

BRITISH STANDARD

Code of practice for the design and manufacture of children's clothing to promote mechanical safety

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Contents

Foreword *ii*

Introduction *1*

1	Scope	<i>2</i>
2	Normative references	<i>2</i>
3	Terms and definitions	<i>3</i>
4	Hazards and associated risks	<i>5</i>
5	Risk assessment	<i>8</i>
6	Garment design, materials and construction	<i>10</i>
7	Manufacture	<i>17</i>
8	Packaging	<i>21</i>
9	Security tagging and display of garments for retail	<i>21</i>

Annexes

Annex A (informative)	Injury data relating to children's clothing	<i>22</i>
Annex B (normative)	Method for determination of removal force of attached components	<i>27</i>
Annex C (normative)	Method for determination of the security of attachment of non-grippable attached components	<i>40</i>
Annex D (normative)	Information to be supplied by the designer to the manufacturer	<i>44</i>
Annex E (informative)	Testing and statistical evaluation for process control purposes	<i>45</i>

Bibliography *46*

List of figures

Figure B.1	– Examples of button boxes	<i>29</i>
Figure B.2	– Plate for use in button box	<i>31</i>
Figure B.3	– Example of a suitable grip for testing 13, 14 and 15 ligne (8.25 mm, 8.5 mm and 9.5 mm) poppers	<i>31</i>
Figure B.4	– Press fastener lower grip	<i>32</i>
Figure B.5	– Diamanté upper grip	<i>33</i>
Figure B.6	– Diamanté lower grip	<i>33</i>
Figure B.7	– Example of the arrangement for testing press fasteners	<i>35</i>
Figure B.8	– Example of the arrangement for testing diamanté	<i>37</i>
Figure B.9	– Example of the arrangement for testing embellishments attached to slide fastener pullers	<i>38</i>

List of tables

Table 1	– Recommended values for security of attached components on finished garments	<i>12</i>
Table A.1	– Injuries analysed by age	<i>22</i>
Table A.2	– Injuries analysed by cause	<i>23</i>
Table A.3	– Injuries analysed by type	<i>23</i>
Table A.4	– Injuries analysed by gender	<i>24</i>
Table A.5	– Injuries caused by components of clothing	<i>24</i>
Table A.6	– Causes of injuries in relation to the categories of clothing	<i>25</i>
Table A.7	– Comparison of HASS statistics from 1995 and 2000	<i>26</i>
Table C.1	– Composition of phosphate reference detergent	<i>40</i>
Table E.1	– Expected failure rates for different Z-values	<i>45</i>

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 46, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 31 December 2007. It was prepared by Technical Committee TCI/66, *Apparel and interior textiles*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7907:1997, which is withdrawn.

Information about this document

This is a full revision of the standard, which has been prepared to bring the standard up to date, and in particular to take into account BS EN 14682:2004, which now covers cords and drawstrings on children's clothing.

This revision of the standard introduces the following principal changes.

- New clauses have been added on hazards and risks, and on risk assessment.
- References are made to BS EN 14682, and recommendations that are now covered by BS EN 14682 have been removed.
- Recommended performance levels, and test methods, for the security of attachment of attached components have been added.

This British Standard gives recommendations for the design and manufacture of children's clothing to promote mechanical safety. The recommendations in this standard are based on the potential risks of mechanical injury to children from their clothing which have been identified through reference to published accident statistics and discussions with retailers and manufacturers of children's clothing. The statistics are summarized in Annex A. These have been updated and are presented in a different format from that used in the previous edition of BS 7907. A table comparing accident data from 1995 and from 2000 (before and after publication of the first edition of this standard) is also included.

Test methods have been included for the measurement of the security of attachment of different types of attached components. The need to be very specific in the method of test for each component type became apparent during research into current commercial practices. Owing to the wide range of attached components they have been grouped together for the purposes of the test methods.

Grippable components have been grouped on the basis of the type of grip needed for the test, which has been closely defined for each group (see Annex B). Currently there are a variety of grip designs being used by different laboratories to measure the removal force for the same components and this can lead to variations in the results. The speed of operation of the tensile testing machine has also been closely defined as variation in test speeds can also give a variation in the results.

For testing non-grippable components a washing method is given in Annex C. The characteristics of the washing machine, the detergent and the washing and drying conditions have been closely defined, as variations in any of these can lead to variation in the test results. It should be noted that, while the test method involves a washing and drying process, the test is intended to determine the durability of attachment of the attached components, rather than the performance of the garment. For this reason the test conditions are much more aggressive than the conditions used in normal laundering.

Recommended performance levels for the security of attached components are given that have been found to be achievable on most types of garment and have been found in many years of retail practice to provide safe garments.

NOTE These are not necessarily at the same levels as those required for toys as specified in BS EN 71-1:2005.

While the majority of accidents involve younger children, this standard is intended to assist in reducing the risk of accidents to children of all ages.

This standard is intended for designers, specifiers and manufacturers of children's clothing. It is also intended to be used by importers, distributors and retailers to assist them in the selection of clothing that does not present a hazard. The standard also gives guidance for retailers on the safety aspects of the packaging and display of children's clothing.

Assessed capability. Users of this British Standard are advised to consider the desirability of sourcing materials and components from suppliers who operate quality systems that have been assessed and registered against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

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

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.

Introduction

The General Product Safety Regulations 2005 [1] require all products placed on the market to be safe, and provide information on how the safety of products should be assessed. According to the General Product Safety Regulations 2005 [1] product safety may be assessed by reference to the following:

- a) specific product regulations;
- b) national regulations;
- c) European standards which have had their references published in the Official Journal of the European Union;
- d) other European standards;
- e) community technical specifications;
- f) national standards (i.e. British Standards that are not UK versions of European standards);
- g) industry codes of good practice;
- h) state of the art and technology, and the safety which consumers may reasonably expect.

More details on assessment of product safety are given in the Department of Trade and Industry publication *The General Product Safety Regulations 2005: Guidance for businesses, consumers and enforcement authorities* [2].

When designing children's clothing, it is essential to take into consideration the behaviour of children, whose need for exploration and challenge drives them to use items in new and different ways. One common factor children share is that they are unaware of cause and effect and are therefore substantially less cautious than adults in relation to hazards.

It should be emphasized that consideration of the recommendations given in this standard from the earliest possible stage, i.e. the design stage, is of prime importance.

Recommendations on risk assessment are given in Clause 5. The recommendations given relate only to mechanical safety. There are many other safety aspects relating to children's clothing that need to be considered when carrying out a full risk assessment, including chemical safety, thermal protection (against heat or cold), avoidance of overheating, flammability, and protection against solar radiation (protection against sunburn).

1 Scope

This British Standard gives recommendations for the design and manufacture of children's clothing to promote mechanical safety.

The standard also gives recommendations on safety aspects of the packaging and display of children's clothing, including guidance for retailers.

This standard is applicable to clothing intended for children up to 14 years of age.

This standard is intended for use at all stages of the clothing supply chain, including use by designers, specifiers and manufacturers of children's clothing. It is also intended to be used by importers, distributors and retailers to assist them in the selection of clothing that does not present a mechanical hazard.

This standard is not applicable to:

- a) child care articles, such as bibs, nappies and soother holders;
- b) footwear, such as boots, shoes and slippers;
- c) toys and other items sold with the clothing.

The standard does not include recommendations on any clothing features that might be necessary to cater for children with special needs.

The standard does not include recommendations on the following:

- 1) chemical safety;
- 2) protection against allergic reactions, e.g. to nickel released from metal components, rubber and feathers;
- 3) thermal protection (against heat or cold);
- 4) avoidance of overheating in children under 12 months;
- 5) flammability;
- 6) protection against solar radiation (protection against sunburn).

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 1903:1981, *Glossary of terms used by the clothing industry*

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

BS 4162, *Methods of test for buttons*

BS EN 14682, *Safety of children's clothing – Cords and drawstrings on children's clothing – Specifications*

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

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

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*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS 1903:1981 and the following apply.

3.1 children's clothing

garments intended by design, manufacture or selling route to be worn by children up to 14 years of age

NOTE The guidance notes to the VAT Regulations [3] give garment measurements for children up to the eve of their 14th birthday.

3.2 filling material

material which is encased in fabric to form part of the structure of a garment

NOTE Filling materials include waddings, foams and feathers.

3.3 foreign object

object not intended to be a part of a garment

3.4 ischaemic injury

injury to a part of the body resulting from a restriction of blood circulation

3.5 attached components

3.5.1 press fastener

fastening device consisting of a male component and a female component that are attached to different parts of a garment and which is fastened by aligning the two components and pressing them together

NOTE 1 Press fasteners include poppers and snaps.

NOTE 2 Press fasteners can be attached to a garment mechanically or can be sewn on.

3.5.2 tack button

fastening device comprising a button with a hollow shank on the back and a separate sharp tack, which is attached to a garment by pushing the sharp end of the tack through the fabric from the reverse side into the shank of the button

NOTE 1 Tack buttons are also known as jeans buttons or stud buttons.

NOTE 2 Tack buttons are widely used on denim and other casual garments.

3.5.3 rivet

two part assembly, comprising a part (referred to as a burr) which is attached to the outer surface of the garment by a tack which passes through the fabric from the reverse side

NOTE Rivets are usually used as reinforcements, particularly on the corners of pockets on denim and other casual garments.

3.5.4 eyelet

item used to reinforce a hole through a garment, comprising a short metal tube with a flange at one end which is fastened to the garment by pushing it through the hole and compressing it against a die

NOTE 1 An eyelet may also include a washer on the reverse side.

NOTE 2 Eyelets are used to facilitate lacing or the insertion of a drawstring, to drain pockets or to provide ventilation.

3.5.5 pom-pom

ball created either from cut lengths of thread or yarn fastened at the centre, or from a piece of fabric filled with wadding

NOTE Pom-poms can be secured directly to a garment or attached by means of a cord.

3.5.6 tassel

bundle of lengths of yarn or other materials fastened at one end and free at the other end

NOTE Tassels can be secured directly to a garment or attached by means of a cord.

3.5.7 tab

piece of textile or other material, of flat or looped construction, attached to the outside of a garment either for identification or for decorative purposes

NOTE These are distinct from adjusting tabs, which are defined in BS EN 14682.

3.6 garment assembly

section of a garment, made under production conditions, using production equipment and the components that are to be used in production

3.7 hazard

potential source of harm to the wearer of a garment

3.8 risk

combination of the probability of occurrence of a hazard and the severity of the harm which that hazard could be expected to cause

3.9 risk assessment

thorough evaluation of the mechanical risks that a garment could present to the wearer as a result of the design, materials, components and construction of the garment

3.10 sharp object

object with one or more edges or points which are exposed, or which could become exposed, and which are likely to cause a cutting or piercing injury to the wearer of a garment

3.11 touch and close fastener

fastener consisting of two pile fabric tapes that are attached to different parts of a garment which is fastened by pressing the pile sides of the two tapes together and which can be unfastened by peeling apart the two tapes starting at either end

3.12 wear trial

trial of a garment involving wear by intended users in order to obtain information on the wear performance and characteristics of the garment

3.13 magnet

piece of iron, steel or alloy having the properties of attracting or repelling iron

3.14 magnetic material

material capable of being attracted by, or acquiring the properties of, a magnet

4 Hazards and associated risks

4.1 General

Details of some of the mechanical hazards constituted by children's clothing, or parts of it, and the risks associated with these hazards are given in 4.2 to 4.11.

4.2 Ischaemic injuries

Ischaemic injuries can be caused by loose or untrimmed threads on the foot or hand area of garments becoming wrapped around fingers or toes, or by entrapment of fingers or toes in open fabrics (e.g. crochet) or in fabrics with long float stitches. This causes a tourniquet effect, thus restricting the blood circulation. This is a particular concern in babywear as the source of distress cannot be communicated by the baby and might go undetected for some time.

In addition, areas of skin or parts of the genitalia can protrude through a mesh fabric used as a lining for swimming trunks when the parts are cold. As the body warms up these parts expand and can become entrapped in the mesh leading to ischaemic injury. Several incidents of this kind have been recorded.

Elasticated cuffs can also cause a reduction in blood flow to the hands or feet if the elastic is too tight or too strong; this is a particular concern in babywear.

4.3 Entrapment of the penis in a slide fastener

All boys' trousers that have a slide fastener present a risk of entrapment of the penis in the fastener. There have been a number of reports of accidents in which this has happened.

4.4 Injuries from sharp objects

Injuries to children can be caused by clothing which contains sharp objects. The severity of the injury can range from a scratch or irritation to a more serious injury.

Injuries can be caused by components with sharp edges, which are sometimes found on buttons, slide fasteners and decorative features, or by sharp edges which are produced through the deterioration of components during the wear and aftercare lifecycle of the garment. For example, components of press fasteners can become detached from the garment leaving sharp prongs exposed, and buttons can break, or covered buttons can come apart, leaving a sharp edge.

Pins, staples and other sharp objects used in the manufacture and packaging of clothing can also cause serious injury if they are left in the garment.

4.5 Choking and aspiration

Buttons, toggles and many other garment attachments (including rubber and soft plastics items, such as badges) can be a potential hazard, particularly to children under 36 months, if the item becomes detached from the garment. As young children are known to place such items in their mouth, and might also insert them into their nose or ears, any foreign object found in a child's garment can present a risk of either choking or aspiration. Stones left as a residue from a stone-washing process can present the same risks.

Although most textile materials, being air permeable and flexible, are not considered to present a risk of choking in themselves, if a young child sucks and partly swallows a textile item this could cause induced vomiting which can lead to choking and/or serious illness. Examples of such textile items are bows and ribbons, particularly where these could unravel, and other attachments that become detached from a garment. Loose fibres from pile fabrics are not generally considered to present a risk of choking owing to their short length and small quantity. However, if a garment sheds a significant quantity of pile which gets into a child's mouth this can also cause induced vomiting, leading to choking and/or serious illness. Babies up to 12 months old are most at risk.

Aspiration (where items are inhaled via the mouth or nose) is possible if detached parts are sufficiently small to pass into the trachea, for example beads, diamant_閼 and sequins. Often these items might not be detected, as their chemical nature means they are unlikely to be identified by X-ray. The foreign body can cause toxic shock or lead to an infection, the source of which might not be readily identified. This can result in rapid and unexplained weight loss requiring hospitalization.

4.6 Swallowing

In most cases a detached item that has been swallowed will pass into the stomach and should eventually pass through the body with food without causing harm. Notable exceptions are sharp objects and magnets.

4.7 Strangulation, entrapment and tripping

Garments manufactured with cords, drawstrings or loops present a potential risk of strangulation, entrapment or tripping. Studies of accident data indicate two distinct trends.

- For children aged 2 to 8 years the risk of entrapment of hood or neck cords in climbing or playground equipment such as slides, resulting in strangulation, is most common.
- For children aged 10 to 14 years data indicate severe injury or even death caused by entrapment of cords and strings from waists and lower hems of garments in various moving vehicles. Children of this age not only play without supervision, but also are encouraged to become independent and travel to and from school unsupervised. Instances are reported of loops and cords being trapped in doors of buses or trains, etc., while long strings from lower hems of garments can become tangled in bicycle wheels and chains resulting in the rider falling in the path of other road traffic, or simply tripping the wearer. The presence of any rigid toggle or a knot can increase the risk of these accidents.

4.8 Restriction of vision and hearing

Hoods and certain types of headwear can restrict a child's vision or hearing, or both. Garments with hoods, and certain types of headwear, have the potential to increase the risk of the child being involved in an accident. Particular concern has been raised regarding an increased risk of playground and of road traffic accidents.

4.9 Suffocation

Accident statistics suggest that suffocation accidents involving children's clothing are rare. However, there remains a risk of suffocation in babies under 12 months if a garment has a hood constructed from materials which are impermeable to air.

4.10 Overheating

Research on sudden infant death syndrome (SIDS) has identified overheating to be a major contributory factor in unexplained or sudden death in sleeping babies under 12 months.

Evidence suggests that babies are put down to sleep wearing thermally resistant clothing or too many layers of clothing and/or have excessive bedding, possibly in overheated bedrooms.

As babies lose 85% of their excess heat through the head, the best way to avoid overheating is to have no hood on sleepwear, especially nightwear.

4.11 Slipping, tripping and falling

Accident statistics show that the majority of tripping and falling accidents are caused by poorly fitting garments. It is unclear whether this is due to inappropriate garment selection by the parent or carer or to the garment itself being incorrectly sized. Examples of the latter could be a skirt or a trouser leg being too long in relation to the waist and hip measurements. A belt or cord which is too long might also put the wearer at risk of tripping. Some slipping accidents can be attributed to children of walking age wearing socks or footed garments without wearing additional footwear.

5 Risk assessment

COMMENTARY ON CLAUSE 5

The recommendations given in Clause 5 relate only to mechanical safety. There are many other safety aspects relating to children's clothing that need to be considered when carrying out a full risk assessment, including chemical safety, thermal protection (against heat or cold), avoidance of overheating, flammability, and protection against solar radiation (protection against sunburn).

The General Product Safety Regulations [1] specify that all consumer products have to be safe or reasonably safe in normal and foreseeable use.

Risk assessments should be carried out so as to cover every stage of the garment production process, from the design stage, through manufacturing to retailing. This should include an exchange of information between all those concerned with the design, manufacturing, buying and retailing of the garments to ensure that garments put on sale to the public are mechanically safe.

The main stages that need to be carried out in a risk assessment are as follows:

- a) identification of the hazards;
- b) identification of the risks associated with each of the hazards;
- c) removal of the hazards wherever possible;
- d) for those hazards that cannot be removed, taking action to reduce the risks associated with them to an acceptable level.

NOTE 1 To assist in the assessment of risks associated with particular hazards, some recorded accident statistics are given in Annex A.

If a particular aspect of a garment design is found to present a risk, consideration should be given to removing the feature and/or obtaining the same effect using a safer technique.

Measures to remove hazards and reduce risks at the manufacturing stage should include the following:

- 1) adapting to technical progress and using safer technology;
- 2) developing a coherent overall prevention policy which covers technology, organization of work, and control of factors relating to the working environment, e.g. introducing a broken needle policy in a factory, and control of hand sewing procedures and the use of pins and staples;
- 3) implementing manufacturing management procedures to avoid or minimize risk including giving appropriate instructions to employees, for example on correct broken needle procedures.

Risk assessments should be done on all garments, covering the complete range of sizes.

The following factors should be taken into account:

- the age of the intended wearer;
- the expected characteristics of a child that age, and the situation in which they are likely to be wearing the garment, including the following:
 - weight and height of the child;
 - body measurements relevant to specific potential hazards, e.g. wrist size in the case of a garment with elasticated cuffs;
 - the age-related abilities of the child;
 - the normal behaviour of the child;
 - the situation(s) in which the garment is intended to be worn;
 - the normal levels of supervision of the child while they are wearing the garment. For example, not only is a sleeping baby very unlikely to be supervised, but it might also continue to be unsupervised when it wakes.

When carrying out a risk assessment, it should be borne in mind that young children cannot be expected to appreciate risks and that their behaviour can be unpredictable.

Risk assessments should be documented. The documentation should be dated and identified so that it is traceable, and should include a record of the name and position of the individual(s) who carried out the assessment. Risk assessments should be reviewed at least annually for long-running styles and further action taken to reduce risks if necessary.

Wear trials should never be carried out as part of a risk assessment.

NOTE 2 Guidance on wear trials is given in BS 7754. If a previously unidentified safety issue, or perceived safety issue, becomes apparent during a wear trial then the wear trial should be stopped immediately and the risk assessment should be reviewed.

6 Garment design, materials and construction

6.1 General

Assessed capability. Users of this British Standard are advised to consider the desirability of sourcing materials and components from suppliers who operate quality systems that have been assessed and registered against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

Garment designs and sizing should be based on anthropometric data for children in the relevant age group.

The performance of materials and components can be greatly reduced by aftercare processes. It is important therefore that the type and likely frequency of aftercare processes are taken into consideration when assessing the materials and components in the garments.

Appropriate care instructions should be provided with each garment using the symbols specified in BS EN ISO 3758.

For each garment design, the designer should provide the manufacturer with a full product specification which should include, as a minimum, the information listed in Annex D.

6.2 Selection of fabrics

Fabrics should be used which do not present a mechanical risk to the wearer when forming part of a garment. If necessary, the construction of the garment should be altered so that the fabrics used do not present a mechanical risk.

Particular consideration should be given to the position of the fabric on the garment, the age of the intended wearer and the type of end use of the garment, if any of the following fabric types are to be used.

- Fabrics with integral holes or open construction, e.g. crochet and lace, which can cause entrapment of fingers or other body parts leading to ischaemic injury (see 4.2).
- Mesh fabrics, which can present a risk of entrapment if used in the lining of boys' swimming trunks (see 4.2). This risk can be reduced by using a soft handle fabric with a hole size less than 1.5 mm.
- Pile fabrics. Consideration should be given to pile length, pile retention, position on garment and age of end user, particularly in garments for children under 12 months (see 4.5).
- Jacquard fabrics. Jacquard fabrics which have uncut float stitches longer than 10 mm should not be used in the hand or foot area of garments designed for children under 12 months.

Fabric used to support a sewn-on component, for example a button, should be sufficiently strong that when the attachment of the component is tested in accordance with Table 1 and 6.5.1 Notes 2 and 3 the fabric does not tear. If necessary, reinforcing material should be used in areas where components are attached.

6.3 Filling materials

Filling materials should not contain any hard or sharp objects.

Garments which contain filling material should be designed and constructed in such a way that the filling material is inaccessible and secure.

NOTE Particular care should be taken when using feathers/down as a filling material, as the quills could present a hazard to the wearer.

6.4 Sewing thread

Monofilament sewing thread should not be used in the construction of children's garments owing to the risk of it causing ischaemic injury or skin abrasion.

All thread ends in the hand and foot areas of the garment should be trimmed off to a maximum of 10 mm.

Thread used to support a sewn-on component, for example a button, should be sufficiently strong that the security of attachment of the component is in accordance with Table 1 and 6.5.1 Notes 2 and 3.

6.5 Attached components

6.5.1 General

This subclause gives recommendations that apply to all attached components. Specific additional recommendations for individual types of attached components are given in 6.5.2 to 6.5.9.

It is essential that all components attached to clothing for children under 36 months are securely attached and remain attached throughout the normal or reasonably foreseeable period of use of the garment.

Components attached by lockstitch (301) (see Note 1) 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 for garments for children aged under 36 months. Components attached by chainstitch (100) can be prone to becoming detached and should not be used for garments for children aged under 36 months.

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

The security of attached components on finished garments should be in accordance with Table 1.

Table 1 Recommended values for security of attached components on finished garments

Component	Minimum removal force N	Performance	Test method (see Note 2)
Grippable ^{A)} (except sequins):			
Largest dimension >6 mm	70 ^{B)}	—	Annex B
Largest dimension >3 mm but ≤6 mm	50	—	Annex B
Largest dimension ≤3 mm	—	Negligible change	Annex C
Non-grippable ^{A)} (including sequins and plastics sleeving on ends of cords or laces)	—	Negligible change	Annex C

^{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 Annex B.

^{B)} For code B zip fasteners (see 6.8.1) the requirement for open-end fastener single stringer slider retention is 60 N as specified in BS 3084:2006.

NOTE 2 In order to ensure that finished garments meet the recommended 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 garment. If a component fails, attention should be given to the mode of failure so that corrective action can be taken.

NOTE 3 The test method requires that 5 specimens of any specific type of component be tested. The recommended attachment strengths apply to the forces measured on each individual specimen, rather than the mean value from the 5 specimens tested.

6.5.2 Buttons

Only buttons which have passed the mechanical tests given in BS 4162 should be used on children's clothing. Buttons should be used which do not have sharp edges on the outside, and which also do not have sharp edges internally that could become exposed and present a hazard.

Particular care should be taken if multi-component buttons are to be used as these can disassemble to produce potentially hazardous small parts.

NOTE 1 For tack buttons see 6.5.8.

Buttons should not be used which bear any resemblance to food.

NOTE 2 Attention is drawn to the Food Imitations (Safety) Regulations 1989 [4].

Care should be taken that the provision of spare buttons does not pose any additional risk.

6.5.3 Fabric embellishments, including bows and labels

The ends of all fabric embellishments, especially ribbons, should be adequately secured to prevent unravelling.

It is essential that any heat sealed or laser cut fabric labels, badges or tabs do not have sharp edges.

The lengths of any fabric embellishments should conform to BS EN 14682.

6.5.4 Rubber or soft plastics embellishments, including labels, badges and tabs

The following should be considered when selecting rubber or soft plastics embellishments for clothing for children under 36 months.

- a) *Stitch density*. Perforations caused by stitching can cause parts of the attachment to detach.
- b) *Degradation of the materials*. These can be degraded by exposure to heat, laundering detergents, etc.

6.5.5 Pom-poms and tassels

Pom-poms and tassels constructed from cut lengths of yarn should not be used on garments for children aged under 36 months owing to the potential for fibres and yarns to be easily removed.

6.5.6 Sequins, beads and similar components

On garments designed for children under 36 months, sequins, beads and similar components should not be attached by either hand sewing or chain stitching (e.g. Adda technique) owing to difficulties in achieving consistency in attachment security. Machine attached sequins are generally more secure and a minimum of 3 stitches should be used to hold each sequin flat.

Where hand-sewn sequins or beads are applied, it is recommended that the stitching is locked off after every 10th stitch.

6.5.7 Diamant^関 and heat fused components

The security of attachment of these items can be adversely affected by the following factors:

- a) textured fabric surfaces, e.g. velour, velvet, ribs and other uneven surfaces;
- b) highly extensible fabrics;
- c) certain fabric finishes, e.g. stain repellent finishes;
- d) items of garment construction, e.g. pockets and pocket bags, and embroideries, appliqu^関 and prints. The uneven surfaces these produce can cause inconsistencies in application pressure.

It is also important to ensure consistency in the application process (see 7.4).

6.5.8 Press fasteners and similarly applied components

Selection and positioning of press fasteners (including poppers and snaps) and similarly applied components, including tack buttons, rivets, eyelets, and hooks and bars, is an important element of garment design. The designer should ensure that:

- a) the correct type of fastener is selected. In particular, post-type fasteners should not be used on knitted fabrics as these can pull through the knitted structure. Prong-type fasteners are required for these fabrics;
- b) fasteners are not applied over seams or on areas of uneven fabric thickness as insecure attachment can result;

- c) the correct size of fastener is selected to match the compressed fabric thickness and only one size is used per garment;
- d) where necessary, the fabric is reinforced, for example with a fusible interlining, to ensure adequate fabric stability for a secure attachment (see 6.2);
- e) needle detector compatible fasteners are selected, i.e. fasteners made of non-magnetic material which do not trigger needle detectors (see 7.2).

It is recommended that press fastener data sheets are obtained from the fastener manufacturers and used to record the description and position of all fasteners on the garment and to check that all the above points have been acted upon. Additionally, the data sheet should be used to record the pinch setting, a measure of the attached fastener thickness at each position, at the pre-production stage. This data should then be used for checking the fasteners during manufacture (see 7.3).

6.5.9 Magnets

Magnets should not be used on children's garments.

6.6 Elastication

If elastics are to be used in a garment, an elastic should be selected that is sufficiently strong to hold the relevant part of the garment in place, but which has sufficient stretch to avoid the risk of injury to the wearer. In addition, the length of the elastic should be carefully chosen so that the elasticated part of the garment is the correct size for the intended wearer.

It is essential to indicate both the relaxed and minimum stretched measurements of any elasticated parts of a garment in the manufacturer's specification.

6.7 Touch and close fasteners

It is recommended that soft qualities of touch and close fastener are used on garments for children aged 12 months and under.

When positioning touch and close fasteners the hook component should be directed away from the child's body where possible to avoid the possibility of skin abrasion.

It is recommended that pieces of touch and close fasteners are die cut with rounded corners to minimize the risk of scratching.

6.8 Slide fasteners (zips)

6.8.1 General

Zips conforming to BS 3084:2006 should be used. Zips conforming to performance code A, B, C or D should be used as applicable to the type of clothing, in accordance with BS 3084:2006. Ultra-light weight zips (performance code A) should not be used in clothing for children under 36 months.

NOTE In the 2006 revision of BS 3084 a requirement has been added for single stringer slider retention in open-end zip fasteners. Zips which do not conform to BS 3084 in this respect can present a choking risk.

Where components of a zip could come into contact with the skin, the use of a plastics zip with plastics top stops and bottom stops is recommended, in preference to a zip with claw-type metal stops. The top stops and the elements (teeth) should be free from burrs and sharp edges. The use of a fabric zip guard, comprising an inner flap, is recommended to reduce the risk of catching or scratching, particularly around the face and neck.

6.8.2 Slide fasteners (zips) in boys' trousers

It is preferable that functional slide fasteners are not used in the fly area of trousers designed to fit boys aged 5 years and under. Designers should consider alternative trouser constructions, for example a touch and close fastener or a non-functioning mock-fly and/or an elasticated waistband.

All boys' trousers with a zip fly should have a zip guard at least 20 mm wide, secured by stitching across the fly opening at the bottom, to provide protection against accidental entrapment of the penis in the elements (teeth) of the zip. Use of zips with plastics elements is preferable as these are less likely to cause severe injury if entrapment does occur.

6.9 Cords, strings, ribbons and bows

Where these are used they should conform to BS EN 14682.

NOTE Attention is drawn to the Children's Clothing (Hood Cords) Regulations 1976 [5]. The regulations state that outerwear garments with a chest measurement of less than 44 cm flat should not have a hood designed to be secured by means of a cord drawn through the fabric.

6.10 Neckties

Conventional neckties are not suitable for children under 5 years old. Neckties on garments for children in this age group should be designed to be easily detachable should they become entangled. This can be achieved by the use of touch and close fasteners at the neckband or use of a clip-on fastener.

6.11 Garments with integral feet

Consideration should be given to enhancing the slip resistance of garments with feet which are designed to be worn by walking children without footwear. An example of how this can be done is the use of a friction enhancing surface bonded to the fabric on the soles of the garment.

6.12 Hoods

Sleepwear, especially nightwear, designed for babies under 12 months should not have hoods, because of the risk of overheating.

Garments for babies under 12 months should not have hoods made of impermeable material because of the risk of suffocation.

Because a hood can restrict a child's vision or hearing or both (see 4.8) garments with hoods should be designed to minimize this. Particular attention should be paid to the design of hoods in garments for older children, who are more likely to undertake activities without adult supervision.

NOTE Attention is drawn to the Children's Clothing (Hood Cords) Regulations 1976 [5]. The regulations state that outerwear garments with a chest measurement of less than 44 cm flat should not have a hood designed to be secured by means of a cord drawn through the fabric.

6.13 Embroidery and appliqué

When positioning embroidery and appliqué on garments, the potential of the back of the stitching to rub on the skin during wear should be taken into account. The use of a fusible interlining or full panel linings to back the embroidery is recommended where there is a risk of abrasion.

Care should be taken to ensure that the stitch lengths used on embroideries and appliqué are not long enough to form loops which could pose a risk of ischaemic injury to children under 36 months. There should be no float stitches on the back or front of the embroidery or appliqué in excess of 10 mm.

6.14 Stone washing

Stones or other residues left in the pockets or turn-ups of garments following stone washing can present a risk of choking to children under 36 months (see 4.5) and, therefore, it is recommended that an alternative process, such as enzyme washing, be used on garments for this age group.

If stone washing is used on garments for older children, physical measures should be taken to prevent stones and other residues being retained. These include sewing up pockets prior to washing, and turning out and cleaning all pockets, turn-ups, etc. at the garment inspection stage.

7 Manufacture

7.1 Sharp objects

7.1.1 General

Sharp objects used in the manufacture of garments can cause serious injury if they are accidentally left in a garment and come into contact with the wearer.

7.1.2 Pins and staples

Pins and staples are sometimes used in cloth spreading, cutting, position marking and the identification of faults. However, it is not essential to use such items during the manufacturing process. Manufacturers should eliminate their use, for example by use of self adhesive labels to mark garment faults, self adhesive markers, and clamps to hold fabric lays.

Metal staples should not be used anywhere in the manufacturing environment. This includes their use to fasten paperwork and paper patterns.

7.1.3 Sewing needles (hand and machine)

Sewing needles carry the same risk as other sharp objects but cannot be eliminated from the manufacturing process. Therefore, manufacturers should have a documented needle control system to ensure that garments are not contaminated with sewing needles or needle fragments.

The system should include documented procedures for the following:

- a) designating a particular person to be responsible for the issue of needles;
- b) ensuring that only the designated person has access to needle supplies;
- c) ensuring that a new needle is only issued on receipt of all parts of the old needle;
- d) ensuring that if a needle breaks all the broken pieces are retrieved. If all the parts cannot be found then all potentially affected garments should be quarantined for individual metal detection;
- e) ensuring that all incidents of broken needles are recorded, together with details of the actions taken;
- f) ensuring, for hand sewing needles, that the issue and return of every needle, at the beginning and end of every shift, is recorded.

7.1.4 Knitting machine needles and linking points, and tagging gun needles

Knitting machine needles and linking points, and tagging gun needles, can present the same risks as sewing needles so, if these are used, the manufacturer should have a documented control system that is in accordance with the recommendations given in 7.1.3.

7.1.5 Scissors, clippers and other sharp tools

These should be secured to the workstation, where possible, and/or subject to a documented control system that is in accordance with the recommendations given in 7.1.3.

7.2 Metal detection (including needle detection)

Use of metal detectors during garment manufacture is an important measure against metal contamination. However, metal detection should always be used in addition to control procedures for needles and other sharp objects (see 7.1), and not in place of them.

There are two main types of metal detectors, those which detect all metallic materials and those which detect magnetic materials only. The latter are usually referred to as "needle detectors" and are designed for use with garments that include non-magnetic metal components.

Static conveyor metal detectors are recommended. Hand held metal detectors may be used to help locate metal fragments, but are not as effective in ensuring that garments are free from metal contamination.

It is essential that metal detectors are calibrated daily in accordance with the manufacturer's instructions, and records of the calibration kept.

Metal detection can be used for several purposes, at different stages in manufacture, including broken needle detection, inspection of garment parts sourced from elsewhere and as part of garment inspection. Final metal detection should be carried out on finished garments, after packing, wherever possible.

In the following cases it might not be possible to carry out final metal detection on finished garments.

- a) If components such as belt buckles or brace clips made of magnetic materials (e.g. certain ferrous metals) are to be used, metal detection needs to be carried out prior to their attachment, but at the latest possible stage of manufacture.
- b) Some qualities of pumice used in stone washing can leave a residue on garments which might activate the metal detector. In this case, it might be necessary to perform metal detection prior to this process.

Inspected garments should be clearly identified to distinguish them from those not yet inspected and from rejected garments.

Garments which trigger the metal detectors should be quarantined for detailed examination. If the contaminant can be located and removed, the garment should then be put through the metal detection procedure again. If the contaminant cannot be located and removed, the garment should be destroyed.

Any metal contamination found, and subsequent action(s) taken, should be recorded.

7.3 Machine applied fasteners

The manufacturer should arrange for staff who will be attaching fasteners to garments to be trained in attachment techniques by the supplier of the fasteners.

The manufacturer should have a system to control the security of attachment of fasteners, which should include documented procedures for the following:

- a) ensuring that suitable fasteners are selected (see 6.5.8);
- b) ensuring machines, dies and settings are correct for the particular type of fastener and the substrate;
- c) machine inspections, including inspection routines and frequencies;
- d) inspection and testing of fastener application.

Pinch settings on fastener attaching machines should be recorded and checked against those measured at the pre-production stage, at least twice per shift. This can provide an indication of correct fastener application.

All fasteners should be subjected to a visual inspection after attachment to detect any defective attachments, such as those with deformed prongs.

Subjecting garments to wash processes such as stone washing, enzyme washing or garment dyeing can lead to mechanical damage and/or leave chemical residues, which might affect the security of the attachments. It is recommended that, in these cases, fasteners should be attached after the washing or dyeing process.

7.4 Application of glued and heat fused components

It is recommended that garment manufacturers should have a documented procedure to control the consistency of attachment for diamant^閼 and heat fused components. It is essential that the component supplier's guidelines for attachment of these items with regard to temperature, time and pressure are followed and that these conditions are closely monitored.

7.5 Elasticated garments

If elastics are used in a garment, it is essential to have control procedures in place to ensure that the relaxed and the minimum stretched measurements, as given in the manufacturer's specification, are maintained throughout the manufacturing process.

7.6 Inspection

It is essential that personnel involved in inspection are supplied with all relevant information to enable them to perform their task effectively. This should include relevant technical specifications and work instructions relating to the garment.

Inspection of garments should be carried out at intermediate stages during the construction of the garment and after completion of the garment, for conformity to the garment specification.

In addition, all completed garments should be inspected for foreign objects. Particular attention should be paid to areas of the garment which could conceal foreign objects, such as pockets, turn-ups, linings and hems. Garments with feet should be turned inside out to enable a proper inspection to be performed. Any foreign objects found should be removed or, if this is not possible, the garment should be destroyed.

7.7 Testing for security of attached components

Testing for the security of attached components should be in accordance with Table 1 and 6.5.1 Notes 2 and 3.

NOTE Additional testing for process control purposes is recommended for production runs extending over more than one shift and/or involving more than one production line. This may be done using the procedure given in Annex E.

Garments that have been tested for security of attached components should only be released for sale after they have been corrected. If this is not possible the garments should be destroyed so that they cannot be used.

7.8 Rejected garments

Rejected garments should be clearly identified and quarantined.

Garments which have been rejected for safety reasons should only be released for sale after they have been corrected. If this is not possible the garments should be destroyed so that they cannot be used.

If a garment from a batch fails a test in accordance with Annex B or Annex C, the batch from which that garment came should be identified and quarantined. The cause of the failure should be identified and appropriate action taken.

7.9 Documentation and traceability

Manufacturers should document their manufacturing practices and procedures and keep records of all activities relating to product safety. Records should be kept in a form which allows traceability of particular batches of garments should this become necessary.

8 Packaging

8.1 General

Pins and staples should not be used in packaging. Alternative methods should be used where it is necessary to secure garments in packaging, e.g. shirts. Care should be taken that the packaging does not include items that could present a hazard, for example small plastics clips that could present a choking hazard to children under 36 months.

8.2 Plastic bags

If plastic bags are used for packaging, the bags should be printed with a safety warning, to warn customers of the potential risk to children of suffocation. The following wording is recommended.

"PLASTIC BAGS CAN BE DANGEROUS.

TO AVOID DANGER OF SUFFOCATION KEEP THIS BAG AWAY FROM BABIES AND CHILDREN."

Polythene bags less than 0.038 mm thick should be perforated with 6 mm holes to reduce the risk of suffocation.

9 Security tagging and display of garments for retail

It is essential that security tags used in retail are carefully controlled to ensure that pins are not left in garments when they are sold to the customer as they can present a risk, particularly to younger children.

Pins put into garments used for display in retail can present a risk to the wearer if they are left in the garment. It is recommended that other methods be used to hold display garments in position. If pins are necessary it is important to ensure that they are all removed from the garment before it is sold to the purchaser.

Annex A (informative)

Injury data relating to children's clothing

A.1 General

The injury data presented in this annex have been extracted from the Home Accident Surveillance System (HASS) [6] and Leisure Accident Surveillance System (LASS) [7] and relate to incidents involving children 14 years old and younger during the period 1996 to 1999. These two systems are linked computer databases that hold records of consumers who attended accident and emergency departments of 18 sample hospitals across the UK. The HASS database contains details of accidents that occur within the confines of the home and its surrounding garden and boundaries. The LASS database contains details of accidents that occur outside the confines of the home and garden, but does not include road traffic accidents or accidents sustained in the course of paid employment (the latter not being applicable to children 14 years old and younger anyway).

NOTE The injury data cover risks which are outside the scope of this British Standard, but the data has been included in its entirety for the convenience of users of the standard.

A.2 Injuries analysed by age

An analysis of injuries according to age is given in Table A.1. Clothing injuries were remarkably evenly dispersed, except that considerably fewer injuries occurred before the age of 1 year than at other ages. More injuries occurred at ages 2 years to 4 years than at other ages. From ages 5 years to 14 years, 6% or 7% of the total injuries occurred in each year group.

Table A.1 Injuries analysed by age

Age Years	Number of injuries	Percentage of total	Cumulative percentage
<1	19	2%	2%
1	71	7%	9%
2	89	9%	18%
3	90	9%	27%
4	87	9%	36%
5	64	6%	42%
6	58	6%	48%
7	68	7%	55%
8	65	7%	61%
9	67	7%	68%
10	66	7%	75%
11	71	7%	82%
12	60	6%	88%
13	58	6%	94%
14	62	6%	100%
Total	995	100%	

A.3 Injuries analysed by cause

An analysis of injuries according to cause is given in Table A.2. The principal causes of injuries were tripping on clothing (either clothing lying on the floor or being worn), catching of clothing (either on body parts or objects) and cutting by clothing, mostly by zips. Also prevalent were cases of insertion or choking, usually involving buttons, and injuries caused by fires and/or flames.

Table A.2 Injuries analysed by cause

Cause of injury	Number of injuries	Percentage of total
Tripped on clothing	296	30%
Clothing caught	222	22%
Cutting or piercing instruments	114	11%
Insertion	109	11%
Choking	85	9%
Fire and flames	73	7%
Struck by	46	5%
Strangulation	4	0%
Other	46	5%
Total	995	100%

A.4 Injuries analysed by type

An analysis of injuries according to type is given in Table A.3. Some types of injury follow invariably from a particular cause, such as thermal burns from fire and flames. Some types of injury can result from several different causes, such as contusions and abrasions, which can occur as a result of tripping on clothing, getting clothing caught, or being struck by clothing. Contusions and abrasions occurred almost twice as often as the next most common type of injury, lacerations. There were also 95 fractures, 58 strains and sprains, and 15 cases of concussion during the period 1996 to 1999.

Table A.3 Injuries analysed by type

Type of injury	Number of injuries	Percentage of total
Contusion or abrasion	312	31%
Laceration	158	16%
Foreign body	109	11%
Fracture	95	10%
Thermal burn	69	7%
Ingested foreign object	66	7%
Strain or sprain	58	6%
Not stated	17	2%
Concussion	15	2%
Puncture	10	1%
Avulsion	5	1%
Dislocation	4	0%
Anoxia	4	0%
Dental injury	1	0%
Haemorrhage	1	0%
Other	71	7%
Total	995	100%

A.5 Injuries analysed by gender

The frequency of injuries was very similar in males and females, as shown in Table A.4.

Table A.4 Injuries analysed by gender

Gender	Number of injuries	Percentage of total
Male	524	53%
Female	471	47%
Total	995	100%

A.6 Injuries caused by components of clothing

The principal injuries from components of clothing were those from buttons and zips, which constituted 62% of this type of injury. Table A.5 gives a more detailed analysis of injuries that have been caused by components of clothing.

Table A.5 Injuries caused by components of clothing

Component	Number of injuries	Percentage of total
Button	177	40%
Zipper	98	22%
Shoelaces	33	7%
Sleeve	23	5%
Buckle	23	5%
Pocket	17	4%
Other	75	17%
Total	446	100%

A.7 Injuries analysed by cause and clothing category

An analysis of the causes of injuries in relation to the different categories of clothing is given in Table A.6.

The relative numbers of injuries from each cause differed significantly according to the category of clothing being worn.

The relative numbers of injuries from each cause associated with day wear was the most similar to the relative numbers of injuries from each cause overall, as given in Table A.2. Clothing caught or tripped on, cutting or piercing injuries, and fire and flames, were the most common causes of injury.

Outerwear was also associated with many tripping, catching and cutting injuries, but with considerably fewer fire and flame injuries. Struck by injuries were more common with outerwear than with any other clothing category. Some of these injuries occurred while the children were "roughhousing", others while they were putting on or taking off the outerwear. Children can be struck by metal buckles, buttons, collars, fasteners and zips, in addition to the garment itself.

Nightwear was associated with the highest percentage of fire and flame injuries. Twenty-six percent of nightwear injuries were a result of fires and flames.

The most common cause of injury associated with nightwear was tripping on clothing. Children are more likely to trip when they are sleepy, and also more likely not to see clothes that block their way in the dark.

There were relatively few instances of children catching clothing in the case of nightwear, probably because children do not engage in the vigorous activities they undertake normally during the day.

Most prevalent among injuries caused by accessories were "struck by" injuries. Since belts were one of the two principal items in the accessories category, along with scarves, the high count of contact injuries is not surprising. Cutting and piercing injuries were second most common, resulting from belt buckles. The two strangulation injuries are important to note.

Table A.6 Causes of injuries in relation to the categories of clothing

Cause of injury	Number of injuries					
	Clothing accessory	Day wear	Footwear	Nightwear	Other clothing	Outerwear
Choking	4	14	0	1	0	8
Clothing caught	4	129	7	4	3	59
Cutting or piercing	12	63	6	1	2	20
Fire and flames	2	35	0	17	1	3
Insertion	0	6	0	1	0	0
Other	16	10	3	2	0	13
Strangulation	2	1	0	0	0	0
Struck by	17	4	2	2	0	18
Tripped on clothing	9	114	43	38	4	69
Total	66	376	61	66	10	190

A.8 Comparison of HASS statistics from 1995 with those from 2000

A comparison of the HASS statistics from 1995 with those from 2000, three years after the publication of the first edition of BS 7907, is given in Table A.7.

The number of accidents in 2000 was almost half that in 1995; however there were slightly more button swallowing accidents.

In addition, there were several types of accidents in 2000 which were not recorded in 1995 (see last five entries in Table A.7). These might reflect the increase in the use of toggles on the lower edges of garments, the increase in other accidents related to cords (which is the reason for the publication of BS EN 14682) and the increase in slips on laminate floors.

Table A.7 Comparison of HASS statistics from 1995 and 2000

Description of accident	Number of accidents	
	1995	2000
Button swallowed	17	22
Button up nose/Button in ear	27	19
Other foreign body swallowed	9	7
Other foreign body in mouth cavity	2	0
Other foreign body in lung	0	0
Other foreign body up nose	20	0
Other foreign body in ear	7	0
Penis trapped in zip	19	14
Other lacerations from zip	14	4
Other lacerations from clothing	18	0
Eye struck by clothes	5	3
Slipped when wearing footed sleepwear	1	3
Tripped over clothing being worn	14	0
Injured by pulling tight jumper over head	1	0
Foreign body in eye	0	1
Toggle caught in bike	0	3
Tab or strap caught on handle	0	2
Other injury from toggle	0	2
Slipped on floor when wearing socks	0	2
Total	154	80

Annex B (normative) **Method for determination of removal force of attached components**

B.1 General

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

B.2 Principle

An attached component is held in the upper grip of a constant rate of extension (CRE) tensile testing machine and the garment 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 garment. The removal force and the mode of failure are recorded.

B.3 Apparatus

B.3.1 *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 should be in accordance with BS EN ISO 10012. Under conditions of use, the accuracy of the machine should 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 should not exceed $\pm 1\%$. The machine should be capable of maintaining a constant rate of extension of 100 mm/min, with an accuracy of $\pm 10\%$. The machine should 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.

B.3.2 *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 B.1a) and Figure B.1b). The box should 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 should be as shown in Figure B.2 made from gauge plate metal (1.65 ± 0.15) mm thick. The slot width, W , should 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 garments.*

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.*

B.3.3 Press fastener upper grip, for testing of press fasteners, including poppers, 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 should be evenly spaced. The profile of the claw should 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) poppers is shown in Figure B.3.

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.

B.3.4 Press fastener lower grip, for testing of press fasteners including poppers, as shown in Figure B.4.

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

B.3.5 Diamant? upper grip, for testing of fused or glued on diamant ≥ 3 mm, comprising a two pronged grip, as shown in Figure B.5, capable of opening sufficiently to slide over the diamant? and sprung loaded in order to grip under the edges of the diamant? as the grip rises.

B.3.6 Diamant? lower grip, for testing of fused or glued on diamant ≥ 3 mm, comprising a central post as shown in Figure B.6 and a clamping ring (see Figure B.8).

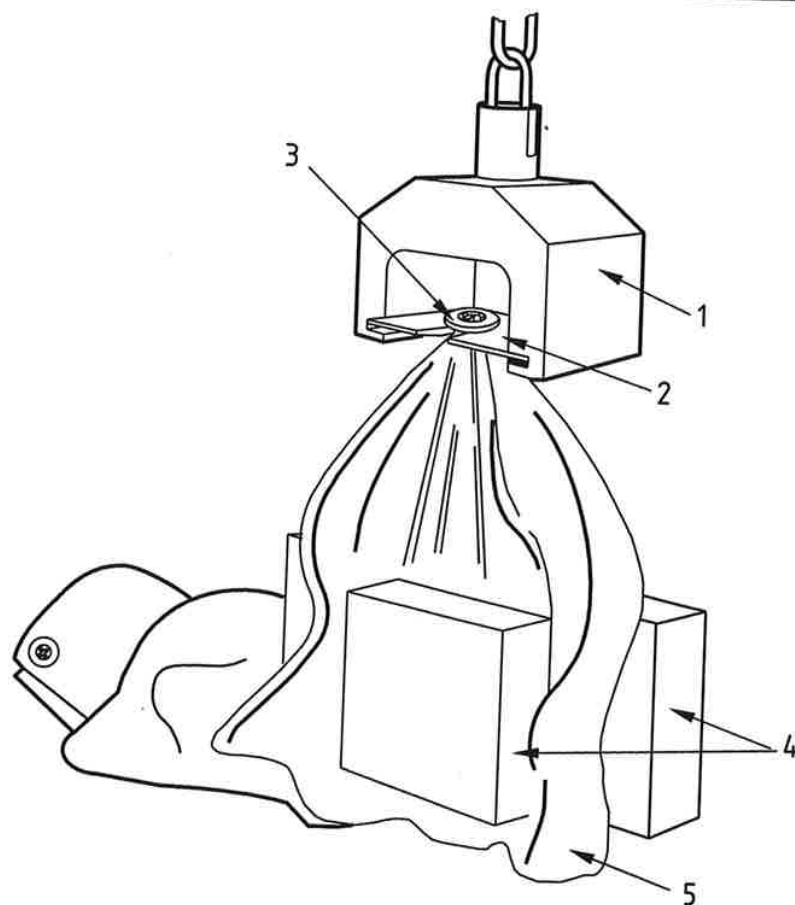
B.3.7 Flat-faced clamping device, for use as the lower grip for testing of all attachments other than press fasteners, diamant ≥ 3 mm and slide fastener puller attachments, comprising a clamping device fitted with a front jaw face (25 ± 1) mm \times (25 ± 1) mm, and a back jaw face not less than (25 ± 1) mm \times (50 ± 1) mm.

B.3.8 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.

B.3.9 Clamping device with hook, as shown in BS 3084:2006, Figure B.1, for testing of embellishments attached to slide fastener pullers.

B.3.10 Masking plate, as described in BS 3084:2006, B.2.2, for testing of embellishments attached to slide fastener pullers.

Figure B.1 Examples of button boxes



Key

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

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

Figure B.1 Examples of button boxes (*continued*)

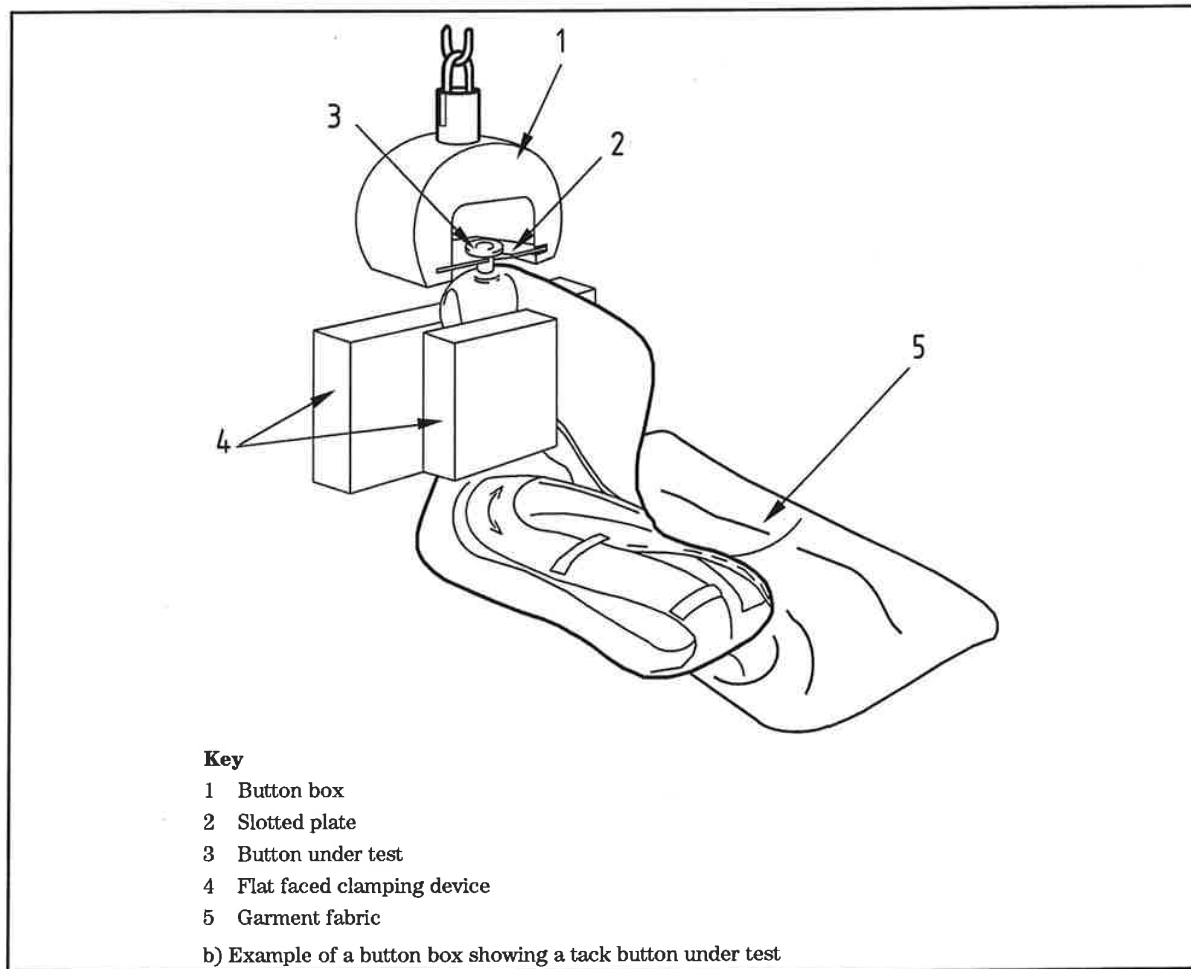


Figure B.2 Plate for use in button box

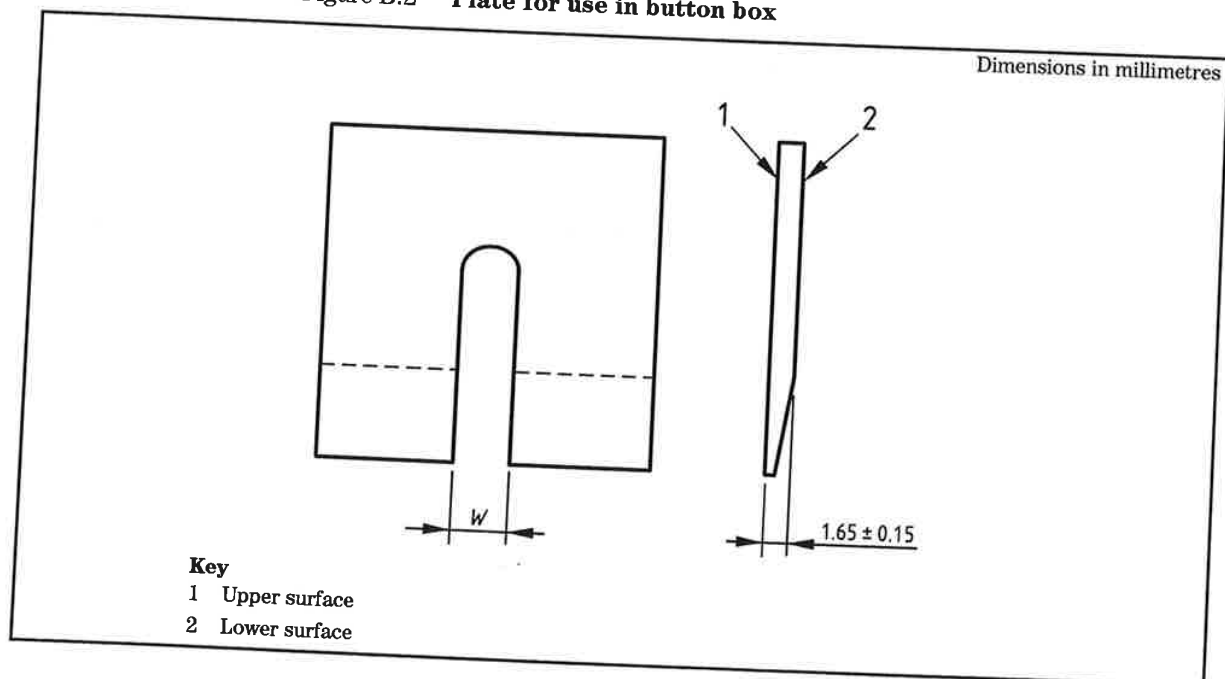


Figure B.3 Example of a suitable grip for testing 13, 14 and 15 ligne (8.25 mm, 8.5 mm and 9.5 mm) poppers

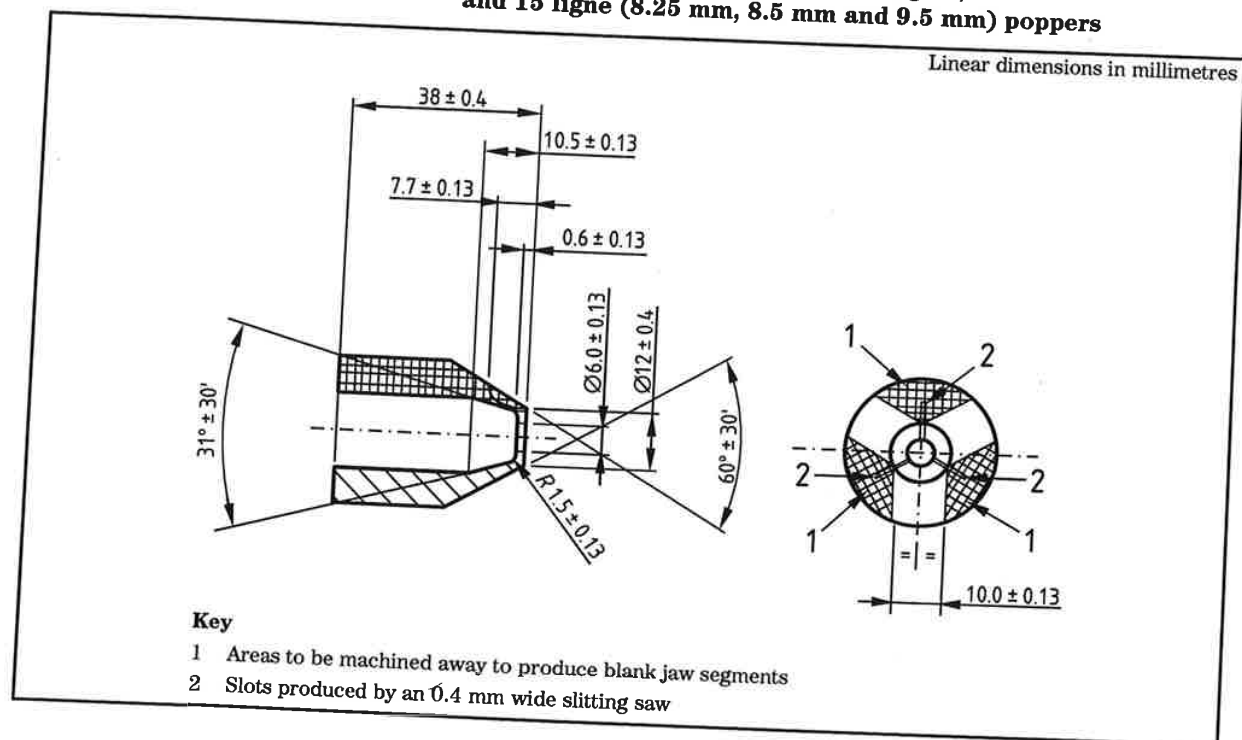
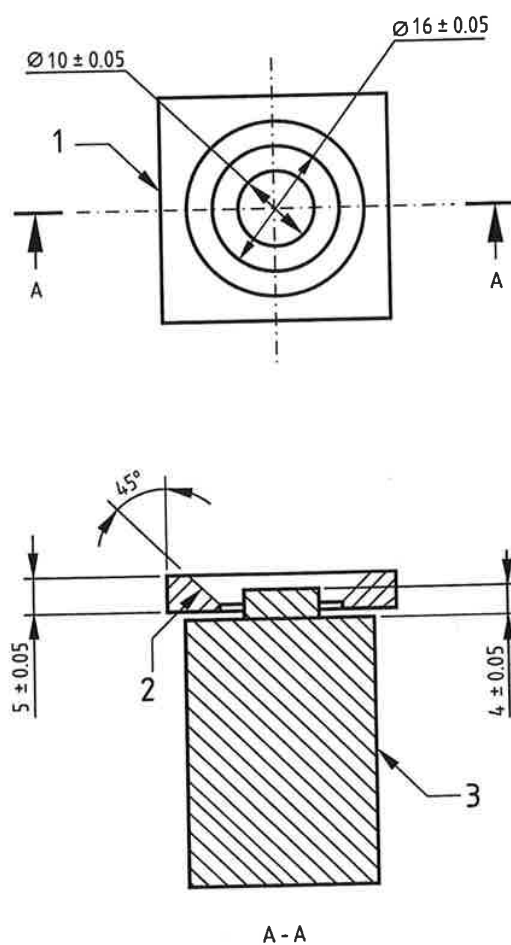


Figure B.4 Press fastener lower grip

Linear dimensions in millimetres



Key

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

Figure B.5 Diamant? upper grip

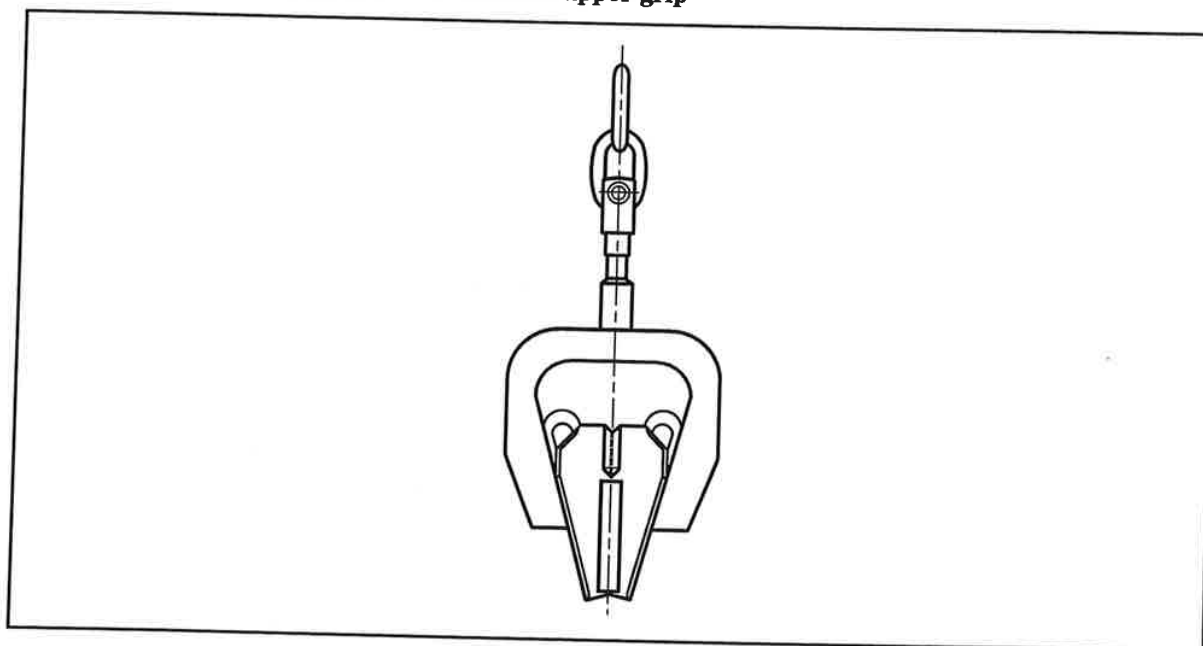
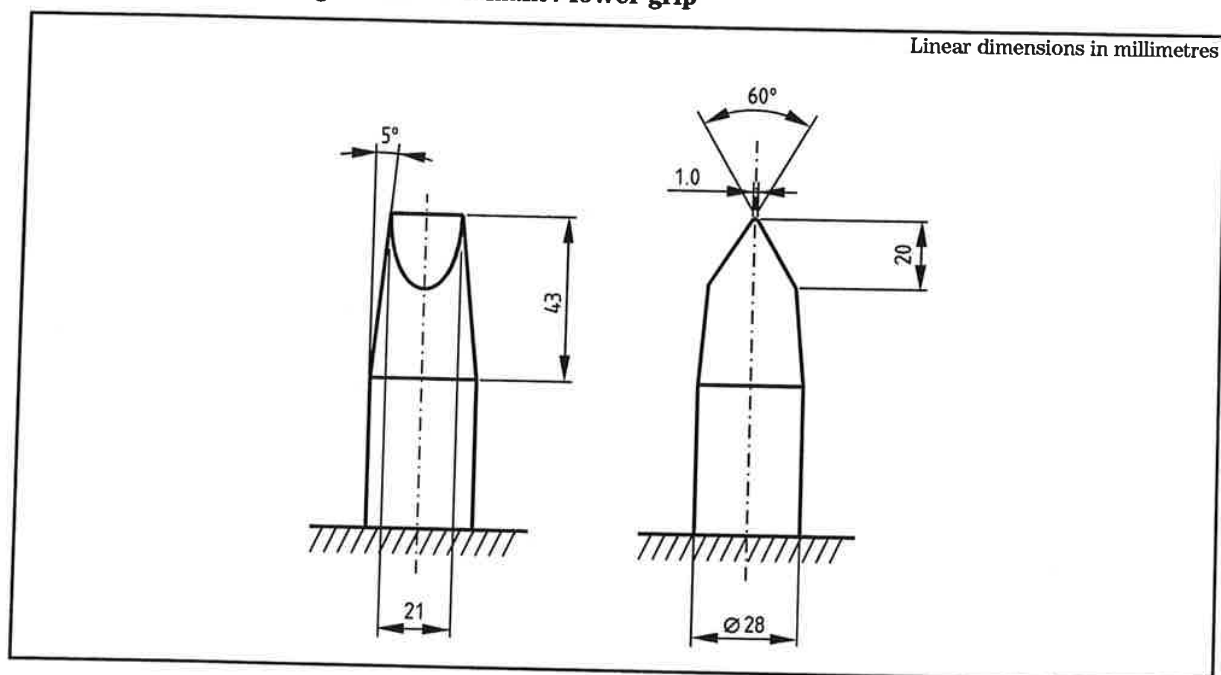


Figure B.6 Diamant? lower grip



B.4 Atmosphere for conditioning and testing

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

B.5 Sampling and selection of test specimens

B.5.1 Sampling

A sufficient number of representative garments or garment assemblies should be taken to provide the number of test specimens recommended in **B.5.2**.

In the case of testing at the production stage the garments or garment assemblies should be taken from the production line(s).

B.5.2 Selection of test specimens

Testing should 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.

B.6 Procedure

B.6.1 Rate of extension or elongation

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

B.6.2 Machine set-up and test specimen mounting

B.6.2.1 General

Set up the machine and mount the test specimens as described in **B.6.2.2** to **B.6.2.8**.

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

B.6.2.2 Buttons and tack buttons

Mount the button box, with the appropriate slotted plate, (B.3.2) in the top of the machine and the flat-faced clamping device (B.3.7) in the base of the machine. Set the gauge length to (20 ± 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.

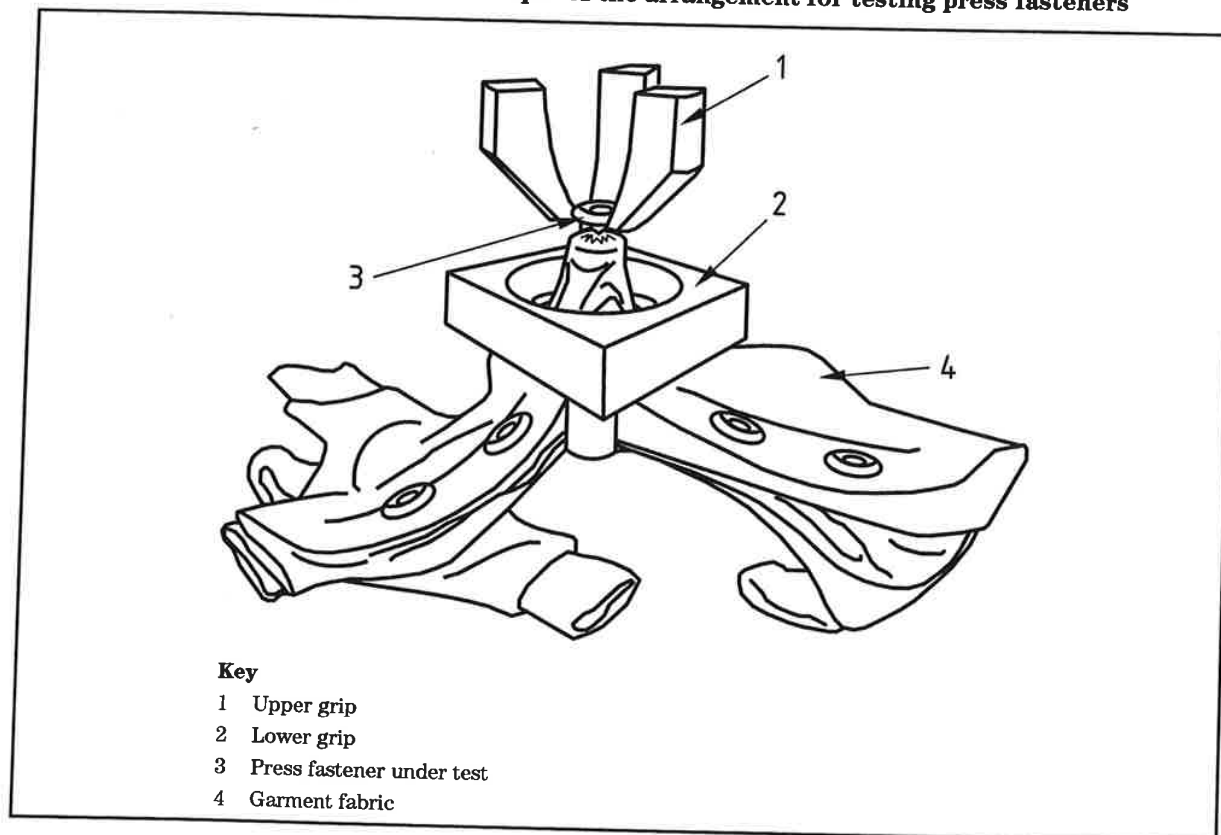
Fold the main body of the garment below the button to give a double thickness of fabric and clamp this in the lower grip.

B.6.2.3 Press fasteners including poppers

Mount the press fastener lower grip (B.3.4) in the base of the machine and the press fastener upper grip (B.3.3) 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 B.7.

Move the upper grip to one side and place main body of the garment 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 B.7 Example of the arrangement for testing press fasteners



B.6.2.4 Beads and similar sewn on components >3 mm

Mount the button box, with the appropriate slotted plate, (B.3.2) in the top of the machine and the flat-faced clamping device (B.3.7) 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 garment below the bead or other component to give a double thickness of fabric and clamp this in the lower grip.

B.6.2.5 Diamant 閼, fused or glued on, >3 mm

Mount the diamant? lower grip (B.3.6) in the base of the machine and the diamant? upper grip (B.3.5) 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 B.8.

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

B.6.2.6 Fabric embellishments, including bows and labels

Mount a flat-faced clamping device (B.3.7) in the base of the machine and either a wedge-type clamping device (B.3.8) or a flat-faced clamping device (B.3.7) 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 garment below the embellishment to give a double thickness of fabric and clamp this in the lower grip. Do not pre-tension.

B.6.2.7 Pom-poms and tassels

Mount the button box, with the appropriate slotted plate, (B.3.2) in the top of the machine and the flat-faced clamping device (B.3.7) 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 garment below the pom-pom or tassel to give a double thickness of fabric and clamp this in the lower grip.

B.6.2.8 Embellishments (hard and soft) attached to slide fastener pullers

Mount the masking plate (B.3.10) in the base of the machine. Mount either the clamping device with hook (B.3.9) or the wedge-type clamping device (B.3.8) into the top of the machine, as appropriate to the type of embellishment being tested. An example of the arrangement is shown in Figure B.9.

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 B.8 Example of the arrangement for testing diamant 関

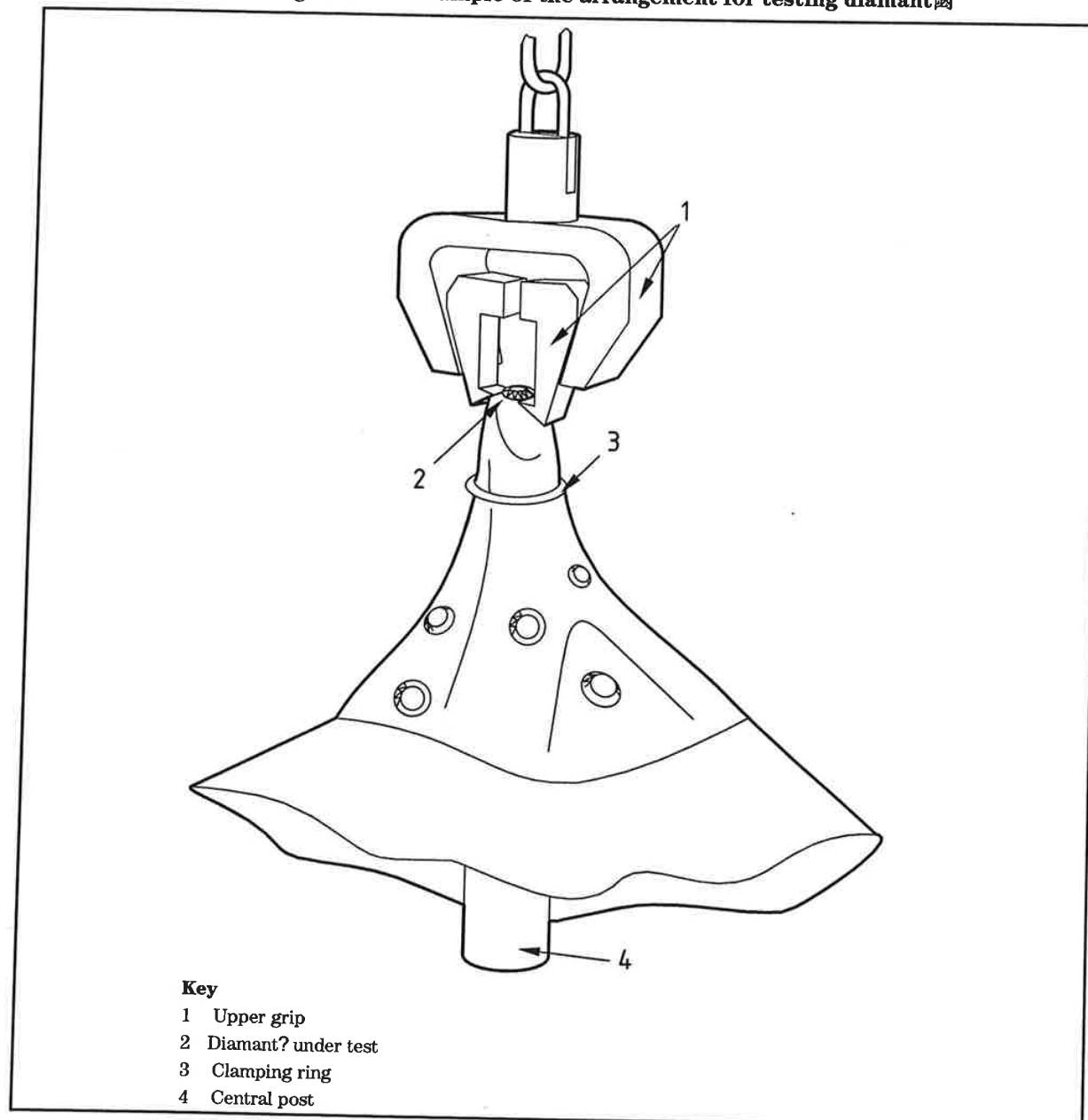
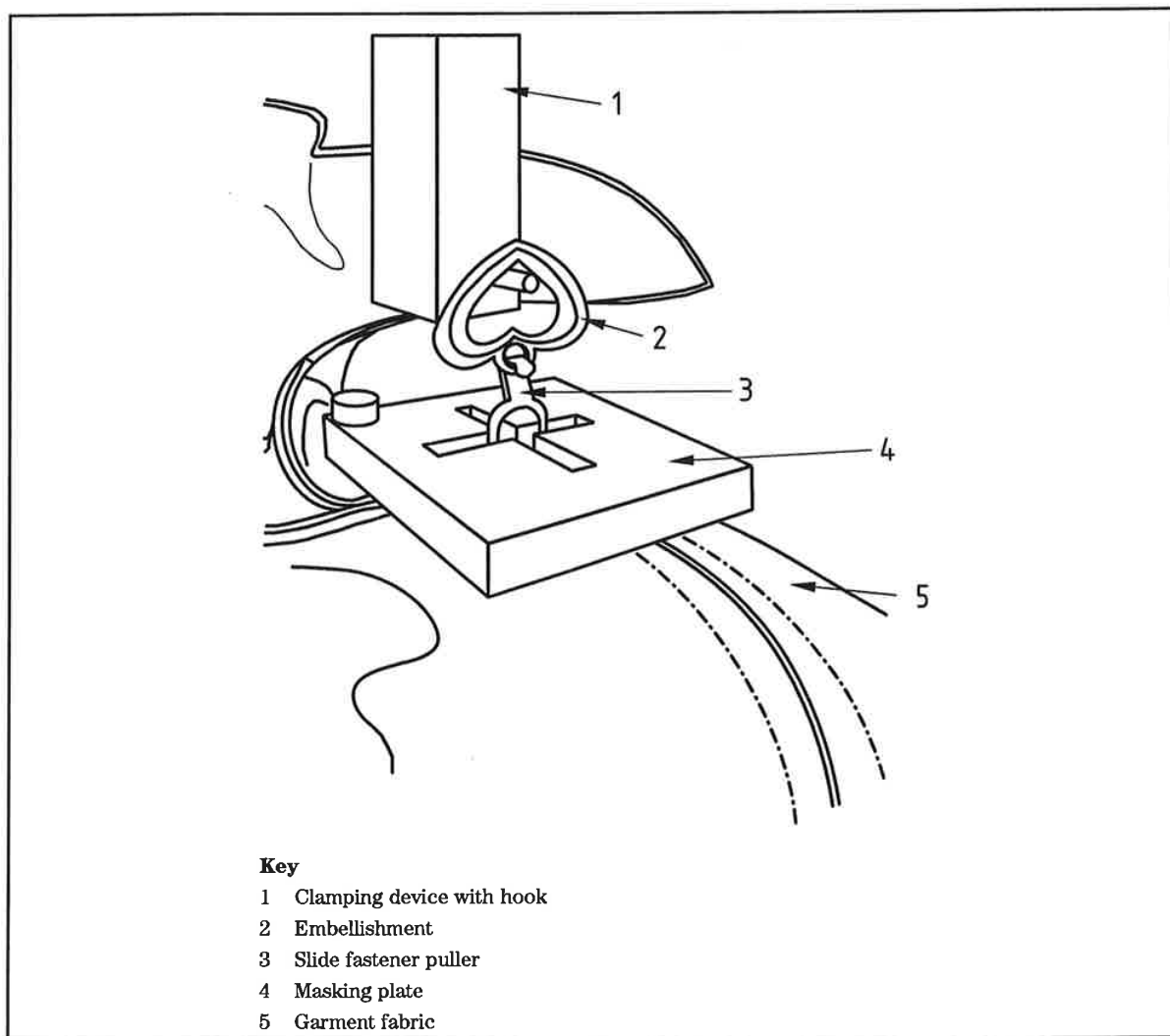


Figure B.9 Example of the arrangement for testing embellishments attached to slide fastener pullers



B.6.3 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 garment 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.

B.7 Test report

The test report should include the following information:

- a) number and date of this British Standard, i.e. BS 7907:2007;
- b) date of the test;
- c) garment description, and style number where applicable;
- d) name of supplier and name of factory, as applicable;
- e) gauge length used, in millimetres (mm);
- f) condition of test specimens (including any pre-treatment applied);
- g) number of test specimens;
- h) component type(s) and size(s), substrate(s) and, where applicable, location of the components tested;
- i) for each specimen tested, the removal force in newtons to the nearest 0.1 N, and the mode of failure;
- j) any deviation from the procedure.

Annex C (normative)

Method for determination of the security of attachment of non-grippable attached components

COMMENTARY ON ANNEX C

The method given in this annex 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 garment. For this reason the test conditions are much more aggressive than the conditions used in normal laundering.

C.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.

C.2 Materials

C.2.1 *Phosphate reference detergent*, with the composition given in Table C.1.

C.2.2 *Sodium perborate*.

Table C.1 Composition of phosphate reference detergent

Ingredient	Content %
Linear sodium alkylbenzene sulfonate (mean length of alkane chain C _{11,5})	8.0
Ethyloxyated fatty alcohol C ₁₂₋₁₈ (7EO)	2.9
Sodium soap (chain length C ₁₂₋₁₇ 46%; C ₁₈₋₂₀ 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 ₂ O = 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.	

C.3 Apparatus

C.3.1 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) °C¹⁾.

C.3.2 Spin dryer.

C.3.3 Tumble dryer, conforming to BS EN ISO 6330:2001, 5.2.1.

C.3.4 Mesh drying trays, with a non-rusting finish, large enough for the test specimens to be laid out flat.

C.3.5 Balance, capable of weighing up to at least 2 kg with an accuracy of ± 25 g.

C.3.6 Ballast pieces, made of 100% knitted polyester texturized filament fabric having a mass per unit area of (310 ± 20) g/m². Ballast pieces should consist of four thicknesses of fabric, overlapped together on all four sides and bar tacked at the corners. The pieces should measure (20 ± 4) cm \times (20 ± 4) cm. Each ballast piece should weigh (50 ± 5) g.

C.3.7 Thermometer, with an accuracy of ± 2 °C.

C.3.8 Timer, capable of measuring 15 min with an accuracy of ± 30 s.

C.4 Selection of test specimens and reference specimen

A sufficient number of garments or garment assemblies should 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 garment or garment assembly should be retained, untreated, for use as a reference specimen.

C.5 Wash temperature and drying method

C.5.1 Wash temperature

The wash temperature used for testing should be $10 \text{ °C} \pm 2 \text{ °C}$ above the maximum recommended wash temperature for the garment. For hand wash only garments a wash temperature of $40 \text{ °C} \pm 2 \text{ °C}$ should be used.

¹⁾ A Durawash machine is an example of a suitable machine. Durawash is a trade name owned by Roaches International Ltd., Upperhulme, Leek, Staffordshire, ST13 8TY, UK, and is an example of a suitable product available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement by BSI of this product.

C.5.2 Drying method for garments with fused or glued on components

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

C.5.3 Drying method for garments without fused or glued on components

For garments without fused or glued on components, if the care instructions indicate that the garment may be tumble dried the garment should be tumble dried at the recommended setting until dry.

If the care instructions indicate that the garment is not to be tumble dried, it should be dried flat on a mesh drying tray (C.3.4).

C.6 Procedure

C.6.1 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.

C.6.2 Preparation of the washing machine

Fill the washing machine with 40 l of water. Heat the water to the relevant temperature in accordance with C.5.1 and maintain it at this temperature, checking the temperature using the thermometer (C.3.7).

C.6.3 Wash load

Weigh the test specimens and make the load up to a total of $1.0 \text{ kg} \pm 50 \text{ g}$ with the ballast pieces (C.3.6).

C.6.4 Detergent

Weigh out $(40 \pm 1) \text{ g}$ of detergent (C.2.1) and $(10 \pm 1) \text{ g}$ of sodium perborate.

C.6.5 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 $15 \text{ min} \pm 1 \text{ min}$, ensuring that the test specimens remain moving in the water for the duration of the test.

C.6.6 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.

C.6.7 Drying

Dry the test specimens in accordance with C.5.2 or C.5.3, as applicable.

C.6.8 Final assessment

Re-examine each test specimen with reference to the records of the initial examination (see **C.6.1**) 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.

C.7 Test report

The test report should include the following information:

- a) the number and date of this British Standard, i.e. BS 7907:2007;
- b) the date of the test;
- c) garment description, and style number where applicable;
- d) name of supplier and/or name of factory, as applicable;
- e) number and description of test specimens;
- f) wash temperature used;
- g) drying procedure;
- h) results of the assessment in accordance with **C.6.8**;
- i) any deviations from the test method.

Annex D (normative) Information to be supplied by the designer to the manufacturer

For every garment design, the designer should provide the manufacturer with the following information, as applicable:

- a) a description of the garment;
- b) the intended use of the garment;
- c) the age group for which the garment is intended;
- d) full details of the garment including at least the following:
 - 1) the size specification;
 - 2) the fabric(s), including the weight and construction;
 - 3) sewing threads and garment construction;
 - 4) any filling materials;
 - 5) any elasticated areas;
 - 6) description, details, position and method of attachment of any attached components and/or embellishments. This may include the following:
 - i) buttons;
 - ii) press fasteners;
 - iii) slide fasteners;
 - iv) touch and close fasteners;
 - v) pom-poms;
 - vi) bows;
 - vii) cords and/or ribbons;
 - 7) any garment washing or other treatment that is part of the manufacturing process, e.g. stone washing or sand blasting.

NOTE The descriptions may be provided in writing or in the form of a drawing, a template and/or a sample garment.

Annex E (informative) Testing and statistical evaluation for process control purposes

A method of evaluating test results for process control purposes is the calculation of a Z -value, which is a process capability index that can be used to measure the ability of a process to generate products consistently to a defined specification.

To do this, a minimum of 30 specimens of each component/substrate type need to be tested. The Z -value can then be calculated from the following equation:

$$Z = \frac{\bar{x} - S_L}{s}$$

where:

\bar{x} is the arithmetic mean of the maximum force measurements (see Annex B);

S_L is the lower specification limit (as given in Table 1);

s is the sample standard deviation.

A minimum Z -value of 4.0 has been found to indicate acceptable consistency of the process. Expected failure rates for different Z -values are given in Table E.1.

Table E.1 Expected failure rates for different Z -values

Z -value	Defects per million (ppm)
2.5	6 210
3.0	1 350
3.5	233
4.0	32
4.5	3
5.0	0.3

NOTE For process control purposes, an in-line test method may be used as an alternative to the laboratory method given in Annex B. However, an in-line test method might give different results to the laboratory method.

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 – Classification and terminology of stitch types*

BS 7754, *Code of practice for garment evaluation by wearer trials*

BS EN 71-1:2005, *Safety of toys – Part 1: Specification for mechanical and physical properties*

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- [1] GREAT BRITAIN. General Product Safety Regulations 2005 (SI 2005 No. 1803). London: The Stationery Office.
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