

INFORMAL GROUP ON GASEOUS FUELLED VEHICLES
Within the UN GRPE (WP29)
PROPOSED AMENDMENT

Name of Organisation submitting Amendment/Work Item

AEGPL

Person submitting Item

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Regulation name and reference number

Proposed amendment to supplement 4 to Regulation 115 (ECE/TRANS/WP.29/2009/117).

Name of Amendment/Work Item

Proposal for an amendment to Regulation 115 introducing a new class of bi-fuel vehicle/gas system and clarifying the requirements between all the classes.

Specific language for Amendment/Work Item

English

Rationale: (Why is it important/required?)

Specific provisions are necessary for gas systems intended to be fitted on direct injection petrol vehicles in order to safeguard the petrol injectors (a certain amount of petrol need to be injected also in gas mode, especially when particular temperature conditions are reached).

The proposed amendment introduces a new definition for these systems and sets the associated requirements (notably in Annex 6 where a methodology to measure the amount of LPG consumed plus a limit are introduced).

Please submit new work items to:

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Changes to supplement 4 to Regulation 115 are made on bold characters and/or via strikethroughs :

Clarification of the definitions via:

“

2. Definitions

...

2.1.3. "A vehicle is considered mono-fuel", when, after the retrofit operation, **it is designed primarily for permanent running on LPG or CNG, but may also have a petrol system for emergency purposes or starting only, where the petrol tank does not contain more than 15 litres of petrol** ~~it is equipped with a petrol tank of capacity \leq 15 litres, that can only be used to "limp home"~~.

2.1.4. "A vehicle is considered bi-fuel" when, after the retrofit ~~it is equipped to operate on both petrol and LPG or CNG, with a petrol tank capacity exceeding 15 litres.~~
operation:

1. **it is equipped with a gas storage and a separated petrol storage, with a capacity exceeding 15 litres; and**
2. **it can run on petrol (petrol mode) and also on either LPG or CNG (LPG or CNG mode); and**
3. **is designed to run on only one fuel at a time.**

2.1.5. "A vehicle is considered bimix-fuel" when, after the retrofit operation:

4. **it is equipped with a gas storage and a separated petrol storage, with a capacity exceeding 15 litres; and**
5. **it can run on petrol (petrol mode) and also on either LPG or CNG (LPG or CNG mode); and**
6. **in gas mode it is designed to make a limited use of petrol also simultaneously with gas.**

2.1.56. "Master-slave system" means a retrofit system in which the LPG Electronic Control Unit (ECU) or CNG ECU is able to translate the petrol ECU control strategy in LPG or CNG operation.

2.1.67. "Original vehicle" means a vehicle before the installation of the retrofit system.

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Clarification of the requirements for each running mode:

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6.1.2.2. Fuel requirements by the engine: the type of fuel normally used by the engine could be:
(a) LPG only (**LPG mode**) **in case of** ~~(mono-fuel)~~⁴
(b) ~~Both~~ **either** unleaded petrol (**petrol mode**) or LPG (**LPG mode**) **in case of** ~~(bi-fuel)~~
and bimix-fuel⁶
(c) Both diesel fuel or diesel fuel and LPG (dual fuel)

(Provisions for dual fuel have still to be defined).

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Introduction of a new footnote 6 accordingly :

“

⁶ In accordance with the paragraphs 6.1.2.4.1.6.1 and 6.1.2.4.1.6.2., in LPG mode it is permissible to use petrol up to the limits defined therein.

”

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6.1.2.4.1.3. Exhaust emissions test in petrol mode

Subject to the requirements of paragraph 6.1.2.4.1.5., the tests shall be repeated three times using reference petrol. The parent vehicle(s), equipped with the retrofit system, shall comply with the limit values according to the type approval of the original vehicle(s) including the deterioration factors applied during the type approval of the original vehicle(s).

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6.1.2.4.1.6. Exhaust emissions test in LPG mode

Subject to the requirements of paragraph 6.1.2.4.1.8., the tests shall be repeated three times with each reference LPG.

The parent vehicle, equipped with the retrofit system, shall comply with the limit values according to the type approval of the original vehicle(s) including the deterioration factors applied during the type approval of the original vehicle(s).

6.1.2.4.1.6.1 Additional requirements for mono-fuel and bi-fuel vehicles

It is permissible that the engine is started on petrol and switched to LPG after a predetermined period of time which cannot be changed by the driver

If the parent vehicle complies with Regulation No. 83, 05 series of amendments, or with Directive 98/69/EC, or with Regulation No. 49, 04 series of amendments, or with Directive 1999/96/EC, ~~the vehicle shall not use petrol for more than a maximum of aforesaid period of time shall not exceed~~ 90 seconds during each test.

For vehicles complying with later series of amendments to Regulations Nos. 83 and 49, or later amending Directives or European Regulations, this period shall not exceed 60 seconds.

6.1.2.4.1.6.2 Additional requirements for bimix-fuel vehicles

It is permissible to use petrol during the entire test cycle and also simultaneously with LPG provided that the consumption of LPG in energy unit is equal or higher than 80% of the total energy consumed during the test. This percentage shall be calculated in accordance with the methodology provided in Annex 6.

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Addition of a new paragraph 1.a in Annex 1A “Communication” (renumbering to be done in due time):

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1. LPG retrofit equipment considered:

...

1.a. Retrofit system for mono-fuel or bi-fuel vehicles/ bimix-fuel vehicles ²

2. Trade name or mark

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Addition of a new paragraph 2.1.a in Annex 3A “Complete list of information for the purpose of the LPG retrofit system installed on vehicle type approval” (renumbering to be done in due time):

“

2. Description of the LPG retrofit system

2.1. Trade name or mark holder

2.1.a Retrofit system for mono-fuel or bi-fuel vehicles/bimix-fuel vehicles ¹

2.2. Identification type

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Addition of a new Annex 6 “Bi-mix vehicle Type 1 test - Calculation of LPG energy consumption”:

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Annex 6

Bi-mix vehicle Type 1 test - Calculation of LPG energy consumption

1. Measurement of the LPG mass consumed during the cycle

Measurement of the LPG mass consumed during the cycle shall be done by a fuel weighing system capable to measure the LPG storage container at the beginning and at the end of the test in accordance with the following:

(a) an accuracy of ± 2 per cent of the difference between the two readings at the beginning and the end of the test or better;

(b) a precision of ± 1 per cent of full scale or better.

Precautions shall be taken to avoid measurement errors.

Such precautions shall at least include the careful installation of the device according to the instrument manufacturers' recommendations and to good engineering practice

2. Calculation of energy percentage of LPG use on total energy consumed

The following condition shall be fulfilled:

$$\text{Mlpg} * 100 / (\text{FCmean} * \text{dist} * \text{d}) \geq 80\%$$

Where

Mlpg: the LPG mass consumed during the cycle

FCmean: the mean fuel consumption calculated in accordance with par. 6.1.2.4.3.2

dist= distance travelled during the cycle.

d=0.538kg/liter

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