CLEPA
European Association of Automotive Suppliers

Pedestrian Protection

Test method - Active hood/bonnet systems

This document is a complement to existing pedestrian headform test methods. It expands the test method to cover cars equipped with an active hood/bonnet system.
How to test, number of tests etc is not described in this document.

Definitions

The active pedestrian protection system is in this document referred to as the "Protection System". It consists of a sensor system including some control unit, referred to as the "Sensor", and one or more "Protection Devices".

T0	First contact leg-bumper
T_sensor	The time for the Sensor to give a firing signal. Three values will be recorded, one in each test.
T_sensor_max	The largest value from the three tests is chosen.
Signal_fire	Level of firing signal to the Protection Device(s).
T_fire	Time delay for firing of the Protection Device(s). Equal to T_sensor_max.
T_impact_min1	The shortest time for a head impact after T0 for WAD area less than 1500 mm. Proposal 60 ms (t.b.d.). (6-year-old child at 40 km/h)
T_impact_min2	The shortest time for a head impact after T0 for WAD area above 1500 mm. Proposal 90 ms (t.b.d.).
T_impact_max1	The longest time for a head impact after T0 for WAD area less than 1500 mm. Proposal 200 ms (t.b.d.).
T_impact_max2	The longest time for a head impact after T0 for WAD area above 1500 mm. Proposal 250 ms (t.b.d.).

Tests

The tests are divided in two parts. In the first part the Sensor alone is tested, the Protection Device(s) is then disconnected. These tests are performed to determine the maximum sensor firing time. In the second part the active hood/bonnet system is tested separately in headform tests with firing time delays depending on the maximum sensor firing time.

Sensor test

EEVC WG17 free flying legform (50^{th} percentile adult male) or another appropriate impactor (depending on the type of sensors used) is used at 40 km/h impact speed (see also "General remarks".)
Three tests are performed, one in each third of bumper area (any point), same procedure as EEVC WG17 test method, but not necessarily the same test points.
The output fire signal is recorded (T_sensor) in each test. In each test the Sensor must produce a clear firing signal above a certain level (Signal_fire).
The maximum fire signal time is chosen (T_sensor_max).

Car speed as an input parameter?

Note. Non-electrically deployed systems will need a different test procedure.

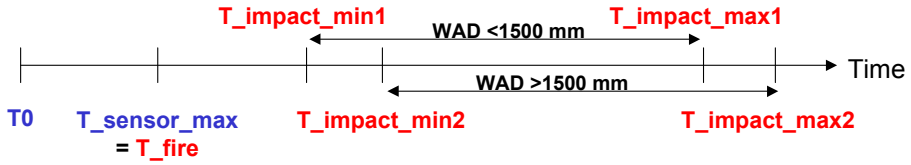
Headform tests

The propulsion system and the Protection Device(s) is activated with two time delays with T0 defined as above. The Protection Device(s) is given a firing signal with a time delay T_fire equal to T_sensor_max. The propulsion system is tuned so that the headform impacts the hood/bonnet at a

certain time delay after T0 (firing signal at Signal_fire level). The headform impact tests are performed in the same way as for passive systems, but the time delay can in each test be any value between T_impact_min and T_impact_max.
The total number of headform tests is the same as for passive pedestrian protection systems.

General remarks

The vehicle must meet the requirements also at lower speeds. If it is suspected that the headform injury values will reach higher values at lower speed the vehicle can be tested at any chosen speed. The legform tests and the headform tests are then performed at the same impact speed. If the Sensor does not give a firing signal at the chosen speed the headform tests shall be performed at this speed with the Protection Device(s) in a non-activated mode.
The legform tests to determine T_sensor_max and T_fire are however always performed at 40 km/h.



Sensor test: Legform test to determine maximum sensing time (T_sensor_max). T0 is the first leg contact to bumper.

Headform test: Protection Device(s) fired at T_fire (value given from T_sensor_max) and head impact time delay can be varied between T_impact_min and T_impact_max. The values of T_impact_min and T_impact_max depend on the impact area on the hood, shorter time values on the forward part of the hood and longer time values on the rear part of the hood.

Figure 1. Graph explaining the timing of the tests.