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TEST METHOD SECTION 213.4

Built-In Child Restraint System and Built-In Booster Cushion

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TEST METHOD SECTION 213.4 — BUILT-IN CHILD RESTRAINT SYSTEM AND BUILT-IN BOOSTER CUSHION

1. INTRODUCTION

Subsections 2 and 3 of this section make up the test methods referred to in Section 213.4 of Schedule IV to the Motor Vehicle Safety Regulations, for demonstrating compliance with the requirements of this section.

(Original signed by)

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2. DEFINITIONS

In this section:

“Specific vehicle shell” means the actual vehicle model part into which the built-in child restraint system and/or built-in booster cushion is fabricated, including the complete surroundings of the built-in system. If the built-in child restraint system and/or built-in booster cushion is manufactured as part of

- (a) any seat other than a front passenger seat, these surroundings include the back of the seat in front, the interior rear side door panels and trim, the specific seat, the floor pan, the B and C pillars, and the ceiling; or
- (b) the front passenger seat, these surroundings include the dashboard, the steering wheel column, and attached levers and knobs, the “A” pillars, any levers and knobs installed on the floor or on a console, the interior front side door panels and trim, the front seat, the floor pan and the ceiling; (*châssis de véhicule de type particulier*).

“Specific vehicle” means the actual vehicle model into which the built-in child restraint system and/or built-in booster cushion is fabricated; (*véhicule de type particulier*).

3. TEST

3.1 TEST DEVICES

- 3.1.1 The test device used in testing the built-in child restraint system and/or built-in booster cushion under this regulation shall be either a specific vehicle shell or a specific vehicle.
- 3.1.2 In the case of a built-in child restraint system or a built-in booster cushion, the anthropomorphic test device shall be a three-year-old anthropomorphic test device conforming to Sub-part C of Title 49, Transportation, Part 572 of the Code of Federal Regulations of the United States of America, revised as of October 1, 1990, clothed in thermal knit waffle-weave polyester and cotton underwear, a size 4 long-sleeved shirt having a mass of 0.1 kg, a size 4 pair of long pants having a mass of 0.1 kg and cut off just far enough above the knee to allow the knee targets to be visible, and size 7M sneakers with rubber toe cap, uppers of dacron and cotton or nylon and a total weight of 0.45 kg. Clothing other than the shoes shall be machine-washed in 70°C to 82°C water and machine-dried to 48°C to 60°C for 30 minutes.
- 3.1.3 Before being used in testing under this standard, the anthropomorphic test device shall be conditioned at any ambient temperature from 19°C to 26°C and at any relative humidity from 10% to 70% for at least 4 hours.

3.2 BUCKLE RELEASE TEST PROCEDURE

- 3.2.1 The belt assembly buckles used for a built-in child restraint system or a built-in booster cushion shall be tested for release force in the following manner:
- (a) install the anthropomorphic test device in the built-in child restraint system or built-in booster cushion in accordance with paragraph 3.4.3;
 - (b) tie a self-adjusted sling to each wrist and ankle of the anthropomorphic test device in the manner illustrated in Figure 3;
 - (c) pull the sling horizontally in the manner illustrated in Figure 3 and parallel to the longitudinal centreline of either the specific vehicle shell or the specific vehicle and apply a force of 200 N;
 - (d) operate the buckle release mechanism; and
 - (e) measure the buckle release force as specified in Motor Vehicle Safety Test Methods, section 209, Seat Belt Assemblies.

3.3 DYNAMIC TEST CONDITIONS

- 3.3.1 The test shall, at the option of the manufacturer, be either

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- (a) a frontal impact simulation with the specific vehicle shell mounted on the test platform subject to a change of velocity of 48 km/hr with the acceleration of the test platform entirely within the curve shown in Figure 1; or
 - (b) a frontal barrier crash test of the entire specific vehicle, traveling longitudinally forward at any speed up to and including 48 km/hr impacting a fixed collision barrier that shall be perpendicular to the line of travel of the vehicle.
- 3.3.2 When conducting the test with either the specific vehicle shell or the specific vehicle,
- (a) prepare the system in accordance with the manufacturer's instructions as required by subsection 213.4(19);
 - (b) adjustable seats shall be in the adjustment position midway between the forward-most and the rear-most positions, and if separately adjustable in a vertical direction, are at the lowest position. If an adjustment position does not exist midway between the forward-most and rear-most positions, the closest adjustment position to the rear of the midpoint shall be used;
 - (c) adjustable lumbar and side supports shall be adjusted in the lowest position and are not deployed;
 - (d) adjustable seat backs are placed in the manufacturer's nominal design riding position. If a nominal position is not specified, the undeployed vehicle seat back shall be placed in an adjustment position so that the torso line of a 3-dimensional H-point machine installed on the undeployed vehicle seat, as specified in the Society of Automotive Engineers Recommended Practice (SAE) J826, measures as closely as possible to, without exceeding, 25°;
 - (e) adjustable head restraints shall be adjusted to their highest adjustment position if not otherwise specified in the manufacturer's instructions;
 - (f) operable vehicle windows and vents shall be placed in the fully opened or fully closed position;
 - (g) convertibles and open-body type vehicles shall have the top, if any, in place in the closed passenger compartment configuration; and
 - (h) doors shall be fully closed and latched but not locked.
- 3.3.3 If the specific vehicle shell is selected for testing,
- (a) it shall be mounted on a dynamic test platform so that the longitudinal centreline of the shell is parallel to the direction of the test platform travel, so that movement between the base of the shell and the platform is prevented; and
 - (b) the platform shall be instrumented with an accelerometer linked to a data processing system. The data shall be filtered with a Class 60 filter as
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specified in the Society of Automotive Engineers Recommended Practice (SAE) J211 OCT88 "Instrumentation for Impact Test". The accelerometer sensitive axis shall be parallel to the direction of the test platform travel.

- 3.3.4 If the specific vehicle is selected for testing, the vehicle shall be loaded to the following condition:
- (a) in the case of a passenger car,
- (i) determine the rated cargo and luggage mass (RCLM) by

$$\text{RCLM} = \text{VCM} \textit{ minus } \text{NOM};$$
where: VCM is the vehicle capacity mass displayed on the tire placard of the vehicle; and
NOM is the normal occupants' mass.
- (ii) determine the adjusted rated cargo and luggage mass ($\text{RCLM}_{\text{adjusted}}$) by

$$\text{RCLM}_{\text{adjusted}} = \text{RCLM} \textit{ minus } \text{the combined mass of all the appropriate anthropomorphic test devices used to test the built-in child restraint systems and/or built-in booster cushions}$$
- (iii) determine the test mass (TM) by

$$\text{TM} = \text{UVM} \textit{ plus } \text{RCLM}_{\text{adjusted}}^* \textit{ plus } (2 \textit{ times } \text{ATDM}) \textit{ plus } \text{the combined mass of the appropriate anthropomorphic test devices used to test the built-in child restraint systems and/or built-in booster cushions};$$
where: UVM is the unloaded vehicle mass; and
ATDM is the mass of each of two anthropomorphic test devices placed in the front outboard seating positions which may be, at the option of the manufacturer, an anthropomorphic test device which conforms to the requirements of Sub-part B (mass of 74.4 kg) or to the requirements of Sub-part E (mass of 78.6 kg), of Title 49, Transportation, Part 572 of the Code of Federal Regulations of the United States of America, revised as of October 1, 1990.
- (b) in the case of a multi-purpose passenger vehicle,
- (i) determine the rated cargo and luggage mass (RCLM) by

$$\text{RCLM} = \text{GVWR} \textit{ minus } \text{UVM} \textit{ minus } (\text{DSC} \textit{ times } \text{NOM});$$
where: GVWR is the gross vehicle weight rating obtained from the Statement of Compliance Label;
UVM is the unloaded vehicle mass;
DSC is the designated seating capacity; and

* This mass shall be secured in the luggage area.

NOM is the normal occupants' mass.

- (ii) determine the adjusted rated cargo and luggage mass ($RCLM_{adjusted}$) by

$RCLM_{adjusted} = (RCLM \text{ or } 136 \text{ kg, whichever is less}) \text{ minus}$
the combined mass of all the appropriate anthropomorphic test devices used to test the built-in child restraint systems and/or built-in booster cushions.

This mass is secured to the vehicle and distributed in accordance with subparagraph (iv) below.

- (iii) determine the test mass (TM) by

$TM = VM_{adjusted} \text{ plus } RCLM_{adjusted} \text{ plus}$ the combined mass of the appropriate anthropomorphic test devices used to test the built-in child restraint systems and/or built-in booster cushions;

where: $VM_{adjusted} = UVM \text{ plus } (2 \text{ times } ATDM)$; and

ATDM is the mass of each of two anthropomorphic test devices placed in the front outboard seating positions which may be, at the option of the manufacturer, an anthropomorphic test device which conforms to the requirements of Sub-part B (mass of 74.4 kg) or to the requirements of Sub-part E (mass of 78.6 kg), of Title 49, Transportation, Part 572 of the Code of Federal Regulations of the United States of America, revised as of October 1, 1990.

- (iv) The test mass (TM) must be distributed over each axle so that the mass on each axle, as measured at the tire interface, shall be in proportion to its GAWR, in the following manner:

$$PM_{\underline{F}A} = TM \text{ times } \left(\frac{\text{frontGAWR}}{\text{frontGAWR} + \text{rearGAWR}} \right); \text{ and}$$

$$PM_{\underline{R}A} = TM \text{ times } \left(\frac{\text{rearGAWR}}{\text{frontGAWR} + \text{rearGAWR}} \right).$$

where: $PM_{\underline{F}A}$ is the proportional mass over the front axle; and

$PM_{\underline{R}A}$ is the proportional mass over the rear axle;

IF $PM_{\underline{F}A}$ is smaller than or equal to the measured front axle share of the adjusted VM, then the final test mass over the front axle should be retained as the measured front axle share of the adjusted VM and the rear axle shall be loaded with the remaining mass placed over the rear axle in such a manner as to not change the mass over the front axle; or

if $PM_{\underline{R}A}$ is smaller than or equal to the measured rear axle share of the adjusted VM, then the final test mass over the rear axle should be retained as the measured rear axle share of the adjusted VM and the front axle shall be

loaded with the remaining mass placed over the front axle in such a manner as to not change the mass over the rear axle.

- (c) in the case of a bus with a GVWR greater than 4 536 kg, determine the test mass (TM) by;
- TM = UVM *plus* ([unsecured mass of 54.5 kg at every designated seating position] *minus* [the combined mass of all the appropriate anthropomorphic test devices used to test the built-in child restraint systems and/or booster cushions]) *plus* the combined mass of all the appropriate anthropomorphic test devices used to test the built-in child restraint systems and/or booster cushions.
- (d) if a built-in child restraint system and/or built-in booster cushion is supplied in the vehicle at one of the seating positions requiring the placement of a Part 572, 50th percentile anthropomorphic test device, then the 3-year-old anthropomorphic test device shall be substituted for the Part 572, 50th percentile anthropomorphic test device, but only at that seating position. The test mass specified in above shall be adjusted so that the final test mass remains as if the test was performed with 50th percentile anthropomorphic test devices;
- (e) all instrumentation and data reduction shall be in accordance with SAE J211 OCT88;
- (f) 50th percentile anthropomorphic test devices shall be installed at the applicable front outboard seating positions in accordance with the seating procedure described in Motor Vehicle Safety Test Methods, Section 208;
- (g) the parking brake shall be disengaged and the transmission shall be in neutral;
- (h) the tires shall be inflated to the manufacturer's specification; and
- (i) the fuel tank shall be filled to any level from 90% to 95% of capacity and the rest of the fuel system shall be filled to its normal operating capacity in accordance with the Motor Vehicle Test Methods, Section 301, "Fuel System Integrity" (October 3, 1977).

3.3.5 The dynamic test shall be conducted at any ambient temperature from 19°C to 26°C and at any relative humidity from 10% to 70%.

3.4 DYNAMIC TEST PREPARATION

- 3.4.1 In the case of each built-in child restraint system and/or built-in booster cushion, prepare the restraint in accordance with the manufacturer's instruction required by subsection 213.4(19).
- 3.4.2 Place the appropriate anthropomorphic test device as specified in 3.1.2 in the built-in child restraint system or built-in booster cushion.

- 3.4.3 When placing the 3-year-old anthropomorphic test device in a built-in child restraint system and/or built-in booster cushion, position the anthropomorphic test device according to the instructions for child positioning provided by the manufacturer with the system while conforming to the following:
- (a) holding the anthropomorphic test device torso upright until it contacts the system's seat back surface, place the anthropomorphic test device in the seated position within the system with the mid-sagittal plane of the anthropomorphic test device head vertical and parallel to the longitudinal centreline of the specific vehicle shell or the specific vehicle;
 - (b) extend the arms of the anthropomorphic test device as far as possible in the upward vertical direction and extend the legs as far as possible in the forward horizontal direction with the feet perpendicular to the centreline of the lower legs; and
 - (c) using a flat square surface with an area of 2 500 mm² apply a force of 180 N, perpendicular to the back of the vehicle seat, first against the anthropomorphic test device crotch and then at the thorax in the mid-sagittal plane of the anthropomorphic test device.
- 3.4.4 If provided, shoulder and pelvic belts that directly restrain the dummy shall be adjusted by tightening the belts until a 10 N force applied (with a device as illustrated in Figure 2) simultaneously to the webbing at the top of each dummy shoulder and to the pelvic webbing 50 mm on either side of the torso mid-sagittal plane, pulls the webbing 6 mm from the anthropomorphic test device.
- 3.4.5 For a built-in child restraint system or a built-in booster cushion that uses a fixed or movable surface to restrain the occupant, attach all appropriate restraint system belts and tighten them as specified in 3.4.3 or 3.4.4. Position each movable surface in accordance with the manufacturer's instructions.
- 3.4.6 After the anthropomorphic test device has been installed in the restraint system, rotate each anthropomorphic test device limb downward in the plane parallel to the anthropomorphic test device mid-sagittal plane until the limb contacts a surface of the restraint system, booster cushion, or a part of the specific vehicle or specific vehicle shell so that limb placement does not inhibit torso or head movement during the test.

3.5 DYNAMIC TEST

- 3.5.1 Perform the dynamic test in accordance with the procedure described above.

3.6 POST-DYNAMIC TEST BUCKLE RELEASE TEST

- 3.6.1 The buckle release test shall be repeated as described in section 3.2 after the dynamic test.

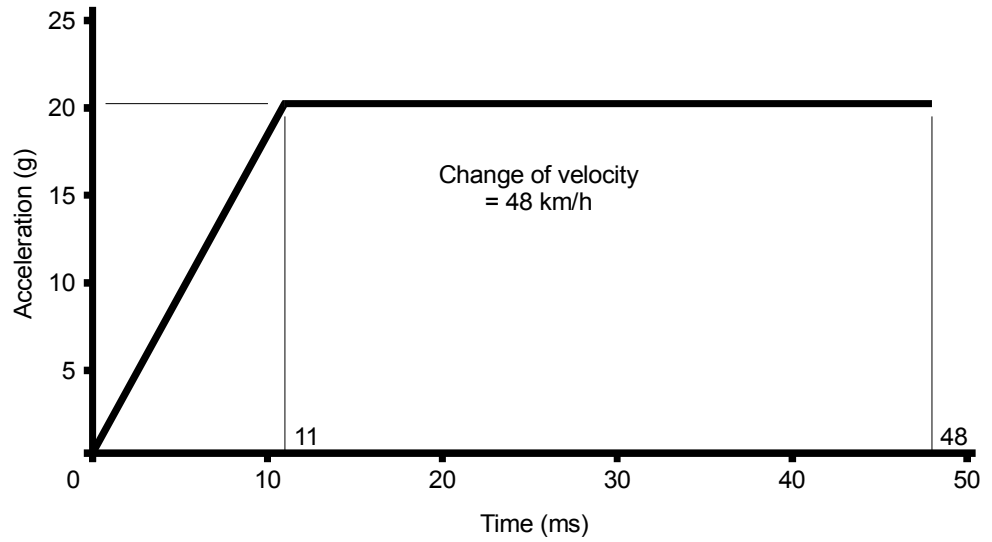


Figure 1 — Test Platform Acceleration Graph

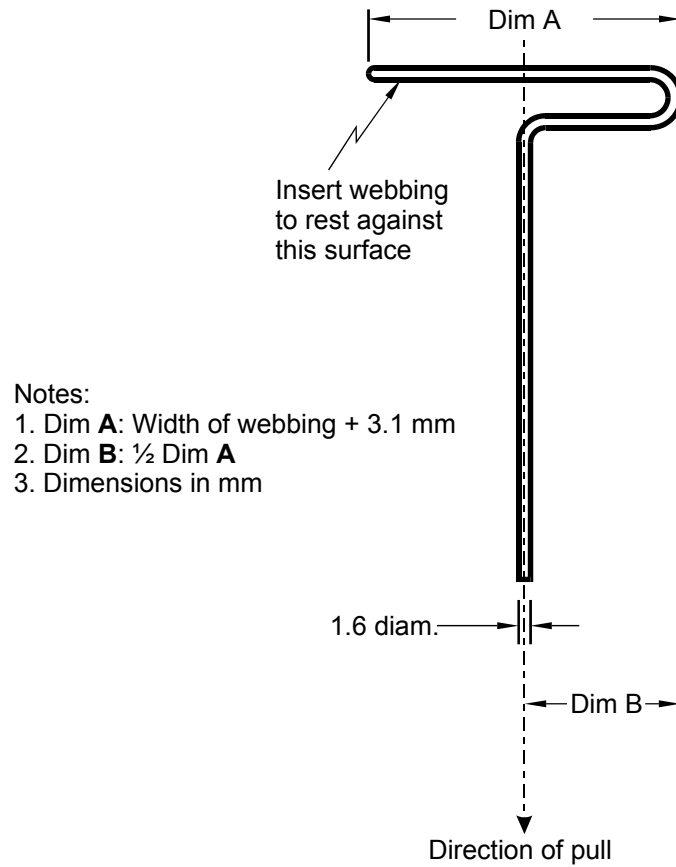


Figure 2 — Webbing Tension Pull Device

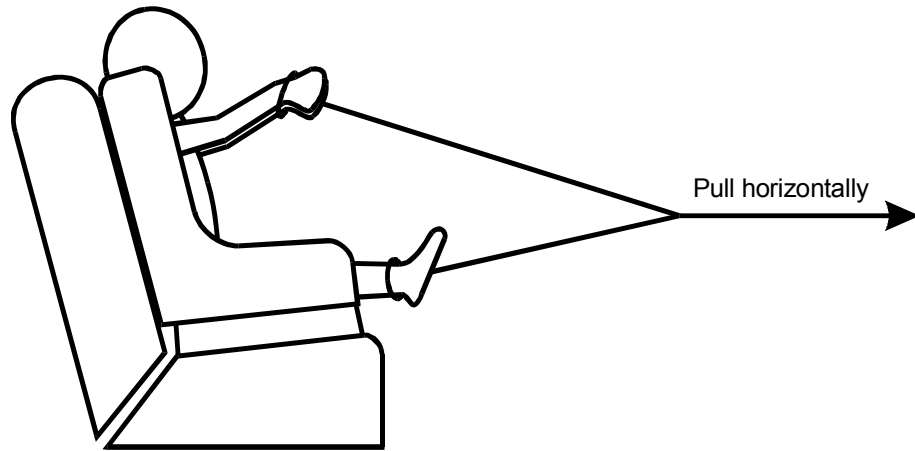


Figure 3 — Buckle Release Test