

## **Certification Standard for Type Approval Testing of Active Deployable Systems of the Bonnet Area**

**Note:**

Part II, Chapter I, Paragraph 1.1.2 and 2.1.3 of the ANNEX of the Technical Prescription (2004/90/EC) dated on 04. February 2004 to which is referred in Article 3 of the EU Directive for Pedestrian Protection (2003/102/EC) dated on 06. December 2003.

All devices designed to protect vulnerable road users shall be correctly activated before and/or be active during the appropriate test. It shall be the responsibility of the applicant for approval to show that the devices will act as intended in a pedestrian impact.

**Scope:**

- Only type approval conditions are considered according to the draft GTR or the EU Directive (assuming that EU Phase 2 in principle is identical with the GTR), i.e.:
  - Passing the LEGFORM TEST;
  - Passing the alternative UPPER LEGFORM TEST to bumper;
  - Passing the HEADFORM TESTS.
- Based on contact sensor techniques. The standard shall be open for later amendments to include non-contact sensor systems.
- Marking up the vehicle in deployed position. In case of a technology that makes it impossible to mark up in deployed position (for example external airbags) it can be agreed between the manufacturer and the Technical Service to mark up in undeployed position.

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## Test Procedure:

1	<p>Calculate the <b>Head Impact Time (HIT)</b> for 6yo-child, 5%-female and 50%-male in deployed position of the system, at a vehicle speed as specified for the leg impact in the legal requirements, at the centre of the vehicle, in walking posture, the leg facing the vehicle is backwards, using an appropriate simulation tool.</p> <p>HIT = time from first contact on bumper to time of head to bonnet contact.</p> <p>The manufacturer and the Technical Services should agree the appropriate choice of the HIT (6yo or 5% or 50%) for each impact point.</p>
2	<p>The vehicle or the system manufacturer provides the <b>Sensor Time (ST)</b> of the system</p> <p>In principle:</p> <p>Total Response Time (TRT) = Sensor Time (ST) + Deployment Time (DT)</p>
3	<p>Perform <b>LEGFORM TEST</b> or <b>UPPER LEGFORM TEST</b> to bumper to measure TRT at the lifting device.<sup>1)</sup></p> <p>Demonstrate:</p> <p style="padding-left: 20px;">TRT &lt; HIT (6yo or 5% or 50%, depending on the impact location);</p> <p style="padding-left: 20px;">The system reaches and remains in the intended position before head impact;</p> <p style="padding-left: 20px;">The system can be supported in a representative way<sup>2)</sup>.</p>
3.1	<p>Testing of systems that remain in a permanent deployed position:</p> <p>If all conditions of item 3 can be demonstrated, perform <b>HEADFORM TESTS in deployed position</b> of the bonnet.</p>
3.2	<p>Testing of systems that do <b>not</b> remain in a permanent deployed position:</p> <p>If the conditions of item 3 cannot be demonstrated, perform "<b>dynamic</b>" <b>HEADFORM TESTS</b>.</p> <p>"Dynamic" in this case means:</p> <p>Triggered ignition time of the deployable system and the headform propulsion device is needed. This shall be agreed between the manufacturer and the Technical Service, based on the HIT &amp; ST.</p> <p>The HIT may be calculated as in item 1, but for the undeployed condition.<sup>3)</sup></p>
4	<p>System <b>with non-contact</b> sensors:</p> <p>For systems with non-contact sensors the TRT has to be considered separately.</p>

<sup>1)</sup> This could be done during the required legal legform/upper legform to bumper tests. However, the TRT could also be established using an alternative method, e.g. dummy testing.

<sup>2)</sup> "Supported in a representative way" could mean e.g. by a spring system.

<sup>3)</sup> Since there is no static position of the bonnet, the HIT might be calculated in the undeployed position. In this case, the HIT is only used to determine the correct firing time for the impactor - such that it would hit the undeployed bonnet at the time calculated. The impactor thus correctly simulates an actual pedestrian head and as the bonnet is then deployed it will hit the deploying bonnet earlier than the calculated time. In addition, calculation of the HIT for a theoretical "fully deployed" condition would be very difficult and in fact would be a much less accurate method than using the undeployed condition.