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Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

One-hundred-and-fifty-first session

Geneva, 22 – 25 June 2010

Item 4.2.5 of the provisional agenda

1958 Agreement – Consideration of draft amendments to existing Regulations

Proposal for Supplement 7 to the 02 series of amendments to Regulation No. 51 (Noise of M and N categories of vehicles)

Submitted by the Working Party on Noise *

The text reproduced below was adopted by the Working Party on Noise (GRB) at its fifty-first session. It is based on ECE/TRANS/WP.29/GRB/2009/6, as amended by informal document No. GRB-51-08/Rev. 1. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration (ECE/TRANS/WP.29/GRB/49, para. 6).

* In accordance with the programme of work of the Inland Transport Committee for 2006–2010 (ECE/TRANS/166/Add.1, 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.

Insert a new paragraph 2.19., to read:

“2.19. “*Design family of silencing system or silencing system components*”

Silencing systems or components thereof belong to the same design family if all of 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/m³);
- (f) Maximum contact surface between the gas flow and the absorbing material (e.g. perforation open area).”

Annex 5, amend to read:

“Annex 5

Silencing Systems Containing Acoustically Absorbing Fibrous Materials

1. General

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

- (a) the exhaust gas is not in contact with the fibrous materials; or if
- (b) 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.

1.1. Continuous road operation for 10,000 km

1.1.1. 50 ± 20 per cent 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.

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

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.
- 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:
- (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).
- 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.
- 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.
- In the second case, the engine shall be mounted on a dynamometer. The test apparatus, a detailed diagram of which is shown in Figure 3 of the appendix to this annex shall be fitted at the outlet of the silencing system. Any other apparatus providing equivalent results is acceptable.
- 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.
- 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 40 kPa. It shall close when this pressure does not differ by more than 10 per cent from its stabilized value with the valve open.
- 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.
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1.2. Conditioning on a test bench

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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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