



Economic and Social Council

Distr.: General
6 December 2010

Original: English
English and French only

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

Working Party on Noise

Fifty-third session

Geneva, 15–17 February 2011

Item 3(a) of the provisional agenda

Regulation No. 51 (Noise of M and N categories of vehicles) – Development

Proposal for draft amendments to Regulation No. 51

Submitted by the expert from the International Organization of Motor Vehicle Manufacturers *

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) to eliminate the contribution of the tyre under very high torque on the overall noise level when performing the Wide Open Throttle (WOT) test according to Method B. This document is based on Informal document No. GRB-52-04 distributed at the fifty-second session of the Working Party on Noise (GRB) (see report ECE/TRANS/WP.29/GRB/50, para. 9), and Informal document No. GRB-51-20 distributed at the fifty-first session of GRB (see report ECE/TRANS/WP29/GRB/49, para. 8). Modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

* 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.

I. Proposal

Annex 10, paragraph 2.2.2., amend to read (including the existing footnote ²):

"2.2.2. The tyres to be used for the test shall be representative for the ~~axle~~ **vehicle** and shall be selected by the vehicle manufacturer and recorded in Annex 9. They shall correspond to one of the tyre sizes designated for the vehicle as original equipment. The tyre is or will be commercially available on the market at the same time as the vehicle ². The tyres shall be inflated to the pressure recommended by the vehicle manufacturer for the test mass of the vehicle. The tyres shall have a tread depth of at least 80 per cent of the full tread depth.

² The tyre contribution for overall sound emission being important, this vehicle Regulation has taken into account the tyre/road sound emission regulations. **Traction tyres, snow tyres and special use** tyres according to UNECE Regulation No. 117 **as amended by the 02 series of amendments (2010)** shall be excluded during type-approval- and COP-measurements on request of the manufacturer."

II. Justification

1. The purpose of the testing described in Annex 10 to regulation No. 51 is to address the noise sources of the vehicle, which are of substantial importance for the further reduction of the overall noise emission of the vehicle during urban driving conditions, by means of a test performed on a test site.

2. All known studies dealing with the analysis of the urban traffic noise situation show that the tyre noise contribution in case of Heavy Commercial Vehicles (HCV), under torque and under rolling conditions during urban driving, has no influence on the overall noise emission of the HCV (see references in paragraph 8. below).

3. When calculation models such as TRANECAM are used to calculate the noise emission behaviour under real urban driving conditions, the parameter for the tyre road noise contribution in case of HCV is by default set to zero since its influence can be neglected.

4. All known studies dealing with the analysis of the urban traffic noise situation show that the power train noise contribution in case of HCV has a significant influence on the overall noise emission in real urban traffic. It is responsible for around 50 per cent of the total noise emission in real urban traffic (see references in paragraph 8. below).

5. When the new measurement procedure in case of HCV were developed by the International Organization for Standardization (ISO), both information were taken into account to find an agreement on how to address the most important noise source of the vehicle, the power train, when simulating urban driving condition on a test site.

6. A WOT test was chosen to be the best alternative to address the most important noise source of the vehicle, the power train. The major disadvantage of the WOT test is that still generates acceleration levels which are higher than twice the ones achieved during real urban driving conditions. That is the reason by which the WOT test gives completely wrong results for the overall noise emission levels of the vehicle when traction tyres are used. The tyre noise contribution from the interaction between the tyre and the ISO-surface increases with torque with around 0.65 dB(A)/1000 Nm. This means that this noise source becomes the dominating noise source during WOT testing and overshadows all other noise sources by far. It is a noise source which is exaggerated when testing under WOT conditions with traction tyres. Using normal tyres when performing the WOT test gives the possibility to

solve this problem. This tyre is less sensitive to the torque. It increases with around 0.15 dB(A)/1000 Nm only. The influence of the noise contribution of the artificially created noise source is eliminated.

7. Taking into account the considerations mentioned above, paragraph 2.2.2. of Regulation No. 51, Annex 10 should be amended as proposed.

8. References:

- (a) Investigations on Improving the Method of Noise Measurement for Powered Vehicles (Report Number 10506067 by order of the Germany Federal Environmental Agency, August 1999, Steven, H.)
 - (b) EU-Project WG8 Traffic Noise Calculation Study (TRL & RWTÜV 2004)
 - (c) Investigation on Noise Emission of Vehicles in Road Traffic (TÜV Nord 2005)
 - (d) Informal document No. GRB-51-20 (OICA 2010)
 - (e) Informal document No. GRB-52-04 (OICA 2010)
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