

Proposal for amendments to the 07 series of amendments to UN Regulation No. 83 (Uniform provisions concerning the approval of vehicles with regard to the emission of pollutants according to engine fuel requirements)

The text reproduced below was prepared by the expert from CITA proposing to amend the 07 series of amendments to UN Regulation No. 83, improving the design of vehicles to make tampering of emissions systems more difficult and to facilitate its detection.

I. Proposal

Paragraph 2.13., amend to read:

- “2.13. **"On-Board Diagnostic (OBD)" means an on-board diagnostic system for emission control, which has the capability of identifying the likely area of malfunction or detected tampering by means of fault codes stored in computer memory.**“

Insert new paragraph 2.17., amend following numbering

- “**2.17. "Engine protection" means measures to protect the engine in extreme rare situations, where the engine could be harmed although it has been designed, constructed and assembled according to 5.1. of this Regulation.;**“

Insert new paragraph 2.98.:

- “**2.98. "Tampering" means inactivation, removal, disconnection, adjustment or modification of the emission control system, including any software, other logical control elements or components of such a system, that has the effect, whether intended or not, of worsening the emissions performance of the vehicle;**“

Paragraph 3.1.1., amend to read:

- “3.1.1. In addition, the manufacturer shall submit the following information:

...

(f) A description of the provisions taken to prevent tampering with and modification of the emission control computer, **or any emissions-related controller;**

...

(i) **A description on how to start the combustion engine at hybrid electric vehicles regardless of the state of charge of the traction battery.**

(j) **Information on the sequence of commands necessary to bring the engine to its maximum speed**

Paragraph 4.10.2., amend to read:

- “4.10.2 The OBD system shall be designed, constructed and installed on a vehicle so as to enable it to identify types of deterioration, malfunction **or detected tampering** over the entire life of the vehicle.“

Paragraph 5.1.1. amend to read:

- “5.1.1. **The components liable to affect the emission of pollutants shall be designed, constructed and assembled so that their normal operation does not harm persons or the environment more than unavoidable.**

The components liable to affect the emission of pollutants shall be so designed, constructed and assembled as to enable the vehicle, in normal use, despite the vibration to which they may be subjected, to comply with the provisions of this Regulation. **Engines shall be designed, constructed and assembled so as to enable them to comply with the provisions of this Regulation.“**

Insert new paragraph 5.1.1.1.

- “5.1.1.1. **The technical measures shall also contain measures against mechanical, electric or software tampering on any emissions-related systems or components“.**

Paragraph 5.1.5.1., amend to read:

- “5.1.5.1. Any vehicle with an emission control computer, **or emissions-related controller**, shall include features to prevent modification, except as authorised by the manufacturer. The manufacturer shall authorise modifications if these modifications are **approved by the type approval authority and** necessary for the diagnosis, servicing, inspection, retrofitting or repair of the vehicle. Any reprogrammable computer codes or operating parameter shall be resistant to tampering and afford a level of protection at least as good as the provisions in **both ISO DIS 15031-7, dated 15 March 2001 (SAE J2186 dated October 1996) and either ISO 15031-7:2013 or SAE J2186: 2019.** Any removable calibration memory chips shall be potted, encased in a sealed container, or protected by electronic algorithms and shall not be changeable without the use of specialised tools and procedures. Only features directly associated with emissions calibration or prevention of vehicle theft may be so protected.“

Paragraph 5.1.5.2., amend to read:

- “5.1.5.2. Computer-coded engine operating parameters shall not be changeable without the use of specialised tools and procedures (e.g. soldered or potted computer components or sealed (or soldered) computer enclosures). **In any case, it shall not be changeable without authorisation by the manufacturer and approval by the Type Approval Authority.“**

Paragraph 5.1.6., amend to read:

- “5.1.6. It shall be possible to inspect the vehicle in roadworthiness test in order to determine its performance in relation to the data collected in accordance with paragraph 5.3.7. If this inspection requires a special procedure, this shall be detailed in the service manual (or equivalent media). This special procedure shall not require the use of special equipment other than that provided with the vehicle **or a generic scan tool.**

For hybrid electric vehicles it shall be possible to start the combustion engine at any state of charge of the traction battery.“

Paragraph 7.3.1.4., amend to read:

- “7.3.1.4. The durability test shall be carried out using a vehicle **with a software version approved or to be approved by the Type Approval Authority**. It may have a different body style, gear box (automatic or manual) and size of the wheels or tyres from those of the vehicle type for which the type approval is sought.“

Paragraph 7.4.1., amend to read:

- “7.4.1. The type approval shall be extended to different vehicles with identical engine and emission control systems **and emission control software** as defined in Appendix 2 to Annex 11 to this Regulation. The type approval shall be extended regardless of the following vehicle characteristics:
...“

Paragraph 9.2.5.6., amend to read:

- “9.2.5.6. The numbers of the type approvals applicable to these vehicle types within the family, including, where applicable, the numbers of all extensions and field fixes/recalls (re-works), **and approved emission control software versions;**“

Paragraph 9.2.5.11., amend to read :

- “9.2.5.11. The results from the manufacturer's in-service conformity procedure, including:
...
(e) Test data, including the following:
...
(viii) All required data downloaded from the vehicle;~~and~~
(ix) For each monitor to be reported the in-use performance ratio IUPR_M; **and**
(x) **emission control software version.**“

Appendix 3, paragraph 3.2., amend to read:

- “3.2. The OBD system shall be checked for proper functioning. Any **indications for malfunction or tampering** in the OBD memory shall be recorded and the requisite repairs shall be carried out. If the OBD malfunction indicator registers a malfunction during a preconditioning cycle, the fault may be identified and repaired. The test may be re-run and the results of that repaired vehicle used.“

Appendix 6, paragraph 5.4., amend to read:

- “5.4. A deviation of more than 50 per cent [**or less than 1 per cent**] between the average reagent consumption and the average demanded reagent consumption by the engine system over a period of 30 minutes of vehicle operation, shall result in the activation of the driver warning system in paragraph 3. above, which shall display a message indicating an appropriate warning (e.g. "urea dosing malfunction", "AdBlue dosing malfunction", or

"reagent dosing malfunction"). If the reagent consumption is not rectified within 50 km of the activation of the warning system then the driver inducement requirements of paragraph 8. below shall apply."

Appendix 6, paragraph 7.2., amend to read:

"7.2. Malfunctions in the reagent dosing system attributed to technical failures (e.g. mechanical or electrical faults, **or detected tampering**) shall also be subject to the OBD requirements in Annex 11 to this Regulation."

Appendix 6, paragraph 8.1.1., amend to read:

"8.1.1. The requirement for a driver inducement system shall not apply to vehicles designed and constructed for use by the rescue services, armed services, civil defence, fire services and forces responsible for maintaining public order. Permanent deactivation of the driver inducement system for these vehicles shall only be **technically possible and** done by the vehicle manufacturer."

Appendix 6, paragraph 8.3., amend to read:

"8.3. The manufacturer shall select which type of inducement system to install. The options for a system are described in paragraphs **8.3.1.and 8.3.2.** below."

Appendix 6, renumber paragraph 8.3.4. into 8.3.2.

Appendix 6, insert new paragraph 8.3.3.:

"**8.3.3 Where the fuel tank of the vehicle is capable to store less than a distance equivalent to a driving range of 500 km, a "no start after refuelling" system described in paragraph 8.3.3.1 or a "fuel lockout" system described in paragraph 8.3.3.2 shall also be considered a sufficient driver inducement system.**"

Appendix 6, renumber paragraphs 8.3.2. into 8.3.3.1. and paragraph 8.3.3. into 8.3.3.2.; amend numbering in former 8.3.4.3. into "8.3.2.1, 8.3.2.2. or 8.3.2.3."

Annex 1, insert new paragraph 3.1.2.:

"**3.1.2 Approved emission control software versions (with integrity information for each):**
....."

Annex 2 - Addendum, item 1.13.3., amend to read:

"1.13.3. Total gear ratios (including the rolling circumferences of the tyres under load) for each gear: road speeds per 1,000 min⁻¹ (km/h)
First gear:
Second gear:
Third gear:"

Fourth gear:

(add lines up to highest gear if necessary)

Overdrive: :

Annex 11, paragraph 1., amend to read:

“1. Introduction

This annex applies to the functional aspects of On-Board **Diagnostic** (OBD) system for the emission control of motor vehicles.“

Annex 11, paragraph 2.1., amend to read:

“2.1. "OBD" means an on-board diagnostic system for emission control which shall have the capability of identifying the likely area of malfunction **or detected tampering** by means of fault codes stored in computer memory.“

Annex 11, paragraph 2.10., amend to read:

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

Annex 11, insert new paragraph 2.21.:

“2.21. **"Tampering" means inactivation, adjustment or modification of the emission control system, including any software, other logical control elements, or components of such a system, that has the effect, whether intended or not, of worsening the emissions performance of the engine;**“

Annex 11, paragraph 3.1., amend to read:

“3.1. All vehicles shall be equipped with an OBD system so designed, constructed and installed in a vehicle as to enable it to identify types of deterioration, malfunction, **or tampering** over the entire life of the vehicle. In achieving this objective the Type Approval Authority shall accept that vehicles which have travelled distances in excess of the Type V durability distance (according to Annex 9 to this Regulation) referred to in paragraph 3.3.1. of this annex, may show some deterioration in OBD system performance such that the emission limits given in paragraph 3.3.2. of this annex may be exceeded before the OBD system signals a failure to the driver of the vehicle.“

Annex 11, paragraph 3.1.1., amend to read:

“3.1.1. Access to the OBD system required for the inspection **(including roadworthiness testing)**, diagnosis, servicing or repair of the vehicle shall be unrestricted and standardised. All emission related fault codes shall be consistent with paragraph 6.5.3.4. of Appendix 1 to this annex.“

Annex 11, insert new paragraph 5.3.:

“5.3. In order to inspect the vehicle in roadworthiness test or to design roadworthiness test methods, OBD information shall also be made available to Roadworthiness Authorities or related bodies on a non-discriminatory basis.

This information shall e.g. contain

- a list of approved software versions of emission related controllers and their related integrity information, including necessary access information,
- access and judgement information for emission related sensor signals,
- access and judgement information for parameters calculated by emission related controllers
- information on how to start the combustion engine on hybrid electric vehicles
- information on the sequence of commands necessary to bring the engine to its maximum speed“

Annex 11 - Appendix 1, insert new paragraphs 2.1.5 to 2.1.8.:

“2.1.5. Simulation of tampering of a component of the engine management or emission control system

2.1.6. Preconditioning of the vehicle with a simulated tampering over preconditioning specified in paragraphs 6.2.1. or 6.2.2. of this appendix;

2.1.7. Driving the vehicle with a simulated tampering over the Type I test cycle and measuring the emissions of the vehicle;

2.1.8. Determining whether the OBD system reacts to the simulated tampering and indicates malfunction in an appropriate manner to the vehicle driver.“

Annex 11 - Appendix 1, paragraph 6.5.1.1., amend to read:

“6.5.1.1. Upon determination of the first malfunction **or first detected tampering** of any component or system, "freeze-frame" engine conditions present at the time shall be stored in computer memory. Should a subsequent fuel system or misfire malfunction occur, any previously stored freeze-frame conditions shall be replaced by the fuel system or misfire conditions (whichever occurs first). Stored engine conditions shall include, but are not limited to calculated load value, engine speed, fuel trim value(s) (if available), fuel pressure (if available), vehicle speed (if available), coolant temperature, intake manifold pressure (if available), closed- or open-loop operation (if available) and the fault code which caused the data to be stored. The manufacturer shall choose the most appropriate set of conditions facilitating effective repairs for freeze-frame storage. Only one frame of data is required. Manufacturers may choose to store additional frames provided that at least the required frame can be read by a generic scan tool meeting the specifications of paragraphs 6.5.3.2. and 6.5.3.3. of this appendix. If the fault code causing the conditions to be stored is erased in accordance with paragraph 3.8. of this annex, the stored engine conditions may also be erased.“

Annex 11 - Appendix 1, paragraph 6.5.1.5., amend to read:

“6.5.1.5. For all types of vehicles entering into service, the software calibration identification number **and its integrity information** shall be made available through the serial port on the standardised data link connector. The software calibration identification number **and its integrity information** shall be provided in a standardised format.“

Annex 11 - Appendix 1, insert new paragraph 6.6.:

“6.6. The manufacturer shall hold and provide on request a complete list of approved emission control software versions with integrity information for each.”

Annex 11 - Appendix 1, paragraph 7.7.1., amend to read:

“7.7.1. Within 10 seconds of a malfunction **or tampering being detected, which disables a monitor required to meet the monitoring conditions of this annex (i.e. a pending or confirmed code is stored), the OBD system shall disable further incrementing of the corresponding numerator and denominator for each monitor that is disabled. When the malfunction **or tampering** is no longer detected (i.e., the pending code is erased through self-clearing or through a scan tool command), incrementing of all corresponding numerators and denominators shall resume within 10 seconds.”**

II. Justification

To avoid tampering, it is necessary to have additional requirements for design and behaviour of the systems.

To ensure that tampering at engines is detected during lifetime, e.g. in roadworthiness testing, it is necessary to provide additional requirements for access to and information about the systems and its components.

III. Additional expert review needed

Appendix 1, Table App1/1:

The values in the last line are implausible.

A proposal of reference values regarding opacity, particle number and nitrogen oxides will be submitted in a later stage.