

Seat belt assemblies for road vehicles —

Part 2: Specification for restraining devices for children

Committees responsible for this British Standard

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- Association for Consumer Research
- Automobile Association
- Baby Equipment Hirers' Association
- British Retailers' Association
- British Rubber Manufacturers' Association
- Child Accident Prevention Trust
- Consumer Policy Committee of BSI
- Department of Transport
- Department of Transport (Transport and Road Research Laboratory)
- Institute for Consumer Ergonomics
- Medical Research Council
- Ministry of Defence
- Motor Industry Research Association
- National Automobile Seat Belt Association
- Royal Automobile Club
- Royal Society for the Prevention of Accidents
- Society of Motor Manufacturers and Traders Ltd.
- University of Birmingham

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Foreword

This Part of BS 3254 has been prepared under the direction of the Automobile Standards Policy Committee. It supersedes BS 3254-2:1988, which is withdrawn.

This revision has been necessary to take account of developments in child-restraining devices now available on the market.

Although the use of restraining devices is known to give valuable protection in certain types of motoring accident, such equipment cannot be expected to prevent injury or even death in severe accidents. In actual use the protection offered by the restraining device depends largely on its correct installation.

The attention of users is drawn to the need to discard any seat belt or harness stressed from a severe accident. The complete installation should also be inspected after any accident.

Requirements for restraining devices for adults are given in BS 3254-1.

Certification requirement. Attention is drawn to the fact that the Road Vehicles (Construction and Use) Regulations 1986, as amended, require seat belts to be certified with a designated approval mark. For seat belts within the scope of this British Standard, the designated approval mark is the registered certification trade mark of BSI (Kitemark). For details about certification, contact BSI Quality Assurance, Linford Wood, Milton Keynes, MK14 6LL.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 3254 specifies requirements for seat belt assemblies designed to restrain children riding in motor cars from the effects of accidents.

The following two groups of assembly are dealt with.

Group A. For children of mass between 9 kg and 18 kg. Lap belts used alone are excluded from this group.

Group B. For children of mass between 18 kg and 36 kg.

NOTE 1 Some devices may be usable in both or part of both groups.

Restraining devices in each group may be one of the following four types.

Type 1. A combined car seat-restraining device and child-restraining device.

Type 2. A car seat-restraining device and separate child-restraining device supplied together.

This could have

- a) common anchorage points for both devices;
- b) separate anchorage points for both devices;
- c) the child-restraining device attached to the separately restrained car seat.

Type 3. A child-restraining device when an adult seat belt is to be used for restraining the car seat.

Type 4. A child-restraining device which is designed to be restrained by means of an approved adult seat belt and which incorporates its own harness assembly. The child-restraining device, when attached to the adult belt, restrains the car seat.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 3254 the following definitions apply.

2.1

chair assembly

an assembly intended primarily for children of group A. It consists of a shaped seat in which the child is restrained by a harness assembly and which is anchored to the car structure by an approved adult seat belt or by its own restraining straps, which also retain it in place should the car overturn. It will include any playtray offered by the manufacturer seeking approval, as being fully compatible with the remainder of the chair assembly

2.2

harness assembly

an assembly of straps and buckles which is intended to restrain the movement of a child in the event of an accident and prevent harmful contact with any part of the car structure as a result of deceleration up to the equivalent of the dynamic test

2.3

buckle

a quick-release device which can be readily operated by an adult to release the child from attachment to the car

2.4

webbing; straps

those parts of an assembly which are of fabric and form the actual restraining components of the device as distinct from buckles, clips and anchorages

2.5

clips; slides

devices through which the webbing passes and by which the effective length of the straps can be adjusted to suit the circumstances (see 2.12)

2.6

body-restraining components

those components of an assembly that directly restrain the movement of the body and are in contact with it

2.7

load-carrying components

those components of an assembly that link the body-restraining components to the car structure

NOTE It is possible for some components to perform both functions.

2.8

anchoring attachments

devices at the end of the webbing straps used to attach straps to the car structure

2.9

car seat-restraining device

a device to anchor a car seat backrest to the car structure to prevent it moving forward in the event of deceleration. It may be separate from, or part of, a child-restraining device and be suitable for either a back or a front seat, or both

2.10

anchorage points

any provision on the car structure for securing the anchoring attachments

2.11**crotch strap**

a strap or straps passing between the child's thighs, intended to prevent the child sliding under the lap strap in normal use and to prevent the lap strap moving up off the pelvis in an impact

2.12**quick adjusters**

an adjuster which can enable a strap or straps to be tightened or loosened in one smooth movement when the child is in the seat and the seat is installed in the vehicle (see 2.5)

3 Design**3.1 General**

The design requirements shall be based on the following assumptions.

- a) The child is of mass which is either:
for group A, from 9 kg up to 18 kg; or
for group B, between 18 kg and 36 kg.
- b) The accident conditions will impose a loading on the complete assembly equivalent to 20 times the mass of the wearer for the child restraint and 20 times the mass of the seat for the seat restraint, both directed parallel to the longitudinal axis of the car.

Any webbing actually restraining the child in both groups A and B (in group A chair assemblies this shall mean the harness within the chair) shall confine the major part of the distribution areas of any impact load to the chest and pelvis. The webbing shall not be so placed that cutting or localized force is inflicted on the child when the straps are stressed in an accident.

NOTE For the purposes of this requirement the shoulder is considered part of the chest.

A chair assembly or harness assembly shall be so attached to the car that the child is held in position in the event of deceleration, overturning or rolling of the car. The general design, assembly and finish shall not incorporate any detail likely to cause injury to the child.

The car seat-restraining device shall in all instances effectively restrain the backrest of the vehicle seat. In type 3 devices the adult belt shall not be used to restrain an adult as well as a child at the same time. Such belts shall also be of a type approved by UK regulations as suitable for the purpose.

Anchorage points of any harness assembly or car seat-restraining device less than 300 mm apart laterally shall not be used except where the harness referred to is a harness within a chair assembly as defined in 2.1. The chair in this context shall provide lateral support for the child.

The manufacturer of the restraining device shall declare that the toxicity of materials used to manufacture the restraint, and accessible to the restrained child, complies with BS 5665-3.

3.2 Car seat anchoring

The manufacturer of the child's seat belt shall provide arrangements, either separately or incorporated in one design, for restraining the forward movement of any part of the backrest of the car seat, with which the child-restraining device is used, that is likely to cause injury to the child in the event of an accident. This shall not apply when such restraint is achieved by means of an adult type seat belt, in which case details of suitable seat belts shall be given to the purchaser.

NOTE 1 This requirement may be met by the use of webbing with anchorages or other similar devices. The anchorage points for the seat belt may be incorporated in anchorage points for the car seat.

NOTE 2 It is essential that these anchorage points provide ample strength to sustain a load at least equivalent to the test load. In cases of doubt the car manufacturer should be consulted.

CAUTION. When an anchoring cross bar is provided for the attachment of more than one restraining device, its strength and the strength of its attachments to the vehicle structure¹⁾ have to be sufficient to sustain the sum of the effects of load from all the individual restraining devices.

4 Construction

The assembly shall comprise the following.

- a) Body-restraining components, incorporating a buckle.
- b) Load-carrying components, which may incorporate the body-restraining components or may restrain the chair in some types of assembly.
- c) Anchoring attachments, except for type 4 devices where the chair assembly is attached to the car by the adult seat belt.
- d) Clips, slides or other means of adjusting the body-restraining components.
- e) For types 1 and 2, car seat-restraining components and anchoring attachments.

The harness of a chair assembly shall include a crotch strap.

¹⁾ The structure of a vehicle is not normally considered to include the car seat.

The adjusters that are used to fit the body-restraining components to the child shall be of the quick-adjuster type.

If a chair assembly includes a playtray, or if the manufacturer of the chair assembly produces a playtray that can be fitted to the chair assembly, the mass of the playtray shall not exceed 0.5 kg.

5 Testing

5.1 General

A device intended to be used in more than one configuration, e.g. a type 4 device which is intended for use with a lap and diagonal belt or a lap belt, shall be tested in each condition.

If the chair assembly manufacturer offers a playtray as part of the chair assembly, or indicates that a playtray of his manufacture is completely compatible with the remainder of the chair assembly, the child-restraining device shall be tested with the playtray in situ.

An assembly or component part subjected to any specified performance test shall not, under any circumstances, be put into service.

5.2 Type testing

New and unused sample assemblies representative of each design, and samples of component parts and attachment fittings, shall be submitted for examination and testing for compliance with this Part of BS 3254. Each assembly shall be tested without alteration, and samples of component parts and anchoring attachment fittings shall be provided as specimens where required by the individual tests.

The dynamic test specified in 8.1.2 shall be performed with dummies of mass 9 kg and 15 kg for group A and with dummies of mass 15 kg and 32 kg for group B.

NOTE Where a device is intended for use by both groups A and B, and the configuration is the same for both groups (except for adjustment of strap length), tests with the 15 kg dummy may be omitted.

5.3 Routine testing

New and unused assemblies shall be selected at intervals or from a batch of fixed size for testing and examination for compliance with this Part of BS 3254.

The dynamic test specified in 8.1.2 shall be performed alternately with dummies of mass 9 kg or 15 kg for group A and with dummies of mass 15 kg or 32 kg for group B.

NOTE The dummies prescribed in this standard are the TNO dummies details of which are contained in ECE Regulation No. 44, Annex 8.

6 Webbing

When measured as described in Appendix A, webbing which may come into contact with the body of the wearer shall with the following minimum width dimensions:

- a) 25 mm for group A;
- b) 38 mm for group B.

Webbing forming load-carrying components shall comply with clause 8. The manufacturer shall determine the tensile strength of webbing required according to the design of belt for which it is required. To ensure uniformity the breaking force test used shall be that described in BS 2576 for flax, jute and hemp webbings.

7 Buckles and component parts other than webbing

7.1 General

The buckle shall be so positioned that it can be released with either hand by an adult or by a child considered old enough to act responsibly, in case of emergency, but shall be either so designed or so positioned that the child cannot within reason release it accidentally. It shall be so placed that its position, intention and operation are immediately obvious to a rescuer in emergency.

The buckle shall be released by pressing either a button or a similar device. The buckle-release device shall be coloured red. No other part of the buckle shall be of this colour.

The design of any separable parts shall be such that either the separate parts of the assembly cannot be put together incorrectly, or that their connection other than as intended will permit the components to separate under a force of not more than 22 N or will not adversely affect their function.

Any surface against which the adult seat belt or child-restraint webbing moves in normal use, other than for the purposes of manual adjustment and with the exception of anchorage plates, shall have a radius of not less than 1.5 mm on edges coming in contact with webbing.

7.2 Buckle width

The maximum overall width of any buckle or clip on the body-restraining components shall not exceed 64 mm, when measured at right angles to the strap. The operating face of the button or similar device shall be not less than 16 mm in width. All external parts shall be free from burrs and sharp edges and shall be corrosion-resistant.

When tested as described in Appendix B, there shall be no signs of deterioration and no corrosion, visible to the unaided eye of a qualified observer, likely to impair the proper functioning of the assembly.

7.3 Strength test for securing buckle

The buckle shall be assembled with two lengths of webbing and tested as described in Appendix C to withstand a test loading as follows.

- a) A buckle operating with all-metal surfaces shall not show appreciable deformation under a force of:
 - for group A, 1.35 kN;
 - for group B, 2.70 kN.
- b) A buckle operating on the webbing strap surface shall not allow the webbing to slip through the buckle by more than 25 mm under a force of:
 - for group A, 1.35 kN;
 - for group B, 2.7 kN.

After being subjected to the test, the buckle shall function satisfactorily and the webbing shall not show signs of damage arising from the design of the buckle.

7.4 No tension test

The force needed to open a buckle that has not previously been subjected to a force, when it is not under tension, shall be not less than 30 N measured perpendicularly to its operating surface in its initial position.

8 Strength of assembly

8.1 Child-restraining device

8.1.1 Static test

When tested as described in Appendix D with a test force of:

- a) for group A, 3.6 kN;
- b) for group B, 7.1 kN;

the child-restraining device shall comply with the following:

- 1) no total failure of any component shall have occurred;
- 2) no load-bearing component shall have become separated from its mating part;
- 3) the securing buckle shall be capable of normal release;
- 4) either:
 - i) there shall have been no significant failure of stitching; or
 - ii) if significant failure of stitching has occurred, when retested as described in Appendix D the stitching shall not fail completely;

- 5) the sides of the chair shall remain sufficiently rigid that they do not distort to the extent of touching the sides of the body block.

8.1.2 Dynamic test

When tested as described in Appendix E (see also Appendix G to Appendix K), the child-restraining device shall comply with items 1) to 4) of 8.1.1, and also with the following:

- a) the head of the dummy shall not pass beyond a vertical transverse plane which is 500 mm forward of the Cr point (see Figure 1);
- b) the maximum resultant acceleration of the chest of the dummy shall not exceed $60g^{(2)}$;
- c) there shall be no loading of the abdomen as confirmed by the use of high-speed photography or by a bubble film detector;
- d) the head of the dummy shall not make contact with the playtray, if fitted, whilst the playtray is still attached to the remainder of the chair assembly.

Where a restraining device has a base which is intended to be supported by the car seat cushion, it shall also be tested with any top straps disconnected (excluding the adult seat belt diagonal strap). Under these conditions the head of the dummy shall not pass beyond a vertical transverse plane which is 600 mm forward of the Cr point.

8.1.3 Playtray removal test

If applicable, the playtray shall detach from the chair assembly when pulled with a force not exceeding 100 N applied at the centre of the inside surface in a horizontal plane at 45° on either side of the fore and aft axis and at 45° above the horizontal plane in the fore and aft vertical plane with the child restraint mounted on the test seat, both reclined and upright.

8.2 Seat-restraining device

8.2.1 Static test

When tested as described in Appendix D with a force of:

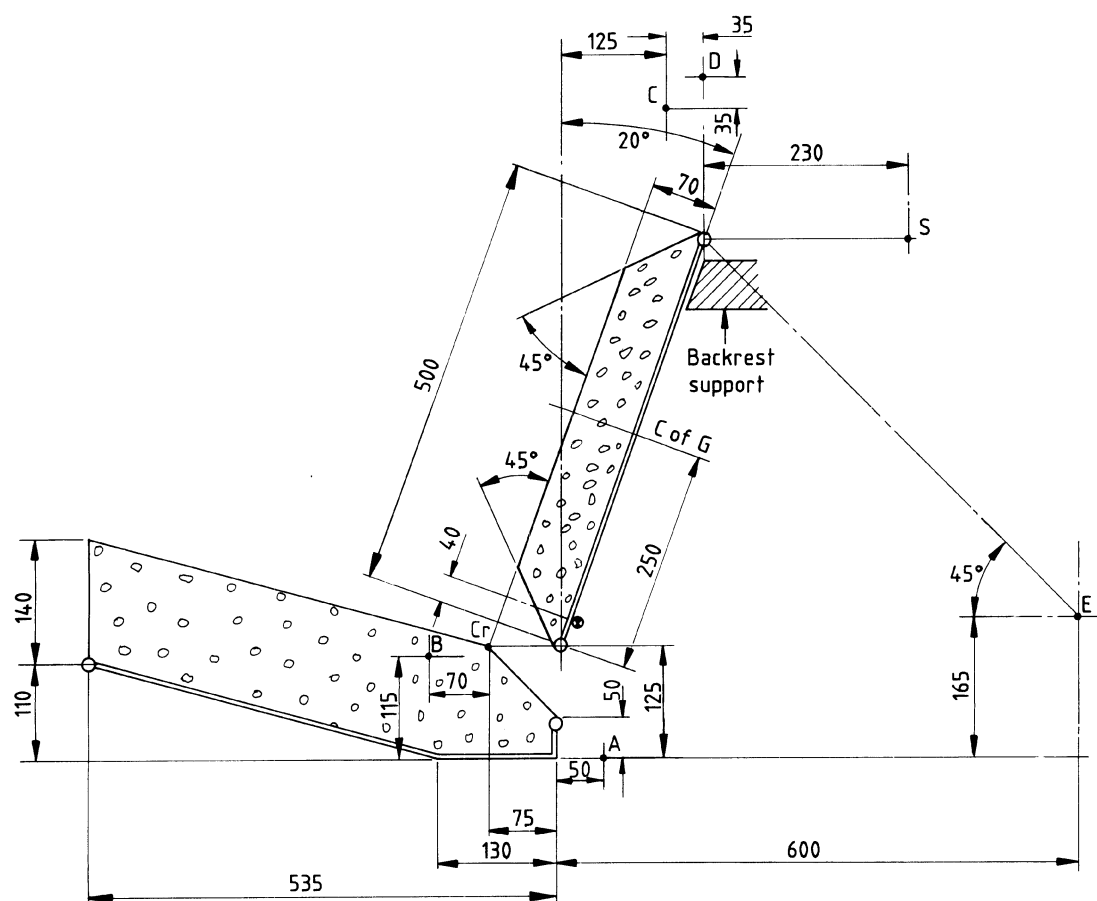
- a) 6.2 kN when tested as a seat-restraining device;
- b) 9.8 kN if the seat-restraining device incorporates the anchorage points for a group A child's restraining device;
- c) 13.3 kN if the seat-restraining device is also intended for a group B child's restraining device;

the seat-restraining device shall comply with items 1) to 4) of 8.1.1.

²⁾ Use instrumentation in accordance with channel frequency class 180 specified in BS AU 228-1.

8.2.2 Dynamic test

When tested as described in Appendix E (see also Appendix G to Appendix K), the seat-restraining device shall comply with 1) to 4) of 8.1.1.



Mass of backrest = 16 kg

All linear dimensions are in millimetres.

Key

- == = rigid part, attached to the trolley
- = canvas cover
- = metal tube, 20 mm in diameter
- = position of the anchorage point
- = hinge pivot point
- ◉ = polyurethane foam (see table 2)
- Cr = point at which a line extended down the front face of the backrest meets the seat cushion.

Figure 1 — Dimensions of test seat