ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

Working Party on the Construction of Vehicles

DRAFT SUPPLEMENT 2 TO REGULATION No. 101

(CO₂ emissions and fuel consumption of passenger cars)

Note: The text reproduced below was adopted by the Administrative Committee (AC.1) of the amended 1958 Agreement at its sixth session, following the recommendation by the Working Party at its one-hundred-and-twelfth session. It is based on documents TRANS/WP.29/R.811, not amended (TRANS/WP.29/566, paras. 70 and 132).
Paragraph 5.2.4., amend to read:

"5.2.4. The appropriate reference fuel as defined in annex 9 of Regulation No. 83 must be used for testing.

For LPG and natural gas (NG) that reference fuel must be used which is chosen by the manufacturer for the measurement of the net power in accordance with Regulations No. 85. The chosen fuel must be specified in the communication document as defined in annex 2.

For the purpose of calculation mentioned in paragraph 5.2.3., the following fuel characteristics will be used:

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

- 0.538 kg/litre for LPG
- 0.714 kg/m³ for NG

(b) hydrogen-carbon ratio: fixed values will be used which are:

- 1.85 for petrol
- 1.86 for diesel fuel
- 2.525 for LPG
- 4.00 for NG"

Annex 1,

Item 1.2.2., amend to read:

"1.2.2. Fuel: leaded petrol / unleaded petrol / diesel oil / LPG / NG 1/"

Insert new items 1.2.4.5. to 1.2.4.6.3.3., to read:

"1.2.4.5. By LPG fuelling system: yes/no 1/
1.2.4.5.1. Approval number according to Regulation No. 67 and documentation:
1.2.4.5.2. Electronic Engine Management Control Unit for LPG-fuelling:
1.2.4.5.2.1. Make(s): .................................. 1.2.4.5.2.2. Type: .................................
1.2.4.5.3.3. Emission related adjustment possibilities: ..............
1.2.4.5.3. Further documentation:
1.2.4.5.3.1. Description of the safeguarding of the catalyst at switch-over from petrol to LPG or back: ...........................
1.2.4.5.3.2. System lay-out (electrical connections, vacuum connections compensation hoses, etc): ...........................................
1.2.4.5.3.3. Drawing of the symbol: ..........................

1.2.4.6. By NG fuelling system: yes/no 3/
1.2.4.6.1. Approval number according to Regulation No. 67: ............
1.2.4.6.2. Electronic Engine Management Control Unit for NG-fuelling:
1.2.4.6.2.1. Make(s): ..................................
1.2.4.6.2.1. Type: ..................................
1.2.4.6.2.2. Emission related adjustment possibilities: ............
1.2.4.6.3. Further documentation:
1.2.4.6.3.1. Description of the safeguarding of the catalyst at switch-over from petrol to NG or back: .......................
1.2.4.6.3.2. System lay-out (electrical connections, vacuum connections compensation hoses, etc): ...........................................
1.2.4.6.3.3. Drawing of the symbol: ..........................

Annex 3,

Insert a new item 6.5.4., to read:

"6.5.4. In the case of LPG/NG 1/ the reference fuel used for the test (eg. G20, G25): ........................................

"
Item 6.5.4. to 6.5.6. (former), renumber as items 6.5.5. to 6.5.7.

Item 7.1.2., amend to read:

"....
7.1.2. Fuel consumption. 3/
....

3/ Repeat for petrol and gaseous fuel in the case of a vehicle that can run either on petrol or on a gaseous fuel."

Annex 5,

Paragraph 1.4.3.3., amend to read:

".....
The dilution factor is calculated as follows:

\[
\text{where:}
\]

Paragraph 1.5.2., amend to read:

"1.5.2. The fuel consumption, expressed in litres per 100 km (in the case of petrol, LPG or diesel) or in m³ per 100 km (in the case of NG) is calculated by means of the following formulae:

(a) for vehicles with a positive ignition engine fuelled with petrol:
\[
FC = \left( \frac{0.1154}{D} \right) \times \left[ (0.866 \times HC) + (0.429 \times CO) + (0.273 \times CO_2) \right]
\]

(b) for vehicles with a positive ignition engine fuelled with LPG:
\[
F_{c,\text{norm}} = \left( \frac{0.1212}{0.538} \right) \times \left[ (0.825 \times HC) + (0.429 \times CO) + (0.273 \times CO_2) \right]
\]

If the composition of the fuel used for the test differs from the composition that is assumed for the calculation of the normalised consumption, on the manufacturer's request a correction factor \( cf \) may be applied, as follows:
\[
F_{c,\text{norm}} = \left( \frac{0.1212}{0.538} \right) \times (cf) \times \left[ (0.825 \times HC) + (0.429 \times CO) + (0.273 \times CO_2) \right]
\]

The correction factor \( cf \), which may be applied, is determined as follows:
\[
\text{cf} = 0.825 + 0.0693 \times n_{\text{actual}}
\]
where: \( n_{\text{actual}} \) = the actual H/C ratio of the fuel used

(c) for vehicles with a positive ignition engine fuelled with NG:

\[
F_{c,\text{norm}} = \left( \frac{0.1336}{0.654} \right) \times \left[ 0.749 \times HC + 0.429 \times CO + 0.273 \times CO_2 \right]
\]

(d) for vehicles with a compression ignition engine:

\[
FC = \left( \frac{0.1155}{D} \right) \times \left[ 0.866 \times HC + 0.429 \times CO + 0.273 \times CO_2 \right]
\]

In these formulae:

FC = the fuel consumption in litre per 100 km (in the case of petrol, LPG or diesel) or in m³ per 100 km (in the case of Natural Gas)

HC = the measured emission of hydrocarbons in g/km

CO = the measured emission of carbon monoxide in g/km

CO₂ = the measured emission of carbon dioxide in g/km

D = the density of the test fuel.

In the case of gaseous fuels this is the density at 15°C.