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Light vehicles – UN Regulations Nos. 68 (measurement of maximum speed, including electric vehicles), 83 (emissions of M_1 and N_1 vehicles), 101 (CO2 emission/fuel consumption) and 103 (replacement pollution control devices)

Proposal for amendments to UN Regulation No. 83 (emissions of M_1 and N_1 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) in order to update the on-board diagnostics (OBD) requirements to the state of the art. The modifications to the current text of Regulation No. 83 are marked in bold for new or struck through 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

A. Proposal for amendments to the 06 series of amendments to UN Regulation No. 83

1. Definitions

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, driving mode where a malfunction would be detected if present, and engine shut-off**, and includes the period of engine off time up to the next engine start-up**.

For vehicles that employ engine shutoff strategies (e.g., engine shutoff at idle), the manufacturer may use an alternate definition for driving cycle (e.g., key on and key off). Engine restarts following an engine shut-off commanded by the engine control strategy shall not be considered a new driving cycle.

Engine restarts following an engine shut-off that has been neither commanded by the vehicle operator nor by the engine control strategy but caused by an event such as an engine stall may be considered a new driving cycle or a continuation of the existing driving cycle."

Annex 11, paragraph 2.11., amend to read*:*

"2.11. A "*warm-up cycle*" means sufficient vehicle operation such that the coolant temperature has risen by a least 22 K from engine starting and reaches a minimum temperature of 343 K (70 °C).

Alternatively, manufacturers may use the alternative definition of a warm-up cycle as a driving cycle with vehicle operation in which the criteria specified in sections 7.5.1. (a) – (c) of Annex 11, Appendix 1 are met. "

2. Electrical failures

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 OBD system is also approved if a DTC is stored at vehicle emissions exceeding 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, paragraphs 6.3.1.4. and 6.3.1.5., amend to read*:*

"6.3.1.4. Electrical disconnection of any other emission-related component connected to a power-train management computer (if active on the selected fuel type). **For these failure modes, a Type I Test need not be performed.**

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered.

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.

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered."

Annex 11, Appendix 1, paragraphs 6.3.2.3. and 6.3.2.4, amend to read*:*

"6.3.2.3. Electrical disconnection of any fuelling system electronic fuel quantity and timing actuator. **For these failure modes, a Type I Test need not be performed.**

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered.

6.3.2.4. Electrical disconnection of any other emission-related component connected to a power-train management computer. **For these failure modes, a Type I Test need not be performed.**

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered."

3. OBD system test

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

"6.4.1.1. …

The MI shall **be** activate**d 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** activate**d 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.

…"

4. IUPR reporting

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 new paragraph 7.6.2.1. to read:

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

5. IUPR reporting – Hybrids

Annex 11, Appendix 1, paragraph 7.1., amend to read:

"7.1. General Requirements

For the purpose of calculating counters and ratios under the In-use performance requirements, “engine start” is defined as the start of the internal combustion engine.

For the calculation of the General Denominator and the Denominator$_M$ “cumulative time since engine start” in 7.5.1(a) and “cumulative vehicle operation” in 7.5.1(b) the manufacturer may choose the option to consider only times where the internal combustion engine is running.”

Paragraph 9.3.1., amend to read:

"…

For OBD IUPR$_M$ testing only, vehicles fulfilling the criteria of paragraph 2.2.1. of Appendix 3 shall be included in the test sample.

Vehicles of small series productions with less than 1000 vehicles are exempted from minimum IUPR requirements as well as the requirement to demonstrate these to the approval authority."

6. Monitoring of Diesel after treatment devices

Annex 11, Appendix 1, insert new paragraph 3.3.5.3, to read:

"3.3.5.3. To demonstrate compliance with 3.3.4.1., 3.3.4.2., 3.3.4.7. and 3.3.4.8. respectively of this appendix, manufacturers may monitor the first element of the emission after treatment system alone or in combination with the next element(s) downstream.

If the manufacturer chooses this option it should be demonstrated, that a total removal of the element(s) not monitored does not lead to emissions above the thresholds in paragraph 3.3.2. and that the paragraphs 3.3.5.1. and 3.3.5.2. are continued to be ensured.”

Annex 11, Appendix 1, sub-paragraphs of paragraph 3.3.4., amend to read*:*

"3.3.4.1 Where fitted, reduction in the efficiency of the catalytic converter**. Manufacturers may monitor the first catalyst alone or in combination with the next catalyst(s) downstream.**

The provisions of 3.3.5.3. apply.

3.3.4.2. Where fitted, the functionality and integrity of the particulate trap**. Manufacturers may monitor the first trap alone or in combination with the next trap(s) downstream.**

The provisions of 3.3.5.3. apply.

3.3.4.3. The fuel-injection system electronic fuel quantity and timing actuator(s) is/are monitored for circuit continuity and total functional failure**.**

3.3.4.7. Malfunctions and the reduction in efficiency of a NO x after-treatment system using a reagent and the reagent dosing sub-system shall be monitored.

The provisions of 3.3.5.3. apply.

3.3.4.8. Malfunctions and the reduction in efficiency of NO x after-treatment not using a reagent shall be monitored.

The provisions of 3.3.5.3. apply."

B. Proposal for amendments to the 07 series of amendments to UN Regulation No. 83

1. Update of communication standards

Annex 1, paragraph 3.2.12.2.7.6.3., amend to read*:*

"3.2.12.2.7.6.3. A comprehensive document describing all sensed components with the strategy for fault detection and MI activation (fixed number of driving cycles or statistical method), including a list of relevant secondary sensed parameters for each component monitored by the OBD system. A list of all OBD output codes and format used (with an explanation of each) associated with individual emission related power-train components and individual non-emission related components, where monitoring of the component is used to determine MI activation. In particular, a comprehensive explanation for the data given in service $05 Test ID $21 to FF and the data given in service $06 must be provided. In the case of vehicle types that use a communication link in accordance with ~~ISO 15765-4 "Road vehicles – Diagnostics on Controller Area Network (CAN) – Part 4: Requirements for emissions-related systems"~~ **the standard listed in paragraph 6.5.3.1.(a) of Annex XI, Appendix 1 of this Regulation**, a comprehensive explanation for the data given in service $06 Test ID $00 to FF, for each OBD monitor ID supported, must be provided."

Annex 2, Appendix 1, paragraph 3., amend to read*:*

"3. A comprehensive document describing all sensed components with the strategy for fault detection and MI activation (fixed number of driving cycles or statistical method), including a list of relevant secondary sensed parameters for each component monitored by the OBD system and a list of all OBD output codes and format used (with an explanation of each)

associated with individual emission related power-train components and individual non-emission related components, where monitoring of the component is used to determine MI activation. In particular, a comprehensive explanation for the data given in service $05 Test ID $21 to FF and the data given in service $06 shall be provided. In the case of vehicle types that use a communication link in accordance with **the standard listed in paragraph 6.5.3.1(a) of Annex XI, Appendix 1 of this Regulation** ~~ISO 15765-4 'Road vehicles – Diagnostics on Controller Area Network (CAN) – Part 4: Requirements for emissions-related systems~~[2], a comprehensive explanation for the data given in service $06 Test ID $00 to FF, for each OBD monitor ID supported, shall be provided."

Annex 11, paragraph 3.9.3.1., amend to read*:*

"3.9.3.1. On a request from a diagnostic scan tool, the diagnostic signals shall be transmitted on one or more source addresses. The use of source addresses is described in **the standard listed in paragraph 6.5.3.1(b) of Annex XI, Appendix 1 of this Regulation** ~~ISO DIS 15031-5 "Road vehicles – communication between vehicles and external test equipment for emissions-related diagnostics – Part 5: Emissions-related diagnostic services", dated 1 November 2001.~~"

Annex 11, Appendix 1, paragraph 6.5.3., amend to read*:*

"6.5.3. The emission control diagnostic system must provide for standardised and unrestricted access and conform with the following ISO standards and/or SAE specification. **Later versions may be used at the manufacturers' discretion.**

All references to standards in UN Regulation No. 83, if listed in paragraph 6.5.3.1. of this appendix, shall be understood as references to the standards mentioned in the abovementioned paragraph.

The standards in 6.5.3.1(f) and (g) may be used as an option instead of 6.5.3.1(b) not earlier than 01.01.2019.

6.5.3.1. **The following standard (a) shall be used for transmission of OBD relevant information**.

~~One of the~~ The following standard~~s with the restrictions as described~~ must be used as the on board to off-board communications link:

~~ISO 9141-2: 1994 (amended 1996) "Road Vehicles – Diagnostic Systems – Part 2: CARB requirements for interchange of digital information;~~

~~SAE J1850: March 1998 Class B Data Communication Network Interface". Emission related messages must use the cyclic redundancy check and the three-byte header and not use interbyte separation or checksums;~~

~~ISO 14230:2000 – Part 4 "Road Vehicles – Keyword protocol 2000 for diagnostic systems – Part 4: Requirements for emission-relate systems";~~

(**a)** ISO ~~DIS~~ 15765-4**:2011** "Road vehicles – Diagnostics on Controller Area Network (CAN) – Part 4: Requirements for emissions-related systems", dated 1 ~~November 2001~~ **February 2011**;

(**b) ISO 15031-5 "Road vehicles - communication between vehicles and external test equipment for emissions-related diagnostics – Part 5: Emissions-related diagnostic services", dated 1 April 2011 or SAE J1979 dated 23 February 2012;**

(**c) ISO 15031-4 "Road vehicles – Communication between vehicle and external test equipment for emissions related diagnostics – Part 4: External test equipment", dated 1 June 2005 or SAE J1978 dated 30 April 2002;**

(**d) ISO 15031-3 "Road vehicles – Communication between vehicle and external test equipment for emissions related diagnostics Part 3: Diagnostic connector and related electrical circuits: specification and use", dated 1 July 2004 or SAE J 1962 dated 26 July 2012;**

(e) ISO 15031-6 "Road vehicles – Communication between vehicle and external test equipment for emissions related diagnostics – Part 6: Diagnostic trouble code definitions", dated 13 August 2010 or SAE J2012 dated 07 March 2013;

(f) ISO 27145 "Road vehicles -Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD)" dated 2012-08-15 with the restriction, that only 6.5.3.1(a) may be used as a data link;

(g) ISO 14229:2013 "Road vehicles — Unified diagnostic services (UDS) with the restriction, that only 6.5.3.1(a) may be used as a data link".

6.5.3.2. Test equipment and diagnostic tools needed to communicate with OBD systems must meet or exceed the functional specification given in **the standard listed in paragraph 6.5.3.1(c) of this Appendix** ~~ISO DIS 15031-4 "Road vehicles — Communication between vehicle and external test equipment for emissions related diagnostics — Part 4: External test equipment", dated 1 November 2001~~.

6.5.3.3. Basic diagnostic data, (as specified in paragraph 6.5.1.) and bi-directional control information must be provided using the format and units described in **the standard listed in paragraph 6.5.3.1(b) of this Appendix** ~~ISO DIS 15031-5 "Road vehicles — Communication between vehicle and external test equipment for emissions related diagnostics — Part 5: Emissions related diagnostic services", dated 1 November 2001~~, and must be available using a diagnostic tool meeting the requirements of **the standard listed in paragraph 6.5.3.1(c) of this Appendix** ~~ISO DIS 15031-4~~.

The vehicle manufacturer shall provide to a national standardisation body the details of any emission-related diagnostic data, e.g. PID's, OBD monitor Id's, Test Id's not specified in ~~of~~ **the standard listed in paragraph 6.5.3.1(b) of this Regulation** ~~ISO DIS 15031-5~~ but related to this Regulation.

6.5.3.4. When a fault is registered, the manufacturer must identify the fault using an appropriate **ISO/SAE controlled** fault code ~~consistent with those given in Section 6.3.of~~ **specified in one of the standards listed in paragraph 6.5.3.1(e) of this appendix** ~~ISO DIS 15031-6 "Road vehicles — Communication between vehicle and external test equipment for emissions related diagnostics — Part 6: Diagnostic trouble code definitions"~~, relating to "emission related system diagnostic trouble codes". If such identification is not possible, the manufacturer may use **manufacturer controlled** diagnostic trouble codes according to ~~Sections 5.3. and 5.6.~~ **the same standard** ~~of ISO DIS 15031-6~~. The fault codes must be fully accessible by standardised diagnostic equipment complying with the provisions of paragraph 6.5.3.2. of this annex.

The vehicle manufacturer shall provide to a national standardisation body the details of any emission-related diagnostic data, e.g. PID's, OBD monitor Id's, Test Id's not specified in ~~of~~ **the standard listed in paragraph 6.5.3.1(b) of this appendix** ~~ISO DIS 15031-5~~ but related to this Regulation.

6.5.3.5. The connection interface between the vehicle and the diagnostic tester must be standardised and must meet all the requirements of **the standard listed in paragraph 6.5.3.1(d) of this Appendix** ~~ISO DIS 15031-3 "Road vehicles – Communication between vehicle and external test equipment for emissions-related diagnostics – Part 3: Diagnostic connector and related electrical circuits: specification and use", dated 1 November 2001~~. The installation position must be subject to agreement of the administrative department such that it is readily accessible by service personnel but protected from tampering by non-qualified personnel."

Annex 11, Appendix 1, paragraph 7.6.1., amend to read*:*

"7.6.1. The OBD system shall report**,** in accordance with the **ISO 15031-5** specifications **of the standard listed in paragraph 6.5.3.1(b) of this Appendix,** the ignition cycle counter and general denominator as well as separate numerators and denominators for the following monitors, if their presence on the vehicle is required by this annex:

(a) Catalysts (each bank to be reported separately);

(b) Oxygen/exhaust gas sensors, including secondary oxygen sensors

(each sensor to be reported separately);

(c) Evaporative system;

(d) EGR system;

(e) VVT system;

(f) Secondary air system;

(g) Particulate filter;

(h) NOx after-treatment system (e.g. NOx adsorber, NOx reagent/catalyst system);

(i) Boost pressure control system."

2. Definitions

General

Annex 11, paragraph 2, amend to read:

"2. …

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

Definition driving cycle

Annex 11, paragraph 2.10., amend to read*:*

"2.10. A "driving cycle" consists of engine start-up, driving mode where a malfunction would be detected if present, and engine shut-off**, and includes the period of engine off time up to the next engine start-up**.

For vehicles that employ engine shut-off strategies (e.g., engine shutoff at idle), the manufacturer may use an alternate definition for driving cycle

(e.g., key on and key off). Engine restarts following an engine shut-off commanded by the engine control strategy shall not be considered a new driving cycle.

Engine restarts following an engine shut-off that has been neither commanded by the vehicle operator nor by the engine control strategy but caused by an event such as an engine stall may be considered a new driving cycle or a continuation of the existing driving cycle."

Definition warm up cycle

Annex 11, paragraph 2.11., amend to read*:*

"2.11. A "*warm-up cycle*" means sufficient vehicle operation such that the coolant temperature has risen by a least 22 K from engine starting and reaches a minimum temperature of 343 K (70 °C).

Alternatively, manufacturers may use the alternative definition of a warm-up cycle as a driving cycle with vehicle operation in which the criteria specified in sections 7.5.1 (a) – (c) of Annex 11, Appendix 1 are met. "

3. Electrical failures

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 OBD system is also approved if a DTC is stored at vehicle emissions exceeding 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, paragraphs 6.3.1.4. and 6.3.1.5., amend to read*:*

"6.3.1.4. Electrical disconnection of any other emission-related component connected to a power-train management computer (if active on the selected fuel type). **For these failure modes, a Type I Test need not be performed.**

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered.

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. **The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered.**"

Annex 11, Appendix 1, paragraphs 6.3.2.3. and 6.3.2.4., amend to read*:*

"6.3.2.3. Electrical disconnection of any fuelling system electronic fuel quantity and timing actuator. **For these failure modes, a Type I Test need not be performed.**

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered.

6.3.2.4. Electrical disconnection of any other emission-related component connected to a power-train management computer. **For these failure modes, a Type I Test need not be performed.**

The manufacturer may demonstrate the failure using driving conditions, in which the component is used and the monitoring conditions are encountered."

4. OBD system test

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

"6.4.1.1. […].

The MI shall **be** activate**d at the latest** before the end of this test ~~ at the latest~~ 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** activate**d at the latest** before the end of this test ~~ at the latest~~ 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."

[…].

5. IUPR reporting

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 point (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 new paragraph 7.6.2.1., to read:

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

6. IUPR reporting – Hybrids

Annex 11, Appendix 1, paragraph 7.1, amend to read:

"7.1. General Requirements

For the purpose of calculating counters and ratios under the In-use performance requirements, "engine start" is defined as the start of the internal combustion engine.

For the calculation of the General Denominator and the Denominator$_M$ "cumulative time since engine start" in 7.5.1(a) and "cumulative vehicle operation" in 7.5.1(b) the manufacturer may choose the option to consider only times where the internal combustion engine is running."

Paragraph 9.3.1, amend to read:

"[…]

For OBD IUPR$_M$ testing only, vehicles fulfilling the criteria of paragraph 2.2.1. of Appendix 3 shall be included in the test sample.

Vehicles of small series productions with less than 1000 vehicles are exempted from minimum IUPR requirements as well as the requirement to demonstrate these to the approval authority."

7. Monitoring of Diesel after treatment devices

Annex 11, insert new paragraph 3.3.5.3, to read:

"**3.3.5.3. To demonstrate compliance with 3.3.4.1., 3.3.4.2., 3.3.4.7. and 3.3.4.8. respectively of this appendix, manufacturers may monitor the first element of the emission after treatment system alone or in combination with the next element(s) downstream.**

If the manufacturer chooses this option it should be demonstrated, that a total removal of the element(s) not monitored does not lead to emissions above the thresholds in paragraph 3.3.2. and that the paragraphs 3.3.5.1. and 3.3.5.2 are continued to be ensured."

Annex 11, sub-paragraphs of paragraph 3.3.4., amend to read*:*

"3.3.4.1. Where fitted, reduction in the efficiency of the catalytic converter. **Manufacturers may monitor the first catalyst alone or in combination with the next catalyst(s) downstream.**

The provisions of 3.3.5.3. apply.

3.3.4.2. Where fitted, the functionality and integrity of the particulate trap. **Manufacturers may monitor the first trap alone or in combination with the next trap(s) downstream.**

The provisions of 3.3.5.3. apply.

3.3.4.3. The fuel-injection system electronic fuel quantity and timing actuator(s) is/are monitored for circuit continuity and total functional failure~~;~~**.**"

3.3.4.7. Malfunctions and the reduction in efficiency of a NO x after-treatment system using a reagent and the reagent dosing sub-system shall be monitored.

The provisions of 3.3.5.3. apply.

3.3.4.8. Malfunctions and the reduction in efficiency of NO x after-treatment not using a reagent shall be monitored.

The provisions of 3.3.5.3. apply."

II. Justification

A. Justification for the proposal in part A above

1. Definition

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

Definition driving cycle

2. Annex 11 of Regulation 83 contains the definition of a driving cycle in the definition section under para. 2.10:

3. Depending on the monitoring strategy e.g. “analysis conducted during computer shut down”; “diagnostics performed on evap systems”., the period of engine-off time up to the next engine start is required (comparatively CARB regulation.)

4. Vehicles employing engine shut off at idle are specifically taken into account.

Definition warm up cycle

5. Annex 11 of Regulation 83 contains the definition of a warm-up cycle in the definition section under para 2.11.:

6. Under section 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."

7. The intention of this section is to keep fault code information in the memory long enough to give the service technician this information if a customer shows up at the workshop driven by the previous MIL illumination. Assuming 2 to 3 warm up cycles per day this information on healed codes (the system is OK and does not need repair!) stays 13 to 20 days in the memory which is long enough for the above described purpose.

8. 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 service garage for the regular service intervals might get unnecessary repairs because this information is still present. Costumers will fail PTI in some member states because of not erasing a fault code.

9. To erase a fault code, the engine has to be operated (7.5.1(a) requires an engine start).

2. Electrical failures

10. Electrical failures (disconnection, short to battery and short to ground) have only one of two states, present or not present. There is no such thing as a partial failure therefore the concept of threshold monitoring is inappropriate.

11. Demonstrating these types failures in a type 1 test is often inappropriate or wasteful. The demonstration of the monitor working properly should therefore be possible in a driving cycle defined by the manufacturer, in which the component (sensor/actuator) is used. This is true also for the electronic evaporative control device. Paragraphs 6.3.1.4. 6.3.1.5., 6.3.2.3. and 6.3.2.4. should be amended.

12. This is true also for the electronic evaporative control device. Paragraphs 6.3.1.4. 6.3.1.5., 6.3.2.3. and 6.3.2.4. should be amended.

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

3. OBD system test

14. 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.

15. UN Regulation No. 83 allows in paragraph 3.5.2. more than two preconditioning cycles for MI activation. According to paragraph 6.2.2. the manufacturer may request alternative preconditioning cycles.

16. 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 MI has to be illuminated before the type 1 test, in which emissions are measured.

17. For vehicles developed according to CARB OBD II requirements, the MI 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.

18. Additionally there should be no bar to activating the MIL earlier than the minimum requirements. In some cases it is desirable to alert the driver as soon as possible to the fault condition.

4. IUPR reporting

19. 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.

20. Although any reporting of electrical failure ratios is not possible due to the regulations and standards concerning scan tool communication, the proposed new text confirms this, thus avoiding any ambiguities.

5. IUPR reporting – Hybrids

21. Hybrids with an increased electrical range, especially those, which could be charged externally (plug in hybrids), are using the internal combustion engines less frequent than non-hybrid vehicles, thereby minimizing fuel consumption and emissions but also time for running monitors to detect a malfunction of the internal combustion engine.

22. For "non-hybrid" vehicles, the definition:

"3.5.1. The general denominator is a counter measuring the number of times a vehicle has been operated. It shall be incremented within 10 seconds, if and only if, the following criteria are satisfied on a single driving cycle:

(a) Cumulative time since engine start is greater than or equal to 600 seconds while at an elevation of less than 2,440 m above sea level and at an ambient temperature of greater than or equal to -7° C;

(b) Cumulative vehicle operation at or above 40 km/h occurs for greater than or equal to 300 seconds while at an elevation of less than 2,440 m above sea level and at an ambient temperature of greater than or equal to -7 °C"; implies, that the engine, e.g. the internal combustion engine, is working constantly. To avoid misunderstandings add the above to Annex 11, Appendix 1 under paragraph 3.… implies, that the engine, i.e. the internal combustion engine, is working constantly. To avoid misunderstandings, amend the requirements accordingly.

6. Monitoring of Diesel after treatment devices

23. Emission after treatment systems for Diesel vehicles may comprise multiple elements related to a single pollutant in order to comply to very strict emission limits and by the need to fulfil the OBD requirements.

24. An example if NOx after treatments where a small catalyst to avoid slip of ammonia is used downstream of the main conversion catalyst: this device in turn makes a small contribution to the overall NOx conversion. In this case robust monitoring of the smaller unit alone is difficult or impossible. Analogous situations arise for the catalysis of other pollutants.

25. In some split systems it is more robust / reliable to monitor the upstream catalyst only to infer the performance of the whole system.

26. During the "OBD system test" the whole system is aged to the threshold limit. Therefor the "unmonitored" portion of the after treatment system is monitored using an "indirect approach".

27. For large devices, a sensor at position 2 will deliver no signal during normal driving conditions:

Paragraphs 3.3.5., 3.3.5.1. and 3.3.5.2. refer to total functional failure for certain components:

3.3.5. Manufacturers may demonstrate to the Type Approval Authority that certain components or systems need not be monitored if, in the event of their total failure or removal, emissions do not exceed the emission limits given in paragraph 3.3.2. of this annex.

3.3.5.1. The following devices should however be monitored for total failure or removal (if removal would cause the applicable emission limits to be exceeded):

(a) A particulate trap fitted to compression ignition engines as a separate unit or integrated into a combined emission control device;

(b) A NOx after-treatment system fitted to compression ignition engines as a separate unit or integrated into a combined emission control device;

(c) A diesel oxidation catalyst (DOC) fitted to compression ignition engines as a separate unit or integrated into a combined emission control device.

3.3.5.2. The devices referred to in paragraph 3.3.5.1. shall also be monitored for any failure that would result in exceeding the applicable OBD threshold limits.

28. If a failure results in emissions above the OTLs, all components have to be monitored. If the failure results in emissions above the emission limits, certain components of the after treatment system shall be monitored for total functional failure.

29. The proposal reflects these requirements and the manufacturer is required to demonstrate, that the requirements are fulfilled.

B. Justifications for proposal in part B above

A. Update of communication standards

30. The communication standards referenced throughout the regulation are outdated. All references to ISO 15031-x and 15765-4 should be updated to the latest version. With the standards currently referenced it would be impossible to fulfil other requirements in Regulation No. 83, i.e. reporting of IUPR information. Furthermore some standards are referenced several times throughout the document, which may result in future inconsistencies. To avoid this, it was decided to move all references to communication standard to a separate paragraph and delete the version information from all other references.

31. Two new standards for communication to external test equipment are introduced into the regulation. ISO 27145 (WWH OBD), which is already used in Heavy Duty vehicles and ISO 14229, which forms the basis for WWH OBD.

32. Such an introduction needs to be carefully considered, as OBD is not only used in independent workshops but also during PTI in several regions.

33. To introduce these new protocols in workshop testers and on the equipment of PTI stations, a lead time of approx. 4 years is introduces to allow the update testers in the workshop and the PTI equipment.

B. Definition

5. General

34. 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.

6. Definition driving cycle

35. Annex 11 of Regulation No. 83 contains the definition of a driving cycle in the definition section under para. 2.10.:

36. Depending on the monitoring strategy e.g. "analysis conducted during computer shut down"; "diagnostics performed on evap systems"., the period of engine-off time up to the next engine start is required (comparatively CARB regulation).

37. Vehicles employing engine shut off at idle specifically taken into account.

7. Definition warm up cycle

38. Annex 11 of Regulation No. 83 contains the definition of a warm-up cycle in the definition section under para. 2.11.:

39. Under section 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."

40. The intention of this section is to keep fault code information in the memory long enough to give the service technician this information if a customer shows up at the workshop driven by the previous MIL illumination. Assuming 2 to 3 warm up cycles per day this information on healed codes (the system is OK and does not need repair!) stays 13 to 20 days in the memory which is long enough for the above described purpose.

41. 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 service garage for the regular service intervals might get unnecessary repairs because this information is still present. Costumers will fail PTI in some member states because of not erasing a fault code.

42. To erase a fault code, the engine has to be operated (7.5.1(a) requires an engine start).

43. CARB will amend the Warm Up Cycle definition for this reason.

C. Electrical failures

44. Electrical failures (disconnection, short to battery and short to ground) have only one of two states, present or not present. There is no such thing as a partial failure therefore the concept of threshold monitoring is inappropriate.

45. Demonstrating these types failures in a type 1 test is often inappropriate or wasteful. The demonstration of the monitor working properly should therefore be possible in a driving cycle defined by the manufacturer, in which the component (sensor/actuator) is used. This is true also for the electronic evaporative control device. Paragraphs 6.3.1.4., 6.3.1.5., 6.3.2.3. and 6.3.2.4. should be amended.

46. This is true also for the electronic evaporative control device. Paragraphs 6.3.1.4., 6.3.1.5., 6.3.2.3. and 6.3.2.4. should be amended.

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

D. OBD system test

48. Typically an 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.

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

50. 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 MI has to be illuminated before the type 1 test, in which emissions are measured.

51. For vehicles developed according to CARB OBD II requirements, the MI 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.

52. Additionally there should be no bar to activating the MIL earlier than the minimum requirements. In some cases it is desirable to alert the driver as soon as possible to the fault condition.

E. IUPR reporting

53. 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.

54. Although any reporting of electrical failure ratios is not possible due to the regulations and standards concerning scan tool communication, the proposed new text confirms this, thus avoiding any ambiguities.

F. IUPR reporting – Hybrids

55. Hybrids with an increased electrical range, especially those, which could be charged externally (plug in hybrids), are using the internal combustion engines less frequent than non-hybrid vehicles, thereby minimizing fuel consumption and emissions but also time for running monitors to detect a malfunction of the internal combustion engine.

56. For "non-hybrid" vehicles, the definition:

"3.5.1. The general denominator is a counter measuring the number of times a vehicle has been operated. It shall be incremented within 10 seconds, if and only if, the following criteria are satisfied on a single driving cycle:

(a) Cumulative time since engine start is greater than or equal to 600 seconds while at an elevation of less than 2,440 m above sea level and at an ambient temperature of greater than or equal to -7° C;

(b) Cumulative vehicle operation at or above 40 km/h occurs for greater than or equal to 300 seconds while at an elevation of less than 2,440 m above sea level and at an ambient temperature of greater than or equal to -7 °C;" implies, that the engine, e.g. the internal combustion engine, is working constantly. To avoid misunderstandings add the above to Annex 11, Appendix 1 under paragraph 3. …" implies, that the engine, i.e. the internal combustion engine, is working constantly. To avoid misunderstandings, amend the requirements accordingly.

G. Monitoring of Diesel after treatment devices

57. Emission after treatment systems for Diesel vehicles may comprise multiple elements related to a single pollutant in order to comply to very strict emission limits and by the need to fulfil the OBD requirements.

58. An example if NOx after treatments where a small catalyst to avoid slip of ammonia is used downstream of the main conversion catalyst: this device in turn makes a small contribution to the overall NOx conversion. In this case robust monitoring of the smaller unit alone is difficult or impossible. Analogous situations arise for the catalysis of other pollutants.

59. In some split systems it is more robust / reliable to monitor the upstream catalyst only to infer the performance of the whole system.

60. During the "OBD system test" the whole system is aged to the threshold limit. Therefor the "unmonitored" portion of the after treatment system is monitored using an "indirect approach".

61. For systems with a small "Part 2 Device" there will be no measurable difference between sensors at position 1 and position 2. Monitoring the second part will be impossible during normal driving conditions.

62. Paragraphs 3.3.5., 3.3.5.1. and 3.3.5.2. refer to total functional failure for certain components:

3.3.5. Manufacturers may demonstrate to the Type Approval Authority that certain components or systems need not be monitored if, in the event of their total failure or removal, emissions do not exceed the emission limits given in paragraph 3.3.2. of this Annex.

3.3.5.1. The following devices should however be monitored for total failure or removal (if removal would cause the applicable emission limits to be exceeded):

(a) A particulate trap fitted to compression ignition engines as a separate unit or integrated into a combined emission control device;

(b) A NOx after-treatment system fitted to compression ignition engines as a separate unit or integrated into a combined emission control device;

(c) A diesel oxidation catalyst (DOC) fitted to compression ignition engines as a separate unit or integrated into a combined emission control device.

3.3.5.2. The devices referred to in paragraph 3.3.5.1. shall also be monitored for any failure that would result in exceeding the applicable OBD threshold limits.

63. If a failure results in emissions above the OTLs, all components have to be monitored. If the failure results in emissions above the emission limits, certain components of the after-treatment system shall be monitored for total functional failure.

64. The proposal reflects these requirements and the manufacturer is required to demonstrate, that the requirements are fulfilled.