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World Forum for Harmonization of Vehicle Regulations (WP.29)

Working Party on Noise (GRB)

(Thirty-fourth session, 20-23 February 2001,
agenda item 2.1.)

PROPOSAL FOR DRAFT AMENDMENTS (NEW TEST METHOD) TO REGULATION No. 51

(Noise of M and N categories of vehicles)

Transmitted by the Expert from the Netherlands

Note: The text reproduced below was prepared by the expert from the Netherlands, in order to introduce into the Regulation a new test method, more representative of urban driving conditions. The proposal is based on the results of a study presented to GRB during its thirty-third session (TRANS/WP.29/GRB/31, para. 12).

Note: This document is distributed to the Experts on Noise only.

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A. PROPOSAL

Paragraphs 6.2.2. to 6.2.2.1.4.3., replace by the following text:

"6.2.2. Sound level limits

6.2.2.1. The sound level of vehicle types, as measured by the method described in paragraph 3.1. of annex 3 to this Regulation, shall not exceed the following limits:

Vehicle Categories	limit values dB(A)	
	Acceleration	cruise- by
6.2.2.1.1. Vehicles used for the carriage of passengers and capable of having not more than nine seats, including the driver's seat: 6.2.2.1.1.1. with a maximum authorised mass not exceeding 1.5 tonnes 6.2.2.1.1.2. with a maximum authorised mass greater than 1.5 tonnes but not exceeding 2 tonnes 6.2.2.1.1.3. with a maximum authorised mass greater than 2 tonnes	<u>1</u> /	<u>1</u> /
6.2.2.1.2. Vehicles used for the carriage of passengers having more than nine seats, including the driver's seat, and a maximum authorised mass of more than 3.5 tonnes: 6.2.2.1.2.1. with an engine power less than 150 kW (ECE) 6.2.2.1.2.2. with an engine power of 150 kW (ECE) or above	<u>1</u> /	<u>1</u> /
6.2.2.1.3. Vehicles used for the carriage of passengers having more than nine seats, including the driver's seat; vehicles used for the carriage of goods: 6.2.2.1.3.1. with a maximum authorised mass not exceeding 2 tonnes 6.2.2.1.3.2. with a maximum authorised mass greater than 2 tonnes but not exceeding 3.5 tonnes	<u>1</u> /	<u>1</u> /
6.2.2.1.4. Vehicles used for the transport of goods: 6.2.2.1.4.1. with an engine power less than 150 kW (ECE) 6.2.2.1.4.2. with an engine power of 150 kW (ECE) or	<u>1</u> /	<u>1</u> /

above

"

1/ (for the note see page 3)

Paragraphs 6.2.2.2. to 6.2.2.2.3., should be deleted. 1/

Annex 1,

Item 8.1.: Two separate tables will have to be filled in:
one for the acceleration test and one for the cruise-by test.

Annex 3,

Paragraphs 2.2.1. and 2.2.2., amend to read:

- "2.2.1. Measurements shall be made on partially loaded vehicles and, except in the case of non-separable vehicles, without trailer or semi-trailer. The extra mass (including the driver and measuring equipment) added to the vehicle shall be 50 per cent of the maximum payload as listed in the specifications of the vehicle.
- 2.2.2. The tyres used for the test are selected by the vehicle manufacturer and shall comply with commercial practice 2/ and be available on the market; they shall meet the minimum tread depth of 6 mm in the main grooves of the tread surface.
- The tyres must be inflated to the pressure(s) appropriate to the test mass of the vehicle."

Insert new paragraphs 2.2.7. and 2.2.8., to read:

- "2.2.7. Install a throttle stop (e.g., a chain and turnbuckle on the accelerator pedal or throttle linkage or other convenient means which will provide a fixed stop to the throttle mechanism or fuel valve for diesels). [in case of an electronic linkage between the accelerator and the throttle/fuel valve, the stop may be realised by an external electronic device as well. This electronic throttle stop shall have no other function, than the mechanical equivalent and shall comply with the intention of paragraph 2.2.8]. Set the stop at a position such that, when the accelerator is rapidly depressed and maintained against the stop, the vehicle achieves an acceleration from 20 to 35 km/h in a distance of 20 meters. Initial trials will be required to determine the proper setting of the throttle stop.

1/ Note: Two separate limits will hold for the acceleration test and cruise-by test as described in paragraph 3.1. of annex 3 to this Regulation. Sound level limits shall be revised in accordance with the revised measurement procedure, after having tested a representative fleet

of vehicles accordingly. The sound level limits will have to be adjusted in two steps: the first step to compensate for the new measurement method and the second step to enforce the implementation of state of the art noise reduction technology. Most likely these two steps are set simultaneously. In order to have effective limit values for the 'modal vehicles' a new paragraph 6.2.2.2. with allowances may be introduced for 'exceptional vehicles' (like 10x8 off-road trucks).

2/ Note: Based on the (expected) sales of vehicle-tyre combinations, the most sold tyre size and type are to be chosen. e.g. in case of 4WD vehicles "all-terrain" tyres should be used. e.g. in case of trucks, traction tyres should be used on the rear axle and rib tyres should be used on the front axle."

2.2.8. Vehicle components, 3/ which significantly influence the noise emission and which are controlled by an (electronic) control unit, shall not be tuned 4/ for noise type approval circumstances, with the only purpose of reducing type approval noise readings. A permanent effect in normal traffic of such components is to be secured."

Paragraph 3.1.1.1., amend to read:

"3.1.1.1. Two tests shall be performed:

- a) acceleration from 20 to 35 km/h (ca 1.6 m/s²);
- b) cruise-by at 50 km/h.

At least two measurements shall be made for both tests on each side of the vehicle. Preliminary trials, calculations and measurements will be necessary to determine the proper setting of the accelerator position and gear ratio."

Paragraph 3.1.1.3., amend to read:

"3.1.1.3. Two lines, AA' and BB', parallel to line PP' and situated respectively 10 m forward and 10 m rearward of that line shall be marked out on the test runway. In some cases, as specified below, line AA' shall be more than 10 m forward of line PP'. This temporary line shall be marked by traffic cones.

The vehicle shall be driven in a straight line over the acceleration section in such a way that the longitudinal median plane of the vehicle is as close as possible to the line CC' and approach line AA', at a steady speed as specified.

In case of the acceleration test, when the front of the engine reaches the line AA', the accelerator shall be depressed as rapidly as practical against the throttle stop, and held in that position until the rear of the engine crosses line BB'; the accelerator may then be released so that the vehicle maintains speed, or decelerates slowly.

In case of the cruise-by test, the accelerator shall be kept in a fixed position, such that the vehicle speed is constant."

3/ Note: Examples are:

- a) shutters in intake or exhaust system,
- b) shutters in the engine encapsulation,
- c) shifting programmes of automatic gear boxes,
- d) devices limiting the tyre slip, vehicle acceleration, max engine speed, etc.

4/ Note: In practice this may be checked by varying the entrance speed/min⁻¹ within ± 15 per cent in steps of 5 per cent and measuring the resulting variance in noise emission.

Paragraphs 3.1.2. to 3.1.2.3.2., amend to read:

"3.1.2. Determination of the approach speed and gear ratio

3.1.2.1. Symbols used

The letter symbols used in this paragraph have the following meaning:

- S: engine rotational speed as indicated under item 5.4. of annex 1.
- N_{stat} : stationary (idle) engine rotational speed as declared by the vehicle manufacturer.
- V_{max} : maximum speed declared by the vehicle manufacturer.
- N_A : uniform engine rotational speed at the approach of line AA'.
- N_B : engine rotational speed when the rear of the engine passes line BB'.
- V_A : uniform vehicle speed at the approach of line AA'.
- V_B : vehicle speed when the rear of the engine passes line BB'.

3.1.2.2. Approach speed and distance for all vehicles

In case $V_{max} < 50$ km/h, the cruise-by test shall be performed at V_{max} .

In case $V_{max} < 35$ km/h, the acceleration test shall be performed from 20 km/h to V_{max} .

In case the vehicle does not reach the prescribed end speed at line BB', even at wide-open throttle (WOT) (= kick down), the acceleration will start at a distance more than 10 m before line PP'. In that case line AA' will be temporarily placed at a distance before line PP' such that at WOT acceleration the vehicle reaches 35 km/h at line BB'.

In case $V_{max} < 20$ km/h, the acceleration test shall be skipped.

3.1.2.3. Vehicle with a manually-operated gearbox

3.1.2.3.1. acceleration test

The test will be performed in the second gear. All gears for use on paved roads (including parking gears, crawlers etc.) will be included in determining the second gear. Gears designed for off-road use only, shall be disregarded.

If in the second gear the theoretical engine speed at line BB' exceeds the engine speed S, the following procedure comes into effect: 5/

If $1.2 \geq N_B/S > 1$; $V_A = 10$ km/h and $V_B = 29$ km/h.

If $N_B/S > 1.2$; The next higher gear will be chosen.

This procedure is repeated until $N_B \leq S$.

5/ Note: This will rarely happen for vehicles other than category M3
and N3.

3.1.2.3.2. cruise-by test

The cruise-by test will be performed in the highest possible gear, where $N_A > 1.5 \times N_{stat}$."

Paragraphs 3.1.2.3.2.1. to 3.1.2.3.2.3., should be deleted.

Paragraph 3.1.2.4., amend to read:

"3.1.2.4. Vehicle with an automatic transmission

If the vehicle has a manual selector, the test shall be conducted with the selector in the position used for 'normal' driving on paved roads (e.g. drive, automatic).

If the vehicle is equipped with additional transmission programmes or switches (e.g. economy/sporty, summer/winter). The programme shall be used which is automatically selected when the vehicle is started and run in prior to the test. If no automatic selection is made, all programmes shall be tested. The condition giving the highest noise level shall be retained.

Gears/programmes designed for off-road use only, shall be disregarded.

Downshifting (including kick down), shall be allowed."

Paragraphs 3.1.2.4.1. to 3.1.2.4.2.2., should be deleted.

* * *

B. JUSTIFICATION

1. There are two noise reduction goals:

- a. the equivalent level of a steadily flowing traffic stream
- b. the peak level of single accelerating vehicle events.

These two goals cannot be covered with only one test and only one limit value.

2. The difference in traffic noise emission between noisy and silent vehicles is very much dependent on the vehicle speed. This difference typically ranges from 30 dB(A) at 10 km/h to only 6 dB(A) at 50 km/h. In order to be able to discriminate better between noisy and silent vehicles, the test speed should be significantly lower than the current 50 km/h.

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