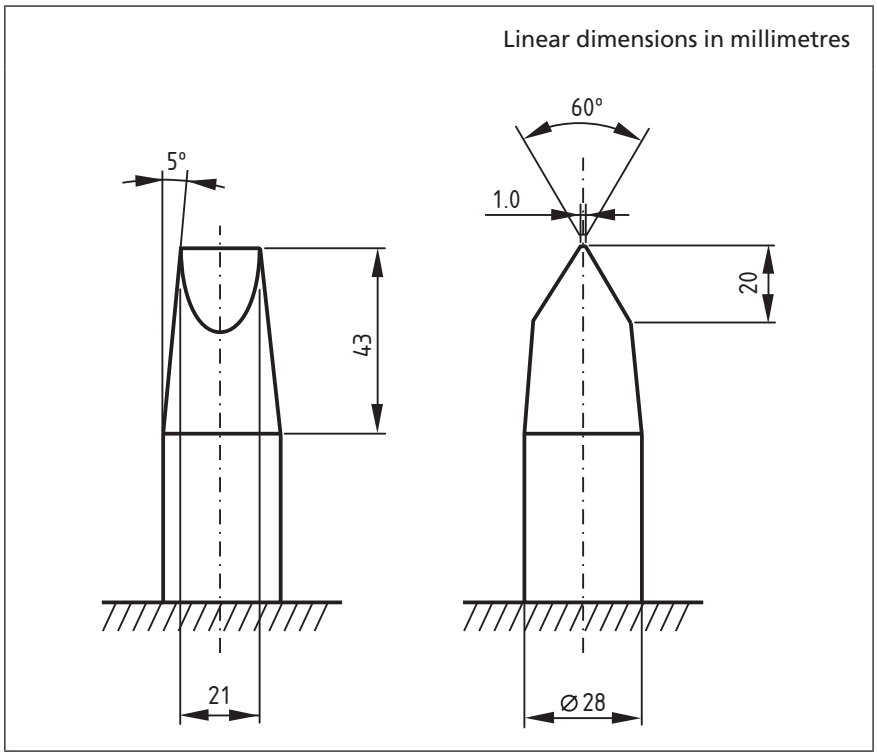


Figure 7 **Diamanté lower grip**



6 Chemical hazards

*NOTE See **A.2** for further information.*

6.1 Migration of certain elements

All materials used shall conform to BS EN 71-3.

6.2 Total content and migration of formaldehyde

When tested in accordance with BS EN ISO 14184-1, fabrics shall not contain free or hydrolyzed formaldehyde in excess of 30 mg/kg.

*NOTE The sample tested for **6.2** may be different to that used for **6.1**.*

7 Thermal hazards

7.1 Flammability hazards

All products shall conform to the requirements of BS EN 14878.

7.2 Hyperthermia

7.2.1 Requirements

When a separate sample is tested in accordance with BS 5335-1:1991, **D.2** and BS 5335-2:2006, **4.2**, but with the modifications listed in **5.1** of this standard, the maximum thermal resistance shall be 4.0 tog.

*NOTE See **A.3** for further information.*

7.2.2 Test method

7.2.2.1 Conditioning

The test specimens shall be conditioned in a standard atmosphere of 65% ± 2% relative humidity, 20 °C ± 2 °C, as specified in BS EN ISO 139, for a minimum of 24 h. All tests shall also be carried out in this atmosphere.

7.2.2.2 Preparation of test specimens

A full-size product shall be tested wherever possible.

7.2.2.3 Test procedure

Prepare the product in the following manner.

a) Remove from packaging and shake in a uniform manner to ensure even distribution of the filling material. Allow the product to condition for a minimum of 24 h.

b) Place the sleeping bag on the test apparatus in the open position so that the thermal resistance of only one side is measured. Products with side or front fastenings may need to be cut in order for the product to lie flat on the test bed.

c) Adjust the apparatus so that the upper hot face temperature testing conditions are set at 33 °C ± 0.5 °C; the temperature of the air layer above the product is set at 20 °C ± 2.0 °C; and the air speed above the product is no greater than 0.3 m/s.

d) Calculate the tog value using the formulae in BS 5335-1:1991, correct to 0.1 tog.

e) Continue the test, taking readings at regular intervals, until steady state conditions are achieved. Record sufficient readings to ensure that the standard deviation of the calculated tog value is no more than 5%.

NOTE It is generally recognized that the method used for the determination of thermal resistance has an accepted accuracy of ±0.5 tog.

If the thermal resistance of the sleep bag is variable or can be varied by the nature of its design, it shall conform to **7.2.1** in each area of the fabric or for each mode of use specified by the manufacturer.

8 Mechanical hazards – entrapment

8.1 Entrapment of body

For sleep bags with a stated age range up to 6 months, the size of the neck opening shall be between 280 mm and 320 mm.

For sleep bags with a stated age range from 6 months upwards, the size of the neck opening shall be between 355 mm and 395 mm.

NOTE 1 Figure 8 gives examples of designs of common neck openings. The dashed line shows where this measurement should be taken.

*NOTE 2 See **A.4** for further information.*

8.2 Entrapment of fingers and toes

8.2.1 Requirements

When tested in accordance with **8.2.2**, there shall be no openings in mesh or flexible materials that allow the finger probe to penetrate to the 7 mm diameter section.

There shall be no loop labels attached to the sleep bag.

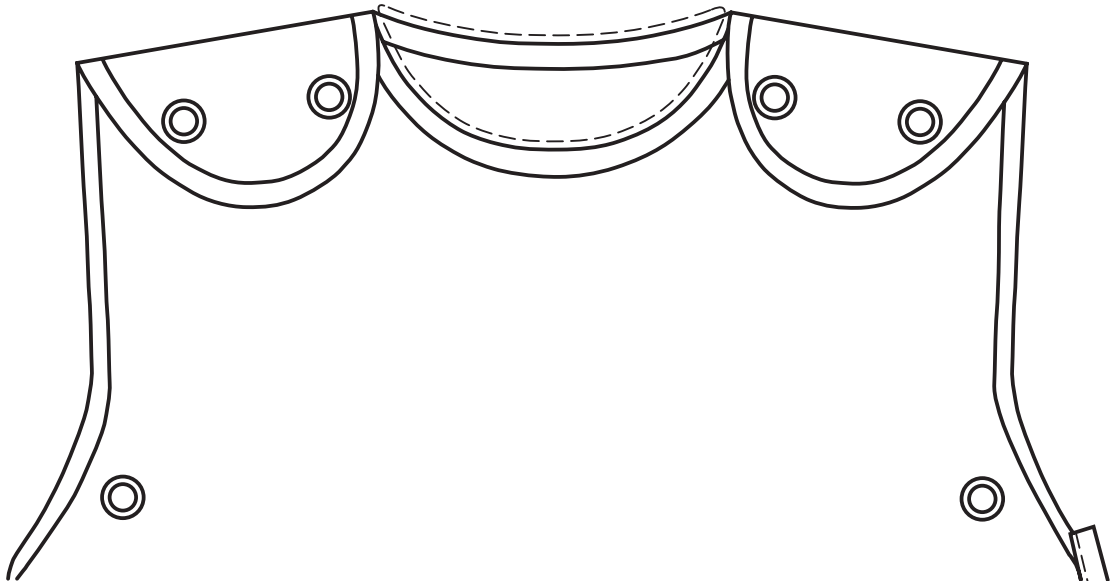
For all faces of the fabric, the maximum length of uncut threads shall be 10 mm, and the maximum length of cut threads shall be 10 mm.

*NOTE See **A.4** for further information.*

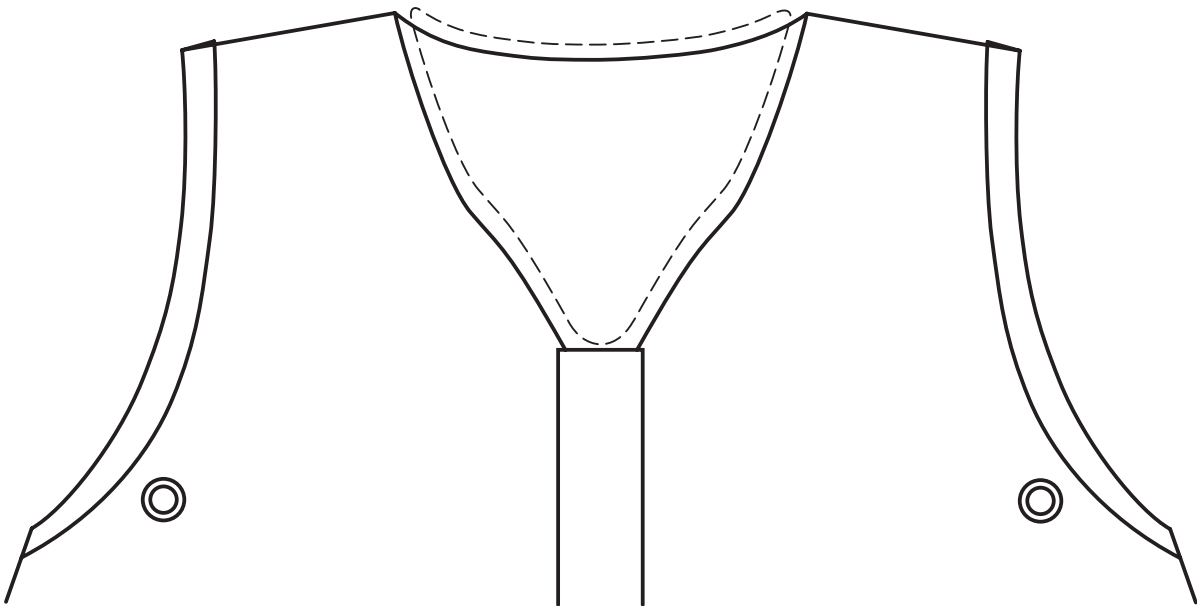
8.2.2 Test method

Mount the finger probe (see **5.2**) on a device for exerting a force and insert the probe with an applied force of up to 30 N into the openings in mesh and flexible materials.

Figure 8 **Examples of designs of common neck openings**



a) Round neck



b) Zip front

9 Mechanical hazards – entanglement

9.1 Requirements

When tested in accordance with **9.2**, cords, ribbons and parts used as ties shall have a maximum length of 75 mm.

The ends of ribbons and parts used as ties shall be secured to prevent unravelling.

Monofilament threads shall not be used.

*NOTE See **A.5** for further information.*

9.2 Test method

Measure the length of a cord, ribbon or part used as a tie from the fixing point on the sleep bag to its free end, while applying a 25 N tensile force to it.

10 Mechanical hazards – choking and ingestion

*NOTE See **A.6** for further information.*

10.1 Requirements

All components shall be securely attached and remain attached throughout the normal or reasonably foreseeable use of the product.

NOTE 1 Components attached by lockstitch (301) (see Note 2) are generally the most secure and should be used where possible. Components attached by handstitch (200) can be secure provided the process is strictly controlled, however this method is not recommended.

NOTE 2 The numbers in brackets refer to the stitch type classifications described in BS 3870-1:1991.

Components shall not be attached by chainstitch (100).

The security of attached components on finished sleep bags shall be in accordance with Table 1.

Table 1 **Values for security of attached components on finished sleep bags**

Component	**Minimum removal force** N	**Performance**	**Test method** (see Note 3)
Grippable [A] (except sequins)			
Largest dimension >6 mm	70 [B]	—	**10.2.1**
Largest dimension >3 mm but ⩽6 mm	50	—	**10.2.1**
Largest dimension ⩽3 mm	—	Negligible change	**10.2.2**
Non-grippable [A] (including sequins and plastics sleeving on ends of cords or laces)	—	Negligible change	**10.2.2**

[A] Grippable and non-grippable in this context refer to whether the component under test can be gripped, without deformation or other damage, by the apparatus described in Clause **5**.

[B] For code B zip fasteners (see BS 7907:2007, **6.8.1**) the requirement for open-end fastener single stringer slider retention is 60 N as specified in BS 3084:2006.

NOTE 3 In order to ensure that finished sleep bags meet the required levels for security of attachments given in Table 1, it is recommended that testing be carried out at a number of stages from the design stage through production, in addition to testing of the finished sleep bag. If a component fails, attention should be given to the mode of failure so that corrective action can be taken.

NOTE 4 The test method requires that 5 specimens of any specific type of component be tested. The required attachment strengths apply to the forces measured on each individual specimen, rather than the mean value from the 5 specimens tested.

10.2 Test methods

10.2.1 Determination of removal force of attached components

10.2.1.1 General

This is a laboratory based method designed for testing of finished sleep bags. However, it may also be used to test sleep bags and/or sleep bag assemblies at the relevant stages of sleep bag design and production.

10.2.1.2 Principle

An attached component is held in the upper grip of a constant rate of extension (CRE) tensile testing machine and the sleep bag to which it is attached is held in the lower grip. The grips are separated at a constant rate until the component is removed from the sleep bag. The removal force and the mode of failure are recorded.

10.2.1.3 Atmosphere for conditioning and testing

The atmosphere for conditioning and testing shall be as specified in BS EN ISO 139. All test specimens shall be conditioned in this atmosphere for 24 h before testing.

10.2.1.4 Sampling and selection of test specimens

10.2.1.4.1 Sampling

A sufficient number of representative sleep bags or sleep bag assemblies shall be taken to provide the number of test specimens recommended in **10.2.1.4.2**.

In the case of testing at the production stage the sleep bags or sleep bag assemblies shall be taken from the production line(s).

10.2.1.4.2 Selection of test specimens

Testing shall be carried out on 5 specimens of the following:

- each type of attached component;
- each size of attached component; and
- each component/substrate combination.

NOTE It is recognized that this number of specimens might not always be available for testing at the design/development stage. In such circumstances a smaller number may be taken but the test results obtained should be interpreted with caution.

10.2.1.5 Procedure

10.2.1.5.1 Rate of extension or elongation

Set the rate of extension or elongation of the tensile testing machine to (100 $\pm$ 10) mm/min.

10.2.1.5.2 Machine set-up and test specimen mounting

10.2.1.5.2.1 General

Set up the machine and mount the test specimens as described in **10.2.1.5.2.2** to **10.2.1.5.2.8**.

Ensure that the grips are positioned so that the vertical centre lines of the upper and lower grips correspond, and are aligned with the direction of the applied force.

Ensure that the test specimens are mounted centrally so that the longitudinal centre-line of the test specimen passes vertically through the centres of the upper and the lower grips.

Ensure that the sleep bag or fabric assembly is mounted in the lower grip in such a way that no damage or slippage occurs during testing.

10.2.1.5.2.2 Buttons and tack buttons

Mount the button box, with the appropriate slotted plate, (**5.4**) in the top of the machine and the flat-faced clamping device (**5.9**) in the base of the machine. Set the gauge length to (20 $\pm$ 0.5) mm.

Slide the button or tack button onto the plate, taking care not to stress or damage any of the sewing threads or the shank of the button or tack button.

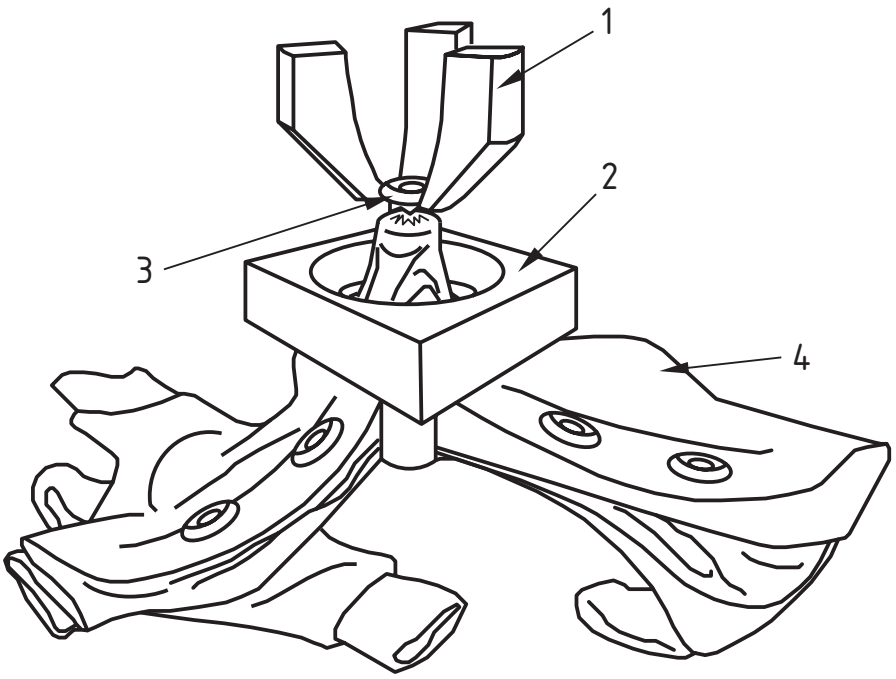
Fold the main body of the sleep bag below the button to give a double thickness of fabric and clamp this in the lower grip.

10.2.1.5.2.3 Press fasteners including press stud fasteners

Mount the press fastener lower grip (**5.6**) in the base of the machine and the press fastener upper grip (**5.5**) in the top of the machine, so that it is just clear of the lower grip surface. An example of the arrangement is shown in Figure 9.

Move the upper grip to one side and place main body of the sleep bag over the lower grip; centralize the fastener onto the central post and close the clamping ring. Locate the upper grip onto the rim of the fastener and tighten (taking care not to over-tighten).

Figure 9 **Example of the arrangement for testing press fasteners**



Key

1 Upper grip
2 Lower grip
3 Central post
4 Sleep bag fabric

10.2.1.5.2.4 Beads and similar sewn on components >3 mm

Mount the button box, with the appropriate slotted plate, (**5.4**) in the top of the machine and the flat-faced clamping device (**5.9**) in the base of the machine. Set the gauge length to (20 ± 0.5) mm.

Slide the bead or other component onto the plate, taking care not to stress or damage any of the sewing threads.

Fold the main body of the sleep bag below the bead or other component to give a double thickness of fabric and clamp this in the lower grip.

10.2.1.5.2.5 Diamantés, fused or glued on, >3 mm

Mount the diamanté lower grip (**5.8**) in the base of the machine and the diamanté upper grip (**5.7**) in the top of the machine so that it is just clear of the lower grip surface. An example of the arrangement is shown in Figure 10.

Place the main body of the sleep bag over the post, and centralize the diamanté onto the knife edge, taking care not to stress or damage the bonding of the diamanté to the sleep bag. Place the clamping ring over the post and lock into position to prevent the sleep bag fabric moving during the test. Lower the top grip down over the diamanté and onto the fabric positioned on the sloping edge of the post so that as the grip returns upwards it will locate under the diamanté, and remove it as the tension is applied.

10.2.1.5.2.6 Fabric embellishments, including bows and labels

Mount a flat-faced clamping device (**5.9**) in the base of the machine and either a wedge-type clamping device (**5.10**) or a flat-faced clamping device (**5.9**) in the top of the machine. Set the gauge length to between 10 mm and 20 mm.

Clamp the embellishment in the upper grip. For bows, clamp all the looped ends and tails of the bow in the upper grip.

Fold the main body of the sleep bag below the embellishment to give a double thickness of fabric and clamp this in the lower grip. Do not pre-tension.

10.2.1.5.2.7 Pom-poms and tassels

Mount the button box, with the appropriate slotted plate, (**5.4**) in the top of the machine and the flat-faced clamping device (**5.9**) in the base of the machine. Set the gauge length to (20 ± 0.5) mm.

Slide the pom-pom or tassel onto the plate, taking care not to stress or damage any of the sewing threads.

Fold the main body of the sleep bag below the pom-pom or tassel to give a double thickness of fabric and clamp this in the lower grip.

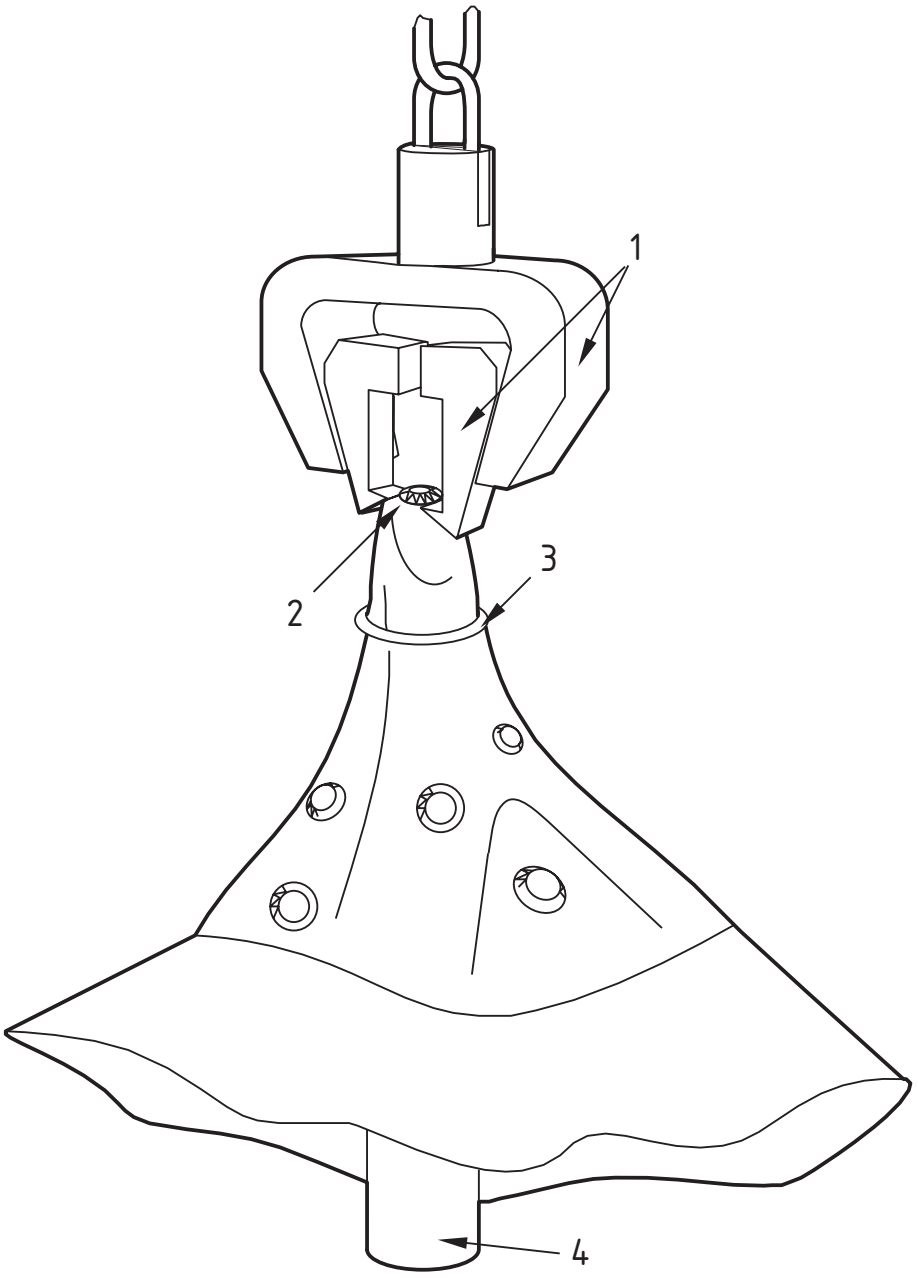
10.2.1.5.2.8 Embellishments (hard and soft) attached to slide fastener pullers

Mount the masking plate (**5.12**) in the base of the machine. Mount either the clamping device with hook (**5.11**) or the wedge-type clamping device (**5.10**) into the top of the machine, as appropriate to the type of embellishment being tested. An example of the arrangement is shown in Figure 11.

NOTE The gauge length required will depend on the length of the slider puller and its embellishment.

Pass the puller with its embellishment through the hole in the masking plate and secure the embellishment into or onto the upper grip so that it is secure but without pre-tension.

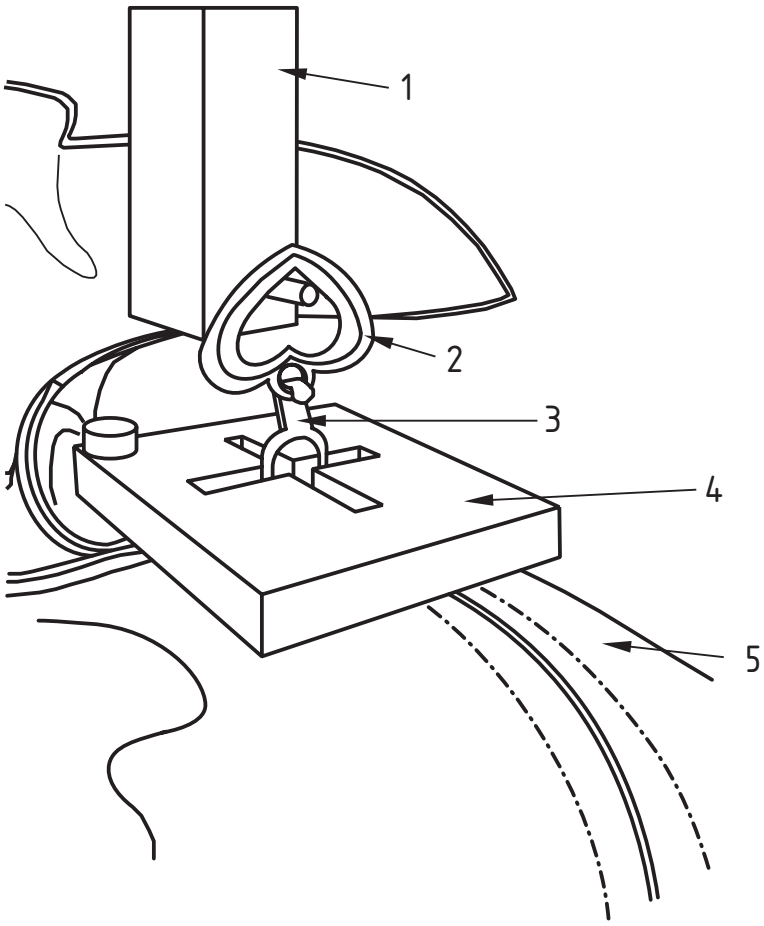
Figure 10 **Example of the arrangement for testing diamantés**



Key

1 Upper grip
2 Diamanté under test
3 Clamping ring
4 Central post

Figure 11 **Example of the arrangement for testing embellishments attached to slide fastener pullers**



Key

1 Clamping device with hook
2 Embellishment
3 Slide fastener puller
4 Masking plate
5 Sleep bag fabric

10.2.1.5.3 Operation of the tensile testing machine

Set the machine to record the maximum force. Start the movable grip in motion until the component becomes detached from the sleep bag or fails.

Record the maximum force in newtons to the nearest 0.1 N and the mode of failure as follows:

- breakdown of the component;
- breakdown of the means of attachment;
- breakdown of the fabric.

10.2.2 Determination of the security of attachment of non-grippable attached components

*COMMENTARY ON **10.2.2***
This method involves a washing and drying process. However, this test is intended to determine the durability of attachment of attached components, rather than the performance of the sleep bag. For this reason the test conditions are much more aggressive than the conditions used in normal laundering.

10.2.2.1 Principle

A set of test specimens, and a reference specimen, are examined and a detailed record made of the location, means of attachment and condition of all attached components. The test specimens are washed and dried, while the reference specimen is retained without treatment.

The attached components on the test specimens are re-examined with reference to the records from the initial examination, and compared with the reference specimen, and any changes recorded.

10.2.2.2 Materials

10.2.2.2.1 *Phosphate reference detergent*, with the composition given in Table 2.

10.2.2.2.2 *Sodium perborate*.

Table 2 **Composition of phosphate reference detergent**

Ingredient	**Content** %
Linear sodium alkylbenzene sulfonate (mean length of alkane chain $C_{11.5}$)	8.0
Ethyloxylated fatty alcohol $C_{12\text{-}18}$ (7EO)	2.9
Sodium soap (chain length $C_{12\text{-}17}$ 46%; $C_{18\text{-}20}$ 54%)	3.5
Foam inhibitor concentrate 8% on inorganic carrier	—
Phosphate	43.8
Sodium carbonate	—
Sodium salt of a copolymer from acrylic and maleic acid	—
Sodium silicate (SiO_2:Na_2O = 3.3:1)	7.5
Magnesium silicate	1.9
Carboxymethylcellulose	1.2
EDTA	0.2
Optical whitener for cotton (stilbene type)	—
Sodium sulfate (as accompanying substance or added)	21.2
Protease (Savinase 8.0)	—
Water	9.8
Total	**100.0**

NOTE This detergent is known as ECE reference detergent 77 without optical brightener.

10.2.2.3 Selection of test specimens and reference specimen

A sufficient number of sleep bags or sleep bag assemblies shall be selected to enable testing of 5 specimens of the following:

- each type of attached component;
- each size of attached component; and
- each component/substrate combination.

NOTE It is recognized that this number of specimens might not always be available for testing at the design/development stage. In such circumstances a smaller number may be taken but the test results obtained should be interpreted with caution.

In addition, a further complete sleep bag or sleep bag assembly shall be retained, untreated, for use as a reference specimen.

10.2.2.4 Wash temperature and drying method

10.2.2.4.1 Wash temperature

The wash temperature used for testing shall be 10 °C ± 2 °C above the maximum recommended wash temperature for the sleep bag. For hand wash only sleep bags a wash temperature of 40 °C ± 2 °C shall be used.

10.2.2.4.2 Drying method for sleep bags with fused or glued on components

Sleep bags with fused or glued on components, including sleep bags labelled as "Do not tumble dry" by means of words or a care symbol, shall be tumble dried at the hottest setting for 90 min.

10.2.2.4.3 Drying method for sleep bags without fused or glued on components

For sleep bags without fused or glued on components, if the care instructions indicate that the sleep bag may be tumble dried the sleep bag shall be tumble dried at the recommended setting until dry.

If the care instructions indicate that the sleep bag is not to be tumble dried, it shall be dried flat on a mesh drying tray (**5.16**).

10.2.2.5 Procedure

10.2.2.5.1 Initial assessment of test specimens

Examine each attached component on each of the test specimens and record its location and means of attachment, and condition. Compare all the test specimens with each other and with the reference specimen and record any differences.

10.2.2.5.2 Preparation of the washing machine

Fill the washing machine with 40 L of water. Heat the water to the relevant temperature in accordance with **10.2.2.4.1** and maintain it at this temperature, checking the temperature using the thermometer (**5.19**).

10.2.2.5.3 Wash load

Weigh the test specimens and make the load up to a total of 1.0 kg ± 50 g with the ballast pieces (**5.18**).

10.2.2.5.4 Detergent

Weigh out (40 ± 1) g of detergent (**10.2.2.2.1**) and (10 ± 1) g of sodium perborate.

10.2.2.5.5 Wash cycle

Place the ballast pieces, detergent and sodium perborate into the machine and run the machine for approximately 1 min to dissolve the powders. Then add the test specimens and run the machine for a further 15 min $\pm$ 1 min, ensuring that the test specimens remain moving in the water for the duration of the test.

10.2.2.5.6 Rinsing and spinning

At the end of the 15 min wash cycle remove the test specimens from the machine and rinse thoroughly in cold water to ensure the removal of all the detergent. Spin dry for a maximum of 1 min to remove excess water.

10.2.2.5.7 Drying

Dry the test specimens in accordance with **10.2.2.4.2** or **10.2.2.4.3**, as applicable.

10.2.2.5.8 Final assessment

Re-examine each test specimen with reference to the records of the initial examination (see **10.2.2.5.1**) and compare it with the reference specimen. For each attached component recorded in the initial assessment, record any changes as follows:

a) no change;

b) negligible change, i.e. visible change, but component remains securely attached;

c) slight change, i.e. detectable loosening of component;

d) distinct change, i.e. visibly obvious breakdown of the means of attachment and/or fabric breakdown;

e) complete failure, i.e. the component has come off.

For any component showing changes, record the mode of failure, e.g. breakdown of fusing or glue (delamination), breakage of sewing threads, sewing threads coming undone, breakdown of the attached component, breakdown of the fabric.

11 Mechanical hazards – suffocation

11.1 Requirements for plastic packaging

Any plastic covering used as packaging that does not conform to BS EN 71-1 shall be conspicuously marked with the following statement.

*NOTE 1 See **A.7** for further information.*

> **CAUTION.** KEEP PLASTIC COVERING AWAY FROM CHILDREN TO AVOID SUFFOCATION.

NOTE 2 The statement may be expressed in different words providing they clearly convey the same information.

12 Mechanical hazards – inadequate structural integrity

12.1 Dimensional stability

When a previously untested sleep bag is washed in accordance with the manufacturer's instructions, the mean dimensional change in the length and the width of the sleep bag shall not exceed ±5% when tested in accordance with BS EN ISO 5077:2008, Clause **7**.

12.2 Fastenings

Only press stud fasteners and slide fasteners shall be used as fastenings.

*NOTE See **A.8** for further information.*

Slide fasteners shall conform to BS 3084:2006, Table 1, Performance Code C.

Chain stitch shall not be used to attach fastenings to the sleep bag.

13 Product information

13.1 Marking

The sleep bag shall be permanently labelled, with a minimum character height of 1.5 mm, with the following:

a) "WARNING. KEEP AWAY FROM FIRE" in red upper case letters, in no less than 10 point;

b) the number and year of this British Standard, i.e. BS 8510:2009 [1)];

c) the name, registered trade name or registered trade mark of either the manufacturer, distributor or retailer;

d) fibre content of all covering and filling materials included in the sleep bag;

e) the appropriate cleaning/washing/drying instructions in accordance with the symbols defined in BS EN 23758;

f) the measured tog value;

g) the age range and/or height of the child for which the sleep bag is intended.

13.2 Purchase information

The following information shall be provided at the point of sale:

a) the age range and/or height of the child for which the sleep bag is intended;

b) the sleep bag conforms to BS 8510:2009;

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1) Marking BS 8510:2009 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

c) the sleep bag is for use in a cot or crib;

d) the tog value of the product with the applicable room temperatures;

NOTE The following measured tog values for children's sleep bags may be used as a guide:
Less than 1.0 tog – room temperature 24 °C to 27 °C.
1 to 2 tog – room temperature 21 °C to 23 °C.
2 to 3.5 tog – room temperature 10 °C to 20 °C

e) advice on external factors that add to the insulation properties provided by the sleep bag, including the quantity of clothing the child is wearing;

f) the sleep bag is intended to be used without additional bedding.

13.3 Instructions for use

Instructions concerning the safe use of the sleep bag shall be provided covering every requirement from **13.2** and headed "IMPORTANT! KEEP FOR FUTURE REFERENCE" in letters not less than 5 mm high.

The instructions shall also include a notice saying "Do not use the sleep bag if the fastenings are damaged" or words to the same effect.

Sleep bags are often sold with the purchase information and the instructions combined, and where this is the case the information shall be presented in such a way that it is easy to store.

13.4 Warnings

The instructions detailed in **13.3** shall contain the following warnings:

WARNING. This sleep bag is for use in a cot or crib.

WARNING. Do not let your child overheat.

WARNING. Do not use the sleep bag if the child's head can pass through the neck-hole when the product is fastened for use.

WARNING. Keep away from fire.

Annex A (informative) Rationales for the requirements for children's sleep bags

A.1 General

This informative annex has been included to provide a rationale for the inclusion of some of the requirements given in this standard. This standard has been drafted in a hazard-based format and explanations are given for the inclusion of some of these hazards.

A child's sleep bag is designed to provide sufficient warmth for a child while sleeping in a cot or crib without the need for additional bedding. A sleep bag should provide a safe sleeping environment as there are no blankets that could cover the child's head and potentially result in overheating or suffocation, and the sleep bag itself should not present any hazards to the child.

A.2 Chemical hazards

Children up to the age of 24 months spend a considerable amount of time both mouthing and chewing. It is important that the levels of certain chemical elements in the sleep bag are controlled.

A.3 Thermal hazards

All thermal hazards are serious and might lead to permanent injury or death.

Flash effect is usually associated with pile fabrics where the flame can spread across the surface of material without the substrate burning. It is necessary to reduce the rate of spread of flame as low as is reasonably possible so that a child can be removed from the sleep bag if any of the materials ignite.

Hyperthermia occurs when a child's core temperature rises. Combinations of room temperature and the composition of products that cause heat build-up constitute a hazard. Hyperthermia has been associated with sudden infant death syndrome.

The test method used to determine thermal resistance is based on that used for duvets, with the size of the test bed reduced to reflect the smaller size of a sleep bag. This, together with information concerning the use of an appropriate tog value, the amount of clothes a child is wearing and the ambient conditions in which the child is sleeping should help to ensure that hyperthermia does not occur.

The thermal resistance of a quilt or duvet will depend upon many inter-related factors but is essentially related to the amount of still air which can be entrapped within a quilted product.

The choice of cover fabric and filling material may be determined by considerations other than those associated with thermal resistance. Whilst the choice of materials used may affect the thermal resistance of the quilt or duvet, the materials do not in themselves make a large contribution to the overall thermal resistance of the product. It is the filling material or rather the air trapped within the filling material that plays the greatest part in determining the overall thermal resistance whilst the primary fabric cover makes only a small contribution.

Thermal resistance is directly related to mass per unit area and thickness although the relationship is not linear. It does not therefore follow

that an increase in weight or thickness will result in a proportional increase in thermal resistance and some trial and error may be required to establish the manufacturing tolerances required to maintain the desired tog value within perceived limits.

A.4 Entrapment hazards

A sleep bag is designed so that a child's entire body cannot slip down into it. This is achieved by armholes and a neck opening, with fastenings so that the child can be accessed.

It is important that any fastenings remain in a closed position during use.

Two neck sizes have been specified to enable sleep bags to be produced for varying age ranges, as it is important that the neck opening is sufficiently small to prevent the sleep bag passing over the child's head, whilst being sufficiently large to be comfortable for the child.

If a child's fingers or toes become trapped in loops or threads there could be a tourniquet effect, resulting in loss of blood supply to the tips. Requirements have been included to limit the size of openings in any mesh type fabric, and the length of both uncut and cut threads on the inner and outer surfaces of the fabric have been limited to reduce the risk of entrapment of both fingers and toes.

A.5 Entanglement hazards

If a cord, tie or similar part is long enough to become wound around a child's neck, strangulation could occur. The length of any of these parts has been restricted to prevent this, and a requirement specified for the ends of these parts to be finished so that they will not unravel in use and cause a similar hazard.

Monofilament thread (a single thread of man-made fibre) is exceptionally strong and cannot be broken in use. If this type of thread became wound round a child's finger the blood supply could be cut off.

A.6 Choking and ingestion hazards

Choking and ingestion are serious hazards. When air cannot pass into a child's lungs, irreversible brain damage could occur.

A.7 Suffocation hazards

Suffocation is a serious hazard to young children. It can occur if a child's external airways, nose and mouth are blocked simultaneously. Enclosures that do not allow air to pass constitute a suffocation hazard. The main risk is from the packaging, often in the form of a bag in which the sleep bag is supplied.

A.8 Hazards from inadequate structural integrity

It is important that the sleep bag does not fall apart in use or the fastenings come undone because either event could result in the child's body slipping into the sleep bag

Fastenings have been limited to press stud fasteners and slide fasteners (zips) because buttons and touch and close fasteners are considered less secure.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 3870-1:1991, *Stitches and seams – Part 1: Classification and terminology of stitch types*

BS 7907:2007, *Code of practice for the design and manufacture of children's clothing to promote mechanical safety*

BS EN 13537, *Requirements for sleeping bags* [2)]

BS EN 13538 (all parts), *Determination of dimensional characteristics of sleeping bags* [2)]

[2)] Referenced only in Clause **1** (scope).

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