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(JAPIA/JSA)

## Automotive accessories— Child restraints

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## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by the Japan Auto Parts Industries Association (JAPIA)/the Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS D 0401 : 1996** is replaced with this Standard.

In this revision, striving after international conformity in the technical level of safety, it adopts the provisions seemed to be rational from within the regulation of ECE (United Nations Economic Commission for Europe) and FMVSS (Federal Motor Vehicle Safety Standards).

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## Automotive accessories— Child restraints

**1 Scope** This Japanese Industrial Standard specifies requirements for construction, performance and the like of child restraints to be used in automobiles (hereafter referred to as “restraints”).

**2 Normative references** The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

- JIS D 0201 *Automobile parts—General rules of electroplating*  
JIS D 0202 *General rules of coating films for automobile parts*  
JIS D 0204 *Method of high and low temperature test for automobile parts*  
JIS D 1050 *Road vehicles—Techniques of measurement in impact tests—Instrumentation*  
JIS D 1201 *Road vehicles, and tractors and machinery for agriculture and forestry—Determination of burning behaviour of interior materials*  
JIS D 4604 *Automotive parts—Seat belt*  
JIS K 6400 *Test methods for flexible polyurethane foam*  
ISO 845 *Cellular plastics and rubber—Determination of apparent (bulk) density*  
ISO 1798 *Polymeric materials, cellular flexible—Determination of tensile strength and elongation at break*  
ISO 1856 *Polymeric materials, cellular flexible—Determination of compression set*  
ISO 2439 *Polymeric materials, cellular flexible—Determination of hardness*  
ISO 3386-1 *Polymeric materials, cellular flexible—Determination of stress-strain characteristic in compression—Part 1 : Low-density materials*  
ISO 13216-1 *Road vehicles—Anchorages in vehicles and attachments to anchorages for child restraint systems—Part 1 : Seat bight anchorages and attachments*  
DIN 53587 *Bestimmung des Pyrolyserückstandes von siliconkautschuk—Erzeugnissen*

**3 Definitions** For the main terms used in this Standard, the following definitions apply.

- a) **child restraint** A device intended to be attached on an automobile seat by means of any connecting function with a seat belt or seat bight anchorage fixed in the automobile for seating or laying down a child to restrain and/or position him.
- b) **child** A newborn baby, suckling, infant, schoolchild and so forth weighing up to 36 kg.
- c) **guardian** A person who shall protect the child riding together.

- d) **forward-facing** Facing in the same direction as the normal travel direction of the automobile.
- e) **rear-facing** Facing in the direction opposite to the normal travel direction of the automobile.
- f) **car bed** A restraint designed to restrain and/or position the child in a supine or prone position on a continuous surface.
- g) **child seat** A restraint designed not to restrain a child directly by the adult seat belt but to restrain and/or position him in a rear- or forward-facing position by any means of the following devices.

- 1) Impact shield<sup>(1)</sup>
- 2) Combination of impact shield and auxiliary seat<sup>(2)</sup>
- 3) Combination of impact shield, auxiliary seat and child belt
- 4) Combination of child belt and auxiliary seat

Notes (1) A device to be secured in front of the child to reduce the impact, as restricting his forward movement, in the event of head-on collision.

(2) A device placed on automobile seat to seat a child, which comprises a seat cushion or a seat cushion with seat back.

- h) **booster seat** A restraint designed to restrain and/or position a child suitably so that it is possible to restrain him directly with a seat belt fixed in the automobile.
- i) **child belt** A part of the restraint consisting of webbing, buckle, length adjuster and so forth to restrain a child.
- j) **auxiliary belt** A belt used for securing the restraint, which has been mounted on an automobile seat with the seat belt, to the vehicle seat back and the like to stabilize furthermore as assisting prevention of falling down.

Remarks : A restraint may not be securely held against an impact in the event of traffic accident and the like by using this belt alone.

- k) **universal child restraint** It refers to any of the following 1), 2) and 3).
  - 1) **Universal type [I] child restraint** A restraint intended to be restrained or positioned on an automobile seat by means of the vehicle seat belt.
  - 2) **Universal type [II] child restraint** A restraint intended to be restrained or positioned on an automobile seat by means of connecting with seat bight anchorages defined in ISO 13216-1.
  - 3) **Universal type [III] child restraint** A restraint capable of application as either of universal type [I] and type [II] restraint.
- l) **lock-off device** A device which locks and prevents movement of one section of the webbing of a vehicle seat belt relative to another section thereof. This term covers the following classes.

- 1) **Class A device** A device that prevents the child pulling webbing from the retractor through to the lap belt part, when the seat belt is used to restrain the child directly.
  - 2) **Class B device** A device that allows the retention of an applied tension in the lap belt part of a seat belt to prevent webbing slipping from the retractor, which would release the tension and place the restraint in a non-optimal position, when the seat belt is used to secure the restraint.
- m) **connector** A part of the structure of universal type II or type III child restraint, which is a connecting mechanism provided in a restraint frame for attaching the restraint to a seat bight anchorage.
- n) **restraint frame** A part mainly composing the restraint other than the child belt.
- o) **seat cushion** A part of the restraint, which is the seating surface area intended to accommodate waist of the child.
- p) **seat back** A part of the restraint, which is the leaning back area intended to accommodate head and torso of the child.
- q) **side support** A part of the restraint provided with seat back, which is a support preventing lateral movement of the head.
- r) **crotch belt** A restraining component passing through crotch of the child.
- s) **dummy** An anthropomorphic model of a child.
- t) **dummy torso** Portion of the body of a dummy in seating position, excluding the upper and lower limbs, that lies between the top of the dummy shoulders and the top of the restraint seating surface.
- u) **contactable surface** Any restraint frame surface that may contact any part of the head or torso of the dummy, when the dummy is seated on the restraint in a normal position.

## 4 Division

**4.1 Division of restraints** Restraints are divided by the applicable weighing range of children as given in Table 1.

**Table 1 Division of restraints**

Unit: kg

| Division | Weighing range of children    |
|----------|-------------------------------|
| W1       | Less than 10                  |
| W2       | 9 or more up to and incl. 18  |
| W3       | 15 or more up to and incl. 25 |
| W4       | 22 or more up to and incl. 36 |

**4.2 Division to restraining system** Forward-facing child seats and booster seats shall not apply to the division W1. Booster seats shall not apply to the division W2.

## 5 Performance

**5.1 Corrosion resistance of restraints** For a restraint of which the metallic part is plated or painted, when it is tested by the method described in 7.3, the effective surface shall meet the criteria specified in 5.4 of JIS D 0201 or 3.5 of JIS D 0202.

### 5.2 Heat resistance of restraints

**5.2.1 Restraint frame** Restraint frames, when tested by the method of 7.4.1 for the heat resistance, shall be free from remarkable deformation, damage, stickiness and the like on any part requiring the function and strength.

**5.2.2 Child belt** Child belts, when tested by the method of 7.4.2 for the heat resistance, shall be free from remarkable warp, damage and the like on any part requiring the function and strength.

**5.3 Flammability of organic materials** Organic materials composing a restraint, when tested by the method described in 7.5, shall meet any of the following criteria.

- a) Not to burn.
- b) The burning velocity does not exceed 100 mm/min when calculated by clause 8 of JIS D 1201.
- c) The test piece stops the combustion before passing 60 s after reaching the marked line A (refers to a straight line passing through a point 38 mm apart from the free end of the burning test piece and parallel to the opening end of the testing fixture defined in JIS D 1201), and also the length burnt shall be less than 50 mm in that duration.

### 5.4 Performance of child belts

**5.4.1 Webbing** Webbing shall be as follows:

- a) The tensile strength, when tested by the method of 7.6.2, shall be as given in Table 2.

**Table 2 Tensile strength of webbings**

Unit: kN

| Division  | Tensile strength |
|-----------|------------------|
| W1 and W2 | 3.6 min.         |
| W3        | 5.0 min.         |
| W4        | 7.3 min.         |

- b) For the abrasion resistance, when tested by the method of 7.6.4, the tensile strength shall remain at least 75 % of the value shown before the test.

**5.4.2 Buckle** Buckles shall be as follows:

- a) For the durability, when tested by the method of 7.7.2, there shall be no damage, abrasion or the like on the buckle.
- b) The releasing force (a force required to release the buckle) shall be as follows:
  - 1) Not to be less than 40 N when tested by the method of 7.7.3 a).
  - 2) Not to be released during the test described in 7.9.
  - 3) Not to be exceeding 80 N when tested by the method of 7.7.3 b).

**5.5 Dynamic load performance of restraints**

**5.5.1 General** A restraint, when tested by the methods described in 7.9, shall be free of breakage, and not generate harmful cracks, deformation or the like, that may injure the child, on any element bearing strength retaining function.

**5.5.2 Car bed** During the test described in 7.9, any part of head and torso of the dummy shall be held within the car bed. A part of them, however, may appear temporarily out of the car bed by a rebounding, but it shall be brought back to remain within the car bed when it has come into stable state.

**5.5.3 Rear-facing child seat** To be as follows during the test described in 7.9.

- a) **Behaviour of dummy** Behaviour of the dummy shall be as follows:
  - 1) The centre of gravity of the dummy's head shall not be positioned beyond the upper movement limit line on the child seat indicated in Attached Fig. 1.
  - 2) The dummy shall not be thrown out from the device.
- b) **Maximum angle of seat back inclination** The angle between the seat back surface and the vertical shall not exceed 60° as shown in Attached Fig. 1.

**5.5.4 Forward-facing child seat** To be as follows, during the test described in 7.9.

- a) **Dummy acceleration** When tested by using a dummy of nominal mass 15 kg, the dummy acceleration shall be as follows. Excepting the acceleration at the time of rebounding.
  - 1) In the case of using a 3-year-old dummy, the resultant acceleration determined with the accelerometer mounted on the centre of gravity of the dummy head in triaxial direction shall not exceed 784 m/s<sup>2</sup> for a cumulative duration more than 3 ms. Further, the resultant acceleration determined with the accelerometer mounted on the centre of gravity of the dummy's chest in triaxial direction shall not exceed 588 m/s<sup>2</sup> for a cumulative duration more than 3 ms.
  - 2) In the case of using a 3-year-old manikin, the resultant acceleration determined with the accelerometer mounted on the centre of gravity of the dummy's chest in triaxial direction shall not exceed 539 m/s<sup>2</sup> for a cumulative duration of more than 3 ms. Further, the vertical component of the chest acceleration generating a tensile force between the abdomen and head shall not exceed 295 m/s<sup>2</sup> for a cumulative duration of 3 ms.

- b) **Behaviour of dummy** The behaviour of dummy shall be as follows:
- 1) The dummy's head shall not displace beyond 550 mm forward in horizontal distance from point Cr of the seat indicated in Attached Fig. 4. Further, the displacement upward thereof shall not exceed 800 mm in vertical distance.
  - 2) Forward displacement of the dummy knee pivots, measured at right angles to the vertical passing through point Cr on the test seat indicated in Attached Fig. 4, shall not exceed 700 mm.
  - 3) The dummy shall not be in an abnormal posture and not be thrown out from the device.

**5.5.5 Booster seat** During the test described in 7.9, the dummy or the restraint frame shall not be thrown out from the vehicle seat belt.

## **6 Construction, dimensions and mass**

**6.1 General construction** The general construction of restraints shall be as follows:

- a) To be constructed as being capable of easily fixing with, attaching on and detaching from an automobile seat with the seat belt fixed in the automobile or by means of a connector, and not to displace inordinately or fall down in the event of an impact due to urgent braking, traffic accident and the like.

An auxiliary belt for further stabilizing the restraint fixation may be equipped.

- b) Not to be constructed as being hung over the automobile seat back or inserting any of its part such as legs, except the connector, into a clearance between the seat cushion and seat back.
- c) Car beds shall be designed as restraining and/or positioning a child sideways to the normal travel direction of the automobile.
- d) To be so constructed as that a child can be easily restrained and/or positioned within the restraint, and rescued by the guardian or the third person in the event of emergency.
- e) Not to be constructed as to give the child an unpleasant feeling under a state of ordinary service.
- f) To be so constructed as protecting the child from injury, reducing the damage and having less fear to injure other occupants of the vehicle in the event of impact due to hard braking, traffic accident and so on.
- g) To be constructed as not impair the automobile seat and seat belt.
- h) Components shall be attached or connected securely at their respective attaching and connecting parts.
- i) Child seats having child belt which are to be used in forward-facing position shall be constructed as provided with a crotch belt.
- j) Child belts shall be so constructed as adjustable to snugly fit the circumference of any child seated in the relevant device.

- k) Universal type [II] and type [III] child restraints, other than those of a system with hooks for attaching to anchorage, shall be constructed as making clear signal indicating that the relevant device has fully attached to the anchorage, or visibly recognisable the full attachment in ease. Further, the connector, where the webbing or any soft material alike is applied for the component, shall be constructed to be adjustable to secure the relevant device firmly in an automobile.
- l) For restraints of division W3 and W4, function of attachment through connecting with a seat bight anchorage may be provided. In this case, such device shall be constructed as not to subject the seat bight anchorage to inertial force of the child mass.
- m) Combination of the division of restraints and the attaching system shall be as any of the following.

1) **Division W1 and W2**

|    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |
|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| W1 | ○                                                                                                  | ×                                                                           | W1 | ○                                                                                                  | ×                                                                           | W1 | ×                                                                                                  | ×                                                                           |
| W2 | ×                                                                                                  | ×                                                                           | W2 | ○                                                                                                  | ×                                                                           | W2 | ○                                                                                                  | ×                                                                           |

  

|    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |
|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| W1 | ×                                                                                                  | ○                                                                           | W1 | ×                                                                                                  | ○                                                                           | W1 | ×                                                                                                  | ×                                                                           |
| W2 | ×                                                                                                  | ×                                                                           | W2 | ×                                                                                                  | ○                                                                           | W2 | ×                                                                                                  | ○                                                                           |

  

|    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |
|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| W1 | ○                                                                                                  | ○                                                                           | W1 | ○                                                                                                  | ○                                                                           | W1 | ×                                                                                                  | ×                                                                           |
| W2 | ×                                                                                                  | ×                                                                           | W2 | ○                                                                                                  | ○                                                                           | W2 | ○                                                                                                  | ○                                                                           |

## 2) Division W3 and W4

|    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |    | Existence of function of attachment, or restraining a child directly, by using the adult seat belt | Existence of function of attachment by connecting with seat bight anchorage |
|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| W3 | ○                                                                                                  | ○ or ×                                                                      | W3 | ○                                                                                                  | ○ or ×                                                                      | W3 | ×                                                                                                  | ×                                                                           |
| W4 | ×                                                                                                  | ×                                                                           | W4 | ○                                                                                                  | ○ or ×                                                                      | W4 | ○                                                                                                  | ○ or ×                                                                      |

Remarks : The mark ○ refers to the case having the relevant function, and the mark ×, not having.

n) Soft connectors shall be fixed permanently in the restraint frame.

## 6.2 Restraint frame

**6.2.1 Shape, dimensions and mass** The shape, dimensions and mass of restraint frames shall be as follows:

a) For those with a seat back, the height and the width of the part contactable with a child's head (hereafter referred to as "head part") of the seat back shall be as follows:

- 1) The height of seat back, measured from the contact point of a disc with the seat cushion along a line approximately parallel to the seat back surface as shown in Fig. 1 a), when the disc having a diameter of 200 mm is placed as tangent to both the seat cushion and seat back, shall not be less than the value given in Table 3.

Where two or more contact points of the disc with the seat cushion are found, the height shall be taken at the point, among them, nearest to the restraint frame base. Further, in the case where it is impossible to specify the contact point of the disc with the seat cushion, the measurement shall be done from the point at which a curved surface of 100 mm or more in radius comes in contact with a line parallel to the base plane of the restraint frame which is placed on the horizontal plane, as shown in Fig. 1 b).