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RESTRAINING DEVICES FOR CHILDREN IN MOTOR VEHICLES

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BRIEF HISTORY

The ISO Recommendation R 1713, *Restraining devices for children in motor vehicles*, was drawn up by Technical Committee ISO/TC 94, *Personal safety – Protective clothing and equipment*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1713, which was circulated to all the ISO Member Bodies for enquiry in October 1968. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Italy	Thailand
Austria	Japan	Turkey
Belgium	New Zealand	U.A.R.
Chile	Portugal	United Kingdom
Germany	Romania	U.S.A.
Greece	South Africa, Rep. of	U.S.S.R.
Hungary	Spain	
Israel	Switzerland	

The following Member Bodies opposed the approval of the Draft :

Netherlands
Norway
Sweden

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

ISO Recommendation | R 1713 | October 1970

RESTRAINING DEVICES

FOR CHILDREN IN MOTOR VEHICLES

INTRODUCTION

The success of the seat belt as a restraining device for adults in motor accidents has led to the devising of similar protection for young children travelling in motor vehicles.

The age/weight range considered is for children weighing not more than 22.5 kg (50 lb) and capable of sitting upright unaided, i.e. children aged from approximately 8 months to approximately 6 years.

For the efficient operation of a child restraining device in an accident it is essential to restrict the forward movement of the vehicle seat.

Attention is drawn to the fact that there is less risk of injury to children when travelling in a back seat of a vehicle.

1. SCOPE

1.1 This ISO Recommendation lays down the requirements and test methods for restraining devices for child occupants of motor vehicles, designed to minimize the risk of bodily harm in an accident.

1.2 Manufacturing requirements are specified for the materials used and for the finish of buckles and metal parts. The tests specified are restricted to the determination of the suitability of a belt or assembly and of its components.

1.3 This ISO Recommendation does not cover requirements for the parts of a vehicle to which restraining devices are anchored.

1.4 Three types of device are covered, each type capable of restraining children of up to 22.5 kg (50 lb) in weight and who are capable of sitting upright unaided.

The types are as follows :

(1) a combined vehicle seat and child restraining device;

(2) a vehicle 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 each device;
- (*c*) the child restraining device attached to the separately restrained vehicle seat;

(3) a child restraining device when an adult seat belt is to be used for restraining the vehicle seat.

To ensure that the child restraining device is not used with the wrong vehicle seat anchorage or without seat anchorage, each type should be so designed that the anchorage attachments of the devices are not interchangeable between types, and types 2 and 3 are incapable of being legitimately used as a child restraining device without also using the appropriate seat restraining device.

The vehicle seat restraining device should, in all instances, effectively restrain the seat back and also the base of a seat with a hinged base.

2. DEFINITIONS

2.1 *Chair assembly.* An assembly consisting of a shaped seat (which may face backwards), in which the child is restrained and which rests on the vehicle seat and is anchored to the vehicle structure or seat.

2.2 *Harness assembly.* An assembly of straps and buckles, or a garment, in which the child is restrained.

2.3 *Securing buckle.* A buckle of quick release pattern, designed or placed to minimize the possibility of unintentional opening by the wearer, but readily operable, which secures the wearer within the assembly, or the assembly within the vehicle.

2.4 *Webbing.* The flexible straps used for body restraint usually made of a textile material. When the term webbing is used in this ISO Recommendation it may cover any alternative material used as straps.

2.5 *Adjusting device.* A device to permit the assembly to be adjusted to the requirements of the individual wearer. It may be part of the securing buckle.

2.6 *Attachment fittings.* The parts of the assembly provided to attach it to the vehicle anchorages.

2.7 *Vehicle seat restraining device.* A device to secure the appropriate parts of a vehicle seat to the vehicle structure to restrain their forward movement in event of an accident.

2.8 *Energy absorbing device.* (Definition to be added later.)

3. GENERAL REQUIREMENTS

3.1 Construction of an assembly

The assembly may be composed of the following :

(*a*) body restraining components incorporating a buckle or other form of quick release;

(*b*) load-carrying components which may be part of the body restraining components or may restrain a "chair" in some types;

(*c*) attachment fittings;

(*d*) means of adjusting the body restraining components to suit the individual wearer.

3.2 Design requirements

3.2.1 *General.* Every effort should be made in the design of the assembly to ensure that in case of collision no dangerous forces are exerted which could cause severe injury. The design should be based on the following assumptions :

(*a*) that the child weighs 22.5 kg (50 lb);

(*b*) that the vehicle seat with which the restraining device may be associated weighs 30 kg (66 lb);

(*c*) that the accident conditions will impose a maximum loading on the complete assembly equivalent to twenty times the weight of the wearer for child restraint, and twenty times the weight of the seat for seat restraint, both directed parallel to the longitudinal axis of the vehicle.

3.2.2 *Distribution of load.* Any webbing actually restraining the child should distribute any impact load over the chest, shoulders and/or pelvis and should not be so placed that any cutting or localized force is imposed on the child if the straps are stressed in an accident.

3.2.3 *"Chair" assembly.* A chair should be attached to the vehicle so that it is held in position in the event of deceleration, overturning or rolling of the vehicle, and the general design, assembly and finish should not incorporate any detail likely to cause injury to the child.

3.2.4 *Vehicle seat restraining device.* The manufacturers of the restraining device should provide arrangements, either separately or incorporated in one design, for restraining the forward movement of any part of the seat with which a child restraining device is used, that is likely to cause injury to the child in the event of an accident. Exceptions to this are where restraint is achieved by an adult type seat belt, in which case details of suitable belts should be given to the purchaser; and where the restraining device is designed and labelled for use in specific models of vehicles in which the vehicle manufacturer has provided other adequate seat restraint.

This requirement may be met by the use of webbing with anchorages or other suitable devices and it is permissible for the anchorage points for the seat belt to be incorporated.

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

3.3 Requirements for the provision of instruction

Instructions, illustrated where necessary to show correct methods of use, should be supplied with each assembly to ensure that the purchaser understands the method of attachment and how to obtain the greatest benefit from the particular assembly; also to ensure that he is warned against making any alterations and additions which might impair its effeciency.

The method of threading the webbing through each type of buckle in the assembly, together with the method of releasing the securing buckle, should be explained in simplified detail.

A warning of a general nature should also be included urging consultation with the manufacturer or supplier in case of doubt, and stressing that a type 3 assembly should only be used with an approved adult seat belt.

It should also be stated if the assembly is not suitable for use with a hinged vehicle seat.

4. REQUIREMENTS FOR WEBBING

4.1 Width

Webbing that may come into contact with the body of the wearer should have a minimum width of 25 mm (1 in) when measured under a load of 2/3 of the breaking load for the particular webbing.

4.2 Strength

Webbing forming load-carrying components should be adequate to satisfy the strength of assembly required by section 6.

5. REQUIREMENTS FOR BUCKLES AND METAL PARTS

5.1 Strength

5.1.1 All buckles and metal parts should comply with the appropriate test and other requirements applicable to them in the complete assembly. After being subjected to such tests buckles should function satisfactorily.

5.1.2 The buckle should be capable of withstanding repeated operations and should be operated 5000 times before the assembly is tested statically (see clause 6.2).

5.2 Design

5.2.1 The size and shape of the buckle should not be such as to cause undue pressure or injury to the wearer in an accident, and it should not be less than the width of the strap wherever it is in contact with the wearer.

5.2.2 The buckle should be designed and/or positioned so that it can be released with either hand by an adult or by a child old enough to act responsibly in emergencies, but should be designed or positioned so that the wearer cannot release it accidentally. It should be placed so that its position, function and operation are immediately obvious to a rescuer.

5.3 Finish

5.3.1 All parts should be free from burrs and sharp edges.

5.3.2 All metal parts should be resistant to corrosion and, when tested in accordance with clause 7.2, no part should show significant sign of corrosion.

6. REQUIREMENTS FOR ASSEMBLY

6.1 Dynamic test

(Requirements to be added later.)

6.2 Static test of car seat restraining device

The static test should be applied in accordance with clause 7.1 using a test load of 6000 N (600 kgf) (1320 lbf). If the anchorage points of the child restraining device are incorporated in a vehicle seat restraining device, the test load should be 10 500 N (1050 kgf) (2315 lbf). If the seat restraining device is intended for alternative use as an adult's seat belt, the requirements for adults' seat belts should also be met.

6.3 Static test for child restraining device

6.3.1 After operating the buckle as described in clause 5.1.2 the static test should be applied in accordance with clause 7.1 using a test load of 4500 N (450 kgf) (990 lbf).

6.4 Test criteria

6.4.1 The total horizontal displacement of the dummy at the point of application of the load should not exceed 300 mm (12 in).

6.4.2 On completion of the above two tests, apart from permanent stretching of the webbing, no part of the assembly should show failure or fracture of the anchorage shackles or shear pins, etc, but on visual inspection very minor defects unlikely to affect the functioning of the assembly in normal use may be considered acceptable.

6.4.3 Any partial failure of the stitching should be checked by a repeat test on the same assembly. If the stitching does not then fail completely it should be accepted.

6.4.4 In assemblies in which the restraining device and the vehicle seat are anchored separately to the vehicle structure, the horizontal displacement of the seat should not result in any load being imposed on the dummy.

6.5 Energy absorption

(Requirements to be added later.)

6.6 Slipping of webbing

During the application of the tests described in clauses 6.2 and 6.3 the total amount of slip of the webbing through the load-carrying buckles or adjusting devices should be measured. This should not exceed 25 mm (1 in) for each buckle and adjusting device. The total amount of slip should not exceed 50 mm (2 in).

6.7 Buckle release

When the assembly is loaded to 300 N (30 kgf) (66 lbf) the force required to release the buckle should not exceed 90 N (9 kgf) (20 lbf) and the operating device should withstand the force without distortion.

7. TEST METHODS

7.1 Assembly test

7.1.1 *Apparatus.* The apparatus used for the assembly test should be of rigid construction so as not to become distorted appreciably under the specified test loads. It should incorporate means

(*a*) for mounting the test seat shown in Figure 1 and the dummy shown in Figure 2. These should be mounted so that they can move separately and freely but only along the axis of loading;

(*b*) for applying the specified test loads to the dummy and test seat at a rate of loading such as to cause a movement of the dummy and seat of 100 mm (4 in) per minute from no load to full load;

(*c*) for measuring the loads applied and the movement of the dummy and seat in the direction of loading.

7.1.2 *Sample.* The sample should consist of one previously unloaded assembly, complete with all attachment fittings as provided by the supplier.

7.1.3 *Preparation.* The assembly should be erected on the test apparatus in accordance with the supplier's instructions for use. Where necessary an additional contoured block may be inserted between the dummy and the restraining device. For any specified method of installation the assembly should be erected on the test apparatus in the way which gives the most adverse angular and dimensional relationships.

Care should be taken to lock a cam-type buckle only with the force of its spring; it should not be forced or allowed to snap down. If a metal to metal buckle is used, it should be checked that there is no danger of latching the two parts together in a manner resulting in reduced strength or reduced holding ability.

If the design allows, any free end of webbing should extend beyond any appropriate adjusting buckle by an adequate amount to accommodate slip.

The webbing should be marked on the unloaded side of each buckle or metal part in the assembly.

7.1.4 *Procedure.* The test loads should be applied simultaneously to the child restraining device, and to the seat restraining device, and with the loads stabilized at the specified figures, the assembly should be examined for compliance with clause 6.4.

The load on the test seat should then be removed and the load on the dummy reduced to the appropriate load given in clause 6.7. While maintaining this load, a force should be applied by a spring balance or other load-measuring device to the buckle in a manner and direction typical of that which would normally be employed to open it. For instance, for lever release buckles the force may be applied on the centre line of the buckle lever or finger tab, 3 mm (1/8 in) from its edge and in a direction to produce maximum releasing effect.

NOTE. – Other equivalent and correct methods of determining the maximum buckle release force are acceptable.

7.1.5 *Test report.* The following information should be given :

(*a*) any damage to the seat or child restraining device;

(*b*) the amount of slip of webbing at each buckle and adjusting device;

(*c*) the force required to release the buckle when the assembly is under reduced load;

(*d*) the maximum forward displacement of the dummy.

7.2 Corrosion test

7.2.1 *Procedure.* Metal parts should be placed in a boiling solution of sodium chloride (10 % m/m) for 15 minutes. They should then be immediately dropped into a similar solution at room temperature, and without wiping left to dry at room temperature for 24 hours.

7.2.2 *Test report.* Metal parts should be examined visually and any sign of corrosion should be reported.

8. MARKING AND LABELLING

Each assembly should be clearly and indelibly marked with the maximum weight for which it is intended.

In addition, type 2 devices should bear the words "Use with seat restraint only according to instructions" and type 3 devices the words "Use with adult seat belt only according to instructions".