

KS

KOREAN INDUSTRIAL STANDARD

Automotive Accessories – Child Restraints

KS R 4053 : 1998

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Automotive Accessories - Child Restraints

1. Scope

This Korean Industrial Standard specifies the child restraints⁽¹⁾ (hereafter referred to as "restraints") used as mounted on the automobile seat to protect a child riding in an automobile from injury or to lighten the injury in a traffic accident involving automobiles and others.

Note⁽¹⁾ The restraint means the apparatus to be mounted on the automobile seat by means of the seat belt attached to the vehicle to seat or lay a child to be restrained and/or positioned. However, the belt for child independently used is excluded.

2. Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. The most recent editions of the standards indicated below shall be applied.

KS M 6518	Physical Testing Methods for Vulcanized Rubber
KS M 6672	Flexible Urethane Foam for Cushion
KS R 0013	General Rules of Electroplating for Automobile Parts
KS R 0014	General Rules of Coating Films for Automobile Parts
KS R 0016	Method of High and Low Temperature Test for Automobile Parts
KS R 0093	Road vehicles - Techniques of Measurement in Impact Tests - Instrumentation
KS R 1052	Test Method for Flammability of Organic Interior Materials for Automobiles
KS R 4027	Seat Belts for Automobiles

3. Definitions

The definitions of main terms used in this Standard shall be as follows :

a) child

The generic name for a newborn baby, a suckling, an infant and a school child not more than 36kg in body weight.

b) guardian

The person riding in the same vehicle as the child in the position of guarding the child.

c) forward

The same direction as the advancing direction of an automobile.

d) backward

The direction reverse to advancing direction of an automobile

e) bed for suckling

The restraint by which principally a suckling is laid down with its face upward or downward on a continuous plane to be restrained and/or positioned

f) seat for infant

The restraint by which an infant is not directly restrained with a seat belt but is restrained and/or positioned backward or forward with the following devices :

- 1) An impact shield⁽²⁾
- 2) The combination of an impact shield and an auxiliary seat⁽³⁾
- 3) The combination of an impact shield, and auxiliary seat and the belt for a child.
- 4) The combination of the belt for a child and an auxiliary seat.

Notes ⁽²⁾ An apparatus attached in front of the child for alleviating a child's shock by restricting the child's forward motion on the occasion of a head-on collision.

⁽³⁾ A device placed on the automobile seat for seating an infant, and fitted with a seat cushion or both a seat cushion and a seat back.

g) seat for school child

The restraint by which principally a school child is suitably restrained and/or positioned so that the school child can be directly restrained with a seat belt.

h) belt for child

A part restraint for a child, consisting of a webbing, a buckle, a length regulator and so on.

i) auxiliary belt

A belt for further securing the restraint, attached to the automobile seat with the seat belt, by fixing it tightly to the seat back or the like of the automobile for the prevention of a fall.

Remark This auxiliary belt alone cannot securely hold the restraint against the shock in a traffic accident or the like.

j) apparatus body

A part constructing the restraints other than the belt for child.

k) seat cushion

A partial area of the seat, as a part of the restraint, for accommodating the waist.

l) seat back

A partial area of the leaning back, as a part of the restraint, for accommodating the head and trunk.

m) side support

A support, as a part of the restraint with a seat back, for preventing the lateral motion of the head.

n) crotch belt

Restraining component through the crotch of a child.

o) dummy

A human model analogous to a child.

p) trunk of dummy

The body part of the dummy in a sitting posture between the sitting surface of the restraint and the shoulder top of the dummy.

However, the upper and lower limbs of the dummy are excepted.

q) contact surface

The surface of the apparatus body contacted by the head and trunk of a dummy when the dummy is seated on a restraint in a normal condition.

4. Types and Grades

4.1 Types

The restraints shall be classified into the types as given in Table 1.

Table 1. Types of Restraints

Type	Symbol
Bed for suckling	N
Seat for infant ⁽⁴⁾	Y
Seat for school child	G

Note ⁽⁴⁾ There are infant's seats used for forward use, backward use and the combined use.

4.2 Grades

The restraints shall be divided into the grades as given in Table 2 according to the applicable range of the body weight of a child.

Table 2 Grades of Restraints

Unit : kg

Grade	Range of body weight of a child
W1	Under 10
W2	9 to 18
W3	15 to 25
W4	22 to 36

4.3 Combination of Types and Grades

The restraints shall be available for use according to the combination of the types given in Table 1 and the grades given in Table 2. However, the combination of type Y and grade W1 shall be used only for backward and the combinations of type G and grade W1, and of type G and grade W2 shall not be used.

5. Performance

5.1 Corrosion Resistance of Restraints

When the metallic part of a restraint is plated or painted, its available surface shall conform to the criteria specified in 8.3 of KS R 0013 or 3.5 of KS R 0014 when tested by the method given in 6.3.

5.2 Heat Resistance of Restraints

5.2.1 Apparatus Body

When the heat resistance of the apparatus body is tested by the method given in 7.4.1, the parts for which function and strength are required shall be free from remarkable deformation, damage, stickiness, and so on.

5.2.2 Belt for Child

When the heat resistance of the belt for child is tested by the method given in 7.4.2, the parts for which function and strength are required shall be free from remarkable warp, damage, and so on.

5.3 Combustibility of Organic Materials

When tested by the method given in 7.5, the organic materials constructing the restraint shall conform to the combustion retarding properties and self-extinguishing properties specified in 6.7 of KS R 1052.

5.4 Performance of Belt for Child

5.4.1 Webbing

The webbing shall be as follows :

- a) When tested by the method given in 7.6.2, the tensile strength shall be as given in Table 3.

Table 3 Tensile Strength of Webbing

Unit : kN

Grade	Tensile strength
W1 and W2	3.6 min.
W3	5.0 min.
W4	7.3 min

- b) When the wear resistance is tested by the method given in 7.6.4, the tensile strength shall keep not less than 75% of the value indicated before the test.

5.4.2 Buckle

The buckle shall be as follow :

- a) When the endurance of a buckle is tested by the method given in 7.7.2, the buckle shall be free from damage, wear, and so on.
- b) The releasing force(force required to release a buckle) shall be as follows :
- 1) When tested according to the method given in 7.7.3, a), it shall be not less than 40 N
 - 2) The buckle shall not be released during the test given in 7.8.
 - 3) When tested according to the method given in 7.7.3 b), it shall be not more than 80 N

5.5 Dynamic Load Performance of Restraints

5.5.1 Restraints in General

When a restraint is tested by the method given in 6.8, any individual part having the function of maintaining strength shall not break, be free from the generation of harmful cracks, deformation, and so on likely to injure a child.

5.5.2 Bed for Suckling

Any part of the head and trunk of a dummy shall be kept within the bed for suckling throughout the test given in 7.8. However, any part of the head and trunk of the dummy, even though temporarily displaced from the bed for suckling at the time of a rebound, shall be brought back within the bed when it comes to a standstill.

5.5.3 Backward Seat for Infant

During the test in 7.8, the seat shall be kept as follows :

a) Behavior of dummy

The behavior of a dummy shall be as follows :

- 1) The position of the head gravity center of a dummy shall not exceed the upper behavior-limit line of the seat for infant given in Attached Fig. 1.
- 2) The dummy shall not be hurled out of the apparatus.

b) Maximum inclined angle of seat back

The angle made by the surface of a seat back and the vertical plane shall not exceed 60 ° as given in Attached Fig. 1.

5.5.4 Forward Seat for Infant

During the test in 7.8, the seat shall be kept as follows :

a) Resultant acceleration

The resultant acceleration of the head and chest of a dummy of 15kg in nominal mass shall be as follows. However, the resultant acceleration at the time of a rebound is excepted.

1) Resultant acceleration at head

The resultant acceleration measured with the accelerometer attached to the position of the head gravity center of a dummy in three directions shall not exceed 785m/s². However, the resultant acceleration lasting 3ms or less is excepted.

2) Resultant acceleration at chest

The resultant acceleration measured with the accelerometer attached to the position of the chest gravity center of a dummy in three directions shall not exceed 588 m/s². However, the resultant acceleration lasting 3 ms or less is excepted.

b) Behavior of dummy

The behavior of a dummy shall be as follows :

- 1) The forward displacement distance of the head gravity center of the dummy shall be not more than 600mm as measured at right angles with the vertical line passing through the point Z on the seat for test given in Attached Fig. 3.
- 2) The forward displacement distance of the knee articulation fulcrum of the dummy shall be not than 700mm as measured at right angles with the vertical line passing through the point Z on the seat for test given in Attached Fig. 3.
- 3) The dummy shall not be hurled out of the apparatus.

5.5.5 Seat for School Child

A dummy or an apparatus body shall not be hurled out of a seat belt during the test given in 7.8.

6. Structure and Dimensions

6.1 General Structure

The general structure of the restraints shall be as follows :

- a) The restraints shall be so constructed as to facilitate fixation, attachment and detachment to and from the automobile seat with the seat belt attached to the vehicle and not to be inordinately displaced or tumbled down by shocks due to hard brakes, traffic accidents, and so on.

The auxiliary belt for further securing the fixture of the restraints may be provided.

- b) The restraints shall not be so constructed that they are hung over the seat back of the automobile or a part of the leg of the restraints is inserted into the clearance between the seat cushion and the seat back
- c) The bed for suckling shall be so constructed as to restrain and/or position a suckling crosswise to the advancing direction of the automobile.
- d) The restraints shall be so constructed that a child can be easily restrained and/or positioned in the restraints and can be easily rescued out by a guardian or by a third person in case of emergency.
- e) The restraints shall be so constructed as not to give a child an unpleasant feeling under the ordinary condition.
- f) The restraints shall be so constructed as to protect a child from damage, or to lighten the damage and not to inflict damage on a fellow passenger in case of shocks due to hard brakes, traffic accident and so on.
- g) The restraints shall be so constructed as not to damage the seat and seat belt of the automobile.
- h) The mounting part, connecting part, etc. of each component shall be securely attached or connected.
- i) The restraints shall be so constructed as to be equipped with a belt for child, and the forward seat for infant shall be equipped with a crotch belt.

6.2 Apparatus Body

6.2.1 Shapes and Dimensions

The apparatus body shall be of the shape and dimensions suitable for a child not to give excessive oppression to the trunk of a child, especially the weak part of body such as abdomen, and shall be as follows :

- a) When there is a seat back, its height and the width of the part with which the head of a child contacts (hereafter referred to as "head part") shall be as follows :