



Transport  
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automobiles

## **TEST METHOD 213.2**

### **Booster Seats**

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## List of Referenced Documents

SAE International Recommended Practice J211-1, *Instrumentation for Impact Test – Part 1 – Electronic Instrumentation* (July 2007)

Subparts N and S, part 572, chapter V, title 49 of the *Code of Federal Regulations* of the United States (revised as of October 1, 2011)

## 1. Introduction

Test Method 213.2 — Booster Seats (May 2012) is referred to in Part 4 of the Motor Vehicle Restraint Systems and Booster Seats Safety Regulations (RSSR).

## 2. Test Devices to be Used

### 2.1 Standard seat assembly

The standard seat assembly is mounted on a dynamic test platform, instrumented as set out in subsection 2.2, so that the seat orientation reference line (SORL) is parallel to the direction of travel of the test platform and any movement between the base of the assembly and the platform is prevented. The location of the seat belt anchorage points on the standard seat assembly is illustrated in Figures 3 and 5 of Schedule 7 to the RSSR.

### 2.2 Test platform

The test platform shall be instrumented with an accelerometer that is linked to a data processing system, and the accelerometer-sensitive axis shall be parallel to the direction of travel of the test platform. The data shall be filtered with a Class 60 filter, as specified in the SAE International Recommended Practice J211-1, *Instrumentation for Impact Test – Part 1 – Electronic Instrumentation* (July 2007).

### 2.3 Type 2 seat belt assembly

Type 2 seat belt assemblies that meet the requirements of section 209 of the [Motor Vehicle Safety Regulations](#) and whose webbing is not more than 50 mm wide shall be attached, without the use of retractors or reels of any kind, to the seat belt anchorage points provided on the standard seat assembly.

## 2.4 Anthropomorphic test device:

For the dynamic tests, select all anthropomorphic test devices (ATD) specified in paragraphs (a) and (b), as required, for testing a booster seat for use by persons whose mass and height are within the ranges indicated in the statement referred to in paragraph 409(1)(e) of the RSSR.

- (a) A booster seat that is designed to be used by persons in a specified mass range that includes any persons having a mass greater than 18 kg but not greater than 22.7 kg, or by persons in a specified height range that includes any persons whose height is greater than 1100 mm but not greater than 1250 mm, shall be tested with the Hybrid III 6-year-old child ATD conforming to subpart N, part 572, chapter V, title 49 of the *Code of Federal Regulations* of the United States (revised as of October 1, 2011).
- (b) A booster seat that is designed to be used by persons in a specified mass range that includes any persons having a mass greater than 22.7 kg, or by persons in a specified height range that includes any persons whose height is greater than 1100 mm, shall be tested with
  - (i) the Hybrid III 6-year-old child ATD conforming to subpart N, part 572, chapter V, title 49 of the *Code of Federal Regulations* of the United States (revised as of October 1, 2011); and
  - (ii) the weighted 6-year-old child ATD conforming to subpart S, part 572, chapter V, title 49 of the *Code of Federal Regulations* of the United States (revised as of October 1, 2011).

**2.4.1** The clothing of any ATD, other than the shoes, shall be machine washed in water that is at a temperature of at least 71°C but not more than 82°C and machine dried at a temperature of at least 49°C but not more than 60°C for 30 minutes.

**2.4.2** The clothing of any ATD shall consist of light-weight cotton stretch short-sleeved shirt and above-the-knee pants, and size 12½ M sneakers with rubber toe caps, uppers of Dacron and cotton, or nylon and a total mass of 0.453 kg.

**2.4.3** For the purposes of the dynamic tests, any ATD used shall be conditioned at an ambient temperature of at least 20.6°C but not more than 22.2°C and at a relative humidity of at least 10 % but not more than 70 % for at least 4 hours immediately prior to the test.

### **3. Dynamic Tests**

#### **3.1 Test Description**

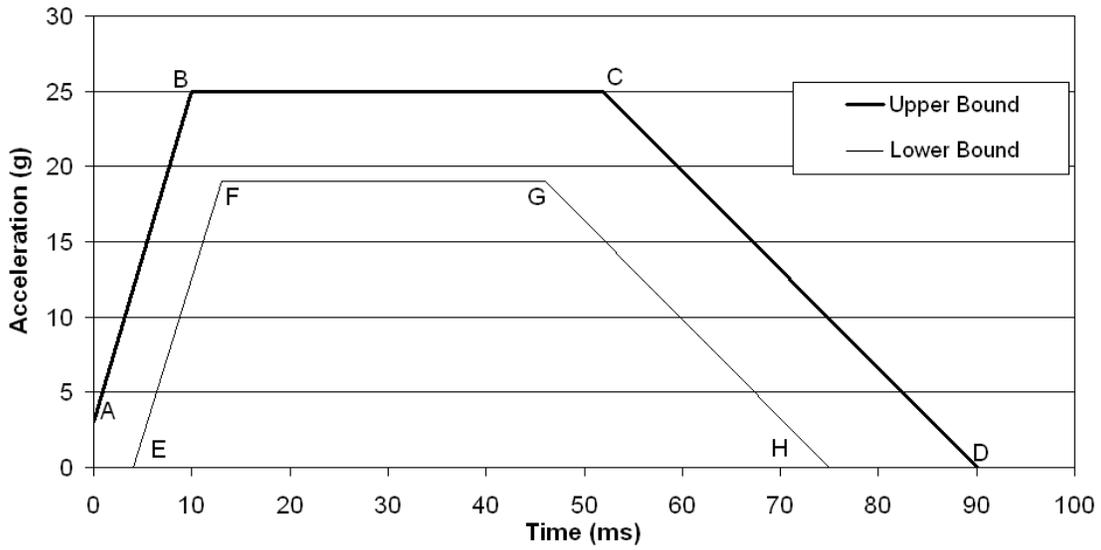
A dynamic test is to be conducted in accordance with the procedure set out in subsections 3.4 and 3.5 using

- (i) an ATD specified in subsection 2.4;
- (ii) a standard seat assembly mounted as set out in subsection 2.1; and
- (iii) a new booster seat attached to the standard seat assembly by means of a Type 2 seat belt assembly, as set out in subsection 2.3, installed in either configuration of appropriate anchorage points.

#### **3.2 Test Acceleration**

The dynamic tests simulate a frontal barrier impact having an acceleration plot of the test platform following every curve that meets the two following requirements:

- (a) it is within the corridor shown in Figure 1; and
- (b) it represents a change of velocity of 48 km/h.



Upper Bound		
Point	Time	Acceleration
A	0	3
B	10	25
C	52	25
D	90	0
Lower Bound		
Point	Time	Acceleration
E	4	0
F	13	19
G	46	19
H	75	0

Figure 1 — Test Platform Acceleration Graph

### 3.3 Test Conditions

For the dynamic tests, the ambient temperature shall be at least 20.6°C but not more than 22.2°C with a relative humidity of at least 10 % but not more than 70 %.

### 3.4 Positioning of the ATD and Installation of the Booster Seat for a Dynamic Test

**3.4.1** In accordance with the manufacturer's instructions, place a new booster seat at the centre seating position of the standard seat assembly. Only the lap and shoulder belt are used to fasten the booster seat. No tether strap or any other supplemental device is used to attach the booster seat to the standard seat assembly. Place the booster seat such that it is centred between the lap belt anchor positions. Position the base of the booster seat rearward as far as possible against the seat back of the standard seat assembly by pushing the booster seat rearward until the intersection of the booster seat's back and bottom contacts the intersection of the standard seat assembly's back and base cushion.

**3.4.2** Any ATD placed in the booster seat shall be positioned in accordance with the manufacturer's instructions while conforming to the following:

- (a) Holding the torso upright until it contacts the seat back of the booster seat or the standard seat assembly, as applicable, seat the ATD in the booster seat so that the mid-sagittal plane of its head is coincident with the SORL.
- (b) Lift the arms of the ATD as far as possible in the upward vertical direction.
- (c) Extend the legs of the ATD as far as possible in the forward horizontal direction, with its feet perpendicular to the centreline of the lower legs.
- (d) Using a flat square surface with an area of 2580 mm<sup>2</sup>, apply a force of 178 N perpendicular to the plane of the seat back of the standard seat assembly, first against the crotch of the ATD and then in the mid-sagittal plane against its thorax.
- (e) Secure the booster seat to the standard seat assembly using the seat belt. Tighten the pelvic restraint, to a tension, as measured by a force gauge used on the webbing, of not less than 53.5 N and not more than 67 N.
- (f) Tighten the upper torso restraint, to a tension, as measured by a force gauge used on the webbing, of not less than 9 N and not more than 18 N.
- (g) Rotate each limb of the ATD downward in a plane parallel to its mid-sagittal plane until the limb contacts a surface of the booster seat or a surface of the standard seat assembly. Position the limbs so that they will not inhibit the movement of the torso or head during the test.

### **3.5 Test Procedure**

Accelerate the test platform in accordance with the requirements of subsection 3.2.

## **4. Quasi-Static Testing**

**4.1** A quasi-static test is to be conducted in accordance with the procedure set out in subsections 4.2 to 4.4 using an apparatus equipped with a flat circular contact area that

- (a) is 203 mm in diameter;
- (b) is able to accommodate the upper seating surface of the booster seat; and
- (c) has a displacement rate between 50 and 500 mm/s.

**4.2** Apply a preload of 175 N on the upper seating surface of the booster seat without removing any padding or covering.

**4.3** After applying the force specified in 4.2, apply a vertical force of 2 250 N anywhere on the upper seating surface of the booster seat.

**4.4** Measure the deflection.