**Economic and Social
Council**

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

Working Party on the Construction of Vehicles

DRAFT SUPPLEMENT 2 TO REGULATION No. 101

(CO_2 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).

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<u>Paragraph 5.2.4.</u>, 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/m^3 for NG

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

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

<u>Annex 1</u>,

<u>Item 1.2.2.</u>, amend to read:

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

<u>Insert new items 1.2.4.5. to 1.2.4.6.3.3.</u>, to read:

"1.2.4.5.   By LPG fuelling system :   yes/no <u>1</u>/
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 <u>3</u>/
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: . . . . "

<u>Annex 3</u>,

<u>Insert a new item 6.5.4.</u>, to read:

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

<u>Item 6.5.4. to 6.5.6. (former)</u>, renumber as items 6.5.5. to 6.5.7.

<u>Item 7.1.2.</u>, amend to read:

"....
7.1.2.   Fuel consumption. <u>3</u>/

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

<u>Annex 5</u>,

<u>Paragraph 1.4.3.3.</u>, amend to read:

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

        _____

                    2

            _____

                2

            _____

                2

        where:
        ......"

<u>Paragraph 1.5.2.</u>, 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 m^3 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:

               $FC = (0.1154 / D) * [(0.866 * HC) + (0.429 * CO) + (0.273 * CO_2)]$

         (b)   for vehicles with a positive ignition engine fuelled with LPG:

               $Fc_{norm} = (0.1212 / 0.538) * [(0.825 * HC) + (0.429 * CO) + (0.273 * CO_2)]$

         If the composition of the fuel used for the test differs from the compo-
         sition that is assumed for the calculation of the normalised consumption,
         on the manufacturer's request a correction factor cf may be applied, as
         follows:

               $Fc_{norm} = (0.1212 / 0.538) * (cf) * [(0.825 * HC) + (0.429 * CO) + (0.273 * CO_2)]$

         The correction factor cf, which may be applied, is determined as
         follows:

               $cf = 0.825 + 0.0693 * n_{actual}$

where: n_{actual} = the actual H/C ratio of the fuel used

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

Fc_{norm} = (0.1336 / 0.654) * [(0.749 * HC) + (0.429 * CO) + (0.273 * CO_2)]

(d)   for vehicles with a compression ignition engine:

FC =   (0.1155 / D) * [(0.866 * HC) + (0.429 * CO) + (0.273 * CO_2)]

In these formulae:

FC =   the fuel consumption in litre per 100 km (in the case of petrol, LPG or diesel) or in m^3 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

CO_2 =   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.

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