

EDR/DSSAD IWG Revisions to ECE/TRANS/WP29/GRSG/2023/13

The revisions detailed below reflect the consensus of the EDR/DSSAD IWG following the original submission of the ECE/TRANS/WP29/GRSG/2023/13 document.

Document - ECE/TRANS/WP29/GRSG/2023/13 (IWG on EDR/DSSAD) Proposal for a New UN Regulation Concerning the Approval of Event Data Recorders for Heavy Duty Vehicles

The text reproduced below was prepared by the experts from the Informal Working Group on EDR/DSSAD aiming to clarify, supplement and correct the current text as regards to Heavy Duty Event Data Recorder (EDR). It is based on document ECE/TRANS/WP29/GRSG/2023/13. The modifications to the current text of the UN document are marked in bold for new or strikethrough for deleted characters. Potential amendments that are still in discussion are included in brackets [].

For additional clarity and context, the entire document with proposed amendments marked up has been included as an Appendix.

Note that this document only provides revisions to the main requirements sections. Updates to the Data Element Annex will be provided in a subsequent document.

I. Proposal

Section 0. Forward, amend paragraph 0.1 and 0.2 to read:

- 0.1. **The intention of this Regulation is to establish uniform provisions concerning the approval of motor vehicles in the categories M₂, M₃, N₂ and N₃ with regard to their Event Data Recorders (EDRs).**

~~The provisions concern performance elements contained in this document provide guidance and/or specifications for vehicles fitted with Event Data Recorders (EDRs) specifically the minimum collection, storage, and crash survivability of the motor vehicle crash event data. These performance elements do~~ **It does** not include specifications for data retrieval tools and methods which are subject to national or regional level requirements.

- 0.2. The purpose of these ~~performance elements~~ **provisions** is to ensure that EDRs record, in a readily usable manner, data valuable for effective crash investigations and for analysis of safety equipment performance **while limiting, to the extent possible, the recording of data unrelated to the crash. Such crash** ~~These~~ data will help provide a better understanding of the circumstances in which crashes and injuries occur and will facilitate the development of safer vehicle designs. In this context, crashes should be understood as involving property damage and/or personal harm, including that of vulnerable road users involved.

Section 0. Forward, insert new paragraph 0.2.1 to read:

- [0.2.1 **It is understood that, in the current state of technology, the aforementioned objective can be reached only by recording the data in a specified time period based on defined triggers and trigger thresholds. These triggers may, but do not always immediately precede or follow or coincide with the crash.**]

Justification:

Corrects Forward text to refer to a Regulation instead of “guidance”.

Some active safety systems have vehicle specific programs that may include different levels of intervention intensity. In addition, some triggers like “Last stop” can record events that are not associated with a crash. The proposed language is intended to clarify that manufacturers have flexibility in the application of these triggers to apply them in a manner that will limit the recording of data unrelated to a crash.

Section 1. Scope, amend paragraph 1.1 and 1.2 to read:

- 1.1. This ~~guidance~~ **Regulation** applies to **vehicles of categories all Heavy-Duty Vehicles (HDV)* (i.e., 1958 Agreement M₂, M₃, N₂ and N₃ * vehicle categories and 1998 Agreement Category 1-2 vehicles and Category 2 vehicles).**
~~[* For vehicles of categories M₂ and N₂, Contracting Parties that are signatories to both UN Regulation No. 160 and this (new EDR HDV) UN Regulation shall recognize approvals to either Regulation as equally valid.]~~
~~[* Requirements of this regulation are deemed to be met if the requirements of UN Regulation No. 160 are fulfilled.]~~
- 1.2. This ~~guidance~~ **Regulation** is without prejudice to the requirements of national or regional laws.

* As defined in Section 2 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document ECE/TRANS/WP.29/78/Rev.6) – <https://unece.org/transport/standards/transport/vehicle-regulations-wp29/resolutions>.

Justification:

Removes reference to 98 agreement weight categories and appropriately replaces “guidance” with Regulation

Section 1. Scope, amend paragraph 1.4 to read:

- 1.4. If there is no system or sensor designed to provide the **trigger indicated in 5.3.1.3 table of active [passive] safety systems or** data element to be recorded and stored under section ~~35~~, in the format (range, resolution, and sample rate) indicated in Annex ~~4~~. "DATA ELEMENTS" or it is not operational at the time of **reaching a specific trigger condition as indicated in 5.3.1 or** recording, this document requires neither recording of such data nor fitting or making such systems or sensors operational. However, if the vehicle is fitted with an original equipment manufacturer sensor or system designed to provide the **trigger indicated in 5.3.1.3 or** data element in the format specified in Annex ~~4~~. "DATA ELEMENTS", then it is mandatory to report the data element in the specified format when the sensor or system is operational. In the case the reason for not being operational at the time of recording is a failure of this system or sensor, this failure state shall be recorded by the EDR as defined in the data elements Annex ~~4~~. Data elements.

Justification:

* As defined in Section 2 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document ECE/TRANS/WP.29/78/Rev.6) – <https://unece.org/transport/standards/transport/vehicle-regulations-wp29/resolutions>.

This amendment clarifies that the “if fitted” condition applies to both the trigger and data element.

Section 2. Definitions, delete the following:

- ~~2.2. “Accident emergency call status” means the operating status of the emergency call system.~~
- ~~2.10. “Blind spot warning system status” means the operating status of the blind spot warning system.~~
- ~~2.25. “HD EDR” means event data recorder for heavy duty vehicles.~~
- ~~[2.34. “Maximum delta-V, lateral” means the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral axis.]~~
- ~~2.36. “Non zero crash type” means (add definition).~~
- ~~2.67. “VRU Proxi System” means a set of sensors and/or logic which provides warning of vulnerable road users in close proximity. (e.g. UN Regulations Nos. 159 and 151)~~

Justification:

The deleted definitions represent either data elements or terms that are no longer included, relevant to the document, or are duplicates.

Section 2. Definitions, add the following (renumber as appropriate):

- [x.xx “System intervention” means the activation of a system, as defined by the manufacturer [to the satisfaction of the type approval authority].]**
- x.xx “Vehicle master control switch” means the device by which the vehicle’s on-board electronics system is brought, from being switched off, as in the case where a vehicle is parked without the driver being present, to normal operation mode.**
- 2.xx. “Vehicle type with regard to its Event Data Recorder” means vehicles which do not differ significantly in such essential aspects as:**
- (a) The manufacturer’s trade name or mark;**
 - (b) Vehicle features which significantly influence the performances of the EDR; Addition of new trigger(s), new data (elements), or modification in their format, shall not be considered as “significantly influencing the performance of EDR”;**
 - (c) The main characteristics and design of the EDR.**

Justification:

The proposed new definitions are needed to define new concepts (System intervention), vehicle systems (Vehicle master control switch instead of “ignition key” and in line with other UN Resolutions and Regulations), and 58 Agreement specific definition for (Vehicle type with regard to its event data recorder).

Section 2. Definitions, amend the following definitions to read:

- [2.4. “Antilock braking system” means a system which detects wheel slip and automatically modulates the pressure producing the braking forces at the wheel(s) to limit the degree of wheel slip. (add definition)]**
- [2.7. “Automatic Advanced emergency braking system” means a system which can automatically detect a potential 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. ~~(add definition).~~]
- [2.8. *“Automatic Advanced emergency braking system status”* means the system state of the ~~automatic advanced~~ emergency braking system.] add clarifying sentence
- [2.13. *“Cruise control status states”* means the control status of the [conventional road speed ~~adaptive~~] cruise control system.]
- [2.16. ~~“Electronic Stability control”~~ means ~~(add definition)~~ *“Vehicle stability function”* means an electronic control function for a vehicle which improves the dynamic stability of the vehicle.
- 2.16.1 A vehicle stability function includes one or both of the following:
- (a) Directional control
- (b) Roll-over control
- 2.16.2 Control functions within a vehicle stability function:
- 2.16.2.1 *“Directional control”* means a function within a vehicle stability function that assists the driver, in the event of under steer and over steer conditions, within the physical limits of the vehicle in maintaining the direction intended by the driver in the case of a power-driven vehicle, and assists in maintaining the direction of the trailer with that of the towing vehicle in the case of a trailer.
- 2.16.2.2 *“Roll-over control”* means a function within a vehicle stability function that reacts to an impending roll-over in order to stabilise the power-driven vehicle or towing vehicle and trailer combination or the trailer during dynamic manoeuvres within the physical limits of the vehicle.
- Note - The system may also be referred to as “Electronic Stability Control” in other publications or countries.
- 2.21. *“Event Data Recorder”* (EDR) means a ~~device or function system~~ in a vehicle, **the purpose of which is to record** ~~that records~~ the vehicle's dynamic, time-series data during the time period just prior to an event (e.g. vehicle speed versus time) or during [a crash an event] [(e.g. delta V versus time)], intended for retrieval after ~~the a~~ crash event. ~~For the purposes of this definition, the event data does not include audio and video data.~~
- [2.23. *“Event date”* means the date when the [recorded] event occurred.]
- [2.24. *“Event time”* means the time when the [recorded] event occurred.]
- 2.26. *“Event data recorder ~~HD-EDR~~ unit hardware part number”* means the part number for the ~~HD~~ EDR unit.
- 2.27. *“Event data recorder ~~HD-EDR~~ unit software part number”* means the part number/version number for the HD EDR software.
- [2.31. *“Latitude”* means the vehicle position using GPS at the time of the [recorded] event.]
- [2.32. *“Longitude”* means the vehicle position using GPS at the time of the [recorded] event.]
- [2.42. *“Roll angle”* means **the angle around which the vehicle rotates in its longitudinal direction.** ~~(add definition).~~]
- [2.44. *“Roll rate”* means **the speed per unit time at which the vehicle rotates in its longitudinal direction.** ~~(add definition).~~]
- [2.45. ~~“Safety Supplemental restraint system”~~ means a **passive safety system as declared by the vehicle manufacturer, supplementing the restraint system**

as defined by UN R16, with components such as airbags or seatbelt pretensioners. (add definition).]

- [2.46. ~~“Safety Supplemental restraint system status”~~ mean the operating status of ~~safety supplemental~~ restraint system(s).]
- [2.48. ~~“Seat belt status (passenger)”~~ indicates whether the [front outboard] passenger’s seat belt is buckled.]
- [2.58. ~~“Tyre size [designation]”~~ is the tyre size [designation per UN R30] [in revolutions per km.]
- [2.62. “Vehicle configuration” means the [component identification and software identification] ~~Parameter Group Number (PGN) 65259 and PGN 65242~~ for available Electronic Control Unit (ECU) hardware and software part numbers.]

Justification:

The following definitions were modified to either correct or further clarify the original definition. (The definitions section will be updated further once the Data element Annex has been finalized).

Section 4. Approval, amend paragraph 4.1 to read:

- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5. below approval of that vehicle type shall be granted. **Alternatively, approval shall be granted, at the request of the manufacturer and in case of a vehicle type equipped with deployable restraint system with GVW up to [12t], if that vehicle type meets the technical requirements of the 01 or later series of amendments to UN Regulation No. 160.”**

Justification:

Some vehicles in the M2, N2 categories are designed with architecture’s and deployable restraints that make them suitable to use either the light duty or heavy duty EDR specifications. These vehicles may already be approved as M1, N1 categories with respect to their EDR. The exact weight cut-off for this is currently still under discussion.

Section 5. Specifications, amend paragraph 5.0 to remove bracket:

{5. Specifications

Justification:

The “Specifications” section was approved; thus, bracket was removed. However, there remain specific subsections where brackets remain as appropriate.

Section 5. Specifications, amend paragraph 3.3 Data capture to read:

- 5.3. Data capture
- The EDR **shall capture** ~~captures~~ data which shall be written to non-volatile memory when any of the triggers in paragraph 5.3.1. occur ~~[with the exception of last stop which may have a delay].~~
- The EDR shall record the captured data in the vehicle and this data shall remain in the vehicle subject to the provisions of paragraph 5.3.4, at least until they are retrieved in compliance with national or regional legislation, or they are overwritten in compliance with paragraph 5.3.4.**

The EDR non-volatile memory buffer shall accommodate the data related to at least ~~[five]/~~**[three]** different events.

Justification:

The proposed amendment removes the delay clause for the last stop trigger. It also proposes to reduce the number of memory buffer slots from five to three. This is due to the fact that none of the vehicles currently equipped with heavy duty EDR's have more than three slots (these proposed changes are still under discussion and are in brackets).

Section 5. Specifications, amend paragraph 5.3.1 to read:

5.3.1. Conditions **for triggering** ~~which trigger~~ recording of data

Justification:

Editorial correction.

Section 5. Specifications, amend paragraphs 5.3.1 to 5.3.1.3 (Conditions for triggering recording of data) to read:

5.3.1.1. Sudden Deceleration: Change in longitudinal vehicle velocity ~~between 8.0 and 22.5 km/h/s~~ **greater than 3.25 m/s² km/h/s** and persists beyond that threshold for at least 0.75 seconds.

[5.3.1.2. [Last Stop:] The vehicle speed is reported as 0 ~~[(which may wait for 15 seconds or less after)]. [The last stop trigger cannot reoccur until the vehicle speed reaches a speed of 24.0 km/h (14.9 mph) or more for a minimum of 6 seconds.] The act of turning the ignition off [or on] will not directly trigger a last stop event.]~~

5.3.1.3. Activation of an ~~active or passive~~ safety system is showed in the table below:

<i>System (if fitted)</i>	<i>Trigger</i>
Safety Supplemental Restraint System	Deployment Command of a Supplemental Restraint System Non-zero crash type
Antilock Braking System	System Intervention Antilock Braking System active
Automatic Advanced Emergency Braking (including pedestrian/cyclist if equipped)	Emergency Brake Intervention Automatic Emergency Braking active
Electronic Vehicle Stability Function Stability Control	System Intervention Yaw control or Roll Over (foundation) Brake control
Vulnerable Road User Secondary Safety System]	{System Intervention}

Justification:

Sudden Deceleration – The sudden deceleration criteria was revised based on research conducted by the IWG.

Last Stop – The deleted text was transferred to the conditions for recording section.

Safety system table - The proposed amendments more closely align the system trigger names and triggering event with IWG intent.

Section 5. Specifications, amend paragraphs 5.3.2 to 5.3.2.2 (Conditions for recording) to read:

[5.3.2. Conditions ~~that trigger the~~ **for recording to non-volatile memory and** locking of data.

5.3.2.1 The EDR shall capture data which shall be written to non-volatile memory when any of the triggers in paragraph 5.3.1. occur.

[In case of the last stop trigger data shall be written to non-volatile memory only if at least one of the following criteria apply:

- 1. Deactivation of vehicle master control switch**
- 2. [~~Opening of driver's door~~] [Opening of the driver's door [if fitted]]**
- 3. The vehicle speed is reported as 0 for [15]/[20] seconds or longer and the vehicle speed reached 24.0 km/h (14.9 mph) or more for a minimum of 6 seconds since the previous last stop recording.**

[The manufacturer may, at its own discretion, add criteria that prevent writing to non-volatile memory for specific vehicle applications.]

Time zero for the event record shall be the point in time defined in 5.3.1, irrespective of the criterion for writing to non-volatile memory. Only one event record ~~is required to~~ [shall] be created for the same time zero, even if more than one criterion apply or if a criterion applies repeatedly.

5.3.2.2 **In all the cases with supplemental restraint system activation, the memory for the event shall be locked to prevent any future overwriting of the data by subsequent event.**

~~Writing to non-volatile memory for the last stop trigger may be delayed by up to 15 seconds or as part of key-off shutdown process whichever comes first. The write of the last stop shall not occur unless the vehicle speed reached a speed of 24.0 km/h (14.9 mph) or more for a minimum of 6 seconds since the last write. However, in case of power or communication failure (paragraph 5.3.3), data recording is not needed.]~~

Justification:

The proposed amendment/addition further specifies the criteria/conditions for recording last stop trigger. These conditions were added to help reduce the incidence of recording data for non-crash events.

The proposed amendment also requires that EDR records associated with the activation of a supplemental restraint system would result in the recorded data being locked and not capable of being overwritten.

Section 5. Specifications, add paragraphs 5.3.4.1 and 5.3.4.2 (Overwriting) to read:

5.3.4.1 **If an EDR non-volatile memory buffer void of previous-event data is not available, the recorded data shall, subject to the provisions of paragraph 5.3.2.2, be overwritten by the current event data, on a first-in first-out basis, or according to different strategies decided by the manufacturer and made available to the relevant authorities of Contracting Parties.**

5.3.4.2 **Furthermore, if an EDR non-volatile memory buffer void of previous-event data is not available, data originating from supplemental restraint system events shall always overwrite any other data that is not locked per paragraph 5.3.2.2.**

Justification:

The proposed addition provides specifications that direct when and how recorded data can be overwritten by subsequent events.

Section 5. Specifications, add paragraphs 5.4 to 5.4.1 (Survivability) to read:

5.4. Survivability

5.4.1 The data elements listed in Annex 4 shall be retrievable in the format specified even after an impact. Therefore, event data recorders shall resist inertial loads which may occur during a vehicle crash and be mounted in the vehicle in a position of sufficient structural integrity to protect against physical damage due to front and side impacts that would prevent the retrieval of data. To demonstrate these capabilities, Option 1 or Option 2 applies at the choice of the manufacturer.

Option 1:

EDR's shall withstand mechanical shocks at a severity level as specified in the component test of Annex 9C of the 03 or any later series of amendments to UN Regulation No. 100. The devices shall be connected to the test fixture only by the intended mountings provided for the purpose of attaching the event data recorders to the vehicle and in an orientation representative of the vehicle installation.

EDR device(s) shall be mounted in the vehicle cab/passenger compartment or in a position of sufficient structural integrity to protect against physical damage (mechanical integrity) that would prevent the retrieval of data at least in front and side impacts of a severity level corresponding to the mechanical shock requirements above. For positions outside the vehicle cab/passenger compartment, the sufficient structural integrity shall be demonstrated to the technical service together with appropriate documentation (e.g. calculations or simulations).

Option 2:

The manufacturer demonstrates that data is retrievable even after an impact of a severity level set by UN Regulations Nos. 94 (Annex 3), 95 (Annex 4) or 137 (Annex 3) [~~e.g. for M₂ / N₂ vehicles derived from M₁ / N₁~~].

Justification:

The proposed addition provides specifications regarding the shock and crush resistance need for heavy duty applications. It also provides an option that permits manufacturers to demonstrate such protection using actual crash impact testing.

Section 5. Specifications, renumber paragraph to read:

{5.56. It shall not be possible to deactivate the Event Data Recorder}.

Appendix

Proposed amendments to *Proposal for a New UN Regulation Concerning the Approval of Event Data Recorders for Heavy Duty Vehicles* with changes marked in bold for new or strikethrough for deleted characters. Potential amendments that are still in discussion are included in brackets [].

I. Proposal

"UN Regulation No. XXX¹

Uniform Provisions Concerning the Approval of Event Data Recorders (EDR) for Heavy-Duty Vehicles

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¹ The Regulation number will be known when this UN Regulation enters into force. [XXX] will be replaced by the Regulation number once determined.

0. Foreword

- 0.1. **The intention of this Regulation is to establish uniform provisions concerning the approval of motor vehicles in the categories M₂, M₃, N₂ and N₃ with regard to their Event Data Recorders (EDRs).**

~~The provisions concern performance elements contained in this document provide guidance and/or specifications for vehicles fitted with Event Data Recorders (EDRs) specifically the minimum collection, storage, and crash survivability of the motor vehicle crash event data. These performance elements do~~ **It does** not include specifications for data retrieval tools and methods which are subject to national or regional level requirements.

- 0.2. The purpose of these ~~performance elements~~ **provisions** is to ensure that EDRs record, in a readily usable manner, data valuable for effective crash investigations and for analysis of safety equipment performance **while limiting, to the extent possible, the recording of data unrelated to the crash.** ~~Such crash~~ These data will help provide a better understanding of the circumstances in which crashes and injuries occur and will facilitate the development of safer vehicle designs. In this context, crashes should be understood as involving property damage and/or personal harm, including that of vulnerable road users involved.

- [0.2.1 **It is understood that, in the current state of technology, the aforementioned objective can be reached only by recording the data in a specified time period based on defined triggers and trigger thresholds. These triggers may, but do not always immediately precede or follow or coincide with the crash.**]

- 0.3. Contracting parties may but are not required to make EDR requirements mandatory for M₂, M₃, N₂ and N₃ vehicles.

1. Scope

- 1.1. This ~~guidance~~ **Regulation** applies to ~~vehicles of categories all Heavy Duty Vehicles (HDV)* (i.e., 1958 Agreement M₂, M₃, N₂ and N₃ * vehicle categories and 1998 Agreement Category 1-2 vehicles and Category 2 vehicles).~~

~~[* For vehicles of categories M₂ and N₂, Contracting Parties that are signatories to both UN Regulation No. 160 and this (new EDR HDV) UN Regulation shall recognize approvals to either Regulation as equally valid.]~~

~~[* Requirements of this regulation are deemed to be met if the requirements of UN Regulation No. 160 are fulfilled.]~~

- 1.2. This ~~guidance~~ **Regulation** is without prejudice to the requirements of national or regional laws.
- 1.3. The following data elements are excluded from the scope: Vehicle Identification Number (VIN), associated vehicle details, location/positioning data, information on the driver, and date and time of an event.
- 1.4. If there is no system or sensor designed to provide the **trigger indicated in 5.3.1.3 table of active [passive] safety systems** or data element to be recorded and stored under section 5, in the format (range, resolution, and sample rate) indicated in Annex ~~4~~. "DATA ELEMENTS" or it is not operational at the time of **reaching a specific trigger condition as indicated in 5.3.1** or recording, this document requires neither recording of such data nor fitting or

* As defined in Section 2 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document ECE/TRANS/WP.29/78/Rev.6) – <https://unece.org/transport/standards/transport/vehicle-regulations-wp29/resolutions>.

making such systems or sensors operational. However, if the vehicle is fitted with an original equipment manufacturer sensor or system designed to provide the **trigger indicated in 5.3.1.3** or data element in the format specified in Annex 4. "DATA ELEMENTS", then it is mandatory to report the data element in the specified format when the sensor or system is operational. In the case the reason for not being operational at the time of recording is a failure of this system or sensor, this failure state shall be recorded by the EDR as defined in the data elements Annex 4. Data elements.

2. Definitions

For the purposes of this Regulation:

- [2.1. *“Accelerator pedal position”* means the ratio of the throttle pedal opening (driver’s operation) measured as a percentage.]
- ~~2.2. *“Accident emergency call status”* means the operating status of the emergency call system.~~
- [2.3. *“Adaptive cruise control status”* means the control status of the adaptive cruise control system.]
- [2.4. *“Antilock braking system”* means **a system which detects wheel slip and automatically modulates the pressure producing the braking forces at the wheel(s) to limit the degree of wheel slip.**~~(add definition)~~]
- [2.5. *“Antilock brake system status – tractor”* indicates the status of the antilock brake system on the vehicle/tractor.]
- [2.6. *“Antilock brake system status – trailer”* indicates the status of the antilock brake system on trailer(s).]
- [2.7. ~~*“Automatic Advanced emergency braking system”*~~ means **a system which can automatically detect a potential 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.** ~~(add definition).~~]
- [2.8. ~~*“Automatic Advanced emergency braking system status”*~~ means the system state of the ~~automatic advanced~~ **emergency braking system.**] add clarifying sentence
- [2.9. *“Brake status parking”* indicates the status of the switch that is installed to detect whether or not the parking brake has been applied.]
- ~~2.10. *“Blind spot warning system status”* means the operating status of the blind spot warning system.~~
- [2.11. *“Brake status service”* indicates the status of the switch that is installed in the brake system to detect whether the service brake has been applied.]
- [2.12. *“Crash [impact mitigation] system activation notification”* indicates the detection and type of crash by the installed crash mitigation system.]
- [2.13. *“Cruise control **status states**”* means the control status of the [**conventional road speed adaptive**] cruise control system.]
- [2.14. *“Delta-V, longitudinal”* means the cumulative change in velocity, as recorded by the EDR of the vehicle, along the longitudinal axis.]
- [2.15. *“Distance to forward vehicle”* means the distance to the preceding vehicle situated within 250m in the same lane and moving in the same direction.]
- [2.16. ~~*“Electronic Stability control”*~~ ~~means (add definition)~~ ***“Vehicle stability function”* means an electronic control function for a vehicle which improves the dynamic stability of the vehicle.**

- 2.16.1 A vehicle stability function includes one or both of the following:
- (a) Directional control
 - (b) Roll-over control
- 2.16.2 Control functions within a vehicle stability function:
- 2.16.2.1 "**Directional control**" means a function within a vehicle stability function that assists the driver, in the event of under steer and over steer conditions, within the physical limits of the vehicle in maintaining the direction intended by the driver in the case of a power-driven vehicle, and assists in maintaining the direction of the trailer with that of the towing vehicle in the case of a trailer.
- 2.16.2.2 "**Roll-over control**" means a function within a vehicle stability function that reacts to an impending roll-over in order to stabilise the power-driven vehicle or towing vehicle and trailer combination or the trailer during dynamic manoeuvres within the physical limits of the vehicle.
- Note - The system may also be referred to as "Electronic Stability Control" in other publications or countries.**
- [2.17. "Engine hours" means the number of hours that the engine has been operating from the time of the first use of the control unit to the time of the event trigger.]
- [2.18. "Engine load" means the per cent of available engine torque being generated.]
- [2.19. "Engine speed" means the rotational speed of the engine output shaft.]
- 2.20. "Event" means a crash or other physical occurrence that causes the trigger threshold to be met or exceeded.
- 2.21. "Event Data Recorder" (EDR) means a ~~device or function~~ **system** in a vehicle, **the purpose of which is to record** ~~that records~~ the vehicle's dynamic, time-series data during the time period just prior to an event (e.g. vehicle speed versus time) or during ~~a crash an event~~ [(e.g. delta V versus time)], intended for retrieval after ~~the a~~ crash event. ~~For the purposes of this definition, the event data does not include audio and video data.~~
- [2.22. "Event data recording complete" indicates whether a complete set of data that the event data recording device is designed to capture was successfully recorded by and stored in the device.]
- [2.23. "Event date" means the date when the **[recorded]** event occurred.]
- [2.24. "Event time" means the time when the **[recorded]** event occurred.]
- ~~2.25. "HD EDR" means event data recorder for heavy duty vehicles.~~
- 2.26. "**Event data recorder HD EDR unit hardware part number**" means the part number for the ~~HD~~ EDR unit.
- 2.27. "**Event data recorder HD EDR unit software part number**" means the part number/version number for the ~~HD~~ EDR software.
- [2.28. "Ignition cycle, crash" means the number (count) of power mode cycles at the time when the [crash or triggered] event occurs.]
- [2.29. "Ignition cycle download" means the number (count) of power mode cycles at the time when the data was downloaded since the first use of the EDR.]
- [2.30. "Lane departure warning system state" indicates the status of the lane departure warning system.]
- [2.31. "Latitude" means the vehicle position using GPS at the time of the **[recorded]** event.]
- [2.32. "Longitude" means the vehicle position using GPS at the time of the **[recorded]** event.]

- [2.33. “*Maximum delta-V, lateral*” means the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral axis.]
- ~~[2.34. “*Maximum delta-V, lateral*” means the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral axis.]~~
- [2.35. “*Maximum delta-V, longitudinal*” means the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the longitudinal axis.]
- ~~2.36. “*Non zero crash type*” means (add definition).~~
- [2.37. “*Odometer*” means the total vehicle distance travelled at the time of the event trigger.]
- [2.38. “*Pre-crash acceleration, lateral*” means (add definition).]
- [2.39. “*Pre-crash acceleration, longitudinal*” means (add definition).]
- [2.40. “*Rear axle ratio*” is the ratio of the transmission output shaft speed to the tyre rotation rate.]
- [2.41. “*Retarder torque mode*” means the state signal which indicates which retarder torque mode is currently generating, limiting, or controlling the retarder torque.]
- [2.42. “*Roll angle*” means **the angle around which the vehicle rotates in its longitudinal direction.** ~~(add definition).~~]
- [2.43. “*Rollover protection engine control*” means the stability control of engine retarder for rollover protection.]
- [2.44. “*Roll rate*” means **the speed per unit time at which the vehicle rotates in its longitudinal direction.** ~~(add definition).~~]
- [2.45. “~~Safety~~ **Supplemental restraint system**” means **a passive safety system as declared by the vehicle manufacturer, supplementing the restraint system as defined by UN R16, with components such as airbags or seatbelt pretensioners.** ~~(add definition).~~]
- [2.46. “~~Safety~~ **Supplemental restraint system status**” mean the operating status of ~~safety~~ **supplemental** restraint system(s).]
- [2.47. “*Seat belt status (driver)*” indicates whether the driver’s seat belt is buckled.]
- [2.48. “*Seat belt status (passenger)*” indicates whether the **[front outboard]** passenger’s seat belt is buckled.]
- [2.49. “*Speed of forward vehicle*” means the velocity of the preceding vehicle situated within 250m in the same lane and moving in the same direction.]
- [2.50. “*Stability control braking*” means the stability control of wheel brakes for the rollover protection or the yaw control.]
- [2.51. “*Steering wheel angle*” means the angle of the steering shaft connected to the driver control.”]
- [**x.xx** “**System intervention**” means **the activation of a system, as defined by the manufacturer [to the satisfaction of the type approval authority].**]
- [2.52. “*Time to collision with relevant object*” means the duration after which the predicted travelling paths of the host vehicle and the relevant object lead to a distance of 0m between both.]
- [2.53. “*Time, maximum delta-V, lateral*” means the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the lateral axis.]

- [2.54. “Time, maximum delta-V, longitudinal” means the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the longitudinal axis.]
- [2.55. “Time, maximum delta-V, resultant” means the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the lateral and longitudinal axis.]
- 2.56. “Time zero” is the time reference for the EDR data timestamps of an event.
- [2.57. “Tyre pressure monitoring system status” means the operating status of the tyre pressure monitoring system.]
- [2.58. “Tyre size [*designation*]” is the tyre size [**designation per UN R30**] [in revolutions per km.]
- 2.59. “Trigger threshold” means the appropriate parameter has met the conditions for recording an EDR event.
- [2.60. “Trigger threshold activated” indicates which trigger threshold was activated to cause the recording of the event.]
- [2.61. “Vehicle dynamic control system state” means the operational state of the vehicle dynamic control state.]
- [2.62. “Vehicle configuration” means the [**component identification and software identification**] ~~Parameter Group Number (PGN) 65259 and PGN 65242~~ for available Electronic Control Unit (ECU) hardware and software part numbers.]
- [2.63. “Vehicle make” means the name of the vehicle manufacturer.]
- x.xx “**Vehicle master control switch**” means the device by which the vehicle’s on-board electronics system is brought, from being switched off, as in the case where a vehicle is parked without the driver being present, to normal operation mode.
- [2.64. “Vehicle model” means the vehicle’s model name/number.]
- [2.65. “Vehicle safety system manifest” is a manifest of the significant active safety systems fitted to the vehicle.]
- [2.66. “Vehicle speed” means the longitudinal speed of the vehicle that is calculated or estimated from the Vehicle Speed Sensor (VSS).]
- 2.xx. “**Vehicle type with regard to its Event Data Recorder**” means vehicles which do not differ significantly in such essential aspects as:
- (a) The manufacturer’s trade name or mark;
 - (b) Vehicle features which significantly influence the performances of the EDR; Addition of new trigger(s), new data (elements), or modification in their format, shall not be considered as “significantly influencing the performance of EDR”;
 - (c) The main characteristics and design of the EDR.
- ~~2.67. “VRU Proxi System” means a set of sensors and/or logic which provides warning of vulnerable road users in close proximity. (e.g. UN Regulations Nos. 159 and 151)~~
- [2.68. “Vulnerable road user secondary safety system” means a deployable vehicle system outside the occupant compartment designed to mitigate the injury consequences to vulnerable road users during a collision.]
- [2.69. “Vulnerable road user secondary safety system status” indicates the operating status of the vulnerable road user secondary safety system.]
- [2.70. “Yaw control of engine retarder” means the stability control of engine retarder for yaw control.]

- [2.71. “Yaw control of wheel brakes” means the stability control of wheel brakes for yaw control.]

3. Application for Approval

- 3.1. The application for approval of a vehicle type with regard to its EDR shall be submitted by the vehicle manufacturer or by its authorized representative to the approval authority of the Contracting Party according to the provisions of Schedule 3 of the 1958 Agreement.
- 3.2. It shall be accompanied by the following documentation (a model of the information document is given in Annex 2):
- 3.2.1. A description of the vehicle type with regard to the items specified in paragraph 5. below, in particular related to the location of the EDR in the vehicle, the triggering parameters, storing capacity and the resistance to high deceleration and mechanical stress of a severe impact;
- 3.2.2. The data elements and format stored in the EDR;
- 3.2.3. Instructions for retrieving the data from the EDR.
- 3.3. A vehicle representative of the vehicle type to be approved shall be submitted to the approval authority or its designated technical service responsible for conducting the approval tests.

4. Approval

- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5. below approval of that vehicle type shall be granted. **Alternatively, approval shall be granted, at the request of the manufacturer and in case of a vehicle type equipped with deployable restraint system with GVW up to [12t], if that vehicle type meets the technical requirements of the 01 or later series of amendments to UN Regulation No.160.”**
- 4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00 for the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of vehicle.
- 4.3. Notice of approval or of extension or of refusal or of withdrawal of approval or of production definitively discontinued of a vehicle type pursuant to this Regulation shall be communicated to the Contracting Parties to the Agreement applying this Regulation by means of a form conforming to the model in Annex 1 to this Regulation and documentation supplied by the applicant being in a format not exceeding A4 (210 × 297mm) and on an appropriate scale or electronic format.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark conforming to the model described in Annex 3, consisting of:
- 4.4.1. A circle surrounding the letter "E" followed by:
- (a) The distinguishing number of the country which has granted approval; and
 - (b) The number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in this paragraph.

- 4.5. The approval mark shall be clearly legible and be indelible.
- 4.6. The approval authority shall verify the existence of satisfactory arrangements for ensuring effective checks on conformity of production before type-approval is granted.

5. Specifications

Requirements for vehicles fitted with an EDR include data elements, data format and data capture.

- 5.1. Data elements
 - 5.1.1. Each vehicle fitted with an EDR shall record the data elements specified as mandatory and those required under specified minimum conditions during the interval/time and at the sample rate specified in Annex 4.
- 5.2. Data format
 - 5.2.1. Each data element recorded shall be reported as specified in Annex 4, Table 1.
- 5.3. Data capture

The EDR **shall capture** captures data which shall be written to a non-volatile memory when any of the triggers in paragraph 5.3.1. occur ~~[with the exception of last stop which may have a delay].~~

The EDR shall record the captured data in the vehicle and this data shall remain in the vehicle subject to the provisions of paragraph 5.3.4, at least until they are retrieved in compliance with national or regional legislation, or they are overwritten in compliance with paragraph 5.3.4.

The EDR non-volatile memory buffer shall accommodate the data related to at least ~~[five]~~**[three]** different events.

The data elements for every event shall be captured and recorded by the EDR, as specified in paragraph 5.1. in accordance with the following conditions and circumstances:

- 5.3.1. **Conditions for triggering** ~~which trigger~~ recording of data
 - An event shall be recorded by the EDR if one of the following threshold values is met or exceeded. [Triggers that occur such that an overlap of data between events would result may be excluded.]
 - 5.3.1.1. Sudden Deceleration: Change in longitudinal vehicle velocity ~~between 8.0 and 22.5 km/h/s~~ **greater than 3.25 m/s² km/h/s** and persists beyond that threshold for at least 0.75 seconds.
 - ~~[5.3.1.2. [Last Stop:] The vehicle speed is reported as 0 [(which may wait for 15 seconds or less after)]. [The last stop trigger cannot reoccur until the vehicle speed reaches a speed of 24.0 km/h (14.9 mph) or more for a minimum of 6 seconds.] The act of turning the ignition off [or on] will not directly trigger a last stop event.]~~
 - 5.3.1.3. Activation of an ~~active or passive~~ safety system is showed in the table below:

<i>System (if fitted)</i>	<i>Trigger</i>
Supplemental Safety Restraint System	Deployment Command of a Supplemental Restraint System Non-zero crash type
Antilock Braking System	System Intervention Antilock Braking System active

<i>System (if fitted)</i>	<i>Trigger</i>
Automatic Advanced Emergency Braking (including pedestrian/cyclist if equipped)	Emergency Brake Intervention Automatic Emergency Braking active
Vehicle Stability Function Electronic Stability Control	System Intervention Yaw control or Roll-Over (foundation) Brake control
{Vulnerable Road User Secondary Safety System}	{System Intervention}

~~[5.3.2. Conditions that trigger the for recording to non-volatile memory and locking of data.~~

5.3.2.1 The EDR shall capture data which shall be written to non-volatile memory when any of the triggers in paragraph 5.3.1. occur.

[In case of the last stop trigger data shall be written to non-volatile memory only if at least one of the following criteria apply:

- 4. Deactivation of vehicle master control switch**
- 5. ~~[Opening of driver's door]~~ [Opening of the driver's door [if fitted]]**
- 6. The vehicle speed is reported as 0 for [15]/[20] seconds or longer and the vehicle speed reached 24.0 km/h (14.9 mph) or more for a minimum of 6 seconds since the previous last stop recording.**

[The manufacturer may, at its own discretion, add criteria that prevent writing to non-volatile memory for specific vehicle applications.]

Time zero for the event record shall be the point in time defined in 5.3.1., irrespective of the criterion for writing to non-volatile memory. Only one event record [is required to] [shall] be created for the same time zero, even if more than one criterion apply or if a criterion applies repeatedly.

5.3.2.2 In all the cases with supplemental restraint system activation, the memory for the event shall be locked to prevent any future overwriting of the data by subsequent event.

~~Writing to non-volatile memory for the last stop trigger may be delayed by up to 15 seconds or as part of key-off shutdown process whichever comes first. The write of the last stop shall not occur unless the vehicle speed reached a speed of 24.0 km/h (14.9 mph) or more for a minimum of 6 seconds since the last write. However, in case of power or communication failure (paragraph 5.3.3), data recording is not needed.]~~

5.3.3. Conditions for the establishment of time zero

Time Zero is established by the occurrence of any of the above triggers ~~[whereby the last stop time zero shall be the time when speed is reported as 0]~~

[5.3.4. Overwriting]

5.3.4.1 If an EDR non-volatile memory buffer void of previous-event data is not available, the recorded data shall, subject to the provisions of paragraph 5.3.2.2, be overwritten by the current event data, on a first-in first-out basis, or according to different strategies decided by the manufacturer and made available to the relevant authorities of Contracting Parties.

5.3.4.2 Furthermore, if an EDR non-volatile memory buffer void of previous-event data is not available, data originating from supplemental restraint system events shall always overwrite any other data that is not locked per paragraph 5.3.2.2.

5.3.5. Power and Communication failure

Data recorded in the non-volatile memory is retained after a loss of power. However, data need not be recorded when the power or the communication is lost to the device hosting the EDR or systems providing data.

5.4. Survivability

- 5.4.1 **The data elements listed in Annex 4 shall be retrievable in the format specified even after an impact. Therefore, event data recorders shall resist inertial loads which may occur during a vehicle crash and be mounted in the vehicle in a position of sufficient structural integrity to protect against physical damage due to front and side impacts that would prevent the retrieval of data. To demonstrate these capabilities, Option 1 or Option 2 applies at the choice of the manufacturer.**

Option 1:

EDR's shall withstand mechanical shocks at a severity level as specified in the component test of Annex 9C of the 03 or any later series of amendments to UN Regulation No. 100. The devices shall be connected to the test fixture only by the intended mountings provided for the purpose of attaching the event data recorders to the vehicle and in an orientation representative of the vehicle installation.

EDR device(s) shall be mounted in the vehicle cab/passenger compartment or in a position of sufficient structural integrity to protect against physical damage (mechanical integrity) that would prevent the retrieval of data at least in front and side impacts of a severity level corresponding to the mechanical shock requirements above. For positions outside the vehicle cab/passenger compartment, the sufficient structural integrity shall be demonstrated to the technical service together with appropriate documentation (e.g. calculations or simulations).

Option 2:

The manufacturer demonstrates that data is retrievable even after an impact of a severity level set by UN Regulations Nos. 94 (Annex 3), 95 (Annex 4) or 137 (Annex 3) [e.g. for M2 / N2 vehicles derived from M1 / N1.]

- {5.536. It shall not be possible to deactivate the Event Data Recorder.}

6. Modification of Vehicle Type and Extension of Approval

- 6.1. Every modification of the vehicle type as defined in paragraph 2.x of this Regulation shall be notified to the approval authority which approved the vehicle type. The approval authority may then either:
- 6.1.1. Consider that the modifications made do not have an adverse effect on the conditions of the granting of the approval and grant an extension of approval;
- 6.1.2. Consider that the modifications made affect the conditions of the granting of the approval, and require further tests or additional checks before granting an extension of an approval.
- 6.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3. above to the Contracting Parties to the Agreement applying this Regulation.
- 6.3. The approval authority shall inform the other Contracting Parties of the extension by means of the communication form conforming to the model in Annex 1 of this Regulation. It shall assign a serial number to each extension, to be known as the extension number.

7. Conformity of Production

- 7.1. Procedures for the conformity of production shall conform to the general provisions defined in Article 2 and Schedule 1 to the Agreement (E/ECE/TRANS/505/Rev.3) and meet the following requirements:
- 7.2. A vehicle approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements of paragraph 5. above;
- 7.3. The approval authority which has granted the approval may at any time verify the conformity of control methods applicable to each production unit. The normal frequency of such inspections shall be once every two years.

8. Penalties for Non-Conformity of Production

- 8.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 7. above are not complied with.
- 8.2. If a Contracting Party withdraws an approval it had previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by sending them a communication form conforming to the model in Annex 1 to this Regulation.

9. Production Definitively Discontinued

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, the holder shall so inform the approval authority which granted the approval, which in turn shall forthwith inform the other Contracting Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this UN Regulation.

10. Names and Addresses of the Technical Services Responsible for Conducting Approval Tests and of Type Approval Authorities

The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat² the names and addresses of the technical services responsible for conducting approval tests and of the approval authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval are to be sent.

² The online platform "/343 Application" provided by ECE is for the exchange of this information https://apps.unece.org/WP29_application/.

Annex 1

Communication

(Maximum format: A4 (210 x 297 mm))



issued by : (Name of administration)

- Concerning: ²
- Approval granted
 - Approval extended
 - Approval refused
 - Approval withdrawn
 - Production definitively discontinued

of a vehicle type with regard to its Event Data Recorder (EDR) pursuant to UN Regulation No. XXXX.

Approval No.:

Reason(s) for extension (if applicable):

1. Trade name or mark of the vehicle:
2. Vehicle type:
3. Name and address of manufacturer:
4. If applicable, name and address of manufacturer's representative:
5. Brief description of vehicle:
6. Technical service responsible for conducting the approval tests:
- 6.1. Date of report issued by that service:
- 6.2. Number of report issued by that service:
7. Approval granted/refused/extended/withdrawn:²
8. Position of approval mark on the vehicle:
9. Place:
10. Date:
11. Signature:
12. The list of documents deposited with the approval authority which has granted approval is annexed to this communication.

¹ Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in this Regulation).

² Strike out what does not apply.

Annex 2

Information Document on the Type Approval of a Vehicle Type with Regard to its Event Data Recorder

A list of contents shall be included.

Any drawings shall be supplied in an appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.

Photographs, if any, shall show sufficient detail.

General

1. Trade name or mark of vehicle:
2. Vehicle type:
3. Means of identification of type, if marked on the vehicle:
4. Location of the marking:.....
5. Location of and method of affixing the approval mark:
6. Category of vehicle:
7. Name and address of manufacturer:.....
8. Address(es) of assembly plant(s):
9. Photograph(s) and/or drawing(s) of a representative vehicle:.....
10. EDR
 - 10.1. Make (trade name of manufacturer):.....
 - 10.2. Type and general commercial description(s):
 - 10.3. Drawing(s) or photographs showing the location and method of attachment of the EDR in the vehicle:
 - 10.4. Description of the triggering parameter:
 - 10.5. Description of any other relevant parameter (storing capacity, resistance to high deceleration and mechanical stress of a severe impact, etc.):
 - 10.6. The data elements and data format stored in the EDR:

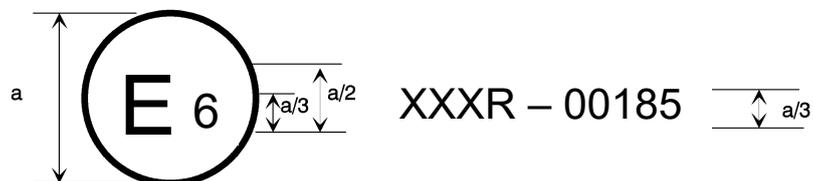
<i>Data element</i>	<i>Recording interval/time (relative to time zero)</i>	<i>Data sample rate (samples per second)</i>

- 10.7. Instructions for retrieving the data from the EDR:

Annex 3

Arrangements of Approval Marks

(see paragraphs 4.4. to 4.4.2. of this Regulation)



$a = 8 \text{ mm min}$

The above approval mark affixed to a vehicle shows that the vehicle type with regard to its EDR concerned has been approved in Belgium (E 6) pursuant to UN Regulation No. XXX. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of UN Regulation No. 160 in its original form.

Annex 4

Data Elements and Format ⁵

Header refers to items that should have a single value established at trigger or before the event. Data in pre-trigger shall be reported at least two values per second for at least 5 seconds before a trigger.

Table 1

List of Data Elements [Note - An Alternative Data Element Table Format Aligned with UN Regulation No. 160 is Under Consideration.]

<i>Data Element</i>	<i>Description</i>
[Event Data Recording Complete]	[This data indicates whether a complete set of data that the event data recording device is designed to capture was successfully recorded by and stored in the device.]
Event Date [exclude from scope]	The date when the event occurred.
[Engine Hours]	The number of hours that the engine has been operating from the time of control unit first use to the time of the event trigger.
[Odometer]	Total vehicle distance at the time of the event trigger.
Latitude [exclude from scope]	Vehicle position using GNSS at the time of the event.
Longitude [exclude from scope]	Vehicle position using GNSS at the time of the event.
Event Time [exclude from scope]	The time when the event occurred.
HD EDR Unit Hardware Part #	The part number for the HD EDR unit.
HD EDR Unit Software Part #	The part number/software version number for the HD EDR software.
Vehicle Make	The name of the vehicle manufacturer.
Vehicle Model	The vehicle's model name/number.
Rear Axle Ratio [pending more info from SAE expert]	Ratio of transmission output shaft speed to tyre rotation rate,
Tyre Size [pending more info from SAE expert]	Tyre size in revolutions per km.
Trigger Thresholds	Lists the currently configured trigger threshold(s).
Trigger Threshold Activated	Indicates which Trigger Threshold was activated to cause the recording the event.
Vehicle Configuration	

⁵ Format requirements specified below are minimum requirements and manufacturers can exceed them.

<i>Data Element</i>	<i>Description</i>
[Vehicle Safety System Manifest]	Manifest of key vehicle safety systems fitted to the vehicle.
[Ignition cycle, crash]	The number (count) of power mode cycles at the time when the crash event occurred since the first use of the EDR.
[Ignition cycle, download]	The number (count) power mode cycles at the time when the data was downloaded since the first use of the EDR.
Vehicle Speed	The longitudinal speed of the vehicle that is calculated or estimated from the Vehicle Speed Sensor (VSS).
Retarder Torque Mode	State signal which indicates which retarder torque mode is currently generating, limiting, or controlling retarder torque.
Brake Status – Parking	Indicates the status of the switch that is installed to detect whether or not the parking brake has been applied.
Brake Status – Service	Indicates the status of the switch that is installed in brake system to detect whether the service brake has been applied. This switch is usually used to turn on the brake lamps.
Engine Speed	Rotational speed of the engine output shaft.
Engine Load	Per cent of available engine torque being generated.
Accelerator Pedal Position	Ratio of the throttle pedal opening (driver's operation) in per cent.
Anti-lock Braking System (ABS) Brake Control Status – Tractor	Indicates the status of the ABS brake control system on the vehicle/tractor, active or not active.
ABS Brake Control Status – Trailer	Indicates the status of the ABS brake control system on trailer(s), active or not active. Active if ABS brake control is active for any trailer.
ACC Mode	Control status of Adaptive Cruise Control (ACC).
Cruise Control States	The current state, or mode, of operation by the cruise control device.
Automatic Emergency Braking	Forward Collision Advanced Emergency Braking System state.
Time to Collision with Relevant Object [not required]	The time to collision is the duration after which the predicted travelling paths of host vehicle and relevant object lead to a distance of 0m between both.
Speed of Forward Vehicle [not required]	Absolute velocity of the preceding vehicle situated within 250 m in the same lane and moving in the same direction.
Distance to Forward Vehicle [not required]	Distance to the preceding vehicle situated within 250 m in the same lane and moving in the same direction.
Lane Departure Warning System State	Indicates the status of lane departure warning system.
Steering wheel angle	Angle of the steering shaft connected to driver control.

<i>Data Element</i>	<i>Description</i>
Rollover Protection Engine Control	Stability control of engine retarder for rollover protection.
Stability Control Braking [only on foundation brake application/control]	Stability control of wheel brakes for Roll Over Protection or Yaw Control.
Yaw Control of Engine Retarder	Stability control of engine retarder for yaw control.
Yaw Control of Wheel Brakes	Stability control of wheel brakes for yaw control.
Vehicle Dynamic Control (VDC) System State	VDC operational state. (Can this be combined into a single signal with stability control above?)
Blind Spot Warning System Status	Operating status of the blind spot warning system.
Crash [Impact Mitigation] System Activation Notification	Indicates detection and type of crash by installed crash mitigation system.
Seat Belt Status (Driver)	Shows if buckled or not.
Seat Belt Status (Passenger)	Shows if buckled or not.
Safety Restraint System Status	Operating status of safety restraint system(s).
[Delta-V, longitudinal]	The cumulative change in velocity, as recorded by the EDR of the vehicle, along the longitudinal axis.
[Maximum delta-V, longitudinal]	The maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the longitudinal axis.
[Time, maximum delta-V, longitudinal]	The time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the longitudinal axis.
[Maximum delta-V, lateral]	The maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral axis.
[Time, maximum delta-V, lateral]	The time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the lateral axis.
[Maximum delta-V, resultant]	The maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral and longitudinal axis.
[Time, maximum delta-V, resultant]	The time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the lateral and longitudinal axis.
[Roll angle]	
[Roll rate]	

<i>Data Element</i>	<i>Description</i>
[Pre-crash acceleration, longitudinal]	10 Hz
[Pre-crash acceleration, lateral]	10 Hz
Accident Emergency Call System Status	Operating status of the emergency call system.
VRU System Status	Operating status of the VRU system.
Tyre Pressure Monitoring System Status	Operating status of the tyre pressure monitoring system.
