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Working Party on Noise

Sixty-seventh session

Geneva, 24-26 January 2018

Report of the Working Party on Noise on its sixty-seventh session

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I. Attendance

1. The Working Party on Noise (GRB) held its sixty-seventh session from 24 to 26 January 2018 in Geneva. The meeting was chaired by Mr. S. Ficheux (France). Experts from the following countries participated in the work following Rule 1(a) of the Rules of Procedure of the World Forum for Harmonization of Vehicle Regulations (WP.29) (TRANS/WP.29/690/Rev.1): China, France, Germany, Hungary, India, Italy, Japan, Netherlands, Norway, Poland, Republic of Korea, Russian Federation, Spain, Sweden, Switzerland and Turkey. Experts from the European Commission (EC) participated. Experts from the following non-governmental organizations also participated: European Association of Automotive Suppliers (CLEPA), European Tyre and Rim Technical Organization (ETRTO), Motorcycle Manufacturers Association (IMMA), International Organization for Standardization (ISO), International Organization of Motor Vehicle Manufacturers (OICA) and World Blind Union (WBU).

II. Adoption of the agenda (agenda item 1)

Documentation: ECE/TRANS/WP.29/GRB/2018/1

2. GRB considered and adopted the agenda. The list of informal documents is contained in Annex I. The list of GRB informal groups is reproduced in Annex IV.

III. Regulation No. 28 (Audible warning devices) (agenda item 2)

3. No issues were considered under this agenda item.

IV. Regulation No. 41 (Noise emissions of motorcycles): Development (agenda item 3)

Documentation: Informal documents GRB-67-12, GRB-67-13 and GRB-67-16-Rev.1

4. The expert from EC reported on the progress of the study on Euro 5 sound level limits of L-category vehicles (GRB-67-13), including a cost-benefit analysis (CBA). According to him, the study identified a potential for reducing sound limits of L-category vehicles. The expert of IMMA was of the view that the study did not properly address a wide variety of vehicles and that lowering the sound limits for type approval would not solve the main issue: single vehicles creating a high noise level (GRB-67-16-Rev.1).

5. The experts from Germany, Netherlands and Spain posed questions about the study assumptions and pointed out that the proposed policy measures would not tackle illegal aftermarket products (silencers) that were the heart of the problem. The Chair invited EC to take into consideration the comments received and to work closely with Contracting Parties, IMMA and other stakeholders with a view to proposing tangible solutions.

6. The expert of Japan informed GRB about the ongoing internal discussions on the limit values in the 04 series of amendments to Regulation No. 41, the outcome of which would be shared with GRB.

7. The expert of IMMA withdrew GRB-67-12.

V. Regulation No. 51 (Noise of M and N categories of vehicles) (agenda item 4)

A. Development

Documentation: ECE/TRANS/WP.29/GRB/2018/2,
ECE/TRANS/WP.29/GRB/2018/3, Informal documents GRB-67-01,
GRB-67-06, GRB-67-07, GRB-67-11, GRB-67-14 and GRB-67-17

8. The expert from ISO presented revised proposals that introduced into Regulation No. 51 an option of indoor testing, according to standard ISO 362-3 (ECE/TRANS/WP.29/GRB/2018/3). This proposal received comments from the experts of China, France (GRB-67-11), Germany, Netherlands, Russian Federation (GRB-67-01), Sweden and OICA. Following an in-depth discussion, GRB adopted the proposals, as amended (Annex II), and requested the secretariat to submit them to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration and vote at their June 2018 sessions as a draft Supplement 4 to the 03 series of amendments to Regulation No. 51.

9. GRB recalled the amendment proposals to Regulation No. 51 adopted at the previous session (ECE/TRANS/WP.29/2018/7) and addressed the pending issue on whether or not the adopted proposals would require a new series of amendments and/or transitional provisions. The experts from the Informal Working Group on Additional Sound Emission Provisions (IWG ASEP) and from OICA presented their views (GRB-67-14 and GRB-67-06). GRB agreed that the adopted proposals should become a new Supplement 3 to the 03 series of amendments to Regulation No. 51 and be accompanied with the following transitional provision (a new paragraph 11.9.):

"11.9. Until 18 months after the date of entry into force of the Supplement 3, it shall not apply to extensions of existing approvals, originally granted prior to the date of entry into force of Supplement 3."

10. GRB requested the secretariat to issue, as soon as possible, an addendum to ECE/TRANS/WP.29/2018/7 with the above text, thus allowing Contracting Parties to prepare for its consideration at the forthcoming session of WP.29 in March 2018.

11. The expert from OICA proposed amendments to Regulation No. 51 with the aim to ensure transparency during the type approval process in situations where the manufacturer could either use mechanical or electronic devices to control the gear shift, or take measures to avoid accelerations greater than 2.0 m/s² (ECE/TRANS/WP.29/GRB/2018/2 and GRB-67-17). The proposal received questions and/or comments from the experts of China, France, Germany, Japan and ISO. GRB adopted the proposals, as contained in Annex III, and requested the secretariat to submit them to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as a draft Supplement 4 to the 03 series of amendments to Regulation No. 51.

12. The expert from China presented suggestions for further development of Regulation No. 51 (GRB-67-07). The expert from France, Chair of IWG ASEP, pointed out that IWG ASEP would try to accommodate these suggestions.

B. Additional sound emission provisions

Documentation: Informal document GRB-67-15-Rev.1

13. On behalf of IWG ASEP, the expert from France presented their status report to GRB (GRB-67-15-Rev.1) and invited all GRB experts to participate in the work of IWG ASEP.

VI. Regulation No. 63 (Noise emissions of mopeds) (agenda item 5)

Documentation: ECE/TRANS/WP.29/GRB/2018/4

14. The expert from EC introduced revised amendments on powered cycles (ECE/TRANS/WP.29/GRB/2018/4). GRB adopted the proposals and requested the secretariat to submit them to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as a draft Supplement 4 to the 02 series of amendments to Regulation No. 63.

VII. Regulation No. 117 (Tyre rolling resistance, rolling noise and wet grip) (agenda item 6)

Documentation: Informal documents GRB-67-08 and GRB-67-18

15. The expert from ETRTO assessed the latest proposals from the Netherlands for stricter tyre noise limits, as presented at the sixty-sixth session of GRB (GRB-67-08). He pointed out some limitations in the data subset used in the Dutch study and questioned the methodology used to derive the new proposed limits from the data subset. The expert from the Netherlands replied to the ETRTO comments (GRB-67-18).

16. The experts from Germany and OICA pointed out that the Dutch study had been based on tyre labels which might be incorrect. The expert from the Russian Federation drew the attention of GRB to the need for a holistic approach to the tyre rolling noise in the system "tyre/road surface". The Chair noted two different approaches for tyre selection by the Netherlands and ETRTO: the Dutch study focused on the most popular tyres of several brands covering about 90 per cent of the market, while ETRTO was concerned about a much wider selection of brands to ensure market choice.

17. GRB invited the Netherlands, ETRTO and other stakeholders to work together with the aim to undertake a holistic study of tyres on the market. Finally, GRB agreed to resume the discussion at the next session.

VIII. Regulation No. 138 (Quiet road transport vehicles) (agenda item 7)

Documentation: Informal document GRB-67-09

18. The expert from OICA proposed to clarify the application of the 01 series of amendments to Regulation No. 138 (GRB-67-09). The experts from China, France, Germany, OICA and WBU commented on the proposal. The secretariat pointed out that it had already rectified the text of paragraph 6.2.6. which had been incorrectly reproduced in a revised consolidated version published on the WP.29 website (E/ECE/324/Rev.2/Add.137/Rev.1 – E/ECE/TRANS/505/Rev.2/Add.137/Rev.1). GRB invited OICA to take into account the comments received and to prepare an official document for consideration at the next session. GRB also requested that the earlier OICA proposals for transitional provisions (ECE/TRANS/WP.29/GRB/2017/7) be included into this new document.

IX. Draft Regulation on reversing alarm (agenda item 8)

Documentation: Informal document GRB-67-10

19. On behalf of the Task Force on Reversing Alarm (TF-RA), the expert from Japan reported on the TF-RA activities. In particular, he mentioned that TF-RA would soon distribute a simple questionnaire among GRB experts with a view to collecting information on national practices with respect to reversing alarms. Based on future responses, TF-TA would draft a new Regulation. The expert from Switzerland suggested that "reversing alarm" should be replaced with "acoustic warning" in the title of a new Regulation.

X. Collective amendments (agenda item 9)

20. No proposals were considered under this agenda item.

XI. Exchange of information on national and international requirements on noise levels (agenda item 10)

Documentation: Informal document GRB-67-13

21. No new information was reported under this item.

XII. Influence of road surface on tyre rolling sound emissions (agenda item 11)

Documentation: Informal document GRB-67-19

22. The expert from the Netherlands presented an update of the project on labelling road surfaces (GRB-67-19), based on the following criteria: skid resistance, noise reduction, rolling resistance and lifespan. GRB recalled its view that labelling road surfaces could only be introduced as a non-legally binding document, e.g. a recommendation or resolution, and its intention to find the most appropriate body to adopt such a document. In this context, the Chair informed GRB about the AC.2 considerations of this issue, at its November 2017 session. The secretariat further reported that the Working Party on Road Transport (SC.1), at its September 2017 session, had indicated that the project was beyond the SC.1 Terms of Reference. The Chair invited the Netherlands, in cooperation with the Chair, secretariat and other interested parties, to draft a recommendation or resolution for consideration at the next session of GRB.

XIII. Acronyms and abbreviations in Regulations under the responsibility of the Working Party on Noise (agenda item 12)

23. No issues were considered under this item.

XIV. Proposal for amendments to the Consolidated Resolution on the Construction of Vehicles (agenda item 13)

Documentation: ECE/TRANS/WP.29/GRSG/2017/20

24. GRB noted that its proposal to change the measuring units for vehicle masses from tonnes to kilograms had been agreed at the October 2017 session of the Working Party on General Safety Provisions (GRSG) (ECE/TRANS/WP.29/GRSG/2017/20) and would be submitted to the March 2018 session of WP.29 for adoption.

XV. Development of the International Whole Vehicle Type Approval system and involvement of the Working Parties in it (agenda item 14)

25. GRB was informed that Revision 3 of the 1958 Agreement had entered into force on 14 September 2017 and that WP.29, at its November 2017 session, had adopted Draft General Guidelines for United Nations regulatory procedures and transitional provisions in UN Regulations and a new UN Regulation No. 0 on the International Whole Vehicle Type Approval (IWVTA).

XVI. Highlights of the November 2017 session of WP.29 (agenda item 15)

Documentation: Informal document GRB-67-05

26. The secretariat reported on the highlights of the 173rd session of WP.29.

XVII. Exchange of views regarding the future work of GRB (agenda item 16)

27. The Chair indicated that, before March 2018, he would again solicit views of GRB experts on this issue.

XVIII. Other business (agenda item 17)

Documentation: Informal documents GRB-67-02, GRB-67-03, GRB-67-04 and GRB-67-11

28. The expert from EC presented updated amendments for a new series of amendments to Regulation No. 9 with the aim to introduce ASEP requirements for L₄ and L₅ category vehicles with the power-to-mass ratio (PMR) of more than 50 W/kg (GRB-67-04). The expert of IMMA was of the view that the industry would need much longer transitional periods for implementing the amendments. The secretariat pointed out that the references to standard ISO 10844 should be updated. GRB invited the expert from EC to update the proposals and submit them as an official document for consideration at the next session.

29. The expert from Germany presented an overview of issues with noise emissions of non-original replacement exhaust silencer systems (NORESS) for L-category vehicles (GRB-67-03), as well as a possible solution in the form of a Supplement 3 to the 01 series to UN Regulation No. 92 (GRB-67-02). Following a brief exchange of views, GRB

generally supported the approach and agreed that the proposed modifications should become a new series of amendments. GRB experts were invited to transmit their comments, if any, directly to the expert of Germany, so that he would be able to submit an official document for consideration at the next session.

30. GRB noted that Ms. M. Prémillieu (France), Messrs. B. Despujols and T. Miyachi (both OICA) had assumed new functions and would no longer attend GRB meetings. GRB thanked them for their contributions and wished them success in the future.

XIX. Provisional agenda for the sixty-eighth session (agenda item 18)

31. For its sixty-eighth session, scheduled to be held in Geneva from 12 (starting at 2.30 p.m.) to 14 (concluding at 5.30 p.m.) September 2018, GRB decided to keep the same structure of the provisional agenda, subject to the deletion of item 12 and adding two new items on Regulations Nos. 9 and 92. GRB noted that the deadline for the submission of official documents to the secretariat would be 18 June 2018, twelve weeks prior to the session.

Annex I

List of informal documents (GRB-67-...) distributed during the session

<i>Symbol</i>	<i>Transmitted by</i>	<i>Agenda item</i>	<i>Language</i>	<i>Title</i>	<i>Follow-up</i>
1-Rev.1	Russian Federation	4 (a)	E	Proposal for additional amendments to UN Regulation No. 51 with the introduction of indoor test methods (ECE/TRANS/WP.29/GRB/2018/3)	(d)
2	Germany	17	E	Proposal for a Supplement 3 to the 01 series of UN Regulation No. 92 (Replacement exhaust silencing systems)	(b)
3	Germany	17	E	Problems with noise emissions of L-category vehicles	(c)
4	European Commission	17	E	Proposal for amendments to UN Regulation No 9 to introduce ASEP requirements for L4 and L5 category vehicles with the power-to-mass ratio (PMR) > 50 W/kg	(b)
5	Secretariat	1, 15	E	General information and WP.29 highlights	(a)
6	OICA	4 (a)	E	Proposal for a corrigendum to ECE/TRANS/WP.29/2018/7	(d)
7	China	4 (a)	E	Suggestions for development of UN Regulation No. 51	(a)
8	ETRTO	6	E	Assessment of the latest proposal by the Netherlands presented at the sixty-sixth session of GRB	(c)
9	OICA	7	E	Proposal for Supplement 2 to the 01 series of amendments to UN Regulation No. 138	(b)
10	TF RA	8	E	Status report	(a)
11	France	4 (a)	E	Indoor pass-by noise	(a)
12	IMMA	3	E	Proposal for amendments to the 04 series of amendments to UN Regulation No.41	(a)
13	European Commission	3, 10	E	Study on Euro 5 sound level limits of L-category vehicles: progress and cost-benefit analysis (CBA) results	(d)
14	IWG ASEP	4 (a)	E	Proposal for a Corrigendum to ECE/TRANS/WP.29/2018/7 and GRB-67-06	(d)
15-Rev.1	IWG ASEP	4 (b)	E	Status report	(a)
16-Rev.1	IMMA	3	E	Comments on the Euro 5 sound level study by EC	(a)
17	OICA	4 (a)	E	Proposal for amendments to ECE/TRANS/WP.29/GRB/2018/2	(a)
18	Netherlands	6	E	Response to GRB-67-08	(c)
19	Netherlands	11	E	Labelling road surfaces	(c)

<i>Symbol</i>	<i>Transmitted by</i>	<i>Agenda item</i>	<i>Language</i>	<i>Title</i>	<i>Follow-up</i>
20	OICA	4 (a)	E	Additional technical remarks and proposals for clarification on the 03 series of amendments to Regulation No. 51	(c)
21	China	4 (a)	E	Noise problems and driving conditions in China based on the 03 series of amendments to Regulation No. 51	(a)
22	OICA	6	E	Tyre sound limits trade off	(a)

Notes:

- (a) Consideration completed or superseded.
- (b) Continue consideration at the next session with an official symbol.
- (c) Continue consideration at the next session as an informal document.
- (d) Adopted and to be submitted to WP.29.

Annex II

Adopted amendments to Regulation No. 51 (based on ECE/TRANS/WP.29/GRB/2018/3)

Table of Contents, Annexes, add a new Annex 8:

"8 Indoor testing"

Paragraph 6.2.1.1., amend to read:

"6.2.1.1. The sound made by the vehicle type submitted for approval shall be measured **either indoors or outdoors** by the methods described in Annex 3 to this Regulation. ~~for the vehicle in motion~~ **The specific conditions for indoor testing are provided in Annex 8 to this Regulation. The results of the outdoor and indoor tests are deemed equivalent.**

For each specific test condition for vehicles, the manufacturer can select to test the vehicle either indoors or outdoors. The Type Approval Authority shall always have the option to mandate an outdoor test for verification. The option of the type approval authority to mandate an outdoor test shall apply to any test specified in this Regulation, including conformity of production testing.

In addition, the sound shall be measured on the stationary³ vehicle; in the case of a vehicle where an internal combustion engine cannot operate when the vehicle is stationary, the emitted sound shall only be measured in motion. In the case of a hybrid electrical vehicle of category M₁ where an internal combustion engine cannot operate when the vehicle is stationary, the emitted sound shall be measured according to Annex 3, paragraph 4.

..."

Annex 1 - Appendix 1, insert new items 2.4. and 2.4.1. to read:

"2.4. Testing method information

2.4.1. Test method selected: Outdoor/Indoor¹"

Annex 3,

Paragraph 1., amend to read:

"1. Measuring instruments

1.1. Acoustic measurements

The apparatus used for measuring the sound level shall be a precision sound-level meter or equivalent measurement system meeting the requirements of Class 1 instruments (inclusive of the recommended windscreen, if used). These requirements are described in "IEC 61672-1:2002: Precision sound level meters", second edition, of the International Electrotechnical Commission (IEC).

¹ Delete what does not apply.

For indoor testing, when no general statement or conclusion can be made about conformance of the sound level meter by each channel of the array conformance (e.g. when pass-by sound level simulation algorithms do not compute the overall level but spectrum or temporal to recompose it), a simulated pass-by run shall be performed at a constant speed of 50 km/h while a constant tone signal is supplied to all channels of the arrays. The simulated A-weighted sound level is processed and the deviation from a reference tone signal shall be checked in accordance to IEC 61672-3.

..."

Paragraph 1.2., amend to read:

"1.2. Calibration of the entire Acoustic Measurement System for a Measurement Session

...

For indoor testing, the entire measurement system shall be checked at the beginning and at the end of a series of sessions.

A qualified calibration method (i.e. electrical calibration) is recommended to be provided by the hardware supplier and, in that case, shall be implemented in the measurement software used. Simulation algorithms using sound source localization detection should deactivate that feature for these tests."

Paragraph 2.1., amend to read:

"2.1. Test Site and ambient conditions

The specifications for the test site provide the necessary acoustic environment to carry out the vehicle tests documented in this Regulation. Outdoor and indoor test environments that meet the specifications of this Regulation provide equivalent acoustic environments and produce results that are equally valid.

2.1.1. Test Site Outdoor

The surface of the test track and the dimensions of the test site shall be in accordance with ISO 10844:2014.

2.1.2. Test Site Indoor

Test Site Indoor requirements shall be as specified below.

- (a) **The test room dimensions are described in paragraph 7.2. of ISO 362-3:2016. All room dimensions may be adjusted to meet the specific application for the products being tested according to Annex 8, paragraph 4.**
- (b) **The test facility shall meet the requirements of ISO 26101:2012 with the qualification criteria and measurement requirements appropriate to this test method as described in ISO 362-3:2016, paragraph 7.3.**
- (c) **Condition of the floor is described in ISO 362-3:2016, paragraph 7.4.**
- (d) **Cooling, ventilation, and exhaust gas management are described in ISO 362-3:2016, paragraph 7.5.**
- (e) **Dynamometer requirements are described in ISO 362-3:2016, paragraph 8.**

- (f) **Vehicle fixing system is described in ISO 362-3:2016, paragraph 9.3.**

2.1.3. Ambient conditions

The surface of the site shall be free of powdery snow, tall grass, loose soil or cinders. There shall be no obstacle which could affect the sound field within the vicinity of the microphone and the sound source. The observer carrying out the measurements shall so position himself as not to affect the readings of the measuring instrument.

...

For indoor testing, background noise shall take into account noise emissions produced by the dynamometer rollers, ventilation systems, and facility exhaust gas systems."

Paragraph 2.2.1., amend to read:

"2.2.1. ...

Measurements shall be made on vehicles at the test mass m_t specified according to the following table.

When testing indoors, the test mass, m_t shall be utilized by the control system of the dyno roller. Actual mass of the vehicle has no effect on results and it is permitted to load the vehicle as necessary to prevent slip between the tyres and the dyno rolls. To detect excessive slip, it is recommended to control the ratio of engine rotational speed and vehicle speed between the acceleration phase and the constant-speed status. To avoid slip, it is possible to increase the axle load.

... "

Paragraph 2.2.2., amend to read:

"2.2.2. ...

When performing indoor testing, tyre/road sound is evaluated independently on the test track with the tyres to be used, according to this paragraph. Propulsion sound is independently evaluated on the dynamometer using tyres and other sound control measures to produce tyre/road sound which does not influence the measurement result."

Paragraph 3., amend to read:

"3. Methods of testing

Outdoor tests shall be performed according to paragraph 3.1.

Indoor tests shall be performed according to paragraph 3.1. using the specifications of ISO 362-3:2016, variant A. For indoor application, the manufacturer shall provide to the technical service, documentation according to Annex 8, paragraph 1. Variant A is a combination of indoor testing (power train sound) and outdoor testing (tyre/road sound).

..."

Paragraph 3.1.1., amend to read:

"3.1.1. General conditions of test

For outdoor testing, two lines, AA' and BB', parallel to line PP' and situated respectively 10 m ± 0.05 m forward and 10 m ± 0.05 m rearward of line PP' shall be marked out on the test runway.

For indoor testing, the virtual line AA' indicates the beginning of the test track, PP' indicates the virtual position of the two pass-by microphones, and BB' indicates the end of the test track. The simulated vehicle speed at AA', v_{AA} , or vehicle speed at PP', v_{PP} , is defined by the roller speed when the reference point of the vehicle passes the virtual line AA' or PP', respectively. The simulated vehicle speed at BB', v_{BB} , is defined when the rear of the vehicle passes the virtual line BB'.

..."

Paragraph 3.1.3., amend to read:

"3.1.3. Interpretation of results

For vehicles of categories M₁ and M₂ having a maximum authorized mass not exceeding 3,500 kg, and category N₁ the maximum A-weighted sound pressure level indicated during each passage of the vehicle between the two lines AA' and BB' shall be rounded to the first significant digit after the decimal place (e.g. XX,X).

For vehicles of category M₂ having a maximum authorized mass exceeding 3,500 kg and categories M₃, N₂, and N₃ the maximum A-weighted sound pressure level indicated during each passage of the reference point of the vehicle between line AA' and line BB' + 5 m shall be rounded, to the first significant digit after the decimal place (e.g. XX,X).

For indoor testing, pass-by sound is simulated by measurement of power train sound on the dynamometer and energetical addition of the tyre/road sound (measured separately on an outdoor test track) according to Annex 8, paragraph 2 of this Regulation.

..."

Insert a new Annex 8 to read:

"Annex 8

Indoor testing

1. Documentation for indoor application

Documentation shall include:

- Validation of facility, e.g. free field propagation, dyno and air handling background noise level, dyno dynamic performance, software.
- Procedures to be applied for indoor testing, e.g. dyno and software set-up, loading and tie-down, air-handling and vehicle's temperature management.
- Coast down and tyre sound level data used for calculation of dynamometer load coefficients and tyre sound data used for determination of final reported results.

- Test results on a representative selection of the manufacturer's production to demonstrate that indoor testing delivers comparable results as outdoor testing within acceptable accuracy.
2. **Vehicle tested indoor using Variant A**

Indoor pass-by test is simulated by measurement of power train sound on the dynamometer and energetical addition of the tyre/road sound (measured separately on an outdoor test track).
 - 2.1. **General**

This method is a combination of indoor testing (power train sound) and outdoor testing (tyre/road sound). It is not necessary to repeat the measurement of the tyre/road sound every time a vehicle is tested. The data of several tyres can be stored in a database and a matching data set from the database can then be used for the test.
 - 2.2. **Power train sound**

It shall be ensured that there is no remaining tyre/road sound affecting the measurements. In any case it shall be ensured that the remaining tyre/road sound shall be at least 10 dB below the maximum A-weighted sound pressure level produced by the vehicle under test. If this condition cannot be fulfilled, a correction shall be carried out. This correction procedure is described in ISO 362-3:2016 Annex B, paragraph B.6.

The vehicle shall be measured according to the operating condition specified in paragraphs 3.1.2.1. or 3.1.2.2. of Annex 3 of this Regulation.
 - 2.3. **Tyre/road sound**

The measurements of the tyre/road sound shall be performed on a test track as described paragraph 2.1.1. of Annex 3 of this Regulation. The evaluation of tyre/road sound consists of two procedures, namely:

 - (a) evaluation of free rolling sound;
 - (b) evaluation of tyre/road sound including torque influence which can be derived from a) by a simplified method.

All conditions for evaluation of tyre/road sound shall be done according to paragraph 3. of this Annex.
 - 2.4. **Calculation of the total vehicle sound**

The total vehicle sound is the energetical sum of tyre/road sound and power train sound. This calculation shall be carried out for each single run as describe in ISO 362-3:2016, paragraph 10.2.4.
 3. **Procedure for measurement, evaluation, and calculation of tyre/road sound when using variant A**

All conditions for evaluation of tyre/road sound, free rolling sound, and torque influence are described in ISO 362-3:2016, Annex B.
 4. **Adjustment of room dimensions**

To cater for the smaller size test rooms, the maximum levels shall be evaluated with caution though to avoid missing them according to ISO 362-3:2016, Annex E."

Annex III

Adopted amendments to Regulation No. 51 (based on ECE/TRANS/WP.29/GRB/2018/2)

Annex 3,

Paragraph 3.1.2.1.4.1., add a new subparagraph (e):

“3.1.2.1.4.1. Vehicles with manual transmission, automatic transmissions, adaptive transmissions or CVTs tested with locked gear ratios

...

(e) If no gear ratio is available with an acceleration below 2.0 m/s², the manufacturer shall, if possible take measures to avoid an acceleration value $a_{wot\ test}$ greater than 2.0 m/s².

Table 1 in Appendix to Annex 3 provides examples for valid measures to control the downshift of gears or to avoid accelerations beyond 2.0 m/s². Any measure used by manufacturer for the above-mentioned purposes shall be documented in the test report.”

Paragraph 3.1.2.1.4.2., amend to read:

“3.1.2.1.4.2. Vehicles with automatic transmission, adaptive transmissions and CVTs tested with non-locked gear ratios:

...

Therefore, it is permitted to establish and use electronic or mechanical devices, including alternate gear selector positions, to prevent a downshift to a gear ratio which is typically not used for the specified test condition in urban traffic.

If possible, the manufacturer shall take measures to avoid an acceleration value $a_{wot\ test}$ greater than 2.0 m/s².

Table 1 in Appendix to Annex 3 provides examples for valid measures to control the downshift of gears or to avoid accelerations beyond 2.0 m/s². Any measure used by manufacturer for the above-mentioned purposes shall be documented in the test report.

...”

Paragraph 3.1.2.1.4.3., amend to read:

“3.1.2.1.4.3. Vehicles with only one gear ratio, like but not limited to Battery Electric Vehicles (BEV) and Fuel Cell Vehicles (FCV)

...

If possible, the manufacturer shall take measures to avoid an acceleration value $a_{wot\ test}$ greater than 2.0 m/s².

Table 1 in Appendix to Annex 3 provides examples for valid measures to avoid accelerations beyond 2.0 m/s². Any measure used by manufacturer for the above-mentioned purposes shall be documented in the test report.

...”

Paragraph 3.1.2.2.1.2., amend to read:

“3.1.2.2.1.2. Automatic transmission, adaptive transmissions, and transmissions with variable gear ratio tested with non-locked gear ratios

The gear selector position for full automatic operation shall be used.

The test may then include a gear change to a lower range and a higher acceleration. A gear change to a higher range and a lower acceleration is not allowed. In any case a gear change to a gear ratio that is typically not used at the specified condition as defined by the manufacturer in urban traffic shall be avoided.

Therefore, it is permitted to establish and use electronic or mechanical devices, including alternative gear selector positions, to prevent a downshift to a gear ratio that is typically not used at the specified test condition as defined by the manufacturer in urban traffic.

Table 1 in Appendix to Annex 3 provides examples for valid measures to control the downshift of gears. Any measure used by manufacturer for the above-mentioned purposes shall be documented in the test report.

...”

Appendix to Annex 3, at the end, add a new table 1:

“Table 1. Examples for Devices and Measures to Enable a Vehicle Tested within the Acceleration Boundaries

<i>No.</i>	<i>Impact</i>	<i>Sub No.</i>	<i>Measure</i>	<i>Additional Requirements</i>
1	Lock of a discrete gear ratio	1*	A discrete gear ratio can be locked by the driver	none
		2	A discrete gear ratio is available onboard, but is not available to the driver. Locking can be activated by the manufacturer with an onboard (hidden) function or with an external device	none
2	Controlled gear shift management: Applicable to transmissions which cannot be locked, or where no locked gear provides a valid test result	1*	Kickdown is deactivated	none
		2	Gear shift change(s) can happen during the test, gear shift is controlled by activation of an internal function or external device	Acceleration** shall be between a_{urban} and $a_{wot,ref}$, not exceeding 2.0 m/s ² .
3	Partial load driving****	1	Acceleration is limited by a mechanical device	Acceleration** shall be between a_{urban} and $a_{wot,ref}$, not exceeding 2.0 m/s ² .

		2	External Programming for partial load acceleration ^{***)}	
4	Mixed Solution (Mode): This measure will be a mix of the above solutions combined in a specific mode	1*	Mode is available onboard and can be selected by the driver	none
		2	Mode is available onboard and can only be activated by the manufacturer with a hidden function or an external device	none
		3	Mode is not available onboard, an external software overrides the internal software	Acceleration** shall be between a_{urban} and $a_{wot,ref}$, not exceeding 2.0 m/s ² .

* Comment: This is a standard situation, already covered by the Regulation text.

** Applicable to vehicles of category M₁, N₁ and M₂ ≤ 3,500 kg.

*** Partial load shall be achieved by simulation of the travel restriction of the accelerator. It is not allowed to interfere with the engine control management.

**** Applicable only to Pure Electric Vehicle (PEV) as defined in the 07 series of amendments to UN Regulation No. 83, paragraph 2.30.

Annex 7, paragraph 2.5.1., amend to read:

“2.5.1. ...

In case of non-locked transmission conditions, the test may include a gear ratio change to a lower range and a higher acceleration. A gear change to a higher range and a lower acceleration is not allowed.

If possible, the manufacturer shall take measures to avoid that a gearshift leads to a condition not in compliance with the boundary conditions. For that, it is permitted to establish and use electronic or mechanical devices, such as alternate gear selector positions. If no such measures can be applied, the rationale shall be provided and documented in the technical report.

Table 1 in Appendix to Annex 3 provides examples for valid measures to control the downshift of gears. Any measure used by manufacturer for the above-mentioned purposes shall be documented in the test report.”

Annex IV

GRB informal groups

<i>Informal group</i>	<i>Chair(s) and Co-chair(s)</i>	<i>Secretary</i>	<i>Expiry date of the mandate</i>
Quiet road transport vehicles (QRTV) for GTR	Mr. Ezana Wondimneh (USA) Tel: +1 202 366 21 17 Email: Ezana.wondimneh@dot.gov Mr. Ichiro Sakamoto (Japan) Tel:+81 422 41 66 18 Fax:+81 422 76 86 04 E-mail: i-saka@ntsel.go.jp	Mr. Andreas Vosinis (Directorate General Growth, European Commission) Tel:+ 32 2 2992116 Email: andreas.vosinis@ec.europa.eu	December 2018
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