COMMISSION OF THE EUROPEAN COMMUNITIES

COM(86) 273 final
Brussels, 19 June 1986

Proposal for a

COUNCIL DIRECTIVE

on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous pollutants from diesel engines for use in vehicles

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(submitted to the Council by the Commission)

EXPLANATORY MEMORANDUM

1. For more than a year and a half now, the Community has been striving to achieve a substantial and rapid reduction in the pollutant emissions of motor vehicles.

At the Environment Council of 27 June 1985, the Commission gave an undertaking to put forward a proposal for a directive on emissions of gaseous pollutants from Commercial Vehicles with diesel engines. Indeed, with the sole exception of the directive 72/306/EEC, on smoke emissions from diesel engines, there exist no specific regulations, at either Community or national level, concerning emissions of diesel-powered commercial vehicles.

It should be remembered that the rules drawn up in the course of the March, June and November 1985 meetings of the Environment Council cover the gaseous emissions of all diesel motor vehicles up to 3.5 tonnes, as well as of all petrol-engined motor vehicles (including commercial vehicles), irrespective of their weight.

The provisions resulting from these three meetings will apply to commercial vehicles in the following manner :

- Petrol-engined vehicles without weight limit, according to the derogation rules worked out during the Council meeting of 28 November 1985 (namely the limit values of the directive 83/351/EEC i.e. the limit values currently applicable to cars).

- Diesel-engined vehicles of the light commercial vehicle N_1 type up to 3.5 tonnes, under the same derogation regime.

The present proposal for a directive, which covers the gaseous emissions of all diesel-engined Commercial Vehicles, aims therefore at completing the Community regulations on gaseous emissions, for all categories of vehicles and for the two types of engine.

2. The Economic Commission for Europe (ECE) of the United Nations at Geneva adopted in 1982 a regulation (R49) on this subject, which has not as yet been transposed into the homologation procedure of any of the signatory countries. Consequently, the manufacturers and the technical and government departments have only a very limited amount of experience with commercial vehicle emissions.

The method of testing, sampling and analysis specified in Regulation R49 is, in the opinion of experts consulted by the Commission departments, compatible with the Community type-approval system.

On the other hand, it is widely accepted, as for example in the German Government's statement of 23 September 1985, that the limit values laid down in this regulation could be considerably improved, in view of the technical progress which has been made in the field of diesel engines.

There is a fairly general consensus in favour of an across the board reduction of the limit values for the three pollutants (CO, HC, NOx).

The reduction proposed by the Commission is of 20% for CO and NOx and 30% for HC. Taking account of the different test procedures, this would bring the European values down to a level virtually equivalent to those currently in force in the United States for the same vehicles.

3. This formula, being based on a wide consensus as it represents the state of the art, can be made applicable to new engines as soon as the necessary administrative procedures for the transposition of the directive into national law permit.

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A period of 18 months is to be allowed for this process ; thus, if the Council were to adopt this directive by mid 1986, it would come into force on 1 January 1988 for new types of engines. An extension of this date is proposed for the adaptation to the provisions of this directive of engines already on the market.

In order to maintain coherence with other new technical requirements, these engines will be subject to the new limit values on the same date the vehicles in which they are to be installed will have to meet the new limit values on noise levels laid down in directive 84/424/EEC, i.e. 1.10.1990. In the same way, the distinction between a new and existing type of engine will be made by reference to type approvals under the smoke emissions directive (72/305/EEC) : engines which have not up to now obtained type-approval under the latter directive, and for which type-approval on smoke emissions is requested, after the (entry into force) (adoption) of the present directive, will be considered to be new types.

4. The proposed rules for heavy commercial vehicles, which will fix limits in an area where pollutant emissions have not, until now, been subject to a regulation, constitutes a first step. They will have to be followed, as has been advocated in several quarters, notably during the Environment Council of 28 November 1985 - by a second stage defining an overall approach to the problem of diesel engine emissions : gaseous pollutants, smoke and particulates. Such an approach which necessitates detailed studies, so as to proceed according to the traditional Community method, which consists of setting the highest possible standards while allowing for optimal conditions regarding timing and costs, taking account of the state of technology.

This will involve analysing on the one hand the effect of these emissions on public health and the environment, and on the other, the technical options for their reduction and their economic and energy impact, taking account of the likely developments in the quality of diesel fuel. This work will be undertaken from the beginning of 1986 and should lead, before the end of 1987, to a comprehensive Commission proposal containing, if necessary, a new specification for the reference fuel.

The dates on which the new community limits will become applicable will have to be compatible with a normal technical evolution starting from the proposed values.

5. As in ECE regulation 49, the same proposed limit values will be applied both to the type-approval of a new type of engine and to the control of the conformity of production of this engine. In view of the lack of data based on the application of this regulation, it is not possible to define separate limit values for production conformity, as is the practice in the case of light vehicle emissions (directive 70/220/EEC). Government experts and the industry have been asked to carry out a study on this subject, and the results of this could, if necessary, be incorporated into the present directive by means of the technical adaptation Committee.

6. Where commercial vehicles are concerned, engines are generally submitted to type-approval tests on emissions independently of the vehicles in which they are due to be installed. The present directive takes account of this practice by referring to the provisions of article 9bis of the Directive 70/156/EEC [1], amended by the directive 78/315/EEC[2], provisions which introduce the notion of independent technical entity into the EEC type approval procedure.

7. For those light commercial vehicles of category N_1 equipped with a diesel engine, it is proposed, in conformity with Regulation 49, that their manufacturers should have the possibility to have them type-approved under either the present directive or directive 70/220/EEC. In this way, account can be taken of the special nature of this category of vehicles, which can be derived either from passenger cars (M_1) or from the higher category of Commercial vehicles (N_2).

   The requirements of the two directives in question are virtually equivalent as a result of the derogation mentioned in point 1. The overall approach described in point 4 should also extend to this category of vehicles, thus ensuring the homogenity of future Community provisions in the commercial vehicle sector.

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(1) O.J. L42 of 23.2.1970 p.1

(2) O.J. L81 of 28.3.1978 p.1

8. Consultation of European Parliament and Economic and Social Committee

The opinion of these two bodies is required in accordance with the provisions of Article 100, indent 2 of the EEC treaty.

The bringing into force of the requirements of the directive necessitates for all the Member States, a modification of their legislative provisions.

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II

(Preparatory Acts)

COMMISSION

Proposal for a Council Directive on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous pollutants from diesel engines for use in vehicles

COM(86) 273 final

(Submitted by the Commission to the Council on 23 June 1986)

(86/C 193/03)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas the technical requirements which motor vehicles must satisfy pursuant to national laws relate, *inter alia*, to the emission of gaseous pollutants from diesel engines for use in vehicles;

Whereas those requirements differ from one Member State to another; whereas these differences could restrict the free movement of the products in question; whereas it is therefore necessary that all the Member States adopt the same requirements either in addition to or in place of their existing rules, in order, in particular, to allow the implementation of the EEC type-approval procedure which was the subject of 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 last amended by Directive 80/1267/EEC (2);

Whereas it is desirable to follow the technical requirements adopted by the United Nations Economic Commission for Europe (ECE) in its Regulation No 49 (Uniform provisions concerning the approval of diesel engines with regard to the emission of gaseous pollutants), which is annexed to the Agreement of 20 March 1958 concerning the adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipment and parts (3),

HAS ADOPTED THIS DIRECTIVE:

Article 1

For the purposes of this Directive, 'vehicle' means any vehicle propelled by a diesel engine, intended for use on the road, with or without bodywork, having at least four wheels and a maximum design speed exceeding 25 km/h, with the exception of vehicles of category M_1 as defined in point 0.4 of Annex I to Directive 70/156/EEC, having a total mass not exceeding 3,5 tonnes, and vehicles which run on rails, agricultural tractors and machines and public works vehicles.

Article 2

No Member State may refuse to grant EEC type-approval or national type-approval of:

— a vehicle type in respect of its diesel engine, or

— a type of diesel engine,

(1) OJ No L 42, 23. 2. 1970, p. 1.
(2) OJ No L 375, 31. 12. 1980, p. 34.

(3) Doc. E/ECE/324 — E/ECE/TRANS/505, Rev 1/add 48, 5. 4. 1982.

on grounds relating to the gaseous pollutants emitted by such an engine if:

— the vehicle type is propelled by a diesel engine for which type-approval of a separate technical unit within the meaning of Article 9a of Directive 70/156/EEC has been granted in accordance with the requirements as laid down in the Annexes to this Directive,

— such a diesel engine regarded as a separate technical unit within the meaning of Article 9a of Directive 70/156/EEC satisfies the relevant requirements as laid down in the Annexes to this Directive.

Article 3

1. The Member State which has granted type-approval of a type of diesel engine shall take the necessary measures to ensure that it is informed of any modification of a part or characteristic referred to in point 2.3 of Annex I. The competent authorities of that Member State shall decide whether fresh tests should be carried out on the modified engine and a fresh report drawn up. Where the tests reveal failure to comply with this Directive, the modification shall not be approved.

2. The Member State which has granted type-approval of a vehicle type in respect of its diesel engine shall take the necessary measures to ensure that it is informed of any modification of such vehicle type as regards the engine installed. The competent authorities of that Member State shall decide whether after a modification measures in application of Directive 70/156/EEC, especially of Article 4 or of Article 6 thereof, must be taken.

Article 4

The amendments necessary for adapting the Annexes so as to take account of technical progress shall be adopted in accordance with the procedure laid down in Article 5.

Article 5

Where the procedure laid down in this Article is followed, the Commission shall decide after consulting the Committee set up by Directive 70/156/EEC, hereinafter referred to as 'the Committee'. The Committee shall deliberate on requests for its opinion formulated by the Commission. The Commission, in seeking the opinion of the Committee, may fix a time limit within which that opinion must be given. The deliberations of the Committee shall not be followed by a vote. However, each member of the Committee may require that his opinion be entered in the minutes.

Article 6

1. Member States shall bring into force the laws, regulations and administrative provisions necessary in order to comply with this Directive by 1 April 1988. They shall forthwith inform the Commission thereof.

2. Until 30 September 1990 Member States shall apply those provisions only to those vehicle types for which type-approval in accordance with Directive 72/306/EEC is also being sought.

3. Furthermore, once notification of this Directive has been effected Member States shall ensure that the Commission is informed, in time for it to submit its comments, of the most important laws, regulations and administrative provisions which they envisage adopting in the field covered by this Directive.

Article 7

This Directive is addressed to the Member States.

ANNEX I

SCOPE, DEFINITIONS AND ABBREVIATIONS, APPLICATION FOR EEC TYPE-APPROVAL SPECIFICATIONS AND TESTS AND CONFORMITY OF PRODUCTION

1. SCOPE

This Directive applies to the gaseous pollutants from all motor vehicles equipped with compression-ignition engines as specified in Article 1 with the exception of those vehicles of category N_1 for which type-approval has been granted under Directive 70/220/EEC (a) as amended by 8/. . ./EEC.

2. DEFINITIONS AND ABBREVIATIONS

For the purposes of this Directive:

2.1. *'Approval of an engine'* means the approval of an engine type with regard to the level of the emission of gaseous pollutants;

2.2. *'diesel engine'* means an engine which works on the compression-ignition principle;

2.3. *'engine type'* means a category of engines which do not differ in such essential respects as engine characteristics as defined in Annex II to this Directive;

2.4. *'gaseous pollutants'* means carbon monoxide, hydrocarbons (assuming a ratio of $C_1H_{1,85}$) and oxides of nitrogen, the last-named being expressed in nitrogen dioxide (NO_2) equivalent;

2.5. *'net power'* means the power in EEC kW obtained on the test bench at the end of the crankshaft, or its equivalent, measured in accordance with the ECE method of measuring power as set out in Directive 80/1269/EEC (b);

2.6. *'rated speed'* means the maximum full-load speed allowed by the governor as specified by the manufacturer in his sales and service literature;

2.7. *'per cent load'* means the fraction of the maximum available torque at an engine speed;

2.8. *'intermediate speed'* means the speed corresponding to the maximum torque value if such speed is within the range of 60 to 75 % of rated speed; in other cases it means a speed equal to 60 % of rated speed;

2.9. **Abbreviations and units**

P	kW	net power output non-corrected (a)
$\overline{CO}$	g/kWh	carbon monoxide emission
$\overline{HC}$	g/kWh	hydrocarbon emission
$\overline{NO_x}$	g/kWh	emission of oxides of nitrogen
conc	ppm	concentration (ppm by volume)
mass	g/h	pollutant mass flow
WF		weighting factor
G_{EXH}	kg/h	exhaust gas mass flow rate on wet basis
V'_{EXH}	m³/h	exhaust gas volume on dry basis
V''_{EXH}	m³/h	exhaust gas volume on wet basis
G_{AIR}	kg/h	intake air mass flow rate
V_{AIR}	m³/h	intake air volume flow rate
G_{FUEL}	kg/h	fuel mass flow rate
FID		flame ionization detector
NDUVR		non-dispersive ultra-violet resonance absorption
NDIR		non-dispersive infrared
CLA		chemiluminescent analyzer

(a) OJ No L 76, 6. 4. 1970, p. 1.
(b) OJ No L 375, 31. 12. 1980, p. 46.
(c) As described in Annex I to Directive 80/1269/EEC (OJ No L 375, 31. 12. 1980, p. 49).

3. APPLICATION FOR EEC TYPE-APPROVAL

3.1. Application for EEC type-approval for a type of engine as a separate technical unit.

3.1.1. The application for approval of an engine type with regard to the level of the emission of gaseous pollutants shall be submitted by the engine manufacturer or by a duly accredited representative.

3.1.2. It shall be accompanied by the undermentioned documents in triplicate and the following particulars:

3.1.2.1. a description of the engine type comprising the particulars referred to in Annex II to this Directive which conform to the requirements of Article 9a of Directive 70/156/EEC,

3.1.2.2. drawings of the combustion chamber and of the upper face of the piston.

3.1.3. An engine conforming to the 'engine type' characteristics described in Annex II to this Directive shall be submitted to the technical service responsible for conducting the approval tests defined in paragraph 5 below.

3.2. Application for EEC type-approval for a vehicle type in respect of its engine.

3.2.1. The application for approval of a vehicle with regard to emission of gaseous pollutants by its engine shall be submitted by the vehicle manufacturer or a duly accredited representative.

3.2.2. It shall be accompanied by the undermentioned documents in triplicate and the following particulars:

3.2.2.1. a description of the vehicle type comprising the particulars referred to in Annex II to this Directive, along with the documentation required in application of Article 3 of Directive 70/156/EEC,

or

3.2.2.2. a copy of the EEC Type-Approval Certificate (Annex VIII to this Directive) for the engine as a separate technical unit which is installed in the vehicle type, along with the documentation required in application of Article 3 of Directive 70/156/EEC.

4. EEC TYPE-APPROVAL

4.1. A certificate conforming to the model specified in Annex VIII shall be issued for approvals referred to under 3.1.

4.2. A certificate conforming to the model specified in Annex IX shall be issued for approval referred to under 3.2 to complete the documentation in relation to Articles 4 and 10 of Directive 70/156/EEC.

5. MARKINGS

5.1. The engine approved as a technical unit must bear:

5.1.1. — the trademark or trade name of the manufacturer of the engine,

5.1.2. — the manufacturer's commercial description,

5.1.3. — the EEC type-approval number preceded by the distinctive letter(s) of the country granting EEC type-approval (1).

5.2. These marks must be clearly legible and indelible.

(1) B = Belgium; D = Federal Republic of Germany; DK = Denmark; E = Spain; F = France; GR = Greece; I = Italy; IRL = Ireland; L = Luxembourg; NL = Netherlands; P = Portugal; UK = United Kingdom.

6. SPECIFICATIONS AND TESTS

6.1. **General**

The components liable to affect the emission of gaseous pollutants shall be so designed, constructed and assembled as to enable the engine, in normal use, despite the vibration to which it may be subject, to comply with the provisions of this Directive.

6.2. **Specifications concerning the emission of gaseous pollutants**

The emission of gaseous pollutants by the engine submitted for testing shall be measured by the method described in Annex III to this Directive. Other methods may be approved if it is found that they yield equivalent results.

6.2.1. The mass of the carbon monoxide, the mass of the hydrocarbons and the mass of the oxides of nitrogen obtained shall not exceed the amounts shown in the table below:

Mass of carbon monoxide (CO) (grams per kWh)	Mass of hydrocarbons (HC) (grams per kWh)	Mass of nitrogen oxides (NO_x) (grams per kWh)
11,2	2,4	14,4

7. INSTALLATION ON THE VEHICLE

7.1. The engine installation on the vehicle shall comply with the following characteristics in respect to the type-approval of the engine:

7.1.1. — intake depression shall not exceed that of the type-approved engine,

7.1.2. — exhaust back pressure shall not exceed that of the type-approved engine,

7.1.3. — exhaust system volume is within ± 40 % of the type-approved engine.

8. CONFORMITY OF PRODUCTION

8.1. Every engine bearing an EEC type-approval number pursuant to this Directive shall conform to the engine type-approved.

8.2. In order to verify conformity as prescribed in point 8.1, an engine bearing an EEC type-approval number shall be taken from the series.

8.3. As a general rule, conformity of the engine with the approved type shall be verified on the basis of the description given in the type-approval certificate and its annexes and, if necessary, an engine shall be subjected to the test referred to in point 6.2 above.

8.3.1. For verifying the conformity of the engine in a test, the following procedure is adopted:

8.3.1.1. An engine is taken from the series and subjected to the test described in Annex III.

8.3.1.2. If the engine taken from the series does not satisfy the requirements of point 6.2.1 above, the manufacturer may ask for measurements to be performed on a sample of engines taken from the series and including the engine originally taken. The manufacturer shall determine the size (n) of the sample, in agreement with the technical service. Engines other than the engine originally taken shall be subjected to a test. The arithmetical mean ($\bar{x}$) of the results obtained

with the sample shall then be determined for each gaseous pollutant. The production of the series shall then be deemed to conform if the following condition is met:

$$\bar{x} + k.S \leqslant L \text{ (a)}$$

where:

L is the limit value laid down in point 6.2.1 for each gaseous pollutant considered, and

k is a statistical factor depending on n and given in the following table:

n	2	3	4	5	6	7	8	9	10
k	0,973	0,613	0,489	0,421	0,376	0,342	0,317	0,296	0,279
n	11	12	13	14	15	16	17	18	19
k	0,265	0,253	0,242	0,233	0,224	0,216	0,210	0,203	0,198

If $n \geqslant 20$ $\quad k = \frac{0,860}{\sqrt{n}}$

8.3.2. The technical service responsible for verifying the conformity of production shall carry out tests on engines which have been run-in partially or completely, according to the manufacturer's specifications.

(a) $S^2 = \frac{(x - \bar{x})^2}{n - 1}$

where x is any one of the individual results obtained with the sample n.

ANNEX II

ESSENTIAL CHARACTERISTICS OF THE VEHICLE AND THE ENGINE AND INFORMATION CONCERNING THE CONDUCT OF TESTS (a)

1. DESCRIPTION OF ENGINE

1.1. Make: .....

1.2. Type: .....

1.3. Cycle: four-stroke/two-stroke (b)

1.4. Bore: ..... mm

1.5. Stroke: ..... mm

1.6. Number and layout of cylinders and firing order: .....

1.7. Cylinder capacity: ..... cm^3

(a) In the case of non-conventional engines and systems, particulars equivalent to those referred to here shall be supplied by the manufacturer.

(b) Strike out what does not apply.