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1958 Agreement:**Consideration of proposals for new UN Regulations submitted by the Working Parties subsidiary to the World Forum****Proposal of new UN Regulation concerning the Approval of Event Data Recorders for Heavy-Duty Vehicles****Submitted by the Working Party on General Safety *****Revision**

The text reproduced below was adopted by the Working Party on General Safety (GRSG) at its 126th session (ECE/TRANS/WP.29/GRSG/105). It is based on ECE/TRANS/WP.29/2023/134, as amended by GRSG-126-02-Rev.1. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their November 2023 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2023 as outlined in proposed programme budget for 2023 (A/77/6 (Sect. 20), table 20.6), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



"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. Introduction

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

The provisions concern the minimum collection, storage, and crash survivability of the motor vehicle crash event data. 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 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 greatest extent possible, the recording of data unrelated to the crash. Such crash 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.
- 0.3. 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.
- 0.4. Contracting parties may but are not required to make EDR requirements mandatory for M₂, M₃, N₂ and N₃ vehicles.

1. Scope

- 1.1. This Regulation applies to the approval of vehicles of categories M₂, M₃, N₂ and N₃* with regard to their Event Data Recorders (EDRs).
- 1.2. This Regulation is without prejudice to requirements of national or regional laws related to privacy, data protection and personal data processing.
- 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 the 5.3.1.3 table of safety systems or the data element to be recorded and stored under section 5, in the format (range, resolution, and sample rate) indicated in Annex 4. "Data Elements and Format" or it is not operational at the time of reaching a specific trigger condition as indicated in 5.3.1 or at the time of 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 the data element in the format specified in Annex 4. "Data Elements and Format", 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 Annex 4. "Data elements and format".

* As defined in Section 2 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document ECE/TRANS/WP.29/78/Rev.7) –<https://unece.org/transport/standards/transport/vehicle-regulations-wp29/resolutions>.

2. Definitions

For the purposes of this Regulation:

- 2.1. *"Accelerator pedal position"* means the actuation of the device that indicates the driver's demand for acceleration to the propulsion system given in percentage of measured range of the device. This can also cover one pedal drive that may be demanding negative torque or even service braking in lower ranges.
- 2.2. *"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.
- 2.3. *"Antilock brake system status – tractor"* indicates the status of the antilock brake system on the vehicle/tractor.
- 2.4. *"Antilock brake system status – trailer"* indicates the status of the antilock brake system on trailer(s).
- 2.5. *"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.
- 2.6. *"Brake status parking"* indicates the status of the switch that is installed to detect whether or not the parking brake has been applied.
- 2.7. *"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.
- 2.8. *"Vehicle stability function"* means vehicle stability control as defined by UN Regulation No. 13. The system may also be referred to as "Electronic Stability Control" in other publications or countries.
- 2.9. *"Propulsion system activation hours"* means the accumulated time that the propulsion system is activated including idle state.
- 2.10. *"Propulsion System Torque"* means the percentage of peak or reference torque.
- 2.11. *"Propulsion System Power"* means the instantaneous power provided by the propulsion system.
- 2.12. *"Propulsion system drive speed"* means the rotational speed of the output shaft of the propulsion system.
- 2.13. *"Event"* means a crash or other physical occurrence that causes the trigger threshold to be met or exceeded.
- 2.14. *"Event Data Recorder"* (EDR) means a device or function in a vehicle, the purpose of which is to record the vehicle's dynamic, time-series data during the time period just prior to, during, and after an event (e.g. vehicle speed versus time).
- 2.15. *"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.
- 2.16. *"End of event time"* means the moment at which the cumulative change in velocity within a 20 ms time period becomes 0.8 km/h or less, or the moment at which the crash detection algorithm of the air bag control unit resets.
- 2.17. *"EDR unit hardware part number"* means the part number for the EDR unit.
- 2.18. *"EDR unit software part number"* means the part number/version number for the EDR software.

- 2.19. *"Ignition cycle, event"* means the number (count) of power mode cycles as determined by the EDR ECU at the time when the event occurred since the first use of the EDR.
- 2.20. *"Ignition cycle, download"* means the number (count) power mode cycles as determined by the EDR ECU at the time when the data was downloaded since the first use of the EDR.
- 2.21. *"Lane departure warning system status"* indicates the status of the lane departure warning system.
- 2.22. *"Maximum delta-V, longitudinal"* means the maximum value of the cumulative change in velocity along the longitudinal axis of the vehicle within a time period of 300 ms after time zero or before the end of event time plus 30 ms, whichever is shorter.
- 2.23. *"Maximum delta-V, lateral"* means the maximum value of the cumulative change in velocity along the lateral axis of the vehicle within a time period of 300 ms after time zero or before the end of event time plus 30 ms, whichever is shorter.
- 2.24. *"Maximum delta-V, resultant"* means the time-correlated maximum value of the cumulative change in velocity, as reported by the EDR along the vector-added longitudinal and lateral axis.
- 2.25. *"Time for maximum delta-V"* means the time from time zero to the point where the maximum value of the cumulative change in velocity, as recorded by the EDR, is found.
- 2.26. *"Retarder torque mode"* indicates which function is currently generating, limiting, or controlling the retarder torque.
- 2.27. *"Roll angle"* means the angle around which the vehicle rotates about its longitudinal axis.
- 2.28. *"Rollover protection control system"* means the stability control of brakes for rollover protection.
- 2.29. *"Roll rate"* means the change of angle per unit time at which the vehicle rotates about its longitudinal axis.
- 2.30. *"Supplemental restraint system"* means a passive safety system as declared by the vehicle manufacturer, supplementing the restraint system as defined by UN Regulation No. 16, with components such as airbags or seatbelt pre-tensioners.
- 2.31. *"Safety belt status"* means the feedback from the safety system that the vehicle's safety belt is fastened or not fastened.
- 2.32. *"Steering wheel angle"* means the angle of the steering shaft connected to the driver control.
- 2.33. *"System intervention"* means the activation of a system, as defined by the manufacturer.
- 2.34. *"Parking brake system"* means the parking braking system as regulated by UN Regulation No. 13.
- 2.35. *"Time zero"* is the time reference for the EDR data timestamps of an event.
- 2.36. *"Tyre pressure monitoring system status"* means the operating status of the tyre pressure monitoring system.
- 2.37. *"Trigger threshold"* means the appropriate parameter has met the conditions for recording an EDR event.
- 2.38. *"Trigger activated"* indicates which trigger was activated to cause the recording of the event.
- 2.39. *"Stability Control System Status - Fully Operational"* indicates whether Stability Control is fully operational or whether its functionality is reduced by a permanent or temporary (e.g. low voltage) defect, by intended action (e.g.

- disabled by a switch or during special diagnostic procedures), not configured or not yet fully initialized (e.g. missing initialization or configuration message).
- 2.40. "*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.
- 2.41. "*Vehicle speed*" means the longitudinal speed of the vehicle that is calculated or estimated from the Vehicle Speed Sensor (VSS).
- 2.42. "*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.
- 2.43. "*Yaw control system*" means the stability control of wheel brakes for yaw control.
- 2.44. "*Corrective Steering Function (CSF) status*" means the operating status of the Corrective Steering Function as defined in UN Regulation No. 79.
- 2.45. "*Emergency Steering Function (ESF) status*" means the operating status of the Emergency Steering Function as defined in UN Regulation No. 79.
- 2.46. "*Automatically commanded steering function (ACSF) status*" means the operating status of the Automatically Commanded Steering Function as defined in UN Regulation No. 79, and of the categories as defined therein.
- 2.47. "*Accident Emergency Call System Status*" means the status of a system that is activated either automatically via in-vehicle sensors or manually, which carries, by means of public mobile wireless communications networks, a set of crash-related data and establishes an emergency audio channel between the occupants of the vehicle and an answering point. Faulted status would mean when the system detects it cannot make a call.

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 maximum mass up to 12,000 kg if:
- this vehicle type meets the technical requirements and the transitional provisions of the 01 or later series of amendments to UN Regulation No. 160 and
 - only for vehicle types with maximum mass between 8,000 - 12,000 kg the manufacturer demonstrates, to the satisfaction of the approval authority, that the triggering performance is equally effective to this Regulation.
- 4.1.1. Vehicles referred to in paragraph 4.1. which are not subject to national and regional regulations providing for crash tests requirements referred to in paragraphs 5.4.1 and 5.4.2. of UN Regulation No. 160 shall be subject to paragraph 5.4. of this regulation.
- 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 data which shall be written to a non-volatile memory when any of the triggers in paragraph 5.3.1. occur.

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 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 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: Vehicle speed changes at a rate higher than 3.25 m/s² and the change persists beyond that threshold for at least 0.7 seconds.

- 5.3.1.2. Last Stop: Trigger shall be activated if any of the following applies:

- (a) Vehicle speed is reported as 0 km/h for 20 s.
- (b) While vehicle speed is reported as 0 km/h, and
 - i. parking brake system is applied, or
 - ii. vehicle master control switch is deactivated.

Re-activation of last stop trigger due to threshold criterion (a.) shall be disabled if the vehicle speed is not reported as 24 km/h or more for a minimum of 6s.

- 5.3.1.3. Activation of a safety system is showed in the table below:

<i>System (if fitted)</i>	<i>Trigger</i>
Supplemental Restraint System	Deployment Command of a Supplemental Restraint System
Antilock Braking System	System Intervention
Advanced Emergency Braking (including pedestrian/cyclist if equipped)	Emergency Brake Intervention
Vehicle Stability Function	System Intervention

- 5.3.2. Conditions for locking of data.

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.

- 5.3.3. Conditions for the establishment of time zero

Time Zero is established by the occurrence of any of the above triggers, except for the last stop.

Time zero for the last stop trigger is established when the vehicle reaches an indicated speed of 0 km/h.

- 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., 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.
- 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).
- 5.5. 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 2.42 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. XXX.

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:

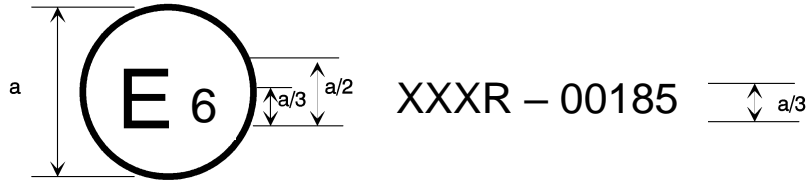
<i>Data element</i>	<i>Recording interval/time (relative to trigger event)</i>	<i>Data sample rate (samples per second)</i>	<i>Minimum range</i>	<i>Accuracy</i>	<i>Resolution</i>

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

Annex 3

Arrangements of approval marks

(see paragraphs 4.4. to 4.4.1. 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. XXX in its original form.

Annex 4

Data Elements and Format

Table 1 - List of data elements ¹

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Event Data Recording Complete	Mandatory	Following other data	N/A	Yes or No	N/A	Yes or No	All 5.3.1 triggers
Propulsion system activation hours event	Mandatory ⁵	-1.0 sec	N/A	0 to 1,193,046 hr	±0.05 hr	0.05 hr	All 5.3.1 triggers
Propulsion system activation hours download	Mandatory ⁶	At time of download	N/A	0 to 1,193,046 hr	±0.05 hr	0.05 hr	All 5.3.1 triggers
EDR unit hardware part number	Mandatory ⁷	N/A	N/A	N/A	N/A	N/A	N/A
EDR unit software part number	Mandatory ⁷	N/A	N/A	N/A	N/A	N/A	N/A

¹ Format requirements specified below are minimum requirements and manufacturers can exceed them.

² "Mandatory" is subject to the conditions detailed in paragraph 1.

³ Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is -0.1 to 1.0 sec (e.g., T = -1 would need to occur between -1.1 and 0 seconds.)

⁴ Accuracy requirement only applies within the range of the physical sensor. If measurements captured by a sensor exceed the design range of the sensor, the reported element shall indicate when the measurement first exceeded the design range of the sensor.

⁵ Manufacturers shall record either *Propulsion system activation hours event* or *ignition cycle, event*.

⁶ Manufacturers shall record either *Propulsion system activation hours download* or *ignition cycle, download*.

⁷ Shall not contain unique serial numbers or other unique identifiers. If serial number traceability is integral to part number - it does not need to be reported.

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Trigger Activated	Mandatory	Event ⁸	N/A	N/A	N/A	Sudden Deceleration, Supplemental Restraint System, Antilock Braking System, Advanced Emergency Braking, Vehicle Stability Function, Last stop	All 5.3.1 triggers
Ignition cycle, event	Mandatory ⁵	-1.0 sec	N/A	0 to 60,000	±1 cycle	1 cycle	All 5.3.1 triggers
Ignition cycle, download	Mandatory ⁶	At time of download	N/A	0 to 60,000	±1 cycle	1 cycle	All 5.3.1 triggers
Vehicle Speed	Mandatory	-20 to +10 sec	4	0 to 250 km/h	±1 km/h	1 km/h	All 5.3.1 triggers
Gear Position Status	Mandatory ⁹	-20 to +10 sec	4	N/A	N/A	reverse	All 5.3.1 triggers
Retarder Torque Mode	Mandatory	-20 to +10 sec	4	N/A	N/A	Default, Operator Selection, Cruise Control, Road Speed Limit, Stability Control, Transmission Control, Engine Speed Limit, Braking System	All 5.3.1 triggers
Brake Status – Parking	Mandatory	-20 to +10 sec	4	N/A	N/A	On or Off	All 5.3.1 triggers
Brake Status – Service	Mandatory	-20 to +10 sec	10	N/A	NA	On or Off	All 5.3.1 triggers

⁸ Event indicates recording around the time of the trigger.

⁹ Gear position is mandatory if the Vehicle speed data element only records forward speeds.

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Propulsion system Torque ¹⁰	Mandatory	-20 to +10 sec	4	actual value reported in Nm	≤100 Nm: ±10 Nm and >100 Nm: 5 % of torques value which was recorded	1 Nm	All 5.3.1 triggers
Propulsion system power ¹⁰	Mandatory	-20 to +10 sec	4	actual value reported in kW	±5 %	1 kW	All 5.3.1 triggers
Propulsion system drive speed ¹⁰	Mandatory	-20 to +10 sec	4	actual value reported in rpm	±100 rpm	100 rpm	All 5.3.1 triggers
Accelerator Pedal Position	Mandatory	-20 to +10 sec	10	0 to 100 %	±5 %	1 %	All 5.3.1 triggers
ABS Brake Control Status – Motor vehicle	Mandatory	-20 to +10 sec	10	N/A	NA	Off, ABS Passive but installed, ABS Active	All 5.3.1 triggers
ABS Brake Control Status – Trailer	Mandatory	-20 to +10 sec	10	N/A	N/A	Off, Faulted, On not intervening, On intervening	All 5.3.1 triggers
Advanced Emergency Braking	Mandatory	-20 to +10 sec	10	N/A	N/A	Off, Faulted, On not warning/intervening, On warning, On intervening	All 5.3.1 triggers
Lane Departure Warning System status	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On not warning, On – Warning	All 5.3.1 triggers
Steering wheel angle	Mandatory	-20 to 10 sec	10	-1776 degrees to +1776 degrees	±0.4 rad 22.9 degrees	0.2 rad 11.5 degrees	All 5.3.1 triggers
Stability Control System status	Mandatory	-20 to +10 sec	10	N/A	N/A	Fully operational, Not fully operational	All 5.3.1 triggers

¹⁰ If motors or other drives are available as separate items then these should be listed with relevant location, e.g., 1st left or 2nd left, 1st right or 2nd right (driven axles), 1st or 2nd,nth (for combined drives) for speed, torque and power. For hybrid systems, engine and motor elements should be listed separately.

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Rollover Protection Control system status	Mandatory	-20 to +10 sec	4	N/A	N/A	Passive but installed, Active	All 5.3.1 triggers
Yaw Control system status	Mandatory	-20 to +10 sec	10	N/A	N/A	Passive but installed, Active	All 5.3.1 triggers
Safety belt status (position x-y) ¹¹	Mandatory	-1.0 sec	N/A	N/A	N/A	Fastened, not fastened	All 5.3.1 triggers
Safety belt pretensioner status (position x-y) ¹¹	Mandatory	Event ⁸	N/A	N/A	N/A	Faulted, not deployed, deployed	Supplemental restraint system
Frontal Airbag system status ¹¹	Mandatory	Event ⁸	N/A	N/A	N/A	Faulted, suppressed (passenger), deployed, not deployed	Supplemental restraint system
Side Airbag system status ¹¹	Mandatory	Event ⁸	N/A	N/A	N/A	Faulted, deployed, not deployed	Supplemental restraint system
Side curtain/tube air bag system status ¹²	Mandatory	Event ⁸	N/A	N/A	N/A	Faulted, deployed, not deployed	Supplemental restraint system
Far-side impact centre air bag system status ¹²	Mandatory	Event ⁸	N/A	N/A	N/A	Faulted, deployed, not deployed	Supplemental restraint system
Blind Spot Information System for the Detection of Bicycles	Mandatory	-20 to +10 sec	10	N/A	N/A	Off, Faulted, On not warning, On warning left-side, On warning right-side	All 5.3.1 triggers
Reversing motion VRU detection system	Mandatory	-20 to +10 sec	10	N/A	N/A	Off, Faulted, On not warning, On warning	All 5.3.1 triggers

¹¹ This data element shall be recorded for all seating positions equipped with systems and sensors in accordance with paragraph 1.4. A separate row shall be added to the report for each seating position, and the positions shall be denoted as: x = seat row number, starting with 1 at the vehicle front; y = seat number, starting with 1 at the vehicle's left side. For example, 'position 1-1' denotes the front leftmost seat and 'position 1-2' denotes the front second seat from the left.

¹² List this element n times, once for each airbag.

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Moving Off Information System for the Detection of Pedestrians and Cyclists	Mandatory	-20 to +10 sec	10	N/A	N/A	Off, Faulted, On not warning, On warning	All 5.3.1 triggers
Maximum delta-V, longitudinal	Mandatory	Event ⁸	N/A	-100 km/h to +100 km/h	±10%	1 km/h	Supplemental restraint system (planar events)
Time, maximum delta-V, longitudinal	Mandatory	Event ⁸	N/A	0–300 ms	±3 ms	2.5 ms	Supplemental restraint system (planar events)
Maximum delta-V, lateral	Mandatory	Event ⁸	N/A	-100 km/h to +100 km/h	±10%	1 km/h	Supplemental restraint system (Planar events)
Time for maximum delta-V, lateral	Mandatory	Event ⁸	N/A	0–300 ms	±3 ms	2.5 ms	Supplemental restraint system (planar events)
Maximum delta-V, resultant	Mandatory	Event ⁸	N/A	-100 km/h to +100 km/h	±10%	1 km/h	Supplemental restraint system (planar events)
Time for maximum delta-V, resultant	Mandatory	Event ⁸	N/A	0–300 ms	±3 ms	2.5 ms	Supplemental restraint system (planar events)
Roll angle	If recorded	-20 to +10 sec	4	-1080 deg to +1080 deg	±10%	10 deg	Supplemental restraint system (rollover events)

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Roll rate	Mandatory if fitted and used for rollover occupant protection system control algorithm	-20 to +10 sec	4	-240 to +240 deg/sec	±10%	4 deg/sec	Supplemental restraint system (rollover events)
Longitudinal Acceleration	Mandatory	-20 to +10 sec	4	-1.5 g to +1.5 g	±10 %	0.1 g	All 5.3.1 triggers
Lateral Acceleration	Mandatory	-20 to +10 sec	4	-1.5 g to +1.5 g	±10 %	0.1 g	All 5.3.1 triggers
Accident emergency call system status	Mandatory	Event ⁸	N/A	N/A	N/A	Faulted, On but emergency call not automatically triggered, On – Emergency call automatically triggered	Supplemental restraint system
Tyre pressure monitoring system warning lamp status	Mandatory	-20 to +10 sec	4	N/A	N/A	On, Off	All 5.3.1 triggers
Yaw Rate	Mandatory	-20 to +10 sec	4	-75 to +75 degrees/second	±10 % of the full range of the sensor	1 degree per second	Supplemental restraint system (planar events)
Corrective steering function status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not intervening, On actively intervening	All 5.3.1 triggers
Emergency steering function status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not intervening, On actively intervening	All 5.3.1 triggers

¹³ Only applies to vehicles subject to approval in accordance with any UN Regulation annexed to the 1958 Agreement with respect to their steering functions.

Data element	Condition for requirement ²	Recording interval/time ³ (relative to trigger event)	Data sample rate (samples per second)	Minimum range	Accuracy ⁴	Resolution	Data recorded for the following triggers
Automatically commanded steering function category A status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not controlling, On controlling	All 5.3.1 triggers
Automatically commanded steering function category B status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not controlling, On controlling	All 5.3.1 triggers
Automatically commanded steering function category C status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not controlling, On controlling	All 5.3.1 triggers
Automatically commanded steering function category D status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not controlling, On controlling	All 5.3.1 triggers
Automatically commanded steering function category E status ¹³	Mandatory	-20 to +10 sec	10	N/A	N/A	Faulted, Off, On but not controlling, On controlling	All 5.3.1 triggers