United Nations ECE/TRANS/WP.29/GRB/63

Economic and Social Council

Distr.: General
8 March 2017

Original: English

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

Working Party on Noise

Sixty-fifth session
Geneva, 15-17 February 2017

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

Contents

GE.17-03779(E)
1703779

I. Attendance

1. The Working Party on Noise (GRB) held its sixty-fifth session from 15 to 17 February 2016 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): Belgium; China; France; Germany; Hungary; India; Italy; Japan; Netherlands; Norway; Poland; Republic of Korea; Russian Federation; Spain; Sweden; Switzerland; Turkey; United Kingdom of Great Britain and Northern Ireland and the United States of America. 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, Inc. (CAETS); International Motorcycle Manufacturers Association (IMMA); International Motorcycling Federation (FIM); 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/2017/1

2. GRB considered and adopted the agenda.

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

Documentation: Informal documents GRB-65-06, GRB-65-07-Rev.1, GRB-65-13, GRB-65-14, GRB-65-17 and GRB-65-19

3. The experts from Germany, Japan, Republic of Korea and Turkey outlined the present situation with reversing alarms at the national level, identified the existing problems in this field and proposed solutions (GRB-65-06, GRB-65-07-Rev.1, GRB-65-13, GRB-65-14 and GRB-65-19). The expert from the Netherlands suggested using white noise alarms that, according to him, have advantages over the traditional tonal noise alarms that beep (GRB-65-17).

4. GRB agreed that, rather than amending Regulation No. 28, a new Regulation on reversing alarm should be prepared. GRB noted that the main issues of the future Regulation would be its scope (categories of vehicles), the possible existence of a pause switch and the alarm sound composition (sound levels and frequencies). GRB agreed that there was no need to establish a new informal working group and that the initial drafting would be carried out by a small group (task force) of interested parties. The expert from Germany volunteered to steer the work of the task force with the assistance of OICA. The experts from Japan and Turkey pointed out that, if need be, they could also act as sponsors.

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

Documentation: Informal documents GRB-65-11 and GRB-65-18

5. The expert from France identified the missing value of 1 dB(A) in the French version of paragraph 1.4.1. of Annex 3 (GRB-65-11). GRB requested the secretariat to correct this mistake by issuing an erratum.

6. 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 does not cover motorcycles with a sidecar (L_4 category of vehicles) (GRB-65-18). The expert from EC requested more time to study if the proposed modification would also require a change in the European Union (EU) legislation. GRB agreed to continue consideration of this issue at the next session, based on an official document to be submitted by IMMA.

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

A. Development

Documentation: Informal documents GRB-65-01, GRB-65-02, GRB-65-04, GRB-65-10 and GRB-65-12

7. The expert from France proposed to correct some inconsistences in the 03 series of amendments to Regulation No. 51 (GRB-65-10). The experts from China and OICA pointed out that more corrections would be necessary. GRB invited all interested experts to cooperate on this issue with a view to preparing a consolidated official document for the next session.

8. The expert from Germany proposed to clarify the wording of paragraph 6.2.2. "Sound level limits" (GRB-65-01). GRB adopted this proposal, as contained in Annex II, and requested the secretariat to submit it to the World Forum for Harmonization of Vehicle Regulations (WP.29) and the Administrative Committee (AC.1) for consideration and vote at their June 2017 sessions as a draft Supplement 2 to the 03 series of amendments to Regulation No. 51.

9. The expert from ISO proposed to introduce indoor testing in Annex 3 of Regulation No. 51 as an option (GRB-65-04). This proposal received comments from the experts of France, Germany, Poland, Russian Federation, EC and OICA. The Chair invited these experts, as well as other interested parties, to review the ISO proposal and to submit a revised document to the next session.

10. The expert from France identified a number of ambiguous provisions in the current text of the 03 series of amendments to Regulation No. 51 that would allow different interpretations (GRB-65-12). He suggested that an implementation or interpretation guide be prepared to address these issues. The expert of OICA welcomed this initiative and pointed out that OICA had started compiling its own list of ambiguities. Following an exchange of views, GRB invited the experts from France, ISO and OICA to prepare a consolidated list of such issues for GRB review and envisaged that further work could be pursued in the framework of a small drafting group.

11. The expert from China reported issues that had been identified when applying the 03 series of amendments to Regulation No. 51 to M_3 vehicles with different powertrain options. In particular, he was of the view that the Regulation should be amended with new provisions that would take into account the specific features of electric and hybrid vehicles.

B. Additional sound emission provisions

Documentation: ECE/TRANS/WP.29/GRB/2017/2, Informal documents GRB-65-24, GRB-65-25 and GRB-65-26

12. On behalf of the Informal Working Group (IWG) on Additional Sound Emission Provisions (ASEP), the expert from France introduced proposals for Supplement 2 to the 03 series of amendments to Regulation No. 51 (ECE/TRANS/WP.29/GRB/2017/2, GRB-65-25 and GRB-65-26). GRB adopted these proposals, as laid down in Annex III, and requested the secretariat to submit them to WP.29 and AC.1 for consideration and vote at their June 2017 sessions as a draft Supplement 2 to the 03 series of amendments to Regulation No. 51.

13. The expert from France also presented a status report of IWG ASEP to GRB (GRB-65-24), together with a detailed work plan and timeline of future activities. The Chair invited all experts to contribute to the work of IWG ASEP.

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

Documentation: Informal document GRB-65-09

14. The expert from EC introduced draft amendments on powered cycles (GRB-65-09), including definitions of new subcategories L1-A and L1-B, with a view to aligning Regulation No. 63 with the EU legislation. The experts from Germany and the Netherlands pointed out that the overwhelming majority of powered cycles were electric and questioned the need for the proposed amendments. The expert of Japan called for a prudent approach when and if introducing new categories of vehicles, because other Regulations might be affected as well. GRB was of the view that more time would be needed to study the proposal and invited the expert from EC to issue it as an official document for the next session.

VII. Regulation No. 92 (Replacement exhaust silencing systems for motorcycles) (agenda item 6)

15. As no issues were considered under this agenda item, GRB agreed not to include it in the provisional agenda of the next session.

VIII. Regulation No. 117 (Tyre rolling resistance, rolling noise and wet grip) (agenda item 7)

16. No new information was presented under this item.

IX. Regulation No. 138 (Quiet road transport vehicles) (agenda item 8)

Documentation: Informal documents GRB-65-05 and GRB-65-23

17. The expert from EC briefed GRB on preparing a new EU Regulation aimed to amend and supplement the Acoustic Vehicle Alerting System (AVAS) requirements in Annex VIII to EU Regulation No. 540/2014, based on the provisions of Regulation

No. 138 and its 01 series of amendments (GRB-65-05). GRB noted the legal complications stemming from the fact that the so-called AVAS 'pause switch' was mandatory in EU Regulation No. 540/2014, optional in the original version of Regulation No. 138 and then prohibited in its 01 series of amendments.

18. The expert from the United States of America, in his capacity of Chair of IWG on Quiet Road Transport Vehicle (QRTV) Global Technical Regulation (GTR), informed GRB that the National Rule on Minimum Sound Requirements for Hybrid and Electric Vehicles had been published in November 2016. He reported on the national procedures for the entry into force of the National Rule and pointed out that its effective date of implementation would be 21 March 2017.[1] He further indicated his intention to convene the next session of IWG QRTV GTR shortly after that date. GRB also noted that WP.29 had agreed to extend the mandate of IWG QRTV GTR until December 2018.

19. 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 (GRB-65-23). Following a brief exchange of comments, GRB invited OICA to submit an official document for consideration at the next session.

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 documents GRB-65-16 and Add.1, GRB-65-27

21. The experts from EC informed GRB about an ongoing study on Euro 5 sound level limits of L-category vehicles (GRB-65-16 and Add.1), with the aim to investigate the potential for lower limits and to prepare justified proposals for amendments to EU Regulation No. 168/2013 and, at a later stage, to UN Regulations Nos. 9, 41 and 63. According to the experts, the study had been launched in response to frequent complaints from citizens over the excessive levels of sound emissions from L-category vehicles, which were often perceived as disturbing and harmful noise for the public health.

22. The experts of Germany, Netherlands, IMMA and OICA pointed out that the underlying problems were not because of the prescribed limits for new vehicles, but due to retrofitting and tampering with silencers of the vehicles in use. Thus, these experts were of the view that only reducing the sound level limits in the above Regulations would not improve the situation, unless accompanied by efficient enforcement measures and market surveillance. GRB agreed to study the relevant documents and to monitor the developments at the EU level.

23. The expert from the Netherlands introduced a summary of various initiatives to reduce noise emissions from road traffic (GRB-65-27) which addressed different sources of noise (road surfaces, tyres and powertrain). He reiterated the benefits of better tyres and maintaining the correct tyre pressure for road safety and fuel efficiency. Finally, he pointed out that excessive drivers' reliance on the Tyre Pressure Monitoring System (TPMS) might be counter-productive. GRB thanked the Dutch expert and noted that these initiatives had already been considered by GRB on various occasions and that some of

[1] www.regulations.gov/docket?D=NHTSA-2016-0125

them fall under the competence of other bodies. For example, the Chair indicated that tyre labelling and TPMS should be addressed by, respectively, EU and the WP.29 Working Party on Braking and Running Gear (GRRF). The Chair also recalled the GRB position that it would premature to tighten the current tyre noise limits in Regulation No. 117.

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

Documentation: Informal documents GRB-65-20, GRB-65-21, GRB-65-22 and Add.1

24. The expert from the Netherlands presented a project on labelling road surfaces (GRB-65-20, GRB-65-21, GRB-65-22 and Add.1) based on four criteria: skid resistance, noise reduction, rolling resistance and lifespan. According to the expert, labelling road surfaces could contribute to road safety, public health, sustainability and economics. GRB noted that the scope of the 1958 and the 1998 Agreements (wheeled vehicles, equipment and parts thereof) does not cover road surfaces and, therefore, no legally binding regulatory decisions could be taken at the WP.29, AC.1 or AC.3 levels. This does not preclude, however, adopting a Recommendation or Resolution on the issue. GRB welcomed the presentation and reiterated the importance of a holistic approach to sound emissions in the system 'tyre-road surface'. Finally, GRB agreed to keep this item on the agenda and looked forward to new presentations on activities conducted at the national level in the field of road surfaces.

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

25. GRB noted that an alternative abbreviation for ‘Replacement Exhaust Silencing System’ (RESS) was proposed in draft Supplement 2 to the 01 series of amendments to Regulation No. 92 (ECE/TRANS/WP.29/2017/5) which had been submitted for consideration to the March 2017 session of WP.29.

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

Documentation: Informal document GRB-65-03-Rev.1

26. The expert from the Russian Federation proposed to change the measuring units for vehicle masses from tonnes to kilograms in the Consolidated Resolution on the Construction of Vehicles (R.E.3, ECE/TRANS/WP.29/78/Rev.4) (GRB-65-03-Rev.1). GRB supported the proposal and requested the secretariat to circulate it to other WP.29 Working Parties, in particular, to Working Party on General Safety (GRSG) at its April 2017 session.

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

27. The secretariat informed GRB about the recent activities of the Subgroup on UN Regulation No. 0 on IWVTA and that its final official draft would be submitted to the June 2017 session of WP.29. GRB also noted that, in December 2016, the European Union had formally transmitted Revision 3 of the 1958 Agreement (ECE/TRANS/WP.29/2016/2) to the United Nations Office for Legal Affairs (OLA) and that its entry into force was scheduled for mid-September 2017.

XVI. Highlights of the November 2016 session of WP.29 (agenda item 15)

Documentation: ECE/TRANS/WP.29/1126, Informal document GRB-65-08

28. The secretariat reported on the highlights of the 170th session of WP.29 (GRB-65-08).

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

Documentation: Informal document GRB-65-15

29. The Chair presented a revised list of possible issues for the future GRB activities compiled at several informal meetings (GRB-65-15). GRB invited experts to submit their comments in writing to the Chair.

XVIII. Other business (agenda item 17)

30. No issues were considered under this agenda item.

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

31. For its sixty-sixth session, scheduled to be held in Geneva from 4 (starting at 2.30 p.m.) to 6 (concluding at 5.30 p.m.) September 2017, GRB noted that the deadline for the submission of official documents to the secretariat would be 9 June 2017, twelve weeks prior to the session. The following provisional agenda was adopted:

1. Adoption of the agenda.
2. Regulation No. 28 (Audible warning devices).
3. Regulation No. 41 (Noise of motorcycles): Development.
4. Regulation No. 51 (Noise of M and N categories of vehicles):
   (a) Development;
   (b) Additional sound emission provisions.
5. Regulation No. 63 (Noise emissions of mopeds).

6. Regulation No. 117 (Tyre rolling noise and wet grip adhesion).
7. Regulation No. 138 (Quiet road transport vehicles).
8. Draft Regulation on reversing alarm.
9. Collective amendments.
10. Exchange of information on national and international requirements on noise levels.
11. Influence of road surface on tyre rolling sound emissions.
12. Acronyms and abbreviations in Regulations under the responsibility of GRB.
13. Proposal for amendments to the Consolidated Resolution on the Construction of Vehicles.
14. Development of the International Whole Vehicle Type Approval (IWVTA) system and involvement of the Working Parties (GRs) in it.
15. Highlights of the March and June 2017 sessions of WP.29.
16. Exchange of views regarding the future work of GRB.
17. Other business.
18. Provisional agenda for the sixty-seventh session.
19. Election of officers

Annex I

List of informal documents (GRB-65-…) distributed during the session

Symbol	*Transmitted by*	*Agenda item*	*Language*	*Title*	*Follow-up*
1	Germany	4 (a)	E	Proposal for correction to ECE/TRANS/WP.29/2015/62	(d)
2	China	4 (a), 9 and 16	E	Research on M_3 sub-categories of Regulation No. 51-03	(a)
3-Rev.1	Russian Federation	13	E	Proposal for amendments to the Consolidated Resolution on the Construction of Vehicles (R.E.3)	(d)
4	ISO	4 (b)	E	Proposals to introduce indoor testing in Regulation No. 51, Revision 3	(b)
5	European Commission	8	E	EU Regulation on AVAS requirements	(a)
6	Japan	2	E	Pre-study for the discussion on reversing alarm systems: Japanese current situation	(c)
7-Rev.1	Germany and Japan	2	E	Reverse alarm of M- and N-vehicles	(c)
8	Secretariat	1, 15	E	General information and WP.29 highlights	(a)
9	European Commission	5	E	Proposal for amendments to Regulation No. 63	(b)
10	France	4 (a)	E	Proposal for correction to the 03 series of amendments to Regulation No. 51	(b)
11	France	3	E	Proposal for correction to the 04 series of amendments to Regulation No. 41	(a)
12	France	4, 17	E	Some proposals for interpretation of Regulation No. 51-03	(c)
13	Turkey	2	E	Proposal for amendment to Regulation No. 28 on reversing audible warning devices	(c)
14	Turkey	2	E	Reversing audible warning devices for M- and N-vehicles	(c)
15	Chair	16	E	GRB subjects for the future	(c)
16	European Commission	10	E	Study on Euro 5 sound level limits of L-category vehicles	(c)
16-Add.1	European Commission	10	E	Study on Euro 5 sound level limits of L-category vehicles	(c)
17	Netherlands	2	E	Additional information on reversing alarms	(c)
18	IMMA	3	E	Proposal for amendment to Regulation No. 41-04	(b)
19	Republic of Korea	2	E	Reversing alarm	(c)
20	Netherlands	11	E	Labelling road surfaces: benefits and necessity	(a)

Symbol	*Transmitted by*	*Agenda item*	*Language*	*Title*	*Follow-up*
21	Netherlands	11	E	Labelling road surfaces: numerical substantiation	(a)
22	Netherlands	11	E	Labelling road surfaces	(a)
22-Add.1	Netherlands	11	E	Labelling road surfaces: presentation	(a)
23	OICA	8	E	Proposal for a new Supplement to the 01 series of amendments to Regulation No. 138	(b)
24	IWG ASEP	4 (b)	E	Progress report	(a)
25	IWG ASEP	4 (b)	E	Presentation of ECE/TRANS/WP.29/GRB/2017/2	(d)
26	IWG ASEP	4 (b)	E	Modifications proposed to ECE/TRANS/WP.29/GRB/2017/2	(d)
27	Netherlands	10	E	Push and pull for noise emission reduction from road traffic in the Netherlands and EU	(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

Paragraph 6.2.2., amend to read:

"6.2.2. Sound level limits

The sound level measured in accordance with the provisions of paragraph 3.1. of Annex 3 to this Regulation, mathematically rounded to the nearest integer value, shall not exceed the following limits:

…"

Annex III

Adopted amendments to Regulation No. 51 (based on ECE/TRANS/WP.29/GRB/2017/2)

Paragraph 2.18., amend to read:

"2.18. Gear[2]

2.18.1. "*Gear ratios*"

2.18.1.1. "*Internal gearbox ratio*" means the ratios of engine to gearbox output shaft revolutions.

2.18.1.2. "*Final drive ratio*" means the ratio(s) of gearbox output shaft to driven wheel revolutions.

2.18.1.3. "*Total gear ratio*" means the ratios between vehicle speed and engine speed during the passage of the vehicle through the test track.

2.18.1.4. "*Gear ratio*" used in context with vehicles tested according to 3.1.2.1. of Annex 3 and Annex 7 is the total gear ratio as defined in 2.18.1.3. above.

2.18.2. "*Locked gear ratio*" means the control of the transmission such that the gear will not change during a test.

2.18.3. "*Gear*" means in the context of this Regulation a discrete gear ratio either selectable by the driver or by an external device.

2.18.4. For vehicles tested according 3.1.2.1. of Annex 3 and Annex 7, "g*ear*$_i$" and "*gear*$_{i+1}$" are defined as two gears in sequence, where gear$_i$ either provides an acceleration within the 5 per cent tolerance according to paragraph 3.1.2.1.4.1. (a) of Annex 3 or an acceleration greater than the reference acceleration, and gear$_{i+1}$ an acceleration lower than the reference acceleration according to paragraph 3.1.2.1.4.1. (b) or (c) of Annex 3.

Paragraph 2.24., amend to read:

"2.24. Table of symbols

Symbol	*Unit*	*Annex*	*Paragraph*	*Explanation*
…	…	…	…	…
$v_{AA'\_ASEP}$	km/h	Annex 7	2.3.	Target vehicle velocity for test point P1 of the assessment method according paragraph 2.4
$v_{BB'\_ASEP}$	km/h	Annex 7	2.3.	Target vehicle velocity for test point P4 of the assessment method according paragraph 2.4

[2] *Note:* The common understanding of a "low gear" or a "high gear" shall not apply to gear ratios. For example, the lowest gear for forward driving, the first gear, has the highest gear ratio of all forward driving gears. While manual transmission has discrete gears, many non-manual transmissions can have more gear ratios engaged by the control unit of the transmission.

Symbol	*Unit*	*Annex*	*Paragraph*	*Explanation*
P_j	—	Annex 7	2.4.	test point(s) under ASEP
j	—	Annex 7	2.4.	index for the test points under ASEP
v_{BB_j}	km/h	Annex 7	2.4.	vehicle test speed at BB' for a particular ASEP test point
$a_{wot,test,\ \kappa j}$	m/s^2	Annex 7	2.5.	acceleration at wide-open throttle achieved in gear κ and at test point j
$L_{wot,\kappa j}$	dB(A)	Annex 7	2.5.	sound pressure level measured for a gear κ and at a test point j; value to be reported and used for calculations to the first decimal place
$n_{BB,\kappa j}$	1/min	Annex 7	2.5.	vehicle test engine speed at BB' for a gear κ and at test point j
$v_{AA,\kappa j}$	km/h	Annex 7	2.5.	vehicle test speed at AA' for a gear κ and at test point j; value to be reported and used for calculations to the first decimal place
$v_{BB,\kappa j}$	km/h	Annex 7	2.5.	vehicle test speed at BB' for a gear κ and at test point j; value to be reported and used for calculations to the first decimal place
$v_{PP,\kappa j}$	km/h	Annex 7	2.5.	vehicle test speed at PP' for a gear κ and at test point j; value to be reported and used for calculations to the first decimal place
L_{anchor}	dB(A)	Annex 7	3.1.	reported vehicle sound pressure level for gear ratio i from Annex 3; value to be reported and used for calculations to the first decimal place
…	…	…	…	…
$L_{\kappa j}$	dB(A)	Annex 7	3.5.	sound pressure level measured for a gear κ and at a test point j; value to be reported and used for calculations to the first decimal place
k_{P_ASEP}	—	Annex 7	4.2.1.	partial power factor determined for the L_{urban} principle of ASEP
L_{wot_ASEP}	dB(A)	Annex 7	4.2.1.	vehicle sound pressure level measured for the L_{urban} principle of ASEP; value to be reported and used for calculations to the first decimal place
$L_{urban\_measured\_ASEP}$	dB(A)	Annex 7	4.2.1.	interim result for calculation of ΔL_{urban_ASEP}; value to be reported and used for calculations to the first decimal place

Symbol	*Unit*	*Annex*	*Paragraph*	*Explanation*
$L_{urban\_normalized}$	dB(A)	Annex 7	4.2.1.	interim result for calculation of ΔL_{urban_ASEP}; value to be reported and used for calculations to the first decimal place
ΔL_{urban_ASEP}	dB(A)	Annex 7	4.2.1.	estimated deviation from urban sound pressure level; value to be reported to the first decimal place
α	—	Annex 7	5.2	gear to be determined for the reference sound assessment according to the type of transmission
L_{ref}	dB(A)	Annex 7	5.3.	reference sound pressure level for reference sound assessment; value to be reported and used for calculations to the first decimal place
…	…	…	…	…
$n_{BB'\_ref}$	1/min	Annex 7	5.3.	Reference vehicle test engine speed for reference sound assessment
$v_{BB'\_ref}$	km/h	Annex 7	5.3.	reference vehicle test speed for reference sound assessment[3]

Insert a new paragraph 2.25., to read:

"2.25. Modes

2.25.1. "*Mode*" means a distinct driver-selectable condition which does affect the sound emission of the vehicle."

Insert a new paragraph 2.26., to read:

"2.26. Stable acceleration

2.26.1. "*Stable acceleration*" applicable when acceleration needs to be calculated is given when the acceleration ratio between $a_{wot\_testPP\text{-}BB}$ and $a_{wot\ test}$ is less than or equal to 1.2.

2.26.2. "*Unstable acceleration*" means a deviation from the stable acceleration during acceleration.

2.26.2.1. Unstable acceleration might occur as well during the start of acceleration from low speeds when the powertrain will react by bumping and jerking on the acceleration request."

Paragraph 6.2.3.3., amend to read:

"6.2.3.3. In applying for type approval, the manufacturer shall provide a statement, in conformity with Appendix 1 of Annex 7, that the vehicle type to be approved complies with the requirements of paragraph 6.2.3. of this Regulation."

[3] All subsequent rows of the table are being deleted (*note by the secretariat*).

Annex 3, paragraph 3.1.2.1.4.1., amend to read:

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

…

In the case of a vehicle not exempted from ASEP according to paragraph 6.2.3., gear i shall be tested and values reported ($L_{wot\ i,}$ $n_{wot,BB\ i}$ $v_{wot,BB\ i}$) in order to perform tests of Annex 7."

Annex 7, amend to read:

"Annex 7

Measuring method to evaluate compliance with the Additional Sound Emission Provisions

Only applicable for vehicles as specified in paragraph 6.2.3. of this Regulation.

1. General (see the flowchart in Appendix 2, Figure 1)

This annex describes a measurement method to evaluate compliance of the vehicle with the additional sound emission provisions (ASEP) conforming to paragraph 6.2.3. of this Regulation.

It is not mandatory to perform actual tests when applying for type-approval. The manufacturer shall sign the declaration of compliance set out in Appendix 1. The approval authority may ask for additional information about the declaration of compliance and carry out the tests described below.

The procedure set out in this annex requires the performance of a test in accordance with Annex 3.

If the tests according to Annex 7 are carried out in the course of type approval, all tests either for Annex 3 and for Annex 7 shall be carried out on the same test track and under similar environmental conditions.[4]

If Annex 7 tests are carried out when type approval has already been granted, e.g. during tests for conformity of production or for in-use compliance, the tests in motion specified in Annex 3 shall be carried out with 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.

2. Measurement method (see the flowchart in Appendix 2, Figure 3)

2.1. Measurement instruments and condition of measurements

Unless otherwise specified, the measurement instruments, the conditions of the measurements and the condition of the vehicle are equivalent to those specified in Annex 3, paragraphs 1. and 2.

[4] Measurements for Annex 7 for a particular vehicle type may be carried out on a different test tracks or under different environmental conditions, each according to the provisions of this Regulation, if the test results L_{woti} and L_{crsi} for the $gear_i$, representing the anchor point, do not differ by more the +/- 1.0 dB from the test results at the time when the tests according to Annex 3 have been carried out.

If the vehicle has different modes which affect sound emission, all modes shall comply with the requirements in this annex. In the case where the manufacturer has performed tests to prove to the approval authority compliance with the above requirements, the modes used during those tests shall be reported in a test report.

2.2. Method of testing

Unless otherwise specified, the conditions and procedures of Annex 3 shall be used. For the purpose of this annex, one run per test condition is measured and evaluated.

2.3. Control range

The ASEP requirements apply to every gear ratio κ that leads to test results within the control range as defined below.

Vehicle speed V_{AA_ASEP}: $v_{AA} \geq 20$ km/h

Vehicle acceleration a_{WOT_ASEP}: $a_{WOT} \leq 5.0$ m/s^2

Engine speed n_{BB_ASEP} $n_{BB} \leq 2.0 * PMR^{-0.222} * S$ or

$n_{BB} \leq 0.9 * S$, whichever is the lowest

Vehicle speed V_{BB_ASEP}:

If the vehicle in the lowest valid gear does not achieve the maximum engine speed n_{BB_ASEP} below 70 km/h, increase the vehicle speed in that gear to reach the maximum engine speed n_{BB_ASEP}, but not beyond 80 km/h.

For any other gear, the maximum vehicle speed is 70 km/h.

For vehicles tested in non-locked transmission conditions, the maximum vehicle speed is 80 km/h.

Gears $\kappa \leq$ gear i as determined in Annex 3

Transmission conditions:

Annex 3 gear selection	*Annex 7 gear selection*
Locked	$Gear_i$, $gear_{i-1}$,…
Non-locked	Non-locked

2.4. Target conditions

The sound emission shall be measured in each valid gear ratio at the four test points as specified below. For all test points the boundary conditions as specified in paragraph 2.3. shall be met.

The gear ratio is valid if all four points and the anchor point meet the specifications of paragraph 2.3. above. Any gear ratio for which this criteria is not fulfilled is invalid and not analysed further.

The first test point P_1 is defined by using an entry speed $v_{AA,\kappa 1}$ of 20 km/h $\leq v_{AA,\kappa 1} <$ 20 km/h + 3 km/h.

For P_1, if a stable acceleration condition cannot be achieved according to 2.26.2.1. in the definition section of this Regulation, the speed $v_{AA,\kappa 1}$ shall be increased in steps of 5 km/h until a stable acceleration is reached.

For all points, if a stable acceleration condition cannot be achieved according to 2.26.1. the acceleration $a_{wot\_testPP\text{-}BB}$ shall be calculated according the formula given in paragraph 3.1.2.1.2 of Annex 3.

In case of non-locked transmission conditions where n_{BB_ASEP} is exceeded during the test, the following measures shall be considered separately or together:

- provisions of paragraph 2.5.1.
- increased speed in steps of 5 km/h.

The test speed for the fourth test point P_4 in any gear is defined by either

- $0.95 \times n_{BB\_ASEP} \leq n_{BB,к4} \leq n_{BB\_ASEP}$ or
- $v_{BB\_ASEP} - 3 \text{ km/h} \leq V_{BB,к4} \leq V_{BB\_ASEP}$ with V_{BB_ASEP} as defined in paragraph 2.3.

The test speed for the other two test points is defined by the following formula:

Test Point P_j: $v_{BB,кj} = v_{BB,к1} + ((j - 1) / 3) * (v_{BB,к4} - v_{BB,к1})$ for j = 2 and 3 with a tolerance of ±3 km/h

Where:

$v_{BB,к1}$ = vehicle speed at BB' of test point P_1

$v_{BB,к4}$ = vehicle speed at BB' of test point P_4

2.5. Test of the vehicle

2.5.1. The path of the centreline of the vehicle shall follow line CC' as closely as possible throughout the entire test, starting from the approach of the reference point according to definition 2.11. of the main body to line AA' until the rear of the vehicle passes line BB'.

At line AA' the accelerator shall be fully depressed. To achieve a more stable acceleration or to avoid a downshift between line AA' and BB' pre-acceleration before line AA' may be used according to the provisions of paragraphs 3.1.2.1.2.1. and 3.1.2.1.2.2. of Annex 3. The accelerator shall be kept in depressed condition until the rear of the vehicle reaches line BB'.

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.

2.5.2. Measurements reading:

Per test point, one single run is carried out.

For every separate test run, the following parameters shall be determined and noted:

The maximum A-weighted sound pressure level of both sides of the vehicle, indicated during each passage of the vehicle between the two lines AA' and

BB', shall be mathematically rounded to the first decimal place ($L_{wot,\kappa j}$). If a sound peak obviously out of character with the general sound pressure level is observed, the measurement shall be discarded. Left and right side may be measured simultaneously or separately**.** For further processing, the higher sound pressure level of both sides shall be used.

The vehicle speed readings at AA', PP' and BB' shall be rounded and reported with the first significant digit after the decimal place. ($v_{AA,\kappa j}$; $v_{PP,\kappa j}$; $v_{BB,\kappa j}$)

If applicable, the engine speed readings at BB' shall be reported as a full integer value ($n_{BB,\kappa j}$).

2.5.3. The calculated acceleration shall be determined in accordance to the formula in paragraph 3.1.2.1.2. of Annex 3 and reported to the second digit after the decimal place ($a_{wot,test,\kappa j}$).

3. Analysis method 1: Slope-Assessment

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:

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

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

3.2. Slope of the regression line for each gear ratio κ

The sound measurements shall be evaluated as function of engine speed according to paragraph 3.2.1.

3.2.1. Calculation of the slope of the regression line for each gear ratio κ

The linear regression line is calculated using the anchor point and the four correlated additional measurements with the results for engine speeds and sound levels as reported under 2.5.2. of this annex.

$$Slope_k = \frac{\sum_{j=1}^{5}(n_j - \bar{n})(L_j - \bar{L})}{\sum_{j=1}^{5}(n_j - \bar{n})^2} \text{ (in dB(A)/1,000 min}^{-1}\text{)}$$

$$\text{With } \bar{L} = \frac{1}{5}\sum_{j=1}^{5} L_j \text{ and } \bar{n} = \frac{1}{5}\sum_{j=1}^{5} n_j \text{ ;}$$

where n_j = engine speed measured at line BB'

3.2.2. Slope of the regression line for each gear ratio κ

The $slope_\kappa$ of a particular gear for the further calculation is the derived result of the calculation in paragraph 3.2.1. rounded to the first decimal place, but not higher than 5 dB(A)/1,000 min^{-1}.

In case of non-locked conditions, if $Slope_{\kappa} < 0$, the selected transmission setup is not valid. In that case the L_{urban}-Assessment as specified in paragraph 4. shall be applied.

3.3. Calculation of the linear sound level increase expected for each measurement

The sound level $L_{ASEP,\kappa j}$ for measurement point j and gear ratio κ shall be calculated using the engine speeds measured for each measurement point, using the slope specified in paragraph 3.2. above to the specific anchor point for each gear ratio.

For $n_{BB\_\kappa,j} \leq n_{anchor}$**:**

$L_{ASEP\_\kappa,j} = L_{anchor} + (Slope_{\kappa} - Y) * (n_{BB\_\kappa,j} - n_{anchor}) / 1{,}000$

For $n_{BB\_\kappa,j} > n_{anchor}$**:**

$L_{ASEP\_\kappa,j} = L_{anchor} + (Slope_{\kappa} + Y) * (n_{BB\_\kappa,j} - n_{anchor}) / 1{,}000$

Where Y= 1

3.4. Additional samples

On request of the type approval authority, two additional runs within the boundary conditions according to paragraph 2.3. of this annex shall be carried out.

3.5. Specifications

Every individual sound measurement shall be evaluated.

The sound level of every specified measurement point shall not exceed the limits given below:

$$L_{\kappa j} \leq L_{ASEP\_\kappa,j} + x$$

With:

x = 3 dB(A) + limit value[5] - L_{urban} for vehicle tested with non-locked transmission conditions

x = 2 dB(A) + limit value[5] - L_{urban} for vehicles tested with locked transmission conditions

If the measured sound level at a point exceeds the limit, two additional measurements at the same point shall be carried out to verify the measurement uncertainty. The vehicle is still in compliance with ASEP, if the average of the three valid measurements at this specific point fulfils the specification.

4. Analysis method 2: L_{urban} Assessment

4.1. General

This evaluation procedure is an alternative selected by the vehicle manufacturer to the procedure described in paragraph 3. of this annex and is applicable for all vehicle technologies. It is the responsibility of the vehicle manufacturer to determine the correct manner of testing. Unless otherwise

[5] As applicable for the approved type of vehicle

specified, all testing and calculation shall be as specified in Annex 3 to this Regulation.

The measurement method is defined in paragraph 2. Each testing point shall be evaluated individually.

4.2. Calculation of ΔL_{urban_ASEP}

4.2.1. Data-processing

From any L_{wot_ASEP} as measured according to this annex, ΔL_{urban_ASEP} shall be calculated as follows:

(a) Calculate $a_{wot\_test\_ASEP}$ using acceleration calculation from paragraph 3.1.2.1.2.1. or 3.1.2.1.2.2. of Annex 3 to this Regulation, as applicable;

(b) Determine the vehicle speed (v_{BB_ASEP}) at BB during the L_{wot_ASEP} test;

(c) Calculate k_{P_ASEP} as follows:

$k_{P\_ASEP} = 1 - (a_{urban} / a_{wot\_test\_ASEP})$

Test results where $a_{wot\_test\_ASEP}$ are less than a_{urban} shall be disregarded.

(d) Calculate $L_{urban\_measured\_ASEP}$ as follows:

$L_{urban\_measured\_ASEP} = L_{wot\_ASEP} - k_{P\_ASEP} * (L_{wot\_ASEP} - L_{crs\ rep})$

For further calculation, use the L_{urban} from Annex 3 to this Regulation without rounding, including the digit after the decimal (xx.x).

(e) Calculate $L_{urban\_normalized}$ to normalize the speed from v_{BB_ASEP} to 50 km/h as follows:

$L_{urban\_normalized} = L_{urban\_measured\_ASEP} - (0.15 * (V_{\_BB\_ASEP} - 50))$

(f) Calculate the deviation ΔL_{urban_ASEP} relative to L_{urban} as follows:

$\Delta L_{urban\_ASEP} = L_{urban\_normalized} - L_{urban}$

4.2.2. Specifications

Compliance with limits:

ΔL_{urban_ASEP} shall be less than or equal to 3.0 dB(A) + limit value[6] - $L_{\mathbf{urban}}$.

5. Reference sound assessment (see the flowchart in Appendix 2, Figure 2)

5.1. General

The reference sound can be obtained by simulation or from direct measurement. The result of one assessment method has to comply with the specification of paragraph 5.4.

5.1.1. Simulation method[7]

[6] As applicable for the approved type of vehicle

[7] Simulation may not always be applicable as the test result of Annex 3 and the elaborated slopes according to paragraph 3. of Annex 7 might not provide consistent data for the simulation. In that case, it is recommended to carry out direct measurements.

For simulation, the reference sound is assessed at a single point in one discrete gear, simulating an acceleration condition assuming an exit speed $v_{BB'}$ equal to 61 km/h. The sound compliance is calculated using the slope results of paragraph 3.2.2.

If the result of slope of 3.2.2. is not available for the gear specified in paragraph 5.2, this slope of the missing gear can be determined according to paragraphs 2.4., 3.1. and 3.2.

5.1.2. Direct measurement method

For direct measurement, the reference sound is assessed at a single run in an acceleration condition started at line AA' as specified in paragraph 2.5. The gear shall be as specified in paragraph 5.2. for vehicles tested in locked condition or in a gear selected position for normal driving as specified by the manufacturer for vehicles tested in non-locked condition.

The target test speed v_{AA} is equal to 50 km/h ± 1 km/h unless v_{BB} exceeds 61 km/h.

If v_{BB} exceeds 61 km/h, the target test speed v_{BB} shall be set to 61 km/h ± 1 km/h. The entry speed shall be adjusted to achieve the target test speed.

5.2. The determination of gear α is as follows:

α = 3 for all manual transmission and for automatic transmission tested in locked position with up to 5 gears;

α = 4 for automatic transmission tested in locked position with 6 or more gears. If the acceleration calculated from AA to BB + vehicle length in gear 4 exceeds 1.9 m/s², the first higher gear α > 4 with an acceleration lower than or equal to 1.9 m/s² shall be chosen.

For vehicles tested under non-locked condition, the gear ratio for further calculation shall be determined from the acceleration test result in Annex 3 using the reported engine speed and vehicle speed at line BB'.

5.3. Data-processing for simulation assessment

5.3.1. Determination of reference engine speed $n_{BB'\_ref\_\alpha}$

The reference engine speed, $n_{BB'\_ref\_\alpha}$, shall be calculated using the gear ratio of gear α at the reference speed of $v_{BB'\_ref}$ = 61 km/h.

5.3.2. Calculation of L_{ref}

$$L_{ref} = L_{anchor} + Slope_{\alpha} * (n_{BB'\_ref\_\alpha} - n_{anchor}) / 1{,}000$$

5.4. Specifications

For vehicles of category M_1, L_{ref} shall be less than or equal to 76 dB(A).

For vehicles of category M_1 fitted with a manual transmission having more than four forward gears and equipped with an engine developing a rated maximum net power greater than 140 kW (according to Regulation No. 85) and having a maximum-power/maximum-mass ratio greater than 75, L_{ref} shall be less than or equal to 79 dB(A).

For vehicles of category M_1 fitted with an automatic transmission having more than four forward gears and equipped with an engine developing a rated maximum net power greater than 140 kW (according to Regulation

No. 85) and having a maximum-power/maximum-mass ratio greater than 75, L_{ref} shall be less than or equal to 78 dB(A).

For vehicles of category N_1 with a technically permissible maximum laden mass below 2,000 kg, L_{ref} shall be less than or equal to 78 dB(A).

For vehicles of category N_1 with a technically permissible maximum laden mass above 2,000 kg and below 3,500 kg, L_{ref} shall be less than or equal to 79 dB(A).

For vehicles of category M_1 and N_1 equipped with a compression-ignition and direct injection internal combustion engine, the sound level shall be increased by 1 dB(A).

For vehicles of category M_1 and N_1 designed for off-road use and with a technically permissible maximum laden mass above 2 tonnes, the sound level shall be increased by 1 dB(A) if they are equipped with an engine having a rated maximum net power of less than 150 kW (according to Regulation No. 85) or by 2 dB(A) if they are equipped with an engine having a rate maximum net power of 150 kW (according to Regulation No. 85) or higher.

Annex 7 – Appendix 1

Statement of compliance with the additional sound emission provisions

(Maximum format: A4 (210 x 297 mm))

..... (Name of manufacturer) attests that vehicles of this type ..... (type with regard to its sound emission pursuant to Regulation No. 51) comply with the requirements of paragraph 6.2.3. of Regulation No. 51.

..... (Name of manufacturer) makes this statement in good faith, after having performed an appropriate evaluation of the sound emission performance of the vehicles.

Date: .....

Name of authorized representative: .....

Signature of authorized representative:

Annex 7 – Appendix 2

Figure 1
Flowchart for the assessment concept for ASEP according to Annex 7

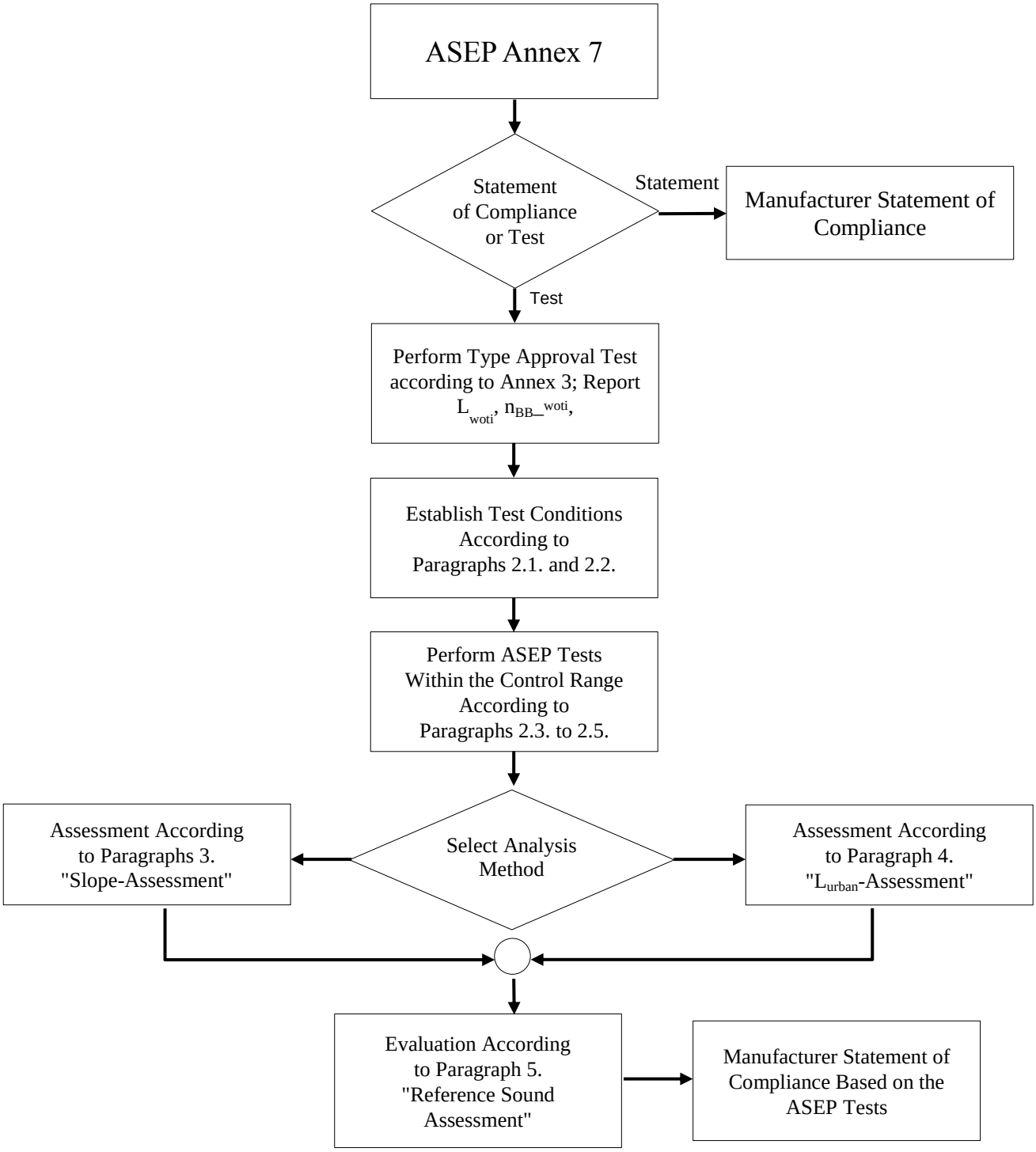


Figure 2
Flowchart for the vehicle sound assessment according to Annex 7, paragraph 5. "Reference sound assessment"

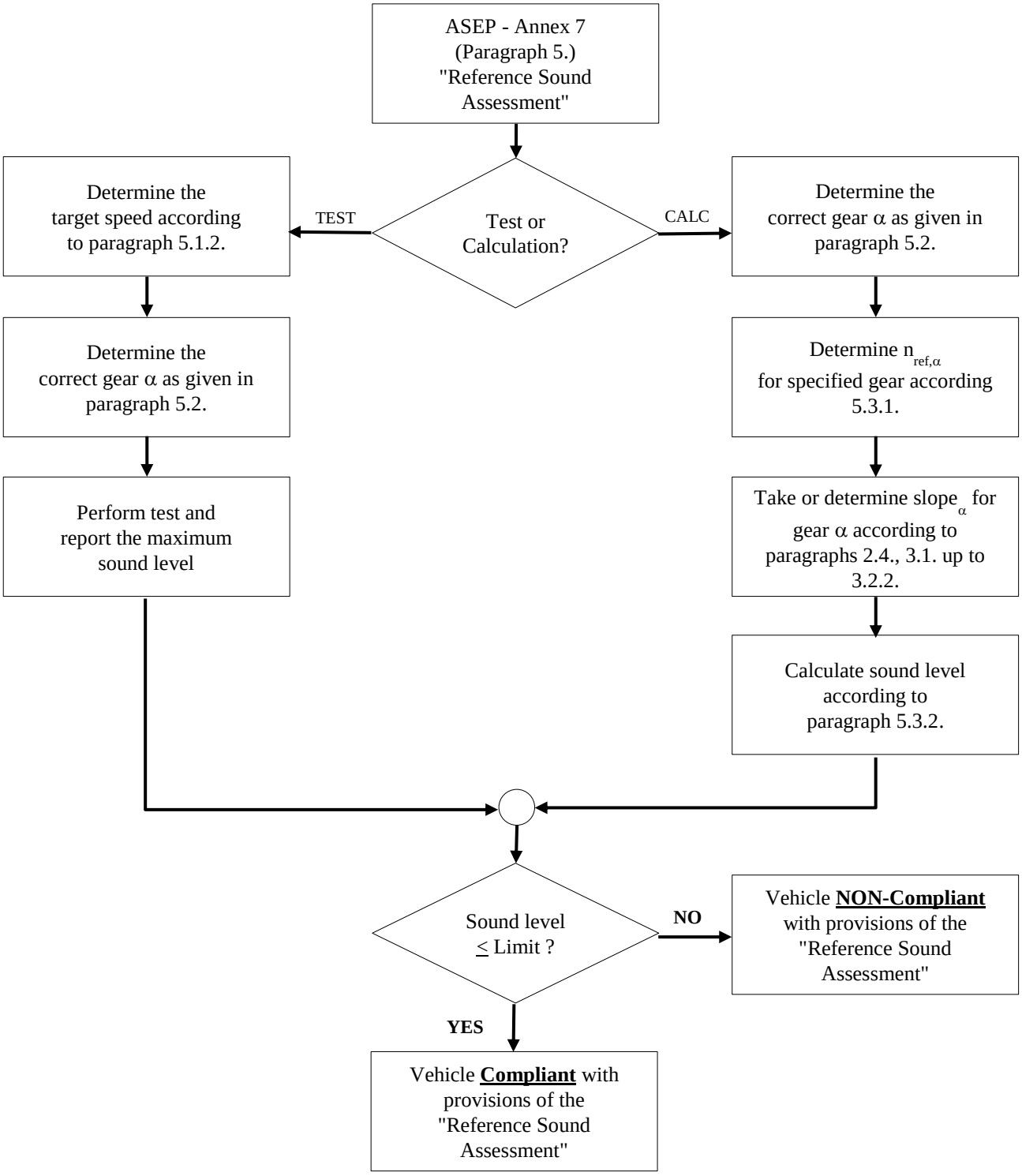
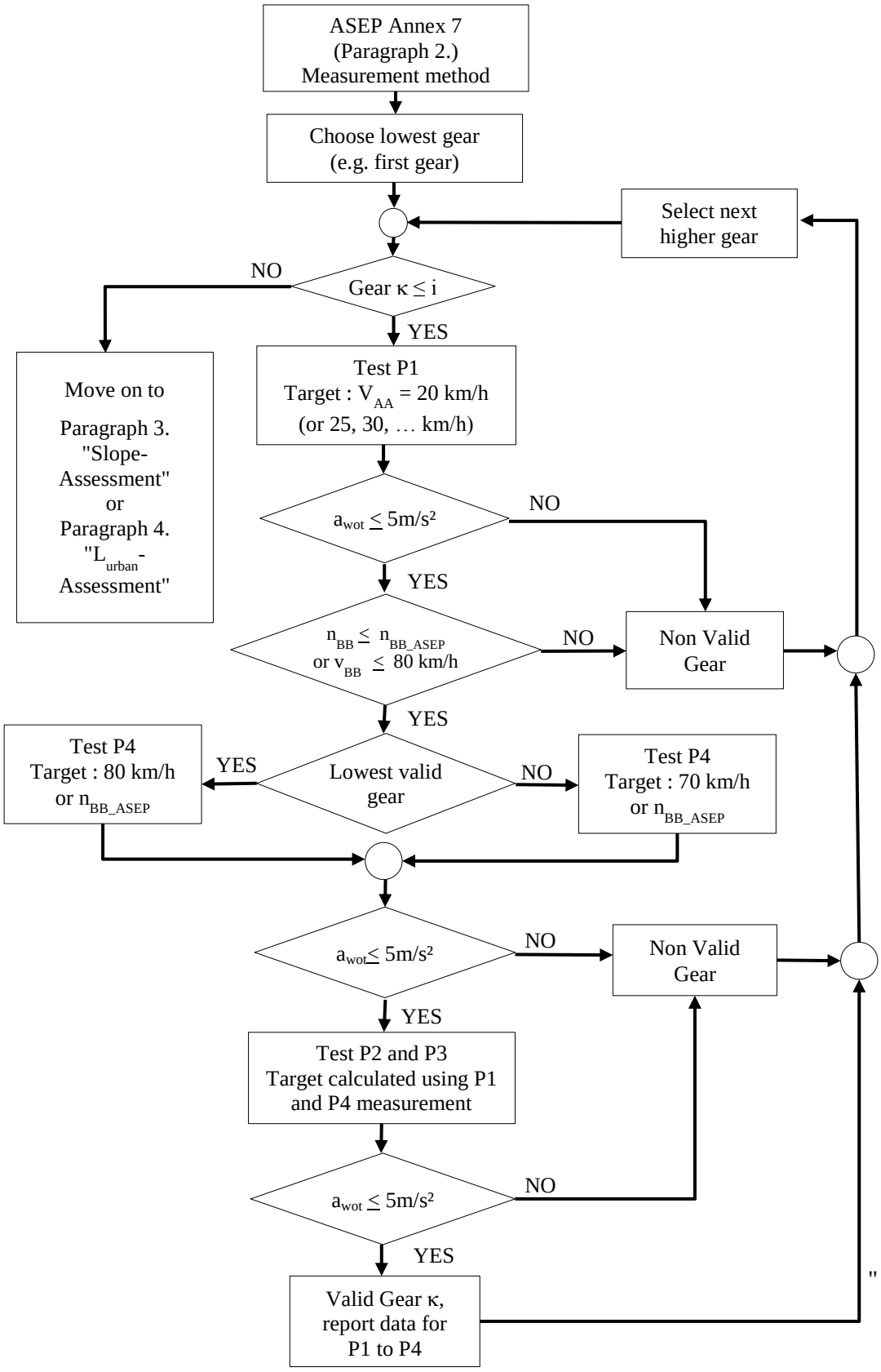


Figure 3
Flowchart for the determination of the individual test points P_j according to Annex 7, paragraph 2. "Measurement method"



"

Annex IV

GRB informal groups

Informal group	*Chair(s) and Co-chair(s)*	*Secretary*	*Expiry date of the mandate*
Quiet road transport vehicles (QRTV) for GTR	Mr. Ezana Wondimneh (USA) Tel: +1 202 366 21 17 E-mail: 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 E-mail: andreas.vosinis@ec.europa.eu	December 2018
QRTV Regulation under 1958 Agreement	Mr. Bernd Schüttler (Germany) Tel: +49 228 99300 4372 Fax: +49 228 99300807 4372 E-mail: bernd.schuettler@bmvi.bund.de Mr. Louis-Ferdinand Pardo (France) Tel: +33 1 69 80 17 66 Fax: +33 1 69 80 17 09 E-mail: louis-ferdinand.pardo@utaceram.com Mr. Ichiro Sakamoto (Japan) Tel:+81 422 41 66 18 Fax:+81 422 76 86 04 E-mail: i-saka@ntsel.go.jp	Mr. Hanns-Peter Bietenbeck (OICA) Tel: +49 221 903 24 09 Fax: +49 221 903 25 46 E-mail: hbietenb@ford.com	September 2017
Additional sound emission provisions (ASEP)	Mr. Louis-Ferdinand Pardo (France) Tel: +33 1 69 80 17 66 Fax: +33 1 69 80 17 09 E-mail: louis-ferdinand.pardo@utaceram.com Mr. Dongming Xie (China) Phone: +86 22 843 79284 Fax: +86 22 84379259 E-mail: xiedongming@catarc.ac.cn Mr. Kazuhiro Okamoto (Japan) Phone: +81 422 41 3227 Fax: +81 422 41 3232 E-mail: k-okamot@shinsa.ntsel.go.jp	Mrs. Françoise Silvani (OICA) Tel: +33 1 76 85 05 92 Fax: +33 1 76 86 92 89 E-mail: francoise.silvani@renault.com	September 2019