**Proposals related to the rollover issue in document EDR-DSSAD-IWG-26-14 and the ‘Engine rpm’ data element**

These proposals have been added to the existing ‘working document Step 2 R160 (EDR-DSSAD-IWG-27-04)’ and are highlighted in red.

 ***Working document for the IWG on EDR/DSSAD / SG-EDR. This document serves as a place holder for proposals under consideration as part of the ‘EDR Step 2’ workstream.***

Proposal by the Informal Working Group on EDR/DSSAD amending the 01 Series of Amendments to UN Regulation No. 160 introducing new requirements in line with the ‘Step 2’ workstream (Programme of Work, GRSG, doc. WP.29-194-30).

The modifications to the text of document ECE/TRANS/WP.29/2020/123/Rev.1 as last amended by ECE/TRANS/WP.29/2021/58 are marked in bold for new or strikethrough for deleted characters.

 I. Proposal

Insert new *paragraph 2.x.*:

“[**2.x. “*Rollover protection system*” means any protection system that protects occupants during a rollover, which is activated by a *vehicle's crash sensing system;****]”*

*Insert new paragraphs 2.xx-zz*:

**[2.xx.** **“*Advanced emergency braking system*” means a system which can automatically detect an imminent forward collision and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating a collision. The system may also be referred to as "Automatic emergency braking system" in other publications or countries.**

**2.yy. “*Trigger activated*” indicates the first trigger that was activated to cause the recording of the event.**

**2.zz. “*Vulnerable road user*” means a person using no vehicle, such as a pedestrian, or using a vehicle without protective occupant compartment, such as a pedal cyclist, micro-vehicle user or motorcyclist.]**

*Paragraph 5.3.1.*, amend to read:

5.3.1. Conditions for triggering recording of data

 An event shall be recorded by the EDR if one of the **[~~following~~ threshold values mentioned under paragraphs 5.3.1.1. to 5.3.1.5]** is met or exceeded**[, even if the End of Event Time of the previous event has not been reached]**.

 **[If a vehicle is not fitted with a system referred to in paragraphs 5.3.1.3. to 5.3.1.5., this document requires neither recording of data according to these paragraphs nor fitting of such systems.]**

 **[If a locking trigger (i.e. any trigger listed in paragraph 5.3.2.) occurs in short succession after a non-locking trigger (i.e. any trigger not listed in paragraph 5.3.2.) and an overlap of data between both events would result, the non-locking trigger may be excluded.]**

5.3.1.1. Change in longitudinal vehicle velocity more than 8 km/h within a 150 ms or less interval.

5.3.1.2. Change in lateral vehicle velocity more than 8 km/h within a 150 ms or less interval

*Paragraph 5.3.1.3.*, amend to read:

5.3.1.3. Activation of Non-reversible occupant restraint system**, including the rollover protection system**.

5.3.1.4. Activation of Vulnerable road user secondary safety system

~~If a vehicle is not fitted with any Vulnerable Road User (VRU) secondary safety system, this document requires neither recording of data nor fitting of such systems. However, if the vehicle is fitted with such a system, then it is mandatory to record the event data following activation of this system.~~

**5.3.1.5. Emergency braking demand by the advanced emergency braking system in response to detecting the possibility of an imminent collision.**

[...]

5.3.3. Conditions for establishment of time zero

Time zero is established at the time when any of the following first occurs:

5.3.3.1. For systems with "wake-up" air bag control systems, the time at which the occupant restraint control algorithm is activated; or

5.3.3.2. For continuously running algorithms,

5.3.3.2.1. The first point in the interval where a longitudinal, cumulative delta-V of over 0.8 km/h is reached within a 20 ms time period; or

5.3.3.2.2. For vehicles that record "delta-V, lateral," the first point in the interval where a lateral, cumulative delta-V of over 0.8 km/h is reached within a 5 ms time period; or

5.3.3.3. Deployment of a non-reversible deployable restraint or activation of VRU secondary safety protection system.

**5.3.3.4. Occurrence of the emergency braking demand trigger of the advanced emergency braking system.]**

*Paragraph 5.3.1.3., amend to read:*

"5.3.1.3. Activation of [**rollover protection system or n**]~~N~~on-reversible occupant restraint system.”

*Paragraph 5.4.*, amend to read:

"5.4. Crash test performance and survivability

5.4.1. Each vehicle subject to the requirements of national or regional frontal crash test regulations, shall conform with the specifications in paragraph 5.4.3.

5.4.2. Each vehicle subject to the requirements of national or regional side impact crash test regulations shall conform with the specifications of paragraph 5.4.3.

5.4.3. The data elements required by paragraph 5.1, shall be recorded in the format specified by paragraph 5.2, exist at the completion of the crash test and the complete data recorded element shall read "yes" after the test. Elements that are not operating normally in braking, etc.) are not required to meet the accuracy or resolution requirements in these crash tests.
The data shall be retrievable even after an impact of a severity level set by UN Regulations Nos. [~~94, 95 or 137~~ **95 and either 94 or 137**].”

*Paragraph x.x*, amend to read:

“x.x. …”

**Annex 4 - Data elements and format**

*Add “AEB” to column ‘Event(s) recorded for’ against the following data elements:*

* *Speed, vehicle indicated*
* *Engine throttle, % full (or accelerator pedal, % full)*
* *Service brake, on/off*
* *Ignition cycle, crash*
* *Ignition cycle, download*
* *Safety belt status, driver*
* *Complete file recorded*
* *Engine rpm*
* *Anti-lock braking system activity*
* *Stability control*
* *Safety belt status, front passenger*
* *Safety belt status, rear passengers*
* *Tyre Pressure Monitoring System Warning Lamp Status*
* *Longitudinal acceleration (pre – crash)*
* *Lateral acceleration (pre – crash)*
* *Yaw Rate*
* *Advanced Emergency Braking System status*
* *Cruise Control System Status*
* *Adaptive Cruise Control Status (driving automation system level 1)*
* *Safety belt status mid- position front*
* *Lane departure warning system status*
* *Corrective steering function status*
* *Emergency steering function status*
* *Automatically commanded steering function category A status*
* *Automatically commanded steering function category B1 status*
* *Automatically commanded steering function category B2 status*
* *Automatically commanded steering function category C status*
* *Automatically commanded steering function category D status*
* *Automatically commanded steering function category E status*
* *Accident emergency call system status*

*Add the following new data element:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data element | Condition for requirement | Recording interval/time | Data sample rate | Minimum range | Accuracy | Resolution | Event(s) recorded for |
| … | … | … | … | … | … | … | … |
| **Trigger activated** | **Mandatory** | **Event** | **N/A** | **N/A** | **N/A** | **Change in longitudinal velocity, Change in lateral velocity, Activation of non-reversible occupant restraint system, Activation of vulnerable road user secondary safety system, [Advanced emergency braking demand for suspected vulnerable road user, Advanced emergency braking demand for suspected non-vulnerable road user (e.g. M- or N-category motor vehicle)]** | **All 5.3.1. triggers** |

 *Amend the following data element:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data element | Condition for requirement | Recording interval/time | Data sample rate | Minimum range | Accuracy | Resolution | Event(s) recorded for |
| … | … | … | … | … | … | … | … |
| Engine rpm | Mandatory | -5.0 to 0 sec | 2 | 0 to **[**~~10,000~~**20,000]** rpm | ±100 rpm[[1]](#footnote-2) | 100 rpm. | **[**~~Planar~~~~Rollover~~**All 5.3.1. triggers]** |

 II. Justification

1. *SG-EDR-42-08:*

Paragraphs 2.x. and 5.3.1.3.: There have been discussions on whether a rollover protection system (ROPS) should be considered a Non-reversible occupant restraint system. For this topic, a new definition is added for a ROPS. This definition is a combination of the purpose of a ROPS (occupant protection during a rollover) and the activation (taken from definition 2.27). To add the activation of a ROPS as a condition for triggering recording of data, it is simply included in 5.3.1.3.

1. *SG-EDR-42-07:*

Paragraph 5.4.: Different views had been addressed during type approval activities on which collision tests are required to be conducted for evidencing the crash test performance and survivability:

1. a side AND a full width frontal AND an offset front collision, or
2. a side OR a full width frontal OR an offset front collision, or
3. a side AND a frontal collision, being either full width OR offset.

From 5.4.1. and 5.4.2. it follows that c) is the correct interpretation. The proposed amendment aims clarifying this.

1. *EDR-DSSAD-IWG-26:*

*SG-EDR-42-06*:

Paragraph 5.3: This proposal aims to achieve that any events based on locking triggers, i.e. those definitively indicating a collision, are always recorded (and subsequently locked) while events triggered shortly before and therefore relating to the same real-world incidents, may be excluded, i.e. not recorded to non-volatile memory. This shall ensure that the most relevant record relating to a real-world incident (around the actual time of collision) is available and locked and that all data elements relevant for an actual collision are captured.

*SG-EDR-42-04*:

Paragraph 5.3: The aim of this proposal is to improve the capture rate of collisions which may be missed by the currently defined triggers, including but not limited to collisions with vulnerable road users, by using advanced emergency braking system interventions as a trigger criterion. (This updated version of proposal SG-EDR-40-02 takes on-board feedback from the SG EDR).

1. *EDR-DSSAD-IWG-26-14:*

Paragraph 5.3.1: This proposal aims to ensure that events are recorded based on other trigger conditions, even when the rollover algorithm is in operation. In some cases, triggers defined in Paragraphs 5.3.1.1 and 5.3.1.3 are not recorded if they occur before the rollover algorithm concludes. (Refer to document EDR-DSSAD-IWG-26-14) The above modifications resolve the issue of unrecorded triggers, enabling verification of actual crash information.

1. *New proposal :*

Annex 4. Table 1, Data elements and format “Engine rpm”: The minimum range of Engine rpm was appropriately defined based on the characteristics of internal combustion engine vehicles. For electric vehicles, the Engine rpm data element is defined in Paragraph 2 to record the Motor rpm (the number of revolutions per minute of the output shaft of the device(s) supplying motive power). As motor output improves in electric vehicles, Motor rpm exceeds 10,000 rpm during high-speed driving. In some vehicle models, it is recorded at the upper limit of the minimum range, 10,000 rpm. Consequently, the minimum range should be expanded to accommodate the Motor rpm range of actual electric vehicles.

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1. These elements do not need to meet the accuracy and resolution requirements in specified crash tests. [↑](#footnote-ref-2)