

## PROPOSAL FOR AMENDMENTS TO REGULATION N° 51

(UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLES HAVING AT LEAST FOUR WHEELS WITH REGARD TO THEIR SOUND EMISSIONS)

The proposal reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) in order to bring in line the requirements of Regulation No. 51 regarding the conditioning of silencing systems or silencing system components containing absorbing fibrous materials with those of Regulation No. 59, which have recently been subject to modification.

During the first presentation of the proposal at GRB-50 (ECE/TRANS/WP.29/GRB/2009/6), some Contracting Parties requested further improvement. This new proposal takes into account those comments and remarks. For the sake of clarity, changes to the wording presented in ECE/TRANS/WP.29/GRB/2009/6 are marked up.

### PROPOSAL

Amend the text [of ECE R 51](#) to read:

#### 2. DEFINITIONS

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#### "2.19. "Design family of silencing system or silencing system components"

For ~~silencing systems or silencing system components, containing acoustically absorbing fibrous material, different design families may be considered. Silencing systems or components thereof belong to the same design family if all the following characteristics are the same:~~

- (a) The exhaust gases in contact with the absorbing fibrous material have ~~net 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/m<sup>3</sup>);
- (f) Maximum contact surface between the gas flow and the absorbing material (e.g. perforation open area)."

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## EXHAUST SYSTEMS CONTAINING ACCOUSTICALLY ABSORBING FIBROUS MATERIALS

### 1. General

Sound absorbing fibrous materials may be used in silencing systems or components thereof only if the exhaust gas is not in contact with the fibrous materials or if the silencing system or components thereof are of the same design family as systems or components for which it has been proven, in the course of type approval process in accordance with the requirements of this regulation for another vehicle-type, that they are not subject to deterioration. Unless one of these conditions is fulfilled, the complete silencing system or components thereof shall be submitted to a conventional conditioning using one of three installations and procedures described below.

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Deleted: when it is established by appropriate means of design and manufacturing, that the efficiency of the system in traffic conditions is sufficient to comply with the existing regulations. Such a silencing system is deemed to be effective in traffic conditions if

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#### 1.1. Continuous road operation for 10,000 km

1.1.1. 50±20 % of this operation shall consist of town 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.

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1.1.2. The two speed regimes shall be alternated at least two times.

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

#### 1.2. Conditioning on a test bench

1.2.1. Using standard parts and observing the vehicle manufacturer's instructions, the silencing system or components thereof shall be fitted to the vehicle referred to in Paragraph 3.3. of this Regulation or the engine referred to in Paragraph 3.4. of this 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.

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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 any condensation which may occur.

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

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- (1) Five minutes at idling speed;
- (2) One-hour sequence under 1/4 load at 3/4 of rated maximum speed (S);
- (3) One-hour sequence under 1/2 load at 3/4 of rated maximum speed (S);
- (4) 10-minute sequence under full load at 3/4 of rated maximum speed (S);
- (5) 15-minute sequence under 1/2 load at rated maximum speed (S);
- (6) 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 (1) to (6).

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1.2.4. During the test, the silencing system or components thereof shall not be cooled by a forced draught simulating 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.

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### 1.3. Conditioning by pulsation

1.3.1. The silencing system or components thereof shall be fitted to the vehicle referred to in paragraph 3.3. of this Regulation or the engine referred to in paragraph 3.4. of this Regulation. In the former case the vehicle shall be mounted on a roller dynamometer.

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In the second case, the engine shall be mounted on a dynamometer. The test apparatus, a detailed diagram of which is shown in Figure 1 of the appendix to this annex shall be fitted at the outlet of the silencing system. Any other apparatus providing equivalent results is acceptable.

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

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1.3.3. 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 40kPa. It shall close when this pressure does not differ by more than 10 per cent from its stabilized value with the valve open.

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1.3.4. The time-delay switch shall be set for the duration of gas exhaust resulting from the provisions laid down in paragraph 1.3.3. above.

- 1.3.5. Engine speed **shall** be 75 per cent of the speed (S) at which the engine develops maximum power.
- 1.3.6. The power indicated by the dynamometer **shall** be 50 per cent of the full-throttle power measured at 75 per cent of engine speed (S).
- 1.3.7. Any drain holes **shall** be closed off during the test.
- 1.3.8. The entire test **shall** be completed within 48 hours.  
If necessary, one cooling period will be observed after each hour."

### **JUSTIFICATION**

During its forty-ninth session, the Working Party on Noise (GRB) had reviewed and agreed to the proposed changes to UNECE Regulation No. 59 which are contained in working document ECE/TRANS/WP.29/GRB/2008/5/Rev.2, subject to a final review by GRB during its fiftieth session. In this respect, it is suggested to update Annex 5 of ECE Regulation No. 51 on the same subject to align the requirements with regard to the conditioning of silencing systems or silencing system components.

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