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Light vehicles – Regulations Nos. 68 (Measurement of the maximum speed, including electric vehicles), 83 (Emissions of M₁ and N₁ vehicles), 101 (CO₂ emissions/fuel consumption) and 103 (Replacement pollution control devices)**Proposal for amendments to the 06 series of amendments to Regulation No. 83 (Emissions of M₁ and N₁ vehicles)****Submitted by the expert from the International Organization of Motor Vehicle Manufacturers***

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) to adapt the on-board diagnostics (OBD) requirements to the technical progress. The modifications to the current text of Regulation No. 83 are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Annex 11, paragraph 2., amend to read:

"2. Definitions

For the purposes of this Annex **only:**"

Annex 11, paragraph 2.10., amend to read:

"2.10. A "driving cycle" consists of engine start-up **key-on**, a driving mode where a malfunction would be detected if present, and engine shut-off **key-off**."

Annex 11, paragraph 3.8.1., amend to read:

"3.8.1. The OBD system may erase a fault code and the distance travelled and freeze-frame information if the same fault is not re-registered in at least 40 engine warm-up cycles **or 40 driving cycles with vehicle operation in which the criteria specified in paragraphs 7.5.1.(a)–(c) of Annex 11, Appendix 1 are met.**"

Annex 11, Appendix 1, paragraph 1., amend to read:

"1. ...

The manufacturer shall make available the defective components and/or electrical devices which would be used to simulate failures. When measured over the Type I Test cycle, such defective components or devices shall not cause the vehicle emissions to exceed the limits of paragraph 3.3.2. by more than 20 per cent. **For electrical failures (short/open circuit), the emissions may exceed the limits of paragraph 3.3.2. by more than 20 per cent.**

When the vehicle is tested with the defective component or device fitted, the OBD system is approved if the MI is activated. The OBD system is also approved if the MI is activated below the OBD threshold limits."

Annex 11, Appendix 1, insert a new paragraph 6.1.1., to read:

"**6.1.1. The Type I Test need not be performed for the demonstration of electrical failures (short/open circuit). The manufacturer may demonstrate these failure modes using driving conditions in which the component is used and the monitoring conditions are encountered. These conditions shall be documented in the type approval documentation.**"

Annex 11, Appendix 1, insert a new paragraph 6.2.3., to read:

"**6.2.3. The use of additional preconditioning cycles or alternative preconditioning methods shall be documented in the type approval documentation.**"

Annex 11, Appendix 1, paragraph 6.3.1.5., amend to read:

"6.3.1.5. Electrical disconnection of the electronic evaporative purge control device (if equipped and if active on the selected fuel type). ~~For this specific failure mode, the Type I Test need not be performed.~~"

Annex 11, Appendix 1, paragraphs 6.4.1.1. to 6.4.2.1., amend to read:

"6.4.1.1. ...

The MI shall **be activated at the latest** before the end of this test under any of the conditions given in paragraphs 6.4.1.2. to 6.4.1.5. **The MI may also be activated during preconditioning.** The Technical Service may substitute those conditions with others in accordance with paragraph 6.4.1.6.

...

6.4.2.1. ...

The MI shall **be activated at the latest** before the end of this test under any of the conditions given in paragraphs 6.4.2.2. to 6.4.2.5. **The MI may also be activated during preconditioning.** The technical service may substitute those conditions by others in accordance with paragraph 6.4.2.5.

..."

Annex 11, Appendix 1, paragraph 7.6.2., amend to read:

"7.6.2. For specific components or systems that have multiple monitors, which are required to be reported by this paragraph (e.g. oxygen sensor bank 1 may have multiple monitors for sensor response or other sensor characteristics), the OBD system shall separately track numerators and denominators for each of the specific monitors ~~except those monitoring for short circuit or open circuit failures~~ and report only the corresponding numerator and denominator for the specific monitor that has the lowest numerical ratio. If two or more specific monitors have identical ratios, the corresponding numerator and denominator for the specific monitor that has the highest denominator shall be reported for the specific component."

Annex 11, Appendix 1, insert a new paragraph 7.6.2.1., to read:

"7.6.2.1. **Numerators and denominators for specific monitors of components or systems that are monitoring continuously for short circuit or open circuit failures are exempted from reporting.**

"Continuously," if used in this context means monitoring is always enabled and sampling of the signal used for monitoring occurs at a rate no less than two samples per second and the presence or the absence of the failure relevant to that monitor has to be concluded within 15 seconds.

If for control purposes, a computer input component is sampled less frequently, the signal of the component may instead be evaluated each time sampling occurs.

It is not required to activate an output component/system for the sole purpose of monitoring that output component/system."

Annex 11, Appendix 1, paragraph 9.3.5.2., amend to read:

"9.3.5.2. ...

Vehicles of small series productions with less than 1,000 vehicles per OBD family are exempted from minimum IUPR requirements as well as the requirement to demonstrate these to the approval authority."

Annex 1, insert a new paragraph 3.10., to read:

- "3.10. Additional provisions for vehicles employing engine shut - off strategies**
- 3.10.1. Driving cycle**
- 3.10.1.1. Autonomous engine restarts commanded by the engine control system following an engine stall may be considered as a new driving cycle or as a continuation of the existing driving cycle."**

Annex 11, insert new paragraph 3.2.3., to read:

- "3.2.3. Identification of deterioration or malfunctions may also be done outside a driving cycle (e.g. after engine shutdown)."**

II. Justification

A. Definitions

(i) General

1. To avoid confusion and contradictions with future amendments of other provisions, the definitions of Annex 11 should be amended, to be valid only for OBD.
2. Update of the definition of "driving cycle" are proposed to reflect changes in vehicle technology (e.g. hybrid electric vehicles), that do not need a start of the internal combustion engine for operation.

(ii) Erasure of fault codes

3. Annex 11 of Regulation No. 83 contains the definition of a warm-up cycle in the definition section under paragraph 2.11.:
4. Under paragraph 3.8. "Erasing a Fault Code" this defined cycle is used to erase healed error code information from the fault code memory:
 - "3.8.1. The OBD system may erase a fault code and the distance travelled and freeze-frame information if the same fault is not re-registered in at least 40 engine warm-up cycles."
5. The intention of this section is to keep fault code information in the memory long enough to give it to the service technician when a customer shows up at the workshop because of a Malfunction Indicator Lamp (MIL) illumination. Assuming two to three warm up cycles per day this information on healed codes (the system is OK and does not need repair!) stays thirteen to twenty days in the memory which is long enough for the above described purpose.
6. For hybrid electrical vehicles which are plugged in regularly causing rare engine operation, the history information on healed errors will most likely stay much longer in the fault code memory. Customers showing up at their workshop for the regular service intervals might get unnecessary repairs because this information is still present. Customers could fail periodical technical inspection (PTI) in some member states because of not erased fault code.
7. To erase a fault code, the engine has to be operated (7.5.1. (a) requires an engine start). For this reason, paragraph 3.8.1. should be amended.

B. Electrical failures

8. Electrical failures (e.g. disconnection, short to battery and short to ground) have only one of two status, present or not present. Therefore the concept of threshold monitoring as a partial failure is inappropriate.

9. Demonstrating these types of failures in a type 1 test is often inappropriate. The demonstration of the proper working monitoring should therefore be possible in a driving cycle defined by the manufacturer, in which the component (sensor/actuator) is used. This is also the case for the electronic evaporative control device. Paragraphs 6.1.1. and 6.3.1.5. should be amended accordingly.

10. The proposed changes do not modify the requirements of monitoring the electrical failures, but intend to clarify the situation during the OBD system test.

C. OBD system test

11. Typically a OBD system test consists of two preconditioning cycles and a final type 1 test. The type 1 test is always performed, even if alternative driving cycles are used, more preconditioning cycles are added or the MI is activated during one of the preconditioning cycles.

12. Regulation No. 83 allows in paragraph 3.5.2. more than two preconditioning cycles for MIL activation. According to paragraph 6.2.2., the manufacturer may request alternative preconditioning cycles.

13. One reason for doing this might be that the operating conditions for monitoring a component might not be encountered in a type 1 test. In such a case, the MIL has to be illuminated before the type 1 test, in which emissions are measured.

14. For vehicles developed according to CARB OBD II requirements, the MIL has to be illuminated after two driving cycles with the fault detected. Such vehicles will illuminate the MI during the second preconditioning cycle as well.

15. Additionally there is no need to activate the MIL before the minimum requirements. In some cases it is desirable to alert the driver as soon as possible about the fault condition.

D. In-Use Performance Ratio (IUPR) reporting

16. The intention of the text of paragraph 7.6.2. in Appendix 1 to Annex 11 saying "... except those monitoring for short circuit or open circuit failures ..." was to exempt the ratios of monitors for electrical failures from being reported. This wording could, however, give the impression that electrical failures are exempted from being reported only for systems with multiple monitors, but are requested for systems consisting of only one electrical monitor.

17. Ratios for continuously monitored components or systems need not be reported, because their ratio is per definition above the minimum required ratio for any system or component.

18. A definition of "continuously", aligned with the provisions of the heavy duty OBD requirements is added.

E. Definitions for hybrids and failure detection

19. For hybrid vehicles and vehicles employing engine shut – off strategies some additional provisions need to reflect technical development.

20. Vehicle usage without the need of an engine start has to be considered and the handling of engine restarts after an unintended engine shut off (e.g. engine stall). Thereby different technologies had to be taken into account.

21. Some monitors of the OBD system need special conditions (e.g. engine stop), which are not encountered during a driving cycle as it is defined in Annex 11. Therefore, it has to be clarified, that these monitors may be performed outside a normal driving cycle. In conjunction with already existing provisions regarding preconditioning cycles, the OBD system test is ensured.
