

Regulation (EU) No 540/2014 of the European Parliament and of the Council of 16 April 2014 on the sound level of motor vehicles and of replacement silencing systems, and amending Directive 2007/46/EC and repealing Directive 70/157/EEC (Text with EEA relevance)

ANNEX IX

EU TYPE-APPROVAL IN RESPECT OF THE SOUND LEVEL OF SILENCING SYSTEMS AS SEPARATE TECHNICAL UNITS (REPLACEMENT SILENCING SYSTEMS)

1. APPLICATION FOR EU TYPE-APPROVAL

- 1.1. The application of EU type-approval pursuant to Article 7(1) and (2) of Directive 2007/46/EC in respect of a replacement silencing system, or components thereof, as a separate technical unit intended for vehicles of categories M₁ and N₁ shall be submitted by the vehicle manufacturer or the manufacturer of the separate technical unit in question.
- 1.2. A model for the information document is contained in Appendix 1.
- 1.3. At the request of the technical service concerned, the applicant shall submit:
 - 1.3.1 two examples of the system in respect of which application for EU type-approval has been made,
 - 1.3.2 a silencing system of the type originally fitted to the vehicle when EU type-approval was granted,
 - 1.3.3 a vehicle representative of the type to which the system is to be fitted, which meets the requirements of point 2.1 of Annex VI,
 - 1.3.4 a separate engine corresponding to the type of vehicle described.

2. MARKINGS

- 2.4.1. The replacement silencing system, or components thereof, excluding fixing hardware and pipes shall bear:
 - 2.4.1.1. the trade mark or trade name of the manufacturer of the replacement silencing system and its components,
 - 2.4.1.2. the manufacturer's trade description.
- 2.4.2. These marks shall be clearly legible and indelible, even when the system is fitted to the vehicle.

3. GRANTING OF EU TYPE-APPROVAL

- 3.1. If the relevant requirements are satisfied, EU type-approval pursuant to Article 9(3) and, if applicable, Article 10(4) of Directive 2007/46/EC shall be granted.
- 3.2. A model for the EU type-approval certificate is contained in Appendix 2.
- 3.3. A type-approval number in accordance with Annex VII to Directive 2007/46/EC shall be assigned to each type of replacement silencing system, or components thereof, approved as a separate technical unit; section 3 of the type-approval number shall indicate the number of this Regulation. Furthermore, if the replacement silencing system is intended to be fitted on vehicle types complying with the limit values of Phase 1 in Annex III only, section 3 of the type-approval number shall be followed by the character 'A'. If the replacement silencing system is intended to be fitted on vehicle types complying with the limit values of Phase 2 in Annex III only, section 3 of the type-approval number shall be followed by the character 'B'. If the replacement

silencing system is intended to be fitted on vehicle types complying with the limit values of Phase 3 in Annex III, section 3 of the type-approval number shall be followed by the character 'C'. The same Member State shall not assign the same number to another type of replacement silencing system, or components thereof.

4. EU TYPE-APPROVAL MARK

4.1. Every replacement silencing system, or components thereof, excluding fixing hardware and pipes, conforming to a type approved under this Regulation shall bear an EU type-approval mark.

4.2. The EU type-approval mark shall consist of a rectangle surrounding the lower case letter 'e' followed by the distinguishing letter(s) or number of the Member State which has granted the approval:

- '1' for Germany
- '2' for France
- '3' for Italy
- '4' for the Netherlands
- '5' for Sweden
- '6' for Belgium
- '7' for Hungary
- '8' for the Czech Republic
- '9' for Spain
- '11' for the United Kingdom
- '12' for Austria
- '13' for Luxembourg
- '17' for Finland
- '18' for Denmark
- '19' for Romania
- '20' for Poland
- '21' for Portugal
- '23' for Greece
- '24' for Ireland
- '25' for Croatia
- '26' for Slovenia
- '27' for Slovakia
- '29' for Estonia
- '32' for Latvia
- '34' for Bulgaria
- '36' for Lithuania
- '49' for Cyprus
- '50' for Malta

It shall also include in the vicinity of the rectangle the 'base approval number' contained in section 4 of the type-approval number referred to in Annex VII to Directive 2007/46/EC, preceded by the two figures indicating the sequence number assigned to the most recent major technical amendment to this Regulation which was applicable at the time of the vehicle type-approval. For this Regulation in its original form, the sequence number is 00. Furthermore, that sequence number shall be preceded by the character 'A' if the replacement silencing system is

intended to be fitted on vehicle types complying with the limit values of Phase 1 in Annex III only, or the character 'B' if the replacement silencing system is intended to be fitted on vehicle types complying with the limit values of Phase 2 in Annex III only, or the character 'C' if the replacement silencing system is intended to be fitted on vehicle types complying with the limit values of Phase 3 in Annex III.

4.3. The mark shall be clearly legible and indelible even when the replacement silencing system, or components thereof, is fitted to the vehicle.

4.4. A model for the EU type-approval mark is contained in Appendix 3.

5. SPECIFICATIONS

5.1. General specifications

5.1.1. The replacement silencing system, or components thereof, shall be designed, constructed and capable of being mounted so as to ensure that the vehicle complies with this Regulation under normal conditions of use, notwithstanding any vibrations to which it may be subject.

5.1.2. The silencing system, or components thereof, shall be designed, constructed and capable of being mounted so that reasonable resistance to the corrosion phenomenon to which it is exposed is obtained having regard to the conditions of use of the vehicle.

5.1.3. Additional prescriptions related to tamperability and manually adjustable multi-mode exhaust or silencing systems

5.1.3.1. All exhaust or silencing systems shall be constructed in a way that does not easily permit removal of baffles, exit-cones and other parts whose primary function is as part of the silencing/expansion chambers. Where incorporation of such a part is unavoidable, its method of attachment shall be such that removal is not facilitated easily (e.g. with conventional threaded fixings) and shall also be attached such that removal causes permanent/irrecoverable damage to the assembly.

5.1.3.2. Exhaust or silencing systems with multiple, manually adjustable operating modes shall meet all requirements in all operating modes. The reported sound levels shall be those resulting from the mode with the highest sound levels.

5.2. Specifications regarding sound levels

5.2.1. Conditions of measurement

5.2.1.1. The noise test of the silencing system and the replacement silencing system has to be executed with the same normal tyres, as defined in paragraph 2 of UNECE Regulation No 117. At the request of the manufacturer, the tests shall not be done with traction tyres, special use tyres or snow tyres, as defined in paragraph 2 of UNECE Regulation No 117. Such tyres could increase the sound level of the vehicle or would have a masking effect on the noise reduction performance comparison. The tyres may be of used condition but shall satisfy legal requirements for in-traffic use.

5.2.2. The noise reduction performance of the replacement silencing system, or components thereof, shall be verified by means of the methods described in point 1 of Annex II. In particular, for the application of this point, reference shall be made to the amendment level of this Regulation which was in force at the time of type-approval of the new vehicle.

(a) Measurement with running vehicle

When the replacement silencing system, or components thereof, is mounted on the vehicle described in point 1.3.3, the sound levels obtained shall satisfy one of the following conditions:

- (i) the value measured (rounded to the nearest integer) shall not exceed by more than 1 dB(A) the type-approval value obtained under this Regulation with the type of vehicle concerned;
- (ii) the value measured (before any rounding to the nearest integer) shall not exceed by more than 1 dB(A) the noise value measured (before any rounding to the nearest integer) on the vehicle described in point 1.3.3., when this is fitted with a silencing system corresponding to the type fitted to the vehicle when submitted for type-approval under this Regulation.

Where back-to-back comparison of the replacement silencing system with the original system is chosen, for the application of point 4.1.2.1.4.2 and/or point 4.1.2.2.1.2 of Annex II, it is allowed to have a gear change to higher accelerations and the use of electronic or mechanical devices to prevent this downshift is not mandatory. If under these conditions the sound level of the test vehicle becomes higher than the COP values, the technical service will decide on the representativeness of the test vehicle.

(b) Measurement with stationary vehicle

When the replacement silencing system, or components thereof, is mounted on the vehicle described in point 1.3.3, the sound levels obtained shall satisfy one of the following conditions:

- (i) the value measured (rounded to the nearest integer) shall not exceed by more than 2 dB(A) the type-approval value obtained under this Regulation with the type of vehicle concerned;
- (ii) the value measured (before any rounding to the nearest integer) shall not exceed by more than 2 dB(A) the noise value measured (before any rounding to the nearest integer) on the vehicle described in point 1.3.3, when this is fitted with a silencing system corresponding to the type fitted to the vehicle when submitted for type-approval under this Regulation.

5.2.3. Further to the requirements of Annex II, any replacement silencing system, or components thereof, has to fulfil the applicable specifications of Annex VII. For replacement silencing systems intended for vehicles type approved in accordance with Directive 70/157/EEC the requirements of Annex VII as well as the specifications of points 5.2.3.1 to 5.2.3.3 of this Annex do not apply.

5.2.3.1. Where the replacement silencing system, or components thereof, is a system or components with variable geometry, in the application for type-approval the manufacturer shall provide a statement in conformity with the Appendix to Annex VII that the silencing system type to be approved complies with the requirements of point 5.2.3 of this Annex. The approval authority may require any relevant test to verify the compliance of the silencing system type to the additional sound emission provisions.

5.2.3.2. Where the replacement silencing system, or components thereof, is not a system with variable geometry, it is sufficient in the application for type-approval that the manufacturer provides a statement in conformity with the Appendix to Annex VII that

the silencing system type to be approved complies with the requirements of point 5.2.3 of this Annex.

5.2.3.3. The compliance statement shall read as follows: ‘(Name of the manufacturer) attests that the silencing system of this type complies with the requirements of point 5.2.3 of Annex IX to Regulation (EU) No 540/2014. (Name of the manufacturer) makes this statement in good faith, after having performed an appropriate engineering evaluation of the sound emission performance over the applicable range of operating conditions.’

5.3. Measurement of the vehicle performances

5.3.1. The replacement silencing system, or components thereof, shall be such as to ensure that vehicle performance is comparable with that achieved with the original equipment silencing system or components thereof.

5.3.2. The replacement silencing system or, depending on the manufacturer's choice, the components of that system shall be compared with an original silencing system, or components thereof, which are also in new condition, successively mounted on the vehicle mentioned in point 1.3.3.

5.3.3. The verification shall be carried out by measuring the back pressure pursuant to point 5.3.4.

The value measured with the replacement silencing system shall not exceed the value measured with the original silencing system by more than 25 % under the conditions mentioned below.

5.3.4. Test method

5.3.4.1. Test method with engine

The measurements shall be conducted on the engine referred to in point 1.3.4 coupled to a dynamometer. With the throttle completely open, the bench shall be adjusted so as to obtain the engine speed (S) corresponding to the rated maximum power of the engine.

For the measurement of back pressure, the distance at which the pressure tap shall be placed from the exhaust manifold is indicated in Appendix 5.

5.3.4.2. Test method with vehicle

The measurements shall be carried out on the vehicle referred to point 1.3.3. The test shall be conducted either on the road or on a roller dynamometer.

With the throttle completely open, the engine shall be loaded so as to obtain the engine speed corresponding to the rated maximum power of the engine (engine speed S).

For the measurement of back pressure, the distance at which the pressure tap shall be placed from the exhaust manifold is indicated in Appendix 5.

5.4. Additional specifications regarding replacement silencing systems, or components thereof, containing acoustically absorbing fibrous materials

5.4.1. General

Sound absorbing fibrous materials may only be used in silencing systems, or components thereof, where any of the following conditions are fulfilled:

(a) the exhaust gas is not in contact with the fibrous materials;

- (b) the silencing system, or the components thereof, are of the same design family as systems, or components thereof, for which it has been proven, in the course of the type-approval process in accordance with the requirements of this Regulation, that they are not subject to deterioration.

Unless one of those conditions is fulfilled, the complete silencing system, or components thereof, shall be submitted to conventional conditioning using one of the three installations and procedures described below.

For the purposes of point (b) of the first subparagraph, a group of silencing system or silencing system components thereof shall be considered as being of the same design family when all of the following characteristics are the same:

- (a) the presence of net gas flow of the exhaust gases through the absorbing fibrous material when in contact with that material;
- (b) the type of the fibres;
- (c) where applicable, binder material specifications;
- (d) average fibre dimensions;
- (e) minimum bulk material packing density in kg/m^3 ;
- (f) maximum contact surface between the gas flow and the absorbing material;

5.4.1.1. Continuous road operation for 10 000 km

5.4.1.1.1. 50 ± 20 % of this operation shall consist of urban driving and the remaining operation shall be long-distance runs at high speed; continuous road operation may be replaced by a corresponding test-track programme.

The two speed regimes shall be alternated at least twice.

The complete test program shall include a minimum of 10 breaks of at least three-hour duration in order to reproduce the effects of cooling and any condensation which may occur.

5.4.1.2. Conditioning on a test bench

5.4.1.2.1. Using standard parts and observing the manufacturer's instructions, the silencing system, or components thereof, shall be fitted to the vehicle referred to in point 1.3.3 or the engine referred to in point 1.3.4. In the first case the vehicle shall be mounted on a roller dynamometer. In the second case, the engine shall be coupled to a dynamometer.

5.4.1.2.2. The test shall be conducted in six six-hour periods with a break of at least 12 hours between each period in order to reproduce the effects of cooling and any condensation which may occur.

5.4.1.2.3. During each six-hour period, the engine shall be run under the following conditions in turn:

- (a) five minutes at idling speed;
- (b) one-hour sequence under 1/4 load at 3/4 of rated maximum speed (S);
- (c) one-hour sequence under 1/2 load at 3/4 of rated maximum speed (S);
- (d) 10-minute sequence under full load at 3/4 of rated maximum speed (S);
- (e) 15-minute sequence under 1/2 load at rated maximum speed (S);

(f) 30-minute sequence under 1/4 load at rated maximum speed (S).

Each period shall comprise two sequenced sets of those conditions in consecutive order from (a) to (f).

5.4.1.2.4. During the test, the silencing system, or components thereof, shall not be cooled by a forced draught simulation normal airflow around the vehicle.

Nevertheless, at the request of the manufacturer, the silencing system, or components thereof, may be cooled in order not to exceed the temperature recorded at its inlet when the vehicle is running at maximum speed.

5.4.1.3. Conditioning by pulsation

5.4.1.3.1. The silencing system, or components thereof, shall be fitted to the vehicle referred to in point 1.3.3 or to the engine referred to in point 1.3.4. In the first case, the vehicle shall be mounted on a roller dynamometer, and, in the second case, the engine shall be mounted on a dynamometer.

5.4.1.3.2. The test apparatus, a detailed diagram of which is shown in Figure 1 of the Appendix to Annex IV shall be fitted at the outlet of the silencing system. Any other apparatus providing equivalent results is acceptable.

5.4.1.3.3. The test apparatus shall be adjusted in such a way that the exhaust gas flow is alternately interrupted and re-established by the quick action valve for 2 500 cycles.

5.4.1.3.4. The valve shall open when the exhaust gas back pressure, measured at least 100 mm downstream of the intake flange, reaches a value of between 35 and 40 kPa. It shall close when this pressure does not differ by more than 10 % from its stabilized value with the valve opened.

5.4.1.3.5. The time-delay switch shall be set for the duration of gas exhaust resulting from the provisions laid down in point 5.4.1.3.4.

5.4.1.3.6. Engine speed shall be 75 % of the speed (S) at which the engine develops maximum power.

5.4.1.3.7. The power indicated by the dynamometer shall be 50 % of the full-throttle power measured at 75 % of engine speed (S).

5.4.1.3.8. Any drain holes shall be closed off during the test.

5.4.1.3.9. The entire test shall be completed within 48 hours. If necessary, one cooling period will be observed after each hour.

5.4.1.3.10 After conditioning, the sound level is checked pursuant to point 5.2.

6. EXTENSION OF EU TYPE-APPROVAL

The silencing system manufacturer or his representative may ask the administrative department which has granted the EU type-approval of the silencing system for one or several types of vehicles, for an extension of the approval to other types of vehicles.

The procedure is that set out in point 1. Notice of the extension of the EU type-approval (or refusal of extension) shall be communicated to the Member States in accordance with the procedure specified in Directive 2007/46/EC.

7. MODIFICATION OF THE TYPE OF SILENCING SYSTEM

In the case of modifications of the type approved pursuant to this Regulation, Articles 13 to 16 and Article 17(4) of Directive 2007/46/EC shall apply.

8. COP

8.1. Measures to ensure the conformity of production shall be taken in accordance with the requirements laid down in Article 12 of Directive 2007/46/EC.

8.2. Special provisions:

8.2.1. The tests referred to point 2.3.5 of Annex X to Directive 2007/46/EC are those prescribed in Annex XI to this Regulation.

8.2.2. The frequency of inspections referred to in point 3 of Annex X to Directive 2007/46/EC is normally once every two years.

9. INFORMATION INTENDED FOR USERS AND TECHNICAL INSPECTION

9.1. Each replacement silencing system shall be accompanied by a paper document issued by the manufacturer of the replacement silencing system or his representative. That paper document shall at least bear the following information:

(a) EU type-approval number of the replacement silencing system (the 5th section indicating the number of the extension of the type-approval can be omitted);

(b) EU type-approval mark;

(c) make (trade name of manufacturer);

(d) type and commercial description and/or part number;

(e) company name and address of manufacturer;

(f) name and address of the manufacturer's representative (if any);

(g) data of the vehicles for which the replacement silencing system is intended:

(i) make,

(ii) type,

(iii) type-approval number,

(iv) engine code,

(v) maximum engine power

(vi) kind of transmission

(vii) any restriction concerning the vehicles where the system can be mounted

(viii) sound level for the vehicle in motion in dB(A) and stationary sound level in dB(A) at min^{-1} (if deviating to the values of the vehicle type-approval);

(h) mounting instructions.

9.2. If the paper document referred to in point 9.1 consists of more than of sheet of paper all sheets shall bear at least a reference to the EU type-approval number.

9.3. The information concerning point 9.1(g) and (h) may be provided on the website of the manufacturer if the website address is indicated on the paper document.

Appendix 1

Information document No ... relating to EU type-approval as separate technical unit of replacement silencing systems for motor vehicles (Regulation (EU) No 540/2014)

The following information, if applicable, shall be supplied in triplicate and include a list of contents. Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance shall be supplied.

0. General
 - 0.1. Make (trade name of manufacturer):
 - 0.2. Type and general commercial description(s):
 - 0.3. Means of identification of type, if marked on the separate technical unit⁽¹⁾:
 - 0.3.1. Location of that marking:
 - 0.5. Company name and address of manufacturer:
 - 0.7. In the case of components and separate technical units, location and method of affixing of the EU type-approval mark:
 - 0.8. Address(es) of assembly plant(s):
 - 0.9. Name and address of the manufacturer's representative (if any):
1. Description of the vehicle for which the device is intended (if the device is intended to be fitted to more than one vehicle type, the information requested under this point shall be supplied for each type concerned)
 - 1.1. Make (trade name of manufacturer):
 - 1.2. Type and general commercial description(s):
 - 1.3. Means of identification of type, if marked on the vehicle:
 - 1.4. Category of vehicle:
 - 1.5. EU whole-vehicle type-approval number:
 - 1.6. Power plant:
 - 1.6.1. Manufacturer of the engine:
 - 1.6.2. Manufacturer's engine code:
 - 1.6.3. Maximum net power (g): ... kW at ... min⁻¹ or maximum continuous rated power (electric motor): ... kW
 - 1.6.4. Pressure charger(s): original part or make and marking⁽²⁾:
 - 1.6.5. Air filter: original part or make and marking⁽²⁾:
 - 1.6.6. Intake silencer(s): original part or make and marking⁽²⁾:

- 1.6.7. Exhaust silencer(s): original part or make and marking⁽²⁾:
- 1.6.8. Catalyst: original part or make and marking⁽²⁾:
- 1.6.9. Particulate Trap(s): original part or make and marking⁽²⁾:
- 1.7. Transmission
 - 1.7.1. Type (mechanical, hydraulic, electric, etc.):
- 1.8. Non-engine devices designed to reduce noise: original part or description⁽²⁾:
- 1.9. Sound-level values:
moving vehicle: ... dB(A), speed stabilised before acceleration at ... km/h;
stationary vehicle dB(A), at ... min⁻¹
- 1.10. Value of the back pressure: ... Pa
- 1.11. Any restrictions in respect of use and mounting requirements:
2. Remarks:
3. Description of the device
 - 3.1. A description of the replacement silencing system indicating the relative position of each system component, together with mounting instructions
 - 3.2. Detailed drawings of each component, so that they can be easily located and identified, and reference to the materials used. These drawings shall indicate the place provided for the compulsory affixing of the EU type-approval mark

Date:

Signed:

Position in company:

Appendix 2

MODEL EU type-approval certificate
(Maximum Format: A4 (210 × 297 mm))

Stamp of approval authority

Communication concerning the

- type-approval⁽³⁾
- extension of type-approval⁽³⁾
- refusal of type-approval⁽³⁾
- withdrawal of type-approval⁽³⁾

of a type of a separate technical unit of silencing systems with regard to Regulation (EU) No 540/2014

Type-approval number:

Reason for extension:

SECTION I.

- 1 Make (trade name of manufacturer):
- 0.2. Type and general commercial description(s):
- 0.3. Means of identification of type if marked on the separate technical unit⁽⁴⁾:
 - 0.3.1. Location of that marking:
- 0.4. Category of vehicle⁽⁵⁾:
- 0.5. Company name and address of manufacturer:
- 0.7. In the case of components and separate technical units, location and method of affixing of the EU type-approval mark:
- 0.8. Address(es) of assembly plant(s):
- 0.9. Name and address of the manufacturer's representative (if any):

SECTION II.

- II Additional information (where applicable): See Addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): See Addendum
6. Place:
7. Date:
8. Signature:

9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

Attachments:	Information package
	Test report

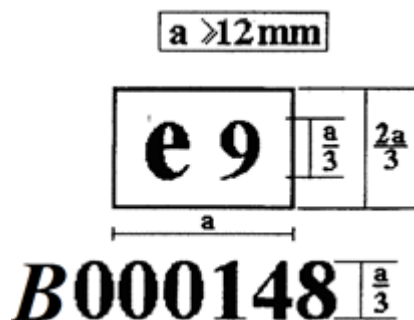
Addendum

to EU type-approval certificate No ...

1. Additional information
 - 1.1. Description of the vehicle for which the device is intended (if the device is intended to be fitted to more than one vehicle type, the information requested under this point shall be supplied for each type concerned)
 - 1.1.1. Make (trade name of manufacturer):
 - 1.1.2. Type and general commercial description(s):
 - 1.1.3. Means of identification of type, if marked on the vehicle:
 - 1.1.4. Category of vehicle:
 - 1.1.5. EU whole vehicle type-approval number:
 - 1.2. Power plant:
 - 1.2.1. Manufacturer of the engine:
 - 1.2.2. Manufacturer's engine code:
 - 1.2.3. Maximum net power (g): ... kW at ... min⁻¹ or maximum continuous rated power (electric motor) ... kW
2. Test results
 - 2.1. Sound level of moving vehicle: ... dB(A)
 - 2.2. Sound level of stationary vehicle: ... dB(A) at ... min⁻¹
 - 2.3. Value of the back pressure: ... Pa
3. Remarks:

Appendix 3

Model for the EU type-approval mark

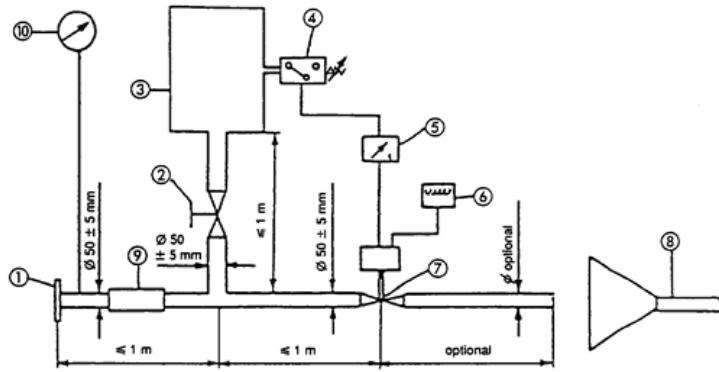


The silencing system, or components thereof, bearing the above EU type-approval mark is a device which has been approved in Spain (e 9) pursuant to Regulation (EU) No 540/2014 under the base approval number 0148, complying with the limit values of Phase 2 in Annex III to that Regulation.

The figures used are only indicative.

Appendix 4

Test apparatus



Appendix 5

Measuring points — back pressure

Examples of possible measuring points for loss-of-pressure tests. The exact measuring point shall be specified in the test report. It shall be in an area where gas flow is regular.

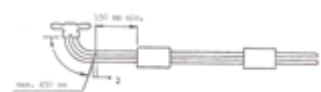
1. Figure 1
Single pipe



2. Figure 2
Partly twin pipe 1



3. Figure 3
Twin pipe



Status: This is the original version (as it was originally adopted).

- (1) If the means of identification of type contains characters not relevant to describe the vehicle types covered by the type-approval certificate such characters shall be represented in the documentation by the symbol: '?' (e.g. ABC??123??).
- (2) Delete where not applicable.
- (3) Delete where not applicable.
- (4) If the means of identification of type contains characters not relevant to describe the vehicle types covered by the type-approval certificate such characters shall be represented in the documentation by the symbol: '?' (e.g. ABC??123??).
- (5) As defined in Annex IIA to Directive 2007/46/EC.