

## Issues identified by the Secretariat in Revision 7 of UN Regulation No. 49 (Emissions of compression ignition and positive ignition (LPG and CNG) engines)

### I. Background

Revision 7 of UN Regulation No. 49 incorporates all valid text up to Supplement 7 to the 05 series of amendments. The Secretariat reviewed the text of Revision 7 before the document is uploaded online and identified some issues that GRPE may wish to address in the near future in order to improve the quality of the Regulation and to facilitate its understanding. Correction of evident typos and layout improvements are already being taken into account by the Secretariat, whereas this informal document aims at listing all substantive issues on which GRPE may wish to take action. In a few cases the Secretariat is proposing amendments marked in bold for new or strikethrough for deleted characters.

### II. List of issues identified

Here below is the list of substantive issues for which the Secretariat would like to bring the attention of GRPE:

1) Paragraph 2.1.10. (*definition of declared maximum power*): ECE KW is not a power unit measure. The Secretariat is proposing to delete ECE and to refer to UN Regulation No. 85 instead.

"2.1.10. *"Declared maximum power ( $P_{max}$ )"* means the maximum power in ~~ECE~~ KW **(maximum net power as specified in Regulation No. 85)**..."

2) Paragraph 2.1.41. (*definition of  $LNG_{20}$* ): The definition does not specify whether the limit set on ethane content (1.5 per cent) is ~~by weight or~~ by volume in liquid phase. Same issue in paragraph 4.6.3.1.7.

3) Paragraph 4.1.5. (*approval of LPG engines*):  $C_3$  and  $C_4$  composition appears in this paragraph without any prior definition or explanation on hydrocarbons composition.

Insert in par. 2.2.2. "Symbols for chemical components", the following symbols:

$C_2$  ethane and ethene

$C_{2+}$  ethane, ethene and higher order hydrocarbons

$C_3$  propane and propene

$C_4$  butane, butene and relative isomers

4) Appendix 3, paragraphs 3 and 4 (*procedure for production conformity testing at manufacturer's request*): Parameters  $s$  (estimate of standard deviation) and  $n$  (sample number) are defined but then not used. Is there any equation missing? If this is not the case they may be deleted. Appendix 3 of R49r6 can be used (with some renumbering).

5) Annex 4a, paragraph 2.8.2. (*test procedure*): Symbols  $n_1$  and  $n_2$  are relative to time values in this paragraph whereas in other parts of the Regulations are defined as number of ETC cycles (number of ETC cycles between two regenerations and during regeneration respectively).

6) Annex 4a, Appendix 2, paragraph 1.2.(b) (*performing the engine power map in ETC test cycle*): The wording injection pump may not be appropriate for all injection system technologies existing nowadays. The Secretariat is proposing to use injection system instead of injection pump to be design neutral.

- "1.2.(b) The engine shall be operated at full load setting of the injection ~~pump system~~ at minimum mapping speed;"
- 7) Annex 4b, paragraph 8.5.1.4. (*equation 54 to calculate  $Q_{SSV}$* ): The same equation to calculate the air flow rate is also reproduced under paragraph 4.1. of Appendix 2 to Annex 4a. Although both are the same equation, different symbols ( $d$  and  $d_v$ ) are used for the same (diameter of the SSV throat).
- 8) Annex 4b, paragraph 9.3.10. (*equipment specification and verification, sampling for raw gaseous emissions*): "Vee" engine configuration seems to be a typo that should be corrected by "V" engine configuration. Same issue in paragraph 9.4.3.1. of Annex 4b.
- "9.3.10. ...  
In the case ... in a "~~Vee~~" "V" engine configuration,...  
..."
- 9) Annex 4b, paragraph 9.5.4.1. (*data analysis, calibration of the SSV*): The same equation is reproduced under paragraph 4.1. of Appendix 2 to Annex 4a but here it is reversed to isolate the discharge coefficient of the SSV ( $C_d$ ). Although both are the same equation, different symbols ( $d$  and  $d_v$ ) are used for the same (diameter of the SSV throat).  $A_0$  constant appears in one equation but not in the other.
- 10) Annex 5, paragraph 1.1. (*technical characteristics of reference fuel*): There are still square brackets in the Table (bottom right corner). Footnote *d* ("The month of publication will be completed in due course") should be revised or deleted since it refers to publications in 1997 and 1998. The Secretariat is proposing to delete both square brackets and footnote *d*. GRPE may wish to verify these references (dates).
- 11) Annex 7, paragraph 3.5.4. (*test for durability of emission control systems, determination of deterioration factors*): Paragraph 1.4. of Appendix 1 to Annex 6 does not exist. The Secretariat is proposing to refer to Annex 2a (Communication) instead:
- "3.5.4. The deterioration factors for each pollutant on the appropriate test cycles shall be recorded in **the Communication of Annex 2A** ~~paragraph 1.4. of Appendix 1 to Annex 6 to this Regulation.~~"
- 12) Annex 7, paragraph 3.7.3. (*test for durability of emission control systems, determination of deterioration factors*): Paragraph 1.4. of Appendix 1 to Annex 6 does not exist. The Secretariat is proposing to refer to Annex 2a (Communication) instead:
- "3.7.3. For the purpose of approval, only the deterioration factors adopted by the manufacturer from paragraph 3.6.1. above or the deterioration factors developed according to paragraph 3.5. above shall be recorded in **the Communication of Annex 2A** ~~paragraph 1.4. of Appendix 1 to Annex 6 to this Regulation.~~"
- 13) Annex 9a, paragraph 5.2.1. (*access to OBD information*): The Secretariat is proposing to replace Community (EU text) by Contracting Parties (terminology according to the Agreement).
- "5.2.1. Not later than three months after the manufacturer has provided any authorized dealer or repair shop within ~~the Community~~ **any Contracting Party applying this Regulation** with repair information, the manufacturer shall make that information (including all subsequent amendments and supplements) available upon reasonable and non-discriminatory payment."
- 14) Annex 9b, Appendix 3, items 6(a2), 8(a2) and 10(b) (*technical requirements for On-Board Diagnostic systems (OBD)*): The text was adopted without setting final monitoring requirements. The sentence in square brackets "monitoring requirements to be further discussed" may need to be replaced by the actual monitoring requirements to be finally agreed by GRPE.

15) Annex 9b, Appendix 3, item 11(*technical requirements for On-Board Diagnostic systems (OBD)*): There are no prescriptions on crankcase ventilation system monitoring.

16) Annex 9b, Appendix 6 (*reference standard documents*): Several ISO standards are mentioned but not the version that shall be used. This may imply that the latest version should be always considered. GRPE may wish to study if this is the actual purpose of the text. The last reference in the Appendix (FDIS 13400-4: 2011 Road vehicles – Diagnostic communication over Internet Protocol (DoIP) – Part 4: Ethernet-based high-speed data link connector) should be revised since now it is likely to be finalized.

17) Annex 11, paragraph 3.1.3. (*technical requirements for dual fuel engines and vehicles*): ~~The reference to Pparagraph 3.2.2.1. should be changed into 3.1.1. relates to the documentation to be provided when applying for approval and not to the criteria set in the definition of dual fuel engine family.~~

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