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#### 1998 Agreement:

Consideration and vote by AC.3 of draft UN GTRs

and/or draft amendments to established UN GTRs, if any

## **Technical Report on the development of Amendment 1 to UN Global Technical Regulation (UN GTR) No. 18 (On-Board Diagnostic (OBD) systems for L-category vehicles)**

### **Submitted by the representative of the European Union\* \*\***

The text reproduced below was prepared by the representative of the European Union. It is a proposal for a Technical Report on the development of Amendment 1 to UN Global Technical Regulation (UN GTR) No. 18 (On-Board Diagnostic (OBD) systems for L-category vehicles). It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Executive Committee (AC.3) of the 1998 Agreement for consideration at its November 2020 sessions.

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\* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

\*\* This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.

# Technical Report on the development of Amendment 1 to UN Global Technical Regulation (UN GTR) No. 18 (On-Board Diagnostic (OBD) systems for L-category vehicles)

## I. Mandate

1. Amendment 1 to the UN GTR No. 18 was developed by the Informal Working Group (IWG) on Environmental and Propulsion Performance Requirements of L-category vehicles (EPPR). The Executive Committee (AC.3) of the 1998 Agreement adopted the authorisation to develop amendments to UN GTR No. 18 at its 45th session (12 November 2015) (ECE/TRANS/WP.29/AC.3/36/Rev.1).

## II. Objectives

2. This UN GTR establishes harmonized functional requirements for OBD and a procedure to test and verify the environmental OBD functions (test type VIII).

3. The scope includes two- and three-wheeled vehicles of category 3<sup>1</sup> equipped with conventional combustion engine technology, while the objectives also include other propulsion types in the next stage of work.

4. The scope of discussions does not cover light four-wheeled vehicles on emission related UN GTRs.

## III. Meetings held by the Informal Working Group (IWG)

5. The proposed text of Amendment 1 to UN GTR No. 18 addressing the points listed in section II above was discussed at length and agreed upon by all participants in numerous IWG meetings and of an ad-hoc OBD2 Correspondence Group (OBD2CG). These meetings took the format of either face-to-face or audio/web meetings.

## IV. Technical references in the development of the UN GTR

6. For the development of the UN GTR, the following legislation and technical standards contain relevant applications of requirements for motorcycles and other vehicles in the scope of this UN GTR or transferable provisions for passenger cars:

(a) UN (1958 Agreement, light-duty legislation): Chapter 11 of Regulation No. 83;

(b) UN (1998 Agreement, heavy-duty legislation): UN GTR No. 5;

(c) UN Mutual Resolution No. 2 (M.R.2);

(d) EU: Annex XII to Regulation (EU) No. 44/2014 (Delegated Act on Vehicle Construction Requirements supplementing Regulation (EU) No. 168/2013) with respect to functional OBD requirements, Annex VIII of Regulation (EU) No. 134/2014 (Delegated Act on Environmental and Propulsion Unit Performance Supplementing Regulation (EU) No. 168/2013) and Article 21 of Regulation (EU) No. 168/2013;

(e) Japan: Safety Regulations for Road Vehicles, Article 31, Attachment 115;

(f) The United States of America (light-duty legislation): US CFR, Title 40, Part 86, Subpart S;

(g) Standards:

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<sup>1</sup> Source: SR1\_TRANS-WP29-1045e (S.R.1) about vehicle categories, masses and dimensions: §2.1. "Category 3 vehicle" means a power driven vehicle with 2 or 3 wheels designed and constructed for the carriage of persons and/or goods.

- (i) International: ISO 2575, ISO 9141-2, ISO 14229-3, ISO 14229-4, ISO 14230-4, ISO 15031-4, ISO 15031-5, ISO 15031-6, ISO 15765-4, ISO 20828, ISO 22901-2;
- (ii) USA: SAE J1850.

## V. Main resolutions agreed by the IWG

The following summary indicates the main resolutions agreed by the IWG and explanations for such decisions.

7. Purpose; This UN GTR establishes harmonized functional requirements for OBD and a procedure to test and verify the environmental OBD functions (test type VIII). The functional requirements and test procedures were developed so that they would be able to provide an internationally harmonized set of functional OBD requirements with respect to the "infra-structure" on-board of a vehicle in the scope of this UN GTR, which determines hardware and software design in a technology-neutral way and that considers technical feasibility and cost-effectiveness.

8. Applicability; The Informal Working Group followed its agreed terms of reference and prepared Amendment 1 to UN GTR No. 18 for two- and three-wheeled vehicles of category 3<sup>2</sup> under the 1998 Agreement. The IWG will, in due time, prepare an equivalent UN Regulation for L-category vehicles in its scope under the 1958 Agreement.

9. Fuels; Only petrol and diesel were considered. As was the case for UN GTR No. 2, Contracting Parties were of the opinion that, being alternate fuels not used for two-wheeled vehicles in a large scale, adding alternate fuels to the scope of this UN GTR would increase the work load of the IWG considering the timeline assigned for the formulation of this amendments to UN GTR No. 18. Therefore, it was agreed to take up the addition of alternate fuels in further revisions within the scope of this GTR.

10. Definitions; The definitions used in this GTR are taken from the draft common definitions incorporated in S.R.1, as well as from the work of the UN Vehicle Propulsion System Definitions (VPSD) group operating under GRPE with the goal to harmonise high level powertrain definitions and from other international and regional legislation.

11. Technical background.

11.1. The European Commission (EC) launched an EPPR study for L-category vehicles in January 2012<sup>3</sup> with the objective to develop proposals to update UN GTR No. 2 for technical progress and to develop proposals for UN GTRs and Regulations with respect to harmonized EPPR legislation not yet covered at the international level for two- and three-wheeled vehicles, e.g. crankcase and evaporative emission test requirements, on-board diagnostic requirements, propulsion unit performance requirements, etc. The output of this comprehensive study was submitted for the review and comments to the IWG on EPPR. The objective was to identify concerns and to provide ready base-proposals for further enhancements by the IWG on EPPR. This would accommodate the needs at the international level to assess a vehicle with respect to on-board diagnostics based on scientific evidence, being objective and developed in a globally accepted way.

11.2. A further study on behalf of the EC (Effect study of the environmental step Euro 5 for L-category vehicles<sup>4</sup>) indicated that the introduction of catalytic converter monitoring via OBD provided a cost beneficial (CBA) procedure to control possible tampering with the exhaust system of the vehicle specially for positive ignition engines systems (namely reducing the possibility of catalyst removal) in Europe.

11.3. IMMA provided a study on countries from other regions of the world related to OBD and in particular, on the tampering rate of L-category vehicles (OBD2CG-17-01 (IMMA)).

<sup>2</sup> ECE/TRANS/WP.29/1045, as amended by Amends. 1 and 2 (Special Resolution No. 1).

<sup>3</sup> Document reference EPPR-07- 07

<sup>4</sup> doi:10.2873/397876. The report provided technical support and a cost-benefit analysis for assessing the individual measures within the Euro 5 package. It also served as technical background for the Report that according to paragraph 5 of Article 23 of Regulation (EU) No 168/2013, the European Commission needed to present to the European Parliament and the Council.

This study indicated that, in those regions, the CBA for the introduction of catalytic monitoring via OBD was negative.

12. Catalytic converter monitoring; The EC could not accept that the OBD would not continuously monitor the catalytic converter deterioration, as it was also one of the main means to fight against exhaust system tampering. Tampering prevention was very high on the EC agenda. Other Contracting Parties were also in agreement that anti-tampering of the exhaust system is a must and therefore, although not wanting to require a catalytic converter monitoring via OBD, they would like to see wordings that allow for other approaches. After several reiterations, a common proposal by Japan and the EC was agreed upon by introducing catalytic converter monitoring via OBD as a Contracting Party option. The Contracting Parties were also granted the possibility to exempt catalyst monitoring for certain vehicle classes only. Prescriptions in 5.3.4. also allow the Contracting Party to impose alternative methods for controlling the tampering with the exhaust system (catalytic converter). However, it is understood that a Contracting Party may only choose to prescribe other (alternative) conditions that the exhaust system needs to satisfy (paragraph 5.3.4.2) if paragraph 5.3.4.1 is not satisfied by the manufacturer. The following alternative methods were discussed and agreed as recommendation among the CPs:

12.1. Installation/use of exhaust systems where the silencer is detachable from the exhaust header pipe by fasteners capable of sustaining exhaust emissions below the NMHC and NO<sub>x</sub> OBD thresholds provided in paragraph 5.5.1. measured at the location of fastening for the duration of the vehicle's useful life.

12.2. Installation/use of exhaust systems where the silencer is integrated into the exhaust header pipe with no fasteners and requires a special tool for detaching the exhaust system from the engine. Equivalent clauses were not introduced for compression-ignition engines, since the market for diesel category 3 vehicles is very limited and therefore special emphasis was not put on those engines.

13. Continuous vehicle operation at idle.

13.1. Paragraph 4.5.1. (c) in Annex 1 to Amendment 1 to UN GTR No. 18 fails to clarify how to handle vehicles equipped with start-stop function that cannot keep continuous operation at idle. The clarification is made in EC EURO 5 regulation in the part that regulation addresses hybrid vehicles. Unfortunately, although Amendment 1 to UN GTR No. 18 is based on the EC EURO 5 regulation, it does not address at this stage hybrid vehicles. Therefore paragraph 4.5.1. (c) needs to be understood as:

13.2. "the idle operation includes the idle-stop situation, since both conditions (accelerator pedal release and vehicle speed <1.6 km/h) are fulfilled even with an unfired engine."

13.3. This will also be in line with the light vehicle regulation where cars (which already have In-Use-Performance Ratio (IUPR) in place) use idle stop as included in idle time.

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