



**Economic and Social
Council**

Distr.
GENERAL

ECE/TRANS/WP.29/GRPE/2006/12
22 March 2006

Original: ENGLISH
ENGLISH AND FRENCH ONLY

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

World Forum for Harmonization of Vehicle Regulations (WP.29)

Working Party on Pollution and Energy (GRPE)

Fifty-second session

Geneva, 6-9 June 2006

Item 5.4. of the provisional agenda

PROPOSAL FOR A DRAFT CORRIGENDUM TO REGULATION No. 101
(CO₂ and fuel consumption)

Submitted by the expert from Switzerland

Note: The text reproduced below was prepared by the expert from Switzerland in order to correct the reference density used for NG in paragraph 5.2.4.(1) of Regulation No. 101. In fact the correct value for NG should be "0.699 kg/m³" instead of the value "0.654 kg/m³" currently used. The text is based on a document without a symbol (informal document No. GRPE-51-4), distributed during the fifty-first GRPE session (ECE/TRANS/WP.29/GRPE/51, para. 52). The modifications to the current text of the Regulations are marked in **bold** characters.

Note: This document is distributed to the Experts on Pollution and Energy only.

A. PROPOSAL

Paragraph 5.2.4., correct to read:

"5.2.4. For the purpose of the calculation fuel characteristics shall be used:

- (1) density: measured on the test fuel according to ISO 3675 or an equivalent method. For petrol and diesel fuel the density measured at 15 °C will be used; for LPG and natural gas a reference density will be used, as follows:

0.538 kg/litre for LPG

0.699 kg/m³ for NG 3/ "

B. JUSTIFICATION

According to footnote 3/ of paragraph 5.2.4.(1), the definition of the reference density for NG is based on the mean value of G20 and G23 reference fuels at 15 °C.

Using the standard sea level conditions of P = 101,325 Pa and T = 15 °C and the gas constant for dry air R = 287.05, the air density D may be calculated as:

$$D = 101325 / (287.05 * (15 + 273.15)) = 1.225 \text{ kg/m}^3.$$

G20 contains 100 per cent of CH₄ (see Regulation No. 85, Annex 8). According to standard CEN EN437:1993, A1:1997 and A2:1999 */, the relative density for G20 i.e. the ratio of masses of equal volumina of gas and dry air is 0.555. The density at 15 °C for G20 may be calculated as:

$$0.555 * 1.225 = 0.680 \text{ kg/m}^3$$

G23 contains 92.5 per cent CH₄ and 7.5 per cent N₂. The density for G23 at 15 °C is therefore:

$$0.586 * 1.225 = 0.718 \text{ kg/m}^3,$$

based on standard CEN EN437:1993, A1:1997 and A2:1999.

The reference density for NG is the mean value of the two gases G20 and G23 at 15 °C (50 per cent to 50 per cent) and should be therefore result at 0.699 kg/m³.

*/ CEN EN437:1993 "Test gases, Test pressures, Appliance categories", and in addition Amendment 1:1997 and Amendment 2:1999. This standard has been superseded by CEN EN437:2003.