

EDR/DSSAD IWG Revisions to ECE/TRANS/WP29/GRSG/2023/14

The revisions detailed below reflect the consensus of the EDR/DSSAD IWG following the original submission of the ECE/TRANS/WP29/GRSG/2023/14 document.

Document - ECE/TRANS/WP29/GRSG/2023/14 (IWG on EDR/DSSAD) Guidance on Heavy Duty Event Data Recorder Performance Elements Appropriate for Adoption in 1958 and 1998 Agreement Resolutions or Regulations

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/2023/14. 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 performance elements contained in this document provide guidance and/or specifications for **heavy duty** 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 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 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:

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 to read:

- 1.1. ~~This guidance applies to 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 guidance are deemed to be met if the requirements of UN Regulation No. 160 are fulfilled.]~~

This document applies to heavy-duty vehicles (Vehicle categories M2, M3, N2, N3 or Categories 1-2 and 2)

Contracting parties shall recognize as equally valid compliance with the requirements of the “light-duty EDR” or the “new HDCV-EDR” for vehicles equipped with airbag deployable supplemental restraint system with GVW up to [12 t], at the request of the manufacturer.

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 1. Scope, amend paragraph 1.4 to read:

- 1.4. If there is no system or sensor designed to provide the **trigger indicated in 3.3.1.3 table of active [passive] safety systems** or data element to be recorded and stored under section 3, in the format (range, resolution, and sample rate) indicated in Annex 1. "DATA ELEMENTS" or it is not operational at the time of **reaching a specific trigger condition as indicated in 3.3.1** 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 3.3.1.3** or data element in the format specified in Annex 1. "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 1. Data elements.

Justification:

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 duplicative.

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

- [x.xx **“System intervention” means the activation of a system, as defined by the 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.**

Justification:

The proposed new definitions are needed to define new concepts (system intervention) and vehicle systems (Vehicle master control switch instead of “ignition key” and in line with other UN Resolutions and Regulations).

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~~ **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 national seat belt requirements, with components such as airbags or seatbelt pre-tensioners.** ~~(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 established standards]** [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 3. Specifications, amend paragraph 3.0 to remove bracket:

{3. Specifications

Justification:

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

Section 3. Specifications, amend paragraph 3.3 Data capture to read:

3.3. Data capture

The EDR shall capture data which shall be written to non-volatile memory when any of the triggers in paragraph 3.3.1. occur [~~with the exception of last stop which may have a delay~~].

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 ~~35.1.~~ in accordance with the following conditions and circumstances:

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 3. Specifications, amend paragraphs 3.3.1 to 3.3.1.3 (Conditions for triggering recording of data) to read:

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

[3.3.1.2. [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.~~]

3.3.1.3. 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
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

<i>System (if fitted)</i>	<i>Trigger</i>
{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 3. Specifications, amend paragraphs 3.3.2 to 3.3.2.2 (Conditions for recording) to read:

~~{3.3.2. Conditions for triggering locking of recording to non-volatile memory and locking of data.~~

3.3.2.1 The EDR shall capture data which shall be written to non-volatile memory when any of the triggers in paragraph 3.3.1. 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 3.3.1, 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.]

3.3.2.2 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 last stop shall not happen 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 (3.3.3), 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 3. Specifications, add paragraphs 3.3.4.1 and 3.3.4.2 (Overwriting) to read:

- 3.3.4.1** 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 3.3.2.2, 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.
- 3.3.4.2** 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 3.3.2.2.

Justification:

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

Section 3. Specifications, add paragraphs 3.4 to 3.4.1 (Survivability) to read:

- 3.4. Survivability**
- 3.4.1** The data elements listed in Annex 1 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 3. Specifications, renumber paragraph to read:

[3.56. It shall not be possible to deactivate the Event Data Recorder].

Appendix

Proposed amendments to *Guidance on Heavy Duty Vehicles Event Data Recorder Performance Elements Appropriate for Adoption in 1958 and 1998 Agreement Resolutions or Regulations* 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

"Guidance on Heavy Duty Vehicles Event Data Recorder Performance Elements Appropriate for Adoption in 1958 and 1998 Agreement Resolutions or Regulations

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0. Foreword

- 0.1. The performance elements contained in this document provide guidance and/or specifications for **heavy duty** 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 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 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 applies to 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 guidance are deemed to be met if the requirements of UN Regulation No. 160 are fulfilled.]~~
- This document applies to heavy-duty vehicles (Vehicle categories M2, M3, N2, N3 or Categories 1-2 and 2)**
- Contracting parties shall recognize as equally valid compliance with the requirements of the “light-duty EDR” or the “new HDCV-EDR” for vehicles equipped with airbag deployable supplemental restraint system with GVW up to [12 t], at the request of the manufacturer.**
- 1.2. This guidance 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 3.3.1.3 table of active [passive] safety systems** or data element to be recorded and stored under section 3, in the format (range, resolution, and sample rate) indicated in Annex 1. "DATA ELEMENTS" or it is not operational at the time of **reaching a specific trigger condition as indicated in 3.3.1** 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 3.3.1.3** or data element in the format specified in Annex 1. "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 1. 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 national seat belt requirements, with components such as airbags or seatbelt pre-tensioners.** ~~(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.**]
- [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 established standards**] [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).]
- ~~2.67. “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. Specifications

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

- 3.1. Data elements
- 3.1.1. 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 1.
- 3.2. Data format

3.2.1. Each data element recorded shall be reported as specified in Annex 1, Table 1.

3.3. Data capture

The EDR shall capture data which shall be written to non-volatile memory when any of the triggers in paragraph 3.3.1. occur ~~[with the exception of last stop which may have a delay].~~

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 ~~35.1.~~ in accordance with the following conditions and circumstances:

3.3.1. Conditions for triggering 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.]

[3.3.1.1. 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.]

[3.3.1.2. [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.]

3.3.1.3. 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
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]

[3.3.2. Conditions for ~~triggering locking of~~ **recording to non-volatile memory and locking of** data.

3.3.2.1 The EDR shall capture data which shall be written to non-volatile memory when any of the triggers in paragraph 3.3.1. 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.] [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 3.3.1, 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.]

- 3.3.2.2** 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 last stop shall not happen 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 (3.3.3), data recording is not needed.]~~

- 3.3.3. Conditions for 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]

- [3.3.4. Overwriting]

- 3.3.4.1** 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 3.3.2.2, 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.

- 3.3.4.2** 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 3.3.2.2.

- 3.3.5. Power and Communication failure

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

- 3.4. Survivability**

- 3.4.1** The data elements listed in Annex 1 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.~~]

[3.56. It shall not be possible to deactivate the Event Data Recorder].

Annex

Data Elements and Format¹

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 2 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 per GNSS at the time of the event.
Longitude [exclude from scope]	Vehicle position per 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 tire rotation rate.
Tire Size [pending more info from SAE expert]	Tire 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	

¹ 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 emergency call system.
VRU System Status	Operating status of the VRU system.
Tyre Pressure Monitoring System Status	Operating status of the tire Pressure Monitoring System,
