Date

Agreement

Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions*

(Revision 2, including the amendments which entered into force on 16 October 1995)

Addendum: XXX : Regulation: XXX

Date of entry into force as an annex to the Agreement: XXX

Uniform provisions concerning the approval of …..

UNITED NATIONS

* Former title of the Agreement: Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

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Regulation No. XXX

Uniform provisions concerning the approval of vehicles with regard to event data recorder

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0. Foreword

This regulation specifies uniform requirements for vehicles equipped with Event Data Recorders (EDRs) concerning the minimum collection, storage, and retrievability of motor vehicle crash event data. It also specifies requirements for vehicle manufacturers to make tools and/or methods so that crash investigators and researchers are able to retrieve data from EDRs.
The purpose of this text is to ensure that EDRs record, in a readily usable manner, data valuable for effective crash investigations and for analysis of safety equipment performance (e.g., advanced restraint systems).
These data will help provide a better understanding of the circumstances in which crashes and injuries occur and will lead to safer vehicle designs.
The scope of an EDR does not necessarily include Data Storage System for Automated Driving Vehicles (DSSAD), these long-term storage DSSADs exist to determine who from the driver or the Automated Driving System (ADS) is driving, in a wide time-window. The EDR as a system for accident reconstruction covers only a very narrow time window, with punctual storage of data initiated by a defined trigger.

1. Scope

1.1. Approval of vehicles of category [M1 ≤ 3,5 t and N1 ≤ 2,5 t] with regard to their Event Data Recorder (EDR).

[1.2. At the request of the manufacturer, Contracting Parties may grant approvals to vehicles of other categories with regard to their Event Data Recorder (EDR).]

2. Definitions

For the purposes of this Regulation:

2.1 "Vehicle type" means a group of vehicles of a particular category which do not differ in at least the following essential respects:

(a) The manufacturer;

(b) The manufacturer’s type designation;

(c) Essential aspects of vehicle design with respect to EDR data storage and retrieval.

2.2 ABS activity means the anti-lock brake system (ABS) is actively controlling the vehicle's brakes.

[2.3 Front air bag warning lamp status means air-bag tell-tale as described by UN Regulation No. 121 Symbol No. 22 and the tell-tale is active or not active.]

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2.4 Capture means the process of buffering EDR data in a temporary, volatile storage medium where it is continuously updated at regular time intervals.

2.5 Recorded means the data is recorded in non-volatile memory for the purpose of subsequent downloading.

2.6 Delta-V, lateral means the cumulative change in velocity, as recorded by the EDR of the vehicle, along the lateral axis, starting from crash time zero and ending at 0.25 seconds, recorded every 0.01 seconds.

2.7 Delta-V, longitudinal means the cumulative change in velocity, as recorded by the EDR of the vehicle, along the longitudinal axis, starting from crash time zero and ending at 0.25 seconds, recorded every 0.01 seconds.

2.8 Deployment time, frontal air bag means (for both driver and front passenger) the elapsed time from crash time zero to the deployment command or for multi-staged air bag systems, the deployment command for the first stage.

2.9 Disposal means the deployment command of the second (or higher, if present) stage of a frontal air bag for the purpose of disposing the propellant from the air bag device.

2.10 End of event time means the moment at which the cumulative delta-V 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.

2.11 Engine RPM means :

(1) For vehicles powered by internal combustion engines, the number of revolutions per minute of the main crankshaft of the vehicle's engine, and

(2) For vehicles not entirely powered by internal combustion engines, the number of revolutions per minute of the motor shaft at the point at which it enters the vehicle transmission gearbox.

(3) For vehicles not powered by internal combustion engines at all, the [number of revolutions per minute of the motor].

[2.12 Engine throttle, percent full means the driver-requested acceleration as measured by the throttle position sensor on the accelerator control compared to the fully-depressed position.]

2.13 Event means a crash or other physical occurrence that causes the trigger threshold to be met or exceeded, or an air bag to be deployed, whichever occurs first.

2.14 Event data recorder (EDR) means a device or function in a vehicle that records the vehicle's dynamic, time-series data during the time period just prior to a crash event (e.g., vehicle speed vs. time) or during a crash event (e.g., delta-V vs. time), intended for retrieval after the crash event. For the purposes of this definition, the event data do not include audio and video data.

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2.15 Frontal air bag means an inflatable restraint system that requires no action by vehicle occupants and is used to meet the applicable frontal crash protection requirements of UN Regulation No. 94.

2.16 Ignition cycle, crash means the number (count) of power cycles applied to the recording device at the time when the crash event occurred since the first use of the EDR.

2.17 Ignition cycle download means the number (count) of power cycles applied to the recording device at the time when the data was downloaded since the first use of the EDR.

2.18 Lateral acceleration means the component of the vector acceleration of a point in the vehicle in the y-direction. The lateral acceleration is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

2.19 Longitudinal acceleration means the component of the vector acceleration of a point in the vehicle in the x-direction. The longitudinal acceleration is positive in the direction of forward vehicle travel.

2.20 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, starting from crash time zero and ending at 0.3 seconds.

2.21 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, starting from crash time zero and ending at 0.3 seconds.

2.22 Maximum delta–V, resultant means the time-correlated maximum value of the cumulative change in velocity, as recorded by the EDR or processed during data download, along the vector-added longitudinal and lateral axes.

2.23 Multi-event crash means the occurrence of 2 events, the first and last of which begin not more than 5 seconds apart.

2.24 Non-volatile memory means the memory reserved for maintaining recorded EDR data in a semi-permanent fashion. Data recorded in non-volatile memory is retained after a loss of power and can be retrieved with EDR data extraction tools and methods.

2.25 Normal acceleration means the component of the vector acceleration of a point in the vehicle in the z-direction. The normal acceleration is positive in a downward direction and is zero when the accelerometer is at rest.

2.26 Occupant position classification means the classification indicating that the seating posture of a front outboard occupant (both driver and front passenger) is determined as being out-of-position.

2.27 Occupant size classification means, for front passenger, the classification of an occupant as an adult and not a child, and for the driver, the classification of the driver as not being of small stature.

2.28 Pretensioner means a device that is activated by a vehicle's crash sensing system and removes slack from a vehicle safety belt system.

2.29 Record means the process of saving captured EDR data into a non-volatile device for subsequent retrieval.

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2.30 Safety belt status means the feedback from the safety system that is used to determine that an occupant's safety belt (for both driver and front passenger) is fastened or unfastened.

2.31 Seat track position switch, foremost, status means the status of the switch that is installed to detect whether the seat is moved to a forward position.

2.32 Service brake, on and off means the status of the device that is installed in or connected to the brake pedal system to detect whether the pedal was pressed. The device can include the brake pedal switch or other driver-operated service brake control.

2.33 Side air bag means any inflatable occupant restraint device that is mounted to the seat or side structure of the vehicle interior, and that is designed to deploy in a side impact crash to help mitigate occupant injury and/or ejection.

2.34 Side curtain/tube air bag means any inflatable occupant restraint device that is mounted to the side structure of the vehicle interior, and that is designed to deploy in a side impact crash or rollover and to help mitigate occupant injury and/or ejection.

2.35 Speed, vehicle indicated means the vehicle speed indicated by a manufacturer-designated subsystem designed to indicate the vehicle's ground travel speed during vehicle operation.

2.36 Stability control means any device that complies with UN ECE R140, “Electronic stability control systems”.

2.37 Steering input means the angular displacement of the steering wheel measured from the straight-ahead position (position corresponding to zero average steer angle of a pair of steered wheels).

2.38 Suppression switch status means the status of the switch indicating whether an air bag suppression system is on or off.

2.39 Time from event 1 to 2 means the elapsed time from time zero of the first event to time zero of the second event.

240 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.

2.41 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.

2.42 Time, maximum delta–V, resultant means the time from crash time zero to the point where the maximum delta–V resultant occurs, as recorded by the EDR or processed during data download.

2.43 Time to deploy, pretensioner means the elapsed time from crash time zero to the deployment command for the safety belt pretensioner (for both driver and front passenger).

2.44 Time to deploy, side air bag/curtain means the elapsed time from crash time zero to the deployment command for a side air bag or a side curtain/tube air bag (for both driver and front passenger).

2.45 Time to first stage means the elapsed time between time zero and the time when the first stage of a frontal air bag is commanded to fire.

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2.46 Time to nth stage means the elapsed time from crash time zero to the deployment command for the nth stage of a frontal air bag (for both driver and front passenger).

2.47 Time zero means whichever of the following occurs first:

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

(2) For continuously running algorithms,

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

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

(3) An air bag deployment.

2.48 Trigger threshold means a change in vehicle velocity, in the longitudinal direction, that equals or exceeds 8 km/h within a 150 ms interval.

For vehicles that record "delta-V, lateral," trigger threshold means a change in vehicle velocity in either the longitudinal or lateral direction that equals or exceeds 8 km/h within a 150 ms interval.

2.49 Vehicle roll angle means the angle between the vehicle y-axis and the ground plane.

2.50 Volatile memory means the memory reserved for buffering of captured EDR data. The memory is not capable of retaining data in a semi-permanent fashion. Data captured in volatile memory is continuously overwritten and is not retained in the event of a power loss or retrievable with EDR data extraction tools.

2.51 X-direction means in the direction of the vehicle's X-axis, which is parallel to the vehicle's longitudinal centerline.

The X-direction is positive in the direction of forward vehicle travel.

2.52 Y-direction means in the direction of the vehicle's Y-axis, which is perpendicular to its X-axis and in the same horizontal plane as that axis.

The Y-direction is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

2.53 Z-direction means in the direction of the vehicle's Z-axis, which is perpendicular to the X and Y-axes.

The Z-direction is positive in a downward direction.

3. Application for approval

3.1 The application for approval of a vehicle type with regards to EDR shall be submitted by its manufacturer or by his duly accredited representative.

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3.2 It shall be accompanied by the undermentioned documents and the following particulars in triplicate:

3.3 A description of the vehicle type with regard to the items mentioned in paragraph 2 above. The numbers and/or symbols identifying the engine type and the vehicle type shall be specified;

3.4 A list of the components, duly identified, constituting the EDR;

3.5 A drawing of the assembled EDR and an indication of its position on the vehicle;

3.6 The Type Approval Authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

4. Approval

4.1. Type approval shall only be granted if the vehicle type meets the requirements of paragraph 5 below.

4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00 corresponding to the 00 series of amendments) 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 vehicle type.

4.3. Notice of approval or of extension or of refusal or withdrawal of approval or of production definitively discontinued of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation.

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 consisting of:

4.4.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval;

4.4.2. The number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1.

4.5. If the vehicle conforms to a vehicle type approved under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 5.4.1. need not be repeated; in such a case the regulation and approval numbers and the additional symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1.

4.6. The approval mark shall be clearly legible and be indelible.

4.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.

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4.8. Annex 2 to this Regulation gives examples of arrangements of the approval mark.

5. Specifications

To comply with this regulation, vehicles shall be equipped with an event data recorder (EDR) that meets the prescribed requirements of this Regulation for the data elements, data capture, survivability, information and data retrieval tool.

5.1 Data elements

The EDR shall record data elements listed in column 1 in Table 1 as follows:

a) Data elements marked as “mandatory” shall be recorded if the vehicle is equipped with the system or function addressed by the data element.

b) Data elements marked as “optional” may be recorded as specified by the vehicle manufacturer.

Data elements shall be recorded during the interval/time and at the sample rate specified in Table 1.

The recorded data elements shall be reported in accordance with the range, accuracy and resolution specified in Table 1.

The vehicle manufacturer may include additional data elements.

For the Acceleration Time-History data and format: the longitudinal, lateral, and normal acceleration time-history data, as applicable, must be filtered either during the recording phase or during the data downloading phase to include:

(1) The Time Step (TS) that is the inverse of the sampling frequency of the acceleration data and which has units of seconds;

(2) The number of the first point (NFP), which is an integer that when multiplied by the TS equals the time relative to time zero of the first acceleration data point;

(3) The number of the last point (NLP), which is an integer that when multiplied by the TS equals the time relative to time zero of the last acceleration data point; and

(4) NLP – NFP + 1 acceleration values sequentially beginning with the acceleration at time NFP * TS and continue sampling the acceleration at TS increments in time until the time NLP * TS is reached.

{Table 1 - see separate Excel file}

{Footnotes to table1}

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

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2) The ignition cycle at the time of download is not required to be recorded at the time of the crash, but shall be reported during the download process.

3) „Vehicle roll angle" may be recorded in any time duration, -1.0 to 5.0 seconds is suggested.

4) List this element n-1 times, once for each stage of a multi-stage air bag system.

5.2 Data capture

The EDR shall capture and record the data elements for events in accordance with the following conditions and circumstances:

5.2.1 In a frontal or side air bag deployment crash: capture and record the current deployment data, up to two events. The memory for each air bag deployment event shall be locked to prevent any future overwriting of these data.

5.2.2 In a deployment event that involves another type of deployable restraint (e.g., pretensioners, knee bolsters, pedestrian protection, etc.), or in a non-deployment event that meets the trigger threshold, capture and record the current non-deployment data, up to two events, subject to the following conditions:

(1) If an EDR non-volatile memory buffer void of previous-event data is available, the current non-deployment event data is recorded in the buffer.

(2) If an EDR non-volatile memory buffer void of previous-event data is not available, the manufacturer may choose either to overwrite the previous non-deployment event data with the current non-deployment event data, or not to record the current non-deployment event data.

(3) EDR buffers containing previous deployment-event data shall not be overwritten by the current non-deployment event data.

5.3 Survivability

The recorded data shall be retrievable by the methodology specified by the vehicle manufacturer for not less than 10 days after a data capture event as defined in paragraph 5.3.

5.4 Information

For vehicles fitted with EDR the owner's manual shall include information that the vehicle is fitted with an EDR. On publication means (e.g. owner’s manual, maintenance manual, official web site) information about data retrieval shall be made accessible.

5.5 Data retrieval tools

Each manufacturer of a motor vehicle equipped with an EDR shall ensure by licensing agreement or other means that a tool(s) is available that is capable of accessing and retrieving the data stored in the EDR that are required by this regulation. The tool(s) shall be available not later than when the Type Approval is granted.

5.6 System Deactivation

It shall not be possible to deactivate the event data recorder by the driver.

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6. Test Procedure

6.1 Vehicles subject to the requirements of UN Regulation No. 94:

Perform an deformable barrier test as specified in UN Regulation No. 94.

Retrieve within 10 days the EDR data by the methodology specified by the manufacturer.

The retrieved data elements shall include all required data elements per Table 1 except for the “Engine throttle, percent full”, “engine RPM”, and “service brake, on/off”, in the format specified in Table 1. The complete data recorded element must read “yes” after the test.

[6.2 Vehicles not subject to the requirements of UN Regulation No. 94 shall be approved in agreement between the manufacturer and the Technical Service.]

7. Modification of vehicle type and extension of approval

7.1. Every modification of the vehicle type, or of any aspect of specification for the EDR, or of the list referred to in paragraph 3.4. above, shall be notified to the Type Approval Authority which approved that vehicle type. The Type Approval Authority may then either:

7.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle still meets the requirements; or

7.1.2. Require a further evaluation report from the Technical Services responsible for conducting the evaluation.

7.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3. above to the Parties to the Agreement applying this Regulation.

7.3. The Type Approval Authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

8. Conformity of production

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2) with the following requirements:

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8.1. A vehicle approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraph 5. above.

8.2. The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be once every two years.

9. Penalties for non-conformity of production

9.1. The approval granted in respect of a type of vehicle pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a vehicle bearing the approval mark does not conform to the type approved.

9.2. If a Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the example in Annex 1 to this Regulation.

10. Production definitively discontinued

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall inform the authority, which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement applying this Regulation by means of a communication form conforming to the example in Annex 1 to this Regulation.

11. 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 Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval are to be sent.

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 type of vehicle with regard to its Event Data Recorder:

Approval No.:..... Extension No.: .....

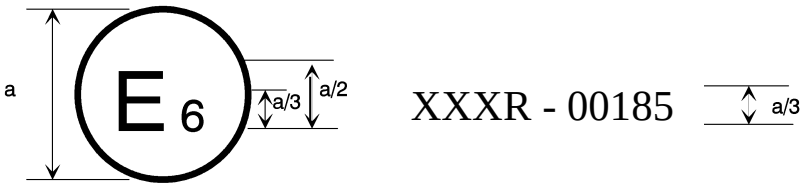
1. Trademark:.....
2. Type and trade name(s):.....
3. Name and address of manufacturer:.....
4. If applicable, name and address of manufacturer's representative: .....
5. Brief description of vehicle:.....
6. Date of submission of vehicle for approval: .....
7. Technical Service performing the approval tests: .....
8. Date of report issued by that Service: .....
9. Number of report issued by that Service:.....
10. Approval granted/refused/extended/withdrawn:[2]
11. Place:.....
12. Date:.....
13. Signature:.....
14. Annexed to this communication are the following documents, bearing the approval number indicated above: .....
15. Any remarks:.....

[1] Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).
[2] Strike out what does not apply.

Annex 2

Arrangements of approval marks

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



a = 8 mm min

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