COMMISSION

COMMISSION DIRECTIVE

of 30 November 1976

adapting to technical progress Council Directive 70/220/EEC of 20 March 1970 on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles

(77/102/EEC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community,

Having regard to Council Directive 70/156/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers (1), as amended by the Act of Accession (2), and in particular Articles 11, 12 and 13 thereof,

Having regard to Council Directive 70/220/EEC of 20 March 1970 on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from positive-ignition engines (3), as amended by the abovementioned Act of Accession, and in particular Article 5 thereof,

Whereas the programme of action of the European Communities on the environment adopted on 22 November 1973 provides for amendments to Directives adopted so as to take into account the latest scientific progress, with particular reference to air pollution by exhaust gases from positive-ignition engines;

Whereas the technical progress made in the construction of positive-ignition engines since Council Directive 70/220/EEC laid down the permissible limits for carbon monoxide and unburnt hydrocarbon emissions from these engines, which limits were made more stringent by Council Directive 74/290/EEC of 28 May 1974 (4), also enables permissible limits to be laid down for nitrogen oxide emissions;

Whereas it is essential that emissions of this latter pollutant from motor vehicles should be restricted with immediate effect in order to establish a basis for coherent Community action to reduce the limits for the three pollutants which are the subject of the EEC type-approval procedure for these vehicles; whereas in order to protect public health and the environment it is advisable to envisage a further reduction of the limits of these pollutants as soon as the work now in progress has given concrete results;

Whereas the measures provided for in this Directive are in accordance with the opinion of the Committee on the Adaptation to Technical Progress

(1) OJ No L 42, 23. 2. 1970, p. 1.
(2) OJ No L 73, 27. 3. 1972, p. 115.
(3) OJ No L 76, 6. 4. 1970, p. 1.
(4) OJ No L 159, 15. 6. 1974, p. 61.

of the Directives on the Removal of Technical Barriers to Trade in the Motor Vehicle Sector,

HAS ADOPTED THIS DIRECTIVE:

Article 1

Annexes I and III to Council Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles, as amended by Council Directive 74/290/EEC of 28 May 1974, are hereby amended in accordance with the Annex to this Directive.

Article 2

1. From 1 April 1977, the Member States shall neither, on grounds relating to air pollution by gases from an engine:

— refuse to grant EEC type-approval, or to issue the documents referred to in the second indent of Article 10 (1) of Directive 70/156/EEC, or to grant national type-approval of a type of motor vehicle;

— nor prohibit the entry into service of such vehicles;

where the level of gaseous pollutants emitted from this type of motor vehicle or from such vehicles meets the requirements of Directive 70/220/EEC, as last amended by this Directive.

2. From 1 October 1977, Member States:

— shall no longer issue the document provided for in the second indent of Article 10 (1) of Directive 70/156/EEC in respect of a type of motor vehicle which emits gaseous pollutants at levels which do not meet the requirements of Directive 70/220/EEC, as last amended by this Directive;

— may refuse national type-approval of a type of motor vehicle which emits gaseous pollutants at levels which do not meet the requirements of Directive 70/220/EEC, as last amended by this Directive.

3. From 1 October 1980, Member States may prohibit the entry into service of vehicles which emit gaseous pollutants at levels which do not meet the requirements of Directive 70/220/EEC, as last amended by this Directive.

4. By 1 January 1977, Member States shall put into force the requirements needed in order to comply with this Directive and shall forthwith inform the Commission thereof.

Article 3

This Directive is addressed to the Member States.

Done at Brussels, 30 November 1976.

For the Commission

Finn GUNDELACH

Member of the Commission

ANNEX

Amendments to the Annexes to Directive 70/220/EEC

ANNEX I: **DEFINITIONS, APPLICATION FOR EEC TYPE-APPROVAL AND TEST SPECIFICATIONS**

Item 1.4 shall be replaced by the following:

'1.4. **Gaseous pollutants**

"Gaseous pollutants" means carbon monoxide, hydrocarbons and nitrogen oxides, the latter expressed as nitrogen dioxide (NO_2) equivalents.'

The second sentence of item 3.2.1.1.4 shall be replaced by the following:

'In each test, the mass of the carbon monoxide, the mass of the hydrocarbons and the mass of the nitrogen oxides obtained must be less for a vehicle of given reference weight, than the amounts shown in the table below:'

For the table a fourth column shall be added as follows:

Mass of nitrogen oxides expressed as NO_2 equivalent (per test in g) L_3
10
10
10
12
14
14·5
15
15·5
16

New item 3.2.1.1.4.1 shall be added after item 3.2.1.1.4:

'3.2.1.1.4.1. However, until 1 October 1979, for application to vehicles other than those of category M_1 and to vehicles equipped with automatic transmissions the limits for nitrogen oxide emissions given in the table of item 3.2.1.1.4 shall be multiplied by a factor 1·25.'

Existing item 3.2.1.1.4.1 shall become item 3.2.1.1.4.2.

Items 3.2.1.1.5.1 and 3.2.1.1.5.2.

The words 'both the pollutants' shall be replaced by 'three pollutants'.

Item 5.1.1.1.

For the table a fourth column shall be added as follows:

Mass of nitrogen oxides expressed as NO_2 equivalent (per test in g) L_3
12
12
12
14·4
16·8
17·4
18
18·6
19·2

New item 5.1.1.1.1 shall be added after item 5.1.1.1:

'5.1.1.1.1. However, until 1 October 1979, for application to vehicles other than those of category M_1 and to vehicles equipped with automatic transmissions the limits for nitrogen oxide emissions given in the table of item 5.1.1.1 shall be multiplied by a factor 1·25.'

ANNEX III: TYPE I TEST

The first sentence of item 3.2.1 shall be replaced by:

'the connecting tubes shall be made of stainless steel and shall, so far as possible, be provided with rigid connections.'

Item 3.2.3.

The words 'and with the reduction to a minimum of condensation on the sides of the sampling bag or bags' shall be deleted.

New items 3.2.4 and 3.2.5 shall be added after item 3.2.3:

'3.2.4. A cooling condenser shall be located between the exhaust pipe of the engine and the inlet of the bag(s) in such a way that gas temperature t_G at the exit of the condenser is maintained within the following limits:

$$5\,^{\circ}\mathrm{C} \leq t_G \leq 17\,^{\circ}\mathrm{C}$$

The cooling system must be designed in such a way as to avoid any entrainment of condensed water by the gases flowing through it. This will enable the humidity of the gases in the sampling bag to be maintained at less than 83 % at 20 °C.

3.2.5. The total volume of the collecting system, excluding the bag, shall not exceed 0·08 m^3. The volume of the bag spreader pipe shall be less than 0·03 m^3.'

Existing items 3.2.4 and 3.2.5 become new items 3.2.6 and 3.2.7.

The first sentence of item 3.3.2 shall be replaced by:

'The carbon monoxide and hydrocarbon analysers shall be of the non-dispersive type with absorption in the infra-red.'

New items 3.3.3 to 3.3.3.3 shall be added after item 3.3.2:

'3.3.3. The nitrogen oxides shall be analysed as follows:

3.3.3.1. The gases contained in the bag shall pass through a converter which reduces the nitrogen dioxide (NO_2) to nitric oxide (NO).

3.3.3.2. The nitric oxide (NO) content of the gases emerging from the converter shall be determined by means of a chemiluminescence analyser.

3.3.3.3. No gas-drying device (ice-trap) must be used upstream of the analyser.'

New item 3.5.7 shall be added after item 3.5.6:

'3.5.7. The converter must be least 90 % efficient.'

Existing items 3.5.7 and 3.5.8 shall become items 3.5.8 and 3.5.9.

Item 4.5 shall be replaced by the following:

'4.5. **Conditioning of bag(s).**'

In the first sentence of item 4.5.1 the words 'the bags shall...,' shall be replaced by 'the bag(s) shall...,'.

New item 4.5.3 shall be added after item 4.5.2:

'4.5.3. Air must be blown into the bag(s) before each test in order the remove any residual moisture.'

Items 4.6.1 to 4.6.1.3 shall be added after item 4.6:

'4.6.1. Check on converter efficiency
The efficiency of the NO_2-NO converter shall be checked by one of the following two methods:

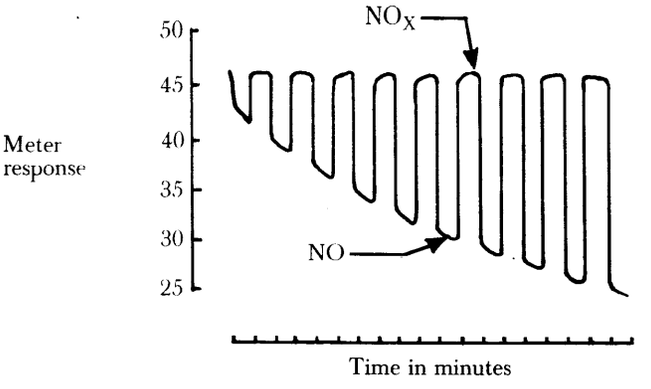
4.6.1.1. Method "A"

4.6.1.1.1. A sampling bag which has not already been used to collect samples of exhaust gases shall be filled with air (or oxygen) and NO reference gas, which will be metered in such a way as to enable a mixture lying within the measuring range of the analyser to be obtained. Enough oxygen shall be added to enable a good proportion of the NO to be converted into NO_2.

4.6.1.1.2. The bag shall be shaken briskly and be immediately connected to the sample feed device on the analyser. The NO and NO_x concentrations shall be measured

in turn at one-minute intervals by alternately passing the sample through the converter and through the bypass tube. After several minutes the presence of NO and NO_x will be recorded as shown in the diagram below if the converter is functioning properly. Although the quantity of NO_2 will be increasing, the sum $NO_x = NO + NO_2$ should remain constant. A reduction in the amount of NO_x as the operations proceed would be a sign that the efficiency of the converter was decreasing and the cause would have to be determined before the device was used.

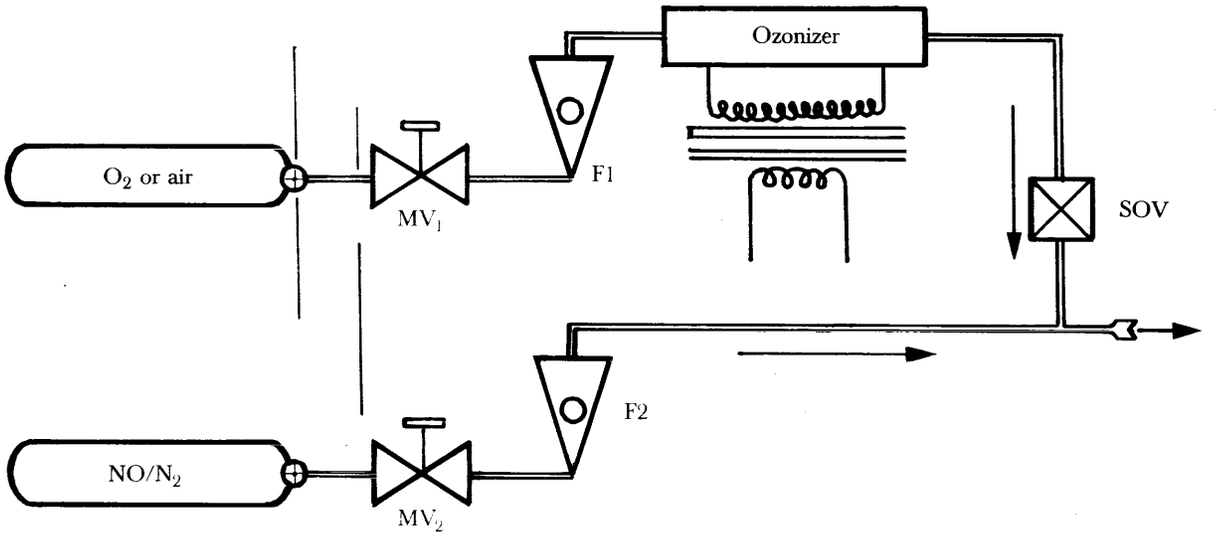
Response rate of the check on converter efficiency



4.6.1.2. Method "B"

The efficiency of the converter can be verified with the aid of an ozonizer in accordance with the diagram and method set out below:

Device for measuring converter efficiency



4.6.1.2.1. The NO analyser shall be connected to a T tube receiving on one side a supply of the calibration gas (mixture of NO in N_2 in a proportion corresponding to about 80% of the full-scale value of the instrument) and from the other side a supply of ozonized oxygen or air (depending on the NO concentration). The inlet pipe for the supply of O_2 shall be provided with a shut-off valve (SOV) and each of the inlet pipes shall also be connected to a metering valve (MV) and a flowmeter (F).

4.6.1.2.2. At the beginning of the check the SOV shall be closed and MV2 set in such a way as to obtain a steady reading from the chemiluminescent instrument set to "bypass". The device shall be spanned and calibrated in such a way that it correctly indicates the concentration of the gas sample used. Note reading (A).

4.6.1.2.3. With the ozonizer off the SOV shall be opened and the O_2 flow rate regulated in such a way as to reduce the figure indicated by the analyser by about 10%. This figure (B) shall be noted. The ozonizer shall be switched on and its voltage regulated so that the instrument reading falls to about 20 % of the initial value obtained with the non-diluted gas. The figure indicated (C) shall be noted.

4.6.1.2.4. The analyser shall be switched to "convert" and the reading (D) shall again be noted. The ozonizer shall be switched off and the new reading (E) noted. The SOV shall be closed and the new reading (F) of the instrument noted. The latter reading must be identical with the initial value (A) unless the gas sample contains NO_2, in which case the figure indicated will be higher.

4.6.1.2.5. The efficiency of the converter (expressed as a percentage) shall be given by

$$\frac{D - C}{E - C} \times 100.$$

4.6.1.3. The efficiency of the converter must be checked at least once a week and preferably once a day.'

Items 4.6.1 and 4.6.2 shall become items 4.6.2 and 4.6.3.

The following sentence shall be added to item 7.1:

'For the purpose of determining corrected volume V' in the case of nitrogen oxides, value PH shall be taken to be equal to O.'

New item 7.2 shall be added after item 7.1:

'7.2. **Correction of "nitrogen dioxide" content**

7.2.1. The nitrogen dioxide content of the gases shall be corrected by means of following formula:

$$C_c = \frac{1}{1 - 0{\cdot}0329\ (H - 10{\cdot}7)}\ C_M$$

C_M = the measured nitrogen dioxide content.

C_c = the corrected nitrogen dioxide content.

H = the absolute humidity expressed in grams of water per kilogram of dry air.

Absolute humidity H is given by the following formula:

$$H = \frac{6{\cdot}2111\ Ra \times P_d}{P_B - P_d \times \frac{Ra}{100}}$$

Ra = the relative humidity of the ambient air in %.

P_d = the saturated-water-vapour pressure at ambient temperature measured with a dry-bulb thermometer.

P_B = the barometric pressure.

Pressures P_d and P_B shall be expressed in the same units.'

Existing item 7.2 shall be replaced by new item 7.3:

'7.3. **Mass of gaseous pollutants contained in each bag**

The mass of the gaseous pollutants contained in each bag shall be determined by means of the product of d × C × V where C is the content per unit volume, d the density of the gaseous pollutants under consideration and V the corrected volume. V shall be replaced by V' in the case of nitrogen oxides.

For carbon monoxide, d = 1·250.
For hydrocarbons, d = 3·844 (hexane).
For nitrogen oxides, d = 2·05 (NO_2).'

Existing item 7.3 shall become new item 7.4.