
EDR Step 2

This document is for informational purposes only. It just provides a glance at items potentially to be considered by the IWG as part of the ‘EDR Step 2 performance elements’.

The Step 2 IWG’s workstream concerns the development of future and advanced requirements on EDR for light and heavy duty vehicles related to e.g. additional data elements, new triggering criteria (e.g. ‘jerk’), durability provisions and test procedures, in particular reinforcing data survivability requirements including fire resistance and water penetration.

This workstream is in an exploratory phase and the text reproduced below does not reflect any official position. It only concerns a first inventory, including input received from IWG delegates. This will be further discussed during future IWG sessions. A complete proposal on items to be developed under Step 2 will be prepared by the IWG for the GRSG 127th session.

Potential Step 2 Provisions

The following section details potential provisions to be considered in the Step 2 EDR common technical requirements document.

Test procedures

3.4.1 Crash test

Vehicles subject to the requirements of UN Regulation No. 94, 95, 137 or national or regional crash regulations or standards. After the crash test, the following requirement shall be met:

- The complete data recorded element must read “yes” after the impact test.
- The acquired (or computed) longitudinal (or lateral) delta-V data shall be within the tolerance of [± 10 km/h] when compared with the laboratory reference longitudinal (or lateral) delta-V.
- Delta-V data shall not produce clipping, or acceleration data shall not exceed range of acceleration sensor.

3.4.2 Driving operation data test

3.4.2.1 The threshold can be triggered by adopting the following four methods or other methods during test:

- The vehicle is impacted to trigger the threshold;
- The vehicle is fixed on the trolley, then the trolley is impacted to trigger the threshold;
- The EDR system is triggered physically.
- The EDR system is triggered by inputting signal

3.4.2.2 The test method shall test the following data elements: “Engine throttle, percent full”, “Accelerator pedal, percent full”, “ABS activity (on, off, engaged)”, “Stability control (on, off engaged)”, “Steering input”, “Engine

RPM”, “Service brake, on/off”, Safety belt buckle and other vehicle electronic/electric system can be set ON/OFF by the driver, etc.

3.4.2.3 After test, the data that EDR recorded shall be identical with the setting before test.

3.4.3 Bench test

The manufacturer shall provide the test box used for connecting with EDR controller, this test box is used to simulate the real vehicle peripheral signals and loads for EDR controller. The test box shall meet following requirements:

-- The test box shall be capable of sending simulated real bus signals to the EDR controller;

-- The test box shall be equipped with necessary peripheral sensors, loads and hardwire connected accessories, to guarantee the normal operation of the EDR controller;

-- The power supply for EDR controller shall be provided by the test bench (thruster) rather than the test box.

The EDR controller and its accessories are installed on the thruster as the connection status on real vehicles. Then the EDR controller is connected with the test box, and powered on by the test bench.

The simulation signals and loads provided by the test box shall be preset and confirmed. The corresponding device of simulation signals that is working or triggered to working under certain logic when the vehicle is operating shall be preset as activated.

3.4.3.1 EDR system trigger test

Prior to test, the EDR controller shall have enough storage space to record at least 1 complete event.

Thrust the EDR controller in longitudinal direction in accordance with the specified impact waveform by the testbench (thruster). The actual longitudinal acceleration is measured by lab accelerometers.

The EDR controller shall be triggered, the event data recorded shall be identical with the data which is pre-set.

3.4.3.2 Test of number of storage events

Prior to test, EDR controller shall have enough storage space to record at least 3 complete events.

Thrust the EDR controller in longitudinal direction in accordance with the specified impact waveform. The actual longitudinal acceleration is measured by lab accelerometers.

Conduct 3 thrust tests with each test interval more than 5s.

EDR controller shall be triggered and shall record the latest 3 events, the event data recorded shall be identical with the data which is pre-set, and at least 3 events are recorded in EDR controller.

3.4.3.3 Storage overwrite mechanism test

3.4.3.3.1 Overwriting of unlocked memory test

Prior to test, EDR controller shall have no sufficient storage space to record a complete event, and in the last three events recorded, there is one event record which is stored in the unlocked memory.

Thrust the EDR controller in longitudinal direction in accordance with the specified impact waveform by the testbench (thruster). The actual longitudinal acceleration is measured by lab accelerometers.

EDR controller shall be triggered. The event data shall override the existing unlocked event data, and shall be identical with the data which is preset in.

3.4.3.3.1 Overwriting of locked memory test (different than above?)

Prior to test, EDR controller shall have no sufficient storage space to record a complete event, and all the stored events data are locked in the memory.

Thrust the EDR controller in longitudinal direction in accordance with the specified impact waveform. The actual longitudinal acceleration is measured by lab accelerometers.

The data record of the EDR controller is consistent with that before the test.

3.4.3.4 Power failure test

Prior to test, EDR controller shall have enough storage space to record at least 1 event.

Thrust the EDR controller in longitudinal direction in accordance with the specified impact waveform by the testbench (thruster). The actual longitudinal acceleration is measured by lab accelerometers.

At the same time of thrust, cut off the power supply to EDR controller.

EDR controller shall be triggered, the event data recorded shall be identical with the data which is pre-set.

Malfunction

Possible insertion of language to consider special case for vehicles with EDR but not an airbag ECU (China).

Consideration of “jerk” (rate at which an object's acceleration changes with respect to time) triggering criteria.

Triggering of recording

For systems with “wake-up” rollover occupant protection control algorithms, the time at which the rollover occupant protection control algorithm is activated.

For continuously running rollover occupant protection control algorithms, the time at which the event is determined to have started as defined by the specific Original Equipment Manufacturer (OEM) and occupant protection control system supplier (for example, accumulated angle or angular rate).

Conditions for triggering locking of data

For systems with “wake-up” rollover occupant protection control algorithms, the time at which the rollover occupant protection control algorithm is activated.

For continuously running rollover occupant protection control algorithms, the time at which the event is determined to have started as defined by the specific Original Equipment Manufacturer (OEM) and occupant protection control system supplier (for example, accumulated angle or angular rate).

Warning for buffer overflow

If all EDR non-volatile memory buffers are locked, the host module should store a non-erasable error explaining that the module should be replaced and should light the MIL for that module.

Power failure

In case of occurrence of collision, if power supply circuit of vehicle cannot supply power normally due to the impact event, the EDR system itself shall have the power supply capability. This power supply capability shall be enough for all relevant firing loops (if available) are fully deployed within (150 ± 10) ms after power failure (or cut-off), and the EDR system shall record all data before T_0 and the data from T_0 to (150 ± 10) ms after power failure (or cut-off).

Data retrieval tools

Each manufacturer of a motor vehicle equipped with an EDR shall ensure by licensing agreement or other means that a tool(s) is commercially available that is capable of accessing and retrieving the data stored in the EDR that are required by this part. The tool(s) shall be commercially available not later than 90 days after the first sale of the motor vehicle for purposes other than resale.]

Also consider parallel language from DSSAD below:

The data shall be retrievable even after an impact of a severity level set by UN-R94, /95 or/137, or other relevant national crash test procedures. If the main on-board vehicle power supply is not available, it shall still be possible to retrieve all data recorded on the DSSAD, as required by national and regional law.

[Survivability

Data should be preserved even when exposed to high temperatures due to fire.

Data should be preserved even in conditions such as fire extinguishing fluid injection and flooding vehicles in a water tank.

Data shall be preserved even in direct shocks outside of the ACM and vehicle crashes.]
