

ANNEX XVI

REQUIREMENTS FOR VEHICLES THAT USE A REAGENT FOR THE EXHAUST AFTERTREATMENT SYSTEM

1. INTRODUCTION

This Annex sets out the requirements for vehicles that rely on the use of a reagent for the aftertreatment system in order to reduce emissions.

2. REAGENT INDICATION

- 2.1. The vehicle shall include a specific indicator on the dashboard that informs the driver of low levels of reagent in the reagent storage tank and of when the reagent tank becomes empty.

3. DRIVER WARNING SYSTEM

- 3.1. The vehicle shall include a warning system consisting of visual alarms that informs the driver when the reagent level is low, that the tank soon needs to be refilled, or the reagent is not of a quality specified by the manufacturer. The warning system may also include an audible component to alert the driver.
- 3.2. The warning system shall escalate in intensity as the reagent approaches empty. It shall culminate in a driver notification that can not be easily defeated or ignored. It shall not be possible to turn off the system until the reagent has been replenished.
- 3.3. The visual warning shall display a message indicating a low level of reagent. The warning shall not be the same as the warning used for the purposes of OBD or other engine maintenance. The warning shall be sufficiently clear for the driver to understand that the reagent level is low (e.g. 'urea level low', 'AdBlue level low', or 'reagent low').
- 3.4. The warning system does not initially need to be continuously activated, however the warning shall escalate so that it becomes continuous as the level of the reagent approaches the point where the driver inducement system in Section 8 comes into effect. An explicit warning shall be displayed (e.g. 'fill up urea', 'fill up AdBlue', or 'fill up reagent'). The continuous warning system may be temporarily interrupted by other warning signals providing important safety related messages.
- 3.5. The warning system shall activate at a distance equivalent to a driving range of at least 2 400 km in advance to the reagent tank becoming empty.

4. IDENTIFICATION OF INCORRECT REAGENT

- 4.1. The vehicle shall include a means of determining that a reagent corresponding to the characteristics declared by the manufacturer and recorded in Appendix 3 to Annex I to this Regulation is present on the vehicle.
- 4.2. If the reagent in the storage tank does not correspond to the minimum requirements declared by the manufacturer the driver warning system in section 3 shall be activated and shall display a message indicating an appropriate warning (e.g. 'incorrect urea detected', 'incorrect AdBlue detected', or 'incorrect reagent detected'). If the reagent quality is not rectified within 50 km of the activation of the warning system then the driver inducement requirements of section 8 shall apply.

5. REAGENT CONSUMPTION MONITORING

Changes to legislation: There are currently no known outstanding effects for the
Commission Regulation (EC) No 692/2008, ANNEX XVI. (See end of Document for details)

- 5.1. The vehicle shall include a means of determining reagent consumption and providing off-board access to consumption information.
- 5.2. Average reagent consumption and average demanded reagent consumption by the engine system shall be available via the serial port of the standard diagnostic connector. Data shall be available over the previous complete 2 400 km period of vehicle operation.
- 5.3. In order to monitor reagent consumption, at least the following parameters within the vehicle shall be monitored:
- (a) the level of reagent in the on-vehicle storage tank;
 - (b) the flow of reagent or injection of reagent as close as technically possible to the point of injection into an exhaust aftertreatment system.
- 5.4. A deviation of more than 50 % 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 section 3, 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 section 8 shall apply.
- 5.5. In the case of interruption in reagent dosing activity the driver warning system as referred to in section 3 shall be activated, which shall display a message indicating an appropriate warning. This activation shall not be required where the interruption is demanded by the engine ECU because the vehicle operating conditions are such that the vehicle's emission performance does not require reagent dosing, provided that the manufacturer has clearly informed the approval authority when such operating conditions apply. If the reagent dosing is not rectified within 50 km of the activation of the warning system then the driver inducement requirements of section 8 shall apply.
6. MONITORING NO_x EMISSIONS
- 6.1. As an alternative to the monitoring requirements in section 4 and 5 manufacturers may use exhaust gas sensors directly to sense excess NO_x levels in the exhaust.
- [^F6.2. The manufacturer shall demonstrate that use of the sensors referred to in point 6.1 and any other sensors on the vehicle, results in the activation of the driver warning system as referred to in point 3, the display of a message indicating an appropriate warning (e.g. 'emissions too high — check urea', 'emissions too high — check AdBlue', 'emissions too high — check reagent'), and the driver inducement system as referred to in point 8.3, when the situations referred to in points 4.2, 5.4 or 5.5 occur.

For the purposes of this point these situations are presumed to occur:

- in the case of vehicles approved to the Euro 5 emission limits of Table 1 of Annex I to Regulation (EC) No 715/2007, if the applicable NO_x emission limit of that table multiplied by a factor of 1,5, is exceeded,
- in the case of vehicles approved to the Euro 6 emission limits of Table 2 of Annex I to Regulation (EC) No 715/2007, if the applicable NO_x OBD threshold limit of the tables set out in points 2.3.2, 2.3.3 or 2.3.4 of Annex XI is exceeded.

NO_x emissions during the test to demonstrate compliance with these requirements shall be no more than 20 % higher than the values referred to in the second paragraph.]

Textual Amendments

- F1** Substituted by [Commission Regulation \(EU\) No 459/2012 of 29 May 2012 amending Regulation \(EC\) No 715/2007 of the European Parliament and of the Council and Commission Regulation \(EC\) No 692/2008 as regards emissions from light passenger and commercial vehicles \(Euro 6\) \(Text with EEA relevance\)](#).

7. STORAGE OF FAILURE INFORMATION

- [^{F2}7.1. Where reference is made to this point, non-erasable Parameter Identifiers (PID) shall be stored identifying the reason for and the distance travelled by the vehicle during the inducement system activation. The vehicle shall retain a record of the PID for at least 800 days or 30 000 km of vehicle operation. The PID shall be made available via the serial port of a standard diagnostic connector upon request of a generic scan tool according to the provisions of point 6.5.3.1 of Appendix 1 to Annex 11 to UN/ECE Regulation No 83 and point 2.5 of Appendix 1 to Annex XI to this Regulation. From the dates referred to in Article 17, the information stored in the PID shall be linked to the period of cumulated vehicle operation, during which it has occurred, with an accuracy of not less than 300 days or 10 000 km.]

Textual Amendments

- F2** Substituted by [Commission Regulation \(EU\) No 566/2011 of 8 June 2011 amending Regulation \(EC\) No 715/2007 of the European Parliament and of the Council and Commission Regulation \(EC\) No 692/2008 as regards access to vehicle repair and maintenance information \(Text with EEA relevance\)](#).

- 7.2. Malfunctions in the reagent dosing system attributed to technical failures (e.g. mechanical or electrical faults) shall also be subject to the OBD requirements in Annex XI.

8. DRIVER INDUCEMENT SYSTEM

- 8.1. The vehicle shall include a driver inducement system to ensure that the vehicle operates with a functioning emissions control system at all times. The inducement system shall be designed so as to ensure that the vehicle can not operate with an empty reagent tank.
- 8.2. The inducement system shall activate at the latest when the level of reagent in the tank reaches a level equivalent to the average driving range of the vehicle with a complete tank of fuel. The system shall also activate when the failures in sections 4, 5 or 6 have occurred, depending on the NO_x monitoring approach. The detection of an empty reagent tank and the failures mentioned in sections 4, 5 or 6 shall result in the failure information storage requirements of section 7 coming into effect.
- 8.3. The manufacturer shall select which type of inducement system to install. The options for a system are described in following points 8.3.1, 8.3.2, 8.3.3 and 8.3.4.
- 8.3.1. A 'no engine restart after countdown' approach allows a countdown of restarts or distance remaining once the inducement system activates. Engine starts initiated by the vehicle control system, such as start-stop systems, are not included in this countdown. Engine restarts shall be prevented immediately after the reagent tank becomes empty

Changes to legislation: There are currently no known outstanding effects for the Commission Regulation (EC) No 692/2008, ANNEX XVI. (See end of Document for details)

- or a distance equivalent to a complete tank of fuel has been exceeded since the activation of the inducement system, whichever occurs earlier.
- 8.3.2. A ‘no start after refuelling’ system results in a vehicle being unable to start after refuelling if the inducement system has activated.
- 8.3.3. A ‘fuel-lockout’ approach prevents the vehicle from being refuelled by locking the fuel filler system after the inducement system activates. The lockout system shall be robust to prevent it being tampered with.
- 8.3.4. A ‘performance restriction’ approach restricts the speed of the vehicle after the inducement system activates. The level of speed limitation shall be noticeable to the driver and significantly reduce the maximum speed of the vehicle. Such limitation shall enter into operation gradually or after an engine start. Shortly before engine restarts are prevented, the speed of the vehicle shall not exceed 50 km/h. Engine restarts shall be prevented immediately after the reagent tank becomes empty or a distance equivalent to a complete tank of fuel has been exceeded since the activation of inducement system, whichever occurs earlier.
- 8.4. Once the inducement system has fully activated and disabled the vehicle, the inducement system shall only be deactivated if the quantity of reagent added to the vehicle is equivalent to 2 400 km average driving range, or the failures specified in sections 4, 5, or 6 have been rectified. After a repair has been carried out to correct a fault where the OBD system has been triggered under point 7.2, the inducement system may be reinitialised via the OBD serial port (e.g. by a generic scan tool) to enable the vehicle to be restarted for self-diagnosis purposes. The vehicle shall operate for a maximum of 50 km to enable the success of the repair to be validated. The inducement system shall be fully reactivated if the fault persists after this validation.
- 8.5. The driver warning system referred to in section 3 shall display a message indicating clearly:
- (a) the number of remaining restarts and/or the remaining distance; and
 - (b) the conditions under which the vehicle can be restarted.
- 8.6. The driver inducement system shall be deactivated when the conditions for its activation have ceased to exist. The driver inducement system shall not be automatically deactivated without the reason for its activation having been remedied.
- 8.7. Detailed written information fully describing the functional operation characteristics of the driver inducement system shall be provided to the approval authority at the time of approval.
- 8.8. As part of the application for type-approval under this Regulation, the manufacturer shall demonstrate the operation of the driver warning and inducement systems.
9. INFORMATION REQUIREMENTS
- 9.1. The manufacturer shall provide all owners of new vehicles written information about the emission control system. This information shall state that if the vehicle emission control system is not functioning correctly, the driver shall be informed of a problem by the driver warning system and that the driver inducement system shall consequentially result in the vehicle being unable to start.
- 9.2. The instructions shall indicate requirements for the proper use and maintenance of vehicles, including the proper use of consumable reagents.

Changes to legislation: There are currently no known outstanding effects for the Commission Regulation (EC) No 692/2008, ANNEX XVI. (See end of Document for details)

- 9.3. The instructions shall specify if consumable reagents have to be refilled by the vehicle operator between normal maintenance intervals. They shall indicate how the driver should refill the reagent tank. The information shall also indicate a likely rate of reagent consumption for that type of vehicle and how often it should be replenished.
- 9.4. The instructions shall specify that use of, and refilling of, a required reagent of the correct specifications is mandatory for the vehicle to comply with the certificate of conformity issued for that vehicle type.
- 9.5. The instructions shall state that it may be a criminal offence to use a vehicle that does not consume any reagent if it is required for the reduction of emissions.
- 9.6. The instructions shall explain how the warning system and driver inducement systems work. In addition, the consequences of ignoring the warning system and not replenishing the reagent shall be explained.

10. OPERATING CONDITIONS OF THE AFTERTREATMENT SYSTEM

Manufacturers shall ensure that the emission control system retains its emission control function during all ambient conditions regularly found in the European Union, especially at low ambient temperatures. This includes taking measures to prevent the complete freezing of the reagent during parking times of up to 7 days at 258 K (– 15 °C) with the reagent tank 50 % full. If the reagent has frozen, the manufacturer shall ensure that reagent shall be available for use within 20 minutes of the vehicle starting at 258 K (– 15 °C) measured inside the reagent tank, so as to ensure correct operation of the emission control system.

Changes to legislation:

There are currently no known outstanding effects for the Commission Regulation (EC) No 692/2008, ANNEX XVI.