**Proposal 1: Modify para. 4.1. for clarity and alignment with proposed annex**

*Insert* under the Scope of the Regulation:

1.1.1. At the request of the manufacturer, vehicles of a mass up to 12,000 kg approved to Regulation No. 160 shall be deemed to meet the requirements of this Regulation subject to the provisions of Annex [x].

*Delete* from para. 4.1. under 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.~~

Justification

1. Para. 4.1. aims to clarify the application of UN R169 with regard to vehicle types within the categories M2 and N2. The application of UN Regulations is defined in the scope of each Regulation. In line with provisions addressing similar situations across other UN Regulations, this proposal moves the provision on the alternate approval to the Scope section of UN R169.

2. The wording of para. 1.1.1. is based on UN R80 (seat strength for vehicles of categories M2 and M3) which recognizes approvals to UN R17 for vehicles of category M2 as equally valid.

3. The wording is simplified because the proposed annex provides the details on the acceptance of the alternative approval to UN R160.

4. The wording clarifies the separation between approvals to UN R160 and UN R169 in line with the “mutual recognition” provisions of the 1958 Agreement. The current text states that an approval may be granted to UN R169 by satisfying the requirements of UN R160.

**Proposal 2: Introduce an annex to explain the conditions under which the approval to UN R160 is deemed acceptable for vehicles within the scope of UN R169.**

**Annex 5**

**Guidance on approvals of vehicles up to a maximum mass of 12,000 kg**

1. This guidance informs manufacturers, technical services, and type-approval authorities concerning the approval of vehicles with a maximum mass of 12,000 kg that are equipped with deployable restraint systems.

2. This Regulation sets requirements for EDR installed on medium and heavy vehicles that do not have characteristics that enable approval to Regulation No. 160.

3. However, vehicles within the scope of this Regulation can have characteristics aligned with the aims of Regulation No. 160 based on aspects such as braking (hydraulic or pneumatic), occupant safety architectures (seating and safety-belt designs, deployable restraint systems), and active safety systems (AEBS, FCW, BSIS, CSF, ESF, etc.).

4. Given that EDR provide information to support crash reconstruction and evaluation of the impact of technologies on road safety, it is important to ensure that the EDR installed on a vehicle type is aligned with the safety architecture of that vehicle to provide this data.

5. Moreover, the integration of passive and active safety technologies into EDR provide multiple strategies for triggering the recording and storage of data. The assessment of EDR capabilities must align with technological progress and allow for methods other than changes in vehicle velocity for triggering an EDR.

6. Therefore, this Regulation allows for approvals of EDR to Regulation No. 160 for certain vehicles within its scope up to a maximum mass of 12,000 kg to be accepted as equally valid subject to the following conditions.

7. The application for approval of the vehicle type with regard to its EDR shall be furnished 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.

8. The application shall be accompanied by the documentation specified under para. 3.2. of the 01 series of amendments to Regulation No. 160 or as amended by a later series of amendments as applicable.

9. For vehicle types of a maximum mass between 8,000 kg and 12,000 kg, the application shall be accompanied by a structured argument supported by evidence that the EDR will record data in accordance with the requirements of Regulation No. 160.

10. The argumentation and evidence for the triggering performance of the EDR recording capabilities may be based on the simulation of a collision with another vehicle and/or documentation of methods used to detect a crash event.

10.1. Collision simulation

10.1.1. An argument for the effectiveness of the EDR data-recording capabilities may be based on the virtual testing of an impact with a target vehicle of a mass of 950 kg with the subject vehicle.

10.1.2. The virtual testing shall demonstrate changes in subject vehicle velocity that meet or exceed the threshold values under para. 5.3.1. of Regulation No. 160.

10.1.3. The longitudinal collision simulation shall represent a frontal collision between the subject vehicle travelling straight and unbraked at [x km/h] and the oncoming target vehicle travelling straight and unbraked at [x km/h] in opposite direction. At impact, the subject vehicle shall overlap the target vehicle by 40 per cent ± 20 mm on the steering-column side.

10.1.4. The lateral collision simulation shall represent side-impact collision between the subject vehicle stationary and the target vehicle travelling a straight path perpendicular to the subject vehicle unbraked at a speed of [y km/h]. At impact, the longitudinal vertical median plane of the collision opponent shall be coincident within ± 25 mm with a transverse vertical plane passing through the R point of the front seat adjacent to the struck side of the vehicle under approval.

10.1.5. The credibility of the toolchain used for the virtual testing shall be demonstrated by the vehicle manufacturer to the satisfaction of the Type Approval Authority or its Technical Service based on the following criteria:

(a) Capability – what the toolchain can do and any associated risks,

(b) Accuracy – how well the toolchain reproduces the target data recorded in physical tests,

(c) Correctness – how sound and robust are the data and the algorithms in the tools,

(d) Fit for Purpose – how suitable the toolchain is for the assessment (e.g. vehicle dynamic model, sensor model, system control model, environment model, scenario model, targets model, …) within its validity domain, and

(e) Usability –The training and experience, which is needed and the quality of the processes that manage the toolchain’s use.

10.2. EDR triggering method

10.2.1. An argument for the effectiveness of the EDR data-recording capabilities may be based on technological solutions for the detection of a crash event such as through the integration of driver assistance systems into the triggering strategies of the EDR.

10.2.2. The documentation shall include an outline schematic of the EDR illustrating the equipment distribution and the interconnections with the passive and/or active safety systems installed on the vehicle.

10.2.3. The outline shall identify signals that trigger the EDR. This may be provided by a labelled block diagram or other schematic, or by a description aided by such a diagram.

10.2.4. The documentation shall explain the means used to generate the signals from the passive and/or active safety systems that trigger the EDR data-recording function(s).

10.2.5. The documentation shall provide the thresholds for the generation of the signals and their effectiveness in meeting or exceeding the performance requirements implicit in para. 5.3.2. of Regulation No. 160.

10.2.6. The thresholds for signal generation may be based on detection of conditions other than changes in subject vehicle velocity.

10.2.7. Effectiveness of the triggering strategy may be demonstrated by functions for the detection of imminent collisions such as incorporated into collision-warning and collision-avoidance systems.

10.2.8. In cases of strategies reliant on signal generation due to an impact, the signal shall be generated by a pulse corresponding to a longitudinal collision generating an impact energy of 133 kN or more and to a lateral collision generating an impact energy of 106 kN or more.

10.2.9. The documentation package shall remain confidential. It may be kept by the approval authority, or, at the discretion of the approval authority, may be retained by the manufacturer. In case the manufacturer retains the documentation package, that package shall be identified and dated by the approval authority once reviewed and approved. It shall be made available for inspection by the approval authority at the time of approval or at any time during the validity of the approval.

Justification

*General*

The approach amending the scope and introducing an annex may permit amendment via a Supplement rather than a new series of amendments.

The proposal also aims to clarify the implicit meaning of the current text that a UN R169 approval may be granted based on compliance with requirements of UN R160. Approvals to one Regulation may be accepted as an alternative to another Regulation, but mutual recognition under the 1958 Agreement does not permit approvals and markings to one Regulation based on satisfying a different Regulation.

*Para. 1*

This paragraph limits the option for approval to UN R160 to vehicles equipped with a deployable restraint system.

*Para. 2-4*

Clarifies that the annex only applies to vehicles equipped with subsystems aligned with light vehicle requirements and technologies. UN R169 was established to address vehicles that cannot be approved to UN R160. UN R160, including the planned Step 2 amendments, specifically cites safety technologies for which authorities want EDR to provide data. Therefore, the paragraphs furnish objective criteria for determining whether the annex may be applied to a vehicle, including based on the data elements covered by UN R160 relative to safety equipment.

*Para. 5*

Notes that advanced technologies are providing new means for detecting imminent collisions. Consideration should be given to whether such sensors from passive and/or safety systems are used to trigger EDR. At the same time, this does not require explicitly or implicitly the integration of these systems into the EDR triggering strategy. The paragraph instructs the Technical Service to consider any integration in its consideration of whether the annex may be applied to the EDR of the vehicle.

*Para. 6-9*

The paragraphs set the maximum scope of the annex as vehicles up to 12,000 kg (para. 6) while explicitly noting that supporting material is required for vehicles between 8,000 and 12,000 kg to underpin the decision on acceptance of an approval to UN R160 (para. 8). Paras. 7-8 transpose the provisions from the current 4.1. of UN R169 and from the current UN R160 to set the overarching conditions for requesting approval under the annex. The supporting materials explicitly must be logically structured and backed by evidence to demonstrate the effectiveness of the EDR.

*Para. 10.1-10.1.4.*

These paragraphs reproduce the EC/DE proposal (EDR-DSSAD-IWG-26-08).

*Para. 10.1.5.*

This paragraph is taken from the recent adoption of amendments to UN R152 (AEBS) to enable the use of virtual testing. These provisions clarify the aspects that should be reviewed in determining whether a simulation methodology is fit for the purposes of the annex and avoids divergence from provisions that have already been approved by WP.29 (i.e., supports consistency across UN Regulations).

*Para. 10.2.1.-10.2.7.*

Advanced vehicle safety technologies integrate functions for detection of imminent collisions. Therefore, these paragraphs establish requirements for documenting any application of these advanced capability to the triggering strategy of the EDR. These provisions enable the Technical Service to determine the effectiveness of these alternative functions, if any, relative to the aims of the EDR regulations. These provisions are derived from CEL annexes and the WP.29-adopted guidelines on ADS safety for the documentation of complex electronic systems. The provisions furnish objective criteria for assessment of strategies if applicable to the EDR.

*10.2.8.*

All occupant and VRU crash safety regulations ultimately address energy management in the event of an impact. Therefore, para. 10.2.8. ensures consideration of the severity of impacts that would be covered by the EDR triggering strategy.

UN R160 grants approvals for EDR based on impacts represented by UN R94, UN R95, and/or UN R137. These tests are conducted at specific impact speeds that enable the calculation of the energy generated by the impacts. Since the basis for all occupant safety initiatives rests on the forces a human body can withstand, establishing equivalence based on the energy released in a crash provides the benchmark for determining the severity of events covered by the EDR regulations. UN R94 specifics a 56 km/h impact and the test was based on occupant safety research with a vehicle of a mass of 1100 kg. Therefore, the figure of 133 kN is derived from this representative configuration. The calculation method is the same for lateral impacts under UN R95.

This approach ensures that the impact-based triggering performance of the EDR is equivalent to the sensitivity required of all EDR even whether the mass of the vehicle in question is considerably higher than the mass/energy equation implicit in the crash safety regulations.