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Regulation No. 59 (Replacement silencing systems)

Proposal for the 02 series of amendments to Regulation No. 59

Submitted by the Informal Working Group on UN Regulations Nos. 51 and 59¹

The text reproduced below was prepared by the GRB Informal Working Group (IWG) on UN Regulations Nos. 51 and 59, to update and revise Regulation No. 59. It is based on document E/ECE/324/Rev.1/Add.58/Rev.1. The modifications to the current text of the UN Regulation are marked in bold for new or strikethrough for deleted characters.

¹ In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Regulation No.59, amend to read:

"Uniform provisions concerning the approval of replacement silencing systems

Contents

	<i>Page</i>
1. Scope	3
2. Definitions	3
3. Application for approval	5
4. Markings	6
5. Approval	6
6. Specifications	7
7. Extension of approval	12
8. Modification of the type of silencing system	13
9. Conformity of production	13
10. Information intended for users and technical inspection	14
101. Penalties for non-conformity of production	14
112. Production definitively discontinued	14
123. Names and addresses of Technical Services responsible for conducting approval tests, and of Type Approval Authorities.....	15
 Annexes	
1 Communication	16
2 Arrangements of approval mark.....	20
3 Test apparatus.....	21
4 Measuring points - Back pressure	22
5 Checks on conformity of production	23
6 Information intended for users and technical inspection	24

1. Scope

This Regulation covers replacement silencing systems for vehicles of categories M₁ and N₁.¹

2. Definitions

For the purpose of this Regulation:

- 2.1. "*Silencing systems*" means a complete set of components necessary for limiting the **noise sound** produced by ~~the an engine of a motor vehicle, its intake and its~~ exhaust (**the exhaust manifold(s), the catalyst(s) and emission after-treatment device(s) are not considered part of the sound reduction system; these parts belong to the engine**);
- 2.2. ~~"Silencing system component" means one of the separate components which together form the silencing system (e.g. silencer proper, expansion chamber, resonator);~~
- "Exhaust silencing system" means a complete set of components necessary for limiting the sound produced by the engine of a motor vehicle and its exhaust of a motor engine;
- 2.3. "Exhaust silencing system or exhaust silencing system component with variable geometry" means an exhaust silencing system or exhaust silencing system component containing one or more moving parts or devices which, by changing the exhaust silencing system or exhaust silencing system component geometry, may change its sound reduction performance (e.g. moving parts or devices changing the noise reduction performances by opening or closing one or more valves in the exhaust gas flow as a function of varying driving or engine conditions (rpm, load, speed, etc.);"
- 2.4. "Exhaust silencing system component" means one of the separate components which together form the exhaust silencing system (e.g. silencer proper, expansion chamber, resonator);
- 2.35. "*Exhaust silencing system of different types*" means **exhaust silencing systems which differ significantly in such respects as which significantly differ in respect of at least one of the following:**
- 2.35.1. ~~That their exhaust silencing components bear different trade names or marks;~~ trade names or trademarks of their components;
- 2.35.2. ~~That the characteristics of the materials constituting an exhaust silencing component are different or that the exhaust silencing components differ in shape or size, a modification regarding the coating (galvanization, aluminium coating, etc.) is not deemed changing the type;~~ the characteristics of the materials constituting their components, except for the coating of those components;

¹ As ~~defined~~ **indicated** in the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev.2, ~~para.2.3~~

- 2.5.3. the shape or size of their components;
- 2.35.4. ~~That the operating principles of at least one exhaust silencing component are different;~~ the operating principles of at least one of their components;
- 2.35.5. ~~That their exhaust silencing components are assembled differently;~~ the assembly of their components;
- 2.35.6. ~~That the number of exhaust silencing systems or exhaust silencing components is different.~~ the number of exhaust silencing systems or components;
- 2.46. "~~Exhaust r~~Replacement silencing system or components of said system" means any part of the **exhaust** silencing system defined in paragraph 2.42. above intended for use on a vehicle, other than a part of the type fitted to this vehicle when submitted for type approval pursuant to this Regulation;
- 2.57. "*Design family of exhaust replacement silencing systems or replacement systems components*" means **exhaust** silencing systems or components thereof belonging to the same design family if all of the **following** characteristics **according 6.4.1.** are the same;
- (a) ~~The exhaust gases in contact with the absorbing fibrous material do not have gas flow through this material: (yes or no);~~
 - (b) ~~The type of the fibres (e.g. basalt wool, biosil wool, glass wool, E-type wool, etc.);~~
 - (c) ~~Binder material specifications (if applicable);~~
 - (d) ~~Average fibre dimensions (thickness, length);~~
 - (e) ~~Minimum bulk material packing density (kg/m³);~~
 - (f) ~~Maximum contact surface between the gas flow and the absorbing material (e.g. perforation open area).~~
- 2.68. "*Approval of an exhaust replacement silencing system or components of said exhaust system*" means the approval of the whole or part of an **exhaust** silencing system adaptable to one or several specified types of motor vehicles, as regards the limitation of their noise level;
- ~~2.7. "*Vehicle type*" means a category of motor vehicles which do not differ significantly in such respects as:~~
- ~~2.7.1. The lines and constituent materials of the body (more particularly the engine compartment and its soundproofing);~~
 - ~~2.7.2. The length and width of the vehicle;~~
 - ~~2.7.3. The type of engine (positive ignition, compression ignition, two stroke or four stroke, reciprocating or rotary, hybrid electric engine type), number and capacity of cylinders, number of carburettors or injection system, arrangement of valves, rated maximum power and corresponding engine speed (rpm) or the type of the electric motor;~~
 - ~~2.7.4. Number and ratios of gears, total ratio of the transmission;~~
 - ~~2.7.5. The number, type and arrangement of the exhaust systems;~~
 - ~~2.7.6. The number, type and arrangement of the intake systems.~~

- 2.9. "Vehicle type" means a category of motor vehicles which does not differ in such essential respects as:
- 2.9.1. The type of engine (positive or compression ignition, two- or four-stroke, reciprocating or rotary piston), number and capacity of cylinders, number and type of carburettors or injection system, arrangement of valves or the type of electric motor;
- 2.9.2. Rated maximum power and corresponding engine speed(s); however if the rated maximum power and the corresponding engine speed differs only due to different engine mappings, these vehicles may be regarded as from the same type;
- 2.9.3. The silencing system.

3. Application for approval

- 3.1. The application for approval of an **exhaust** replacement silencing system or components of said system shall be submitted by its manufacturer or by his duly accredited representative.
- 3.2. It shall be accompanied by the under mentioned documents in triplicate and the following particulars:
- 3.2.1. A description of the vehicle type(s) on which the **exhaust** system or components is intended to be mounted, with regard to the items mentioned in paragraph 2.7. above. The numbers and/or symbols identifying the engine type and the vehicle type shall be specified and the vehicle type approval number, if necessary;
- 3.2.2. A description of the assembled **exhaust** silencing system showing the relative position of each of its components, as well as mounting instructions;
- 3.2.3. Detailed drawings of each **exhaust silencing** component to enable it to be easily located and identified, and a specification of the material used.
- 3.3. On request of the Technical Service conducting the tests for approval, the manufacturer of the **exhaust** silencing system shall submit:
- 3.3.1. A sample of the **exhaust silencing** system or **exhaust silencing** components submitted for approval;
- 3.3.2. A sample of the original **exhaust** silencing system with which the vehicle was equipped when submitted for type approval;
- 3.3.3. A vehicle representative of the type to which the system is to be fitted; to be acceptable this vehicle shall satisfy the requirements of paragraph 8.1 of Regulation No. 51 (Conformity of Production). For the application of paragraph 8.1., the reference to paragraph 6. is limited to paragraphs 6.1. and 6.2.
- 3.3.4. ~~When applicable, a~~ separate engine and components of at least the same cylinder capacity and power as that of the above-mentioned vehicle-, **when applicable**. The engine will be equipped with the necessary means to run the tests specified under paragraph 6.3.4.1. and/or paragraph 6.4.3.
- 3.3.5. **A type-approval number 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 as given in 6.2.2. of the 03 series of amendments of UN Regulation No. 51, 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 as given in 6.2.2. of the 03 series of amendments of UN Regulation No. 51, 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 as given in 6.2.2. of the 03 series of amendments of UN Regulation No. 51, the type-approval number shall be followed by the character "C". The same Contracting Party shall not assign the same number to another type of replacement silencing system, or components thereof.

4. Markings

- 4.1. Each component of the **exhaust** replacement silencing system, excluding tubes and mounting accessories, shall bear:
 - 4.1.1. The trade name or mark of the manufacturer of the system or its components,
 - 4.1.2. The commercial description given by the manufacturer.
- 4.2. **The marking shall also include the character "A" if the replacement silencing system is intended to be fitted on vehicle types complying with the limit values of Phase 1 as given in 6.2.2. of the 03 series of amendments of UN Regulation No. 51, 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 as given in 6.2.2. of the 03 series of amendments of UN Regulation No. 51, 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 as given in 6.2.2. of the 03 series of amendments of UN Regulation No. 51. See Annex 2 for an example of the arrangement of approval mark.**
- 4.3. Such markings shall be clearly legible and indelible.

5. Approval

- 5.1. If the type of **exhaust** replacement silencing system submitted for approval pursuant to this UN Regulation meets the requirement of paragraph 6. below, approval for that type shall be granted.
- 5.2. An approval number shall be assigned to each type approved. Its first two digits (at present **0102** corresponding to the **0102** series of amendments to the UN Regulation) shall indicate the series of amendments incorporating the most recent major technical amendments made to the UN Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of replacement silencing system or component designed for the same type(s) of vehicle.
- 5.3. Notice of approval or of refusal of approval of an **exhaust** replacement silencing system or components of said system pursuant to this UN

Regulation shall be communicated to the Parties to the Agreement which apply this UN Regulation, by means of a form conforming to the model in Annex 1 to the UN Regulation, and of drawings of the **exhaust** silencing system or components supplied by the applicant for approval, in a format not exceeding A4 (210 x 279 mm) or folded to that format and on an appropriate scale.

- 5.4. There shall be affixed to every component of **exhaust** silencing system conforming to a type approved under this UN Regulation an international approval mark consisting of:
 - 5.4.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which had granted approval²;
 - 5.4.2. The number of this UN Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 5.4.1.;
 - 5.4.3. The approval number shall be mentioned in the approval form, as well as the method used for approval tests.
- 5.5. The approval mark shall be easily legible and indelible, when the **exhaust** silencing system is mounted on the vehicle.
- 5.6. A component may be marked with more than one approval number if it has been approved as a part of more than one **exhaust** replacement silencing system; in this case the circle need not be repeated. Annex 2 to this UN Regulation gives an example of the arrangement of the approval mark.

6. Specifications

- 6.1. General specifications
 - 6.1.1. The **exhaust** replacement ~~exhaust-silencing~~ system or components thereof shall be designed, constructed and capable of being mounted so as to ensure that the vehicle complies with the provisions of this UN Regulation under normal conditions of use, notwithstanding any vibrations to which it may be subject.
 - 6.1.2. The **exhaust** silencing system or **exhaust silencing** 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, **including regional climate differences.**
 - 6.1.3. Additional prescriptions related to tamperability and manually adjustable multi-mode ~~exhaust or exhaust~~ silencing systems
 - 6.1.3.1. 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 **exhaust** silencing/expansion chambers. Where incorporation of such a part is unavoidable, its method of attachment shall be

² The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev.3 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

such that removal is not facilitated easily (e.g. with conventional threaded fixings) and ~~should~~ **shall** also be attached such that removal causes permanent/irrecoverable damage to the assembly.

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

6.2. Specifications regarding **noise sound** levels

6.2.1. Conditions of measurement

6.2.1.1. The **noise sound** test of the **exhaust** silencing system and the **exhaust** replacement silencing system have to be executed with the same "normal" tyres ~~as defined in paragraph 2.8. of UN Regulation No. 117~~. The tests are not allowed to be done with "special use" tyres or "snow" tyres as defined in paragraphs ~~2.9. and 2.10.~~ of UN Regulation No. 117. Such tyres could increase the **noise sound** level of the vehicle or would have a masking effect on the **noise sound** reduction performance comparison. The tyres may be of used condition but shall satisfy legal requirements for in-traffic use.

6.2.2. The **noise sound** reduction performance of the **exhaust** replacement silencing system or components of said system shall be verified by means of the methods described in paragraphs 6.2.1., 6.2.2. and 6.2.3. of UN Regulation No. 51. In particular, for the application of this ~~paragraph~~**point**, reference shall be made to the amendment level of UN Regulation No. 51 which was in force at the time of type approval of the new vehicle.

(a) Measurement with running vehicle

When the **exhaust** replacement silencing system or components thereof is mounted on the vehicle described in paragraph 3.3.3. above, the **noise 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 UN Regulation No. 51 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 sound** value measured (before any rounding to the nearest integer) on the vehicle referred to in paragraph 3.3.3. above, when this is fitted with an **exhaust** silencing system corresponding to the type fitted to the vehicle when submitted for type approval under UN Regulation No. 51.

Where back-to-back comparison of the **exhaust** replacement system with the original system is chosen, for the application of paragraph 3.1.2.1.4.2. and/or paragraph 3.1.2.2.1.2. of Annex 3 of UN Regulation No. 51, 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 noise level of the test vehicle becomes higher than the conformity of production (COP)

values, the Technical Service will decide on the representativeness of the test vehicle.

(b) Measurement with stationary vehicle

When the **exhaust** replacement silencing system or components thereof is mounted on the vehicle described in paragraph 3.3.3. above, the **noise 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 UN Regulation No. 51 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 referred to in paragraph 3.3.3. above, when this is fitted with a silencing system corresponding to the type fitted to the vehicle when submitted for type approval under UN Regulation No. 51.

6.2.3. Further to the requirements of Annex 3 of the UN Regulation No. 51, any exhaust replacement silencing system, or components thereof, shall fulfil the applicable specifications of Annex 7 of the UN Regulation No. 51. For exhaust replacement silencing systems intended for vehicles type approved under the former series of the UN Regulation No. 51 the requirements of Annex 7 of the UN Regulation No. 51 as well as the specifications of points 5.2.3.1. to 5.2.3.3. of this Annex do not apply.

6.2.3.1. Where the exhaust 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 Appendix 1 to Annex 7 of the UN Regulation No. 51 that the exhaust silencing system type to be approved complies with the requirements of point 6.2.3. of this UN Regulation. The approval authority may require any relevant test to verify the compliance of the exhaust silencing system type to the additional sound emission provisions.

6.2.3.2. Where the exhaust 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 Appendix 1 of Annex 7 of the UN Regulation No. 51 that the exhaust silencing system type to be approved complies with the requirements of point 6.2.3. of this UN Regulation.

6.3. Measurement of the vehicle performances

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

6.3.2. The **exhaust** replacement silencing system or, depending on the manufacturer's choice, the components of said system shall be compared with an original **equipment exhaust** silencing system or **exhaust silencing**

components, which are also in new condition, successively mounted on the vehicle mentioned in paragraph 3.3.3. above.

- 6.3.3. The verification shall be carried out by measuring the back pressure pursuant to paragraph 6.3.4. below.

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

- 6.3.4. Test method

- 6.3.4.1. Test method with engine

The measurements shall be conducted on the engine referred to in paragraph 3.3.4. above 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 Annex 4 to this UN Regulation.

- 6.3.4.2. Test method with vehicle

The measurements shall be carried out on the vehicle referred to in paragraph 3.3.3. above. 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 Annex 4 to this UN Regulation.

- 6.4. Additional specifications regarding replacement silencing systems or components containing acoustically absorbing fibrous materials

- 6.4.1. General

Sound absorbing fibrous materials may be used in **exhaust** silencing systems or components thereof only if:

- (a) The exhaust gas is not in contact with the fibrous materials; or if
- (b) The **exhaust** silencing system or the components thereof are of the same design family as systems or components for which it has been proven, in the course of the type approval process in accordance with the requirements of this UN Regulation, that they are not subject to deterioration.

Unless one of these conditions is fulfilled, the complete **exhaust** silencing system or component 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 paragraph, a family of exhaust silencing system or exhaust 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.

6.4.1.1. Continuous road operation for 10,000 km

6.4.1.1.1. 50 ± 20 percent 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 programme 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.

6.4.1.2. Conditioning on a test bench

6.4.1.2.1. Using standard parts and observing the vehicle manufacturer's instructions, the **exhaust** silencing system or components thereof shall be fitted to the vehicle referred to in paragraph 3.3.3. of this UN Regulation or the engine referred to in paragraph 3.3.4. of this UN Regulation. In the former case the vehicle shall be mounted on a roller dynamometer. In the second case, the engine shall be coupled to a dynamometer.

6.4.1.2.2. 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.

6.4.1.2.3. 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 the six above-mentioned conditions in consecutive order from (a) to (f).

6.4.1.2.4. During the test, the **exhaust** 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 **exhaust** 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.

- 6.4.1.3. Conditioning by pulsation
- 6.4.1.3.1. The **exhaust** silencing system or components thereof shall be fitted to the vehicle referred to in paragraph 3.3.3. of this UN Regulation or to the engine referred to in paragraph 3.3.4. of this UN Regulation. In the former case, the vehicle shall be mounted on a roller dynamometer, and, in the second case, the engine shall be mounted on a dynamometer.
- 6.4.1.3.2. The test apparatus, a detailed diagram of which is shown in Figure 3 of the Appendix to Annex 5 to UN Regulation No. 51 shall be fitted at the outlet of the **exhaust** silencing system. Any other apparatus providing equivalent results is acceptable.
- 6.4.1.3.3. 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.
- 6.4.1.3.4. 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 percent from its stabilized value with the valve opened.
- 6.4.1.3.5. The time-delay switch shall be set for the duration of gas exhaust resulting from the provisions laid down in paragraph 6.4.1.3.4. above.
- 6.4.1.3.6. Engine speed shall be 75 percent of the speed (*S*) at which the engine develops maximum power.
- 6.4.1.3.7. The power indicated by the dynamometer shall be 50 percent of the full-throttle power measured at 75 percent of engine speed (*S*).
- 6.4.1.3.8. Any drain holes shall be closed off during the test.
- 6.4.1.3.9. The entire test shall be completed within 48 hours. If necessary, one cooling period will be observed after each hour.
- 6.4.1.3.10. After conditioning, the noise level is checked pursuant to paragraph 6.2. above.

7. Extension of approval

The **exhaust** silencing system manufacturer or his duly accredited representative may ask the Type Approval Authority which has granted the approval of the **exhaust** silencing system for one or several types of vehicles, for an extension of the approval to other types of vehicles.

The procedure is that described in paragraph 3. above. Notice of the extension of approval (or refusal of extension) shall be communicated to the Parties to the Agreement which apply this UN Regulation in accordance with the procedure specified in paragraph 5.3. above.

8. Modification of the type of exhaust silencing system

- 8.1. Every modification of the type of **exhaust** replacement silencing system shall be notified to the Type Approval Authority which approved the type of **exhaust** silencing system. The said Authority may then either:
 - 8.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect, or
 - 8.1.2. Require a further test report from the Technical Service responsible for conducting the tests.
- 8.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 5.3. above to the Parties to the Agreement applying this UN Regulation.

9. Conformity of production

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

- 9.1. Every **exhaust** replacement silencing system bearing an approval mark as prescribed under this UN Regulation shall conform to the type of **exhaust** silencing system approved and satisfy the requirements of paragraph 6. above. For conformity of production purposes, the limit values set forth in paragraph 6. above apply with an additional margin of 1 dB(A).
- 9.2. In order to verify conformity as prescribed in paragraph 9.1. above, adequate monitoring of the production shall be carried out.
- 9.3. The holder of the approval shall in particular:
 - 9.3.1. Ensure existence of procedures for the effective control of the quality of products;
 - 9.3.2. Have access to the control equipment necessary for checking the conformity of each approved type;
 - 9.3.3. Ensure that data of test results are recorded and that annexed documents shall remain available for a period to be determined in accordance with the Type Approval Authority;
 - 9.3.4. Analyze the results of each type of product in order to verify and ensure the stability of the product characteristics, making allowance for the variation of an industrial production;
 - 9.3.5. Ensure that for each type of product at least the tests prescribed in Annex 5, paragraph 2., are carried out;
 - 9.3.6. Ensure that sampling or test pieces giving evidence of non-conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.
- 9.4. The ~~competent authority~~ **Type Approval Authority** which has granted type approval may at any time verify the conformity control method applicable to each production unit.

- 9.4.1. At every inspection, the test books and production survey records shall be presented to the visiting inspector.
- 9.4.2. The inspector may take samples at random which will be tested in the manufacturer's laboratory. The minimum number of samples may be determined according to the results of the manufacturer's own verification.
- 9.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in application of paragraph 9.4.2. above, the inspector shall select samples to be sent to the Technical Service which has conducted type approval tests.
- 9.4.4. The ~~competent authority~~ **Type Approval Authority** may carry out any test prescribed in this Regulation.
- 9.4.5. The normal frequency of inspections by the Type Approval Authority shall be one every two years. If unsatisfactory results are recorded during one of these visits, the Type Approval Authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.

10. Information intended for users and technical inspection

- 10.1.** Each replacement silencing system shall be accompanied by a paper document issued by the manufacturer of the replacement silencing system or their representative. That paper document shall at least bear the information according to Annex 6.

101. Penalties for non-conformity of production

- 101.1.** The approval granted in respect of a type of **exhaust** silencing system pursuant to this UN Regulation may be withdrawn if the requirements laid down in paragraph 9. above are not complied with, or if the **exhaust** silencing system or components fail to pass the tests provided for in paragraph 9.2. above.
- 101.2.** If a Party to the Agreement which applies this UN Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this UN Regulation, by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "approval withdrawn".

112. Production definitively discontinued

If the holder of the approval completely ceases to manufacture a type of **exhaust** replacement silencing system or components of the said system in accordance with this UN Regulation, he shall so inform the Type Approval Authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement applying this UN Regulation, by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation: "production discontinued".

123. Names and addresses of Technical Services responsible for conducting approval tests, and of Type Approval Authorities

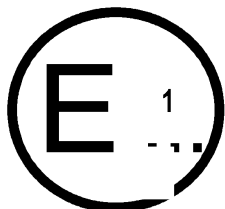
The Parties to the 1958 Agreement applying this UN Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

Annex 1

Communication

(Maximum format: A4 (210 x 297 mm))

issued by: Name of administration:



- concerning²:
- Approval granted
 - Approval extended
 - Approval refused
 - Approval withdrawn
 - Production definitively discontinued

of a type of **exhaust** replacement silencing system or components of the said system pursuant to UN Regulation No. 59

Approval No. Extension No.

1. Trade name or mark of the **exhaust** silencing system:
2. Type of the **exhaust** silencing system:
3. Manufacturer's name and address:
4. If applicable, name and address of manufacturer's representative:
5. Brief description of the **exhaust** silencing system (with/without² fibrous material, etc.):
6. Trade name or mark of the vehicle type for which the **exhaust** silencing system is intended:
7. Vehicle type, starting from serial number:
8. Kind of engine (e.g. positive-ignition, compression ignition, etc.):
9. Cycles: two-stroke/four-stroke²
10. Cylinder capacity:
11. Engine power (kW ~~ECE~~UN):
12. Number of gears:
13. Gears used:

¹ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

² Strike out what does not apply.

14. Final drive ratio(s):
15. Maximum power:
16. Load conditions of vehicle during test:
17. Sound levels:
 - 17.1. Vehicle in motion: db(A) ~~at steady speed before acceleration of km/h~~
 - 17.2. Vehicle stationary: db(A) with engine running at min⁻¹
18. Value of the back pressure:
19. **Exhaust** Silencing system submitted:
 - For approval on:
 - For extension of approval on:
20. Technical Service responsible for conducting approval tests:
21. Date of report issued by that service:
22. Number of report issued by that service:
23. Approval granted/refused²:
25. Place:.....
26. Date:.....
27. Signature:
28. The following documents, bearing the approval number shown above, are annexed to this communication:
 - Drawings, diagrams and plans of the **exhaust** silencing system;
 - Photographs of the **exhaust** silencing system;
 - List of components, duly identified constituting the **exhaust** silencing system.

Appendix 1

Information document No ... relating to UN type-approval of exhaust replacement silencing systems or exhaust silencing components for motor vehicles (UN Regulation No. 59)

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 exhaust silencing systems or exhaust silencing components 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 exhaust silencing systems or exhaust silencing components³:
 - 0.3.1. Location of that marking and method of affixing
 - 0.4. Company name and address of manufacturer:
 - 0.5. Address(es) of assembly plant(s):
 - 0.6. Name and address of the manufacturer's representative (if any):
1. Description of the vehicle(s) 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(s), if marked on the vehicle:
 - 1.4. Category of vehicle(s):
 - 1.5. Vehicle type approval number(s):
 - 1.6. Power plant(s):
 - 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

³ If the means of identification of type contains characters not relevant to describing the separate technical unit types covered by this information document, such characters shall be represented in the documentation by the symbol '?' (e.g. ABC??123??)

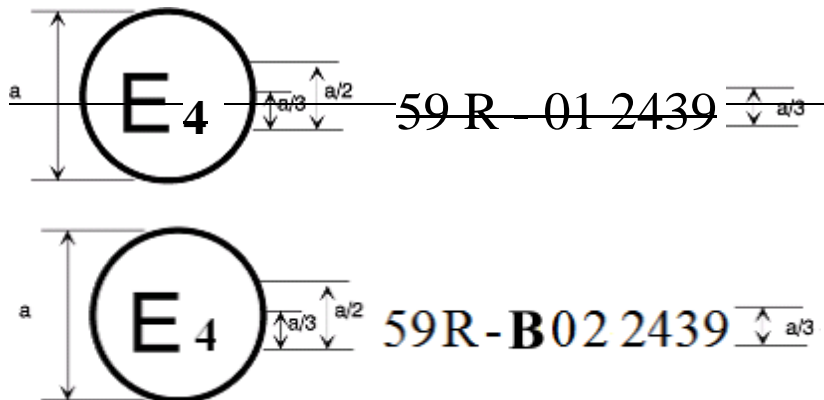
- 1.6.4. Pressure charger(s): original part or make and marking⁴:
- 1.6.5. Air filter: original part or make and marking⁴:
- 1.6.6. Intake silencer(s): original part or make and marking⁴:
- 1.6.7. Exhaust silencer(s): original part or make and marking⁴:
- 1.6.8. Catalyst: original part or make and marking⁴:
- 1.6.9. Particulate Trap(s): original part or make and marking⁴:
- 1.7. Transmission
- 1.7.1. Type (mechanical, hydraulic, electric, etc.):
- 1.8. Non-engine devices designed to reduce noise: original part or description⁴:
- 1.9. Sound-level values:
moving vehicle: dB(A),
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:

⁴ Delete where not applicable.

Annex 2

Arrangements of approval marks

(See paragraph 5.4. of this Regulation)



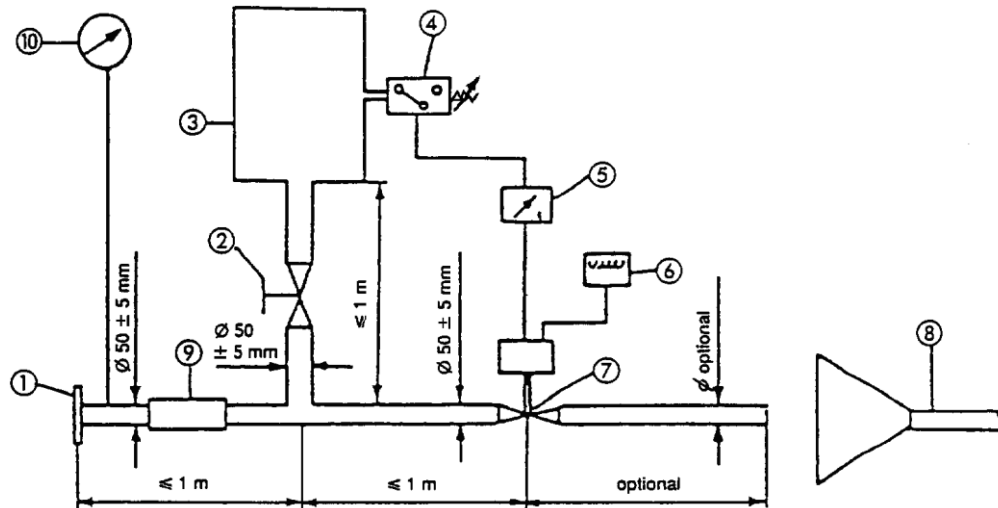
$a = 8 \text{ mm min}$

The above approval mark affixed to a component of **exhaust** silencing system shows that the **exhaust** replacement silencing system type concerned has been approved in the Netherlands (E4) pursuant to UN Regulation No. 59 under approval number ~~01~~22439.

The character **B** symbolizes that the approval was granted for the limit values according to phase 2 as given in 6.2.2. of the 03 series of amendments of the UN Regulation No. 51, followed by two ~~The first two~~ digits of the approval number that indicate that the approval was granted in accordance with the requirements of UN Regulation No. 59 as amended by the ~~01~~2 series of amendments.

Annex 3

Test apparatus



1. Inlet flange or sleeve – connection to the rear of complete **exhaust** silencing system to be tested.
2. Regulation valve (hand operated).
3. Compensating reservoir from 35 to 40 l.
4. Pressure switch 5 kPa to 250 kPa – to open item 7.
5. Time delay switch – to close item 7.
6. Counter of impulses.
7. Quick response valve – such as the valve of an exhaust brake system of 60 mm in diameter, operated by a pneumatic cylinder with an output of 120 N at 400 kPa. The response time, both when opening and closing, shall not exceed 0.5 s.
8. Exhaust gas evacuation.
9. Flexible pipe.
10. Pressure gauge.

Annex 4

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.

Figure 1
Single pipe

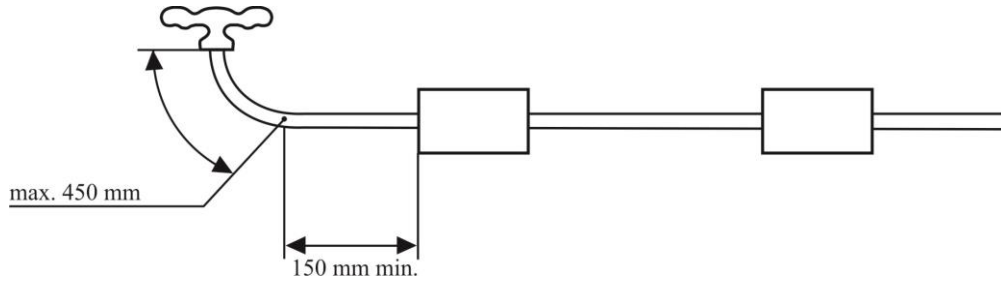


Figure 2
Partly twin pipe¹

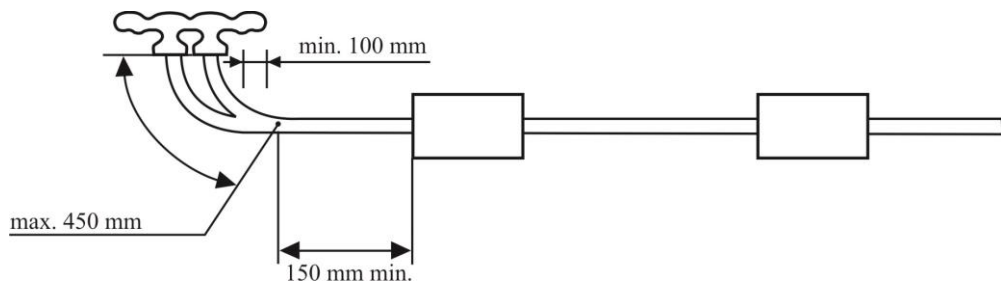
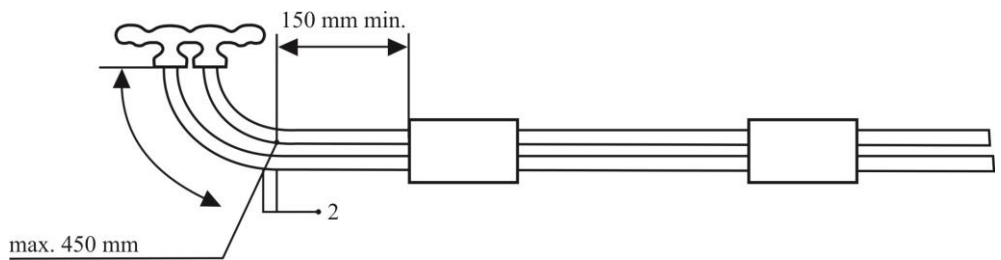


Figure 3
Twin pipe



¹ If not possible, refer to Figure 3.

² Two measuring points, one reading.

Annex 5

Checks on conformity of production

1. General

These requirements are consistent with tests to be held to check conformity of production (COP), according to paragraphs 9.3.5. and 9.4.3. of this UN Regulation.

2. Testing and procedures

The methods of testing, measuring instruments and interpretation of results shall be those described in paragraph 6. of this UN Regulation. The exhaust system or **exhaust silencing** component under test shall be subjected to the test as described in paragraphs 6.2., 6.3. and 6.4. of this UN Regulation.

3. Sampling and evaluation of the results

One **exhaust** silencing system or **exhaust silencing** component has to be chosen and subjected to the tests of paragraph 2. above. If the test results fulfil the conformity of production requirements of paragraph 9.1. of this UN Regulation, the type of **exhaust** silencing system or **exhaust silencing** component is considered to be in compliance with COP.

If one of the test results does not fulfil the conformity of production requirements of paragraph 9.1. of this UN Regulation, two more **exhaust** silencing systems or **exhaust silencing** components of the same type shall be tested pursuant to paragraph 2. above.

If the test results for the second and the third **exhaust** silencing system or component fulfil the conformity of production requirements of paragraph 9.1. of this UN Regulation, the type of **exhaust** silencing system or **exhaust silencing** component is considered in compliance with the conformity of production.

If one of the test results of the second or third **exhaust** silencing system or **exhaust silencing** component does not fulfil the conformity of production requirements of paragraph 9.1. of this UN Regulation, the type of **exhaust** silencing system or **exhaust silencing** component shall be considered not to conform to the requirements of this UN Regulation and the manufacturer shall take the necessary measures to re-establish the conformity.

Annex 6

Information intended for users and technical inspection

1. Each exhaust replacement silencing system shall be accompanied by a paper document issued by the manufacturer of the exhaust replacement silencing system or their representative. That paper document shall at least bear the following information:
 - (a) the type-approval number of the exhaust replacement silencing system (the 5th section indicating the number of the extension of the type-approval can be omitted);
 - (b) the 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 exhaust 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.
 2. If the paper document referred to in paragraph 1. consists of more than of one sheet of paper, all sheets shall bear at least a reference to the EU type-approval number.
 3. The information concerning paragraph 1(g) and 1(h) may be provided on the website of the manufacturer if website address is indicated on the paper document.
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