

**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**

Regulation 83

**Name of Amendment/Work Item**

Proposal for an amendment to Regulation 83 introducing a new class of bi-fuel vehicle/gas system

**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 12 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 revision 4 are made on bold characters:**

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2. Definitions

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2.22.1 *"Mono-fuel gas vehicle"* means a vehicle that is designed primarily for permanent running on LPG or NG/biomethane or hydrogen, but may also have a petrol system for emergency purposes or starting only, where the **capacity of the petrol tank does not exceed** ~~contain~~ ~~more than~~ 15 litres of petrol.

2.23. *"Bi-fuel vehicle"* means a vehicle with two separate fuel storage systems that can run part-time on two different fuels ~~and is designed to run on only one fuel at a time.~~

2.23.1. *"Bi-fuel gas vehicle"* means a bi fuel vehicle that can run on petrol (**petrol mode**) and also on either LPG, NG/biomethane or hydrogen (**gas mode**).

2.23.1.1. *"Bi-fuel Type A gas vehicle"* means a bi-fuel gas vehicle that is **designed to run on only one fuel at a time; (the simultaneous operation on both fuels is permitted during the fuel switch over for a short period of time- *Mr Radzimirski)***

2.23.1.2. *"Bi-fuel Type B gas vehicle"* means a bi-fuel gas vehicle that in gas mode it is designed to make a limited use of petrol also simultaneously with gas. **with a resulting use of gas not lower than 80% in energy unit (or resulting in a minimum use of gas of 80% in energy unit)**

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Annex 1

Engine and vehicle characteristics and information concerning the conduct of tests

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3.2.2.4. Vehicle fuel type: Mono fuel/Bi-fuel **Type A/Bi-fuel Type B**/Flex-fuel<sup>1</sup>

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Annex 12

Granting of an ECE type approval for a vehicle fuelled by LPG or NG/biomethane

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**3.2.6. Notwithstanding the requirements of paragraphs 6.4.1.3. of Annex 4a and 3.2.5. of this annex, in case of bi-fuel Type B gas vehicle it is permissible to use petrol during the entire test cycle and also simultaneously with gas**

provided that the consumption of gas 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 method set out in [Appendix 1 \(LPG\)](#) or [Appendix 2 \(NG/biomethane\)](#) of this Annex.

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New part to be added after the annex 12:

### **“Appendix 1**

#### **Bi-fuel Type B gas vehicle - Calculation of LPG energy consumption**

##### **1. Measurement of the LPG mass consumed during the Type 1 test cycle**

Measurement of the LPG mass consumed during the Type 1 test 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  $\pm 2$  per cent of the difference between the two readings at the beginning and the end of the test or better;

(b) a precision of  $\pm 1$  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:

$$M_{lpg} * 100 / (FC_{norm} * dist * d) \geq 80\%$$

Where

$M_{lpg}$ : the LPG mass consumed during the cycle

$FC_{norm}$ : the mean fuel consumption calculated in accordance with par. 1.4.3. of Annex 6 to Regulation No. 101

$dist$ = distance travelled during the cycle.

$d=0.538\text{kg/liter}$

” [Appendix 2](#)

## **Bi-fuel Type B vehicle - Calculation of NG/biomethane energy consumption**

### **1. Measurement of the CNG mass consumed during the cycle**

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

- (a) an accuracy of  $\pm 2$  per cent of the difference between the two readings at the beginning and the end of the test or better;
- (b) a precision of  $\pm 1$  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 CNG use on total energy consumed**

The following condition shall be fulfilled:

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

Where

**Mlpg:** the CNG mass consumed during the cycle

**FCmean:** the mean fuel consumption calculated in accordance with par. 6.2.2.4.3.2

**dist=** distance travelled during the cycle.

$$d = 0.654 \text{kg/m}^3$$

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