


Economic Commission for Europe
Inland Transport Committee
World Forum for Harmonization of Vehicle Regulations
Working Party on Noise
Sixty-sixth session

Geneva, 4-6 September 2017

**Report of the Working Party on Noise
 on its sixty-sixth session**
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I. Attendance

1. The Working Party on Noise (GRB) held its sixty-sixth session from 4 to 6 September 2017 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, Amend. 1 and Amend. 2): China; France; Germany; Hungary; India; Italy; Japan; Netherlands; Poland; Republic of Korea; Russian Federation; South Africa; 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); International Council of Academies of Engineering and Technological Sciences (CAETS); International Motor Vehicle Inspection Committee (CITA), International Motorcycle Manufacturers Association (IMMA); International Organization for Standardization (ISO) and International Organization of Motor Vehicle Manufacturers (OICA).

II. Adoption of the agenda (agenda item 1)

Documentation: ECE/TRANS/WP.29/GRB/2017/3

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 III.

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: ECE/TRANS/WP.29/GRB/2017/4, Informal documents GRB-66-08, GRB-66-12, GRB-66-15 and GRB-66-17

4. The expert from IMMA proposed to delete the last sentence in paragraph 1.3.2.1., since the scope of the 04 series of amendments to Regulation No. 41 did not cover motorcycles with a sidecar (L₄ category of vehicles) (ECE/TRANS/WP.29/GRB/2017/4). GRB adopted this proposal and requested the secretariat to submit it to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration and vote at their March 2018 sessions as a draft Supplement 6 to the 04 series of amendments to Regulation No. 41.

5. The expert from EC introduced the ongoing study on Euro 5 sound level limits of L-category vehicles (GRB-66-15) with the aim to investigate the potential for new sound limits of L-category vehicles. He explained that the study takes into account the evolution of sound levels of road vehicles (actual vehicle testing), citizens' needs and stakeholders interest (feedback gathering), and technical and economic feasibility in the medium term (cost-benefit analysis). The experts from Germany, Netherlands and OICA pointed out that only reducing the sound limits for new vehicles would not achieve the desired results unless accompanied by measures to combat illegal aftermarket products (silencers). The Chair proposed to resume this discussion once the results of the study would be available.

6. The expert from Germany highlighted the existing problems with and possible solutions for the noise emissions of L-category vehicles, including non-original replacement exhaust silencer systems (NORESS) (GRB-66-12). According to him, there was a gap between quiet vehicles during the type approval process and loud vehicles on the streets, because of manipulation with silencers, loopholes and grey areas in the United Nations and the European Union (EU) regulations. For better enforcement of compliance of vehicles in use with the sound limits and as an alternative to measurement of stationary noise, he proposed a simplified pass-by noise test which could be used for road-side checks and periodic technical inspections of type approved motorbikes and their NORESS (GRB-66-17). The experts from France and the Netherlands supported the need for stronger enforcement. The expert from IMMA volunteered to contribute to developing the pass-by noise test.

7. The expert from Japan presented an overview of the current noise regulations in Japan and their expected development in the future (GRB-66-08). In particular, he pointed out that Japan was reviewing the limit value for the acceleration noise of two-wheelers and hoped that these domestic considerations could be synchronized with the GRB deliberations on new limit values in the 04 series of amendments to Regulation No. 41.

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

A. Development

Documentation: ECE/TRANS/WP.29/GRB/2017/6,
ECE/TRANS/WP.29/GRB/2017/8, Informal documents GRB-66-11,
GRB-66-13, GRB-66-19, GRB-66-20 and GRB-66-21

8. On behalf of a group of experts, the expert from OICA proposed a number of amendments updating and revising the 03 series of amendments to Regulation No. 51 (ECE/TRANS/WP.29/GRB/2017/6). These proposals received comments from the experts of China, Russian Federation and Switzerland (GRB-66-11, GRB-66-13 and GRB-66-19). The expert from OICA also proposed some further modifications (GRB-66-20).

9. The expert from Italy expressed concerns about the suggested extension of the sound pressure level measurement to line BB' plus 20 m, with the aim to properly assess the possible "backfire". According to him, this modification would be a new requirement which should be introduced by means of a new series of amendments with transitional provisions, rather than by a supplement, as proposed in ECE/TRANS/WP.29/GRB/2017/6. He also pointed out that the above modification would need to be accompanied with a similar change in the relevant ISO standard. The experts from Germany, Japan, Sweden and Switzerland supported this amendment proposal in the form of a supplement. The expert of the Russian Federation supported the proposal as a supplement and agreed that Regulation No. 51 and the ISO standard should be aligned. The experts from France and EC were of the view that a new series of amendments would be more appropriate.

10. Given a large number of amendment proposals to Regulation No. 51, including the ones transmitted by the Informal Working Group (IWG) on Additional Sound Emission Provisions (ASEP) (see para. 12 below), GRB consolidated and provisionally adopted these proposals, as contained in Annex II. At the same time, GRB was not in a position to reach consensus on whether or not the adopted proposals would require a new series of amendments and/or transitional provisions. GRB decided to come back to this issue at its next session in January 2018. Meanwhile, the secretariat was requested to submit, in December 2017, the adopted text (Annex II) to WP.29 and AC.1 for consideration and vote

at their March 2018 sessions as a draft Supplement 3 to the 03 series of amendments to Regulation No. 51, upon the understanding that any possible modifications, to be decided by GRB in January 2018, could exceptionally be submitted to WP.29 as a corrigendum or addendum to the original WP.29 document.

11. The expert from ISO proposed to introduce an option of indoor testing, according to standard ISO 362-3, in Annex 3 to Regulation No. 51 (ECE/TRANS/WP.29/GRB/2017/8). This proposal received comments from the experts of France, Netherlands, Poland, Spain, Sweden and OICA. GRB decided to revert to the proposals at the next session and invited all experts to study the document and to send their questions and comments to ISO.

12. The expert from China reported on noise problems and driving conditions in China in relation to the 03 series of amendments to Regulation No. 51 (GRB-66-21). In particular, he pointed out that further research would be needed to identify a relationship between the test cycles and noise problems as well as to develop a test method which would cover both the driving behaviours and noise issues. The Chair invited IWG ASEP to address these issues in cooperation with China.

B. Additional sound emission provisions

Documentation: ECE/TRANS/WP.29/GRB/2017/5, Informal documents GRB-66-06 and GRB-66-14

13. On behalf of IWG ASEP, the expert from France presented its status report to GRB (GRB-66-14). In particular, IWG ASEP had agreed to propose some improvements in the current Annex 7 as soon as possible, as laid down in ECE/TRANS/WP.29/GRB/2017/5, and then to develop a more general and strategic approach of revising Annex 7. The expert from the Russian Federation commented on ECE/TRANS/WP.29/GRB/2017/5 (GRB-66-06). GRB agreed to merge these proposals with the other proposed amendments to the 03 series of amendments to Regulation No. 51 (see para. 9 above).

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

Documentation: Informal document GRB-66-09

14. The expert from EC introduced draft amendments on powered cycles (GRB-66-09). GRB noted that these proposals would first be endorsed at the EU level and then officially submitted to the next session of GRB. The Chair invited experts to provide their comments to the expert from EC.

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

Documentation: Informal documents GRB-66-01 and Add.1, GRB-66-03 and GRB-66-22

15. The expert from the Netherlands provided an overview of their research projects on tyres and proposed a two-stage tightening of the tyre limits for the rolling resistance coefficient, wet grip index and rolling sound emissions (GRB-66-01 and Add.1, GRB-66-03). He also highlighted the importance of keeping the correct tyre pressure for fuel efficiency and pointed out shortcomings of the EU system for labelling tyres.

16. The expert from ETRTO was of the view that the selections of tyres in the Dutch studies was not representative enough for the European market and volunteered to submit to the next GRB session a more comprehensive analysis. The expert from OICA supported the ETRTO view and proposal. He further introduced the results of a recent study of C1 summer tyres (GRB-66-22) according to which no tyre was performing equally well in rolling sound and handling. The expert from Germany acknowledged the progress achieved in rolling sound and pointed out the need to find a compromise for the three tyre parameters in question. He also agreed that the tyre labelling system would need to be improved.

17. The Chair was of the view that amending the limit values in Regulation No. 117 would first require a general agreement of all stakeholders, including the Working Party on Brakes and Running Gear (GRRF). Finally, GRB decided to continue the discussion at the next session.

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

Documentation: ECE/TRANS/WP.29/GRB/2017/7, Informal document GRB-66-16

18. The expert from EC reported on amending and supplementing the Acoustic Vehicle Alerting System (AVAS) requirements in Annex VIII to EU Regulation No. 540/2014, based on the provisions of Regulation No. 138 on Quiet Road Transport Vehicles (QRTV) and its 01 series of amendments (GRB-66-16).

19. GRB noted that the National Rule on Minimum Sound Requirements for Hybrid and Electric Vehicles in the United States of America came into force on 5 September 2017 and that the work of IWG QRTV GTR would resume shortly.

20. The expert from OICA proposed to slightly modify the wording of the transitional provisions introduced in the 01 series of amendments to Regulation No. 138 (ECE/TRANS/WP.29/GRB/2017/7). The Chair proposed to postpone consideration of this document until the adoption, at the November 2017 session of WP.29, of the Draft General Guidelines for United Nations regulatory procedures and transitional provisions in UN Regulations (ECE/TRANS/WP.29/2017/107) (see para. 30 below).

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

Documentation: Informal documents GRB-66-02 and GRB-66-07

21. GRB recalled its previous discussions and decision to draft a new Regulation on reversing alarm (ECE/TRANS/WP.29/GRB/63, paras. 3 and 4). GRB reconsidered whether this work should be conducted in the framework of a new informal working group (GRB-66-07) or by means of a task force (TF) and agreed that TF would be sufficient. The expert from Japan volunteered to take the lead, while the experts of France, Germany, Netherlands, Republic of Korea, Turkey and EC (subject to availability of resources) declared their interest in taking part in the TF activities.

22. The expert from the Republic of Korea briefed GRB on the status of domestic accidents resulting from reversing vehicles (GRB-66-02). He concluded that M₁ vehicles caused the largest number of backup collisions, while N₁ and N₂ vehicles caused the largest number of fatalities. The expert was of the view that all vehicles should be equipped with at least one safety device for moving backward, like rear view cameras, reversing alarms and parking sensors. The Chair pointed out that GRB should collaborate

with the Working Party on General Safety Provisions (GRSG), which was conducting work on rear view cameras. The experts from Germany and OICA were of the view that reversing alarms should be installed on commercial vehicles, while M₁ and N₁ vehicles should be equipped either with rear view cameras or parking sensors.

X. Collective amendments (agenda item 9)

23. 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-66-18

24. The expert from EC informed GRB about the EU activities that aim to prevent or reduce the effects of exposure to environmental noise harmful for health (GRB-66-18). According to the expert, this work is conducted in the framework of Directive 2002/49/EC which inter alia provides for a road vehicle (acoustic) classification and a road surface (acoustic) classification. To allow detailed discussions with member States and stakeholders on environmental noise policy issues, the EU Noise Expert Group (NEG) had been established. The expert wondered if there was space for exchange of information between GRB and NEG. The Chair was of the view that GRB and NEG should identify common elements for future cooperation.

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

Documentation: Informal document GRB-66-05 and Add.1

25. The expert from the Netherlands presented a project on labelling road surfaces (GRB-66-05 and Add.1) based on the following criteria: skid resistance, noise reduction, rolling resistance and lifespan. He pointed out that labelling road surfaces could contribute to road safety, public health, sustainability and economies. GRB noted that the project mainly addressed passenger cars and that for trucks a solution would still be found.

26. GRB thanked the expert for the presentation and recalled its earlier considerations (ECE/TRANS/WP.29/GRB/63, para. 24) that labelling road surfaces could only be introduced as a non-legally binding document, such as a recommendation or resolution. The expert from the Netherlands wondered whether a new annex to the Consolidated Resolution on the Construction of Vehicles (R.E.3) could be an appropriate place for that purpose. GRB also noted that WP.29 and its other subsidiary bodies, like GRRF and GRSG, as well as the Working Party on Road Transport (SC.1) might be interested in pursuing the project and should be consulted. GRB invited its experts to send their contributions, if any, to the expert from the Netherlands and to develop for the next session clear ideas on how to proceed. In the interim, the Chair was requested to brief the Administrative Committee for the Coordination of Work (WP.29/AC.2) on the GRB considerations.

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

27. 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

28. GRB noted that the proposal to change the measuring units for vehicle masses from tonnes to kilograms (GRB-65-03-Rev.1), which was agreed on at the previous session, was submitted to the October 2017 session of GRSG (ECE/TRANS/WP.29/GRSG/2017/20).

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

Documentation: ECE/TRANS/WP.29/2016/2, ECE/TRANS/WP.29/2017/8, ECE/TRANS/WP.29/2017/9

29. GRB noted that Revision 3 of the 1958 Agreement (ECE/TRANS/WP.29/2016/2) would enter into force on 14 September 2017. The secretariat drew the attention of GRB to several novelties in Revision 3, in particular, a new numbering of type approvals, approval markings and their possible replacement by the Unique Identifier (UI), unless specified otherwise in a UN Regulation.

30. The secretariat also informed GRB about the recent activities of IWG on the International Whole Vehicle Type Approval (IWVTA) and that its final official draft had been submitted to the November 2017 session of WP.29 (ECE/TRANS/WP.29/2017/8). Questions and answers on IWVTA were issued as ECE/TRANS/WP.29/2017/9.

XVI. Highlights of the March and June 2017 sessions of WP.29 (agenda item 15)

Documentation: Informal document GRB-66-04

31. The secretariat reported on the highlights of the 171st and 172nd sessions of WP.29 (GRB-66-04).

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

32. No new information was presented under this agenda item.

XVIII. Other business (agenda item 17)

Documentation: ECE/TRANS/WP.29/2017/107, Informal document GRB-66-10

33. Upon the request of WP.29, GRB considered the Draft General Guidelines for United Nations regulatory procedures and transitional provisions in UN Regulations (ECE/TRANS/WP.29/2017/107) prepared by IWG IWVTA. The expert from OICA pinpointed provision 6.1 (in square brackets) which stipulated that "a Contracting Party may apply additional national provisions for vehicle characteristics not covered by the scope of a UN Regulation". According the expert, this provision seemed to be counterproductive for the harmonization of vehicle Regulations and should be clarified. The Chair invited GRB experts to consider the Draft Guidelines and to submit their comments, if any, to the secretariat and/or to IWG IWVTA by 20 October 2017.

34. The expert from EC proposed 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-66-10). The Chair and the expert from Poland raised questions on referencing Global Technical Regulations (GTR) No. 15. The Chair also pointed out that the proposals should be accompanied with transitional provisions and invited the expert from EC to submit updated proposals to the next GRB session as an official document.

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

35. For its sixty-seventh session, scheduled to be held in Geneva from 24 (starting at 2.30 p.m.) to 26 (concluding at 5.30 p.m.) January 2018, GRB decided to keep the same structure of the provisional agenda. GRB noted that the deadline for the submission of official documents to the secretariat would be 30 October 2017, twelve weeks prior to the session. The Chair also invited experts to submit informal documents well in advance before the session.

XX. Election of officers (agenda item 19)

36. In compliance with Rule 37 of the Rules of Procedure (TRANS/WP.29/690 and ECE/TRANS/WP.29/690/Amend.1), GRB called for the election of officers. The representatives of the Contracting Parties, present and voting, elected unanimously Mr. Serge Ficheux (France) as Chair and Mr. Andrei Bocharov (Russian Federation) as Vice-Chair for the sessions of GRB scheduled for the year 2018.

Annex I

List of informal documents (GRB-66-...) 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	Netherlands	6	E	Tyres in Europe	(c)
1-Add.1	Netherlands	6	E	Tyres in Europe: presentation	(c)
2	Republic of Korea	8	E	Status of accidents resulting from reversing vehicles	(a)
3	Netherlands	6	E	Proposal for amendments to the 02 series of amendments to Regulation No.117	(c)
4	Secretariat	1, 15	E	General information and WP.29 highlights	(a)
5	Netherlands	11	E	Road surface labelling	(c)
5-Add.1	Netherlands	11	E	Road surface labelling : presentation	(c)
6	Russian Federation	4 (b)	E	Proposal for amendments to ECE/TRANS/WP.29/GRB/2017/5	(d)
7	Germany and Japan	8	E	Terms of Reference of an IWG or Task Force for a new Regulation on reverse alarm under the 1958 Agreement	(a)
8	Japan	10	E	Review of the motorcycle noise regulation in Japan	(a)
9	European Commission	5	E	Proposal for amendments to Regulation No. 63	(b)
10	European Commission	17	E	Proposal for amendments to Regulation No. 9 to introduce ASEP requirements for vehicles of L ₄ and L ₅ categories with the power-to-mass ratio (PMR) > 50 W/kg	(b)
11	Russian Federation	4 (a)	E	Proposal for amendments to ECE/TRANS/WP.29/GRB/2017/6	(d)
12	Germany	10	E	Problems with noise emissions of L-category vehicles	(a)
13	Switzerland	4 (a)	E	Proposal for amendments to ECE/TRANS/WP.29/GRB/2017/6	(d)
14	IWG ASEP	4 (b)	E	Status report	(a)
15	European Commission	10	E	Study on the Euro 5 sound level limits of L-category vehicles	(a)
16	European Commission	10	E	EU regulation on the AVAS requirements	(a)
17	Germany	10	E	Possibility of “pass-by” light noise measurement of vehicles of L-category	(a)
18	European Commission	10	E	Environmental noise in the European Union	(a)
19	China	4 (a)	E	Proposal for amendments to the 03 series of amendments to Regulation No. 51	(d)

<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/2017/6)

Paragraph 1., amend to read:

"1. Scope

This Regulation contains provisions on the sound emitted by motor vehicles and applies to vehicles of categories M and N.¹

The specifications in this Regulation are intended to reproduce the sound levels which are generated by vehicles during normal driving in urban traffic.

This regulation provides, as well, additional sound emission provisions for vehicles of categories M₁ and N₁ referring to driving conditions with extreme accelerations in an extended speed range representative for urban and suburban traffic."

Paragraph 2.8.1., amend to read:

"2.8.1. ~~"Total engine power" means the sum of all power from available propulsion sources.~~

If two or more sources of propulsive power operate at the conditions of test specified in Annex 3 to this Regulation, the total engine power, P_n, shall be the arithmetic sum of parallel propulsive engines on the vehicle.

Applicable parallel propulsive engines are those power sources, which provide forward motion to the vehicle in combination at the conditions of test, specified in Annex 3 to this Regulation.

The specified power for non-combustion engines shall be the power stated by the vehicle manufacturer."

Paragraph 2.24., table, amend to read:

"2.24. Table of symbols

Symbol	Unit	Annex	Paragraph	Explanation
...
BB'	—	Annex 3	3.1.1.	line perpendicular to vehicle travel which indicates end of zone in which to record sound pressure level during test is 10.00 m behind line PP'
v _{AA'}	km/h	Annex 3	3.1.2.1.2.	vehicle velocity when the reference point passes line AA' (see paragraph 2.11. 5.1. for definition of reference point); value to be reported and used for calculations to the first decimal place
v _{BB'}	km/h	Annex 3	3.1.2.1.2.	vehicle velocity when the reference point or rear of the vehicle passes line BB' (see

				paragraph 2.11. 5.1 for definition of reference point); value to be reported and used for calculations to the first decimal place
$v_{PP'}$	km/h	Annex 3	3.1.2.1.2.	vehicle velocity when the reference point passes line PP' (see paragraph 2.11. 5.1 for definition of reference point); value to be reported and used for calculations to the first decimal place
...
m_t (2 axles virtual)	kg	Annex 3	2.2.7.4.	test mass of a virtual vehicle with two axles (4x2 or 4x4)
v_{rf}	—	Annex 3	2.2.7.4.	vehicle with more than two axles representing the vehicle family
$m_{unladen}$ (2 axles virtual)	kg	Annex 3	2.2.7.4.	unladen vehicle mass of the virtual vehicle with two axles
m_{xload} (2 axles virtual)	kg	Annex 3	2.2.7.4.	extra loading for the virtual vehicle with two axles
$m_{ac\ ra\ max}$ (chosen)	kg	Annex 3	2.2.7.4.	Technically permissible maximum laden mass allowed for the chosen rear axle as defined in paragraph 2.2.7.4. in Annex 3

"

Add a new paragraph 2.27. to read:

"2.27. "Kickdown" means a driver initiated automated gear shift to a test condition outside the specific target conditions for the vehicle as defined in Annex 3."

Add a new paragraph 2.28. to read:

"2.28. "Prevention of downshift" means a measure by the vehicle manufacturer to ensure that the vehicle is tested within its specific target conditions as defined in Annex 3 and Annex 7."

Paragraph 3.3., amend to read:

"3.3. In the case of paragraph 2.2.2. the single vehicle, representative of the type in question, will be selected by the Technical Service conducting approval tests, in accordance with the vehicle manufacturer, ~~as that with the lowest mass in running order with the shortest length and~~ following the specification laid down in paragraph 3.1.2.2. in Annex 3."

Paragraph 6.2.3., amend to read:

"6.2.3. Additional sound emission provisions

The Additional Sound Emission Provisions (ASEP) apply only to vehicles of categories M_1 and N_1 equipped with an internal combustion engine, ~~which is operational within the control range of Annex 7.~~

...

Any electric sound enhancement system for the purpose of the exterior sound emission shall be operational during the type-approval test."

Paragraph 11.6., amend to read:

11.6 Until 30 June ~~2019~~**2022**, vehicles with a serial hybrid drive train which have a combustion engine with no mechanical coupling to the power train are excluded from the requirements of paragraph 6.2.3. above.

Annex 1, Appendix 1, paragraph 2.3.3., amend to read:

"2.3.3. If applicable, Pre-acceleration length l_{PA} (Point of the ~~acceleration~~ **accelerator depression in meter before line AA'). If the pre-acceleration length differs per gear, reporting per gear is required."**

Annex 1,

Appendix 2,

Add a new paragraph 0.2. to read:

"0.2. Type:"

The existing paragraphs 0.2. to 0.6., renumber as 0.3. to 0.7. accordingly.

Add a new paragraph 3.2.6. and subparagraphs to read:

"3.2.6. Pressure charger(s)

3.2.6.1. Make(s):"

3.2.6.2. Type(s):"

Annex 3,

Paragraph 2.1., amend to read:

"2.1. ...
The meteorological instrumentation should be positioned adjacent to the test area at a height of 1.20 m ± 0.02 m. The measurements shall be made when the ambient air temperature is within the range from 5 °C to 40 °C.

Tests carried out on request of the manufacturer at temperatures below 5° C shall be accepted as well.
..."

Paragraph 2.2.1., table, amend to read:

"2.2.1. ...

Vehicle category	Vehicle test mass
M ₁	$m_t = m_{ro} \pm 5\%$ The test mass m_t of the vehicle shall be between $0.9 m_{ro} \leq m_t \leq 1.2 m_{ro}$
N ₁	$m_t = m_{ro} \pm 5\%$ The test mass m_t of the vehicle shall be between $0.9 m_{ro} \leq m_t \leq 1.2 m_{ro}$
N ₂ , N ₃	$m_{target} = 50 \text{ [kg/kW]} \times P_n \text{ [kW]}$ Extra loading, m_{xload} , to reach the target mass, m_{target} , of the vehicle

	<p>shall be placed above the rear axle(s).</p> <p>If the test mass m_t is equal to the target mass m_{target}, the test mass m_t shall be $0.95 m_{target} \leq m_t \leq 1.05 m_{target}$</p> <p>The sum of the extra loading and the rear axle load in an unladen condition, $m_{ra \text{ load unladen}}$, is limited to 75 per cent of the technically permissible maximum laden mass allowed for the rear axle, $m_{ac \text{ ra max}}$. The target mass shall be achieved with a tolerance of ± 5 per cent.</p> <p>If the test mass m_t is lower than the target mass m_{target}, the test mass m_t shall be achieved with a tolerance of ± 5 per cent.</p> <p>If the centre of gravity of the extra loading cannot be aligned with the centre of the rear axle, the test mass, m_t, of the vehicle shall not exceed the sum of the front axle in an unladen condition, $m_{fa \text{ load unladen}}$, and the rear axle load in an unladen condition, $m_{ra \text{ load unladen}}$ plus the extra loading, m_{xload}, and the mass of the driver m_d.</p> <p>The test mass for vehicles with more than two axles shall be the same as for a two-axle vehicle.</p> <p>If the vehicle mass of a vehicle with more than two axles in an unladen condition, $m_{unladen}$, is greater than the test mass for the two-axle vehicle, then this vehicle shall be tested without extra loading.</p> <p>If the vehicle mass of a vehicle with two axles, $m_{unladen}$, is greater than the target mass, then this vehicle shall be tested without extra loading.</p>
<p>$M_2 (M \leq 3,500 \text{ kg})$</p>	<p>The test mass m_t of the vehicle shall be between $0.9m_{ro} \leq m_t \leq 1.2m_{ro}$</p>
<p>Complete $M_2 (M > 3,500 \text{ kg}), M_3$</p>	<p>If the tests are carried out with a complete vehicle having a bodywork,</p> <p>$m_{target} = 50 \text{ [kg/kW]} \times P_n \text{ [kW]}$ is calculated either in compliance with conditions above (see N_2, N_3 category)</p> <p>or</p> <p>$m_t = m_{fo}$</p> <p>The mass in running order shall be achieved with a tolerance of $\pm 10\%$.</p> <p>the test mass m_t of the vehicle shall be $0.9 m_{ro} \leq m_t \leq 1.1 m_{ro}$.</p>
<p>Incomplete $M_2 (M > 3,500 \text{ kg}), M_3$</p>	<p>If the tests are carried with an incomplete vehicle not having a bodywork,</p> <p>$m_{target} = 50 \text{ [kg/kW]} \times P_n \text{ [kW]}$ is calculated either in compliance with conditions above (see N_2, N_3 category),</p> <p>or</p> <p>the test mass m_t of the vehicle shall be $0.9 m_{ro} \leq m_t \leq 1.1 m_{ro}$.</p> <p>where</p> <p>$m_t m_{ro} = m_{chassisM2M3} + m_{xloadM2M3} = m_{fo}$</p> <p>The mass in running order shall be achieved with a tolerance of $\pm 10\%$.</p>

"

Paragraph 2.2.6., amend to read:

"2.2.6. If the vehicle is equipped with an exhaust system containing fibrous materials, ~~the exhaust system is to be conditioned before the test according to Annex 4~~ it might be necessary to carry out a conditioning test prior to testing. The provisions of Annex 4, paragraph 1 in conjunction with the flowchart (figure 2) of the appendix to Annex 4 shall be followed."

Paragraph 2.2.7.1., amend to read:

"2.2.7.1. Calculation of extra loading

...

In this case, the test mass of the vehicle is lower than the target mass

$$m_t < m_{\text{target}} \quad (13)$$

The test mass, m_t , shall be achieved with a tolerance of ± 5 per cent."

Add a new paragraph 2.2.7.4. to read:

2.2.7.4. Calculation of the test mass of a virtual vehicle with two axes:

When a vehicle family is not represented by a two-axle vehicle because it is physically not available, the vehicle family can be represented by a vehicle with more than two axes (vrf). In that case the test mass of a virtual two-axle vehicle (m_t (2 axes virtual)) can be calculated in the following way:

For the calculation of the unladen vehicle mass of the virtual two-axle vehicle ($m_{\text{unladen (2 axes virtual)}}$), take from the vehicle with more than two axes (vrf) the measured unladen front axle load ($m_{\text{fa (vrf) load unladen}}$) and the measured unladen rear axle load of that driven rear axle ($m_{\text{ra (vrf) load unladen}}$) which has the highest unladen load.

If the vehicle (vrf) has more than one front axle, take the one with the highest unladen front axle load.

$$\rightarrow m_{\text{unladen (2 axes virtual)}} = m_{\text{fa (vrf) load unladen}} + m_{\text{ra (vrf) load unladen}}$$

$$\rightarrow m_{\text{xload (2 axes virtual)}} = m_{\text{target}} - (m_d + m_{\text{unladen (2 axes virtual)}})$$

Due to the requirement that the sum of the extra loading ($m_{\text{xload (2 axes virtual)}}$) and the unladen rear axle load, $m_{\text{ra (vrf) load unladen}}$, is limited to 75 per cent of the technically permissible maximum laden mass allowed for the rear axle, $m_{\text{ac ra max (2 axes virtual)}}$, this value, $m_{\text{ac ra max (2 axes virtual)}}$, has to be chosen in such a way that it represents the rear axle of the forecasted highest production-volume in the manufacturer's variation with a technically permissible maximum laden mass allowed for the rear axle ($m_{\text{ac ra max (chosen)}}$) for the vehicle family as declared by the manufacturer.

$$\rightarrow m_{\text{ac ra max (4x2 virtual)}} = m_{\text{ac ra max (chosen)}}$$

$$\text{If } m_{\text{xload (2 axes virtual)}} \leq 0,75 m_{\text{ac ra max (chosen)}} - m_{\text{ra (vrf) load unladen}}$$

then

$$m_t \text{ (2 axes virtual)} = m_{\text{xload (2 axes virtual)}} + m_d + m_{\text{fa (vrf) load unladen}} + m_{\text{ra (vrf) load unladen}}$$

and

$$m_t (2 \text{ axles virtual}) = m_{\text{target}}$$

If $m_{\text{xload}} (2 \text{ axles virtual}) > 0,75 m_{\text{ac ra max (chosen)}} - m_{\text{ra (vrf) load unladen}}$

then

$$m_t (2 \text{ axles virtual}) = 0,75 m_{\text{ac ra max (chosen)}} + m_d + m_{\text{fa (vrf) load unladen}}$$

and

$$m_t (2 \text{ axles virtual}) < m_{\text{target}}$$

The test mass of the vehicle with more than two axles representing the vehicle family is defined as followed:

$$m_t (\text{vrf}) = m_t (2 \text{ axles virtual})$$

and the extra loading is calculated as

$$m_{\text{xload}} (\text{vrf}) = m_t (2 \text{ axles virtual}) - m_d - m_{\text{unladen}} (\text{vrf})$$

Paragraph 3.1.2.1., amend to read:

"3.1.2.1. Vehicles of category M₁, N₁ and M₂ ≤ 3,500 kg technically permissible maximum laden mass:

The path of the centreline of the vehicle shall follow line CC' as closely as possible throughout the entire test, from the approach to line AA' until the rear of the vehicle passes line BB' +20 m. ~~If the vehicle is fitted with more than two wheel drive, test it in the drive selection which is intended for normal road use.~~

..."

Paragraph 3.1.2.1.4.1. (e), amend to read:

"3.1.2.1.4.1. ...

- (c) If the acceleration value of gear ratio *i* exceeds 2.0 m/s², the first gear ratio shall be used that gives an acceleration below 2.0 m/s² unless gear ratio *i*+1 (or *i*+2, or *i*+3 or ...) provides acceleration less than *a_{urban}*. In this case, two gears, *i* and *i*+1 (or *i*+2, or *i*+3 or ...) shall be used, including the gear *i* with acceleration exceeding 2.0 m/s². In other cases, no other gear shall be used. The achieved acceleration *a_{wot}* test during the test shall be used for the calculation of the part power factor *k_p* instead of *a_{wot,ref}*.
- ~~(d) If the vehicle has a transmission in which there is only one selection for the gear ratio the acceleration test is carried out in this vehicle gear selection. The achieved acceleration is then used for the calculation of the part power factor *k_p* instead of *a_{wot,ref}*.~~
- (ed) If rated engine speed is exceeded in a gear ratio (*i*) before the vehicle passes BB' the next higher gear (*i*+1) shall be used. If the next higher gear (*i*+1) results in an acceleration below *a_{urban}*, the vehicle test speed, *v_{test}*, in the gear ratio (*i*) shall be reduced by 2.5 km/h and the gear ratio selection shall proceed as specified by the options given in this paragraph. In no case shall the vehicle test speed be reduced below 40 km/h. If the rated engine speed is exceeded in gear ratio (*i*) before the vehicle passes BB' and the vehicle test speed is

equal to 40km/h, ~~In this case,~~ the higher gear ratio (i+1) is allowed even if $a_{wot\ test}$ does not exceed a_{urban} .

The vehicle test speed in the higher gear ratio (i+1) shall be 50 km/h."

Add a new paragraph 3.1.2.1.4.3. 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)

The gear selector position for forward driving shall be used. The acceleration value $a_{wot\ test}$ shall be calculated as defined in paragraph 3.1.2.1.2.1.

The achieved acceleration $a_{wot\ test}$ shall be greater or equal to a_{urban} .

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

The achieved acceleration $a_{wot\ test}$ is then used for the calculation of the partial power factor k_p (see paragraph 3.1.2.1.3.) instead $a_{wot\ ref}$."

Paragraph 3.1.2.1.4., amend to read

"3.1.2.1.4. Gear ratio selection

...

Appendix 3, Figure ~~3a4a~~ to Figure ~~3e4e~~, give gear selection criteria and test run criteria for categories M₁ and M₂ having a technically permissible maximum laden mass not exceeding 3.500 kg and for category N₁, in a flowchart form as an aid to test operation."

Paragraph 3.1.2.1.5., amend to read:

"3.1.2.1.5. Acceleration test

The manufacturer shall define the position of the reference point in front of line AA' of fully depressing the accelerator. The accelerator shall be fully depressed (as rapidly as is practicable) when the reference point of the vehicle reaches the defined point. The accelerator shall be kept in this depressed condition until the rear of the vehicle reaches line BB'. The accelerator shall then be released as rapidly as possible. **The measurement reading shall not end before the rear of the vehicle is 20 m behind the BB' line.** The point of fully depressing the accelerator shall be reported in Addendum to the Communication form (Annex 1, Appendix 1). The Technical Service shall have the possibility of pretesting.

If the vehicle length was set according to the provisions of 3.1.2.1.2. the accelerator shall be kept in the depressed condition until the reference point reaches BB' + 5 m for front engine vehicles, and BB' + 2.5 m for mid-engine vehicles.

..."

Paragraph 3.1.2.1.6., amend to read:

"3.1.2.1.6. Constant speed test

The constant speed test shall be carried out with the same gear(s) specified for the acceleration test and a constant speed of 50 km/h with a tolerance of ± 1 km/h between AA' and BB', **or if applicable at the speed**

determined for the acceleration test according 3.1.2.1.4.1. (d) with a tolerance of ± 1 km/h between AA' and BB'."

...."

Paragraph 3.1.2.2.1., amend to read:

"3.1.2.2.1. Gear ratio selection

...

Appendix 3, Figure **4a5a** to Figure **4d5d**, give gear selection criteria and test run criteria for categories M₂ having a technically permissible maximum laden mass exceeding 3,500 kg, and for category N₂, M₃ and N₃, in a flowchart as an aid to test operation."

Appendix, flowcharts,

Figures 3a to 3e, renumber as 4a to 4e, respectively.

Figures 4a to 4d, renumber as 5a to 5d, respectively.

Figure 4a (renumbered), replace "locked gears (3.1.2.1.4.1.) See Figures 3b, 3c and 3d" by "locked gears (3.1.2.1.4.1.) See Figures 4b, 4c and 4d".

Figure 4a (renumbered), replace "non-locked gears (3.1.2.1.4.2.) See Figure 3e" by "non-locked gears (3.1.2.1.4.2.) See Figure 4e".

Figure 4b (renumbered), replace "See Case 1 in Figure 3c" by "See Case 1 in Figure 4c".

Figure 4b (renumbered), replace "See Case 2 in Figure 3c" by "See Case 2 in Figure 4c".

Figure 4c (renumbered), replace "See Case 3 in Figure 3d" by "See Case 3 in Figure 4d".

Annex 4,

Paragraph 1., amend to read:

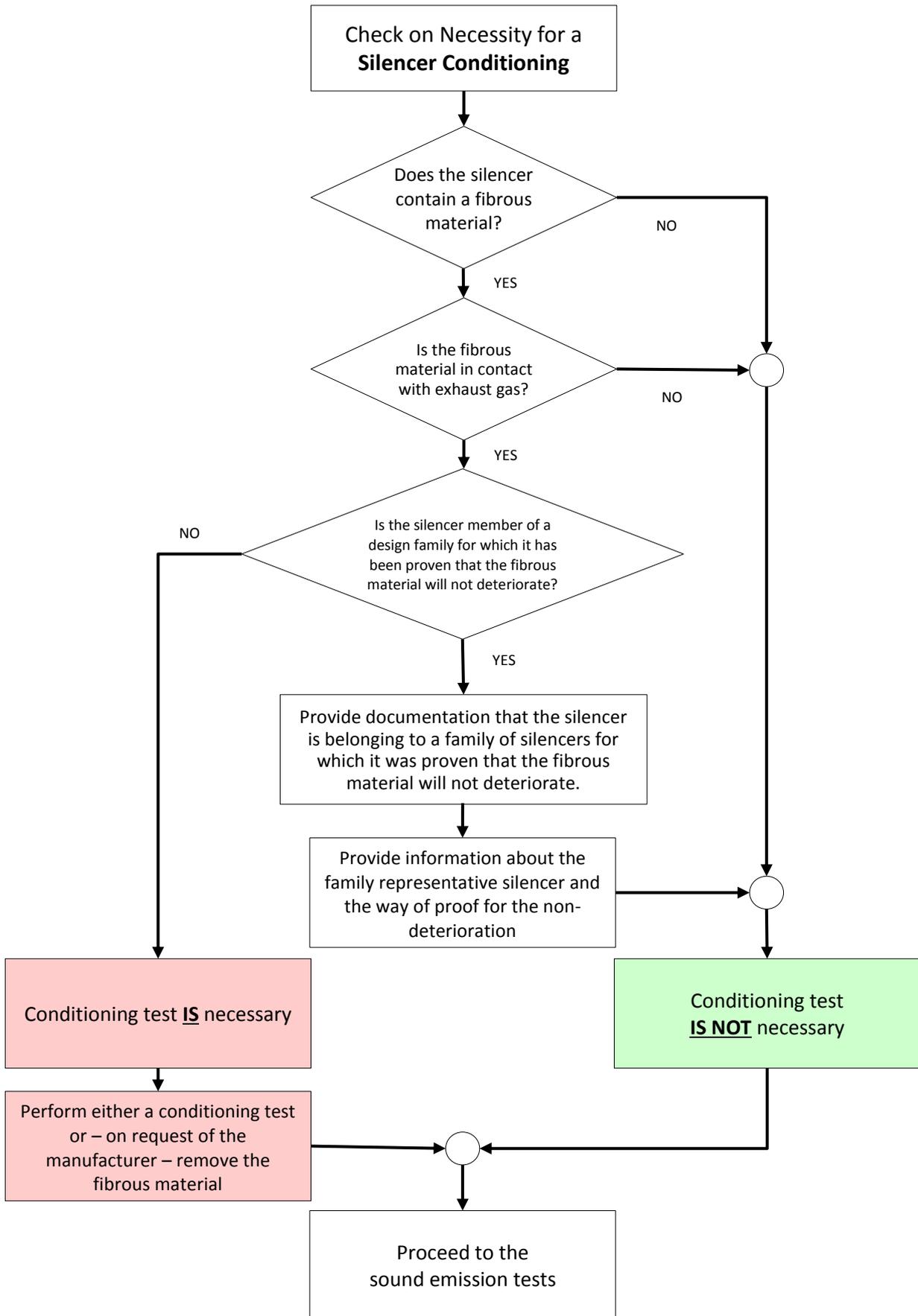
"1. General

...

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, **or - on request of the manufacturer - by removing the fibrous materials from the silencer."**

Appendix, add a new flowchart to read:

Figure 2: Flowchart for the check on the necessity for a silencer conditioning test



Annex 6,

Paragraph 2.1., amend to read:

"2.1. The vehicle(s) under test shall be subjected to the test for measurement of sound of vehicle in motion as described in paragraph 3.1. of Annex 3.

For vehicles of category M₁, N₁ and M₂ ≤ 3,500 kg technically permissible maximum laden mass,

- **the same mode, gear(s)/gear ratio(s), gear weighting factor k and partial power factor k_P as determined during the type approval process.**
- **the test mass m_t of the vehicle shall be between 0.9m_{ro} ≤ m_t ≤ 1.2m_{ro} "**

Paragraph 3., amend to read:

"3. Sampling and evaluation of the results

One vehicle shall be chosen and subjected to the tests set out in point 2. If the sound level of the vehicle tested does not exceed by more than 1 dB(A) the limit value ~~prescribed in Annex 3~~ **specified in paragraph 6.2.2. of this Regulation**, and, where appropriate, paragraph 3. of Annex 5, the vehicle type shall be considered to conform to the requirements of this Regulation.

..."

Annex 7,

Paragraph 3.1., amend to read:

"3.1. Determination of the anchor point

The anchor point is the same for each gear ratio κ falling under the control range according to paragraph 2.3. The parameters for the anchor point are taken from the acceleration test of Annex 3 as follows:

In the case the test has been carried out with two gear ratios:

L_{anchor} is the higher sound pressure level of $L_{\text{wot}(i)}$ of left and right side of gear ratio i ;

n_{anchor} is the average of $n_{\text{BB},\text{wot},i}$ of the 4 runs of gear ratio i reported from Annex 3;

In the case the test has been carried out in a single gear:

L_{anchor} is the higher sound pressure level of L_{wot} of left and right side of gear ratio selected for the test;

n_{anchor} is the average of $n_{\text{BB},\text{wot}}$ of the 4 runs of gear ratio selected for the test reported from Annex 3;"

Annex III

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>
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