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(Acts whose publication is obligatory)

DIRECTIVE 96/1/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 22 January 1996

amending Directive 88/77/EEC on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous and particulate pollutants from diesel engines for use in vehicles

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the opinion of the Economic and Social Committee ⁽²⁾,

Acting in accordance with the procedure laid down in Article 189b of the Treaty ⁽³⁾,

Whereas measures should be adopted within the framework of the internal market;

Whereas the first programme of action of the European Community on protection of the environment ⁽⁴⁾, approved by the Council on 22 November 1973, called for account to be taken of the latest scientific advances in combating atmospheric pollution caused by gases emitted from motor vehicles and for Directives adopted previously to be amended accordingly; whereas the fifth programme of action, which in its general approach was approved by the Council and by the Representatives of the Governments of the Member States, meeting within the Member States, in the resolution of 1 February 1993 ⁽⁵⁾, provides for additional efforts to be made to effect a considerable reduction in the present level of pollutants emitted from motor vehicles;

Whereas the objective of reducing the level of pollutant emissions from motor vehicles and the smooth functioning of the internal market for vehicles cannot be sufficiently achieved by individual Member States and can therefore be better achieved by the approximation of the laws of the Member States relating to measures to be taken against air pollution by motor vehicles;

Whereas it is recognized that the development of transport in the Community has entailed significant constraints for the environment; whereas a number of official estimates of the increase in traffic density have proved to be lower than the actual figures; whereas for that reason stringent emission standards should be laid down for all motor vehicles;

Whereas Directive 88/77/EEC ⁽⁶⁾ laid down the limit values for the emissions of carbon monoxide, unburnt hydrocarbons and nitrogen oxides from diesel engines for use in motor vehicles on the basis of a test procedure representative for European driving conditions for the vehicles concerned; whereas Directive 91/542/EEC provides for two stages, the first stage (1992/93) coinciding with the implementation dates of the new European emission standards for passenger cars; whereas the second stage (1995/96) established a longer-term guideline for the European motor industry by fixing limit values based on the expected performance of technologies still under development, whilst granting industry a lead time for perfecting such technologies;

Whereas under Article 5 (2) of Directive 91/542/EEC the Commission is to report to the Council before the end of 1993 on progress made regarding the availability of technologies for controlling air-polluting emissions from diesel engines, particularly those of 85 kW or less; whereas this report should cover also new statistical methods to monitor production conformity; whereas in the light of the conclusions of this report the Commission is invited, if necessary, to submit a proposal to the

⁽¹⁾ OJ No C 389, 31. 12. 1994, p. 22 and OJ No C 309, 21. 11. 1995, p. 9.

⁽²⁾ OJ No C 201, 26. 7. 1993, p. 9.

⁽³⁾ Opinion of the European Parliament of 20 September 1995 (OJ No C 269, 16. 10. 1995, p. 88), Council common position of 7 November 1995 (OJ No C 320, 30. 11. 1995, p. 21) and Decision of the European Parliament of 13 December 1995 (OJ No C 17, 21. 1. 1996). Council Decision of 22 December 1995.

⁽⁴⁾ OJ No C 112, 20. 12. 1973, p. 1.

⁽⁵⁾ OJ No C 138, 17. 5. 1993, p. 1.

⁽⁶⁾ OJ No L 36, 9. 2. 1988, p. 33. Directive as last amended by Directive 91/542/EEC (OJ No L 295, 25. 10. 1991, p. 1).

Council for revising upwards the limit values for particulate emissions;

Whereas, in the opinion of the experts consulted, it is possible to introduce new provisions on production conformity;

Whereas the very stringent limit value for particulate emissions set in Directive 91/542/EEC for 'Stage 2' cannot, at the present state of technology, be met by most small diesel engines of 85 kW or less by the date set in that Directive; whereas a considerable reduction in particulate emissions may nevertheless be obtained for these engines as from 1 October 1995; whereas, for small diesel engines with a swept volume of less than 0,7 dm³ and a rated power speed of more than 3 000 min⁻¹, the limit value for particulate emissions set in Directive 91/542/EEC should not be introduced until 1997; whereas this additional period would allow the industry to make the necessary changes to ensure compliance with the deferred limit value,

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Annex I to Directive 88/77/EEC shall be amended in accordance with the Annex to this Directive.

Article 2

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to

comply with this Directive before 1 July 1996. They shall forthwith inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The methods of making such reference shall be laid down by Member States.

2. Member States shall communicate the main provisions of national law which they adopt in the field covered by this Directive to the Commission.

Article 3

This Directive shall enter into force on the 20th day following that of its publication in the *Official Journal of the European Communities*.

Article 4

This Directive is addressed to the Member States.

Done at Brussels, 29 January 1996.

For the European Parliament

The President

K. HÄNSCH

For the Council

The President

L. DINI

ANNEX

AMENDMENTS TO THE ANNEXES TO DIRECTIVE 88/77/EEC

- (1) Section 6.2.1.: the following footnote (**) is added to the figure '0,15' of the last line of the table (B(1. 10. 1995)), last column (Mass of particulates (PT) g/kWh):

(**): until 30 September 1997 the value applied to the particulate emissions of engines having a swept volume of less than 0,7 dm³ and a rated power speed of more than 3 000 min⁻¹, is 0,25 g/kWh.'

- (2) Section 8 now reads as follows:

8. PRODUCTION CONFORMITY

- 8.1. Measures to ensure production conformity must be taken in accordance with the provisions of Article 10 of Directive 70/156/EEC. Production conformity is checked on the basis of the description in the type-approval certificates set out in Annex VIII to this Directive.

Sections 2.4.2 and 2.4.3 of Annex X to Directive 70/156/EEC are applicable where the competent authorities are not satisfied with the auditing procedure of the manufacturer.

- 8.1.1. If emissions of pollutants are to be measured and an engine type approval has had one or several extensions, the tests will be carried out on the engine(s) described in the information package relating to the relevant extension.

- 8.1.1.1. Conformity of the vehicle subjected to a pollutant emission test.

After submission of the engine to the authorities, the manufacturer shall not carry out any adjustment to the engines selected.

- 8.1.1.1.1. Three engines are randomly taken in the series and are subjected to the test referred to in Section 6.2. The limit values are given in Section 6.2.1 of this Annex (*).

(*): until 30 September 1998 the value applied to the particulate emissions of engines having a swept volume of less than 0,7 dm³ and a rated power speed of more than 3 000 min⁻¹, is 0,25 g/kWh."

- 8.1.1.1.2. The test are carried out according to Appendix 1 to this Annex, where the competent authority is satisfied with the production standard deviation given by the manufacturer, in accordance with Annex X to Directive 70/156/EEC, which applies to motor vehicles and their trailers.

The tests are carried out according to Appendix 2 to this Annex, where the competent authority is not satisfied with the production standard deviation given by the manufacturer in accordance with Annex X to Directive 70/156/EEC, which applies to motor vehicles and their trailers.

At the manufacturer's request, the tests may be carried out in accordance with Appendix 3 to this Annex.

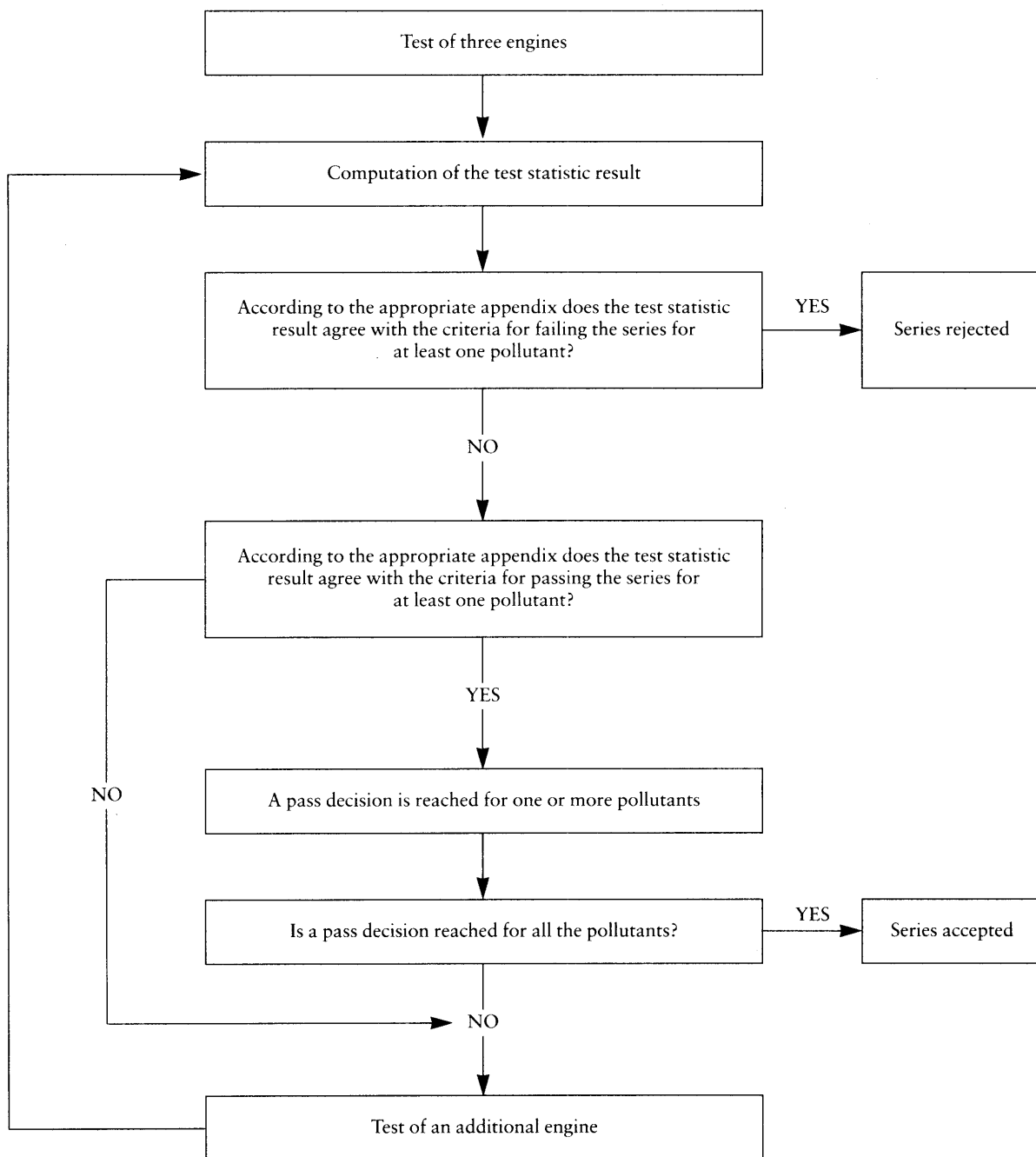
- 8.1.1.1.3. On the basis of a test of the engines by sampling, the production of a series is regarded as conforming where a pass decision is reached for all the pollutants and non-conforming where a fail decision is reached for one pollutant, in accordance with the test criteria applied in the appropriate Appendix.

When a pass decision has been reached for one pollutant, this decision may not be changed by any additional tests made in order to reach a decision for the other pollutants.

If no pass decision is reached for all the pollutants and if no fail decision is reached for one pollutant, a test is carried out on another engine (see Figure I.7).

If no decision is reached, the manufacturer may at any time decide to stop testing. In that case a fail decision is recorded.

Figure 1.7



- 8.1.1.2. The tests will be carried out on newly manufactured engines.
- 8.1.1.2.1. However, at the request of the manufacturer, the tests will be carried out on engines which have been run-in a maximum of 100 hours.
In this case, the running-in procedure will be conducted by the manufacturer who shall undertake not to make any adjustments to those engines.
- 8.1.1.2.2. When the manufacturer asks to conduct an running-in procedure (x hours where $x \leq (100)$ hours), it may be carried out on:
- all the engines that are tested,
 - or
 - the first engine tested, with the determination of an evolution coefficient as follows:
 - the pollutant emissions will be measured at zero and at “x” hours on the first engine tested,
 - the evolution coefficient of the emissions between zero and “x” hours will be calculated for each pollutant:

$$\frac{\text{Emissions "x" hours}}{\text{Emissions zero hour}}$$
 It may be less than one.
 - The subsequent test engines will not be subjected to the running-in procedure, but their zero hour emissions will be modified by the evolution coefficient.
- In this case, the values to be taken will be:
- the values at “x” hours for the first engine,
 - the values at zero hour multiplied by the evolution coefficient for the other engines.
- 8.1.1.2.3. All these tests may be conducted with commercial fuel. However, at the manufacturer's request, the reference fuels described in Annex IV may be used.

(3) The following Appendices are added:

Appendix 1

1. This Appendix describes the procedure to be used to verify production conformity for the emissions of pollutants when the manufacturer's production standard deviation is satisfactory.
2. With a minimum sample size of three the sampling procedure is set so that the probability of a lot passing a test with 30 % of the engines defective is 0,90 (producer's risk 10 %) while the probability of a lot being accepted with 65 % of the engines defective is 0,10 (consumer's risk = 10 %).
3. The following procedure is used for each of the pollutants given in Section 6.2.1 of Annex I (see Figure I 7).

Let:

L = the natural logarithm of the limit value for the pollutant,

x_i = the natural logarithm of the measurement for the i-th engine of the sample,

s = an estimate of the production standard deviation (after taking the natural logarithm of the measurements),

n = the current sample number.

4. For each sample the sum of the standardized deviations to the limit is calculated using the following formula:

$$\frac{1}{s} \sum_{i=1}^n (L - x_i)$$

5. Then:

- if the test statistic result is greater than the pass decision number for the sample size given in Table I.1.5, a pass decision is reached for the pollutant,
- if the test statistic result is less than the fail decision number for the sample size given in Table I.1.5, a fail decision is reached for the pollutant,
- otherwise, an additional engine is tested according to Section 8.1.1.1 of Annex I and the calculation procedure is applied to the sample increased by one more unit.

Table I.1.5

Minimum sample size: 3

Cumulative number of engines tested (sample size) n	Pass decision number A_n	Fail decision number B_n
3	3,327	- 4,724
4	3,261	- 4,790
5	3,195	- 4,856
6	3,129	- 4,922
7	3,063	- 4,988
8	2,997	- 5,054
9	2,931	- 5,120
10	2,865	- 5,185
11	2,799	- 5,251
12	2,733	- 5,317
13	2,667	- 5,383
14	2,601	- 5,449
15	2,535	- 5,515
16	2,469	- 5,581
17	2,403	- 5,647
18	2,337	- 5,713
19	2,271	- 5,779
20	2,205	- 5,845
21	2,139	- 5,911
22	2,073	- 5,977
23	2,007	- 6,043
24	1,941	- 6,109
25	1,875	- 6,175
26	1,809	- 6,241
27	1,743	- 6,307
28	1,677	- 6,373
29	1,611	- 6,439
30	1,545	- 6,505
31	1,479	- 6,571
32	- 2,112	- 2,112

Appendix 2

1. This Appendix describes the procedure to be used to verify production conformity during the type I test when the manufacturer's evidence of production standard deviation is either unsatisfactory or unavailable.
2. With a minimum sample size of three the sampling procedure is set so that the probability of a lot passing a test with 30% of the engines defective is 0,90 (producer's risk = 10%) while the probability of a lot being accepted with 65% of the engines defective is 0,10 (consumer's risk = 10%).
3. The values of the pollutants given in Section 6.2.1 of Annex 1 are considered to be log normally distributed and should be transformed by taking their natural logarithms. Let m_0 and m denote the minimum and maximum sample sizes respectively ($m_0 = 3$ und $m = 32$) and let n denote the current sample number.
4. If the natural logarithms of the values measured in the series are x_1, x_2, \dots, x_n and L is the natural logarithm of the limit value for the pollutant, then, define:

$$d_j = x_j - L$$

and

$$\bar{d}_n = \frac{1}{n} \sum_{j=1}^n d_j$$

$$V_n^2 = \frac{1}{n} \sum_{j=1}^n (d_j - \bar{d}_n)^2$$

5. Table I.2.5 shows values of the pass (A_n) and fail (B_n) decision numbers against current sample number. The test statistic result is the ratio \bar{d}_n/V_n , and shall be used to determine whether the series has passed or failed as follows:

For $m_0 \leq n < m$:

- pass the series if $\bar{d}_n/V_n \leq A_n$,
- fail the series if $\bar{d}_n/V_n \geq B_n$,
- take another measurement if $A_n < \bar{d}_n/V_n < B_n$.

6. Remarks.

The following recursive formulae are useful for calculating successive values of the test statistic:

$$\bar{d}_n = \left(1 - \frac{1}{n}\right) \bar{d}_{n-1} + \frac{1}{n} d_n$$

$$V_n^2 = \left(1 - \frac{1}{n}\right) V_{n-1}^2 + \frac{(\bar{d}_n - d_n)^2}{n-1}$$

($n = 2, 3, \dots$; $\bar{d}_1 = d_1$; $V_1 = 0$)

Table I.2.5

Minimum sample size: 3

Cumulative number of engines tested (sample size) n	Pass decision number A_n	Fail decision number B_n
3	- 0,80381	16,64743
4	- 0,76339	7,68627
5	- 0,72982	4,67136
6	- 0,69962	3,25573
7	- 0,67129	2,45431
8	- 0,64406	1,94369
9	- 0,61750	1,59105
10	- 0,59135	1,33295

Cumulative number of engines tested (sample size) n	Pass decision number A_n	Fail decision number B_n
11	- 0,56542	1,13566
12	- 0,53960	0,97970
13	- 0,51379	0,85307
14	- 0,48791	0,74801
15	- 0,46191	0,65928
16	- 0,43573	0,58321
17	- 0,40933	0,51718
18	- 0,38266	0,45922
19	- 0,35570	0,40788
20	- 0,32840	0,36203
21	- 0,30072	0,32078
22	- 0,27263	0,28343
23	- 0,24410	0,24943
24	- 0,21509	0,21831
25	- 0,18557	0,18970
26	- 0,15550	0,16328
27	- 0,12483	0,13880
28	- 0,09354	0,11603
29	- 0,06159	0,09480
30	- 0,02892	0,07493
31	- 0,00449	0,05629
32	- 0,03876	0,03879

Appendix 3

1. This Appendix describes the procedure to be used to verify, at the manufacturer's request, production conformity for the emissions of pollutants.
2. With a minimum sample size of three engines the sampling procedure is set to that the probability of a lot passing a test with 30% of the engines defective is 0,90 (producer's risk = 10%) while the probability of a lot being accepted with 65% of the engines defective is 0,10 (consumer's risk = 10%).
3. The following procedure is used for each of the pollutants given in Section 6.2.1 of Annex 1, (see Figure I.7).
Let
L be the limit value for the pollutant,
 x_i the value of the measurement for the i -th engine of the sample,
 n is the current sample number.
4. Calculate for the sample the test statistic quantifying the number of non-conforming engines, i.e.:
 $x_i > L$.

5. Then:

- if the test statistic is less or equal to the pass decision number for the sample size given in Table I.3.5, a pass decision is reached for the pollutant,
- if the test statistic is greater or equal to the fail decision number for the sample size given in Table I.3.5, a fail decision is reached for the pollutant,
- otherwise, an additional engine is tested according to Section 8.1.1.1 of Annex I and the calculation procedure is applied to the sample increased by one more unit.

In Table I.3.5 the pass and fail decision numbers are calculated by means of the International Standard ISO 8422/1991.

Table I.3.5

Minimum sample size: 3

Cumulative number of engines tested (sample size) <i>n</i>	Pass decision number	Fail decision number
3	—	3
4	0	4
5	0	4
6	1	5
7	1	5
8	2	6
9	2	6
10	3	7
11	3	7
12	4	8
13	4	8
14	5	9
15	5	9
16	6	10
17	6	10
18	7	11
19	8	9'